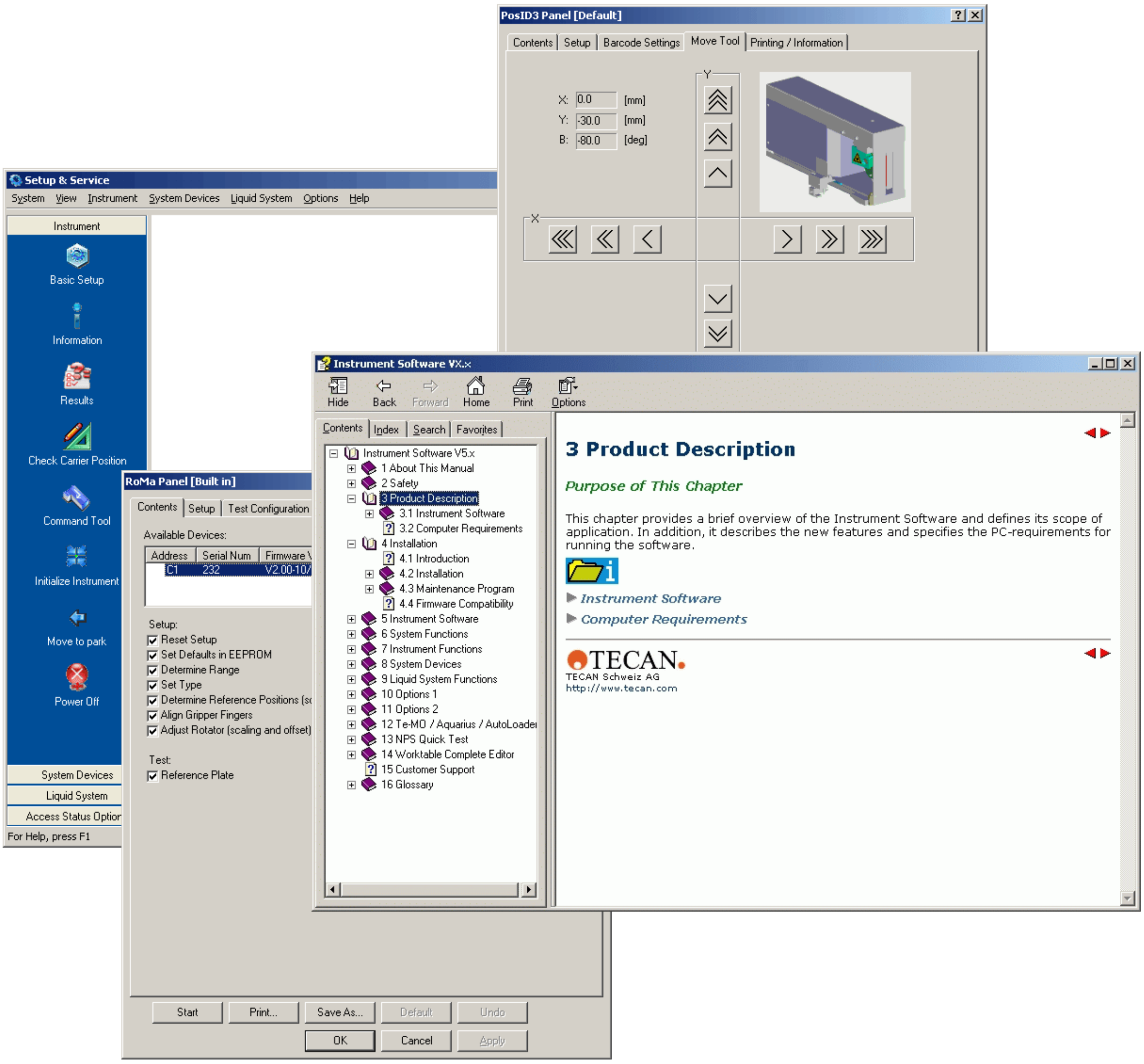
Software Manual

Instrument Software V8.0



3 Product Description

Purpose of This Chapter

This chapter provides a brief overview of the Instrument Software and defines its scope of application. In addition, it describes the new features and specifies the PC-requirements for running the software.

X: 0.0 [mm]
Y: -30.0 [mm]
B: -80.0 [deg]

Address	Serial Num	Firmware V
C1	232	V2.00-10/

Setup:
☑ Reset Setup
☑ Set Defaults in EEPROM
☑ Determine Range
☑ Set Type
☑ Determine Reference Positions (s
☑ Align Gripper Fingers
☑ Adjust Rotator (scaling and offset)

Test:
☑ Reference Plate

Document Status Sheet

Title:	Instrument Software V8.0, Software Manual	**Part number:**	30132342.00
ID:	392888, en, Version 6.5	**Translated from:**	---

Version	**Revision**	**Issue**	**Document History**
1	0	2003-07-31	New manual covering Freedom EVO, Genesis Instruments, Aquarius and AutoLoader. Replacement for document 390791.
1	1	2003-08-22	Minor changes, correction of errors
2	0	2004-04-05	Adaptations for EVOlyzer, new Vector panel, User Administration System
2	1	2004-09-30	Corrections and adaptations in Vector panel (new shelf), for new wash station and new incubator panel. Additional or modified tests in RoMa and Move Test panels.
2	2	2005-02-21	Corrections of minor errors. Modified: LiHa setup page, test of Te-MO 96 wash station. Added: Description of user-defined gravimetric test procedure. Dropped: Impulse.
3	0	2005-10-07	Corrections of minor errors. Adaptation of manual to Instrument Software V5.0. Modified: various panels. New: Tecan Communication server, PosID-3 panel, Liquid System Functions completely redesigned, Send Utility, Logging Viewer., RSS-panel (EVO 75), panels for OEM-customers.
3	1	2006-01-31	Correction of minor errors. Adaptations for instruments 30045716, 30045717 and 30045718. Basic Setup: Worktable page. System devices 2: New Vector 2 panel. Options 2: Implementation of new Loading Port panel.
3	2	2006-04-07	Correction of minor errors. Adaptations to Instrument Software V5.2. PMP panel, adaptations for Cellerity (Flipper, CPO, SMIO for Cellerity panel).
3	3	2006-06-30	Adaptations to Instrument Software V5.3. MCA panel and Te-Stack panels.
3	4	2006-09-30	Correction of minor errors. Adaptations to Instrument Software V5.4. MCA head with gripper, Te-Thermix, adaptations for Paradigm
3	5	2006-11-08	Correction of minor errors. Adaptations to Instrument Software V5.5. Te-Fill option, adaptations for Paradigm.
3	6	2007-01-05	Correction of minor errors. Adaptations to Instrument Software V5.6. Updates for Firmware Download and Te-Thermix.

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Version	**Revision**	**Issue**	**Document History**
4	0	2007-05-15	Correction of minor errors. Adaptations to instrument Software V6.0. Updates to worktables, Incubator, washer (Hydroflex), Vector-2. (see cross references)
4	1	2007-10-24	Correction of minor errors. Adaptations to instrument Software V6.0 SP1. Updates to Vector-2, firmware compatibility list.
4	2	2007-11-01	Correction of minor errors. Adaptations to instrument Software V6.1. Windows Vista Business, UMS, Updates to LiHa panel, DiTi panel, System Liquid panel, new Colorimetric Test, firmware compatibility list.
4	3	2008-09-18	Correction of minor errors. Adaptations to instrument Software V6.2. New MCA384 panel, New MCA wash panel, Updates to RoMa panel, Liquid System panel, Instrument Functions.
4	4	2009-03-17	Correction of minor errors. Adaptations to instrument Software V6.3. New CGM panel; Basic Setup panel, MCA384 panel, Move Test panel and Move Test 2 panel modified.
4	5	2010-03-30	Correction of minor errors. Adaptations to instrument Software V6.4. Description of remote support tool (Netviewer).
4	6	2012-04-12	Support for Air LiHa added.
5	0	2013-03-20	Support for standard user rights under Windows 7.
5	1	2014-02-26	Adaptations to instrument Software V7.1, firmware compatibility list.
6	0	2014-07-07	Adaptations to instrument Software V7.2, New LiHa and Air LiHa panel test: Reed Crosstalk test.
6	1	2015-03-13	Adaptations to Instrument Software V7.3, New Option: Slide-In BCR.

Document Status Sheet

Title:	Instrument Software V8.0, Software Manual	**Part number:**	30132342.00
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Version	**Revision**	**Issue**	**Document History**
6	2	2015-07-15	Updated firmware compatibility list, updated user permissions for Reed Cross-talk test in LiHa and Air LiHa panel.
6	3	2016-02-18	Update Software 7.5; Update Firmware
6	4	2016-04-19	Update Software 7.6
6	5	2017-06-26	Update Software 8.0 Added: Carrier locking test; Support Windows 10

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10 Liquid System Functions

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14 Worktable Complete Editor

15 Customer Support

16 Glossary

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1 About This Manual

Purpose of This Chapter

This chapter points out the purpose of the manual, specifies the product the manual deals with and who the manual is intended for. Furthermore, it explains the symbols, conventions and abbreviations used and offers other general information.

Purpose of This Manual

This manual describes the Instrument Software, provides all information required for proper installation, instructs how to run the software and how to make use of all its features.

Target Group

This manual is intended for all users of the Instrument Software. In particular, operators (scientists, laboratory personnel), field service engineers (FSE), system administrators are addressed.

Note: *Not all functions are accessible to all users:*

- *Apart from some few exceptions, operators can run functional tests but, in most cases, do not have the access rights needed to perform setup procedures and adjustments.*
- *Field service engineers have the access rights that enable them to perform both setup and test functions. To perform setup procedures, a special password is required.*

For Your Safety

Before installing and running the Instrument Software, first read the Software Manual carefully, in particular chapter 2 “Safety”.

Scope

This Instrument Software manual is limited to the following:

- Applicable to the Instrument Software V8.0.
- Installation of the Instrument Software V8.0, general information about the use of the software.
- Freedom EVO Instruments, Freedom EVOlyzer: Setup and test procedures for all system devices and options that can be installed on such instruments and workstations.
- Aquarius and AutoLoader: Setup and test.

1.1 Conventions Used in This Manual

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3

The following list provides an overview of the conventions as used throughout this manual:

User Interface

- **Names of screens** (menus, windows, dialog boxes, message boxes) are printed in bold type, e.g.: “The **Select Components** window appears.”
- **Menus and command sequences** are printed in bold type and connected with a **>** sign, e.g., “Start the function with **Options > Te-MO > Wash Unit**.”
- **Names of controls in dialog boxes, windows or message boxes** (command buttons, check boxes, option buttons etc.) are printed in bold type, e.g. “Select the **Automatic** check box.”
- **Directory and file names** are printed as follows:
  - Path and file names are mentioned directly,
    e.g.: The default path for the Instrument software is
    C:\Program Files\Tecan\Instrument Software\
  - or a placeholder is given for the directory, e.g: <install_path>, which stands for the “real” directory name. Also see next point.
- **Placeholders** (for file names, numbers dates etc.) are set in angle brackets < >, e.g.: TeSonic_<serial_number>_<date>_<time>.any.
- **Cross references** appear as follows, e.g : “Refer to section 1.1.1, 🗎 1-1
  - 1.1.1 refers to the corresponding section number.
  - The symbol 🗎 denotes the page number.
  - 1-1 stands for the chapter number followed by the page number.

Access Levels

The setup procedures described in this manual can only be performed by users having the required access rights. They are marked as follows:

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Production

This procedure is for production and can only be carried out by users belonging at least to the SnS_Production user group.

Note: *For additional information about access rights refer to the description of the “User Management System” (→ Cross References).*

1.2 Reference Documents

This section provides a list of documents that are needed or may be useful in connection with the Instrument Software. They either concern the superior system or options of the Instrument Software

What Does the Doc. ID Tell You?

The Doc. IDs listed below are root numbers. Therefore, they do not contain information about the language, document version or the medium (data storage medium, hardcopy, downloadable file, etc.) of the document.
Check the scope of the corresponding document to make sure that you are in possession of the correct version.

Note: *The Doc. ID does not represent ordering information. For orders refer to the number on the binder, CD casing, etc.*

Operating Manuals

- Active Positioning Carrier Operating Instructions (Doc ID 391 864)
- Aquarius 96 Operating Manual (Doc. ID 392 604)
- Aquarius 384 Operating Manual (Doc. ID 392 681)
- AutoLoader Operating Manual (Doc. ID 392 866)
- Balance Kit Operating Manual (Doc ID 393 278)
- Columbus Washer (Doc ID I 109004)
- Freedom EVO Operating Manual (Doc ID 392 886)
- Freedom EVOlyzer Operating Manual (Doc ID 393 035)
- Freedom EVO Clinical Operating Manual (Doc ID 393 062)
- Freedom EVO 75 Operating Manual (Doc ID 393 248)
- Gravimetric Pipetting Precision Check Instructions (Doc ID 391 172)
- Instructions for Use for Hydroflex Platform (Doc ID 30026397)
- I/O Option for Freedom EVO Instruments (Doc ID 393 173)
- Te-MagS Operating Manual Doc ID 391 237)
- Te-Shake Operating Manual (Doc ID 391 496)
- Te-Stack Operating Manual (Doc ID 391 862)
- Te-VacS Operating Manual (Doc ID 391 236)
- Te-MO 96 (3/3 and 3/5) Operating Manual (Doc ID 393 448)
- Te-MO 384 (3/3 and 3/5) Operating Manual (Doc ID 393 449)

Software Manuals

- Aquarius Software Manual (Doc. ID 392 638)
- Freedom EVOware Software Manual (Doc. ID 393 172)
- Freedom EVOware Runtime Controller Manual (Doc ID 394329)
- Freedom EVOlyzer Application Software Manual (Doc ID 393465)
- Freedom EVOlyzer Runtime Controller Manual (Doc ID 394668)
- Freedom EVOlution Runtime Controller Manual (Doc ID 394803)
- IRIS Application Software Manual (Doc ID 398029)

Service Manuals

These are intended for authorized field service engineers

- Active Positioning Carrier Service Instructions (Doc ID 392 265)
- Aquarius 96 Service Manual (Doc. ID 392 605)

- Aquarius 384 Service Manual (Doc. ID 392 682)
- AutoLoader Service Manual (Doc. ID 392 867)
- Freedom EVO Service Manual (Doc ID 392 887)
- Freedom EVOlyzer Service Manual (Doc ID 393 036)
- Freedom EVO 75 Service Manual (Doc ID 393 249)
- Freedom EVO Maintenance and Service Logbook (Doc ID 392 815)
- Te-MagS Service Instructions (Doc ID 391 353)
- Te-Shake Service Instructions (Doc ID 391 495)
- Te-Stack Service Manual (Doc ID 391 863)
- Te-VacS Service Instructions (Doc ID 392 584)
- Te-MO 96 (3/3 and 3/5) Service Manual (Doc ID 393 450)
- Te-MO 384 (3/3 and 3/5) Service Manual (Doc ID 393 451)
- Multipipetting Peripheral Units Service Manual (Doc ID 393 436)

Liquid Handling

The following manual is intended for liquid handling specialists.

- Liquid Handling Guide (Doc ID 391780)

Installation Instructions

Intended for authorized field service engineers

- RoMa 2 Installation Instructions (Doc ID 391 814)

1.3 Trademarks

The following product names and any registered and unregistered trademarks mentioned in this manual are used for identification purposes only and remain the exclusive property of their respective owners (for simplicity reasons, the symbols for trademarks, such as ® and ™ are not repeated later in the manual):

- Freedom EVOware® and Freedom EVO® are registered trademarks in major countries.
- Freedom EVOlyzer® is a registered trademark of Tecan Group Ltd.
- Pro Team® is a registered trademark of Tecan Group Ltd.
- Te-MO™ is a trademark of Tecan Group Ltd.
- Aquarius™ is a trademark of Tecan Group Ltd.
- Windows® is a registered trademark of Microsoft Corporation.
- Excel® is a registered trademark of Microsoft Corporation.
- Outlook® is a registered trademark of Microsoft Corporation.
- Pentium® is a registered trademark of Intel Corporation.
- WX, SAG 285/01, AG 285, AG 245 are trademarks of Mettler Toledo AG.

1.4 Abbreviations

Air LiHa	Air (displacement) Liquid Handling arm
APC	Active Positioning Carrier
BCR	Barcode Reader

BIOS	Basic Input/Output System
CAN	Controller Area Network
CCW	Counter-clockwise
CD-ROM	Compact Disc
CGM	Common Gripper Module
CPO	Controlled Pump Option
CRC	Carrier, Rack and Container (e.g., CRC-Editor)
CSV	Carrier Shaking Vials
CU	Control Unit (e.g., Genesis CU, Device CU)
CV	Coefficient of Variation
CW	Clockwise
DiTi	Disposable Tip
DLL	Dynamic Link Library
DMSO	Dimethylsulfoxide
EEPROM	Electrically Erasable Programmable Read-Only Memory
FACTS	Flexible Assay Controller and Task Scheduler
FaWa	Fast Wash Pump
FSE	Field Service Engineer
FW	Firmware
GUI	Graphical User Interface
HTML	Hypertext Markup Language
HW	Hardware
LED	Light Emitting Diode
Licos	Liquid Container Supervisor
LiHa	Liquid Handling Arm
LLD	Liquid Level Detection
MALDI	Matrix Assisted Laser Desorption Ionization
MCA	Multichannel arm
MIO	Monitored Incubator Option
MPO	Monitored Pump Option
NAT	Nucleic Acid Testing
ODBC	Open Database Connectivity
PC	Personal Computer

PCB	Printed Circuit Board
PCR	Polymerase Chain Reaction
PMP	Pressure Monitored Pipetting
PnP	Pick and Place Arm
PWM	Pulse Width Modulation
QC	Quality Control
RAM	Random Access Memory
ROM	Read-Only Memory
RoMa	Robotic Manipulator Arm
rpm	Revolutions per Minute
RSP	Robotic Sample Processor
RSS	Rack Sensor Supervisor
RWS	Robotic Workstation
SMIO	Smart Input/Output
SnS	Setup and Service
SPE	Solid Phase Extraction
SPO	Sensor Pump Option
SQL	Structured Query Language
SVGA	Super Video Graphics Array
TCP/IP	Transmission Control Protocol/Internet Protocol
TCS	(Tecan) Communication Server
Te-Fill	Large Volume Dispense Option
Te-MagS	(Tecan) Magnetic Separation Module
Te-MO	(Tecan) Multipipetting Option
Te-VacS	(Tecan) Vacuum Separator Module
TEMPO	Temperature Measuring Option
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
WRC	Wash Refill Center

1.5 Manual Structure

Delivery The manual is available in the following forms:

- Hardcopy (2 binders, see following tables)
- Pdf-file: One pdf-file containing both parts
- Context-sensitive help system. Users of the software can get on-screen help directly from the software.

Overview of Manual Parts

The following two tables show the structures of the parts of the manual.:

Tab. 1-1 *Contents of Part 1*

Section	Chapter	Description / Chapter Name
Title sheet		- Front: Product name, picture - Back: Document history, Copyright note
Contents		Detailed table of contents (covers parts 1 + 2)
Chapter	1	About This Manual
Chapter	2	Safety
Chapter	2	Product Description
Chapter	4	Installation
Chapter	5	Genesis Instrument Software
Chapter	6	System
Chapter	7	Instrument
Chapter	8	System Devices 1
Chapter	9	System Devices 2
Chapter	10	Liquid System

Tab. 1-2 *Contents of Part 2*

Section	Chapter	Description / Chapter Name
Title sheet		- Front: Product name, picture - Back: Document history, Copyright
Chapter	11	Options 1
Chapter	12	Options 2
Chapter	13	Te-MO / Aquarius
Chapter	14	Worktable Complete Editor
Chapter	15	Customer Support
Chapter	16	Glossary (covers parts 1 + 2)
Chapter	17	Index (covers parts 1 + 2)

2 Safety

Purpose of This Chapter

This chapter covers only the general introductory safety instructions applicable to the Instrument Software. Specific safety instructions of the hardware devices are laid down in the respective hardware manuals.

Significance of These Safety Instructions

The Instrument Software is a pure software product and as such it does not contain any hazardous parts. However, the software is used to control hardware devices and options, which may contain parts that can move with great force and at considerable speed.

As a consequence, the safety of users and personnel can only be ensured if the safety instructions in this Software Manual as well as the safety instructions of the hardware devices controlled with the software described here are strictly observed and followed.

Therefore, all relevant manuals must always be available to all users working with the Instrument Software.

2.1 User Qualification

What Users Must Know

Users must be qualified and trained to run the Instrument Software.

In particular, they must fulfill the following qualifications:

- They must have a basic knowledge of the Windows® operating system.
- They must have a thorough knowledge of the technical system functions {FSE, Setup & Service Software}.
- They must have a thorough knowledge of the application run on the system {Operator, Application Software}.
- They must be familiar with the “Good Laboratory Practice” guidelines.
- They must have read and understood the instructions in this Software Manual.

Only users that meet the qualifications prescribed here are authorized to run the program described in this Software Manual.

Training Courses

Note: *Tecan recommends that users attend a software training course. Please ask your nearest Tecan representative about the available courses.*

2.2 Warning Notices Used in the Manuals

The symbols used for safety-related notices have the following significance:

WARNING Symbols

WARNING notices appear as follows:

WARNING

Generally, the triangular warning symbol indicates the possibility of personal injury or even loss of life if the instructions are not followed.

ATTENTION Symbols

ATTENTION notes appear as follows:

ATTENTION

With the general “Read This!” symbol, ATTENTIONs indicate the possibility of equipment damage, malfunctions or incorrect process results, if instructions are not followed.

2.3 Use of the Software

Scope of Application

The scope of application for the Instrument Software is defined in chapter 3 “Product Description”, 🗎 3-1.
The software must not be used for applications other than listed there.

Restrictions

For restrictions concerning the Setup and Test routines of the Setup and Service software refer to “Operating Restrictions”, 🗎 5-1

Validation

It is the responsibility of the user to ensure proper validation and verification of the instrument functions controlled with this software according to applicable laboratory procedures, federal, state, and local regulations.

2.4 Specific Hazards

The following hazards are associated with the use of the Instrument Software:

Cellular Phones

If you have a cellular phone

PROHIBITION

The use of cellular phones may cause faulty liquid detection and unreliable results.

- Turn off all cellular phones.
- Do not use or keep them on standby within the laboratory.

Electrostatic Discharge

Care must be taken when it is unavoidable to touch delicate electronic circuits.

ATTENTION

Damage to electronic boards and delicate electronic circuits.

- Discharge static electricity from your body.
- Wear a wrist strap that is connected to ground when handling delicate electronic circuits.

Risks Through Contamination

Always make sure that the instrument is not contaminated chemically, biologically or radioactively.

WARNING

Chemical, biological and radiative hazards can be associated with certain substances used or processed with the instrument. The same applies to waste disposal.

- Always be aware of possible hazards associated with such substances.
- Request a filled out and signed Decontamination Declaration before performing any setup and test procedures.

Movable Parts

Keep in mind that arm and pipetting devices can move at great speed and with considerable force.

WARNING

Keep your hands off the zone where pipetting devices move.

Laser

Note that the PosID system, Slide-In BCR option, RoMa and Autoloader are equipped with a barcode reader that uses laser technology for scanning.

WARNING

Laser light (CLASS 2 LASER PRODUCT).

- Do not stare into beam nor into its reflections on metallic parts.
- Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Ensure appropriate FDA regulatory actions have been taken for any Class II laser products.

2.5 Safety of the Overall System

In addition to the safety instructions in this Software Manual, the safety instructions in the manuals of the hardware devices must also be observed and followed.

WARNING

Hazards originating from the hardware devices controlled with this software.

Mind the safety instructions of all instruments and options which are used in connection with the Instrument Software.

2.6 General Safety Rules

Legal Regulations

Legal regulations, such as local, state and federal laws which prescribe the use or application as well as the handling of dangerous materials in connection with the Instrument Software must be strictly followed.

Modifications

Modifications to the Instrument Software are not permitted. The manufacturer will decline any claim resulting from unauthorized modifications.

WARNING

Setup of moving devices

- Before executing a setup or test verify that the applied grid positions on the setup page match to the ones used on the worktable. Otherwise instrument could be damaged or operator could be hurt.

WARNING

Calibration of heating devices

- Be careful when applying calibration values for heating devices, otherwise samples might be influenced or operator could be hurt.

3 Product Description

Purpose of This Chapter

This chapter provides a brief overview of the Instrument Software and defines its scope of application. In addition, it describes the new features and specifies the PC-requirements for running the software.

3.1 Instrument Software

3.1.1 Brief Description of the Instrument Software V8.0

Block Diagram

The Instrument Software consists of various modules. The following figure shows the basic modules and the logical connections to other software programs.

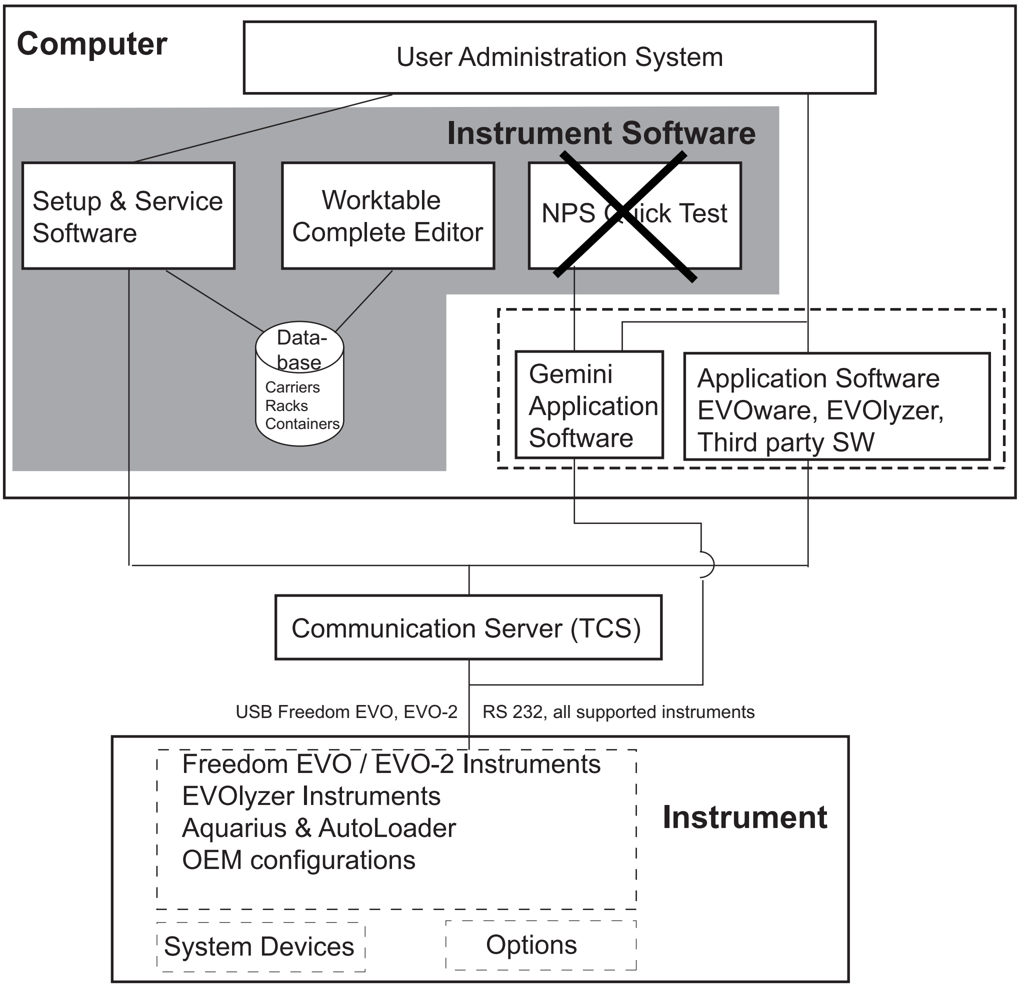


Fig. 3-1 Overview of the Instrument Software V8.0

Software Modules

The Instrument Software is composed of the following software modules:

- **Setup and Service:** This module is used to set up and test an instrument, its devices and optional modules after the mechanical and electrical installation at the customer’s site. Furthermore, diagnostics and service functions allow testing and, if necessary, readjusting, the components during maintenance.
- **Worktable Complete Editor:** The Worktable Complete Editor allows users to define containers, racks, carriers and worktable maps (only for Genesis and Freedom instruments, not for Aquarius).
- **Communication Server (TCS):** The Communication Server is an interface software that controls the communication between the computer and the instrument or workstation.

3.1.2 What’s New in Instrument Software V8.0?

Slide-In BCR

- Carrier Locking Test

Supported OS

- Windows10 64b Professional

3.1.3 Brief Overview of Earlier Versions of the Instrument Software

Instrument Software V7.5

Firmware

- Firmware Versions have been updated:
  - LiHa FW V1.73
  - MCA 384 V1.11

Instrument Software V7.4

Supported Instruments

- See DVD jewel box inlay of the Instrument Software CD.

Instrument Software V7.3

Slide-In BCR

- The barcode reader is a part of the pipetting station. The barcode reader scans the barcodes of the samples in the sample area. The Slide-In BCR is the corresponding panel.

Instrument Software V7.2

Reed Crosstalk Test

- The Reed Crosstalk test allows you to detect tip-presence-sensors (Reed-switches) of a tip adapter that are influenced by the magnet of the neighboring channel.

Instrument Software V7.1

Air LiHa

- Support ZaapMotion Firmware Download if only Bootware is installed.

Instrument Software V7.0

Supported Instruments

- See DVD jewel box inlay of the Instrument Software CD.

User Rights

- Support for standard user rights under Windows 7.

Remote Support

- Change from Netviewer to GoToMeeting for remote support.

Instrument Software V6.5

Supported Instruments

- See DVD jewel box inlay of the Instrument Software CD.

System Devices

- **Air LiHa Panel:**
  - New panel supporting the Air LiHa

Liquid System

- **PMP Panel** description:
  - Adaptations for Air LiHa

Instrument Software V6.4

The Instrument Software V6.4 is a further development of its predecessor version V6.3.

Supported Instruments

- See DVD jewel box inlay of the Instrument Software CD.

User Administration

- Non-administrator users can optionally leave the password field blank.

Options

- 4-slot incubator 60°C supported

Installer

- Automatic installation of remote support tool (Netviewer)

Instrument Software V6.3

The Instrument Software V6.3 is a further development of its predecessor version V6.2.

Supported Instruments

- See DVD jewel box inlay of the Instrument Software CD.

System Devices

- **CGM Panel:**
  - New panel supporting the CGM on MCA384

Instrument Software V6.2

The Instrument Software V6.2 is a further development of its predecessor version V6.1.

Supported Instruments

- See DVD jewel box inlay of the Instrument Software CD.

Utilities

- Utilities moved to the **System** menu:
  - LogViewer
  - Send Utility
- Minor changes in LogViewer operation

Instrument Functions

- **Dock CGM on MCA:**
  - New command to dock CGM on MCA384
    (CGM must be docked prior to initialization of the instrument)

***Note:** CGM is a future product and is officially not supported by the Instrument Software V6.2.*

System Devices

- **MCA384 Panel:**
  - New panel supporting the Multichannel arm 384
- **RoMa Panel:**
  - Barcode Scanner Reading Test includes front and rear scanning
  - Gripper force test for manufacturer
- **Vector-2 Panel**:
  - Support of Qwalys-3 instrument

Liquid System

- **Liquid System Panel:**
  - Support of the new Mettler balance WXS
  - Test Configuration page:
    - Pipetting Test Sequence changeable

Multichannel Functions

- **MCA Wash Panel:**
  - New panel supporting the MCA96 and MCA384 wash tower and MCA384 wash block

NPS Quick Test

- Complete Chapter **NPS Quick Test** removed.

Instrument Software V6.1

The Instrument Software V6.1 is a further development of its predecessor version V6.0.

Supported Instruments

- See DVD jewel box inlay of the Instrument Software CD.

PC Operating System

- Windows XP, Windows **Vista Business**

Utilities

- New utilities:
  - Send Utility
  - LogViewer
  - SnS Selector

User Administration

- New User Administration Tool:
  - User Management System (UMS).

System Devices

- **PosID-3:**
  - New barcode types (Code 93 full ASCII, UPCA)

The program supports the LiHa **8 Plus 1 Access** (EVO75) with the following panels:

- **LiHa panel:**
  - Adaptations to LiHa **8 Plus 1 Access**

- **DiTi panel:**
  - Adaptations to LiHa **8 Plus 1 Access**
- **Liquid System panel:**
  - Adaptations to LiHa **8 Plus 1 Access**
  - new Colorimetric Pipetting Test

Instrument Software V6.0 SP1

The Instrument Software V6.0 SP1 is a further development of its predecessor version V6.0.

Supported Instruments

- See DVD jewel box inlay of the Instrument Software CD.

System Devices

- **Vector-2 panel:**
  - **Set up Vector** of the **RT-Incubator** and **Heated Incubator**: Bottom slot **and** top slot have to be taught.

Instrument Software V6.0

The Instrument Software V6.0 is a further development of its predecessor version V5.6.

Supported Instruments

- See DVD jewel box inlay of the Instrument Software CD.

User Administration System

- Any user can also be a **User Administrator**.

Instrument Functions

- **Basic Setup panel**:
  - **Worktable** page: Includes the three new instruments EVOlyzer-2, EVO 75 and Qwalys 3.

System Devices

- **Vector-2 panel:**
  - Supports RoMa access adjustment for shelf, room temperature incubator(s), loading ports, heated incubator(s), plate washer, plate reader and BEP III (instruments 30045716, 30045717 and 30045718).
  - Vector-1 panel removed (replaced by Vector-2 panel)

Liquid System Functions

- **Washer panel** (new):
  - Test of Hydroflex washer, maintenance tubing and valves.

Options

- **Incubator panel**: The following new features were implemented:
  - Support of **MIO2**.
    - **Heating Plate Connection** Test.
    - **Current Limitation** setup.

Instrument Software V5.6

The Instrument Software V5.6 is a further development of its predecessor version V5.5.

Supported Instruments

The program supports the following Instruments:

- Freedom EVO (75/100/150/200), Freedom EVO Clinical (100/150/200), Freedom EVO-2 (100/150/200), Freedom EVOlyzer (100/150/200), Cellerity, Aquarius / Autoloader, Paradigm
- In principle also for instruments 30045716, 30045717 and 30045718. Note, however, that the V5.1 is a frozen version.

Instrument Functions

- **Basic Setup panel**: The following new features were implemented:
  - **Contents** page:
    New test **Verify Firmware Versions** allows to check the correct firmware versions of predefined configurations.
  - **Firmware Download** page:
    Selection (**Do for** check box) of firmware versions to download is now controlled by selection in the **Replace with** column.
    Firmware versions of subdevices are automatically selected depending on the firmware versions of the master devices.
    For predefined configurations (e.g., Paradigm) the correct firmware versions for all available devices are selected automatically.

Options

- **Te-Thermix panel**: The following new features were implemented:
  - **Contents** page:
    New setup **Shaker Origin Calibration** allows to set the origin (zero point) for the shaking mechanism.

Instrument Software V5.5

The Instrument Software V5.5 is a further development of its predecessor version V5.4.

Supported Instruments

The program supports the following Instruments:

- Freedom EVO (75/100/150/200), Freedom EVO Clinical (100/150/200), Freedom EVO-2 (100/150/200), Freedom EVOlyzer (100/150/200), Cellerity, Aquarius / Autoloader, **Paradigm**
- In principle also for instruments 30045716, 30045717 and 30045718. Note, however, that the V5.1 is a frozen version for Dade Behring.

Instrument Functions

- **Standard panel**: The following new features were implemented:
  - **Printing / Information / QC-Report** page:
    This page now allows to enter the used validated tools into a **Tools** list.

Liquid System

- **Te-Fill**: This panel allows you to setup and test the Te-Fill functions.
- **Waste Pump**: This panel allows you to test the correct function of the **Paradigm** waste pump and level sensor of the wash station.

Options

- **Access Status Options > IOPardigm**: The **Drawers Lock** test procedure has changed.
  The ***IOParadigm*** *panel contains a number of setup and / or test procedures for the various status, display and safety elements found on Paradigm instruments, such as signal lamps, drawer and liquid and DiTi waste sensors, door locks, UPS, fan control, etc. Refer to the panel description for a complete list.*

Instrument Software V5.4

The Instrument Software V5.4 is a further development of its predecessor version V5.3.

Supported Instruments

The program supports the following Instruments:

- Freedom EVO (75/100/150/200), Freedom EVO Clinical (100/150/200), Freedom EVO-2 (100/150/200), Freedom EVOlyzer (100/150/200), Cellerity, Aquarius / Autoloader
- In principle also for instruments 30045716, 30045717 and 30045718. Note, however, that the V5.1 is a frozen version for Dade Behring.

Instrument Functions

- **Basic Setup panel**: The following new features were implemented:
  - **Worktable** page: This page now allows selecting Cellerity as the instrument type.
  - **Firmware Download**: You can navigate through the items listed on this page with the **Tab** or **Enter** key (forward) and **Shift + Tab** (backward).
  - **Serial Number Settings**: Navigation in the same manner as on the **Firmware Download** page.
- **Results panel**: You can preview the QC-report of the items listed on the **Results** page of this panel.
- **Check Carrier Position**: New panel that allows you to verify if the installed LiHa(s) can be positioned correctly with respect to labware (tube racks, microplates) located on the instrument worktable.

System Devices

- **PosID-3 panel**: The **Test Configuration** page was slightly changed. If no barcode could be read, it shows *** (3 asterisks), which corresponds to the indication in the QC-report.
- **MCA panel**: The panel was redesigned as follows:
  - It now supports the setup and test of the (optional) gripper module with two additional procedures:
    - Setup: **Gripper Fingers Alignment and Offsets**
    - Test: **Plate Move Test**.
  - **Set Serial Numbers**: The former setup procedure **Set Head Serial Number** was replaced that allows the user to set the serial number of both the MCA head and the gripper module.
  - **Pages**: The various pages (**Contents**, **Setup**, **Test Configuration, Move MCA**) have been adapted accordingly.
- **Move Test 2**: This panel now supports MCA.

Liquid System

- **Waste Pump**: This panel allows you to test the correct function of the Paradigm waste pump and level sensor of the wash station.

Options

- **Access Status Options > IOPardigm**: The new **IOParadigm** panel contains a number of setup and / or test procedures for the various status, display and safety elements found on Paradigm instruments, such as signal lamps, drawer and liquid and DiTi waste sensors, door locks, UPS, fan control, etc. Refer to the panel description for a complete list.

Instrument Software V5.3

The Instrument Software V5.3 is a further development of its predecessor version V5.2.

Supported Instruments

The program supports the following instruments:

- Freedom EVO (75/100/150/200), Freedom EVO Clinical (100/150/200), Freedom EVO-2 (100/150/200), Freedom EVOlyzer (100/150/200), Cellerity, Aquarius / Autoloader
- In principle also for instruments 30045716, 30045717 and 30045718. Note, however, that the V5.1 is a frozen version for Dade Behring.

Basic Setup

The function of the **Basic Setup > Worktable** page has been changed slightly. If the function **Initialze to front** is (manually or automatically) activated, a message informs the user that he/she must check and, if necessary, adapt the initialization positions of all installed arm devices (LiHa, MCA, PnP, and RoMa).

System Devices

- **MCA panel:** This new panel contains the setups, tests and tools for the MCA (Multichannel Arm).
- **Move Test:** The traditional **Random Move Test** has been modified and now supports the following arms: MCA (new), LiHa, PnP and RoMa.
- Note that the **Move Test 2** panel (introduced in version V5.2) has not been changed.

Options 2

- **Te-Stack panel**: Changes for modified Te-Stack.

Multichannel Functions

The former menu item **Options > Te-MO** has been renamed to **Options > Multichannel**.

- The sub-menu **Multichannel** contains the items **Autoloader**, **Refill**, **Te-MO** and **Wash Unit**.
- Note that the wash unit can also be used for the MCA.

Summary of Older Versions (V5.2 and Earlier)

V5.2

This program version (release June 2006) supports Freedom EVO, EVO-2, EVOlyzer (100/150/200), Cellerity, Aquarius / Autoloader, instruments 30045716, 30045717 and 30045718.

The major new features were:

- The Worktable page (Basic Setup) allows definition of possible worktable cutouts for Freedom EVO, EVOlyzer, Cellerity and for instruments 30045716, 30045717 and 30045718.
- Move Test:
  - New Move Test 2. Allows users to perform a Move Test for instruments like Cellerity where the worktable cannot be emptied completely.
  - The traditional Move Test is still available.
- Liquid system: Two new panels:
  - CPO (Controlled Pump Option): For Cellerity
  - PMP: (Pressure Monitored Pipetting)
- Options: Two new panels:
  - SMIO for Cellerity (integrated in Access and Status options)
  - Flipper panel (for Cellerity). Setups and tests for flipper assembly.
- Te-MO / Aquarius / Autoloader: Setups and tests of Autoloader panel adapted, because the destination device of the Autoloader can be an Aquarius or a Cellerity instrument.

***Note:** For a complete list of the features refer to the Manual Instrument Software V5.2 (Doc ID 392888, en, V3.2).*

V5.1	This program version (release January 2006) supports Freedom EVO, EVO-2, EVOlyzer (100/150/200), Aquarius / Autoloader, instruments 30045716, 30045717 and 30045718.

The major new features were:

- The Worktable page (Basic Setup) allows definition of possible worktable cutouts for Freedom EVO, EVOlyzer, instruments 30045716, 30045717 and 30045718
- PosID-3: New panel for PosID-3
- RoMa panel: Supports RoMa 2, RoMa-3 (with and without barcode scanner)
- Vector-2: Additional vector panel that allows setting up and testing the access of the RoMa-3 to: Shelf, loading ports, plate reader and BEP III.
- Loading Port panel: Integrated in the Access Status Functions. Supports loading port for instruments 30045716, 30045717 and 30045718.

Note: *For a complete list of the features refer to the Manual Instrument Software V5.0 (Doc ID 392888, en, V3.1).*

V5.0

This program version (release October 2005) supports Freedom EVO, EVO-2, EVOlyzer Instruments, as well as Aquarius and AutoLoader).

The major new features were:

- New panel bar (showing available panels in Outlook style).
- Supports communication via USB and RS-232.
- New panel for PosID-3.
- Vector panel moved to System Devices menu and adapted to PosID-3.
- Set X-drive Properties adapted to PosID-2.
- LiHa panel modified. Supports now EVO-75, standard and combo wash stations. Changes in channel and Alignment pages.
- Liquid System: Complete redesign. Former functions replaced with two new panels: (DiTi Test, for DiTi and Lower DiTi eject tests), Liquid System panel (containing FaWa test, Liquid Level Detection and Gravimetric tests).
- Options: Easy Option and Genesis CU door lock tests were dropped. Two new panels: RSS (Rack Sensor Supervisor) for EVO 75 and CSV (Carrier Shaking Vials for Qwalys 3) integrated.
- Additional programs: Communication Server, Logging Viewer and Rsp SendCommand Utility. Note that these can invoked independently of the Setup and Service Software.
- Help System: The integrated context-sensitive help system provides on-screen help at a mouse-click (or by pressing the F1 key).

Note: *For a complete list of the features refer to the Manual Instrument Software V5.0 (Doc ID 392888, en, V3.0).*

V4.9

This program version (release February 2005) supports the same instrument as its predecessor (except Pro Team and Genesis RMP).

The major new features were:

- New LiHa Setup page
- Improved Wash Unit 96 test.
- Changes to manual: “User-defined Gravimetric Test” was added. Setup and test procedures referring to impulse were deleted.

Note: *For a complete list of the features refer to the Manual Instrument Software V4.9x (Doc ID 392888, en, V2.2).*

V4.8

This program version (release October 2004) supports Freedom EVO, Freedom EVOlzer, Freedom EVO clinical, as well as Genesis Freedom and Genesis Classic instruments (except Genesis RMP, which is no longer supported).

The major new features were:

- Some changes in main menu
- Vector panel adapted to improved mechanical design of shelf
- LiHa: changes in Channel Page and Dilutor Tool
- Move Test (possibility to stop test in case of failure
- RoMa: New setup procedure (Align gripper fingers)
- Liquid system: adaptation to new “Combi” wash station
- Options: New incubator panel, adaptation of SPO (MPO) to system and waste liquid bottles with floating sensors, Te-Sonic dropped, Te-MO Setup procedure Adjust Get/Drop Tip block changed.

Note: *For a complete list of the features refer to the manual Instrument Software V4.8x (Doc ID 392888, en, V2.1).*

V4.7

This program version (release April 2004) features support for all Freedom EVO instruments (including Freedom EVO 75), Freedom EVO Clinical and Freedom EVOlyzer, Genesis Pro Team, Aquarius and Autoloader. It still supports Genesis Freedom and Genesis Classic Instruments (except RMP).

The major new features were:

- Introduction of the User Administration system and login for all users.
- Improved installation functions
- Combined Printing / Information page
- New Vector panel for setting up RoMa access to shelf, incubator, reader and washer.
- Redesigned and extended Access / Status functions.

Note: *For a complete list of the features refer to the manual Instrument Software V4.7x (Doc ID 392888, en, V2.0).*

V4.6x

This program version (release mid-2003) features full support of Freedom EVO instruments and Autoloader while still covering most Genesis Freedom and Genesis Classic instruments (except Genesis RMP, which is no longer supported).

The major new features were:

- New LiHa panel that supports the adjustment of tips (e.g., Te-PS tips for 1536 microplates) with the Te-PS (Tecan Positioning System).
- Liquid system with improved and simplified user interface
- New option panels that allow setting up and testing the following devices: Te-Link, Repositioner (optional extension to Te-VacS)
- New panel for setting up and testing Aquarius (optional extension to Aquarius).

Note: *For a complete list of the features refer to the manual Instrument Software V4.6x (Doc ID 392888, en, V1.1).*

V4.5x

This program version covers the whole range of instruments and workstations (Genesis Freedom, Genesis Classic instruments). Several were panels were redesigned and additional panels were added. The main menu was rearranged and the user interface was improved significantly.

The software supports Te-MO/Aquarius and the Incubation Device (used for NAT). PosID 1 is no longer supported.

Note: *For a complete list of the features refer to the manual Genesis Instrument Software V4.5x (Doc ID 390791, en, V5.1).*

V 4.3.x	This program version can be used for Genesis Freedom only. It includes a number of functions and panels for setting up and testing the instrument, the liquid system, arm devices (PosID, LiHa, PnP, RoMa) and Options (Te-MagS, Te-Shake, Te-VacS, Te-Sonic and Te-Stack). ***Note:*** *For a complete list of the features refer to the separate Genesis Freedom Setup and Service Software Manual (Doc ID 392179).*
V 4.2.x	This older program version includes the functions for setting up and testing the liquid system, arm devices such as PosID, LiHa and RoMa. ***Note:*** *For more information about the features refer to the previous version of the manual (Doc ID 390791).*
V 4.1	This software version was not validated for Genesis RMP and was not compatible with the TOPS software.
V 4.02	Special release, compatible with TOPS Software V2.0

3.2 Computer Requirements

The PC on which the Instrument Software is to be installed must meet the following minimum requirements:

Computer Hardware

- CPU: see minimum requirements of operating system.
- RAM size: see minimum requirements of operating system.
- SVGA monitor with a resolution of 1024 x 768 or better.
- Mouse.
- CD-ROM drive.
- Hard disk with at least 300 MB free space.
- Printer
- Depending on the connected devices:
  - One RS-232 or USB V1.1 / V2.0 port for connecting the instrument
  - Additional RS-232 or USB V1.1 / V2.0 ports for connecting devices such as Mettler Toledo Balance, Plate Reader, Plate Washer, etc.
  - Note that certain external devices require USB to RS-232 converters. See below.

USB to RS-232 Converters

Modern computers (particularly notebooks) often have no (or not enough) RS-232 ports. In such a case, the following is recommended:

- If possible, the computer should be equipped with additional RS-232 interfaces (ideal solution).
- Otherwise appropriate USB to RS-232 converters must be used. The following table shows the model recommended by Tecan.

***Note:** These converters must be ordered directly from the manufacturer.*

***Tab. 3-1** USB to Serial Converters*

Manufacturer	Designation	Part No.
Aten International Company Ltd. www.aten.com	USB to RS-232 Converter (1 USB to 1 RS-232 port)	UC-232A
Exsys Vertriebs GmbH www.exsys.ch www.exsys.de	USB to RS-232 Converter (1 USB to 1 RS-232 port)	EX-1331
	USB to RS-232 Converter (1 USB to 4 RS232 port)	EX-1334

Operating System

The Instrument Software is compatible with the following operating systems:

- Windows 7 Professional, Enterprise or Ultimate, 64-bit, Service Pack 1 or higher
- Windows 10 64-bit Professional

Note: *Windows NT4, Windows 2000, Windows Vista Business and Windows XP are no longer supported.*

Communication Server

The software communicates with the instrument mainly via the new **Communication Server**. This server, in turn, requires the following:

- Microsoft Internet Explorer 5.0.1 or later.
- Microsoft .NET framework 2.0 redistribution package is automatically installed with the Instrument Software if not yet installed on the target computer.

Security

The following table shows which local permissions are needed for installing and running the Instrument Software Software.

Tab. 3-2 *Minimum security permissions*

Activity	Windows 7
Program installation	Administrator
Running Setup and Service	User
Running SnS Selector	Administrator

4 Installation

Purpose of This Chapter

This chapter describes the installation of the Instrument Software on a target computer. Read it carefully before starting the installation.

4.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Computer requirements	See section 3.2, 🗎 3-12

Target Computers

The Instrument Software must be installed on target computers that are or will be connected to Freedom EVO or EVOlyzer instruments.

For the computer requirements (see Cross References).

Who Should Install?

Note: *The installation of the Instrument Software should be performed by an authorized field service engineer (FSE) only.*

Access Rights

Note: *To install the Instrument Software on the target computer, you need local administrator rights.*

General Installation Procedure

Pay attention to the following:

- If the instrument is connected to a USB port of the target computer, disconnect the USB-cable before beginning with the installation
- Every new software version will be installed into its own directory.
- If previous versions of the software are installed on the target computer, you will be able to still select them after installation of a new version by using the selector utility (see 4.3.2 “SnS Selector”, 🗎 4-11).
- Install the new Instrument Software.
- Install the USB-driver.
- Log into the Instrument Software. Create the necessary user accounts.
- Test your installation.

Saving User-Defined Data

We recommend that you save your most important user-defined data on a suitable storage medium (e.g., memory stick or CD-ROM if possible) or in a temporary directory (not within the <install_path>).

Saving these files is especially recommended in the following cases:

- Before installing a new version of the Instrument Software.
- Before repairing an existing Instrument Software.
- Before removing (uninstalling) the Instrument Software.
- If you created customized plates for Te-MagS or Te-Shake.
- For use of previously created log or results files

– *For information on the storage locations for the individual file types see 5.3 “Data Files”, 🗎 5-29.*

4.2 Installation

Cross References

List of cross references to information provided in other sections:

Information	**References**
Installing the Instrument Software	See section 4.2.1, 🗎 4-2
Installing the USB-drivers	See section 4.3.4, 🗎 4-13
First login after installation	See section 4.3.1, 🗎 4-9
Testing the installation	See section 4.3.5, 🗎 4-13

4.2.1 Installing the Instrument Software

Installation Directory

Depending on the operating system the Instrument Software will be installed to the following directory.

Windows 7
C:\Program Files (x86)\Tecan\Instrument Software<version>

whereas:

<version> = the version of the Instrument Software to be installed

Note: *This installation directory cannot be changed.*

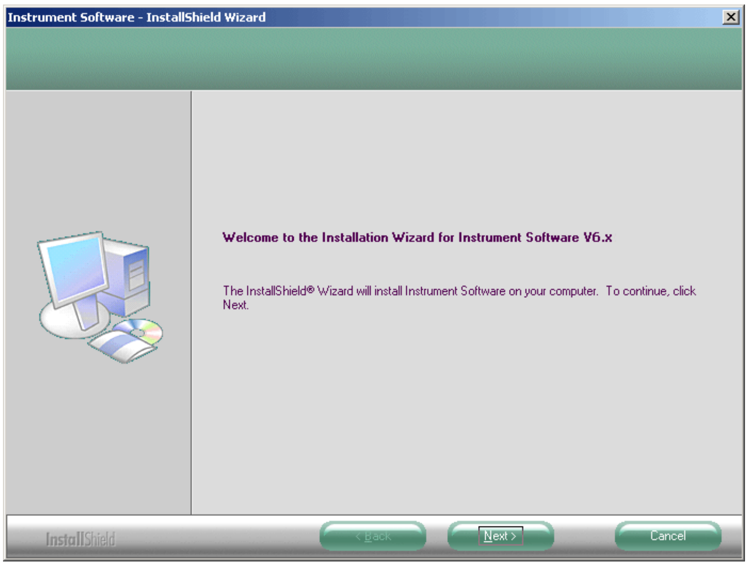
Note: *Usually, the software is installed from an installation CD-ROM.*

The First Steps

To install the Instrument Software:

1. Finish all Windows programs that are currently running.
2. If the instrument is connected to a USB port of the target computer, disconnect the USB-cable before starting with the installation.
3. Log into the Windows operating system as the local administrator.
4. Insert the installation CD in the computer’s CD-ROM drive.
5. In the Windows Explorer, open your CD-ROM drive and change to the Instrument Software directory.
6. Run **Setup.exe** from the Instrument Software directory or open ReadMe.html and follow Step 2.

   If Microsoft .NET Framework V2.0 is not yet installed it will be installed:
   -> Accept the EULA in the upcoming dialog window to start the installation.
7. The Instrument Software **Welcome** window appears.



Welcome to the Installation Wizard for Instrument Software V6.x

The InstallShield® Wizard will install Instrument Software on your computer. To continue, click Next.

Fig. 4-1 *Welcome window*

8 Click **Next** to continue.

Release Notes

*The **Instrument Software** window appears, displaying the latest release notes (not shown here). Note that, after the installation, you can view the release notes at any time from the Windows Start Menu.*

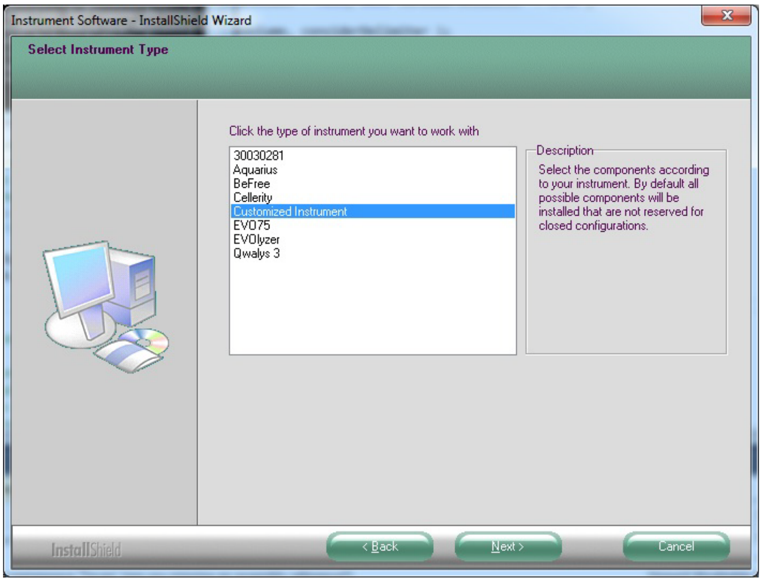
9 Carefully read the release notes to learn about the latest changes and features.

10 Continue with **Next** when done.

Select Instrument

***Note:** The next screen lets you select the instrument type you wish to install. The software then preselects the features needed for the corresponding instrument. Note that you can modify your selections later.*

- ***Aquarius**: Multichannel pipetting instrument.*
- ***BeeFree**: OEM-product.*
- ***Cellerity**: For the installation of a Cellerity instrument.*
- ***Customized Instrument**: Preselects most installable components. You can deselect those components that are not needed later on. Recommended if you want to install an open configuration like Freedom EVO, or Freedom EVO-2.*
- ***EVOlyzer**: For the installation of a Freedom EVOlyzer-2 instrument.*
- ***EVO 75**: For the installation of a Freedom EVO 75 instrument.*
- ***Qwalys 3**: OEM-product.*



Instrument Software - InstallShield Wizard

Select Instrument Type

Click the type of instrument you want to work with

- 30030281
- Aquarius
- BeFree
- Cellerity
- Customized Instrument
- EVO75
- EVOlyzer
- Qwalys 3

Description

Select the components according to your instrument. By default all possible components will be installed that are not reserved for closed configurations.

Fig. 4-2 *Select instrument type*

11 Select the appropriate instrument type and click **Next** when done.

Selecting Components

Note: *The **Select Components** window that appears lets you choose the main components you wish to install (see Fig. 4-3 , 🖹 4-5). Depending on the entry you have made before with **Select Instrument** type, certain components are preselected and marked with a tick √:*

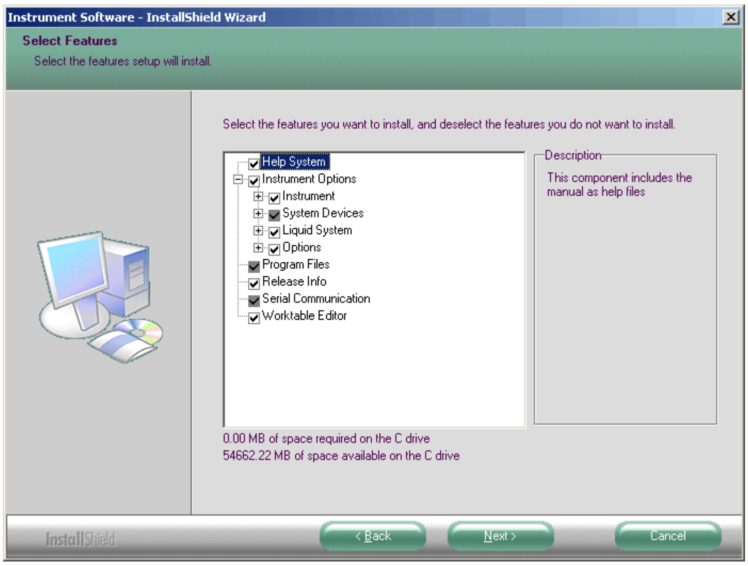
- ***EVOlyzer**, **Cellerity**, **EVO 75**, etc.: The components needed for the corresponding instrument.*
- ***Customized Instruments:** Preselects the most common components, provided they do not belong to an OEM-product or other special configuration. Changes can be made within the next screen.*

12 If the preselected **Instrument Type** is **EVOlyzer**, **Cellerity**, **EVO 75**, etc., you can usually accept the suggested features. Skip the following explanation and continue with step 14 in such a case.

The example shown in the following figure shows the components that are preselected for the instrument type **Customized Instrument** (i.e. the components **Program files**, **Worktable Editor** and **Options).**

When you highlight a component, additional information about the installation of that component is shown in the **Description** frame on the right side of the window.

Note: *Only the components shown in the **Select Feature** window can be selected or deselected during the installation.*



Instrument Software - InstallShield Wizard

Select Features

Select the features setup will install.

Select the features you want to install, and deselect the features you do not want to install.

- ☑ Help System
- ☑ Instrument Options
  - ☑ Instrument
  - ☑ System Devices
  - ☑ Liquid System
  - ☑ Options
- ☑ Program Files
- ☑ Release Info
- ☑ Serial Communication
- ☑ Worktable Editor

Description

This component includes the manual as help files

0.00 MB of space required on the C drive
54662.22 MB of space available on the C drive

Fig. 4-3 *Select features*

Tab. 4-1 *Overview of installable features*

Feature	**Description**
Program Files	Installs Setup and Service executable files, basic DLLs and the SnS worktable database. This database is intended for use in the field and contains Tecan predefined worktable definitions and possibly user-defined worktable definitions.
Release Info	Installs the release info so that it can be viewed later at any time (recommended).
Worktable Editor	Installs the **Worktable Complete Editor**.
Instrument Options	Lets you choose the required options. Can be expanded by clicking the “+” box on the left side. In this case a sub-list containing selectable items is shown. Some of these can be expanded further.
- Instrument	Contains the more general tools for the instrument
- System Devices	System devices that can be installed optionally (PosID, LiHa, Air LiHa, RoMa, PnP, MCA, Move Test, Vector-2)
- Liquid System	Contains a list of liquid system components
- Options	Contains a list of options (see next screen).
Serial Communication	Communication to the instrument via USB or RS232
Help System	Lets you install the context-sensitive help system (recommended)

13 If necessary, add further components to the preselected ones or remove components that are not needed on the instrument you are setting up:

– If, for instance, there is a Te-MagS available on the instrument select it (or leave it selected), otherwise clear the associated check box.

- The same applies to the other component check boxes in the dialog. The software for deselected options can be added at a later time if necessary.

*Note: **Program files** and **Serial Communication** are always necessary. You cannot clear the respective check boxes.*

14 Click **Next** after you have made your choices or if you have accepted the suggested preselection.

Component Transfer Error

15 If a **Component transfer error** message appears during the copying process:

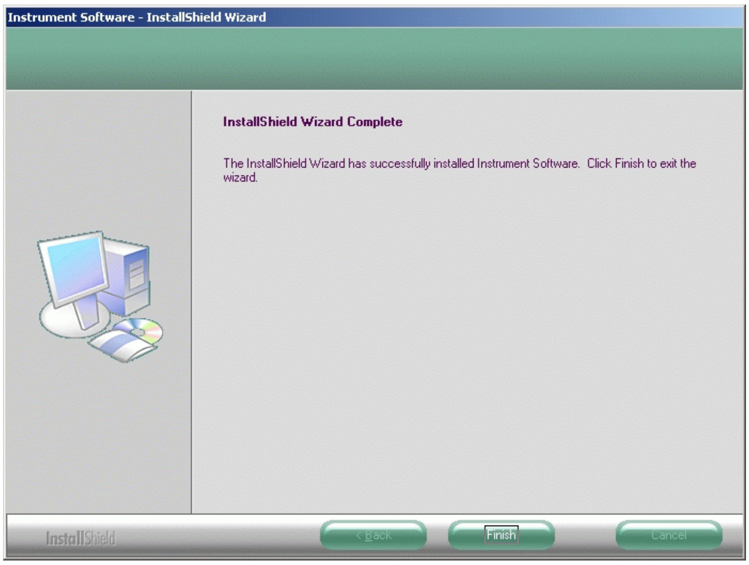
- Your access rights are insufficient for the installation.
- In this case, click on **OK** to abort the installation and repeat the installation with the correct access rights.

User Administration System

If prior to this installation an earlier version (< V6.1) of the Instrument Software was installed, the system will recognise this and prompt the installer to login with administrator rights into the previous user administration system (Eres). With this step the already defined users are migrated to the new user management system (UMS).

Installation Complete

If the copying process can be finished successfully, the **Install Shield Wizard Complete** window notifies you that the installation is completed.



Instrument Software - InstallShield Wizard

InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Instrument Software. Click Finish to exit the wizard.

Fig. 4-4 *Install Shield Wizard Complete window*

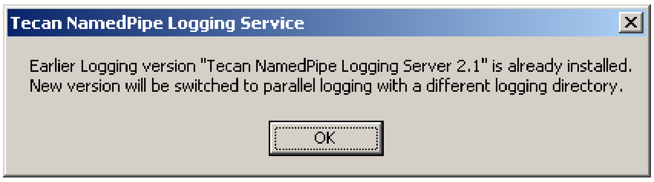
16 Confirm with **Finish**.

17 It is possible that you are now prompted to restart the computer. In this case follow the instructions.

The installation of the Instrument Software is now complete. However, there are still some important things to do. For details refer to section 4.3 “After the Installation”, 🗎 4-8.

Logging Service Message

The following message might appear during installation:


Tecan NamedPipe Logging Service

Earlier Logging version "Tecan NamedPipe Logging Server 2.1" is already installed.
New version will be switched to parallel logging with a different logging directory.

Fig. 4-5 *Logging Service message*

Note: *This message just tells you that older SnS versions store their log files in a different directory than the SnS version that is right now installed.*

If the Installation Fails

If the installation was not successful, proceed as follows:

1. Go to the **Windows Control Panel** and select **Add/Remove Programs** and try to remove the program. Also see section 4.4.5 “Remove”, 🗎 4-19.

After the Installation

Once you have finished the installation you can start using the Instrument Software. Pay attention to the following:

ATTENTION

Pay special attention to the information provided in the release notes.

Do the following:
- Define accounts as necessary.
- Do not forget to reload any user-defined data you have saved before.
- Make sure you download the correct firmware versions.
- If the release notes instruct you to repeat certain setup and alignment procedures, perform them after the startup of the software.

4.2.2 Power Management Setting

Purpose

To prevent the system going into standby mode during setups and tests the power management of the PC has to be set as follows:

Tab. 4-2 Setting for Windows power scheme

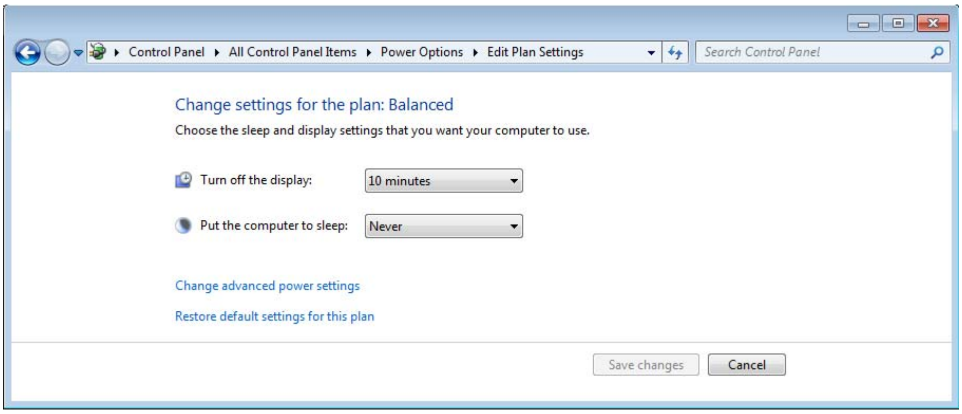
System standby:	Never

ATTENTION

The system might freeze during a setup or test if the power management setting of the PC is not set correctly.
- The system must never go into standby mode.
- Check the power setting of the PC and correct it if necessary.

Tecan Power Scheme

When installing the Instrument Software on a operating system a new power scheme **Tecan** with the setting shown below is created and activated:



Change settings for the plan: Balanced

Choose the sleep and display settings that you want your computer to use.

Turn off the display: 10 minutes

Put the computer to sleep: Never

Fig. 4-6 Power management settings in Windows 7

If the Settings are Wrong

The power management setting can be wrong if:

- the creation of the power scheme **Tecan** failed during the installation of the Instrument software.
- the user changed manually the **System standby** setting.

If the power management setting is wrong, do the following:

1 Make the correct power management setting manually (see Tab. 4-2, 🗎 4-7 and Fig. 4-6, 🗎 4-8 respectively Fig. 4-6, 🗎 4-8)

4.3 After the Installation

Overview

After the successful installation of the Instrument Software there are still some important things to do before you can start using it for setups and tests. They are summarized in the following table.

Tab. 4-3 Things to do after the installation

Activity	References
First login, creating an administrator account, adding new users, assigning them to user group	See section 4.3.1, 🗎 4-9
Login procedure	See section 4.3.3, 🗎 4-12
Installation of USB-drivers	See section 4.3.4, 🗎 4-13
Testing the installation	See section 4.3.5, 🗎 4-13

4.3.1 First Login After Installation

Cross References

List of cross references to information provided in other sections:

Information / Topic	References
Computer Requirements	See section 3.2, 🗎 3-12
Testing the Installation	See section 4.3.5, 🗎 4-13
User Management System	See section 6.5, 🗎 6-3
Login Procedure	See section 4.3.3, 🗎 4-12

User Management System

The very first installation of the Instrument Software includes an important software package, the User Management System. For detailed information about this software refer to (see Cross References).

Note: *The User Management System is not installed together with the Instrument Software if a valid version is already available on the computer (possible after a reinstallation of the Instrument Software).*

First Start-up

Note: *Under Windows 7 standard user rights are sufficient.*

Note: *For additional information refer to “Computer Requirements” and “Testing the Installation” (see Cross References).*

When you start up the Setup and Service software for the first time after the successful installation, the User Management System prompts you to log in before you can start with setting up and testing the instrument. There are two cases possible:

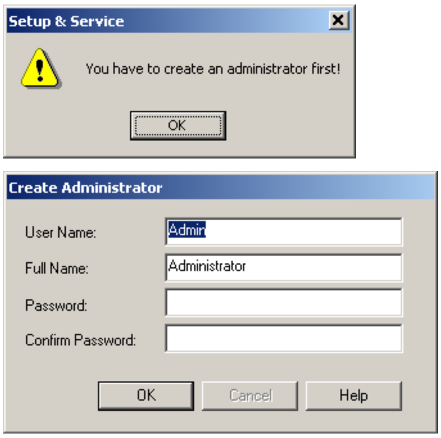
- *A valid version of the User Management System is already installed and appropriate user accounts are available. In this case you can skip the following procedure and continue with section “Login Procedure” (see Cross References).*
- *No valid version of the User Management System was available. Therefore, it was newly installed together with the Instrument Software. In this case, you must first create an administrator and a user account. Follow the instructions provided below.*

Note: *The user who starts up the User Management System for the very first time automatically becomes a system administrator and has unlimited access to all functions of the User Management System. For detailed information about the User Management System, such as user accounts, user groups and rights, user names, passwords, etc. (see Cross References).*

Creating an Administrator Account

To create an administrator account:

1 Start the Setup and Service software from the Windows taskbar with **Start > All Programs > Tecan > Instrument Software <version> > Setup and Service**.



You have to create an administrator first!

User Name: Admin

Full Name: Administrator

Password:

Confirm Password:

Fig. 4-7 First log in as administrator

2 The first prompt informs you that you have to create an administrator account. Click **OK** to continue.

3 On the dialog box **Create Administrator** that appears do one of the following:

- Accept the suggested **User Name** and **Full Name** as shown on the left side.
- Change the entries with names of your choice.

4 Enter a suitable password and confirm it.

5 Note down the user name and password and keep it in a safe place. You will not be able to login as the administrator later if you forget or lose your password.

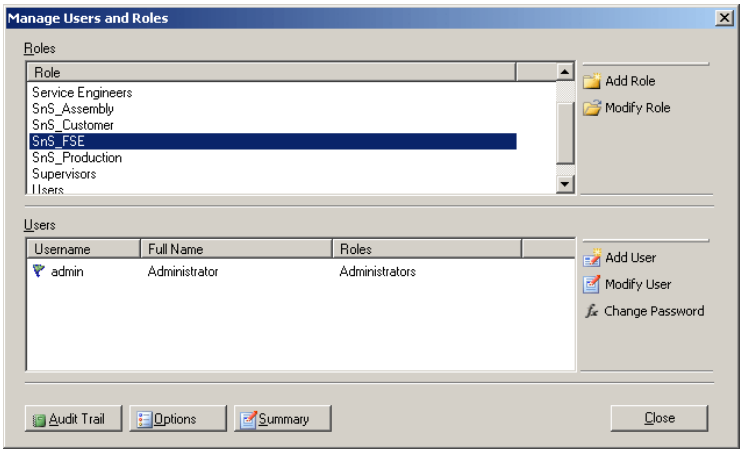
Note: *Please note:*

- *The user name, user full name and the password are case-sensitive.*
- *Choose meaningful user and full names of adequate lengths.*
- *At least 5 characters are required for the password (max. 99 characters).*

6 Check your entries. Click **OK** if they are correct.

The next window is only accessible to administrators. It lets you add and change user accounts.

Next, you must set up one or more user accounts for the persons who will set up the instrument and carry out the associated setup and/or test procedures.



Role
Service Engineers
SnS_Assembly
SnS_Customer
SnS_FSE
SnS_Production
Supervisors
Users

Username	Full Name	Roles
admin	Administrator	Administrators

Fig. 4-8 User administration window

Note*: The same physical person can have more than one user account with different user names. Example: Mr. John Smith can, at the same time, have an administrator account under the user name “josmAd” and a user account with SnS_FSE rights under the user name “josm”. Depending on what Mr.*

John Smith wants to do, he can log in as an administrator or as a user who performs setup and test procedures.

7 If you are installing the Instrument Software at the customer’s site hand the administrator password over to the local system administrator. This enables him or her to add or modify further users in the future.

Adding a New User

To add a new user follow the description in section 6.5.5 “Adding and Modifying User Groups”, 🗎 6-9.

WARNING

Misadjustment, damage to the instrument (or parts of it) and even injuries possible if you assign a user to a user group for which he or she is not qualified.

- Assign a user only to a user group if this person has the required qualifications, training and equipment needed to safely and efficiently carry out the procedures to which he or she will have access.

4.3.2 SnS Selector

Cross References

List of cross references to information provided in other sections:

Information	References
Start menu	See section 5.1.1, 🗎 5-1

Purpose

If more than one version of the Instrument Software is installed on the PC the **SnS Selector** utility allows to select a specific version to use. The selection of a version < V6.1 sets the path in the ODBC driver to the appropriate database.

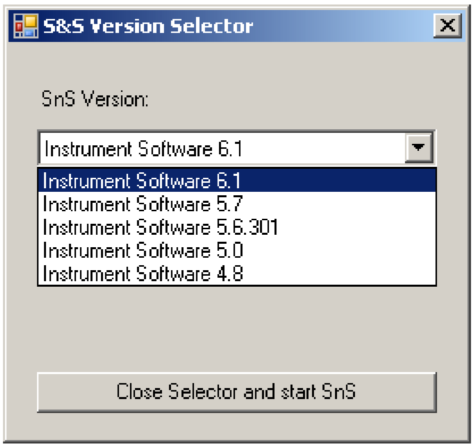
If software version 6.2 is installed the user administration system UMS1.1 is used for this and all other SnS versions installed.

Procedure

To start an Instrument Software version using the **SnS Selector** utility, proceed as follows:

Note: *The utility requires Administrator rights under Windows 7.*

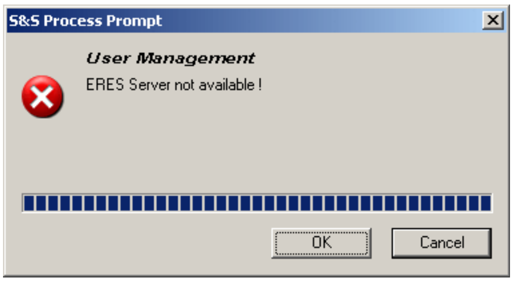
1 Select the **SnS Selector** utility through the windows **Start menu** or double-click the icon on the desktop (see Cross References).



When started, the utility shows all installed Instrument Software versions in a combo box list.

Fig. 4-9 *SnS Selector dialog*

2 Select the Instrument Software version you want to use and click the button **Close Selector and start SnS**.



User Management
ERES Server not available !

Note: *If you try to start an Instrument Software version <V6.1 without using the SnS Selector you will get an error message.*

Fig. 4-10 *Error message ISW < V6.1*

4.3.3 Login Procedure

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3

Note: *If you have a user account (with user name and password) proceed as described below to log in to the Setup and Service software. If necessary, turn to the system administrator for such an account. For detailed information about the User Management System, such as user accounts, user groups and rights, user names, passwords, etc. (→ Cross References).*

1 To login as a user do the following:
On the **Main Menu** of the Setup and Service software, select **System > Login.**

Login Dialog

*The **Login** dialog (see following figure) appears.*

The user name and password have to be entered for login.

User Name: JOSM

Password: ********

Fig. 4-11 *Login dialog*

2 Enter your user name and password and click **OK**.

Note that these entries are case-sensitive.

4.3.4 Installation of the USB-Driver

Purpose

The installation of USB-driver is required when the instrument is to be connected to the computer via a USB port. The following procedure briefly describes how this is done.

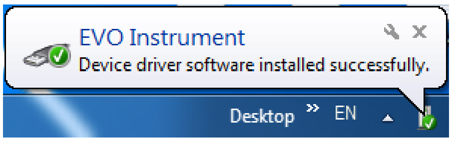
Note:

- *The installation of the USB-driver must be carried out for all new instruments.*
- *If you are upgrading an instrument from Instrument Software 4.9 or earlier, make sure that the TeCU firmware version V1.20 (or later) is installed, before you install the USB-driver.*
- *Remember that the instrument may be connected to a USB port only after the installation of the instrument software.*

Procedure for Windows 7

To install the USB-driver:

1. If not done yet, start the computer and log in.
2. Switch on the instrument.
3. Connect the USB-cable of the instrument to a USB port of the computer.
4. The driver will be installed automatically. After successful installation, a message is displayed in the notification area.



EVO Instrument

Device driver software installed successfully.

Fig. 4-12 *Notification after installation*

4.3.5 Test

Cross References

List of cross references to information provided in other sections:

Information	**References**
Computer requirements	See section 3.2, 🗎 3-12
Start instrument software using SnS Selector	See section 4.3.2, 🗎 4-11
Login procedure	See section 4.3.3, 🗎 4-12
Main window, normal and simulation mode	See section 5.1.2, 🗎 5-3
Selecting a different serial port	See section 6.6, 🗎 6-15
Running the maintenance program	See section 4.4.2, 🗎 4-16

Test Procedure

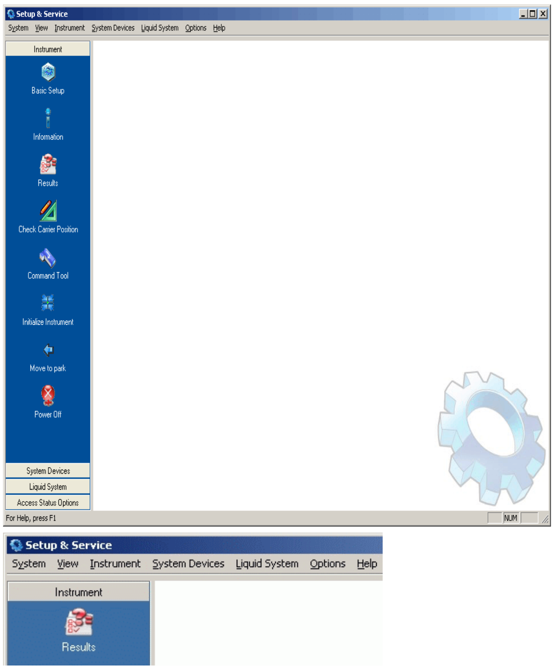
To test the new installation of the Setup and Service software proceed as described below:

Note: *For information on required permissions, refer to Tab. 3-2 “Minimum security permissions”, 🗎 3-13.*

1. Connect the instrument to the computer and switch on the instrument.
2. Select the **SnS Selector** utility through the windows **Start menu** or double-click the **SnS Selector icon** on the desktop and select the Instrument Software version you want to use (see cross references).

Main Window

When the program has started up correctly and you have logged in, the main window appears. Depending on whether the Setup and Service software communicates with the instrument or not, the main window looks as shown in the following figure



Setup and Service software communicates with the instrument and is in the Normal Mode of operation.

The panel bar on the left side shows the panels of the active devices.

If the instrument does not communicate with the computer the **Results** icon is the only item that appears on the panel bar. In this case, the software is in the so-called **Simulation Mode**.

Fig. 4-13 *Main window*

For detailed information about the main window, the normal and the simulation mode (see cross references).

If the Setup and Service software does not communicate with the instrument then check the following:

- Check if the instrument is switched on.
- Check if the instrument is disconnected from the computer.
- After the installation the Setup and Service software assumes that the instrument is connected to a USB port. If it is connected via an RS-232 cable to a COM port instead, you must first define the correct port with **System > Communication**. For more details (see cross references).

When the communication with the instrument works properly you can start using the Setup and Service software.

4.4 Maintenance Program

4.4.1 Introduction

The **Maintenance Program** can be run when the Instrument Software V6.x or higher is installed on the target computer.

Main Functions

The **Maintenance Program** consists of three main functions:

- **Modify:** Allows you to add further software components to the existing program or to remove software components that are no longer needed.
- **Repair:** This function reinstalls every part of the current software configuration on the target computer. Note that no new functions will be added, nor will any existing functions be removed when the **Repair** program is executed. A reinstallation of the existing software may be necessary in the following cases:
  - If the current installation does not run properly (e.g., due to a corrupt file or a file that was deleted unintentionally).
  - If the **Start Menu** entries for running the program are not available to a particular user.
- **Remove:** Removes (uninstalls) the Instrument Software from the target computer.

4.4.2 Running the Maintenance Program

Cross References

List of cross references to information provided in other sections:

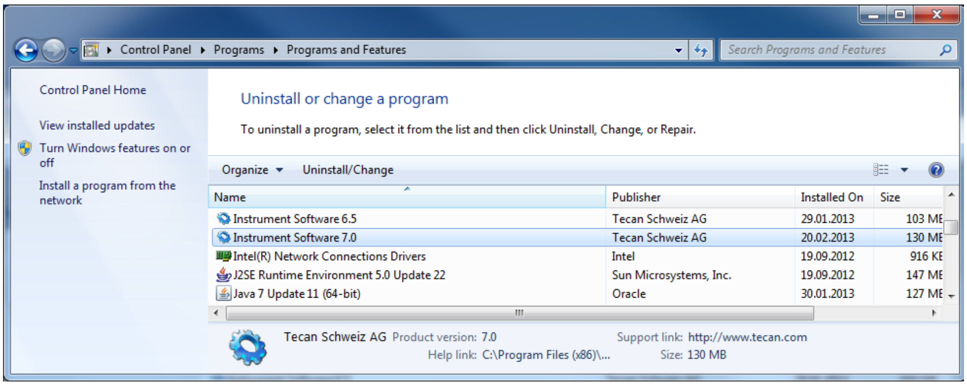
Action	References
Modify a program	See section 4.4.3, 🗎 4-18
Repair a program	See section 4.4.4, 🗎 4-18
Remove (uninstall) a program	See section 4.4.5, 🗎 4-19

***Note:** Under Windows 7, the corresponding view can be found under Programs > Programs and Features.*

Start

To start the **Maintenance Program**:

1. Open the Windows **Control Panel** with **Start > Control Panel** in the Windows taskbar.
2. Double-click the **Add/Remove Programs** icon. The **Add/Remove Programs** window appears.



Uninstall or change a program

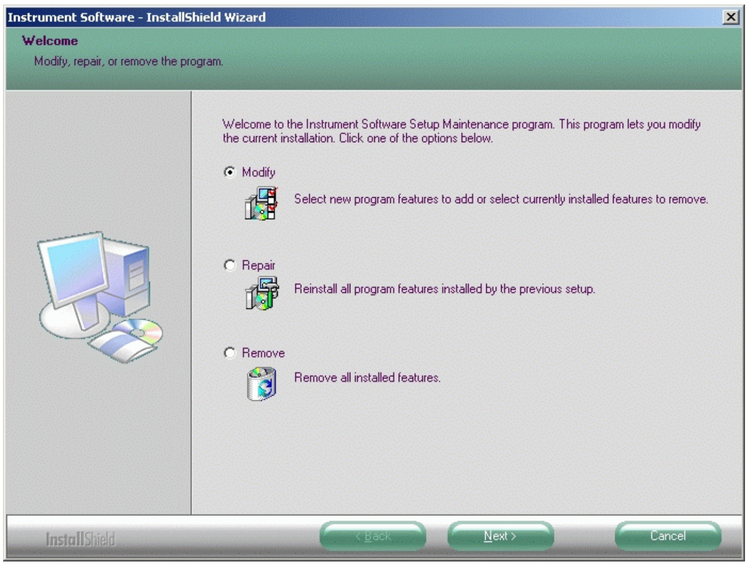
To uninstall a program, select it from the list and then click Uninstall, Change, or Repair.

Name	Publisher	Installed On	Size
Instrument Software 6.5	Tecan Schweiz AG	29.01.2013	103 MB
Instrument Software 7.0	Tecan Schweiz AG	20.02.2013	130 MB
Intel(R) Network Connections Drivers	Intel	19.09.2012	916 KB
J2SE Runtime Environment 5.0 Update 22	Sun Microsystems, Inc.	19.09.2012	147 MB
Java 7 Update 11 (64-bit)	Oracle	30.01.2013	127 MB

Tecan Schweiz AG Product version: 7.0
Support link: http://www.tecan.com
Help link: C:\Program Files (x86)\...
Size: 130 MB

Fig. 4-14 Programs and Features in Windows 7

3. Select the **Instrument Software** item from the list and click the **Change/ Remove** command button. The **Modify, repair or remove the program** window appears.


Instrument Software - InstallShield Wizard

Welcome

Modify, repair, or remove the program.

Welcome to the Instrument Software Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.

● Modify

Select new program features to add or select currently installed features to remove.

○ Repair

Reinstall all program features installed by the previous setup.

○ Remove

Remove all installed features.

Fig. 4-15 Modify, repair or remove the program

Decide What to Do

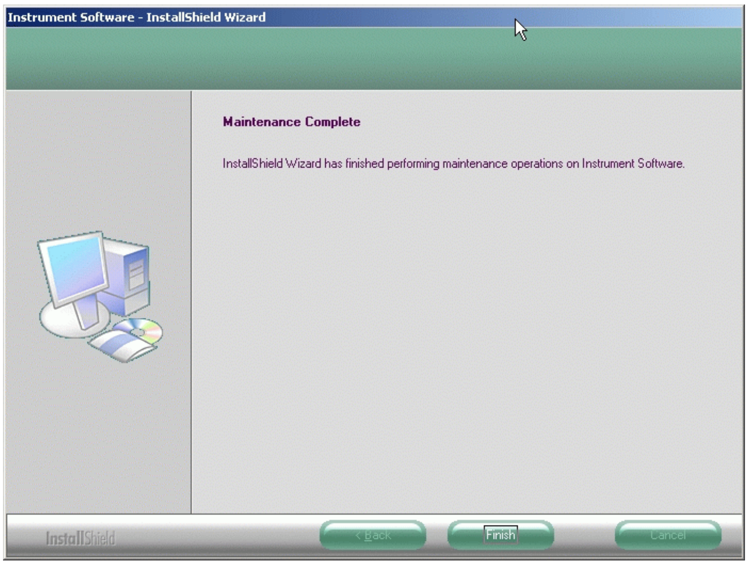
4 Click the appropriate option button:
   - **Modify** to add or remove components.
   - **Repair** to reinstall the program.
   - **Remove** to uninstall.

5 Click **Next** and continue with the section referred to in the → Cross References table.

   The selected option is carried out.

Maintenance Complete

When the selected program is finished the **Maintenance Complete** window appears.


Instrument Software - InstallShield Wizard

Maintenance Complete

InstallShield Wizard has finished performing maintenance operations on Instrument Software.

Fig. 4-16 Maintenance Complete window

6 Click **Finish** to end the **Maintenance** program.

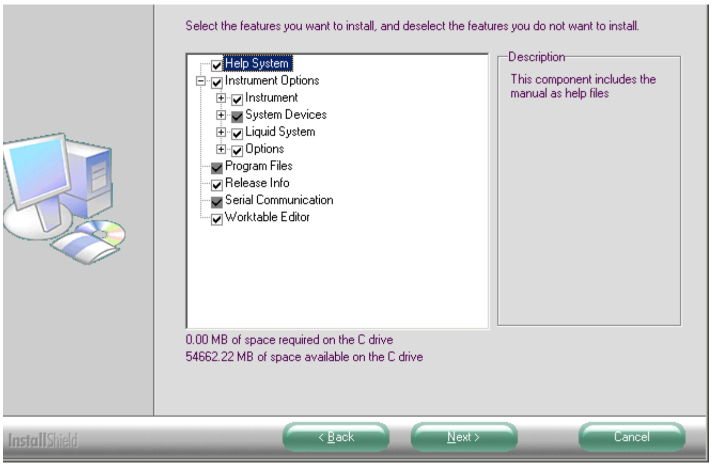
4.4.3 Modify

Purpose

The **Modify** option allows you to install additional components or remove components that are no longer needed.

Components Window

When the **Modify** program is started the **Select Components** window appears.



Select the features you want to install, and deselect the features you do not want to install.

- ☑ Help System
- ☑ Instrument Options
  - ☑ Instrument
  - ☑ System Devices
  - ☑ Liquid System
  - ☑ Options
- ☑ Program Files
- ☑ Release Info
- ☑ Serial Communication
- ☑ Worktable Editor

Description

This component includes the manual as help files

0.00 MB of space required on the C drive
54662.22 MB of space available on the C drive

Fig. 4-17   Select Components window

In the **Select Components** window, the currently installed software components are marked with a tick √.

Procedure

To modify the existing installation:

1. Add new software components as necessary or remove components that are no longer needed:
   - To add a component select the (empty) check box left of the component's name.
   - To remove a component clear the corresponding check box.
2. Continue with **Next.** The selected components are added or removed according to your entries.

End

When the modification is completed the **Maintenance Complete** window appears (see "Maintenance Complete", 🗎 4-17).

4.4.4 Repair

Purpose

This option reinstalls the components of an earlier installation of the Instrument Software. For details see section 4.4.1, 🗎 4-15. No further entries are necessary after starting the **Repair** option.

End

When the modification is completed the **Maintenance Complete** window appears (see "Maintenance Complete", 🗎 4-17).

4.4.5 Remove

Purpose

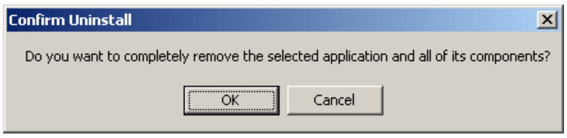
This option lets you remove the Instrument Software completely from your computer.

***Note:** During the execution of the uninstall program one or more of the following messages may appear.*

Confirm Uninstall

The first message prompts you to confirm whether or not you want to remove the installed program completely. Do one of the following:

- Click on **OK** if you want to uninstall
- Click on **Cancel** to quit.



Do you want to completely remove the selected application and all of its components?

Fig. 4-18 Confirm removal of program

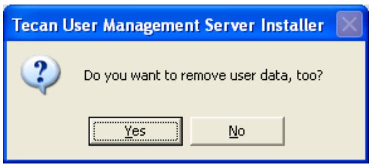
User Data

The next message asks you if the user data shall be removed.

- Click **Yes** to delete the user database in C:\Documents and Settings\All Users\Application Data\Tecan\Tecan User Management\v1.1\UserManagement.xml.

***Note:** Under Windows 7 this path is C:\ProgramData\Tecan\Tecan User Management\v1.1\UserManagement.xml.*

- Click **No** to keep the user data in the above mentioned path.

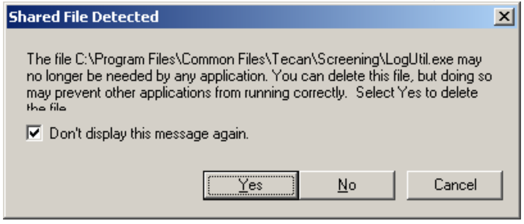


Do you want to remove user data, too?

Fig. 4-19 Confirm removal of user data

Shared File Detected

This message appears if the program has detected one or more files (usually files of type *.exe or *.dll) that can be used by other programs.The Instrument Software was the last registered software on the computer to use the file(s) in question.



The file C:\Program Files\Common Files\Tecan\Screening\LogUtil.exe may no longer be needed by any application. You can delete this file, but doing so may prevent other applications from running correctly. Select Yes to delete the file

☑ Don't display this message again.

Fig. 4-20 Shared file detected

There are two points to consider in this case:

- Usually you can safely select the check box left of the **Don't display this message again** text and click the **Yes** button without running into problems. The file in question (and possibly further shared files) will be deleted without further notifications.

- If you decide to click the **No** button you are on the “absolutely safe side”. The respective files will not be removed from your hard disk, but continue to occupy disk space even if they are no longer used.

4.5 Firmware Compatibility

The Instrument Software software has been validated with the firmware versions as defined in the following table.

Note: *The table lists the firmware versions that were valid when this manual was issued. In the meantime, some of them might have changed. Contact the customer service for the latest firmware list.*

Tab. 4-4 Firmware Overview

Device	Down-load	Firm-ware	File name	Comment
AutoLoader	yes	V1.10	DCUAL110.hex	DC-Servo2 V1.21
CPO, Controlled pump option	yes	V1.10	dcucp110.hex	DC-Servo2 V1.21
DC-Servo2	yes	V1.21	DCS2_121.hex	
Flipper	yes	V1.10	dcufl110.hex	DC-Servo2 V1.21
LiHa / Air LiHa Device CU	yes	V1.80	dculi_180.hex	DC-Servo2 V1.21
Loading Interface	yes	V1.00	SDCUGC100.hex	—
Loading Port	yes	V1.00	lprtcu_100.hex	—
Loading ID	yes	V1.60	loadingID_160.hex	—
MCA96, Multichannel Arm	yes	V1.21	dcumca96_121.hex	DC-Servo2 V1.21
MCA384, Multichannel Arm	yes	V1.11	dcumca384_111.hex	DC-Servo2 V1.21
MIO, Monitored Incubator Option	no no	V1.20 V1.41	— —	for 46 °C for 60 °C; requires PCB MIO60, is also suitable for 46 °C Incubator.
MIO2	yes	V2.10	mio_210.hex	Heated incubator
MPO Monitored Pump Option	yes	V2.00	MPO200.hex	Hitachi processor
Plunger drive (Air LiHa)	yes	V1.20	ZM_10946_120.hex	emulates XP2000 dilutor
PMP Pressure monitored pipetting	yes	V1.02	pmp102.hex	Must be used together with: • LiHa V1.31 or higher • XP SMART V1.10
PnP Pick and Place	yes yes	V1.08 V2.10	Gcupp108.hex dcupp210.hex	PnP on Gate Board PnPDCU, DC-Servo2 V1.21
PosID, Positive Identification	yes yes	V2.51 V1.21	POS2_251.hex dcu_posid3_121.hex	PosID 2 DC-Servo 1 PosID-3 DC-Servo2, V1.21

Tab. 4-4 Firmware Overview (cont.)

Device	Download	Firmware	File name	Comment
	yes	V1.04	DS1100_V104.hex	PosID-3 scanner
RoMa,	yes	V1.13	dcuro113.hex	RoMa, DC-Servo1
RoMa-2 / -3 with and without barcode scanner	yes	V2.21	dcuro_221.hex	DC-Servo2 V1.21
Safety	yes	V1.30	___sa130.hex	Access Status option
Sensor Plate TW	yes	V1.00	SPL100.hex	—
SMIO	yes	V1.01	Smio101.hex	General purpose input/output board.
SPO-MPO	yes	V3.20	SPOMPO_320.hex	FaWa, Licos and trolley sensors, Waste pump
Supervisor 2	yes	V1.00	spvsuii100.hex	Loading port, RT-incubator, weighing scales
Te-CU	yes	V1.40	tecu140.hex	For Freedom EVO and Aquarius, Te-Fill
Te-Link	yes	V1.10	DCUSH110.hex	DC-Servo2 V1.21
Te-MagS	yes	V1.31	mags131.hex	—
Te-MO	yes	V2.02	MUP_202.hex	For Gemini 3.51 and 4.1
Te-MO Wash	yes yes yes	V1.02 V2.11 V1.00	wrc_102.hex wrc2_211.hex wrc2imp100.hex	WRC I WRC II Te-MO & Aquarius 384
Te-Servo	yes	V1.00	tserv100.hex	For MCA96 and MCA384 plungers
Te-Shake	yes	V1.10	___or110.hex	—
Te-Stack	yes	V1.50	dcust150.hex	Transfer stations • Spindle drive • Belt drive with waste option
Te-VacS	yes	V2.10	spe210.hex	Hitachi Processor (Classic + Freedom)
XP SMART	yes	V1.10	xp2_110.hex	Dilutor type XP SMART

5 Instrument Software

Purpose of This Chapter

Gives a brief overview of the Instrument Software, the user interface, some general functions and its operating modes.

Operating Restrictions

ATTENTION

Working with programs (in the foreground) while a Setup or Test routine of the **Setup and Service** software is running in the background may lead to wrong setup or test results or even interrupt the running routine.

- Do not work with other programs while a Setup or Test routine of the Setup and Service software is running.

5.1 Introduction

5.1.1 Start Menu

Cross References

List of cross references to information provided in other sections:

Information	References
Command Tool	See section 7.3, 🗎 7-20
Tecan LogViewer	See section 5.6, 🗎 5-35
Send Utility	See section 5.5, 🗎 5-33
SnS Selector	See section 4.3.2, 🗎 4-11
Worktable Complete Editor	See section 14, 🗎 14-1
Remote Support	See section 15.2, 🗎 15-3

Windows Start Menu

The Instrument Software package consists of several executable programs that can be started independently of each other from the Windows start menu. The start menu consists of two menu levels.

***Note:** The menu items that appear depend on your installation. The start menu shown in the following figure corresponds to a customized instrument.*

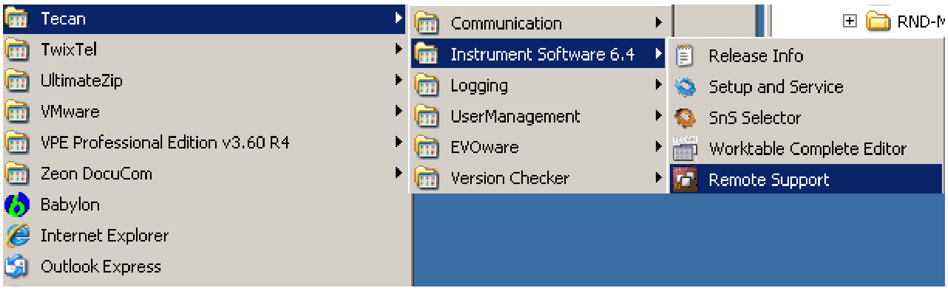


Fig. 5-1 *Windows Start Menu*

Menu Tecan

This menu contains the following items:

- **Communication**: See below.
- **Instrument Software** (followed by corresponding version number): See below.
- **Logging**: Invokes the **Tecan LogViewer** (see cross references).

Submenu Communication

Contains special tools, for example:

- **Send Utility**: Simple utility that lets users send single commands to the instrument. Similar to the **Command Tool** in the **Instrument Menu** (see cross references).

***Note:** For convenience, **Tecan LogViewer** and **Send Utility** can also be started through the **System** menu (see section 6.1 “System Menu”, 🗎 6-1).*

Submenu Instrument Software

Depending on the installation, the sub-menu **Instrument Software** may contain the following items:

- **Release Info:** Provides detailed information about the current release of the software. The information provided corresponds to the one you can view during the installation of the software.
- **Setup and Service:** The Setup and Service software is used to set up and test an instrument or parts of it at the customer’s site after mechanical installation. Most chapters in this manual are dedicated to the Setup and Service software.
- **SnS Selector:** Allows to select a specific Instrument Software version if more than one version is installed (see cross references).
- **Worktable Complete Editor:** Allows you to define containers, racks, carriers and worktable maps (see cross references).
- **Remote Support:** Invokes the remote support tool “GoToMeeting” (see cross references).

5.1.2 Main Window

Computer Communicates with Instrument

After the start of the Setup and Service software, as soon as the computer communicates with the instrument, the **Main Window** appears as shown below.

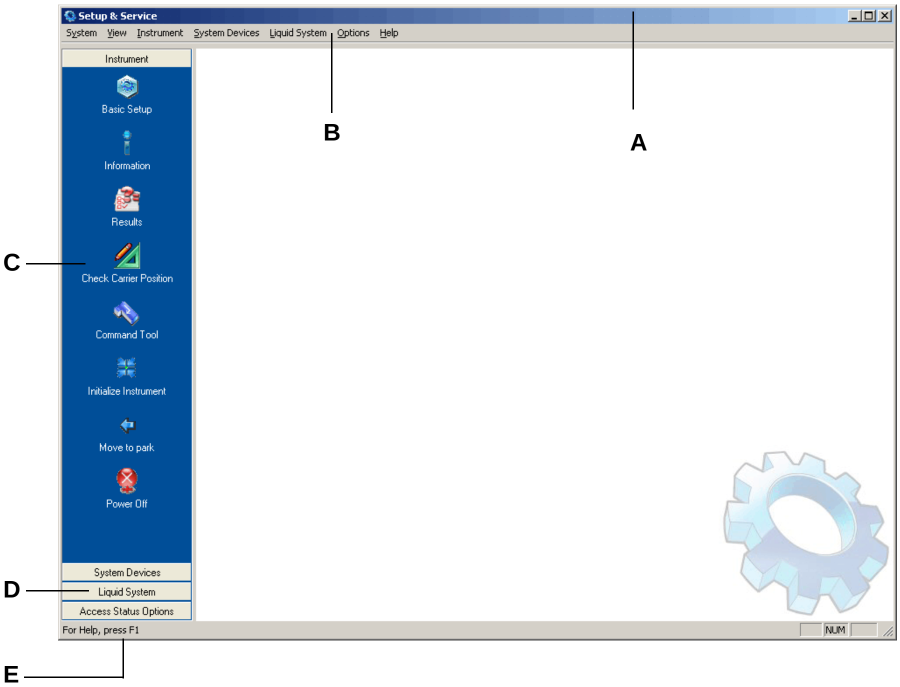


Fig. 5-2 Setup and Service software, main window

The previous figure shows the most important elements on the **Main Window**:

- **Title bar (A)**: Shows the name of the software, **Setup and Service**. Also contains the Windows standard **MinImize**, **Maximize / Reduce** and **Close** buttons.
- **Menu bar (B)**: Shows all menus that are possible for the installed configuration.
  - The items you see when you open a menu correspond to the devices and options you selected during the installation.
  - Note that the menus and their items are always shown, regardless of whether the whole instrument or individual devices/options really communicate with the computer (also see next paragraph).
  - The **View** and the **Help** menus are always present.
- **Panel bar (C and D)**: Unlike the menu bar, the panel bar on the left side shows those menus and items that are currently “active”, i.e. the devices/ options that really communicate with the computer (also see next paragraph). Please note:
  - The look and behavior of the panel bar correspond to that of the Microsoft Outlook tool bar.
  - The menus appear as command buttons. You can expand or collapse a menu by clicking on the respective caption.
  - If you expand a menu, its items appear as icons. If you click on an icon, the corresponding panel opens
    - Item (C) in the figure is an expanded menu.
    - Item (D) in the figure are collapsed menus.

  - We recommend you to expand and collapse some of the menus so that you can see for yourself how the panel bar works.
- **Status bar (E)**: If you move the mouse pointer over a menu item on the top of hte window, a short description of the item appears on the status bar. Note that the status bar can be turned on or off via the **View** menu.

No Communication (Simulation Mode)

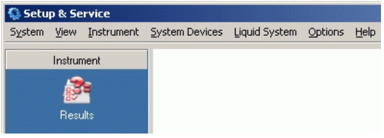


Fig. 5-3 Simulation mode

If the instrument does not communicate with the computer (because it is switched off or not connected properly), the software is in the so-called **Simulation Mode**. If the **Results** panel was selected during the installation, the associated icon is the only item that appears on the panel bar.

***Note:** Unlike with previous program versions, the string “Simulation Mode” does not appear on the title bar.*

Menus

Depending on the instrument type selected during the installation, the following menus may appear on the menu bar

Tab. 5-1 Overview of Menus

Designation	**Explanation**	Details see
System	General functions that are independent of the instrument, a system device or an option.	6, 🗎 6-1
View	Shows/hides the status bar at the bottom of the main window.	5.1.8, 🗎 5-12
Instrument	Instrument-specific functions: Basic Setup, Initialize instrument, Command Tool, Information.	7, 🗎 7-1
System Devices	Setup and test of PosID, LiHa, Air LiHa, PnP, RoMa, CGM, MCA, Vector, Move Test	8, 🗎 8-1
Liquid System	Setup and test of the liquid system: DiTi/Lower DiTi eject test, Liquid Level Detection, Gravimetric Test, Colorimetric Test, YCPO, PMP Function, Te-Fill, Waste Pump	10, 🗎 10-1
Options	**Options 1:** Setup and test of Heated Incubators, Heating Blocks, Te-Thermix, Te-MagS, Te-Shake.	11, 🗎 11-1
	Options 2: Setup and test of Access Status Options, CSV, Flipper, Te-Link, Te-VacS, Repositioner, Te-Stack	12, 🗎 12-1
	Multichannel Functions: Setup and test of Te-MO, Wash Unit, Refill, Aquarius, AutoLoader:	13, 🗎 13-1
Help	The help system provides context-sensitive on-screen help. The menu contains the following items. • **Contents**: Shows the whole contents of this manual on screen.	5.1.3, 🗎 5-5

Tab. 5-1 Overview of Menus

Designation	Explanation	Details see
	• **Index**: Lets you select any of the index entries in chapter “Index” at the end of this manual and opens the page(s) on which they occur. • **Search**: Searches for the keyword entered and lists the sections in which it occurs. **About**: This item is always available. It shows the current program version.	

5.1.3 Help System

Cross References

List of cross references to information provided in other sections:

Information	References
Maintenance program, Modify function	See section 4.4.3, 🗎 4-18

Purpose

The context-sensitive help system provides on-screen help. During the installation of the Instrument Software it is preselected by default and its use is highly recommended.

Note: *If the help system is not available because it was deselected during the installation, you can install it using the* ***Modify*** *function of the* ***Maintenance*** *program (see cross references).*

Using Help Contents…

This is the most important function of the help system. Note that the other two help functions **Index** and **Search** can also be invoked via the **Contents…** feature.

To call up the **Contents** function:

1. From the menu bar, select **Help > Contents…** This opens the on-screen help of the Instrument Software manual with activated **Contents** page.
2. To obtain the chapter structure of the book as shown in the following figure, click on the (+) node left of the item **Instrument Software**.

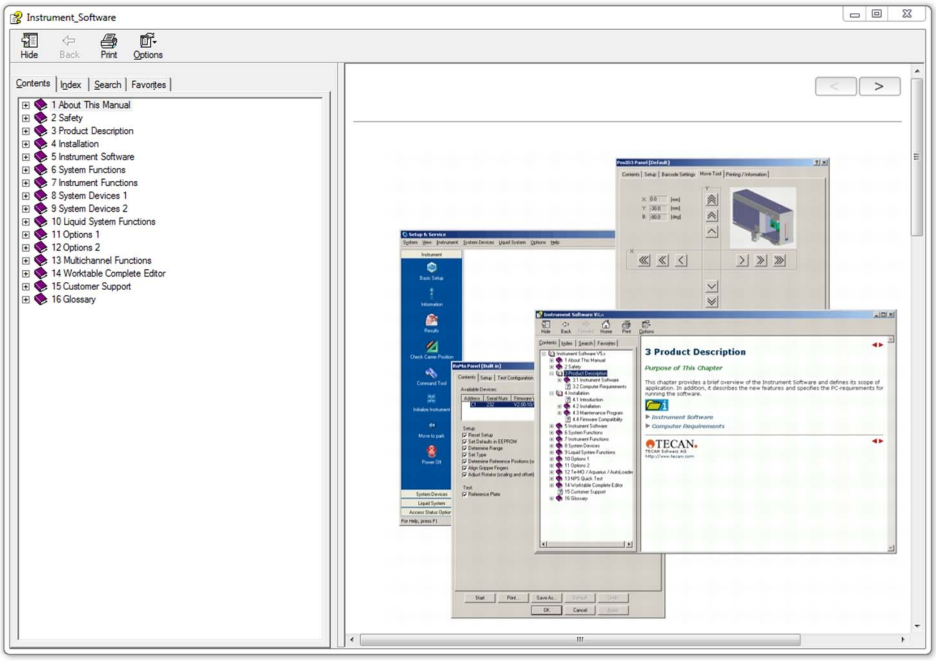
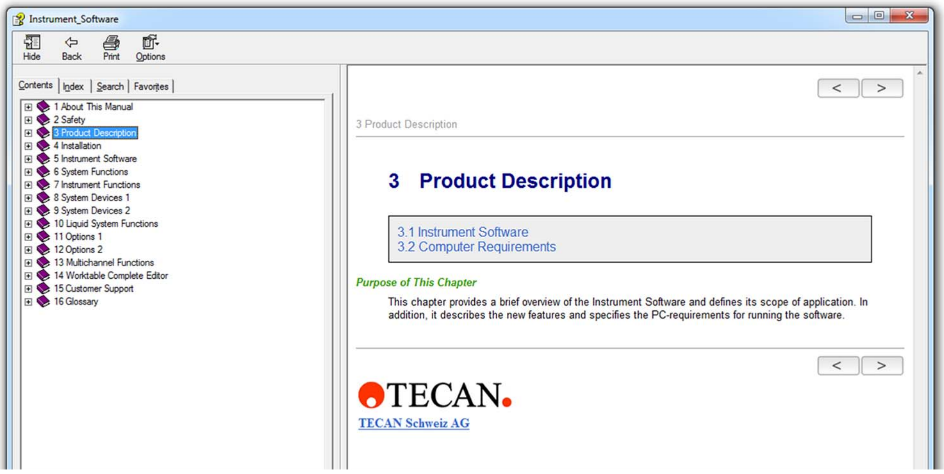


Fig. 5-4 *On-screen help, book structure*

3 You can navigate through the whole manual by expanding/collapsing further nodes. An example is shown on the following screen.



3 Product Description

3.1 Instrument Software
3.2 Computer Requirements

Purpose of This Chapter

This chapter provides a brief overview of the Instrument Software and defines its scope of application. In addition, it describes the new features and specifies the PC-requirements for running the software.

TECAN Schweiz AG

Fig. 5-5 *On-screen help, chapter*

Most Important Features of Help System

The following table summarizes the most important features of **Help Contents…**

Tab. 5-2 Summary of features of the help system

Information	Description
Contents Page	Shows the on-screen version of the Instrument Software Manual
Index Page	Lets you select any of the index entries (i.e. the entries in chapter “Index” of the printed book or the PDF-file).
Search Page	Text search
Favorites Page	Lets you define your own favorites, i.e. shortcuts to frequently used sections.
📂i	“Subsections” symbol. This symbol appears on pages containing sub-pages. The list below the symbol contains the hyperlinks to the corresponding subsections. Note: The symbol is missing if a section has no subsections.
< >	Navigation buttons. Let you move to the previous / next section in the manual.
Function key F1 on keyboard	While you are working with the software you can use the F1 function key to get additional help as follows: • If you are using a page (Setup, Test Configuration, Tools page, etc.) and press the F1 key, the corresponding page description in the manual is displayed (provided the page has the focus). • If you highlight a setup or test procedure on the **Contents** page (by clicking on the procedure name) of a panel and press the F1 key, the description of the highlighted procedure is displayed. Note that this works, even if the procedure is not selected with a check mark. • If you press the F1 key after you have started a setup or test, you will still get the description of a possibly highlighted procedure on the Contents page. • If during the test you are instructed to use a page (Setup, Test Configuration, Tools page), you will get the description of the respective page as long as it has the focus.
?	“Show more information” symbol. If you encounter this symbol on a process prompt, you can click on it to obtain additional information about the procedure to perform. The effect is the same as if you pressed the F1 key.

5.1.4 Starting the Program

Cross References

List of cross references to information provided in other sections:

Information	References
Connect instrument to the computer	See section 5.1.2, 🗎 5-3
SnS Selector	See section 4.3.2, 🗎 4-11
User Management System	See section 6.5, 🗎 6-3
Define communication (COM or USB port)	See section 6.6, 🗎 6-15

ATTENTION

Setup and calibration data affect the performance of every instrument operation. Carefully follow the dialogs in the relevant modules and read this manual when changing any of these settings.

Normal Start with Login

User Account

To start the Setup and Service software and use its functions you must have a user account, a user name and a password, otherwise you have no access to the program. If necessary, ask the system administrator to set up a user account with the appropriate rights for you. For additional information refer to the description of the User Management System (→ Cross References).

Assuming that you have a user account (user name and password), do the following to start the software:

1 Double-click the Setup and Service icon on the desktop or use the Windows Start menu and select **Start > All Programs > Tecan > Instrument Software <version> > Setup and Service**.

Note: *If you have more than one Instrument Software installed on the PC use the SnS Selector utility to start an "older" software version* (→ Cross References).

Login Dialog

*The **Login** dialog (see following figure) appears.*

The user name and password have to be entered for login.

User Name: JOSM

Password: ********

Fig. 5-6 *Login dialog*

2 Enter your user name and password and click **OK.**

Note that these entries are case-sensitive.

The Setup and Service software starts up. The program uses the standard Windows keys and key functions. It can be controlled with the mouse or the keyboard. However, not all functions are accessible to users without a mouse.

Special Case: Predefine User Name and Password

Special Users Only

Note: *In principle, it is possible to predefine your user name and password so that you can start the Setup and Service software without having to enter them at every program start-up. However, you should do this only in the following cases:*

- *If you are the only person in your organization who uses the Setup and Service software on this PC and if nobody else has access to it.*
- *If you are a special user (developer, tester, member of production staff) who has to start the Setup and Service software frequently.*
- *If you are fully aware of possible risks and consequences.*

⚠

WARNING

Damage to the instrument (or parts of it) and injuries to personnel possible if users have free access to functions that require a qualified specialist.

- Predefine the password and user name only if you are the only person who uses the Setup and Service software on this PC.
- Never predefine the password and user name when several people must have access to the software (e.g., operators for printing QC-reports).

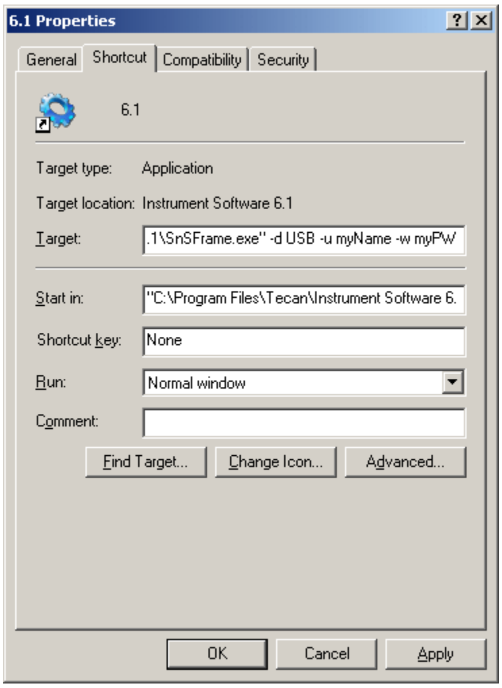
Prerequisite

You must already have a valid user account with user name and password.

Procedure

To predefine the user name and password:

1. Double-click the Setup and Service icon on the desktop or use the Windows Start menu and select **Start > All Programs > Tecan > Instrument Software <version> > Setup and Service**.
2. Press the right mouse button to get the context menu and select **Properties**.



6.1

Target type: Application

Target location: Instrument Software 6.1

Target: .1\SnSFrame.exe" -d USB -u myName -w myPW

Start in: "C:\Program Files\Tecan\Instrument Software 6.

Shortcut key: None

Run: Normal window

Comment:

Fig. 5-7 *Adding the user name and password*

3 Add the following text string after the existing entry in the text box **Target**, for example: **"-u myName -w myPW".**

Important: Enter only the text between the quotation marks, but not the quotation marks themselves.

- **-u** = switch preceding the user name.
- **myName** = user name
- **-w** = switch preceding the password
- **myPW** = password

Note the minus signs before the switches -u and -w and the spaces.

4 If your instrument is connected to the computer via RS-232 and not via USB as shown in the above figure, it is recommended that you change the entry "**-d USB**" to "**-d COM**" For more information follow the instructions provided in section "Communication" (see cross references).

5 Make sure that your entries are syntactically correct.

6 Click **OK** to save your entries.

From now on you can start the Setup and Service software without having to enter your user name and password.

Note: *Keep in mind that, despite this entry, your password will expire after a predefined number of days. When your password expires:*

- *You must define a new one as described in the previous section.*
- *Then you must enter your new password in the **Target** text box on the **Properties** window as described above.*

5.1.5 Quitting the Program

To quit the Setup and Service software:

1 Select **System > Exit** or click the **Close** button of the main window. You are logged out automatically, the main window is closed and the communication to the instrument is disconnected.

5.1.6 Power Off

Cross References

List of cross references to information provided in other sections:

Information	References
LiHa Channel Page	See sections 8.6.5, 🗎 8-84

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This command lets you switch off the following devices so that they can be moved freely along their axes:

- LiHa (all axes)
- Air LiHa (all axes are switched off, Z-axis must be released mechanically)
- RoMa (all axes)
- PnP (X-, Y- and Z-axes)
- PosID (X- and Y-axes)
- MCA / CGM (all axes are switched off, Z-axis must be released mechanically)

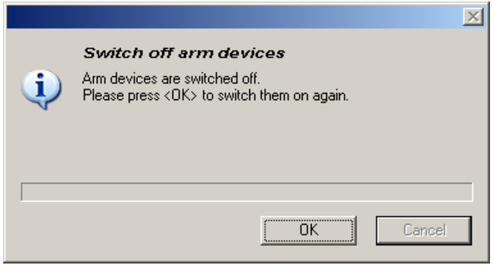
Note: *The function does not switch off the following parts:*

- *PosID; Scanner head*
- *PnP: Rotator/gripper*
- *MCA384: S- and P-axis*

Procedure

To switch off the above arm devices:

1 Click the icon on the toolbar or select **System > Instrument > Power Off**.



Switch off arm devices

Arm devices are switched off.
Please press <OK> to switch them on again.

The prompt shown on the left appears on the screen:

If necessary, you can move the arm device into another position that is more convenient for you (restrictions see above).

Fig. 5-8 *Switch off arms*

2 To switch the arm devices on again click on **OK** on the prompt.

__Note:__ The following applies to the LiHa and Air LiHa:

- *You should not use this function to remove, mount or change the tips on the LiHa. Use the **Change Tips Move** command button on the LiHa or Air LiHa **Channel Page** instead, which is more suitable for this purpose (→ Cross References).*
- *If you nevertheless actuate the tip adapters while the LiHa is switched off, it will be reinitialized when the **OK** button is clicked.*

5.1.7 Move to Park

Purpose

This command lets you move the following devices to their initialization positions on the left side of the instrument:

- LiHa and Air LiHa (all axes)
- RoMa (all axes)
- PnP (X-, Y- and Z-axes)
- PosID (X- and Y-axes)
- MCA (all axes)

Procedure

To move the above arm devices to their initialization positions:

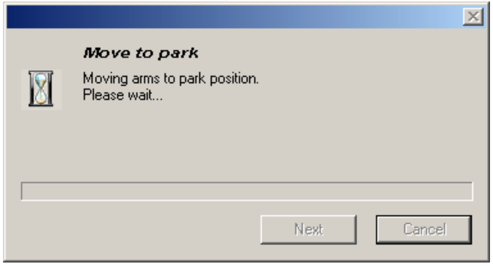
1 Click the icon on the toolbar or select **System > Instrument > Move to Park**.

Possible Messages

Move to park

System not initialized.

This message appears if you click the Move to park symbol before the system is initialized.



Move to park

Moving arms to park position.
Please wait...

This message indicates that the arms are being moved to their parking positions.

Fig. 5-9 *Move to park*

5.1.8 View Menu

This menu has only one function: It switches the status bar at the bottom of the Setup and Service main window on or off.

5.2 Standard Panel

5.2.1 Introduction

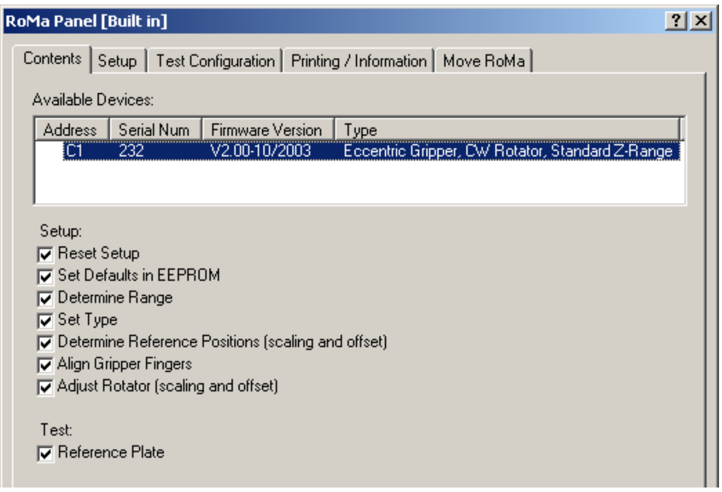
Cross References

List of cross references to information provided in other sections:

Information	References
Connect instrument to computer	See section 5.1.2, 🗎 5-3
Command buttons	See section 5.2.2, 🗎 5-15
Releasing an individual page	See section 5.2.3, 🗎 5-16

Description

Many items of the Setup and Service software menu open a function panel that is subdivided into several tabbed pages. The number and types of pages vary according to the panel's purpose. The following example shows the **RoMa** panel.



Available Devices:

Address	Serial Num	Firmware Version	Type
C1	232	V2.00-10/2003	Eccentric Gripper, CW Rotator, Standard Z-Range

Setup:
☑ Reset Setup
☑ Set Defaults in EEPROM
☑ Determine Range
☑ Set Type
☑ Determine Reference Positions (scaling and offset)
☑ Align Gripper Fingers
☑ Adjust Rotator (scaling and offset)

Test:
☑ Reference Plate

Fig. 5-10 *Example of a panel (RoMa)*

Panel Body

The body of a panel consists of three parts:

- The title bar
- The individual pages. To change to another page click the corresponding tab.
- The command buttons at the bottom.

Title Bar

Contains the name of the panel and a text in square brackets. The text varies depending on how test parameters are defined:

- "User defined" means that the test configuration parameters were altered by the user and do not correspond to the factory-set default values.
- "Built in" means that hard-coded parameters are used.
- "Default" means that the default test parameters read from a file are used.
- <Filename.any>: The test parameters loaded from a user-defined file are used.

Some Typical Pages

The following table lists some typical pages that occur in all or many panels.

Tab. 5-3 Typical pages in a panel

Page	Purpose
Contents	Lists the devices to setup/ test and the possible setup and test procedures
Worktable Page	Shows the layout of the selected worktable map (arrangement of carries, racks, wash stations, etc.) on the worktable
Setup	Lets you define the setup parameters
Test configuration	Lets you set the test parameters
Move	For devices and options that have movable parts. Used to move the whole device or parts of it.
Printing / Information	Lets you compile a QC-report and view certain parameters and data.

Command Buttons

The command buttons near the bottom of the panel let you perform the required action (→ Cross References).

Using a Panel

Typically, you use a panel as follows:

1 Start the panel from the menu. Example: **System Devices > RoMa**. This opens the panel's **Contents** page.

2 From the **Available Devices** list, select the device you want to set up or test.

3 In the sections **Setup** and **Tests**, select the check boxes of the setup/test procedures to perform.

Note: *You can proceed in two ways:*

- *You can select ALL* **Setup** *and* **Test** *check boxes at once and enter the necessary data by clicking the corresponding tabs. Then press the* **Start** *button and all setup/test procedures will be carried out in one run.*
- *Alternatively, you can select one or more* **Setup** *and* **Test** *check boxes and define the necessary data as described. When you press the* **Start** *button the currently selected setup or test procedures will be performed.*
- *If you choose the second method you should begin with the topmost setup/ test procedure and then “work downwards”. Use the second method above all to repeat an individual setup/test procedure.*

4 Where available, use the **Setup, Test Configuration** or **Worktable** pages to view / define the setup and test parameters or worktable layouts.

Note: *In certain cases it may be useful to “release” or separate a page from a panel. For more details (see cross references).*

5 Before starting the setup and test procedures, change to the **Printing / Information** page and fill out the **Comment** fields (recommended).

Note: *The user name under which you have logged in to the Instrument is inserted automatically in the* **Operator** *field. However, you must fill out the* **Comment** *field BEFORE running any tests, otherwise your comments will not appear in the QC-report.*

6. Click **Start** to begin. Where necessary, you will be guided through the setup and test procedures by process prompts that inform you what to do next.
7. Strictly follow the instructions provided. You will be notified when the selected setup or test procedures are finished.
8. After performing the required setup and test procedures you can view device data, parameters, diagnostic data and results as follows:
   - Use the **Printing / Information** page
   - Some panels show this information also on separate **Information**, **Diagnostics** or **Result** pages.

Note: *New panels no longer have* ***Information, Diagnostic*** *or* ***Results*** *pages since the corresponding information is also available on the* ***Printing / Information*** *page. However, you may still find* ***Information, Diagnostic*** *or* ***Results*** *pages on older panels (e.g., Te-MagS).*

9. Use the **Printing / Information** page to preview or print out the QC-report.

5.2.2 Command Buttons

Cross References

List of cross references to information provided in other sections:

Action	References
Connect instrument to computer	See section 5.3, 🗎 5-29
Reload user-defined configuration data	See section 6.7, 🗎 6-17

The command buttons near the bottom of the panel let you perform the required action.

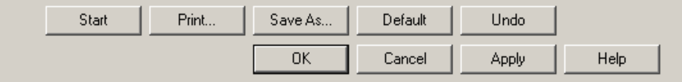


Fig. 5-11 *Command buttons*

Tab. 5-4 *Command buttons*

Button	Explanation
Start/Stop	Toggle button. Caption changes from **Start** to **Stop** and vice versa.
	Start. Starts the selected procedure(s). Caption changes to **Stop**. Setups and tests can be started under the following conditions: - If a device is selected in the **Available Devices** section. - If at least one setup or test procedure is selected - If valid data have been entered on the corresponding pages. Note: If you select more than one procedure, they are executed in the sequence as listed on the **Contents** page. The topmost procedure is executed first.

Tab. 5-4 Command buttons (cont.)

Button	Explanation
	Stop. Stops a running procedure. Caption changes to **Start**. On the **Contents** page, the check boxes of executed procedures are marked gray, the others remain black. Execution can be resumed with **Start** if no settings are changed.
Print	Prints the test results or the QC-report (if implemented)
Save As	Opens the standard Windows **Save As** dialog box to save user-defined test configuration data in an appropriate *.any file . Enter the full file name (with extension .any). **Note**: User-defined test configuration data can be reloaded with **System > Configurarion** (→ Cross References).
Default	Resets setup or test configuration parameters that were changed by the user to their predefined default values. The title bar of the panel and the QC-report show whether the test configuration data correspond to the predefined default values or whether they are user-defined. **Note**: In case the test configuration data are user-defined the file-name appears in both the title bar of the panel and in the QC-report.
Undo	Reloads the previous settings.
OK	Applies the defined values and closes the panel.
Cancel	Closes the panel, but does not apply any changes.
Close	Closes the panel.
Apply	Applies the defined values, but does not close the panel. The window remains open. After clicking **Apply**, the caption of the **Cancel** button changes to **Close** and **OK** is dimmed.
Help	Invokes context sensitive help for the panel on which the button is pressed.

5.2.3 Releasing Pages from a Panel

Purpose

In certain cases it may be useful to separate a page from a panel. The separated page then stays on the screen as shown in the following example.

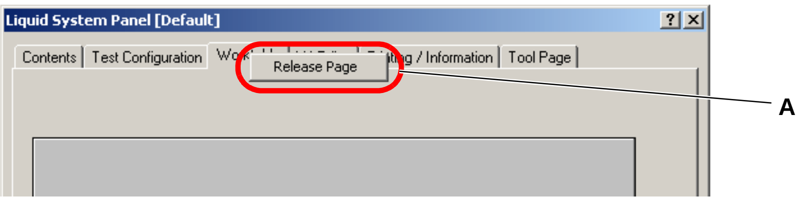
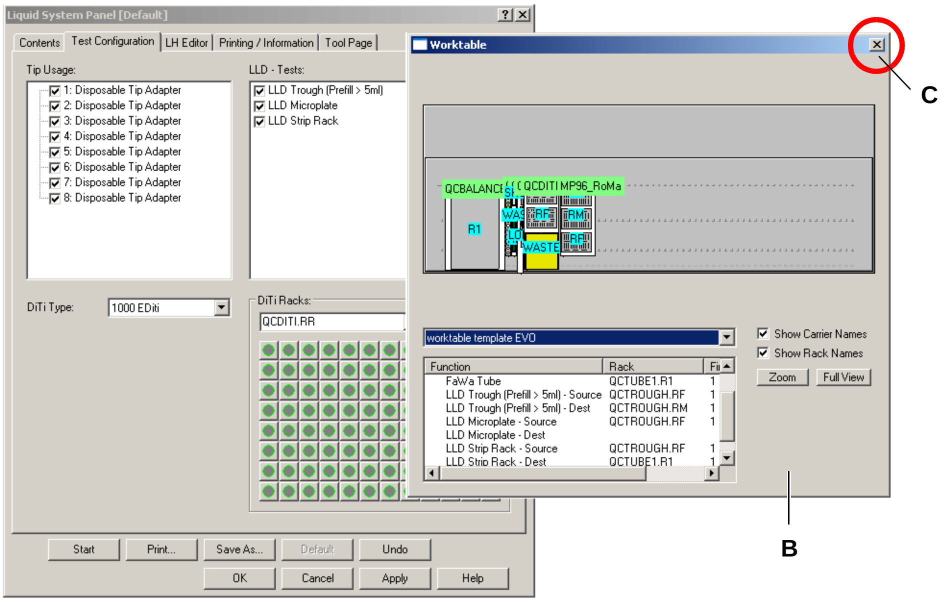


Fig. 5-12 Release (separate) a page, (example)



Tip Usage:
☑ 1: Disposable Tip Adapter
☑ 2: Disposable Tip Adapter
☑ 3: Disposable Tip Adapter
☑ 4: Disposable Tip Adapter
☑ 5: Disposable Tip Adapter
☑ 6: Disposable Tip Adapter
☑ 7: Disposable Tip Adapter
☑ 8: Disposable Tip Adapter

LLD - Tests:
☑ LLD Trough (Prefill > 5ml)
☑ LLD Microplate
☑ LLD Strip Rack

DiTi Type: 1000 EDiti

DiTi Racks: QCDITI.RR

worktable template EVO

☑ Show Carrier Names
☑ Show Rack Names

Function	Rack	Fi
FaWa Tube	QCTUBE1.R1	1
LLD Trough (Prefill > 5ml) - Source	QCTROUGH.RF	1
LLD Trough (Prefill > 5ml) - Dest	QCTROUGH.RM	1
LLD Microplate - Source	QCTROUGH.RF	1
LLD Microplate - Dest		
LLD Strip Rack - Source	QCTROUGH.RF	1
LLD Strip Rack - Dest	QCTUBE1.R1	1

Fig. 5-13 Separated page (example)

A	*Context menu*	*C*	*Close button*
B	*Separated page*		

Separating a Page

Any page can be separated from its parent panel. The following example shows the separation of the **Worktable** page from the **Liquid System** panel.

To separate a page from a panel:

1 Open the panel and select the page you wish to separate by clicking on its tab.
2 Place the mouse pointer over the tab and click the right mouse button.
*The context menu with one entry, **Release Page**, appears.*
3 Click on the context menu again.
This separates the page from the panel.
4 You can now drag the separated page aside as necessary.

Docking a Separated Page

To dock a separated page again to its panel.

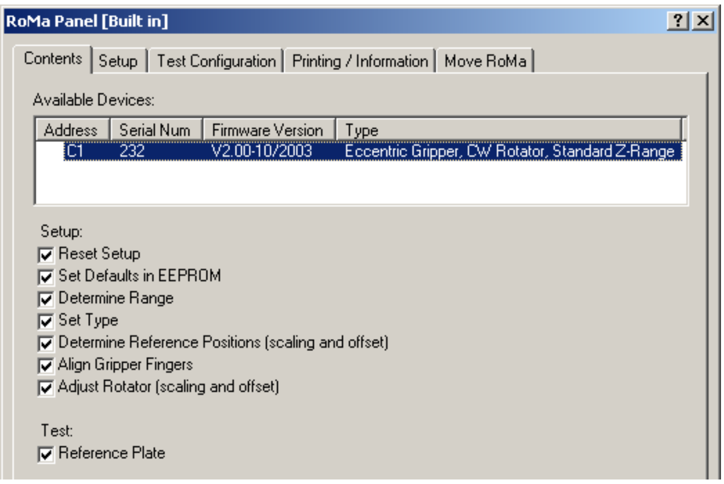
1 Click on the **Close** button (C) of the separated page.

5.2.4 Contents Page

Description

The **Contents** page consists of three sections:

- The list box **Available Devices** on the **Contents** page shows the selectable devices See below.
- Below the list box there are usually two groups of check boxes:
  – **Setup**: Lets you select the setup and calibration procedures
  – **Tests**: Lets you select the test you want to run.
- By selecting one or more setups or tests you define what you want to do:



Available Devices:

Address	Serial Num	Firmware Version	Type
C1	232	V2.00-10/2003	Eccentric Gripper, CW Rotator, Standard Z-Range

Setup:

☑ Reset Setup
☑ Set Defaults in EEPROM
☑ Determine Range
☑ Set Type
☑ Determine Reference Positions (scaling and offset)
☑ Align Gripper Fingers
☑ Adjust Rotator (scaling and offset)

Test:

☑ Reference Plate

Fig. 5-14 *Example: RoMa panel*

Device Selection

As can be seen the available devices are listed in the **Available Devices** section on the corresponding **Contents** page. The behavior of the software depends on the number of physically connected devices.

Tab. 5-5 *Device Selection*

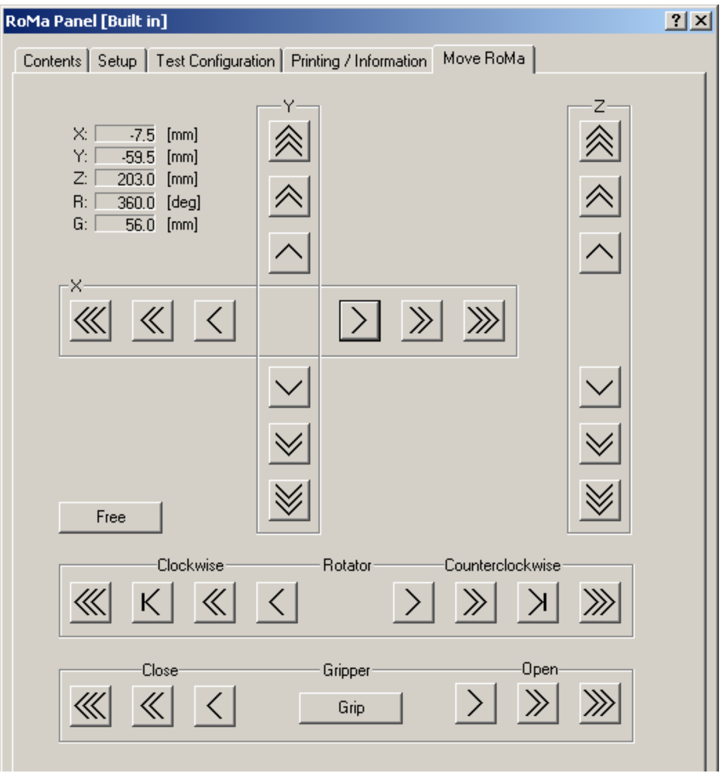
No of Devices	Behavior
0	No device available. When the **Start** button is clicked an error message appears on the screen.
1	The connected device is automatically selected and its settings are read automatically [a)]
2 or more	None of the connected devices are selected. You must select one of them, then its settings are read.

a) Devices without a valid serial number are not automatically selected

5.2.5 Move Pages

Description

The panels of system devices and options containing movable parts (e.g., RoMa, LiHa) have a **Move Tool** page. Such a **Move Tool** page lets you move the whole device or parts of it in certain movement axes. The following example shows the RoMa **Move Tool**.



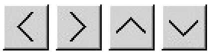
X: -7.5 [mm]
Y: -59.5 [mm]
Z: 203.0 [mm]
R: 360.0 [deg]
G: 56.0 [mm]

Fig. 5-15 *Example: RoMa Move Tool page*

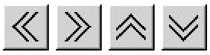
Note: *in this section, only the movement buttons are described. For the other controls you may encounter on a specific* ***Move Tool*** *page, refer to the description of the respective system device or option.*

Movement Buttons

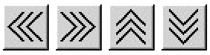
Depending on the parts that can be moved, a **Move Tool** page contains some or all of the following movement buttons:



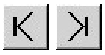
Single step (1/10 mm or 1/10 °) movement/rotation buttons.



Ten steps (1 mm or 1 °) movement/rotation buttons.



Continuous movement/rotation buttons (if button is kept pressed).



Special buttons to move certain parts to specific logical positions. For details refer to the **Move Tool** page of the corresponding option or device.

Note:

- *The arrows on the movement buttons indicate the direction in which the respective parts will be moved.*
- *If you place the mouse pointer over a movement button, a text appears that explains what you can do with the button (so-called “tool tip”),*

Keyboard Control

Instead of the movement buttons you can also use certain keyboard keys to move parts.

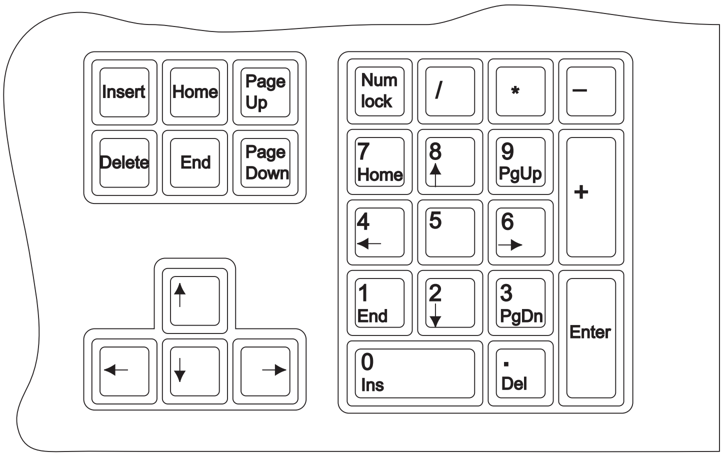


Fig. 5-16 Movement keys

The keys that can be used are located in the numeric keypad on the right side of the keyboard. If you want to use the keys of the numeric keypad make sure the Num Lock key is switched on (if there is a Num Lock indicator lamp it must be turned on).

Directions

Moving directions depend on the specific device or option and are not described here.

Steps

Movable parts are moved as follows:

- Every time you hit one of the above keys the part is moved/rotated by one step (0.1 mm or 0.1 degree).
- If you keep the key pressed it is moved/rotated continuously with increasing speed (start speed, acceleration and speed depend on the device).

5.2.6 Setup and Test Configuration Pages

Before you can run setup or test procedures you must usually make a number of settings on the **Setup** and **Test Configuration** pages. See corresponding panels for details.

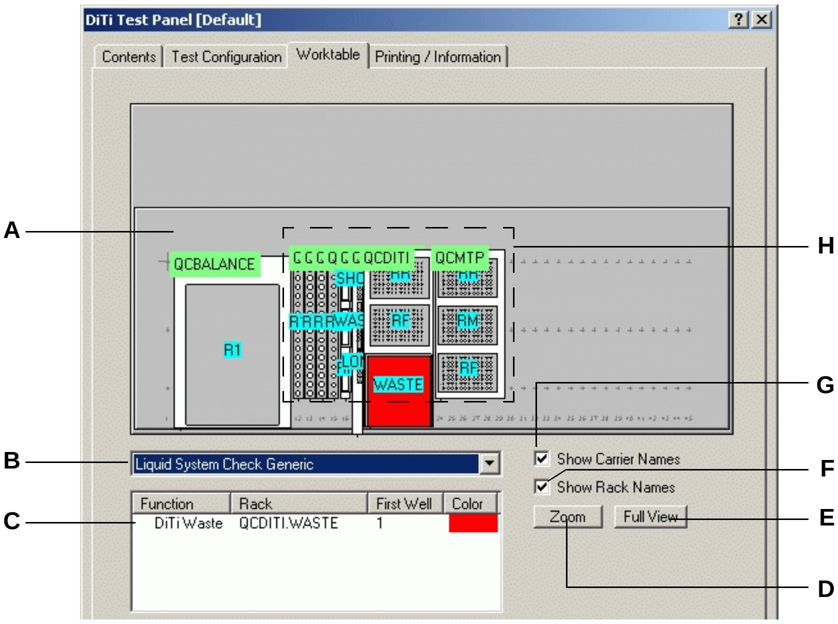
5.2.7 Worktable Page

Purpose

The **Worktable** page is needed by certain **System Device** and **Liquid System** functions. It lets you select an appropriate worktable map that is adapted to a specific function.

Example

The following figure shows an example of worktable map. It can be used, for instance for the **(Lower) DiTi Eject Test** or a **Gravimetric Test** that uses the AG 285 or AG 245 balance.



Liquid System Check Generic

Function	Rack	First Well	Color
DiTi Waste	QCDITI.WASTE	1	🟥

Fig. 5-17 Example: Worktable map for DiTi eject test

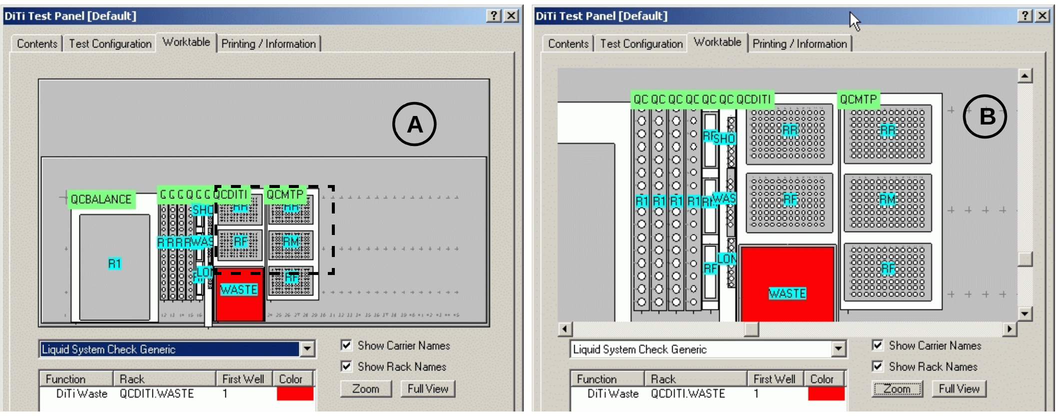
The worktable page contains the following elements:

Tab. 5-6 Controls on Worktable page

Item	Element	Description
A	**Upper window**	Worktable map
B	**List box for worktable maps**	Lets you select a suitable worktable map.
C	**Rack list**	Describes the racks on the worktable that are relevant for the test.
D	**Zoom**	This command button lets you zoom in the marked area (H) so that it will be magnified (see following figure)
E	**Full View**	Returns to the full view where you can see the whole worktable as shown in Fig. 5-17 , 🗎 5-21.
F	**Show Rack Names**	Check box that lets you show or hide the names of racks.
G	**Show Carrier Name**	As above for carrier names.
H	**Dashed line H**	Rectangle you can draw with mouse when you want to zoom into the marked area.

Zoom Function

You can use the **Zoom** command button to magnify a certain area on the worktable map.



Liquid System Check Generic

☑ Show Carrier Names
☑ Show Rack Names

Function	Rack	First Well	Color
DiTi Waste	QCDITI.WASTE	1	🟥

Fig. 5-18 *Magnifying a part of the worktable map*

To magnify a part of the worktable map:

1 Click on the button **Zoom**.

2 Place the mouse pointer in the upper left corner of the area you want to magnify, as shown in figure (A).

3 With the mouse key pressed, draw a rectangle over the area you want to magnify (dashed line in above figure), then release the mouse pointer.

The marked area appears now magnified, see figure (B).

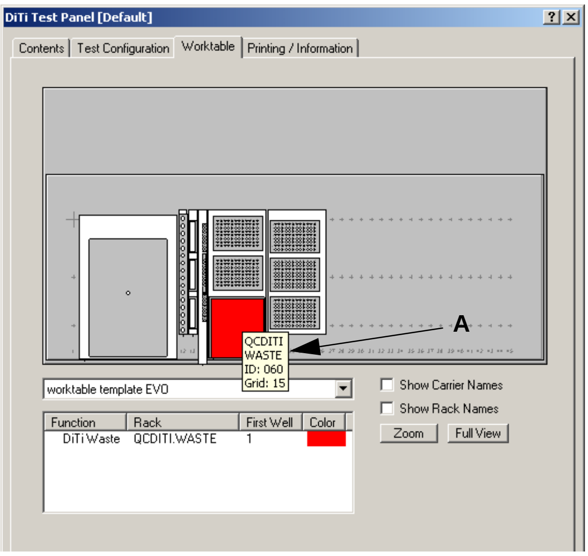
To zoom out, i.e. to return to the full view:

1 Click the button **Full View**.

The worktable map is shown in its original form.

Labware Tooltip

When moving the mouse cursor over a labware on the worktable, the appropriate tooltip is displayed.



QCDITI
WASTE
ID: 060
Grid: 15

worktable template EVO

☐ Show Carrier Names
☐ Show Rack Names

Function	Rack	First Well	Color
DiTi Waste	QCDITI.WASTE	1	🟥

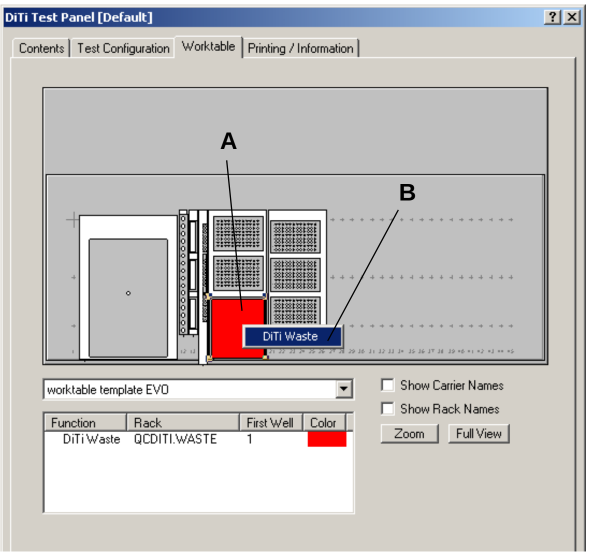
The displayed tooltip shows:

- Carrier / Rack name
- Rack position (RF/RM/RR)
- Carrier ID (from barcode)
- Grid position

Fig. 5-19 *Labware tooltip*

Selection of Labware

Labware can be selected with the mouse on the worktable map.



worktable template EVO

Function	Rack	First Well	Color
DiTi Waste	QCDITI.WASTE	1	🟥

Fig. 5-20 *Select carrier on worktable map*

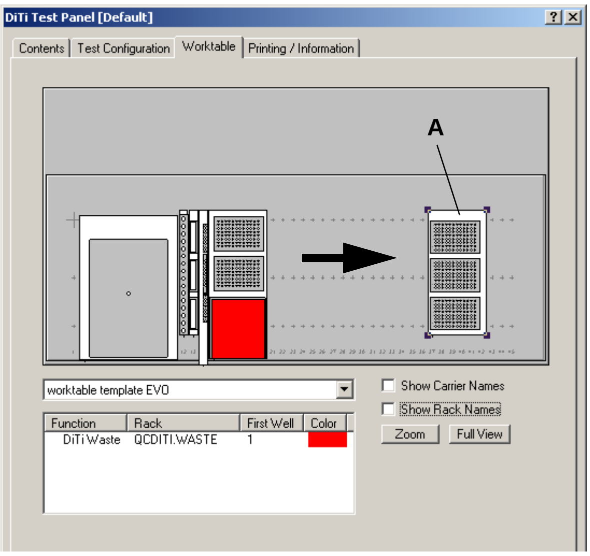
To select a labware on the worktable map:

1. Move the mouse cursor over the labware on the worktable map and select it by clicking the left mouse button.

   The labware gets framed with handles at the corners (A).
2. Click the right mouse button on the selected labware to see the **Function** tag (B).

Drag and Drop Labware

Carriers can be moved and positioned with the mouse on the worktable map.



worktable template EVO

Function	Rack	First Well	Color
DiTi Waste	QCDITI.WASTE	1	🟥

Fig. 5-21 *Drag and drop labware*

To move a carrier:

1. Select the carrier with the mouse by clicking on it with the left mouse button.

   The carrier gets framed with handles at the corners (A).
2. With the mouse cursor on the carrier and the left mouse button pressed move the selected carrier to the target position (see arrow) and release the mouse button.

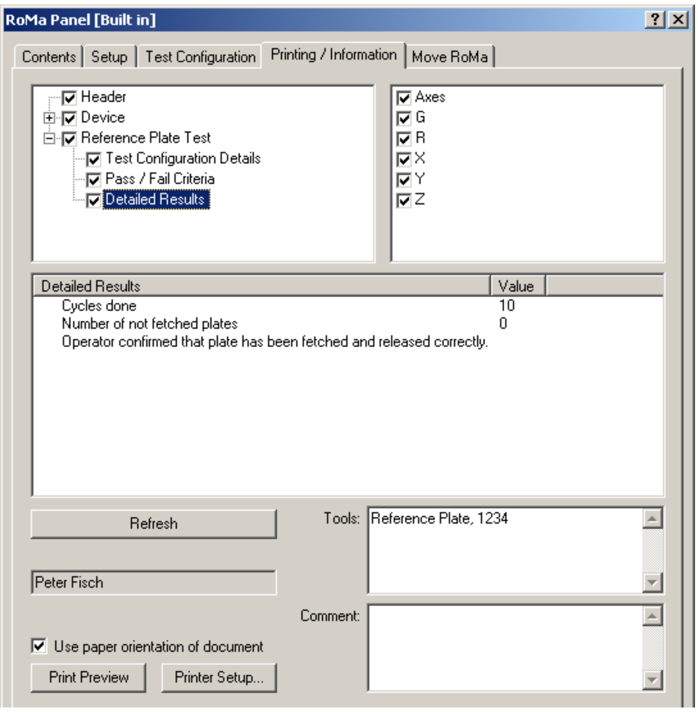
5.2.8 Printing / Information Page / QC-Report

Printing Page

Function

The **Printing / Information** page of a panel allows you to do the following:

- It lets you compose a QC-report that meets your requirements.
- In addition, you can use it to view certain data and parameters, such as device parameters, diagnostic data and test results. The available information depends on the device to which the page refers.



☑ Header
☑ Device
☑ Reference Plate Test
  ☑ Test Configuration Details
  ☑ Pass / Fail Criteria
  ☑ Detailed Results

☑ Axes
☑ G
☑ R
☑ X
☑ Y
☑ Z

Detailed Results	Value
Cycles done	10
Number of not fetched plates	0
Operator confirmed that plate has been fetched and released correctly.	

Tools: Reference Plate, 1234

Peter Fisch

Comment:

☑ Use paper orientation of document

Fig. 5-22 RoMa Printing / Information page

The basic structure of the **Printing / Information** page is the same for all panels. The items that can be selected for printing are listed in two boxes near the top of the page. They contain a number of check boxes. The contents of these lists depend on the panel.

The printing page combines the information that was shown in separate **Results**, **Information** and **Diagnostic** pages in earlier versions of the Setup and Service software.

The window in the middle contains device and diagnostics data where applicable. The contents depend on the item that is highlighted in the top-left window. The above example shows the printing page of the RoMa panel.

Note:

- *The name of the logged-in user is automatically written into the **Operator** text field (cannot be edited by the user).*
- *The **Tools** must be filled out BEFORE an individual setup or test procedure is performed, otherwise the tool information will not appear on the QC-report.*
- *The **Comment** must be filled out BEFORE the **Start** button is clicked, otherwise the corresponding information will not appear on the QC-report.*
- *Comments should briefly describe why setups or tests were carried out (e.g., “First run”, “Replacement of part X”, “Recalibration of sensor Y”, etc.).*

Controls

The **Printing/Infomation** page contains the following controls:

Upper left window	Check boxes that let you select the information for the printed report. Selections next to a square box with a + or - sign can be expanded/collapsed to show/hide subsections.
Upper right window	Lists those sections that occur more than once in the upper left window. The check boxes let you turn on or off all occurrences of a particular section.
Window in the middle	Contains configuration and diagnostics data. The content depends on the highlighted item in the upper left window.
Refresh	Reloads diagnostic data and refreshes the sample time.
Operator field	Text field in which the full name of the logged-in user is automatically written. This field cannot be edited by the user.
Tools	Field in which the user can write information (tool name and part number or serial number) about the used validated tool(s), (recommended). After each entry the ENTER button brings the cursor to the next line. This field must be filled out BEFORE the setup or test procedure is started (see also previous note).
Comment	Field in which the user can write remarks and comments (recommended). Must be filled out BEFORE the test procedures are started (also see previous note).
Print Preview	Lets you preview the QC-report.
Printer Setup	Starts the Windows dialog to setup a printer.
Use Paper Orientation of Document	If this check box is selected (default), the paper orientation (portrait/landscape) as defined the QC-report is used for printing. If it is cleared, the orientation as defined with **Printer Setup** is used instead.

QC-Report

Purpose

The QC-report summarizes the results of the performed tests. Its content depends on the device it refers to and on the selections you have made on the **Printing / Information** page. The figure on the following page shows an example.

Structure

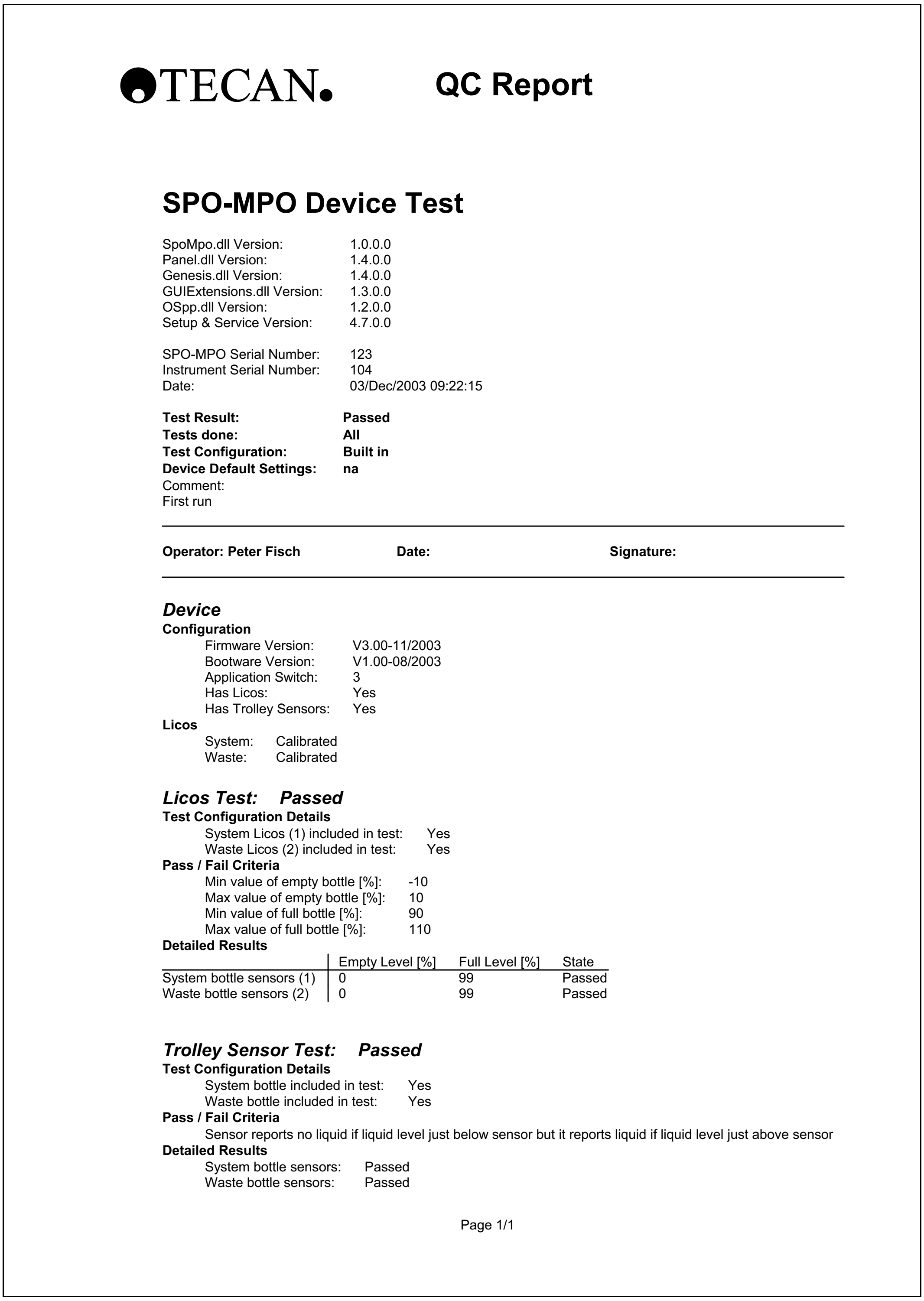
A typical QC-report is subdivided into the following sections:

- **Header:** Shows the following:
  - Device the report refers to, various *.dll versions, firmware and instrument serial numbers

  - Summary of test results, test configuration and settings
  - Comments, name of logged in operator (date and signature beside the operator name must be filled out manually on the hardcopy of the report)
- **Device:** Depending on the device it contains information about:
  - Device configuration, such as firmware and bootware versions, hardware settings, etc.
  - Setup and calibration status.
- **List of performed tests**. Where applicable the following information is provided for each test:
  - Test configuration details
  - Pass/ fail criteria
  - Detailed test results

Example of a QC-Report

The following figure shows an example of a simple QC-report.



TECAN. **QC Report**

SPO-MPO Device Test

SpoMpo.dll Version: 1.0.0.0
Panel.dll Version: 1.4.0.0
Genesis.dll Version: 1.4.0.0
GUIExtensions.dll Version: 1.3.0.0
OSpp.dll Version: 1.2.0.0
Setup & Service Version: 4.7.0.0

SPO-MPO Serial Number: 123
Instrument Serial Number: 104
Date: 03/Dec/2003 09:22:15

Test Result: **Passed**
Tests done: **All**
Test Configuration: **Built in**
Device Default Settings: **na**
Comment:
First run

Operator: Peter Fisch **Date:** **Signature:**

Device
Configuration
Firmware Version: V3.00-11/2003
Bootware Version: V1.00-08/2003
Application Switch: 3
Has Licos: Yes
Has Trolley Sensors: Yes
Licos
System: Calibrated
Waste: Calibrated

Licos Test: Passed
Test Configuration Details
System Licos (1) included in test: Yes
Waste Licos (2) included in test: Yes
Pass / Fail Criteria
Min value of empty bottle [%]: -10
Max value of empty bottle [%]: 10
Min value of full bottle [%]: 90
Max value of full bottle [%]: 110
Detailed Results

	Empty Level [%]	Full Level [%]	State
System bottle sensors (1)	0	99	Passed
Waste bottle sensors (2)	0	99	Passed

Trolley Sensor Test: Passed
Test Configuration Details
System bottle included in test: Yes
Waste bottle included in test: Yes
Pass / Fail Criteria
Sensor reports no liquid if liquid level just below sensor but it reports liquid if liquid level just above sensor
Detailed Results
System bottle sensors: Passed
Waste bottle sensors: Passed

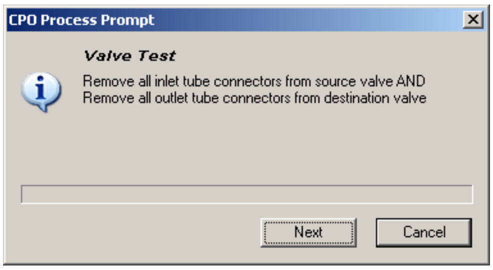
Page 1/1

Fig. 5-23 *Example of a QC-report*

5.2.9 Process Prompts

The various panels of the Setup and Service software contain many setup, alignment and test procedures through which the user is guided by a series of process prompts instructing him / her what to do next. Some examples are given below.

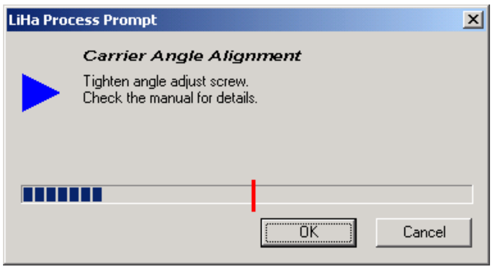
Note: *The examples do not belong to the same procedure. They are only used for illustration.*


CPO Process Prompt

Valve Test

Remove all inlet tube connectors from source valve AND
Remove all outlet tube connectors from destination valve

Ordinary instruction, telling the user what to do next.


LiHa Process Prompt

Carrier Angle Alignment

Tighten angle adjust screw.
Check the manual for details.

Some process prompts show a progress bar providing information about the progress of an action.

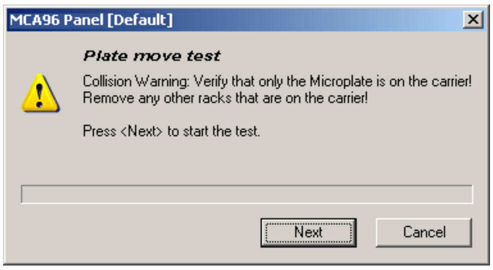
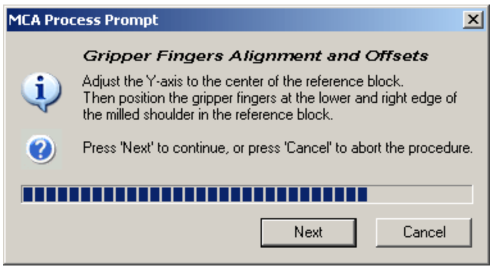

MCA96 Panel [Default]

Plate move test

Collision Warning: Verify that only the Microplate is on the carrier!
Remove any other racks that are on the carrier!

Press <Next> to start the test.

Process prompt warning the user of possible risks (injuries or damage to devices) if certain precautions are disregarded.


MCA Process Prompt

Gripper Fingers Alignment and Offsets

Adjust the Y-axis to the center of the reference block.
Then position the gripper fingers at the lower and right edge of the milled shoulder in the reference block.

Press 'Next' to continue, or press 'Cancel' to abort the procedure.

If a process prompt contains the symbol ? , you can click on it to obtain additional information about the action to perform.

Fig. 5-24 *Examples of process prompt*

5.3 Data Files

The Setup and Service software functions can create several files. These may be helpful for troubleshooting, if a serious failure occurs and you cannot repair it yourself. Call your nearest service organization and mail them the corresponding file(s) or fax them the QC-report in such a case.

Data Path

Depending on the operating system the Instrument Software data will be stored within the following directory.

Windows 7
C:\ProgrammData\Tecan\Setup and Service\<version>

whereas:

<version> = the version of the installed Instrument Software

Note: *For Instrument Software version 6.1 and lower, the default installation path is not version specific.*

In the list below the designation <data_path> is a placeholder for the subdirectory in which the corresponding data is stored.

Result Files

For newer functions, every time a test procedure is started, a result file is created and the test results (all information as on the QC-reports) are written to the directories indicated below.

Saved in directory:	<data_path>\Results
File name:	<function>_<serial_number>_<date>_<time>.any
Example:	TeSonic_103_29Mar2001_09-14-18.any

Log Files

Some functions create a log file and measured values are written into.

Saved in directory:	<data_path>\Log
File name:	Function dependent, see corresponding section.

LogViewer Log Files

Log files for log messages as shown in the LogViewer are stored under the following locations:

Windows 7
C:\ProgramData\Tecan\LoggingServer\LogFile\<log server version>

Test Configuration Files (*.any)

If you save your test configuration data with the **Save As** button at the bottom of the panel, an appropriate *.any file is created and written to the following directory:

Saved in directory:	<data_path>\Config
File name:	<name>.any

Example: MyConfiguration.any

Existing files can be loaded from your user-defined directory with **System > Configuration**. The file name appears in the title bar of the corresponding panel and is printed in the QC-report as “Test Configuration: User Defined [file name]”.

***Note:** For Instrument Software version 6.1 and below, the directory name is \Modules instead of \Config.*

Plate Files

For some functions you can create customized plate files into which your user-specific data is written.

Saved in directory: <data_path>\Config

File name: Function dependent, see corresponding section.

File Open / File Save As

If you have to browse, open or save a file, the software automatically displays the standard Windows **Open** or **Save As** dialog.

Example:

If you want to download a specific firmware file you have to click the appropriate **Browse** button in the **Firmware Download** page to get to the file (see Fig. 7-4, 🗎 7-5). The **Open** dialog is displayed showing the directory (A) where the firmware file is located. By clicking on the down arrow in the **Look in** field (B) you can see the complete path of that directory (C). On the left side of the Open dialog window the directory button **Firmware** (D) is activated.

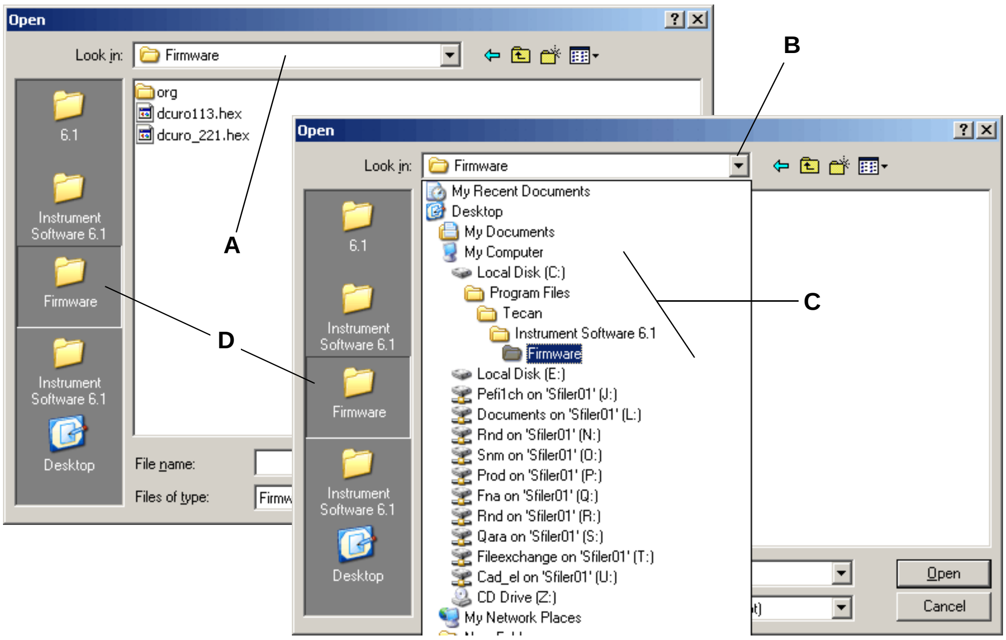


Fig. 5-25 Open dialog window, example firmware download

Other directory buttons on the left side of the **Open** window (from top to bottom):

Tab. 5-7 Open window directory buttons

Button	Designation	Directory
First	x.y	Path / directory where the user data of the Instrument Software x.y is stored
Second	Instrument Software x.y	Path / directory where the Instrument Software x.y is installed
Third	Firmware	Path / directory where the appropriate firmware file is stored
Fourth	variable (depending on the last file access)	Path / directory of the last file access through the Open / Save As windows

5.4 Operating Conditions

Note: *Before working with the Setup and Service software, pay attention to the following points:*

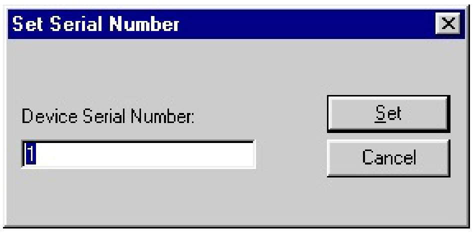
- *Ensure that the correct firmware files have been downloaded.*
- *Some functions require an empty worktable that is free of any obstacles. Pay attention to the prerequisite notices given in the corresponding sections.*
- *Do not start any function if the prerequisites or requirements described are not fulfilled.*

5.4.1 No Valid Serial Number

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

1 If, on the **Contents** page of a panel a device without a valid serial number is selected in the **Available Devices** list, you are prompted to enter a serial number.



Set Serial Number

Device Serial Number: 1

Fig. 5-26 Set Serial Number dialog

2 Type the serial number in the **Device Serial Number** input field:

3 Save the serial number in the EEPROM with **Set**. The **Set Serial Number** dialog is closed.

5.4.2 Normal / Simulation Mode

For detailed information about the connection of the target computer to the instrument, the normal mode of operation and the so-called simulation mode, refer to section 5.1.2 “Main Window”, 🗎 5-3.

5.5 Send Utility

Purpose

The **Send Utility** is primarily intended for experienced field service engineers and developers. It allows users to send single commands to the instrument and to view and analyze the responses from the instrument.

Note: *The **Send Utility** can be invoked independently from the Setup and Service software and can run parallel to it.*

Command Set

There is a specific command set (a so-called FCS = firmware command set) for each firmware. These sets can be used to initialize, move, etc. the various devices and options. They are documented separately and are not described in this manual.

Starting the Utility

To start the **Send Utility**:

1. From the Windows start menu, select
Start > All Programs > Tecan > Communication > <version> > Send Utility.
or within the instrument software:
System > SendUtility

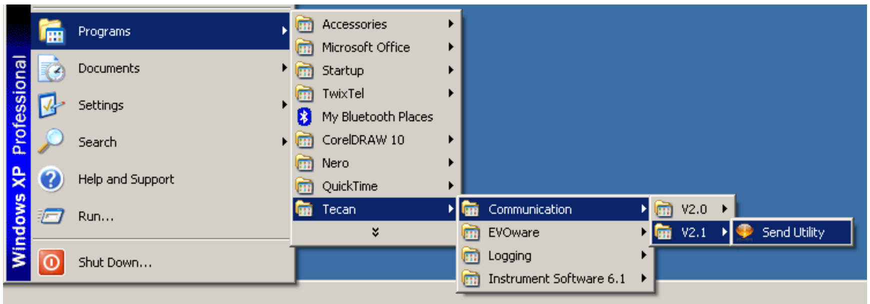


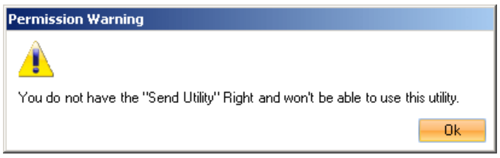
Fig. 5-27 Start Send Utility

tecan
****
User does not exist

Fig. 5-28 Login to the Send Utility

You are now prompted to login:

2. Login with your username and password.

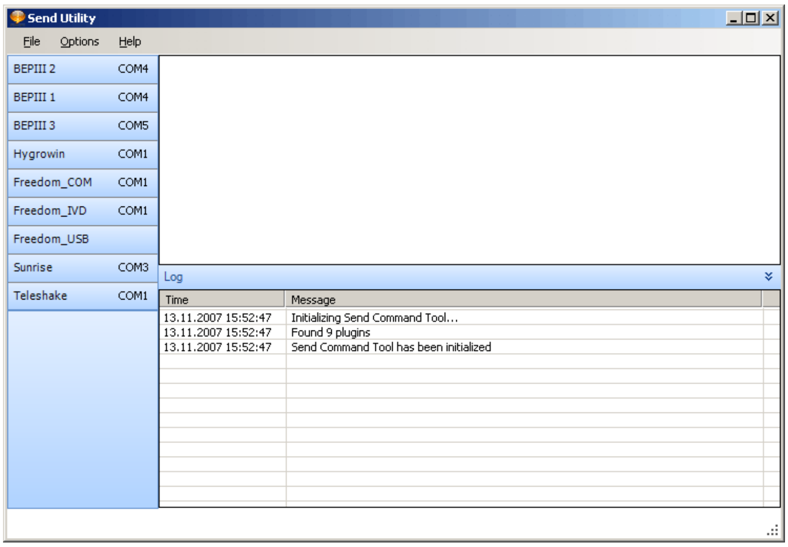


You do not have the "Send Utility" Right and won't be able to use this utility.

Fig. 5-29 Login permission warning

If you do not have the appropriate rights to send firmware commands to the instrument you will get a permission warning. In this case check the user group and rights with the administrator.

3. After successful login the following dialog window is displayed:



BEPIII 2	COM4
BEPIII 1	COM4
BEPIII 3	COM5
Hygrowin	COM1
Freedom_COM	COM1
Freedom_IVD	COM1
Freedom_USB	
Sunrise	COM3
Teleshake	COM1

Time	Message
13.11.2007 15:52:47	Initializing Send Command Tool...
13.11.2007 15:52:47	Found 9 plugins
13.11.2007 15:52:47	Send Command Tool has been initialized

Fig. 5-30 Send Utility dialog 1

Using the Utility

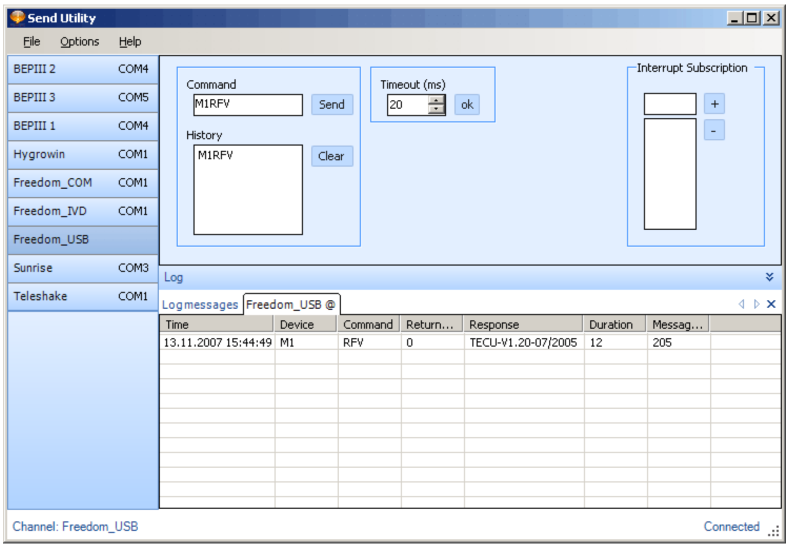
You can now start using the utility.

1 Click on the instrument you want to communicate with on the left pane of the **Send Utility** window.

The selected instrument field will be shaded and the dialog pane opens. On the bottom of the window the status of the connection is displayed, e.g.:

Channel: Freedom_USB	Connected

2 Enter in the **Command** field the firmware command you want to send to the instrument and click **Send** (see example in the figure below).



BEPIII 2	COM4
BEPIII 3	COM5
BEPIII 1	COM4
Hygrowin	COM1
Freedom_COM	COM1
Freedom_IVD	COM1
Freedom_USB	
Sunrise	COM3
Teleshake	COM1

Command: M1RFV
Timeout (ms): 20
History: M1RFV

Time	Device	Command	Return...	Response	Duration	Messag...
13.11.2007 15:44:49	M1	RFV	0	TECU-V1.20-07/2005	12	205

Channel: Freedom_USB Connected

Fig. 5-31 Sending a command

3 View and analyze the response that appears in the **Log** window at the bottom.

Quitting the Utility

If you do not need the utility anymore, you can disconnect it from the instrument by selecting **File > Close.**

5.6 LogViewer

Purpose

The Tecan Logging Server is a central software module that handles the logging of system and error messages for all Tecan software components. The **LogViewer** tool is used to view, filter, and search for messages that have been received by the Tecan Logging Server.

Starting the LogViewer

To start the **LogViewer** choose:
Start > All Programs > Tecan > Logging > <version> > LogViewer
or within the Instrument Software:
System > LogViewer

The LogViewer has three main windows:

- The **Channels** window (A).
- The **Message List** window (B).
- The **Message Detail** window (C), which shows full details of the currently selected message in the Message List window.

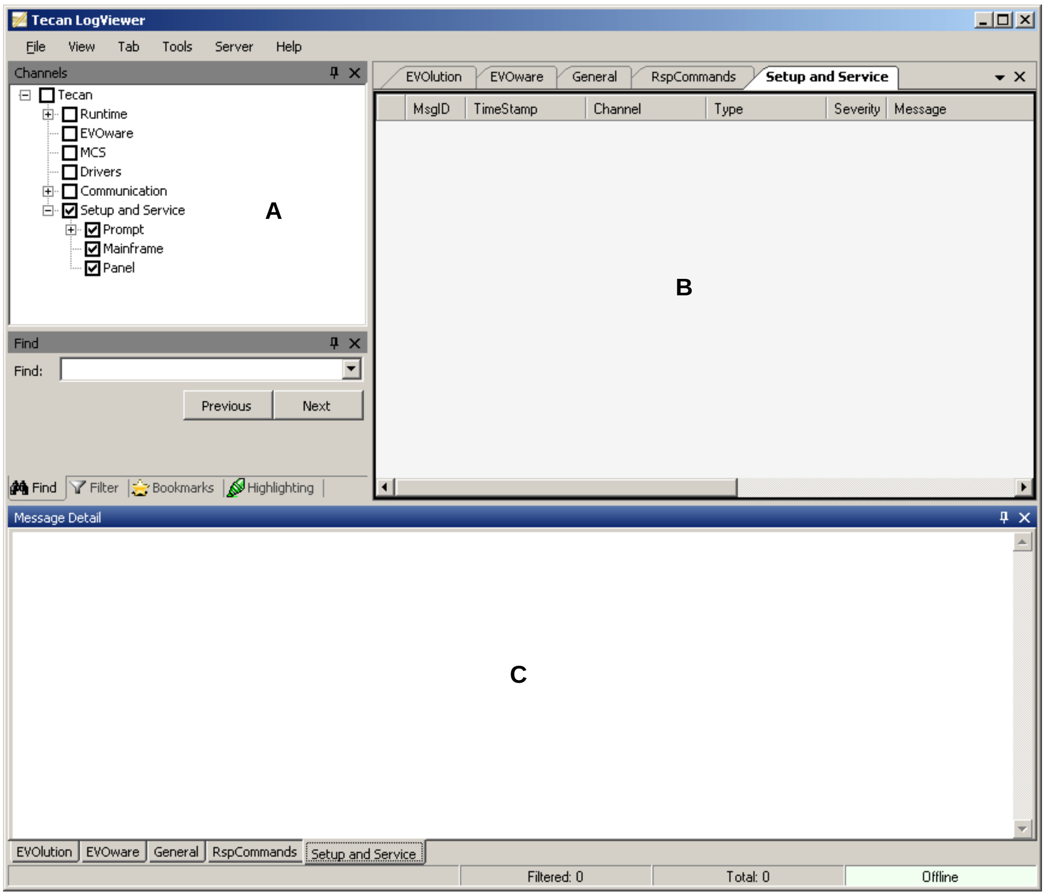


Fig. 5-32 LogViewer main windows

5.6.1 Using the Channels Window

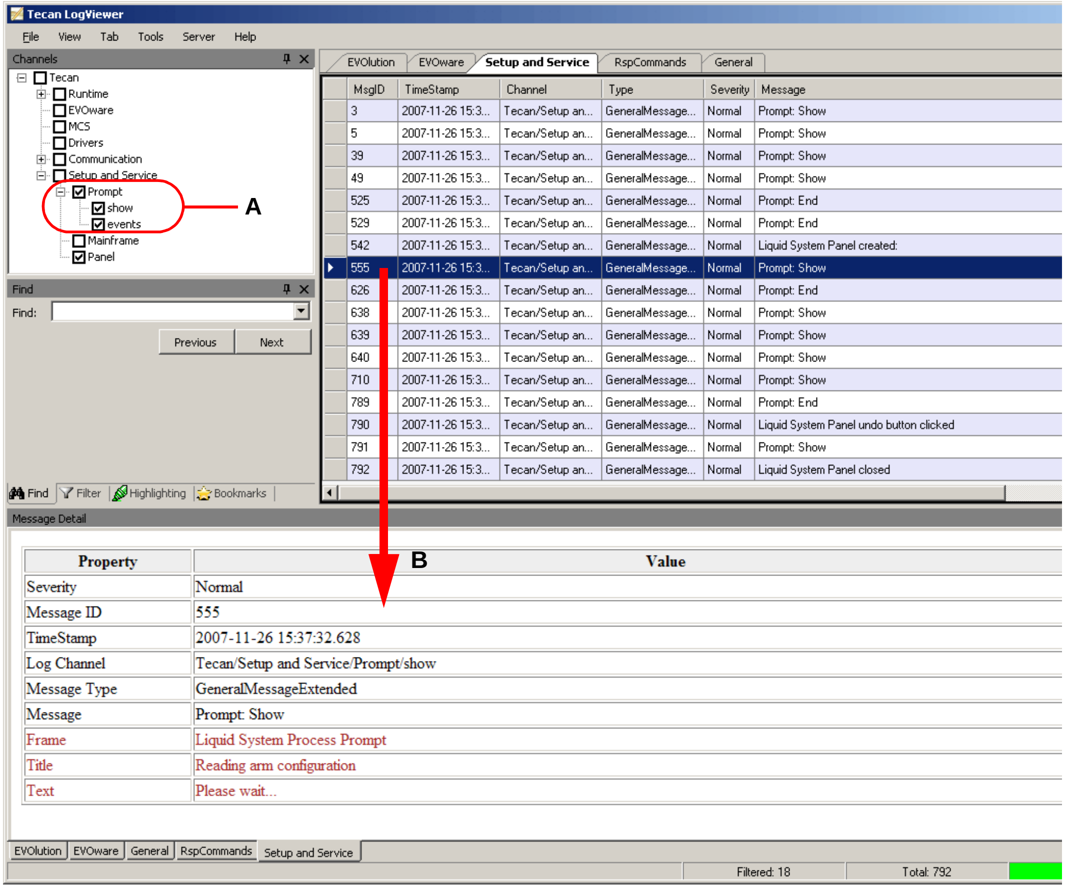
The Channels window (**A** in Fig. 5-32, 🗎 5-35) is used to pre-select or filter messages of a particular type. For example the Prompt channel, as a subchannel of the Setup and Service channel, refers to messages from process prompts.

Selecting channels

Left click on a check box:	selects / deselects only this channel
Right click on the label (name) of a check box:	opens a drop down list with the choice of: • select all • deselect all
Right click on a check box:	selects / deselects this channel and all subchannels

If you check the Prompt check box in the Channels window and uncheck all other check boxes, the Message List window will only show messages that have come from process prompts.

The channels have a hierarchical structure and some of the channels contain sub-channels. For example, in log files from Setup and Service, the **Prompt** channel normally has the two subchannels **show** and **events** (A). These subchannels are also selected if you have right-clicked the check box of the **Prompt** channel.



MsgID	TimeStamp	Channel	Type	Severity	Message
3	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: Show
5	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: Show
39	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: Show
49	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: Show
525	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: End
529	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: End
542	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Liquid System Panel created:
555	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: Show
626	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: End
638	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: Show
639	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: Show
640	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: Show
710	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: Show
789	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: End
790	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Liquid System Panel undo button clicked
791	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Prompt: Show
792	2007-11-26 15:3...	Tecan/Setup an...	GeneralMessage...	Normal	Liquid System Panel closed

Property	Value
Severity	Normal
Message ID	555
TimeStamp	2007-11-26 15:37:32.628
Log Channel	Tecan/Setup and Service/Prompt/show
Message Type	GeneralMessageExtended
Message	Prompt: Show
Frame	Liquid System Process Prompt
Title	Reading arm configuration
Text	Please wait...

***Fig. 5-33** LogViewer showing the Prompt channel and messages from Setup and Service*

5.6.2 Using the Message List Window

The tabs at the top of the Message List window (**B** in Fig. 5-32, 🗎 5-35) are used to adjust the view (e.g., column headings) of the message list to be suitable for a particular message structure, message type or message source. For example, the **RspCommands** tab is the appropriate tab to choose if you want to view messages from the Tecan Communication Server (see 5.6.4.3 “Tab Menu”, 🗎 5-39 for information on the intended usage of the other tabs).

When you select a particular tab, you are also choosing a configurable selection of channels in the **Channels window** (see also 5.6.1 “Using the Channels Window”, 🗎 5-36).

The message ID shown in the **MsgID** column is unique across all tabs. Depending on your channel selection, the same message may appear in several tabs but with a different view and different column headings.

5.6.3 Using the Message Detail Window

The **Message Detail** window (**C** in Fig. 5-32, 🗎 5-35) shows full details of the message that is currently selected in the **Message List** window (arrow **B** in Fig. 5-33, 🗎 5-37).

Messages from Tecan software components and hardware devices have several different structures, which depend on the type of message. The tabs at the bottom of the Message Detail window are used to adjust the formatting (layout) of the detailed view of the message. It is generally appropriate (but not obligatory) to choose the same tab that you choose in the Message List window. The same tab is chosen by default, but you can choose another tab if required.

5.6.4 LogViewer Menus

5.6.4.1 File Menu

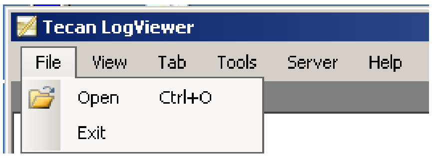


Fig. 5-34 *File menu*

Open

This menu item is used to open a log file in xml format. When the LogViewer is first started, it automatically opens the most recent log file (the log file that is currently used to record messages). New messages that arrive from Tecan software components and drivers, are appended to the end of the log file, and the Message List window is continuously updated (Online mode). Choose **File > Open** to open an older (historical) log file. The LogViewer then switches to **Offline** mode, and recently received messages are no longer shown.

In Offline mode, you can sort the messages in the Message List window by clicking on the column headers. In Online mode, the messages are always sorted chronologically.

When you choose **File > Open**, use the Shift and Ctrl buttons on the keyboard if you want to select several log files in the file browser window and open them simultaneously.

Note: *Alternatively, you can clear (Shift+Del) the Message List window and then select the log files in Windows Explorer and drag them onto the Message List window.*

The total number of messages and the filtered number of messages in the currently open log file(s) is shown at the bottom of the main window (see also Fig. 5-33, 🗎 5-37).

To switch back to Online mode, choose Online in the Tab menu or click the green Offline tab at the bottom right of the main window. Optionally press F5 to refresh the view.

Exit

This menu item is used to exit the LogViewer.

Note: *The Logging Server continues to log Tecan messages independently of the chosen mode in the LogViewer tool (Online mode, Offline mode or currently not running)*

5.6.4.2 View Menu

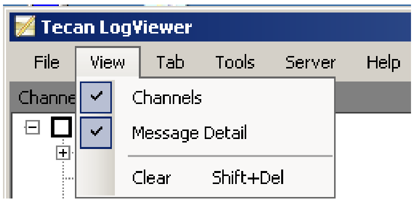


Fig. 5-35 View menu

Channels

This menu item is used to show or hide the **Channels** window.

Message Detail

This menu item is used to show or hide the **Message Details** window.

***Note:** Press F5 if you need to refresh the view of the Message List window.*

Clear (Shift+Del)

Allows to delete all messages in the **Message List** window.

5.6.4.3 Tab Menu

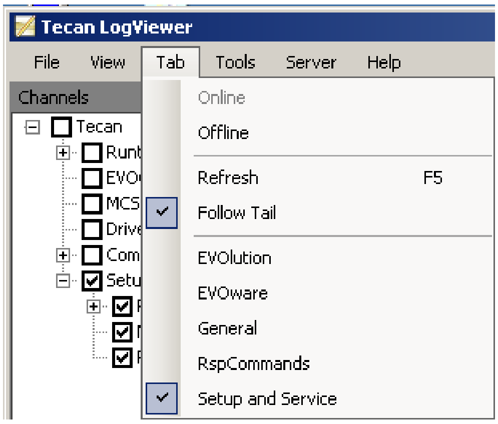


Fig. 5-36 Tab menu

Online / Offline

These menu items are used to switch between Online and Offline mode.

***Note:** Alternatively you can click the green Offline / Online tab at the bottom right of the main window.*

Follow Tail

Activate this option if you want the **Message List** window to scroll automatically in **Online** mode so that the latest messages are always visible at the bottom of the screen. If you want to study a specific message while the Tecan software is still running (i.e. messages are still arriving), you can switch off **Follow Tail** mode to prevent the message from scrolling off the top of the screen.

General

This menu item switches to the General tab of the **Message List** window. This tab shows all mandatory fields (the fields that are mandatory for all message types).

Rsp Commands

This menu item switches to the RspCommands tab of the **Message List** window. This tab is intended for viewing messages from the Tecan Communication Server. The initial default channel selection for this tab is Tecan/Communication.

Setup and Service

The initial default channel selection for this tab is Tecan / Setup and Service

5.6.4.4 Tools Menu

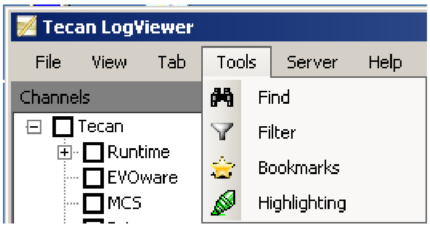
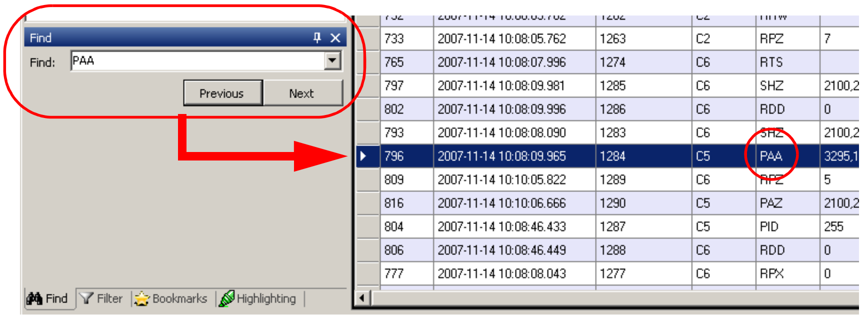


Fig. 5-37 Tools menu

Find

This option is used to search for a particular string in the messages. Click Next or Previous to jump to the next or previous message that contains the string. If the string is found, it is shown highlighted in yellow in the **Message Detail** window.



Find: PAA

733	2007-11-14 10:08:05.762	1263	C2	RPZ	7
765	2007-11-14 10:08:07.996	1274	C6	RTS	
797	2007-11-14 10:08:09.981	1285	C6	SHZ	2100,2
802	2007-11-14 10:08:09.996	1286	C6	RDD	0
793	2007-11-14 10:08:08.090	1283	C6	SHZ	2100,2
796	2007-11-14 10:08:09.965	1284	C5	PAA	3295,1
809	2007-11-14 10:10:05.822	1289	C6	RPZ	5
816	2007-11-14 10:10:06.666	1290	C5	PAZ	2100,2
804	2007-11-14 10:08:46.433	1287	C5	PID	255
806	2007-11-14 10:08:46.449	1288	C6	RDD	0
777	2007-11-14 10:08:08.043	1277	C6	RPX	0

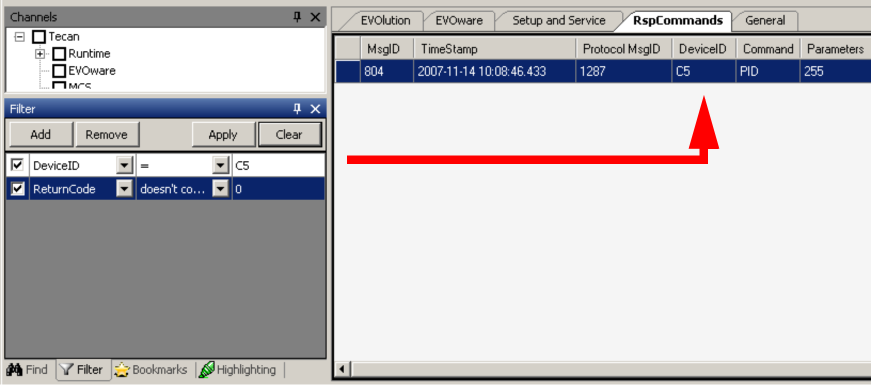
Fig. 5-38 Find function

Filter

This option is used to filter the messages that are shown in the Message List window according to several different criteria. For example, you can choose to show only those messages that have a specified string in the channel name or the message text or that have a specified range of message IDs.

After specifying a new filter, check the check box to activate it and click Apply to apply the filter to the Message List window. Click Clear to clear the filter again.

You can specify several filters and activate the one you want to use. If you activate more than one filter simultaneously, the filter settings are combined using the AND function. The filter settings are automatically saved in a user profile that is associated with your MS Windows user name.



☑ DeviceID = C5
☑ ReturnCode doesn't co... 0

MsgID	TimeStamp	Protocol MsgID	DeviceID	Command	Parameters
804	2007-11-14 10:08:46.433	1287	C5	PID	255

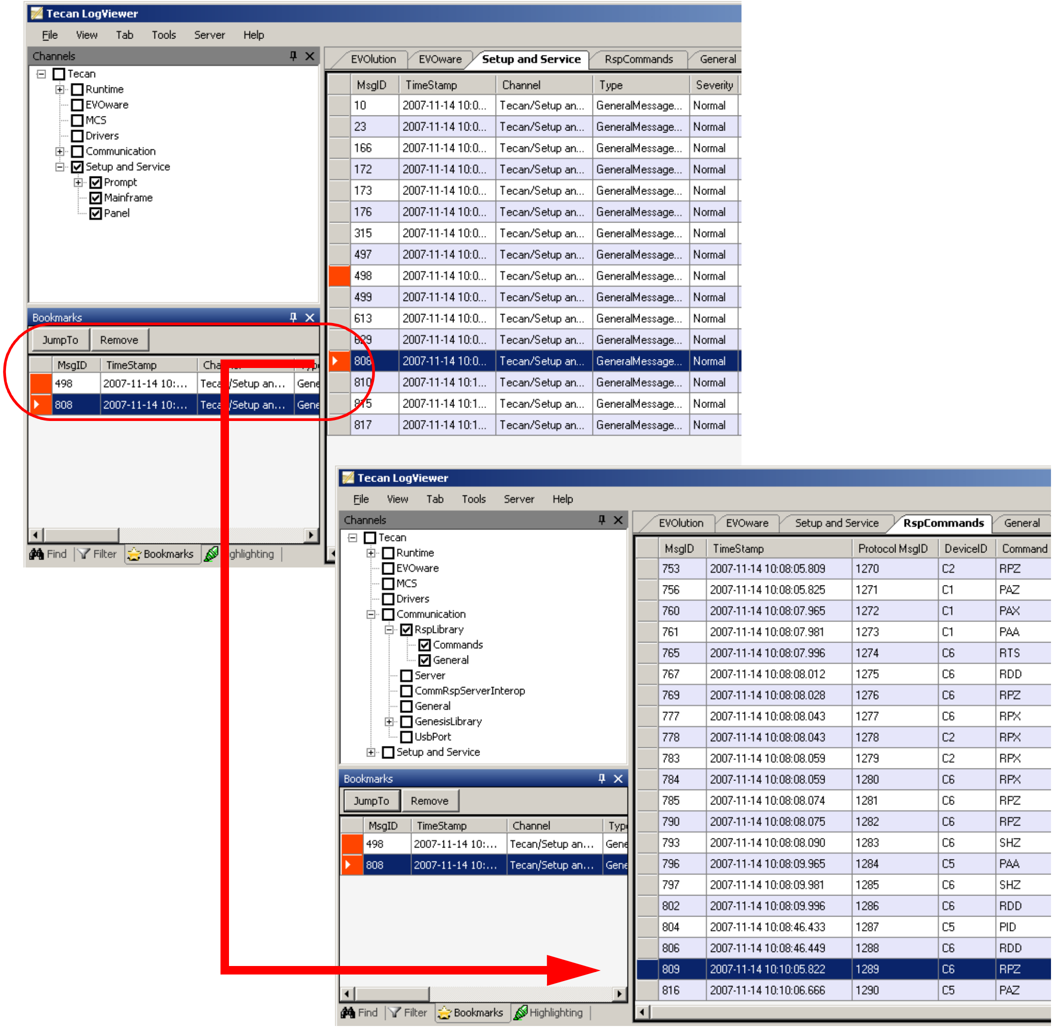
Fig. 5-39 Filter function

Bookmarks

To use the Bookmarks option, right click on a message in the Message List window and choose Add from the context menu. Alternatively, click in the margin column, to the left of the MsgID column. The margin column is then marked red, so you can easily find the message again later. In addition, the message is added to the Bookmarks window. To return to the same message again later, select it in the Bookmarks window and click Jump To.

You can also switch to another tab and jump there to the message with the same bookmark as shown in Fig. 5-40, 🗎 5-42 (if it does not find the same MsgID as in the bookmark it will go to the next higher MsgID in the other tab).

To remove the bookmark again, select the message in the Bookmarks window and click Remove. Alternatively, right click on the bookmarked message in the Message List window and choose Remove from the context menu.



MsgID	TimeStamp	Channel	Type	Severity
10	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
23	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
166	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
172	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
173	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
176	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
315	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
497	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
498	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
499	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
613	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
629	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
808	2007-11-14 10:0...	Tecan/Setup an...	GeneralMessage...	Normal
810	2007-11-14 10:1...	Tecan/Setup an...	GeneralMessage...	Normal
815	2007-11-14 10:1...	Tecan/Setup an...	GeneralMessage...	Normal
817	2007-11-14 10:1...	Tecan/Setup an...	GeneralMessage...	Normal

MsgID	TimeStamp	Channel	Typ
498	2007-11-14 10:...	Tecan/Setup an...	Gene
808	2007-11-14 10:...	Tecan/Setup an...	Gene

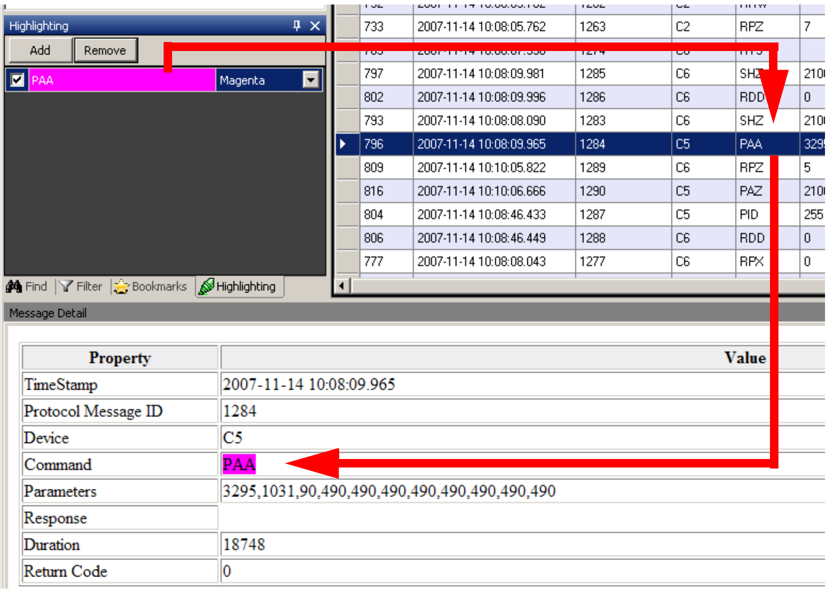
MsgID	TimeStamp	Protocol MsgID	DeviceID	Command
753	2007-11-14 10:08:05.809	1270	C2	RPZ
756	2007-11-14 10:08:05.825	1271	C1	PAZ
760	2007-11-14 10:08:07.965	1272	C1	PAX
761	2007-11-14 10:08:07.981	1273	C1	PAA
765	2007-11-14 10:08:07.996	1274	C6	RTS
767	2007-11-14 10:08:08.012	1275	C6	RDD
769	2007-11-14 10:08:08.028	1276	C6	RPZ
777	2007-11-14 10:08:08.043	1277	C6	RPX
778	2007-11-14 10:08:08.043	1278	C2	RPX
783	2007-11-14 10:08:08.059	1279	C2	RPX
784	2007-11-14 10:08:08.059	1280	C6	RPX
785	2007-11-14 10:08:08.074	1281	C6	RPZ
790	2007-11-14 10:08:08.075	1282	C6	RPZ
793	2007-11-14 10:08:08.090	1283	C6	SHZ
796	2007-11-14 10:08:09.965	1284	C5	PAA
797	2007-11-14 10:08:09.981	1285	C6	SHZ
802	2007-11-14 10:08:09.996	1286	C6	RDD
804	2007-11-14 10:08:46.433	1287	C5	PID
806	2007-11-14 10:08:46.449	1288	C6	RDD
809	2007-11-14 10:10:05.822	1289	C6	RPZ
816	2007-11-14 10:10:06.666	1290	C5	PAZ

Fig. 5-40 Same Bookmark used in different tabs

Highlighting

To use the Highlighting option, click Add, check the check box and enter the string you want to highlight in the colored field. Use the pull-down list to choose the color you want to use for this string. When you scroll through the messages in the Message List window, if the specified string is found it will be highlighted in color in the Message Detail window.

Click Add again to specify another string that you want to highlight. It is normally helpful but not obligatory to choose a different highlighting color for each string you want to highlight.



☑ PAA | Magenta

733	2007-11-14 10:08:05.762	1263	C2	RPZ	7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
797	2007-11-14 10:08:09.981	1285	C6	SHZ	210
802	2007-11-14 10:08:09.996	1286	C6	RDD	0
793	2007-11-14 10:08:08.090	1283	C6	SHZ	210
796	2007-11-14 10:08:09.965	1284	C5	PAA	329
809	2007-11-14 10:10:05.822	1289	C6	RPZ	5
816	2007-11-14 10:10:06.666	1290	C5	PAZ	210
804	2007-11-14 10:08:46.433	1287	C5	PID	255
806	2007-11-14 10:08:46.449	1288	C6	RDD	0
777	2007-11-14 10:08:08.043	1277	C6	RPX	0

Property	Value
TimeStamp	2007-11-14 10:08:09.965
Protocol Message ID	1284
Device	C5
Command	PAA
Parameters	3295,1031,90,490,490,490,490,490,490,490,490
Response	
Duration	18748
Return Code	0

Fig. 5-41   *Highlighting function*

5.6.4.5 Server Menu

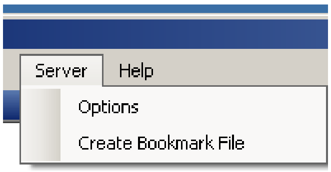
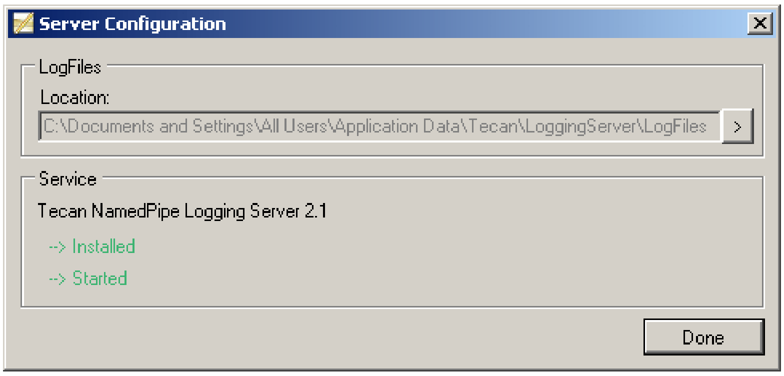


Fig. 5-42   *Server menu*

Options

This menu item shows the directory that the Logging Server uses to store the log files. Click the right arrow to jump to the configured directory in Windows Explorer. This menu item also shows if the Tecan Logging Server is installed on your PC and is currently running.



Location: C:\Documents and Settings\All Users\Application Data\Tecan\LoggingServer\LogFiles

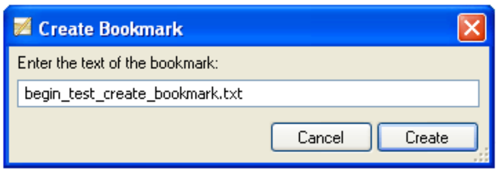
Tecan NamedPipe Logging Server 2.1
--> Installed
--> Started

Fig. 5-43   *Server configuration*

Create Bookmark File

This menu item allows you to insert a bookmark at any time in the running log file. At this point the running log file will be ended and a new log file starts.

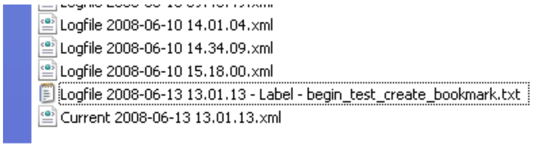
To create a bookmark select **Create Bookmark File** in the Server menu. The **Create Bookmark** dialog box opens where you can enter a name for the bookmark file.



Enter the text of the bookmark:
begin_test_create_bookmark.txt

Fig. 5-44 *Create bookmark dialog*

The bookmark file is stored in the log file directory on the server. The file name consists of the name of the new log file after the bookmark and the name entered in the **Create Bookmark** dialog box.



```
Logfile 2008-06-10 14.01.04.xml
Logfile 2008-06-10 14.34.09.xml
Logfile 2008-06-10 15.18.00.xml
Logfile 2008-06-13 13.01.13 - Label - begin_test_create_bookmark.txt
Current 2008-06-13 13.01.13.xml
```

Fig. 5-45 *Log files with bookmark file inserted*

5.6.4.6 Help Menu

Fig. 5-46 *Help menu*

About Tecan LogViewer

This menu item shows information on the LogViewer version that is installed and on Tecan copyright information.

6 System Functions

6.1 System Menu

Description

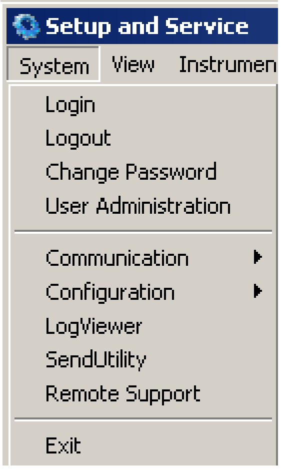


Fig. 6-1 *System menu*

The **System** menu contains the commands applying to the system as a whole and not to a particular device or option.

The commands in the **System** menu are listed below.

Commands

Tab. 6-1 *Overview of commands*

Designation	Explanation
Login	Allows a different user to log in
Logout	To log out from the Setup and Service software
Change Password	Allows users to change their password
User Administration	Calls up the User Management System (for administrators only)
Communication	To establish the communication… • via a USB or a COM port using the Communication Server • or via the Genesis Communication Driver (exceptional cases only!)
Configuration	Loads an *.any configuration file
LogViewer	Allows to view, filter and search for system and error messages received by the Tecan Logging Server
SendUtility	Allows to send single commands to the instrument
Remote Support	Starts the remote support tool
Exit	Quits the Setup and Service software

Note: *A detailed description of the above commands is given in the following sections.*

6.2 Login

Logging in to the Software

When you start up the Setup and Service software via the Windows start menu, you are automatically prompted to enter your user name and password to obtain access to the functions of the software.

However, it is also possible for you to log in after the Setup and Service software has been started up, e.g.:

- While another user is still logged in but does not need the software at the moment. The other user is automatically logged out when you log in.
- After another user has logged out but has not quit the program with **System > Exit**.

Procedure

To log in while the Setup and Service software is running:

1 On the **Main Menu**, select **System > Login**.

Login Dialog

*The **Login** dialog (see following figure) appears.*

The user name and password have to be entered for login.

User Name: JOSM

Password: ********

Fig. 6-2 *Login dialog*

2 Enter your user name and password and click **OK.**

Note that these entries are case-sensitive.

6.3 Logout

Purpose

With this procedure the current user is logged out. Afterwards, another user can log in to the Setup and Service software without having to start up the software anew.

Procedure

To log out without quitting the Setup and Service software:

1 On the Main Menu of the Setup and Service software, select **System > Logout**.

No further entries are necessary. The current user is logged out.

6.4 Change Password

Changing the Password

You are automatically prompted to change your password if your password has expired after a predefined number of days.

However, you can also change your password at any time after you have logged in to the Setup and Service software.

Procedure

To change your password;

1 On the **Main Menu** of the Setup and Service software, select **System > Change Password**.

*The **Change Password** dialog appears.*

The old password has to be entered. The new password has to be entered twice to prevent typing errors.

User Name: JOSM
Old Password: ********
New Password:
Confirm New Password:

Fig. 6-3 *Change password*

2 Enter your **User Name** and the **Old Password**.

3 Type your new password in the fields **New Password** and **Confirm New Password**.

*NOTE: For non-administrator users the field **New Password** and **Confirm New Password** can optionally be left blank.*

4 Click **OK** when done.

From now on you must log in with your new password. The new password will expire after a predefined expiration period. Then you are again automatically prompted to change the password when logging in.

***Note:** Depending on the setting “Minimum number of password changes before re-use” from within the “Options” dialog of the “Manage Users and Roles”, reusing an old password might fail (see 6.5.8 “User Administration Options”, 🖹 6-13).*

6.5 User Management System (UMS)

Purpose

The aim of this section is to provide detailed information about the User Management System and to enable system administrators to set up, change and otherwise manage user accounts and users. Information on how to set password and login conditions is also provided.

***Note:** The User Management System is only accessible to users who are logged in as system administrators.*

6.5.1 Introduction

User Management System

The User Management System is a central software module that handles user log in and user authorization for certain software programs, such as the Setup and Service software, EVOware, EVOlyzer, Gemini, Magellan, and others. It provides facilities to log out users after a specified period of inactivity and to send warnings by e-mail to a specified person (usually the system administrator) if an attempt is made to log in to a such a software program using an invalid user name and password combination.
Furthermore, users are disabled automatically after entering the password incorrectly for a specified number of times.

Access to the Setup and Service Software

The Setup and Service software is a closed system and access to its functions is only granted if the following conditions are fulfilled:

- You must have a user account, a user name and a password.
- You must be a member of a role with the necessary access rights.
- To obtain access to the functions you are authorized to perform, you must log into the software with your user name and password.

Contact your system administrator if you are authorized to use the Setup and Service software, but do not have a user name and password. Note that not all of the possible functions and features of the Setup and Service software are available to all user roles.

Password

***Note:** For Administrators a password is mandatory. Other users can also be defined without a password (see 6.5.6 "Adding and Modifying Individual Users", 🗎 6-9).*

6.5.2 Features of the User Management System

Cross References

List of cross references to information provided in other sections:

Information	**References**
User Management, Options	See section 6.5.8, 🗎 6-13

Purpose

This section describes the main characteristics of the User Management System.

***Note:** You can set or alter some of the features discussed in this section by clicking on the **Options** command button on the* user administration window **Manage Users and Roles** *(→ Cross References).*

Passwords and Names

The following table lists the conventions for the entry of passwords, usernames and full names. Additional explanations are given later in this section.

***Tab. 6-2** Characteristics of passwords and names*

Entry	**Characters**	**Case sensitive?**	**Length**		
			Default	**Min.**	**Max**
Password	• Allowed: a to z, A to Z, 0 to 9, dot	yes	5	5	99
Username	• Allowed: a to z, A to Z, 0 to 9, dot • Not allowed: certain special characters (e.g., space, <, >, etc.)	yes	--	1	99
Full Name	a to z, A to Z, 0 to 9, special characters (e.g., space, hyphen, dot, #, :, German "umlauts" (ä, ö ü), vowels with accents (é, è, à), etc.)	yes	--	1	99

Further Options

The following table shows some more options.

Tab. 6-3 Options

Parameter	Default	Min.	Max.	Explanation
Auto lock time [min]	15	1	100	Time in minutes after which the access to the Setup and Service software is locked if it has been in an idle state. To resume work, the current user must log in anew.
Unsuccessful logins	3	1	100	The access to the software is locked for a user after a number of consecutive attempts to log in with a wrong user name /password combination. The locked account must released by the administrator.
Password expires after [days]	90	1	36500	Number of days after which users are prompted to change their passwords.

Explanations and Examples

Please note:

- Passwords, user names and full names are case-sensitive. The User Management System would treat the following user names as belonging to two different users:
  - “josm” (full name “john smith”) is not regarded as the same person as…
  - “JOSM” with full name “John Smith”
- Certain special characters (spaces, <, >, etc.) are not allowed in user names.
- However, special characters like space, dot, comma, hyphen, etc., are possible in full names. Umlauts (ä, ö ü) and vowels with accent (é è à á ó) are also allowed. Examples of possible names:
  - User names: henry.01, ronny, josm, JOSM1CH, etc.
  - Full names: “Henry G. Thompson”, “Jean-Claude Campiche, Head of Diagnostics”, “barbara.smith”, “Joël Dubonnet, Lab. Assistant”, etc.
- If a user does not use the software for a certain time (i.e. does not run any tests or setups and makes no entries) the access to the software is automatically locked (**Auto lock time**). The access is only unlocked if the locked-out user logs in again.

***Note:** If the locked-out user is not available, the only way for another user to obtain access to the Setup and Service software would be to quit the software via the Windows Task Manager and to restart the Setup and Service software.*

- For security reasons, the access to the software is locked for a user if several consecutive attempts are made to log in with a wrong user name/password combination. This measure helps to prevent “hackers” from finding out the passwords of other users. Only the administrator can release a locked user account.
- As a further security measure, all passwords expire after a predefined number of days. A user whose password has expired is automatically prompted to enter a new password when he or she logs in to the Setup and Service software the next time.

Help System

All screens of the User Management System have a **Help** button via which detailed on-screen help can be called up.

6.5.3 User Groups, Users and Their Rights

Cross References

List of cross references to information provided in other sections:

Information	References
First Login after Installation	See section 4.3.1, 🗎 4-9

System Administrator

The system administrator is a special user who has unlimited access to all functions of the User Management System. He or she is responsible for the safe and correct administration of the system users and is authorized to create, modify, enable and disable user accounts and to assign the users to one or more roles (see "User Groups", 🗎 6-6).

Please note:

- The person who starts up the Setup and Service software for the very first time after the installation automatically obtains the administrator status and is prompted to create an administrator account. For a detailed description of the first login after the installation (→ Cross References).
- A physical person can have both an administrator account and a user account with different user names. Example: Mr. John Smith can, for instance, at the same time have an administrator account under the user name "josmAd" and a user account with SnS_FSE rights under the user name "josm". Depending on what Mr. John Smith wants to do he can log in as an administrator or as a user who performs setup and test procedures.
- It is the system administrator's responsibility never to grant rights to users when they do not have the necessary qualifications, training and tools to perform the associated tasks.

User Groups

A group or user group is called a **Role** within the **User Management System** (UMS). The following roles are standard and created by default (see also following table):

- **SnS_Customer:** Members of this role are authorized to run test and calibration procedures. Normally, they are specially trained end users or supervisors in a laboratory. Some of them may at the same time be system administrators (in this case they must have a separate administrator account with a different user name).
- **SnS_FSE:** Members of this role must be authorized field service engineers. They must have received the necessary training that enables them to run setup, test and calibration procedures, to define device serial numbers and execute firmware commands at the customer's site.
- **SnS_Production:** For employees of the production department only. Members of this role are authorized to perform setup, calibration, and test procedures that may require special equipment that is not available at the customer's site.
- **SnS_Assembly:** For employees of the assembly shop only. The procdures they are authorized to perform may require the use of special equipment.

The following table shows the standard roles and their default rights.

Tab. 6-4 Standard roles and their rights

Right to do / access the following…	**is granted to role …**			
	SnS_Customer	**SnS_FSE**	**SnS_Production**	**SnS_Assembly**
Customer tests and calibrations	X	X	X	
Use of device control tools (e.g., Move Tool pages)	X	X	X	
Setups and tests to be performed by FSEs		X	X	
Defining device serial numbers		X	X	X
Firmware command layer access		X	X	X
Firmware download		X	X	X
Production setups and tests (*)			X	
Developer settings (*)				
Creating configuration files (*)				
Module assembly (*)				X

Note: *The rights marked with an asterisk (*) are reserved for developers, production and assembly staff and must never be granted in the field (danger of misadjustments and loss of setup data).*

6.5.4 User Administration Window

Cross References

List of cross references to information provided in other sections:

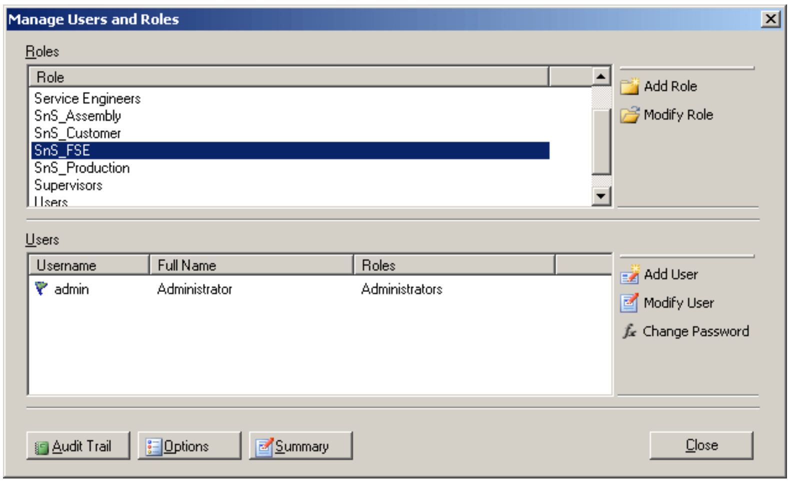
Information	**References**
User groups, Users and their rights	See section 6.5.3, 🗎 6-6
Options	See section 6.5.8, 🗎 6-13

Brief Description

The **User Administration** window is called **Manage Users and Roles and is** the central tool that allows a system administrator to add and change roles and to add, change, lock and unlock user accounts. Each individual user can be assigned to one or more roles. The **Options** dialog, the **Audit Trail** function and a **Summary** of roles and users can also be called up from this window.

You can call up the user administration window **Manage Users and Roles** only if…

- at least one administrator account exists.
- if you are an administrator yourself.



Role
Service Engineers
SnS_Assembly
SnS_Customer
SnS_FSE
SnS_Production
Supervisors
Users

Username	Full Name	Roles
admin	Administrator	Administrators

Fig. 6-4 *User administration window 1*

Controls

The user administration window **Manage Users and Roles** contains the following controls:

Roles	The frame **Roles** contains the controls to view, add and modify roles.
- **Role**	Lists the existing roles
- **Add Role**	Invokes a dialog to add a new role
- **Modify Role**	Invokes a dialog to modify the selected role
Users	The frame **Users** contains the controls to view, add and modify users.
- **User Name**	Lists the short names of the existing users
- **Full Name**	Lists the full names of the existing users
- **Add User**	Invokes a dialog to add a new user
- **Modify User**	Invokes a dialog to modify the settings of an existing user
- **Lock User**	Lets you lock or unlock a user. Locked users have no access to the software.
Audit Trail	Lets you view the changes made to the User Management System
Options	Invokes the **Options** dialog that lets you set and modify various parameters (login and password conditions, etc.).
Summary	Lists the current roles and users
OK	Stores the entered values and closes the window
Cancel	Discards the settings made and closes the window
Help	Provides on-screen help

6.5.5 Adding and Modifying User Groups

Purpose

These procedures allow the system administrator to add roles and to change the settings of existing roles.

Note: *This is a special function:*

- *This function is reserved for employees of the development department and must not be used for authorized field service engineers (FSEs) or customers.*
- *The roles that are needed in the field are created automatically during the installation.*

WARNING

Damage to the instrument (or parts of it) and injuries to personnel possible if roles are set up incorrectly.

- Use only the predefined roles in the field.
- Use this function only if you are sure that the members of the roles you want to add or modify are experienced specialists.

6.5.6 Adding and Modifying Individual Users

Cross References

List of cross references to information provided in other sections:

Information	References
User groups, Users and their rights	See section 6.5.3, 🗎 6-6

Purpose

These procedures allow the system administrator to add users and to change the settings of existing users.

WARNING

Damage to the instrument (or parts of it) and injuries to personnel possible if users are assigned to roles for which they are not qualified.

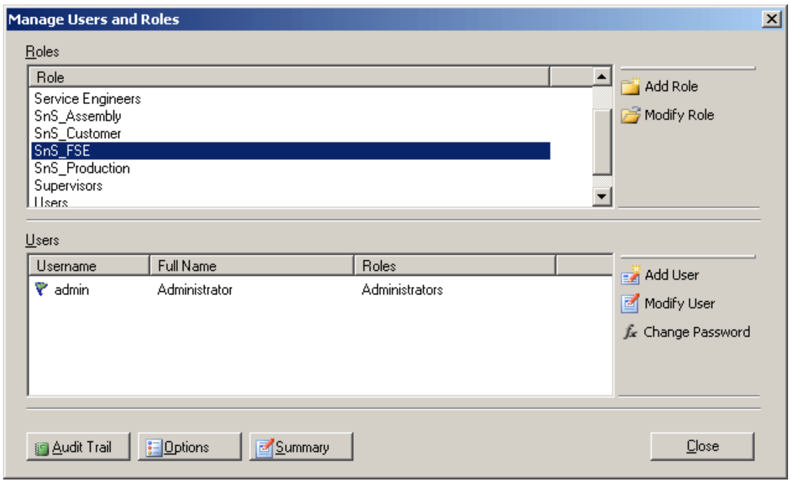
- Assign users only to a role if they have the required qualifications, training and equipment needed to safely and efficiently carry out the procedures to which they have access.

Adding a User

To add a new user:

1. On the **Main Menu** of the Setup and Service software select **System > User Administration**.

   *The user administration window **Manage Users and Roles** opens.*



Manage Users and Roles

Roles

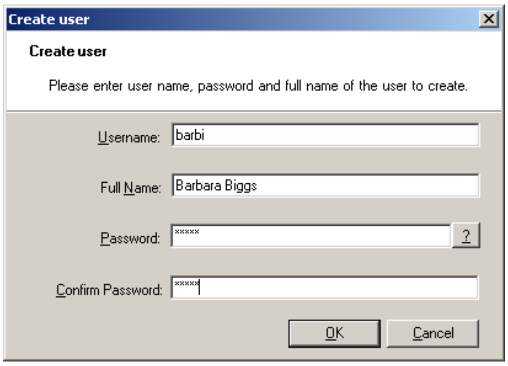
Role
Service Engineers
SnS_Assembly
SnS_Customer
SnS_FSE
SnS_Production
Supervisors
Users

Users

Username	Full Name	Roles
admin	Administrator	Administrators

Fig. 6-5 User administration window 2

2 Click **Add User.**



Create user

Create user

Please enter user name, password and full name of the user to create.

Username: barbi

Full Name: Barbara Biggs

Password: *****

Confirm Password: *****

Fig. 6-6 Creating a new user

The **Create User** dialog opens.

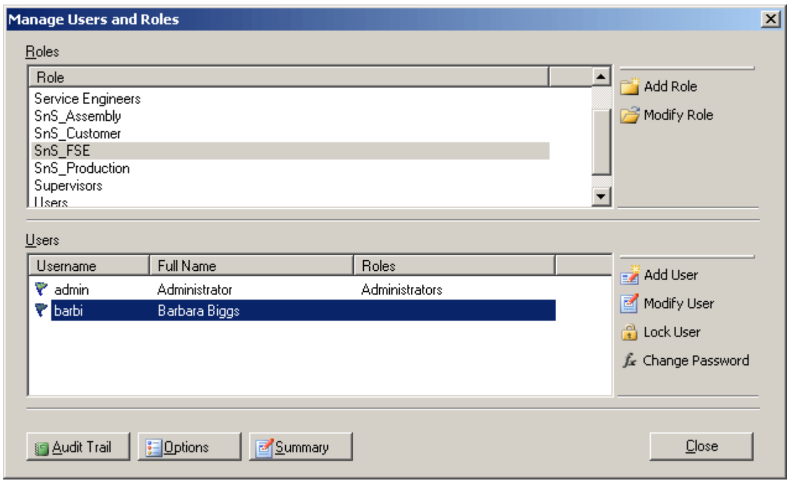
3 Enter the user’s identification:

- Define a suitable **Username**. The new user name must be unique, i.e. none of the existing users may have the same user name. Note that the user name is case-sensitive, i.e. **OsLo**, **oslo** and **osLo** will be treated as different users.
- Type the user’s full name and, if necessary, his/her function in the field **Full Name**.
- Type a suitable password in the field **Password** and confirm it by entering the password a second time in the field **Confirm Password**.

Note: *The password for users other than Administrators is optional.*

Note: *Users can change their password at any time afterwards.*

4 Quit the **Create User** window with OK.



Roles

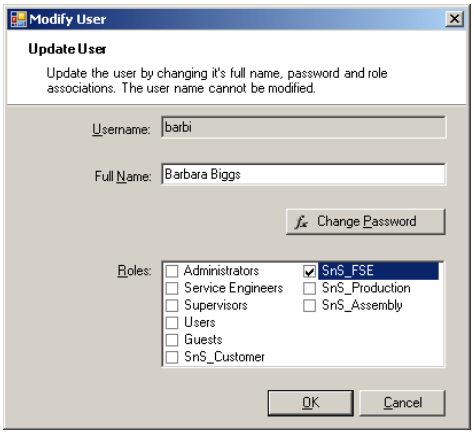
Role
Service Engineers
SnS_Assembly
SnS_Customer
SnS_FSE
SnS_Production
Supervisors
Users

Users

Username	Full Name	Roles
admin	Administrator	Administrators
barbi	Barbara Biggs	

Fig. 6-7 *User administration window 3*

5 In the user administration window **Manage Users and Roles** select the new user and click **Modify User**.



Update User

Update the user by changing it's full name, password and role associations. The user name cannot be modified.

Username: barbi

Full Name: Barbara Biggs

Roles:
☐ Administrators
☐ Service Engineers
☐ Supervisors
☐ Users
☐ Guests
☐ SnS_Customer
☑ SnS_FSE
☐ SnS_Production
☐ SnS_Assembly

The **Modify User** window opens.

Fig. 6-8 *Modifying a new user*

6 If the new user is to be a system administrator, select the **Administrators** check box in the frame **Roles**.

Remember that, in this case, the user will only perform administrative tasks, but cannot be assigned to a role like SnS_FSE, SnS_Customer, etc.

7 If the user is not an administrator, assign him or her to the appropriate role by selecting the corresponding check box in the frame **Roles.**

Important: *Ensure that the user has the necessary qualifications.*

8 Quit the dialog with **OK** to return to the user administration window **Manage Users and Roles**.

9 Quit the user administration window **Manage Users and Roles** by clicking **Close**.

Changing the Password of a User

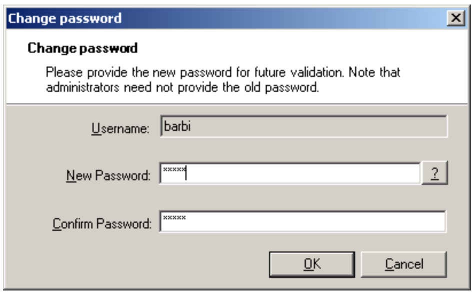
To change the Password of a user when in the user administration window **Manage Users and Roles:**

1 Select the user whose password you want to change from the **Users** list.

2 Click **Change Password.**

The ***Change Password*** *dialog opens.*

Note: You cannot change the user’s name.



Change password

Change password

Please provide the new password for future validation. Note that administrators need not provide the old password.

Username: barbi

New Password: *****

Confirm Password: *****

Fig. 6-9 *Change password*

3 Enter the new password in the field **Password**.

4 Confirm the new password by entering it a second time in the field **Confirm Password**.

5 Click **OK** to quit the dialog window.

6 Quit the user administration window **Manage Users and Roles** by clicking **Close.**

Modifying an Existing User

To modify the access rights of an existing user:

1 On the **Main Menu** of the Setup and Service software select **System > User Administration**.

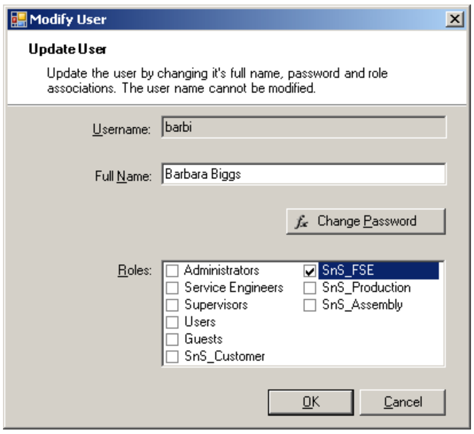
The user administration window ***Manage Users and Roles*** *opens.*

2 Select the user whose settings you want to modify from the **Users** list.

3 Click **Modify User.**

The ***Modifiy User*** *dialog opens.*

Note: You cannot change the user’s name.



Modify User

Update User

Update the user by changing it's full name, password and role associations. The user name cannot be modified.

Username: barbi

Full Name: Barbara Biggs

Roles:
☐ Administrators
☐ Service Engineers
☐ Supervisors
☐ Users
☐ Guests
☐ SnS_Customer
☑ SnS_FSE
☐ SnS_Production
☐ SnS_Assembly

Fig. 6-10 *Add new user*

4 Change the following as necessary:
- – **Full name**. Modify as necessary.
- – Role assignment in the frame **Roles**.
- – Click on **Change Password** if you want to give the user a new password (e.g., if the user has forgotten or lost his/her current password).

5 Quit the dialog with **OK** to return to the user administration window **Manage Users and Roles**.

6 Quit the user administration window **Manage Users and Roles** by clicking **Close**.

Lock / Unlock Users

The **Lock / Unlock User** function allows you to grant or deny an individual user the right to access the functions of the Setup and Service software.
To lock or unlock a user:

1 On the **Main Menu** of the Setup and Service software select **System > User Administration**.

*The user administration window **Manage Users and Roles** opens.*

2 Select the user who you want to lock or unlock in the **Users** list.

***Note:** The caption of the corresponding command toggle button changes if it is clicked. It is **Lock User** if the selected user is currently locked and vice versa.*

3 Click on the **Lock / Unlock User** command toggle button to lock or unlock the user, concerning access to the Setup and Service software.

4 Click **OK** to confirm.

6.5.7 Audit Trail

All changes relating to user management are recorded in the user management **Audit Trail** of the User Management System.

6.5.8 User Administration Options

Cross References

List of cross references to information provided in other sections:

Information	References
Features of the User Management System	See section 6.5.2, 🗎 6-4

Purpose

The **User Administration Options** dialog allows you to set the login and password conditions as described in “Features of the User Management System” (→ Cross References). In addition, it lets you set the e-mail options.

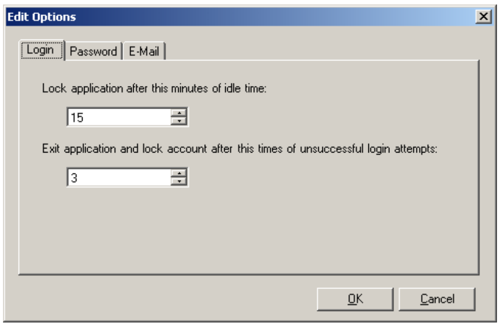
Procedure

To set the options:

1 On the user administration window **Manage Users and Roles** click the **Options** command button.

*The **Edit Options** dialog opens. This dialog is subdivided into three pages (see following figure): Login options, Password options and Mail options.*

2 Make the necessary entries or accept the suggested default values and, when finished, quit the **Edit Options** dialog by clicking **OK**.

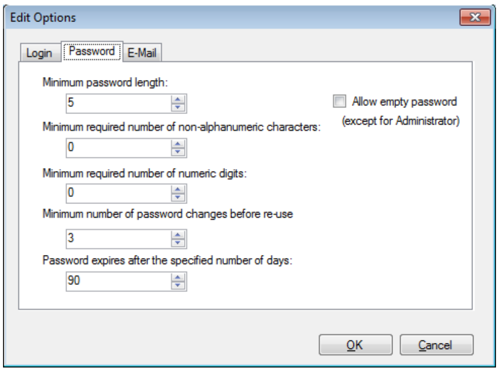


Lock application after this minutes of idle time: 15

Exit application and lock account after this times of unsuccessful login attempts: 3

Use the **Login** page to set:

- The time in minutes after which the application is locked (**Auto Lock** time).
- The maximum number of unsuccessful logins after which the user is locked.



Minimum password length: 5

☐ Allow empty password (except for Administrator)

Minimum required number of non-alphanumeric characters: 0

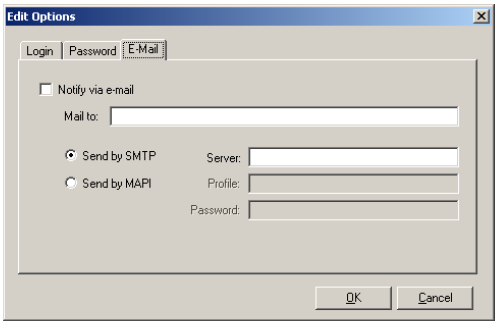
Minimum required number of numeric digits: 0

Minimum number of password changes before re-use: 3

Password expires after the specified number of days: 90

Use the **Password** page to set:

- The minimum password length (number of characters).
- The minimum number of non-alphanumeric characters the password must include.
- The minimum number of digits the password must include.
- The minimum number of password changes required before the password can be reused.
- Number of days after which the password expires.



☐ Notify via e-mail

Mail to:

● Send by SMTP Server:

○ Send by MAPI Profile:

Password:

Use the **E-Mail** page:

- if you want a person (usually a system administrator) to be notified via e-mail if someone tries to log in repeatedly with an incorrect user name/ password combination.

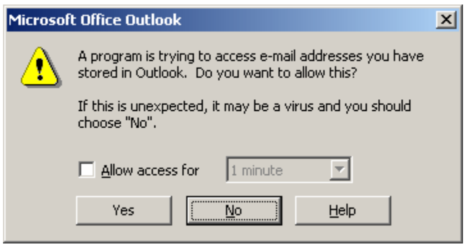
Fig. 6-11 *User administration options*

- Enter the receiver’s mail address.

For sending the e-mail, choose one of the following options:

- Send with SMTP: In this case you must enter the IP address of your mail server.
- Send with MAPI: In this case you must define the Profile and a Password.

Message Cannot Be Sent


Microsoft Office Outlook

A program is trying to access e-mail addresses you have stored in Outlook. Do you want to allow this?

If this is unexpected, it may be a virus and you should choose "No".

☐ Allow access for 1 minute

***Fig. 6-12** No transmission possible*

***Note:** Depending on the security options set in the mailing program, this feature may not work as expected. A message like the one shown on the left may appear instead.*

Contact an IT-specialist in this case.
If you are in doubt what do, disable this feature.

6.5.9 Summary

The **Summary** provides an overview of the users, the groups and their status (administrator, locked, etc.).

6.6 Communication

Cross References

List of cross references to information provided in other sections:

Information	References
Establishing the connection with the instrument	See section 4.3.5, 🗎 4-13
Normal/Simulation mode	See section 5.1.2, 🗎 5-3

Purpose

This function allows you to select or change the communication port (e.g., USB, COM1, COM2, etc.) over which the computer communicates with the instrument.In addition it allows you to select the Genesis communication driver (for exceptional cases only).

6.6.1 Selecting a Communication Port

***Note:** The Setup and Service software expects the instrument to be connected to a USB port.*

- *However you can still connect the instrument to an RS-232 COM port if there is no free USB port available on the target computer.*
- *In such a case you must use an RS-232 communication cable.*

Connection to a COM-Port

To connect the instrument to a COM-port:

1 Make sure the RS-232 cable is properly connected to the TeCu-board (behind left service door) and to a COM-port of the computer (usually located at the back of the computer).

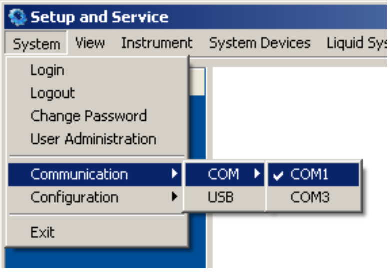


Fig. 6-13 *Connecting via a COM-port*

2 Select
System > Communication > COM
and choose the appropriate COM-port

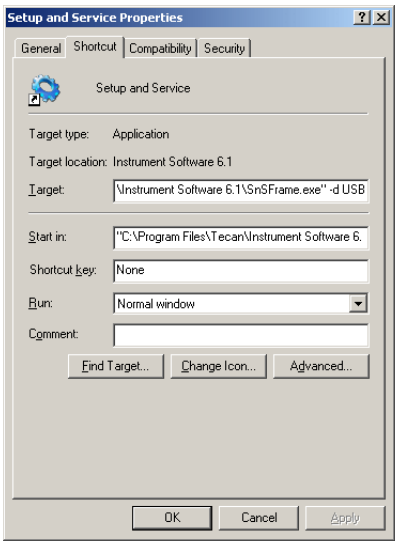
Note: *The currently selected* ***COM*** *port is marked with a tick ✓.*

Permanent Connection to a COM Port

Note that the above connection lasts only as long you do not quit the Setup and Service software. If you want to communicate with the instrument over an RS-232 connection permanently, proceed as follows:

1 Double-click the Setup and Service icon on the desktop or use the Windows Start menu and select
Start > All Programs > Tecan > Instrument Software <version> > Setup and Service.

2 Press the right mouse key to get the context menu and select **Properties.**



Target type: Application
Target location: Instrument Software 6.1
Target: \Instrument Software 6.1\SnSFrame.exe" -d USB
Start in: "C:\Program Files\Tecan\Instrument Software 6.
Shortcut key: None
Run: Normal window
Comment:

Fig. 6-14 *Setup and Service properties*

3 In the **Target** text box, change the communication parameter from **USB** to **COM.**

4 Click **OK** to save your settings.

From now on, the computer communicates with the instrument over the RS-232 COM port.

Connection via a USB Port

If the instrument was connected to a COM port before proceed as follows to connect it via a USB port:

1 Use a USB cable for the connection.

2 Select **System > Communication > USB**

3 Open the **Properties** window (see Fig. 6-14 , 🗎 6-16) as explained in the previous paragraph.

4 In the **Target** text box, change the communication parameter from **COM** to **USB.**

5 Click **OK** to save your settings.

6.7 Configuration

Purpose

The **System > Configuration** menu contains two items that allow users to do the following:

- **Configuration > Open** loads a previously defined *.any configuration file.
- **Configuration > Default** deactivates the the *.any file that was openend last and loads the corresponing standard configuration data instead (stored in an *.anz file).

Explanation

Files of type *.any contain user-defined configuration data.

- They were previously saved under an individual name from a panel with **Save As** (on the bottom of the corresponding panel).
- If you reload this configuration data later, you can reuse previous configuration data.
- If you open a panel without loading any user-defined settings, the predefined default settings (stored in an *.anz file) will be used instead.
- It is not possible to overwrite an *.anz file.

Opening an *.any File

To open an *.any file:

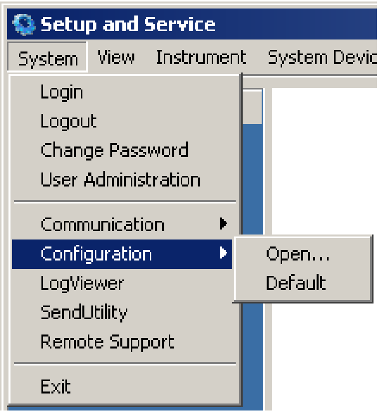


Fig. 6-15 *Configuration > Open*

1 Select **System > Configuration > Open.**

*The Windows **Open** dialog appears (not shown here).*

2 In the **Open** dialog, browse for the required file.

3 Load the file with **Open** from the directory in which it is stored:

4 Perform your setups and tests.

Loading the Default Configuration

If you wish to deactivate the *.any file you have loaded last and use the predefined default configuration data instead:

1 Select **System > Configuration > Default** (see Fig. 6-15 “Configuration > Open”, 🗎 6-17).

6.8 LogViewer

For a detailed description of the LogViewer and its possibilities go to section 5.6 “LogViewer”, 🗎 5-35.

6.9 SendUtility

For a detailed description of the SendUtility and its possibilities go to section 5.5 “Send Utility”, 🗎 5-33.

6.10 Remote Support

For a detailed description of the remote support tool (GoToMeeting) go to section 15.2 “Remote Support”, 🗎 15-3.

6.11 Exit

To quit the Setup and Service software safely without data loss:

1 Select **System > Exit**.

***Note:** The **Exit** function has the following features:*

- *The current user is automatically logged out.*
- *Since changes to setup or test configurations are applied immediately (upon clicking the **Apply** or **OK** buttons), there is no need to perform a **File > Save** or similar function before quitting the Setup and Service software.*

7 Instrument Functions

Purpose of This Chapter

Provides information about the use of the instrument initialization and the **Basic Setup, Command Tool, Information, Results** and **Vector** panels.

Cross References

List of cross references to information provided in other sections:

Information	References
Basic Setup panel	See section 7.1, 🗎 7-2
Initialize Instrument	See section 7.2, 🗎 7-19
Command Tool	See section 7.3, 🗎 7-20
Power Off	See section 5.1.6, 🗎 5-11
Information panel	See section 7.5, 🗎 7-24
Move to park	See section 7.6, 🗎 7-25
Results panel	See section 7.7, 🗎 7-26
Check Carrier Position	See section 7.8, 🗎 7-29

Instrument Menu

The **Instrument** menu contains the following items:

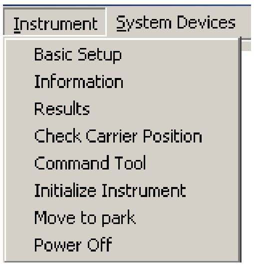


Fig. 7-1 Instrument menu

Tab. 7-1 Overview of instrument functions and panels

Panel	Description
Basic Setup	Initial setup of an instrument
Initialize Instrument	Reinitializes the instrument

Tab. 7-1 Overview of instrument functions and panels

Panel	Description
Command Tool	Special function. Allows experienced field service engineers, production staff and developers to write and execute special command sequences.
Power off	This command lets you switch off the arm devices and PosID so that they can be moved freely along their axes.
Information	Gathers information about the instrument and the installed devices and options.
Results	Provides and overview of the test results of installed devices and options and lets you select and print out the results of individual tests.

For further information (→ Cross References).

7.1 Basic Setup

7.1.1 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Purpose

The **Basic Setup** panel serves for setting up the Instrument for further use (initial setup). The setup must be performed in the following cases:

- When a new firmware is to be downloaded.
- For backing up or restoring parameters stored in EEPROM.
- When serial numbers are to be set.
- After a new installation or a reinstallation of an arm (e.g., LiHa, RoMa, PnP, MCA384, etc.).

Directory, Files

The Basic Setup function can create the following files

Directory	<data_path>\Results (<data_path> see 5.3 “Data Files”, 🗎 5-29).
File name	BasicSetup_<serial_number>_<date>_<time>.any

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

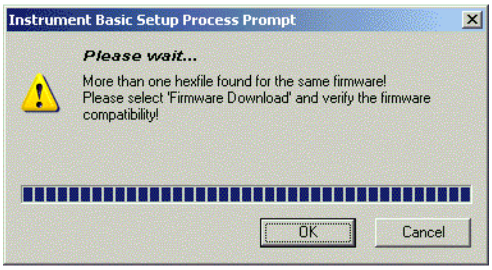
Tab. 7-2 Basic Setup Functions and User Permissions

Function	Type	User	FSE
Firmware Download	Setup		X
Serial Number Setting	Setup		X
EEPROM Backup/Restore	Setup		X
Set X-Drive Properties	Setup		X
Set Machine Size	Setup		X
Verify Firmware Versions	Test	X	X
Worktable	Tool		X
Printing / information	Page	X	X

Starting the Panel

1 Start the panel with **System > Basic Setup**.

The software now scans for the firmware hex files. This may take some time. If the following warning message appears, there are firmware files for which there is more than one version available.



Instrument Basic Setup Process Prompt

Please wait...

More than one hexfile found for the same firmware!
Please select 'Firmware Download' and verify the firmware compatibility!

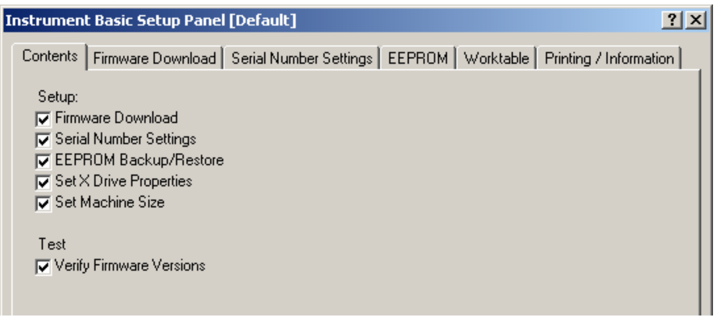
Fig. 7-2 More than one version of same firmware

2 If you want to load a firmware, select the **Firmware Download** check box on the **Contents** page, then click on the tab **Firmware Download**.

3 Verify the firmware compatibility and load the correct version as described in section 7.1.2 “Firmware Download”, 🗎 7-4.

Pages

The **Instrument Basic Setup Panel** is subdivided into the pages listed below:



Instrument Basic Setup Panel [Default]

Setup:
☑ Firmware Download
☑ Serial Number Settings
☑ EEPROM Backup/Restore
☑ Set X Drive Properties
☑ Set Machine Size

Test
☑ Verify Firmware Versions

Fig. 7-3 Basic Setup panel

Tab. 7-3 Pages of Basic Setup panel

Page	Function
Contents	General overview, procedure selection.
Serial Number Settings	Serial number data
Firmware Download	Verification and selection of the firmware to download
EEPROM	Backs up/restores contents of EEPROM
Worktable	Definition of worktable cutouts and extensions
Printing / Information	Print selection for the QC-report

7.1.2 Firmware Download

Cross References

List of cross references to information provided in other sections:

Information	References
Firmware compatibility list	See section 4.5, 🗎 4-21

Field Service Engineers

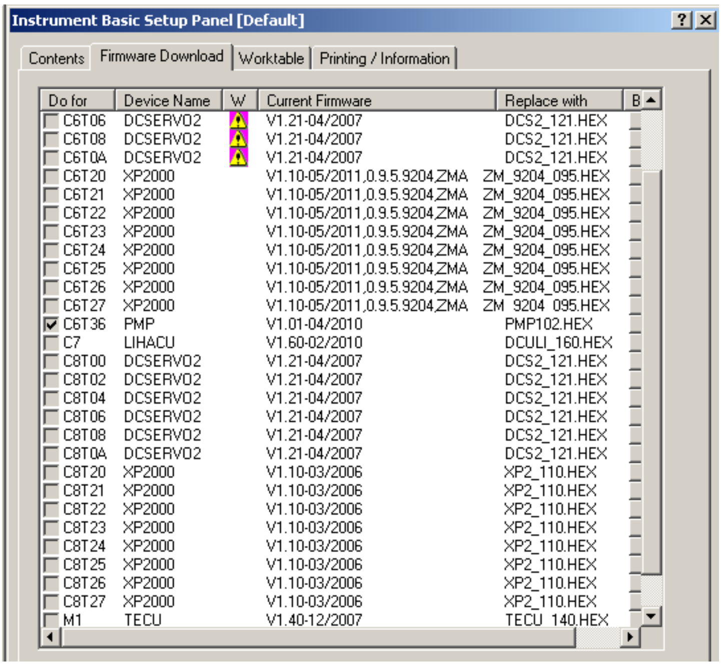
This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Firmware Download** page has the following functions:

- It lists the current firmware versions for the installed devices.
  - Devices for which more than one version of the firmware hex file was found, and with which the software cannot associate the correct HW or FW, are marked with a warning symbol. Provided that the context-sensitive HTML help is installed, you can directly click on this symbol to display the firmware compatibility list (see Cross References).
- In addition, it lets you select and download the required firmware hex file to the device.

Overview



Do for	Device Name	W	Current Firmware	Replace with	B
☐ C6T06	DCSERVO2	⚠	V1.21-04/2007	DCS2_121.HEX	
☐ C6T08	DCSERVO2	⚠	V1.21-04/2007	DCS2_121.HEX	
☐ C6T0A	DCSERVO2	⚠	V1.21-04/2007	DCS2_121.HEX	
☐ C6T20	XP2000		V1.10-05/2011,0.9.5.9204.ZMA	ZM_9204_095.HEX	
☐ C6T21	XP2000		V1.10-05/2011,0.9.5.9204.ZMA	ZM_9204_095.HEX	
☐ C6T22	XP2000		V1.10-05/2011,0.9.5.9204.ZMA	ZM_9204_095.HEX	
☐ C6T23	XP2000		V1.10-05/2011,0.9.5.9204.ZMA	ZM_9204_095.HEX	
☐ C6T24	XP2000		V1.10-05/2011,0.9.5.9204.ZMA	ZM_9204_095.HEX	
☐ C6T25	XP2000		V1.10-05/2011,0.9.5.9204.ZMA	ZM_9204_095.HEX	
☐ C6T26	XP2000		V1.10-05/2011,0.9.5.9204.ZMA	ZM_9204_095.HEX	
☐ C6T27	XP2000		V1.10-05/2011,0.9.5.9204.ZMA	ZM 9204 095.HEX	
☑ C6T36	PMP		V1.01-04/2010	PMP102.HEX	
☐ C7	LIHACU		V1.60-02/2010	DCULI_160.HEX	
☐ C8T00	DCSERVO2		V1.21-04/2007	DCS2_121.HEX	
☐ C8T02	DCSERVO2		V1.21-04/2007	DCS2_121.HEX	
☐ C8T04	DCSERVO2		V1.21-04/2007	DCS2_121.HEX	
☐ C8T06	DCSERVO2		V1.21-04/2007	DCS2_121.HEX	
☐ C8T08	DCSERVO2		V1.21-04/2007	DCS2_121.HEX	
☐ C8T0A	DCSERVO2		V1.21-04/2007	DCS2_121.HEX	
☐ C8T20	XP2000		V1.10-03/2006	XP2_110.HEX	
☐ C8T21	XP2000		V1.10-03/2006	XP2_110.HEX	
☐ C8T22	XP2000		V1.10-03/2006	XP2_110.HEX	
☐ C8T23	XP2000		V1.10-03/2006	XP2_110.HEX	
☐ C8T24	XP2000		V1.10-03/2006	XP2_110.HEX	
☐ C8T25	XP2000		V1.10-03/2006	XP2_110.HEX	
☐ C8T26	XP2000		V1.10-03/2006	XP2_110.HEX	
☐ C8T27	XP2000		V1.10-03/2006	XP2_110.HEX	
☐ M1	TECU		V1.40-12/2007	TECU 140.HEX	

Fig. 7-4 *Firmware Download page*

***Note:** Devices whose firmware cannot be downloaded do not appear on the **Firmware Download** page.*

Controls

The **Firmware Download** page contains the following controls:

Do for	Check boxes to select the CAN-bus addresses of the devices for which you want to download the firmware.
Device Name	Names of the selected devices.
W (W = Warning)	⚠ This warning symbol indicates that there is more than one firmware version available for the device and that the newest version available is not installed. If the context-sensitive HTML help system is installed, you can click on the symbol to obtain the firmware compatibility list (see cross references).
Current Firmware	Shows the names of the firmwares that are currently installed in the corresponding devices.

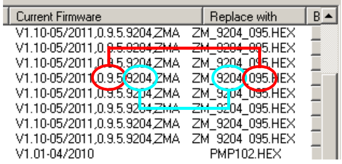
Replace with

V2.00-10/2003
V1.20-07/2005

DCURO_200.HI
DCURO113.HEX
DCURO_200.HEX

If there is a newer firmware available than currently installed it will be proposed for download in this column. FW for subdevices (e.g., DCSERVO2) is automatically proposed accordingly if predefined. If the corresponding row is marked with a warning symbol, you can click on the element in the **Replace with** column and open a drop-down list, from which you can choose the appropriate firmware file.

Air LiHa:
The channel firmware names for the Air LiHa are different than for a standard LiHa. The numbers specifying the firmware are compared as shown.



Current Firmware	Replace with
V1.10-05/2011,0.9.5.9204,ZMA	ZM_9204_095.HEX
V1.10-05/2011,0.9.5.9204,ZMA	ZM_9204_095.HEX
V1.10-05/2011,0.9.5.9204,ZMA	ZM_9204_095.HEX
V1.10-05/2011,0.9.5.9204,ZMA	ZM_9204_095.HEX
V1.10-05/2011,0.9.5.9204,ZMA	ZM_9204_095.HEX
V1.10-05/2011,0.9.5.9204,ZMA	ZM_9204_095.HEX
V1.10-05/2011,0.9.5.9204,ZMA	ZM_9204_095.HEX
V1.10-05/2011,0.9.5.9204,ZMA	ZM_9204_095.HEX
V1.01-04/2010	PMP102.HEX

Browse

Browser buttons that open the standard **Windows Open** dialog to search the file to download in another directory than <install_path>\Firmware.

Navigation in the Table

To navigate in the list control window (table) you can use in addition to the mouse some keys on the keyboard as follows:

Tab. 7-4 *Keyboard navigation*

Key pressed	Initial Cursor Position	Target Cursor Position
Tab	**Do for** checkbox	**Replace With** column, same row
Tab	**Replace With** column	One field down
Shift+Tab	**Replace With** column	One field up
Arrow, up / down	**Replace With** column	scrolls through the drop-down list in the field

TeCU Firmware

TeCU FW download with TeCU boot version 1.0:

- needs RS232 connection

TeCU FW download with TeCU boot version 1.1 or higher:

- needs USB connection

Note: *When doing a firmware download with USB connection it might be that the installation wizard for USB driver comes up. In this case a process prompt instructs you how to continue.*

Procedure for open configurations

To display the current firmware version and to download a new one:

1. On the **Contents** page, select the **Firmware Download** check box and change to the **Firmware Download** page.
   - The newest firmware versions are proposed in the **Replace with** column.
   - The selection / deselection of a **Do for** check box is controlled by the proposal / selection in the **Replace with** column and cannot be changed.
2. To see the firmware compatibility list, you can click on one of the ⚠ symbols (works if the context-sensitive help system is installed).

3. Select the firmware file from the **Replace with** list or use the browser buttons **[…]** button to search for the file.
4. Click **Start** to download the file.
5. If the **Please switch instrument off and on** message appears:
   - Switch off the instrument.
   - Observe the icon and the text in the process prompt.
   - Switch the instrument on again.

Procedure for Predefined configurations

To display the current firmware versions and to download new firmware versions:

1. On the **Contents** page, select the **Firmware Download** check box and change to the **Firmware Download** page.
   - The correct firmware versions are proposed in the **Replace with** column (cannot be changed for subdevices).
   - The selection / deselection of a **Do for** check box is controlled by the proposal / selection in the **Replace with** column and cannot be changed.
2. If one or more of the **Do for** check boxes are selected, click **Start** to download the firmware files.
3. If the **Please switch instrument off and on** message appears:
   - Switch off the instrument.
   - Observe the icon and the text in the process prompt.
   - Switch the instrument on again.
4. Run the **Verify Firmware Versions** test (refer to section 7.1.7 “Test: Verify Firmware Versions”, 🗎 7-12).

7.1.3 Serial Number Settings

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Serial Number Settings** page displays the serial numbers of the installed devices. Where necessary, the numbers can be set or changed manually on this page.

Air LiHa

The **Serial Number** settings for the Air LiHa control boards and the plunger drives is done via the **Setup** page in the **Air LiHa Panel** (refer to section 8.7.9 “Set Board and Axis Serial Numbers”, 🗎 8-145).

Controls

The **Serial Number Settings** page contains the following controls:

Set for	Check boxes to select the device addresses the serial number is to be set for.

Navigation in the Table

To navigate in the list control window (table) you can use in addition to the mouse some keys on the keyboard as follows:

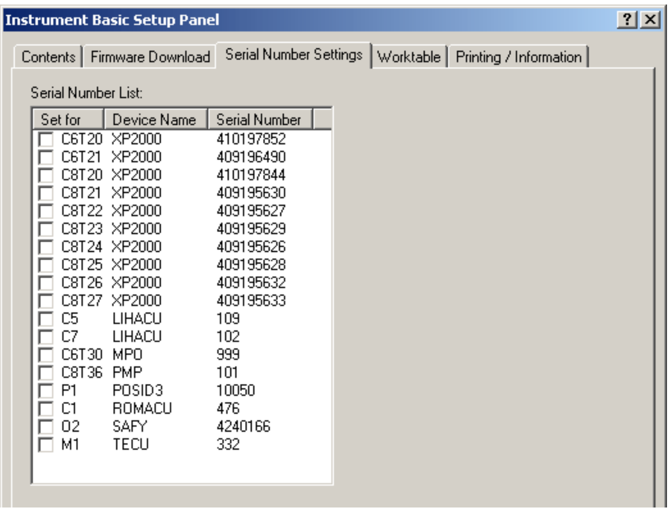
Tab. 7-5 Keyboard navigation

Key pressed	Initial Cursor Position	Target Cursor Position
Tab	**Set for** checkbox	**Serial Number** column, same row
Tab	**Serial Number** column	One field down
Shift+Tab	**Serial Number** column	One field up

Procedure

To display the serial numbers:

1 On the **Contents** page, select the **Serial Number Settings** check box and change to the **Serial Number Settings** page.



Serial Number List:

Set for	Device Name	Serial Number
☐ C6T20	XP2000	410197852
☐ C6T21	XP2000	409196490
☐ C8T20	XP2000	410197844
☐ C8T21	XP2000	409195630
☐ C8T22	XP2000	409195627
☐ C8T23	XP2000	409195629
☐ C8T24	XP2000	409195626
☐ C8T25	XP2000	409195628
☐ C8T26	XP2000	409195632
☐ C8T27	XP2000	409195633
☐ C5	LIHACU	109
☐ C7	LIHACU	102
☐ C6T30	MPO	999
☐ C8T36	PMP	101
☐ P1	POSID3	10050
☐ C1	ROMACU	476
☐ O2	SAFY	4240166
☐ M1	TECU	332

Fig. 7-5 Serial Number Settings page

2 If, in an exceptional case, an invalid serial number or no serial number is set for a device (in the latter case 0 is displayed instead of a serial number), select the corresponding **Set for** check box and type the valid serial number directly in the respective field in the **Serial Number** column.

3 Save your entries with **Start**.

7.1.4 EEPROM

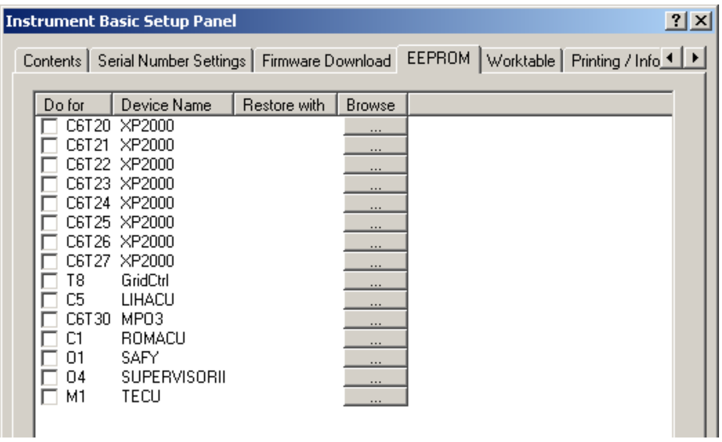
Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **EEPROM** page lets you back up EEPROM parameters of one or more devices on disk and/or restore such parameters from disk.

- Backing up the current device parameters is recommended after the installation and setup of the software.
- If, at a later time, an electronic board has to be replaced you can restore the parameters after the installation of the new board, so that you do not have to perform the setup or calibration procedures again.



Do for	Device Name	Restore with	Browse
☐ C6T20	XP2000		...
☐ C6T21	XP2000		...
☐ C6T22	XP2000		...
☐ C6T23	XP2000		...
☐ C6T24	XP2000		...
☐ C6T25	XP2000		...
☐ C6T26	XP2000		...
☐ C6T27	XP2000		...
☐ T8	GridCtrl		...
☐ C5	LIHACU		...
☐ C6T30	MPO3		...
☐ C1	ROMACU		...
☐ 01	SAFY		...
☐ 04	SUPERVISORII		...
☐ M1	TECU		...

Fig. 7-6 *EEPROM Backup page*

The **EEPROM** page contains the following controls:

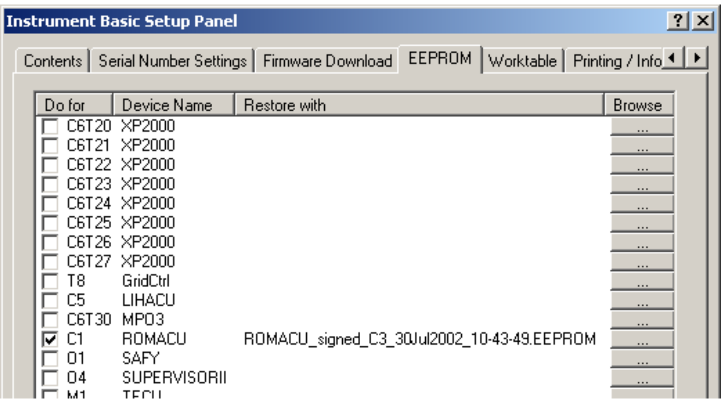
Do for	Check boxes to select the device addresses of the EEPROMs to backup.
Restore with	Shows the names of the files selected with the [**…**] buttons (browser)
…	Browser buttons that open the standard **Windows Open** dialog to search the files with the parameters to restore.

Backup

To backup the contents on disk:

1. On the **Contents** page, select the **EEPROM Backup/Restore** check box and change to the **EEPROM** page
2. Select the check boxes of the EEPROMs you wish to backup.
3. Click **Start.** The contents of the selected EEPROMs are written to disk:
   - Path: <data_path>\EEPROM
   - Example of a file name: ROMACU_signed_C3_30Jul_2002_10-43-49.EEPROM

Restore



Do for	Device Name	Restore with	Browse
☐ C6T20	XP2000		...
☐ C6T21	XP2000		...
☐ C6T22	XP2000		...
☐ C6T23	XP2000		...
☐ C6T24	XP2000		...
☐ C6T25	XP2000		...
☐ C6T26	XP2000		...
☐ C6T27	XP2000		...
☐ T8	GridCtrl		...
☐ C5	LIHACU		...
☐ C6T30	MP03		...
☑ C1	ROMACU	ROMACU_signed_C3_30Jul2002_10-43-49.EEPROM	...
☐ O1	SAFY		...
☐ O4	SUPERVISORII		...

Fig. 7-7 *EEPROM restore*

To restore the contents of a file that was backed up earlier:

1. Select the check boxes of the devices whose parameters to want to restore.
2. Use the appropriate browser buttons [**...**] to search the associated files. The names of the selected files appear in the **Restore with** column.
3. Click **Start**. When you click the **Start** button the following happens:
   - Before restoring anything, a backup copy is made of the EEPROM contents of each selected device. Backup data are written to the <data_path>\EEPROM directory.
   - Then, the contents of the files shown in the **Restore with** column are restored to the associated EEPROMs (i.e. written back into the respective EEPROMs).

7.1.5 Set X-Drive Properties

Cross References

List of cross references to information provided in other sections:

Information	References
Batch file for CGM field upgrade	See section 8.9.20, 🗎 8-199

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Set X Drive Properties** procedure determines the order of the arms and the arm type in each position and sets the default offset and displacement for each arm. In addition it determines the X-home position of the PosID-3.

The procedure must be performed whenever the arm configuration has been changed (upgrade, downgrade, exchange of arm positions).

Note: *After upgrading an MCA384 with a CGM you can run the batch file for CGM field upgrade to prevent from having to re-do the setup of the whole instrument. It is assuming that the instrument, including the MCA384, was correctly setup before the CGM upgrade (refer to cross references above).*

ATTENTION

Before starting the **Set X Drive Properties** procedure:

- Make sure the worktable is empty and free of obstacles at all times.
- Make sure each arm and (if installed) the PosID-3 can be initialized.
- If you set the X-drive properties, you must perform the PosID-3, LiHa, RoMa, MCA96, MCA384, CGM and / or PnP setup function afterwards.
  Start with the CGM setup if the CGM is installed.

ATTENTION

After the **Set X Drive Properties** procedure:

- If a CGM is installed you must start the CGM Panel first and do the CGM setup.
  The CGM must be able to dock on the MCA384 before you can use the various arm panels.

Procedure

To set the X-drive properties:

1. On the **Contents** page, select the **Set X Drive Properties** check box. No further parameters need to be entered.
2. Start the procedure with **Start**.
3. You are prompted that after the **Set X Drive Properties procedure** you have to setup all arms anew.
4. The Z-axes of all arms are initialized (except the Z-axis of the CGM) and you are prompted that all Y-axes are powered off.
5. You are prompted that for the following setup of the CGM and the various arms you have to move the arms manually to an adequate position.

ATTENTION

The Z-break may get damaged when moving the CGM in the Z-axis.

- Always release the Z-break (release button) of the CGM before moving the CGM in the Z-axis.

6. At the end of the procedure, the values found are written to the instrument.

7.1.6 Set Machine Size

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Set Machine Size** procedure detects the instrument size (number of grid positions).

Procedure

To determine the machine size:

1. On the **Contents** page, select the **Set Machine Size** check box. No further parameters need to be defined.
2. Start the procedure with **Start**.
3. At the end of the procedure, the values found are written to the instrument.

7.1.7 Test: Verify Firmware Versions

Purpose

The **Verify Firmware Versions** test checks for a predefined configuration if the firmware versions are corresponding to the configuration.
In all other cases the check box for this test is deactivated.

Requirements

At least one of all required devices of the predefined configuration must be available.

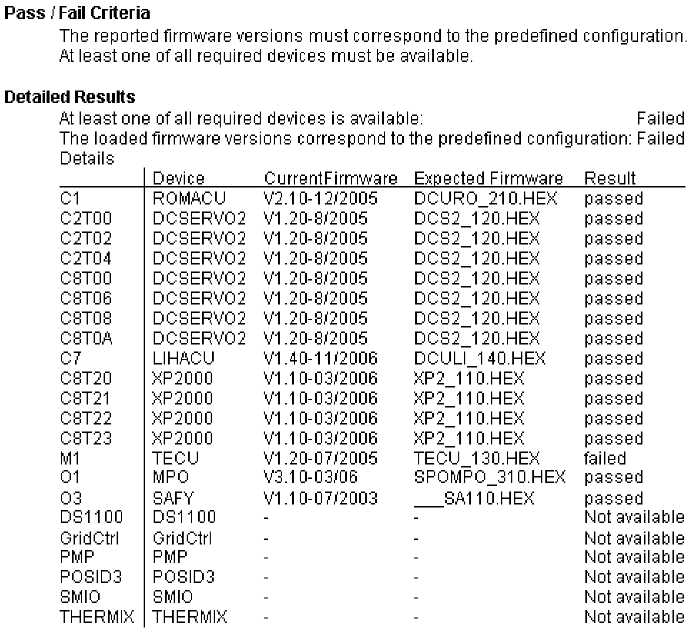
Procedure

To verify the firmware versions:

1. On the **Contents** page, select the **Verify Firmware Versions** check box. No further parameters need to be defined.
2. Run the test with **Start**.

Test Results

View or print a QC report with the detailed results of the test.
(refer to section 7.1.9 “Printing / Information”, 🗎 7-18)



Pass / Fail Criteria

The reported firmware versions must correspond to the predefined configuration.
At least one of all required devices must be available.

Detailed Results

At least one of all required devices is available: Failed
The loaded firmware versions correspond to the predefined configuration: Failed
Details

	Device	CurrentFirmware	Expected Firmware	Result
C1	ROMACU	V2.10-12/2005	DCURO_210.HEX	passed
C2T00	DCSERVO2	V1.20-8/2005	DCS2_120.HEX	passed
C2T02	DCSERVO2	V1.20-8/2005	DCS2_120.HEX	passed
C2T04	DCSERVO2	V1.20-8/2005	DCS2_120.HEX	passed
C8T00	DCSERVO2	V1.20-8/2005	DCS2_120.HEX	passed
C8T06	DCSERVO2	V1.20-8/2005	DCS2_120.HEX	passed
C8T08	DCSERVO2	V1.20-8/2005	DCS2_120.HEX	passed
C8T0A	DCSERVO2	V1.20-8/2005	DCS2_120.HEX	passed
C7	LIHACU	V1.40-11/2006	DCULI_140.HEX	passed
C8T20	XP2000	V1.10-03/2006	XP2_110.HEX	passed
C8T21	XP2000	V1.10-03/2006	XP2_110.HEX	passed
C8T22	XP2000	V1.10-03/2006	XP2_110.HEX	passed
C8T23	XP2000	V1.10-03/2006	XP2_110.HEX	passed
M1	TECU	V1.20-07/2005	TECU_130.HEX	failed
O1	MPO	V3.10-03/06	SPOMPO_310.HEX	passed
O3	SAFY	V1.10-07/2003	___SA110.HEX	passed
DS1100	DS1100	-	-	Not available
GridCtrl	GridCtrl	-	-	Not available
PMP	PMP	-	-	Not available
POSID3	POSID3	-	-	Not available
SMIO	SMIO	-	-	Not available
THERMIX	THERMIX	-	-	Not available

Fig. 7-8 *QC report of a predefined configuration*

If the Test Fails

Try the following:

- Ensure that all required devices are available (None of the required devices must have a “**Not available**” in the **Result** column of the QC report).
- Download the correct firmware versions for all required devices (refer to section “Procedure for Predefined configurations”, 🗎 7-7).
- If the problem persists contact the customer service department for assistance.

7.1.8 Worktable

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

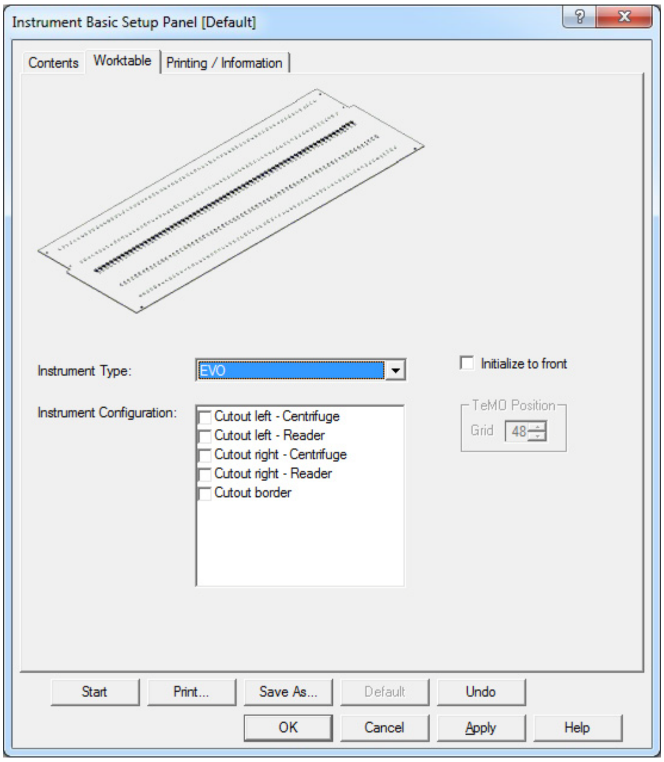
Purpose

The **Worktable** page is a tool that lets you define special instrument options, as well as the positions of possible cutouts in the worktable or on the right border for the various instrument types:

- Freedom EVO: Cutouts within the worktable for centrifuge or reader or on the right border for other devices.
- EVOlyzer: No cutouts can be selected.
- Instruments 30045716, 30045717 and 30045718: Positions of BEPs.
- Other instrument configurations according to installation.

The following two figures show the **Worktable** pages for various instrument types and configurations.

Worktable Page for Freedom EVO



Instrument Type: EVO

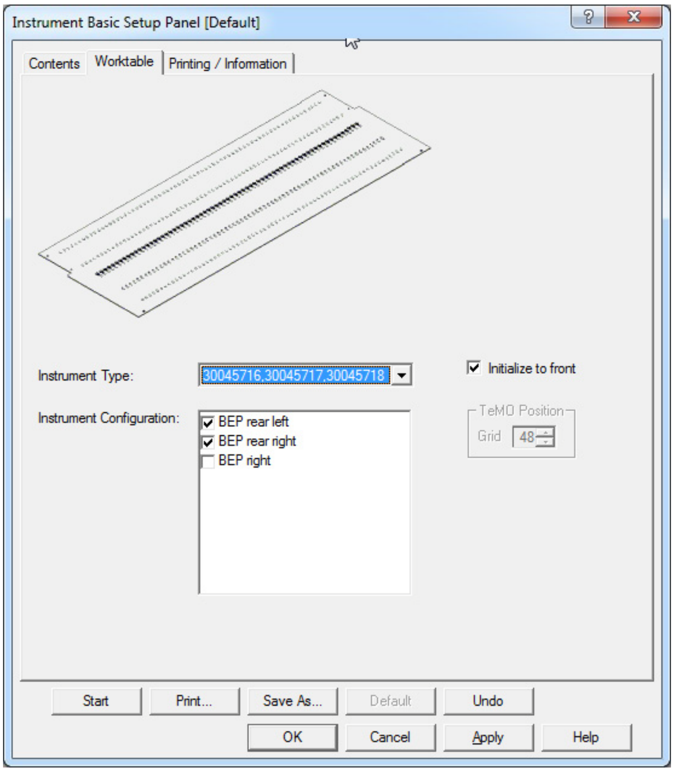
☐ Initialize to front

Instrument Configuration:
☐ Cutout left - Centrifuge
☐ Cutout left - Reader
☐ Cutout right - Centrifuge
☐ Cutout right - Reader
☐ Cutout border

TeMO Position
Grid 48

Fig. 7-9 Worktable page for Freedom EVO

Worktable Page for 30045716, 30045717 and 30045718



Instrument Type: 30045716,30045717,30045718

☑ Initialize to front

Instrument Configuration:
- ☑ BEP rear left
- ☑ BEP rear right
- ☐ BEP right

TeMO Position
Grid 48

Fig. 7-10 *Worktable page for instruments 30045716, 30045717 and 30045718*

Controls The Worktable Page contains the following controls:

Tab. 7-6 Controls on Worktable page

Control	Descriptions
Upper part	Picture that shows the worktable. Selected cutouts appear on the picture.
Instrument Type	Drop down list that lets you select the instrument to set up: • EVO for Freedom EVO instruments • EVOlyzer if the instrument is a Freedom EVOlyzer • Instruments 30045716, 30045717 and 30045718 (OEM product) • etc.
Initialize to front	If this feature is enabled, the set init position in x is activated. See **Setup** page of the corresponding arm device panels. If a Te-Mo or an instrument 30045716, 30045717 or 30045718 installed, this feature is enabled automatically.
Te-MO Position	The spin box on this frame is only available if a Te-MO is installed on the instrument. It lets you set the left-most grid position occupied by the Te-MO.
Instrument Configuration	The check boxes that appear in this list box depend on the instrument type selected.
- For Freedom EVO	The check boxes let you define the cutouts for the reader and the centrifuge.
	• No check box selected: Worktable has no cutouts.
	• **Cutout left - Centrifuge** and **Cutout right - Centrifuge**: Let you select the cutout(s) for the centrifuge(s) below the worktable.
	• **Cutout left - Reader** and **Cutout right - Reader**: Let you select the cutout(s) for the reader(s) below the worktable.
	• **Cutout border**: Lets you select a cutout at the right-hand edge of the worktable.
- For Freedom EVOlyzer	The list box does not contain any check boxes (no cutouts possible for this instrument type).
- For instruments 30045716, 30045717 and 30045718	The check boxes let you define the BEP positions:
	• BEP rear left • BEP rear right • BEP right
	Note: Not all possible combinations of BEP positions are used in the field. The arrangements used in the field are: • Either two BEPs on rear side • or one BEP on right side

Note:

- *The **Worktable** page does not appear in the panel if an instrument has no arms (MCA, LiHa, RoMa, PnP) at all (e.g., Aquarius, also possible with Freedom EVO). The elements on the page cannot be activated if no cutouts are possible for the instrument in question.*
- *Before using the **Worktable** page, define the machine size with **Set Machine Size.***

Procedure

To define the **Worktable** configuration:

1 If not done yet, set the machine size.

2 Click the **Worktable** tab. The **Worktable** page appears.

3 Select the appropriate **Instrument Type** (e.g., **EVO**, **EVOlyzer**, etc.).

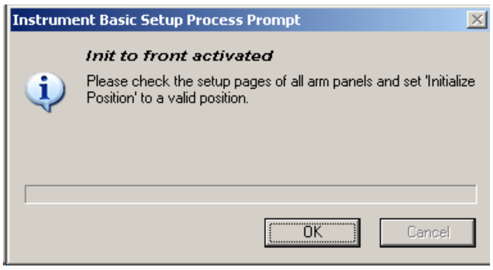
4 Depending on the instrument type, define the **Instrument Configuration**, for example:

- Freedom EVO: Define the cutout positions if there are any.
- Freedom EVOlyzer: No selection possible.
- Instruments 30045716, 30045717 and 30045718: Define the BEP-positions:
  - Either **BEP rear left** plus **BEP rear right.**
  - or **BEP right**.
- Other instrument configurations: As required by the instrument.

5 In certain cases (e.g., BEP, Te-MO or special labware installed on the rear side of the worktable), it is possible that the arm devices (LiHa, MCA, RoMa or PnP) cannot be moved to their initialization positions with their heads or pipetting channels in the rear positions in order to avoid collisions. Set the following in such a case:

- Select the check box **Initialze to front**. Note that in most cases this check box is selected automatically (e.g., in case of a Te-MO or a BEP).
- If a Te-MO installed on the instrument, you must also set its leftmost grid position in the frame **Te-MO Position**.

If the Initialize to front feature is selected the following message appears on the screen.


Instrument Basic Setup Process Prompt

Init to front activated

Please check the setup pages of all arm panels and set 'Initialize Position' to a valid position.

Fig. 7-11 *Initialize to front*

6 If this message appears, you must use the **Setup** pages of the installed arm devices and

7 Click the appropriate command button to store or cancel your selections (**Apply**, **OK** or **Cancel**).

7.1.9 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

7.2 Initialize Instrument

Purpose

This function initializes the instrument. During the initialization all installed system devices (LiHa, RoMa, PnP and PosID) are moved to their initial positions on the left side of the instrument.

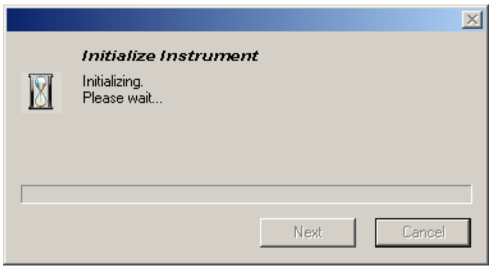
Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Procedure

To initialize the instrument:

1 Start the function with **Instrument > Initialize Instrument**. The following message appears:



Initialize Instrument

Initializing.
Please wait...

The message box disappears as soon as the initialization is finished.

Fig. 7-12 *Initialize instrument*

Power Off

It is recommended to move the MCA384 with CGM (gripper) with the command **Move to Park** to park position before switching off the instrument. After that you can switch on and initialize the instrument faster because the CGM is already docked on the MCA384.
Be aware that **Move to Park** is only working if the CGM is docked on the MCA384. Therefore it is best for a shutdown to use the commands on the instrument panel bar in a top down sequence (see Fig. 7-13, 🗎 7-20).

Dock CGM on MCA384

To dock the CGM (gripper) on the MCA384 head, proceed as follows:

1 Start the command **Dock CGM on MCA** from the Instrument menu or from the **Panel Bar**.

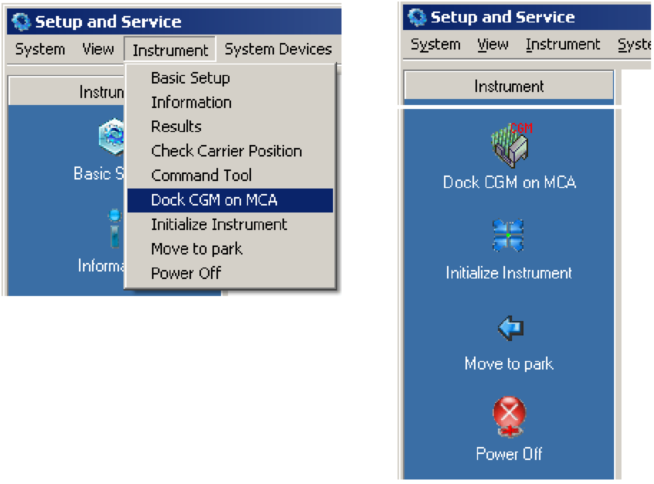
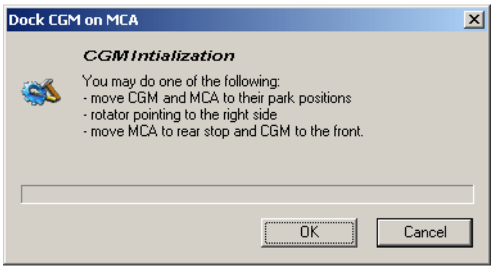


Fig. 7-13 *Dock CGM on MCA*

You will now be guided through the procedure by a series of process prompts.



CGM Intialization

You may do one of the following:
- move CGM and MCA to their park positions
- rotator pointing to the right side
- move MCA to rear stop and CGM to the front.

Fig. 7-14 *CGM initialization*

2 Move the CGM and the MCA384 head as instructed in the process prompt.

3 Click **OK** when done.

The CGM (gripper) will be docked on the MCA384 head.

4 Now initialize the instrument (refer to "To initialize the instrument:", 🗎 7-19)

7.3 Command Tool

7.3.1 Introduction

Purpose

The **Command Tool** panel is intended for experienced field service engineers, developers and the production department. It offers them the following possibilities:

- To edit and execute single commands.
- To write, edit and execute small batch programs (command sequences). Such batch programs can be stored in a directory and reloaded later.
- Single commands and batch programs allow performing special test sequences that cannot be invoked via the normal menu.

Command Set

There is a specific command set (a so-called FCS = firmware command set) for each firmware. These sets can be used to initialize, move, etc. the various devices and options. They are documented separately and are not described in this manual. We recommend you to contact the customer service department for more detailed information.

Pages

The **Command Tool** panel consists of the following pages:

Tab. 7-7 Pages of Command Tool Panel

Page	Function
Batch File Execution	Lets you execute command sequences (batch programs).
Single Commands	Lets you enter and run single commands

7.3.2 Batch File Execution

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Batch File Execution** page contains all the controls you need to create, edit, run, store, retrieve and delete command sequences.

Controls

The **Batch File Execution** page contains the controls described after the following figure.

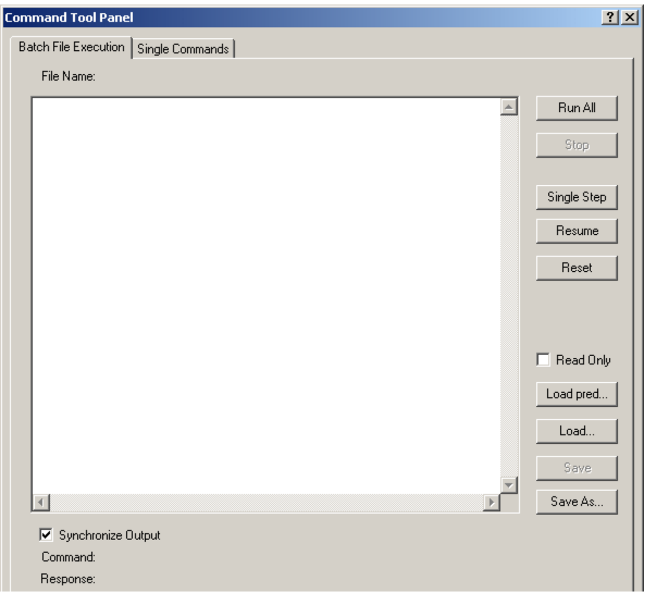


Fig. 7-15 Batch file execution window

File Name	Name of the currently loaded batch file

Window	The large window on the left serves for entering the single commands that make up a command sequence. Commands can be typed directly in the window. Each command line must be terminated with the **Enter** key on your keyboard.
Command buttons	
Run All	Click this button to execute all commands of the batch
Stop	Stops the execution of a batch
Single Step	Lets you execute the batch stepwise (command line by command line)
Resume	Resumes the execution of a stopped batch, beginning at the current command line
Reset	Resets the internal logic after errors
Load pred...	Invokes the **Windows Open** dialog window from which you can select a predefined batch file containing a command sequence. **Note**: predefined batch files are stored during installation of the Instrument software in the installation path.
Load…	Invokes the **Windows Open** dialog window from which you can select a previously setup batch file containing a command sequence. The batch files are setup by the user.
Save	Saves the current contents of the **Edit** window
Save As…	Opens the **Windows Save As** dialog that lets you save the contents of the **Edit** window under a different name.
Read Only	To enables/disable write protection of batch files. If this check box is selected batch files can be loaded from disk, but not overwritten.
Synchronize Output	If this check box is selected the command line that is currently executed is marked in the window.
Command	Text field, shows the currently executed command
Response	Text field, shows the response of the instrument. (the text can be copied to the clipboard with <CTRL>C for further use)

7.3.3 Single Commands

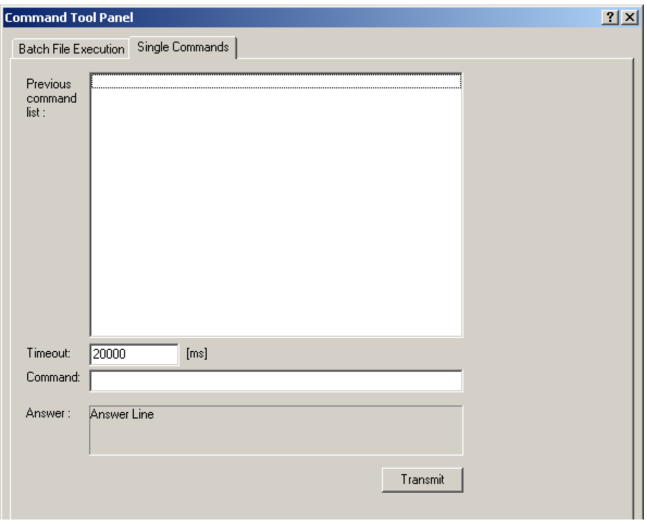
Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Single Commands** page lets you enter and execute single commands. Commands you have entered earlier remain visible in the edit window and can be executed again later.

Note: *You cannot store the commands you have entered on disk and retrieve them later. Use the **Batch File Execution** page in such a case.*



Timeout: 20000 [ms]

Answer : Answer Line

Fig. 7-16 *Single Command window*

Controls

The **Single Commands** page contains the following controls:

Previous command list	Shows previously entered commands
Timeout	If a command is not completely processed within this time a communication error message will be displayed in the Answer text field. The time-out value can be set by the user.
Command	Test box in which the next command to be executed can be typed.
Answer	Text field showing the response of the instrument
Transmit	Sends the command to be executed to the instrument

7.4 Power Off

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This command lets you switch off the following devices so that they can be moved freely along their axes.

- LiHa (all axes)
- RoMa (all axes)
- PnP (X-, Y- and Z-axes)
- PosID (X- and Y-axes)

- MCA / CGM (all axes, to move the MCA / CGM in the Z-axis, the mechanical Z-brake must be released).

For detailed information refer to section 5.1.6 “Power Off”, 🗎 5-11.

7.5 Information

7.5.1 Introduction

Purpose

The **Information** panel allows you to call up detailed information about the instrument and the currently installed system devices and options through a single panel. In this way, you do not need to open the screens or panels of each individual device or option to obtain the required information.

Note:

- *You cannot perform any setups or tests through the **Information** panel*
- *The **Information** panel is available to all user groups.*

Pages

The **Information** panel contains only one page (see following section).

7.5.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	**References**
Printing a report	See section 5.2.8, 🗎 5-24

Brief Description

The only page of the **Information** panel serves two purposes (see following figure);

- It lets you view the required information
- At the same time it serves as the panel’s **Printing** and allow you to print out information about the selected items.

Calling up the Panel

To call up the **Information** panel:

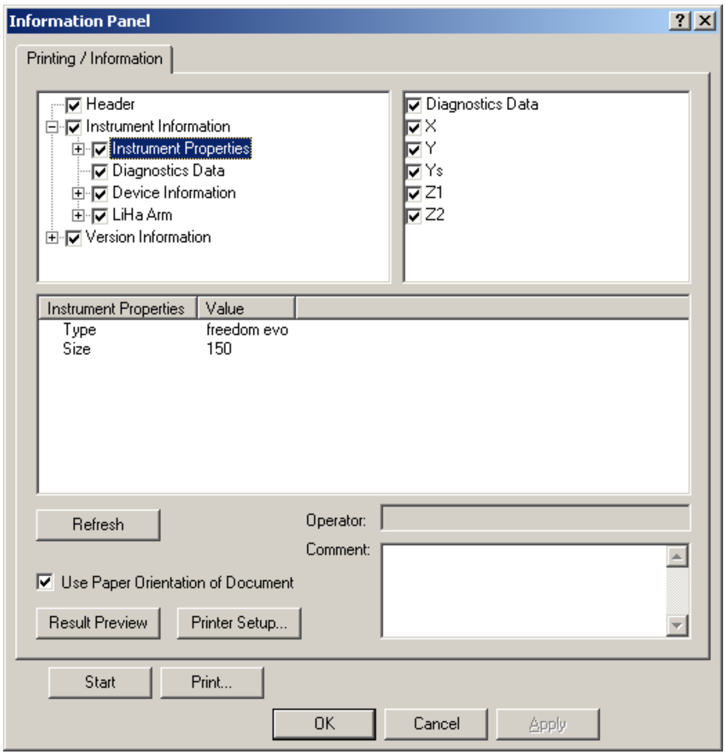
1. On the main menu select **Instrument > Information**.

   *The **Information** panel’s only page appears.*
2. If necessary type a suitable comment in the **Comment** field.

   *As with every panel you must fill out the **Comment** field before starting the function. Note that your full name as defined in the User Management System is automatically inserted in the field **Operator** (this field cannot be edited).*
3. Click **Start** when done.

   The software starts gathering information about the instrument and the installed devices and options.
4. View the information by selecting the corresponding items in the upper left window.

5 Print out a report if required.



- ☑ Header
- ☑ Instrument Information
  - ☑ Instrument Properties
  - ☑ Diagnostics Data
  - ☑ Device Information
  - ☑ LiHa Arm
- ☑ Version Information

- ☑ Diagnostics Data
- ☑ X
- ☑ Y
- ☑ Ys
- ☑ Z1
- ☑ Z2

Instrument Properties	Value
Type	freedom evo
Size	150

☑ Use Paper Orientation of Document

Fig. 7-17 Information panel

7.6 Move to Park

Purpose

This command lets you move all arms to their parking positions on the left side of the instrument. The command is also available on the panel bar.

- MCA96
- MCA384
- CGM

Note: *You cannot use this command before the instrument is initialized.*

For detailed information refer to section 5.1.7, 🗎 5-12.

MCA384 with CGM

It is recommended to move the MCA384 with CGM (gripper) with the command **Move to Park** to park position before switching off the instrument.
After that you can switch on and initialize the instrument.
Be aware that **Move to Park** is only working if the CGM is docked on the MCA384.

7.7 Results

7.7.1 Introduction

Purpose

The **Results** panel provides an overview of the test results of installed devices and options and lets you select and print out the results of individual tests.

Note:

- *You cannot perform any setups or tests through the **Results** panel*
- *The **Results** panel functions are available to all user groups.*

Pages

The **Results** panel consists of the following two pages (see the figures in the following paragraphs):

Tab. 7-8 *Pages of Results Panel*

Page	**Function**
Results	Provides an overview of available test results, grouped together by selectable criteria.
Printing / Information	Lets you configure and print out the information selected on the **Results** page.

Procedure

To call up the **Results** panel:

1 From the main menu select **Instrument > Results**.

7.7.2 Results Page

Directory and Files

Test results are stored as follows:

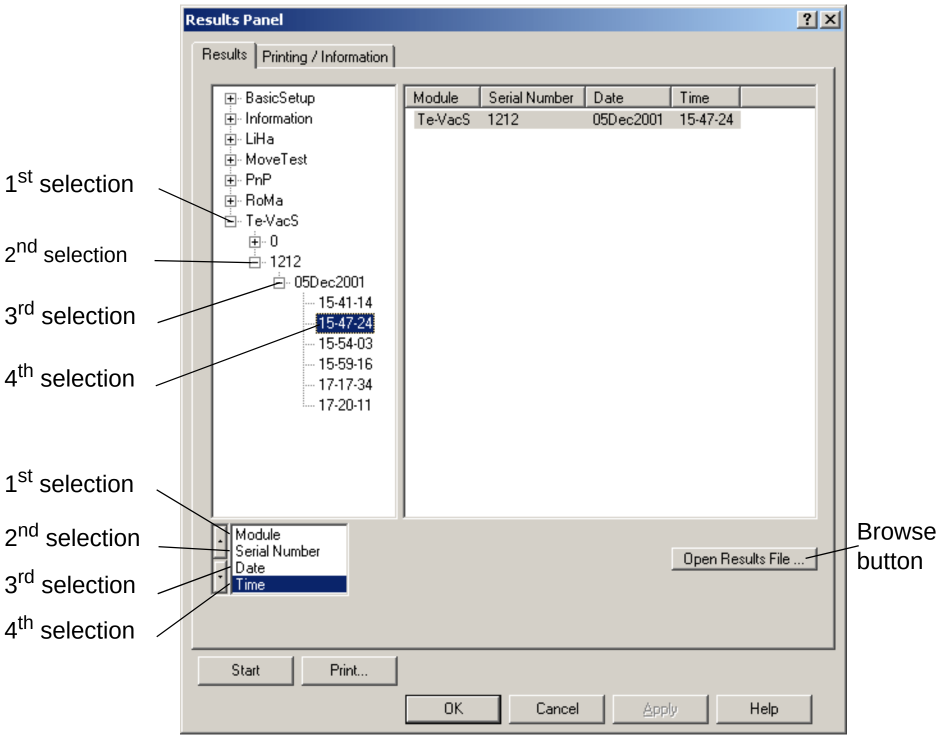
Directory:	<data_path>\Results
File name structure:	<module>_<serial_number>_<date>_<time>.any
Example:	TeVacS_1212_05Dec2001_15-47-24.any

If you look at the file name you will find that it contains the following items (separated by an underbar _):

- **Module:** The name of the module or device that was tested
- **Serial number:** The number shown depends on the test:
  - In case of a device test: The device serial number is shown.
  - In case of a system test: The instrument’s serial number.
- **Date:** Day/month/year on which the test was performed
- **Time:** Hour/minute/second when the test was concluded (local time, 24-hour clock, i.e. 0:00:00 till 23:59:59 hours).

Selection Criteria

The module name, serial number, date and time are used as the selection criteria on the **Results** page.



Module	Serial Number	Date	Time
Te-VacS	1212	05Dec2001	15-47-24

Fig. 7-18 *Results page*

Controls

The **Results** page contains the following controls:

Upper left list box	Tree view with four selection levels. It serves as a browser that lets you select an individual test quickly. The nodes (the small square boxes with the + or - sign) can be expanded or collapsed to show or hide the associated sub-selections.
Right list box	Lists the results available for the item selected in the left list. If you double-click an item in this list or if you select it and press the **Enter** key, a preview of the associated QC-report appears. To close the report, press **Alt + F4**.
List at bottom	Lets you define or change the selection order.
OK	Closes the panel
Cancel	Closes the panel
Open Results File…	If you click the button below the right list box the Windows standard Open dialog will be displayed. It allows you to select any QC-report (*.any file—e.g., “Information.any”). You can print the corresponding report with the **Print...** button, or you can change to the **Printing / Information** page to make further selections or to open a **Print Preview**.
Print	Prints the results of the item(s) selected in the right list. You can also change to the Printing / Information page and print the results more selectively.

Default Selection Order

The example shows the default selection order of the test results:

- 1st selection: by module (in our example Te-VacS is expanded).
- 2nd selection: by serial number within 1st selection (in our case there is one Te-VacS with serial number 1212).
- 3rd selection: by date within 2nd selection (in our case, tests with Te-VacS 1212 were carried out on 5 December 2001).
- 4th selection: by time within 3rd selection (the example shows the times when the tests for TeVacS 1212 were concluded on 5 December 2001).

Changing the Selection Order

The selection order is given by the position of a selection criterion in the small list below the tree view. The criterion at the top is the 1στ selection, the one at the bottom is the 4th selection.

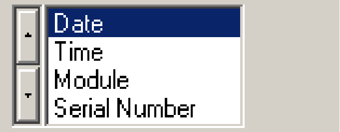


Fig. 7-19 Changing the selection order

To change the selection order:

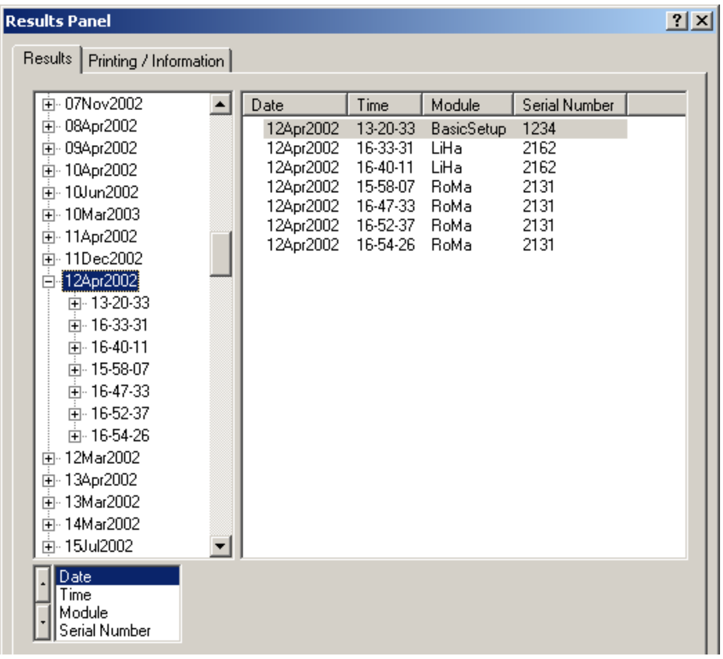
1. Highlight the criterion whose position you wish to change.
2. Use the arrow keys on the left side to move it up or down the list.

Example

If you wish to view the results of all tests carried out on a particular day you can proceed in several ways, e.g.:

- You can move the **Date** criterion up to the top of the list and the **Time** criterion to the second position.
- You can also move the **Serial Number** criterion down to the bottom of the list and the **Module** criterion to the third position.

The following figure shows an example of a **Results** page with the results grouped by date.



Date	Time	Module	Serial Number
12Apr2002	13-20-33	BasicSetup	1234
12Apr2002	16-33-31	LiHa	2162
12Apr2002	16-40-11	LiHa	2162
12Apr2002	15-58-07	RoMa	2131
12Apr2002	16-47-33	RoMa	2131
12Apr2002	16-52-37	RoMa	2131
12Apr2002	16-54-26	RoMa	2131

Fig. 7-20 Results grouped by date

Previewing the QC-Report

You can preview the QC-report associated with the list on the right side as follows:

- Double-click an item (or highlight it and press the **Enter** key). This opens a preview of the QC-report associated the item selected.
- To close the report, press **Alt + F4**.

7.7.3 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

7.8 Check Carrier Position

7.8.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Workable editor	See section 14, 🗎 14-1
LiHa Channel page	See section 8.6.5, 🗎 8-84

Purpose

The **Check Carrier Position** panel is a tool that lets you verify if the LiHa tips can be positioned correctly to the X-, Y- and Z-positions of labware items arranged on the worktable (microplates, tube racks).

- The labware used must be defined on the worktable page using the Worktable Editor (see cross references).
- The LiHa tips used must be defined on the LiHa **Channel** page (see cross references).

Pages

The **Check Carrier Position** panel consists of the following three pages (see the figures in the following paragraphs):

Tab. 7-9 Pages of Check Carrier Position panel

Page	Function
Contents Page	Lets you select the LiHa(s) to include in the verification.
Worktable Page	Shows the worktable layout
Move LiHa	Tool that allows you to move one or more LiHa channel to certain wells of tube racks or microplates.

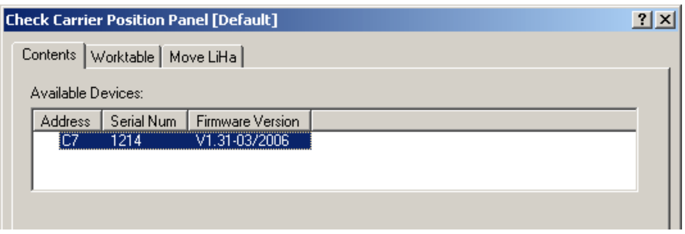
Procedure

To call up the **Check Carrier Position** panel:

1 From the main menu select **Instrument > Check Carrier Position.**

*This opens the **Contents** page.*

Contents Page



Available Devices:

Address	Serial Num	Firmware Version
C7	1214	V1.31-03/2006

Fig. 7-21 Check Carrier Position, Contents page

As the above figure shows, the **Contents** page contains no setup or test procedures. The window **Available Devices** allows you to select the LiHa(s) to verify.

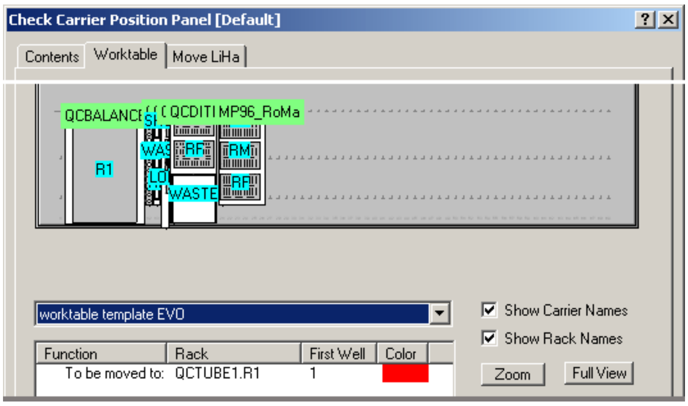
7.8.2 Worktable Page

Cross References

List of cross references to information provided in other sections:

Information	References
Workable editor	See section 14, 🗎 14-1
Worktable page	See section 8.6.5, 🗎 8-84

The Worktable page allows you to select the labware to include in the verification. For a more information (see cross references).



worktable template EVO

☑ Show Carrier Names
☑ Show Rack Names

Function	Rack	First Well	Color
To be moved to:	QCTUBE1.R1	1	🟥

Fig. 7-22 *Check Carrier Position, Worktable page*

7.8.3 Move LiHa Page

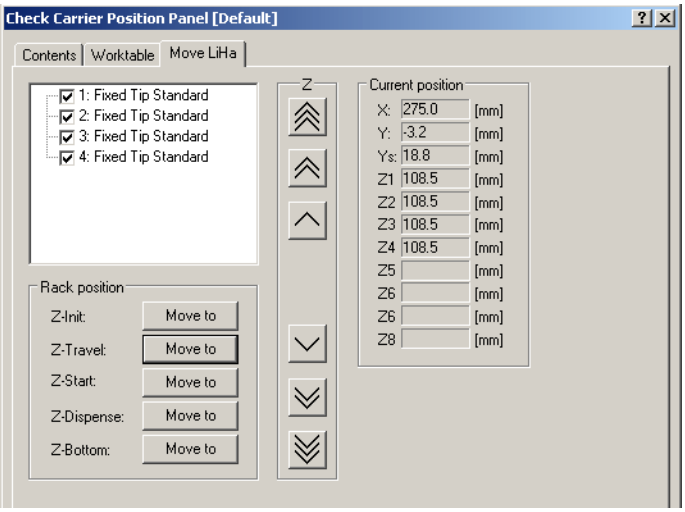
Cross References

List of cross references to information provided in other sections:

Information	References
Workable editor, Container editor	See section 14.4, 🗎 14-11
Worktable page	See section 8.6.5, 🗎 8-84

Move Page

This page lets you verify informally if the LiHa selected on the Contents page can be positioned correctly with respect to the labware selected on the Worktable page.



☑ 1: Fixed Tip Standard
☑ 2: Fixed Tip Standard
☑ 3: Fixed Tip Standard
☑ 4: Fixed Tip Standard

Rack position:
Z-Init: Move to
Z-Travel: Move to
Z-Start: Move to
Z-Dispense: Move to
Z-Bottom: Move to

Current position:
X: 275.0 [mm]
Y: -3.2 [mm]
Ys: 18.8 [mm]
Z1 108.5 [mm]
Z2 108.5 [mm]
Z3 108.5 [mm]
Z4 108.5 [mm]
Z5 [mm]
Z6 [mm]
Z6 [mm]
Z8 [mm]

Fig. 7-23 *Check Carrier Position, Move LiHa page*

Controls

The **Move LiHa** page contains the following controls:

Window near upper left corner	Lets you select / deselect the LiHa channels to include in the verification.
Rack Position	This frame shows five positions to which the LiHa channels, selected in the upper / left window, can be moved in the Z-axis (also see note below): • **Z-Init**: The top position of a channel • **Z-Travel**: Position into which a tip is move before liquid detection, dispense or aspiration begins (approx 3 mm above rim of well). • **Z-Start**: Position in which liquid detection is switched on (approx 1 mm above rim of well). • **Z-Dispense**: Position in which dsipensation begins. • **Z-Bottom**: Lowest possible position • **Move to buttons**: To move the tips into a particular position, click the **Move to** button beside the posiiton.
Z	The movement buttons in this frame let you move the selected tips upwards or downwards
	︿ ﹀ Move tip 1/10 mm up / down
	︽ ︾ Move tips 1 mm up / down
	⋀⋀⋀ ⋁⋁⋁ Move tips continuously up / down
Current positions	This frame shows the current tip positions in the X-, Y- and Z-axes.

Note: *For a detailed description of Z-positions, refer to the “Worktable Complete Editor”, section “Container Editor” (see cross references).*

8 System Devices 1

Purpose of This Chapter

This chapter provides detailed information about the setup and test of the following devices: Positive Identification System (PosID)[1], the Liquid Handling Arms (LiHa, Air LiHa), the Multichannel Arm 384, the CGM and the Multichannel Arm 96.

Note: *The Move Test, Pick and Place Arm (PnP) and Robotic Manipulator Arm (RoMa) are dealt with in chapter "System Devices 2).*

8.1 Introduction

Available Arms

The following robotic arms are available for Freedom EVO instruments:

- Liquid Handling Arms (LiHa and Air LiHa) for liquid pipetting tasks.
- Multichannel Arms (MCA96 and MCA384) for multichannel pipetting functions.
- Common Gripper Module (CGM) on MCA384 for plate and DiTi box handling on the platform worktable.
- Pick and Place (PnP) for tube handling.
- Robotic Manipulator Arm (RoMa) for plate handling on the platform worktable.
- Robotic Manipulator Arm (RoMa) Long for plate handling on and underneath the platform worktable.

Device Parameters

When you set up an arm, various device parameters are determined and written to the device.

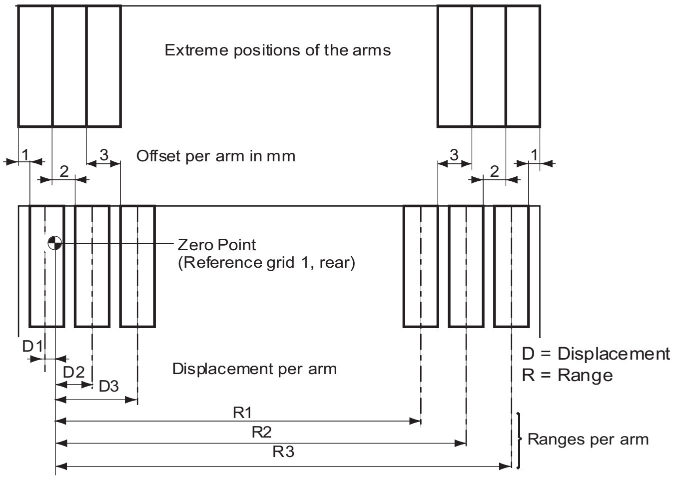


Fig. 8-1 *Device parameters (Freedom EVO)*

---

[1] *PosID 2 and PosID-3. PosID1 is no longer supported by the Setup and Service software*

Note:

- *The above figure applies to Freedom EVO instruments that can be equipped with 3 arms.*
- *The displacement of the leftmost arm (D1) may be negative (depends on the arm configuration).*

Reference Positions

Freedom Instruments

The reference positions vary depending on the instrument size and the location of possible worktable cutouts.
The following table lists standard reference positions.

Note: *Depending on the worktable layout (e.g., in case of cutouts, arm configuration—e.g. if an MCA and a second or third arm are installed), it may be necessary to move the reference pins to other positions than shown in the table.*

Tab. 8-1 *Standard reference grid positions for EVO Instruments*

Instrument/workstation type	Instrument size	Total # of grid positions	Left reference position	Right reference positions
Freedom EVO	100	30	1	22
	150	45	1	37
	200	69	1	61
Freedom EVOlyzer	100	30	1	22
	150	45	1	37
	200	—	—	—

Grid Positions

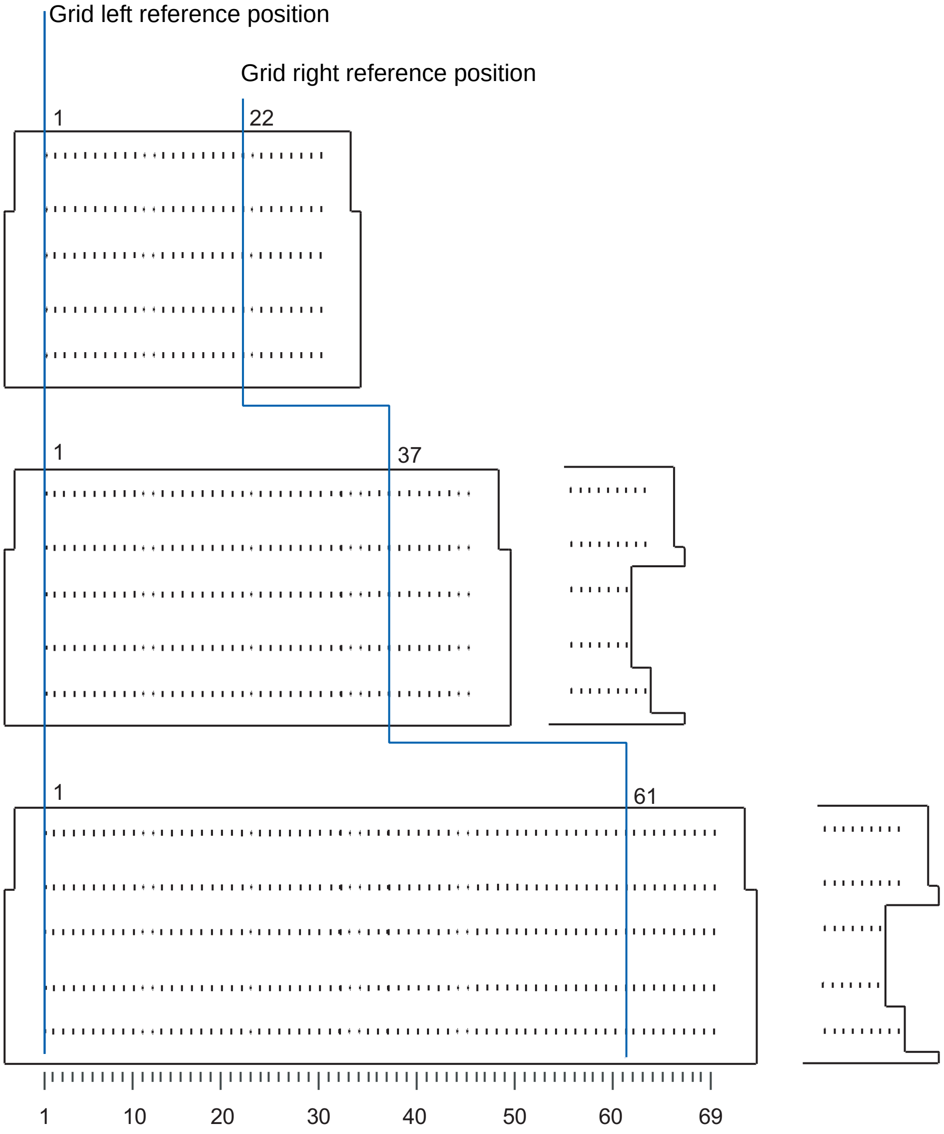


Fig. 8-2 *Grid reference positions for Genesis instruments*

Note: *The grid right reference position depends on how many incubators are used. The rule is -6 for each incubator and a safety distance of -4, e.g.*

- *with one incubator: (total grids) - (6+4)*
- *with two incubators: (total grids) - (12+4).*

8.2 System Devices Menu

The **System Devices** menu contains the commands listed below.

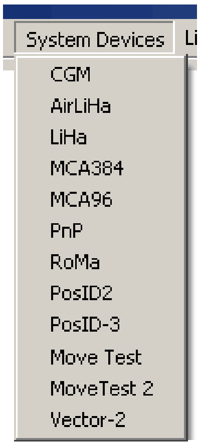


Fig. 8-3 *System Devices menu*

Tab. 8-2 *System Devices Menu*

Menu Item	Function	See section
PosID 2	Setup and test of PosID 2	8.4, 🗎 8-5
PosID-3	As above for PosID-3	8.5, 🗎 8-37
LiHa	As above for the liquid handling arm	8.6, 🗎 8-75
AirLiHa	As above for the Air liquid handling arm	8.7, 🗎 8-134
MCA96	As above for the Multichannel Arm 96	8.10, 🗎 8-203
MCA384	As above for the Multichannel Arm 384	8.8, 🗎 8-150
CGM	As above for the CGM	8.9, 🗎 8-182
Move Test	Range and random move test for LiHa, MCA, RoMa, PnP and PosID.	9.2, 🗎 9-2
Move Test 2	Special Move Test for Cellerity (only if Cellerity has been selected during installation)	9.3, 🗎 9-9
PnP	Setup and test of the Pick and Place Arm	9.4, 🗎 9-23
RoMa	As above for the Robotic Manipulator Arm	9.5, 🗎 9-40
Vector-2	As above for RoMa access for shelf, room temperature incubator(s), loading ports, heated incubator(s), plate washer, plate reader and BEP III (instruments 30045716, 30045717 and 30045718	9.6, 🗎 9-72

Note: *The Move Test, Move Test 2, PnP, RoMa and Vector-2 panels are dealt with in chapter “System Devices 2”.*

8.3 Positive Identification PosID

Purpose

The positive identification system (PosID) uses a barcode scanner to read barcode labels applied to objects like carriers, racks and containers. This allows the application software to continuously locate and check the positions of such objects.

PosID Types

There are several generations of positive identification system modules:

- **PosID 1:** This first-generation version of PosID is no longer supported by the Setup and Service software and is therefore not described in this manual.
- **PosID 2:** Positive identification supplied as of November 1997. For detailed information see section 8.4 “PosID 2 Functions”, 🗎 8-5
- **PosID-3:** New and improved version supplied as of July 2005. For detailed information see section 8.5 “PosID-3 Functions”, 🗎 8-37.

***Note:** The Setup and Service software automatically recognizes the installed PosID type.*

8.4 PosID 2 Functions

8.4.1 Brief Overview

Overview

The following figure provides an overview of the PosID 2.

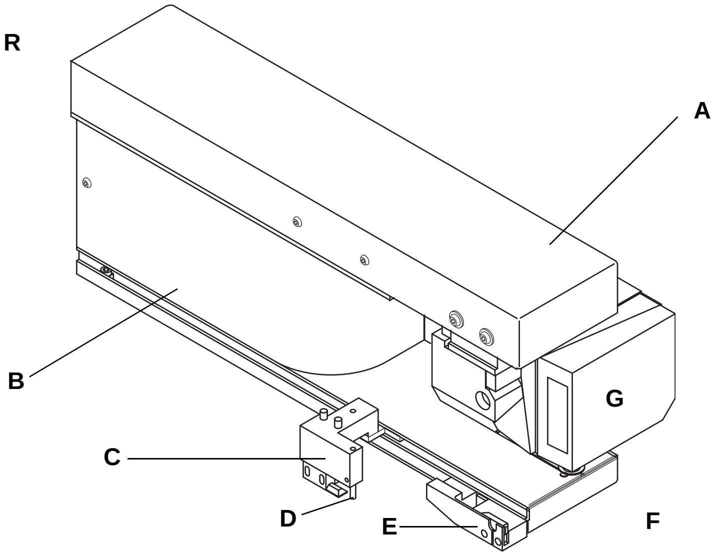


Fig. 8-4 *PosID 2, overview*

A	*Top cover*	***E***	*“No Tube” sensor*
B	*Left side cover*	***G***	*Barcode scanner*
C	*Gripper*	***F***	*Instrument front*
D	*Gripper pin*	***R***	*Rear side of instrument*

Parts of PosID 2

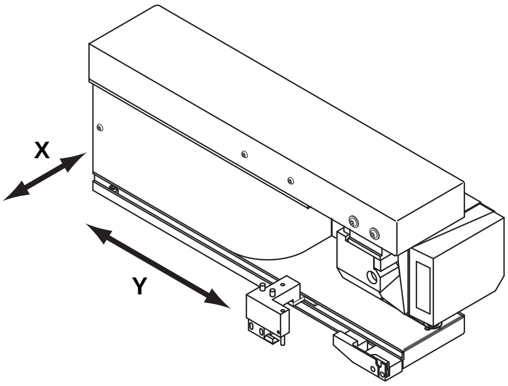
The PosID 2 consists of the following main parts:

- **Barcode scanner:** The barcode scanner (G) at the front uses a laser beam to scan and read the barcodes on the labels applied to carriers, racks and tubes. The barcode scanner can be turned round a vertical axis but can also be turned into a horizontal position. See “movement axes” later in this section.
- **Gripper:** The gripper (C) is driven by an electronically controlled motor (not visible in figure) and can move along the left side of the PosId 2. Its gripper pin can engage with movable carriers for objects like tubes, microplates, troughs, etc. and move them back and forth. In this way, the objects move past the barcode scanner so that the latter can read the code labels.
- **“No Tube” sensor:** The “No Tube” sensor is a reflective optosensor that checks whether or not there is a tube in a particular tube carrier position.

Movement Axes

The whole PosID 2 or parts of it can be moved as follows:

- **X-axis.** Movement of the whole PosID 2 from left ↔ right along the worktable
- **Y-axis.** Movement of gripper front ↔ rear along the left side of the PosID 2



X	*X-axis (whole PosID 2)*
Y	*Y-axis (gripper)*

Fig. 8-5 *PosID 2 X and Y axes*

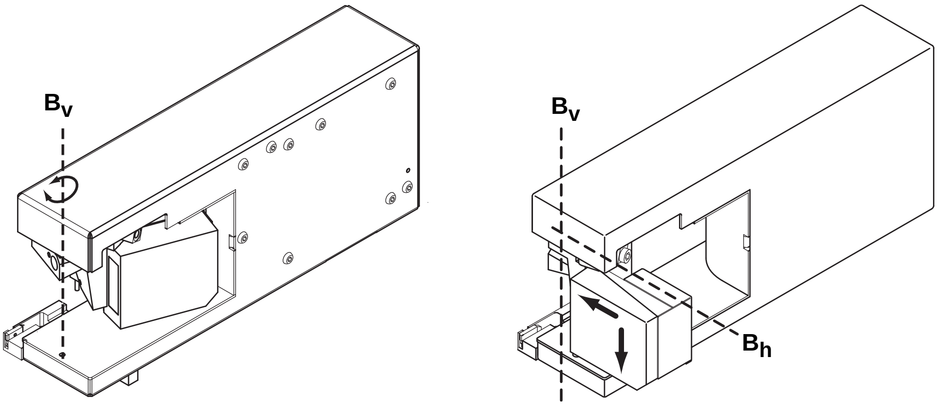
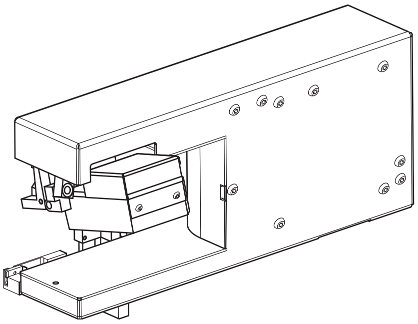


Fig. 8-6 *Vertical movement axis (left) and change position (right)*

- **B-axis.** The barcode scanner can be moved in the so-called B-axis as shown in the two following figures:
  - **Vertical B-axis (B_V):** The barcode scanner can turn round this axis so that it can read labels attached to the rear side of objects as well as labels placed on the right side of objects (see left side of following figure).

- **Change position.** If the reader is moved beyond the change position shown on the right side of the figure it starts turning into a horizontal position.
- **Horizontal B-axis (B_h):** This is the axis around which the barcode scanner reader turns after it has moved beyond the change position. It can turn round the B_h-axis until it reaches the position shown below.



This position enables the barcode scanner to scan and read horizontal labels applied to the right side of movable objects.

Fig. 8-7 *PosID 2, Barcode scanner in horizontal position*

Safety Precautions

As has been said before the barcode scanner generates a laser beam to scan the barcode labels. Therefore be careful when setting up or testing the PosID 2.

WARNING

Laser light (CLASS 2 LASER PRODUCT).

- Do not stare into beam nor into its reflections on metallic parts.
- Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Ensure appropriate FDA regulatory actions have been taken for any Class II laser products.

ATTENTION

To avoid collisions with other parts make sure the worktable is empty and free of obstacles during the execution of the test procedures.

- Collisions can damage devices or cause misadjustments.

8.4.2 PosID Service Rack

Cross References

References to information provided in other sections.

Information	Reference
Release finger adjustment	See section 8.4.9, 🗎 8-21

Purpose

To perform the setup and test procedures described in this section you need the PosID Service Rack.

Brief Description

The PosID Service Rack contains all the parts needed to adjust the gripper and the barcode scanner mechanically and to teach certain logical positions with the aid of the software.

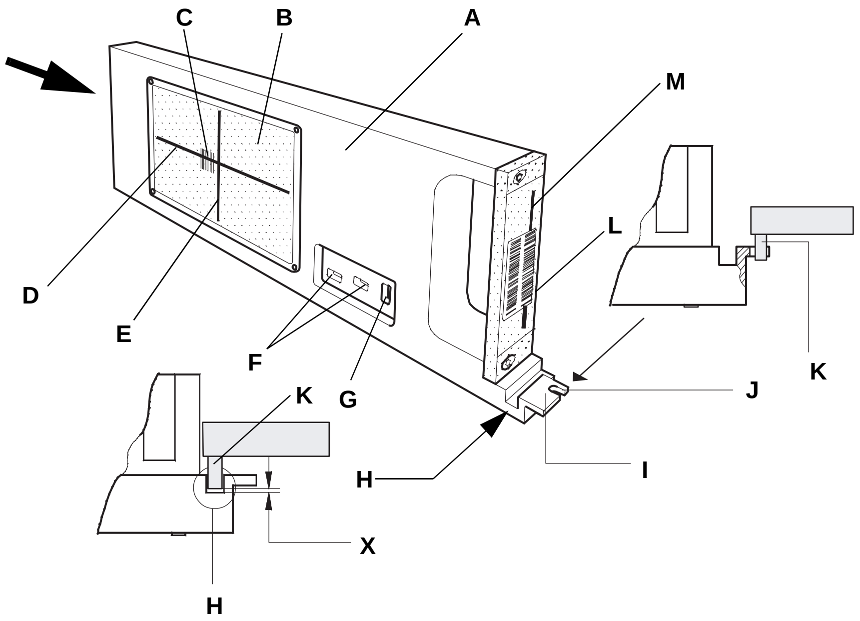


Fig. 8-8 PosID service rack

A	*Complete service rack*	***H***	*Groove that engages with gripper pin for moving the rack*
B	*Window with reference lines and reference barcode*	***I***	*Flange at rear of rack*
C	*Reference barcode*	***J***	*Gripper adjustment slot*
D	*Horizontal reference line*	***K***	*Gripper pin of PosID*
E	*Vertical reference line*	***L***	*Vertical reference barcode*
F	*Openings for “No Tube” sensor test*	***M***	*Vertical reference line*
G	*Opening for position setup in Y-axis*	→	*(Arrow) Front side of service rack*

Parts of Service Rack

The following table provides an overview of those parts of the PosID 2 that are involved in mechanical adjustments, software setups or tests.

Tab. 8-3 Parts of Service Rack

Item	Description	Mech. Adj.	SW Setup	Test
B	Translucent window near the front, contains 2 reference lines and a barcode	X	X	
C	Horizontal reference code (barcode scanner)		X	
D	Horizontal reference line (barcode scanner)	X	X	
E	Vertical reference line (barcode scanner)	X	X	
F	2 openings (setup and test of “No Tube” sensor)			X
G	Opening for setup up Y-axis		X	
H	Groove with engages with the gripper pin (I) of the PosID. Allows to move the service rack back and forth along the PosID 2 during setups and tests.	X	X	X
J	Slot for aligning the gripper pin (i) of the PosID with the service rack (→ Cross References)	X	X	
L	Vertical reference barcode (barcode scanner)			X
M	Vertical reference line (barcode scanner)	X	X	

8.4.3 Logical Positions and Parameters

Cross References

References to information provided in other sections.

Information	Reference
Set defaults in EEPROM	See section 8.4.10, 🗎 8-22
Set y- and b-logical positions to default	See section 8.4.12, 🗎 8-23

X-Axis

The following table shows the parameters of the X-axis.

Tab. 8-4 Parameters of X-Axis

Parameter	FW Default	Setup and Service	
		SnS Default	Adj
X-Offset	780	none	a
X-Scale factor	10000	none	a

Y-Axes The logical positions of the Y-axis are listed in the following table.

Tab. 8-5 *Parameters of Y- and B-Axes*

Parameter	**Logical Positions**	**FW Default**	**Setup and Service**		
			SnS Default	**EEPROM**	**Adj**
Y Offset		15	none		a
Y-scale adjust factor		10000	10000	x	
Load	1	2220	2220	o	
Remove	2	3170	3170	o	
Max. Read	3	0	0	o	
Connect	4	3170	3170	o	
Push Connect	5	3170	3170	o	
Carrier present check	6	3010	3000	o	
Init positions	7	2850	2850	o	
Test rack	8	3099	3100	o	

B-Axis The following table lists the parameters in the B-axis.

Tab. 8-6 *Parameters of B-Axis*

Parameter	**Logical Position**	**FW Default**	**Setup and Service**		
			SnS Default	**EEPROM**	**Adj**
B-Offset		80	80	x	
B-Scale adjust factor		10000	10000	x	
Carrier read positions	1	0	0		a
Horizontal read positions	2	2650	2610		a
Vertical read positions (sample reagent)	3	1350	1350		a
Collision avoidance position	4	0	0	o	
Change position	5	1410	1410		a

Explanation

The following tables show the logical positions in the X, Y and B-axes.

Note: *Meaning of the columns in the following tables:*

- ***FW Default*** *values (firmware defaults) are hardcoded in the firmware.*
- ***SnS Default*** *values are written to the EEPROM by the Setup and Service software as follows:*
  - **x in column EEPROM:** by procedure **Set Default in EEPROM.**
  - **o in column EEPROM:** by procedure **Set Y- and B-Logical Positions to Default**
- *An* ***a*** *in column* ***Adj*** *indicates, that the respective parameter changes during the adjustment.*
- *Logical positions are indicated in steps*
  - 1 step in Y-axis = 0.1 mm
  - 1 step in B-axis = 0.1 degree.
- *Y- and B-scale factors are indicated in 0.1 ‰.*

8.4.4 PosID 2 Panel

Cross References

References to information provided in other sections.

Information	Reference
Using the panel	See section 5.2, 🗎 5-13
Setting the serial number	See section 7.1.3, 🗎 7-7

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 8-7 PosID 2 Functions and User Permissions

Function	Type	User	FSE
Set defaults in EEPROM	Setup		X
Autorange	Setup		X
Set y- and b-logical positions to default	Setup		X
Determine scaling and offsets	Setup		X
Mechanical adjustment	Setup		X
Determine change position	Setup		X
Determine barcode reading positions	Setup		X

Tab. 8-7 PosID 2 Functions and User Permissions (cont.)

Function	Type	User	FSE
“No Tube” sensor test	Test	X	X
Barcode reading test	Test	X	X
Move Tool	Tool	X	X
Printing / Information	Page	X	X

Files, Directories

The PosID 2 function creates the following files:

- **Result Files:** Test results are stored in *.any files.

  Directory: <data_path>\Results

  File name: PosID2_<serial_number>_<date>_<time>.any

- Test Configuration Files

  Directory: user defined

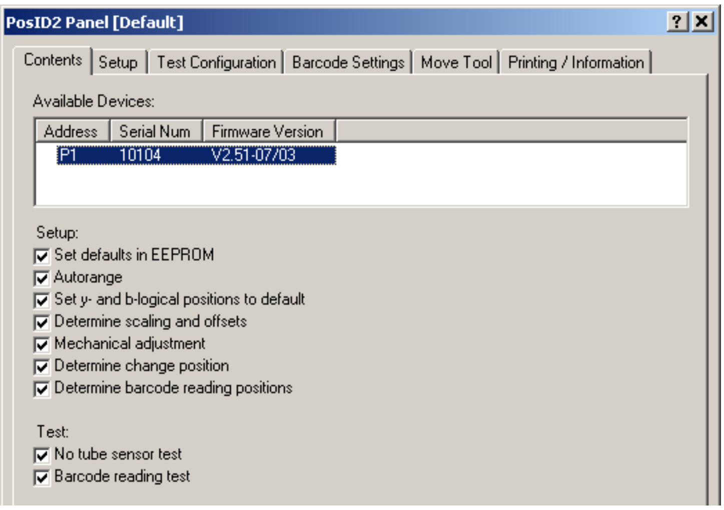
  File name: <name>.any

Starting the Panel

To set up and test the PosID 2:

1 Start the panel with **System Devices > PosID2**.

*The **PosID2** panel with activated **Contents** page appears. After starting the panel, no check box is selected and not all tabs are visible.*



Available Devices:

Address	Serial Num	Firmware Version
P1	10104	V2.51-07/03

Setup:

☑ Set defaults in EEPROM
☑ Autorange
☑ Set y- and b-logical positions to default
☑ Determine scaling and offsets
☑ Mechanical adjustment
☑ Determine change position
☑ Determine barcode reading positions

Test:

☑ No tube sensor test
☑ Barcode reading test

Fig. 8-9 PosID 2, Contents page

Pages The PosID 2 panel is subdivided into the following pages

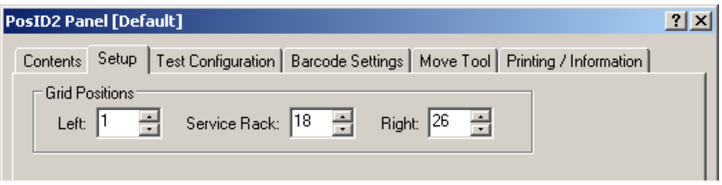
Tab. 8-8 Pages of PosID 2 panel

Pages	Function
Contents	General overview, procedure selection.
Setup	Setup of grid positions
Test Configuration	Settings for “No Tube” sensor and barcode reading tests
Barcode Settings	Lets you configure various barcodes
Move Tool	For moving the whole PosID 2, the gripper and the barcode scanner
Printing / Information	Print selection for the QC-report

8.4.5 Setup Page

Purpose This page lets you define the grid positions for:

- Left and right grid positions
- Grid position of service rack.



Left: 1
Service Rack: 18
Right: 26

Fig. 8-10 PosID 2, Setup page

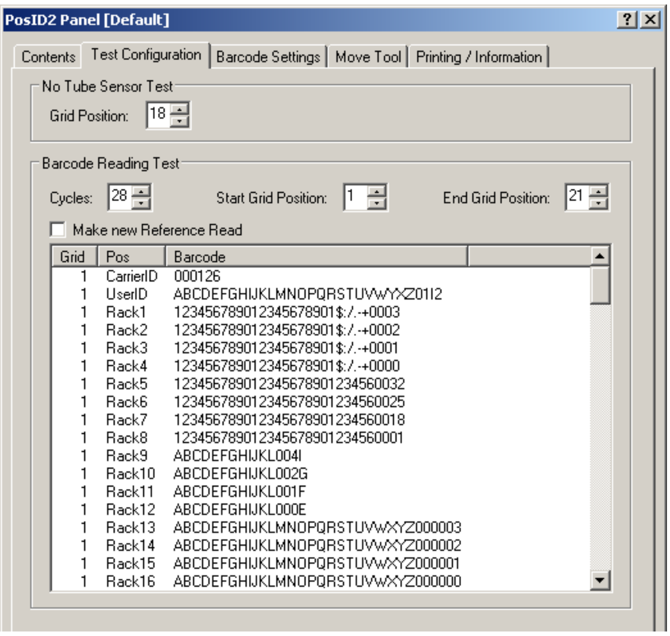
Controls The three spin boxes in the frame **Grid Positions** are used as follows:

- **Left** and **Right** grid positions: The values set in these spin boxes are used during the execution of the setup procedure **Determine scaling and offsets** for both the Y- and the X-axis.
- In the spin box **Service Rack** you can enter the position of the service racks.

Note: *In most cases, you can accept the default values that are automatically set by the software.*

8.4.6 Test Configuration Page

Purpose This page allows you to set the parameters for the **No Tube Sensor Test** and the **Barcode Reading Test**.



No Tube Sensor Test

Grid Position: 18

Barcode Reading Test

Cycles: 28

Start Grid Position: 1

End Grid Position: 21

☐ Make new Reference Read

Grid	Pos	Barcode
1	CarrierID	000126
1	UserID	ABCDEFGHIJKLMNOPQRSTUVWYXZ01I2
1	Rack1	123456789012345678901$:/.-+0003
1	Rack2	123456789012345678901$:/.-+0002
1	Rack3	123456789012345678901$:/.-+0001
1	Rack4	123456789012345678901$:/.-+0000
1	Rack5	123456789012345678901234560032
1	Rack6	123456789012345678901234560025
1	Rack7	123456789012345678901234560018
1	Rack8	123456789012345678901234560001
1	Rack9	ABCDEFGHIJKL004I
1	Rack10	ABCDEFGHIJKL002G
1	Rack11	ABCDEFGHIJKL001F
1	Rack12	ABCDEFGHIJKL000E
1	Rack13	ABCDEFGHIJKLMNOPQRSTUVWXYZ000003
1	Rack14	ABCDEFGHIJKLMNOPQRSTUVWXYZ000002
1	Rack15	ABCDEFGHIJKLMNOPQRSTUVWXYZ000001
1	Rack16	ABCDEFGHIJKLMNOPQRSTUVWXYZ000000

Fig. 8-11 PosID 2 panel - Test Configuration page

Controls

No Tube Sensor Test	Contains a spin box for the service rack position in which the test is to be performed.
Barcode Reading Test	Frame containing the corresponding controls
- **Cycles**	For setting the number of test cycles
- **Start Grid Position**	For setting the position of the leftmost carrier to be checked
- **End grid position**	For setting the position of the rightmost carrier to be checked
- **Make new Reference Read**	- If this check box is selected the barcodes are read anew and the new values are used as a reference. - If the check box is cleared the values from the last reference reading are used instead or can be loaded from a file.
- **Window in lower part**	Shows the values from the last reference read: - Grid: Grid position of the carrier on which the racks are placed. - Pos: Shows the type of identification, such as - CarrierID: Identifies the carrier type - UserID: An identification label applied by the used - Rack x: Identifies the rack type
Barcode	- If a barcode was read, it appears in this column.

- If the PosID did not read any barcode, the respective space in the column remains blank. Possible reasons:
  - Wrong barcode settings
  - A tube has been detected (by “No Tube” sensor), but no barcode label is applied to it, or the label is damaged or otherwise unreadable.
  - “No tube sensor” is inactive.
  - If a microplate was expected:
    - MP is not present or placed incorrectly
    - MP has no barcode label or the label is damaged

  $$$ (3 dollar signs): No object was detected by the “No Tube” sensor: Possible reasons:
  - No tube present
  - No tube rack present.

Carrier settings

The command button **Show carrier editor** opens the **Carrier Editor**. Users can view carrier settings, import carriers or define customized carriers (for expert users only). For more details see below.

8.4.7 Barcode Settings

Purpose

The **Barcode Settings** page is a tool that allows users to load, view, change and store barcode settings. These settings are used by the **Barcode Reading Test**.

Example

The following figure shows a barcode of the type “Code 39 Standard”. Information about barcodes may be found in literature supplied by the manufacturer barcode or test kit.

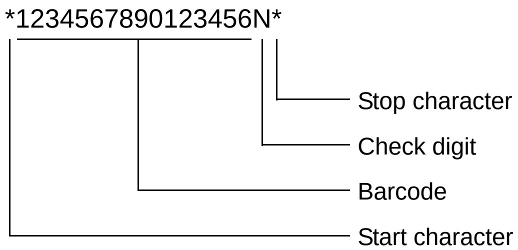


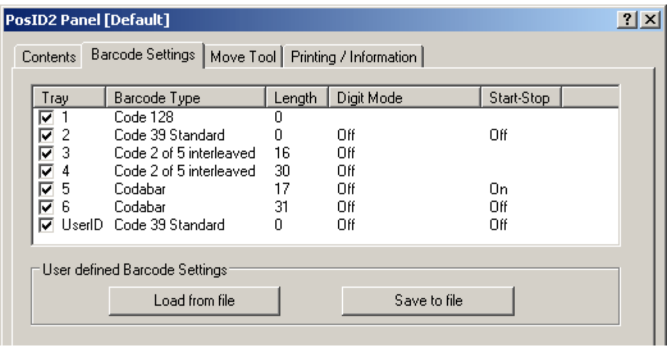
Fig. 8-12 Key to Barcode “Code 39 Standard”

Normally, the barcodes are set at the factory. However, both field service engineers and operators can alter the settings depending on the barcode types on the carriers used for the **Barcode Reading Test**. When reading problems occur (e.g., when whole racks cannot be read), the barcode settings must be checked. PosID 2 can read 6 different barcodes simultaneously in one run.

The Setup and Service software supports 22 different barcode types as listed in the tables later in this section.

Barcode Settings Page

This page is always available to users as long as the PosID 2 panel is open.



Tray	Barcode Type	Length	Digit Mode	Start-Stop
☑ 1	Code 128	0		
☑ 2	Code 39 Standard	0	Off	Off
☑ 3	Code 2 of 5 interleaved	16	Off	
☑ 4	Code 2 of 5 interleaved	30	Off	
☑ 5	Codabar	17	Off	On
☑ 6	Codabar	31	Off	Off
☑ UserID	Code 39 Standard	0	Off	Off

***Fig. 8-13** PosID 2, Barcode Settings*

List in upper part	Shows the current barcode settings. Depending on the barcode type certain settings can be altered.
- **Tray**	Lists the barcodes the PosID2 can read (the term “tray” denotes the memory place where the settings are physically stored). The check boxes beside the designation allow the user to enable/disable the corresponding “tray”. - **1 to 6:** These “trays” contain the barcode data of labels applied to microplates and tubes. - **UserID:** For barcodes on labels applied to the vertical barcode flag of carriers.
- **Barcode Type**	Drop down list boxes from which a barcode type can be assigned to each tray.
- **Length**	Length (= number of digits) of the barcode. Certain barcode types have a fixed length that cannot be changed by the user. For other barcode types the length is editable. - **0:** Lenght is variable (max. 32 characters, only possible for barcodes with start and stop digits) - **n:** Barcode has a defined length of n characters (either defined by the user or given by the barcode type).
- **Digit Mode**	With certain barcode types a check digit can be added to the actual barcode. If the check digit is enabled the correctness of a barcode reading can be verified. There are 3 possible modes: - **Off:** Check digit is disabled, no verification. - **On with transmission**: Check digit is enabled and is transmitted to the PosID 2 when the barcode is read. - **On without transmission:** Check digit is enabled, but is not transmitted when the barcode is read.
- **Start-Stop**	With certain barcode types a start and a stop character can be added at the beginning and the end of the code digits. - **Off:** Start and stop digits disabled.

	- **On:** Start and stop digits enabled.
Read from File	Reads previously stored barcode settings from the corresponding *.any file (PosID2BarcodeSettings.any).
Store to File	Stores the current settings in the corresponding *.any file. Previous settings will be overwritten.

Load, Store and Apply Settings

Barcode settings are loaded, stored and applied as follows:

- **At the start of the panel**: When the panel is started the settings that are currently stored in the PosID’s EEPROM appear on the **Barcode Settings** page.
- **Read from file:** If you click this button, previously stored settings in the PosID2BarcodeSettings.any file are loaded. If no settings have been stored before an error message appears.
- **Store to Files:** Writes the current settings shown on the **Barcode Setting** page to the PosID2BarcodeSettings.any file. If no settings have ever been stored earlier the file does not exist and will be created first.
- **Default:** If you click this button (at the bottom of the panel) the default barcode settings as defined by the prdoduction department are loaded.
- **Apply:** If you click this button (at the bottom of the panel) the settings shown on the page are written to the EEPROM on the Te-CU board (Freedom EVO) or Genesis CU board (Geneis instruments). When the panel is started up the next time these settings will be loaded into the page.

Available Barcodes

The following table lists the available barcodes.

Tab. 8-9 Available Barcodes

Code Type	Barcode Length	Check Digit Mode	Start/Stop character
Code 2 of 5 interleaved	enabled	enabled	-
Code 39 Standard	enabled	enabled	enabled
Code 39 Full ASCII	enabled	enabled	enabled
Code 32	fixed 9	-	-
C.I.P.	enabled	-	-
Codabar	enabled	enabled	enabled
Code 128	enabled	-	-
EAN 128	enabled	-	-
Code 93 Standard	enabled	-	-
Code 93 Full ASCII	enabled	-	-
EAN 13	fixed 13	-	-
EAN 8	fixed 8	-	-
UPC A	fixed 12	-	-
UPC E	fixed 8	-	-

Tab. 8-9 Available Barcodes

Code Type	Barcode Length	Check Digit Mode	Start/Stop character
EAN 13 add on 2	fixed 15	-	-
EAN 8 add on 2	fixed 10	-	-
UPC A add on 2	fixed 14	-	-
UPC E add on 2	fixed 10	-	-
EAN 13 add on 5	fixed 18	-	-
EAN 8 add on 5	fixed 13	-	-
UPC A add on 5	fixed 17	-	-
UPC E add on 5	fixed 13	-	-

Settings Used by Production

The following table shows the barcodes used by the production department.

Tab. 8-10 Barcode Settings used by Production

Tray	Code type	Activate	Barcode Length	Check Digit Mode	Start-Stop character
1	Code 128	yes	0	-	-
2	Code 39 Standard	yes	0	Off	Off
3	Code 2 of 5 interleaved	yes	16	Off	-
4	Code 2 of 5 interleaved	yes	30	Off	-
5	Codabar	yes	17	Off	On
6	Codabar	yes	31	Off	Off
UserID	Code 39 Standard	yes	0	Off	Off
Carrier ID	Code 128	Not editable; standard ID barcode for all factory defined carriers.			

8.4.8 Move Tool

Cross References

References to information provided in other sections.

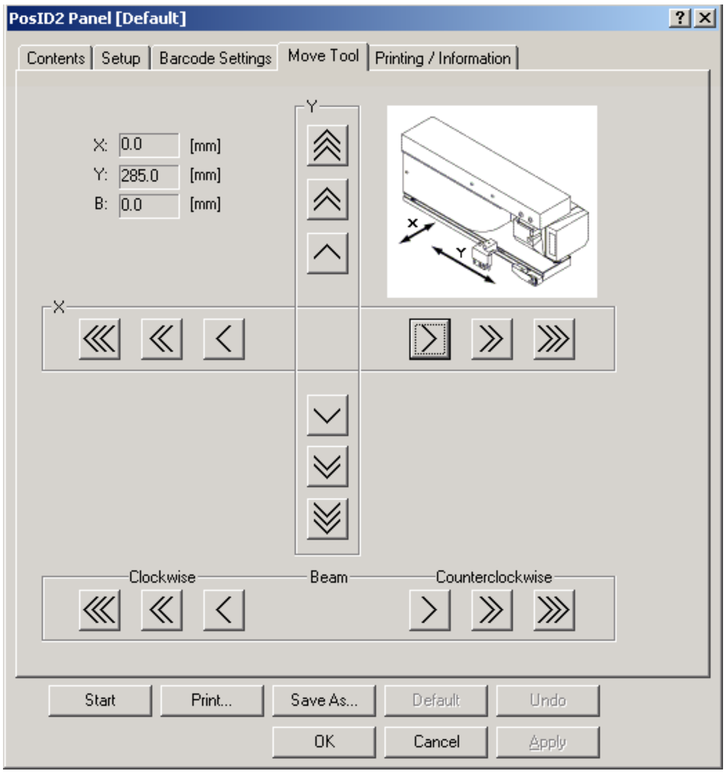
Information	Reference
Movement axes	See section 8.4.1, 🗎 8-5

Purpose

The **Move Tool** allows you to move the whole PosID 2 or parts of it in the X-, Y or B-axes.

- Whole PosID 2: In the X-axis (left ↔ right).
- Gripper: In the Y-axis (front ↔ rear):
- Barcode scanner: B-axis
- For more information about the movement axes (→ Cross References).

***Note:** Not all movement axes are enabled during each setup or test procedure. However, the software always enables the possible movement directions automatically.*



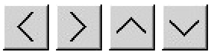
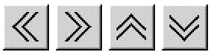
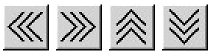
X: 0.0 [mm]
Y: 285.0 [mm]
B: 0.0 [mm]

Fig. 8-14 *PosID 2, Move Tool*

Controls

The PosID 2 **Move Tool** page contains the following controls:

X	Frame containing the movement buttons for the X-axis
Y	Frame containing the movement buttons for the Y-axis

Beam	Frame containing the movement buttons for the B-axis. The barcode scanner can be turned clockwise and counterclockwise in the horizontal and vertical axes (→ Cross References)
	Single step movement buttons (X- and .Y-axes 1/10 [mm], B-axis 0.1 [degree]
	Ten steps movement buttons (X- and .Y-axes 1 [mm], B-axis 1 [degree]
	Continuous movement buttons (if button is kept pressed).
Text boxes in upper left corner	Show the current positions in the three movement axes.

Note:

- *The arrows on the movement buttons indicate the direction in which the respective parts will be moved.*
- *If you place the mouse pointer over a movement button, a text appears that explains what you can do with the button (so-called “tool tip”)*

Keyboard Control

It is also possible to use the keyboard for the movements in the various axes. You can use the corresponding keys of the numeric keypad or the keys in the key blocks left of the numeric keypad.

Tab. 8-11 *Moving PosID 2 with the Keyboard*

Key (left of numeric keypad)	Key in numeric pad	Movement axes PosID
→	6 →	X+ (right)
←	4 ←	X- (left)
↓	2 ↓	Y+ (front)
↑	8 ↑	Y- (rear)
Page Up	PgUp 9	B+ (CW)
Page Down	PgDn 3	B- (CCW)

Steps

The movable parts of the PosID 2 are moved as follows:

- Every time you hit one of the above keys the part is moved by one step (0.1 mm or 0.1 degree).
- If you keep the key pressed it is moved continuously at a speed of approx. five steps per second.
- You can press a key continuously and at the same time press the Ctrl key. In this case, the arm is moved continuously at a relatively high, constant speed.

8.4.9 Aligning the PosID 2 with the Service Rack

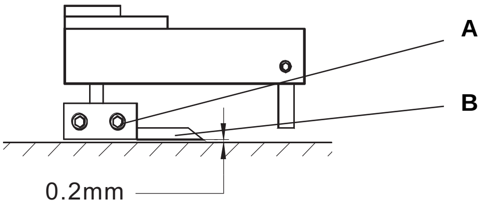
Purpose

Before the PosID 2 can be set up with the aid of the Setup and Service software it must be aligned properly with the service rack.

Procedure

To align the service rack with the PosID 2:

1. Switch off the instrument.
2. Use a feeler gauge to check the gap between the release finger of the PosID 2 and the workable surface as in the following figure.



A	*Fixing screws*
B	*Release finger*

Fig. 8-15 *Release finger adjustment*

3. If necessary loosen the two fixing screws (A) and adjust the release finger as shown in the above figure. Tighten the screws when done.
4. Insert the service rack into a grid position on the worktable. See following figure.
5. Manually move the PosID gripper pin into the groove (F) of the service rack as shown on the right side of the following figure.
6. Check the gap between the bottom of the groove (F) and gripper pin (C). Adjust to approx. 0.5 mm as shown on the left side of the following figure.

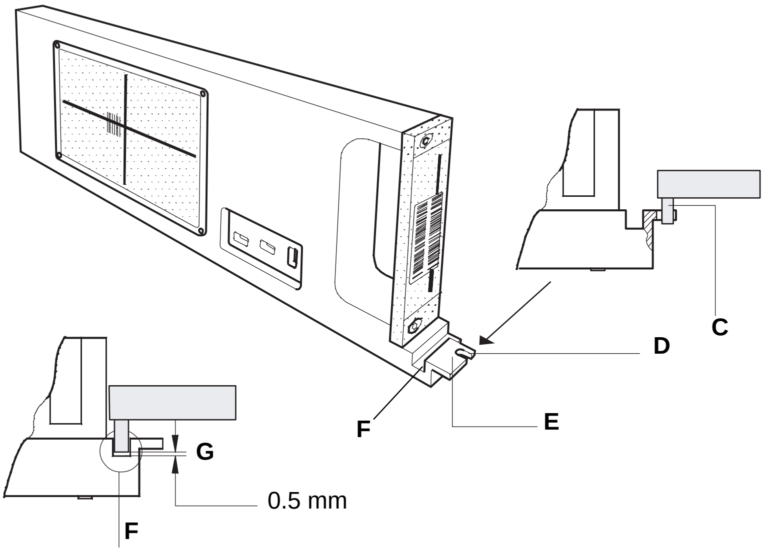


Fig. 8-16 *Mechanical adjustment*

C	*Gripper pin*	***F***	*Groove*
D	*Gripper adjustment slot*	***G***	*Gap between gripper pin and bottom of groove*
E	*Flange at rear of rack*		

7 Switch the instrument on.

8.4.10 Setup: Set Defaults in EEPROM

Cross References

References to information provided in other sections.

Information	Reference
Tables with logical positions	See section 8.4.3, 🗎 8-9

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box.

   No further parameters need to be defined.
2. Download the default values to the PosID and have them re-read by the software with **Start**.

8.4.11 Setup: Autorange

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Autorange** procedure moves the PosID 2 in all possible axes to determine the available ranges. The values found are written to the PosID 2.

Procedure

To perform the **Autorange** procedure:

1. On the **Contents** page, select the **Autorange** check box. No further entries need to be made.
2. Click **Start** to begin.

   *At the end of the procedure, the **Setup: Done** message is displayed.*
3. Confirm with **OK**.

8.4.12 Setup: Set Y and B Logical Positions to Default

Cross References

References to information provided in other sections.

Information	Reference
Tables with logical positions	See section 8.4.3, 🗎 8-9

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The procedure **Set Y and B Logical Positions to Default** procedure writes the default values for the logical positions in the Y- and B-axes to the EEPROM. These values are marked with an o in the EEPROM columns of the tables for the logical positions (→ Cross References).

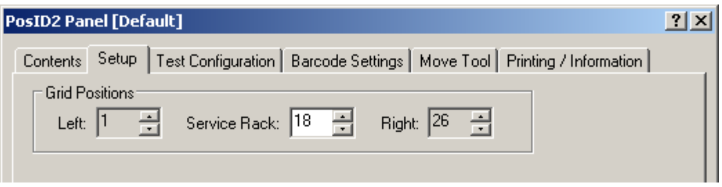
Procedure

To write the corresponding default values to the EEPROM:

1 On the **Contents** page, select the **Set Y and B Logical Positions to Default** check box.

2 If necessary, change to the **Setup** page and set the grid position in which you want to perform the setup.

In most cases you can accept the default value that appears on the screen.



Grid Positions
Left: 1
Service Rack: 18
Right: 26

Fig. 8-17 *Setup page*

No further parameters need to be defined.

3 Click **Start**.

The PosID2 and the barcode scanner move to their logical positions in the Y and B-axes. At each logical position, the associated default value is stored.

8.4.13 Setup: Determine Scaling and Offsets

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

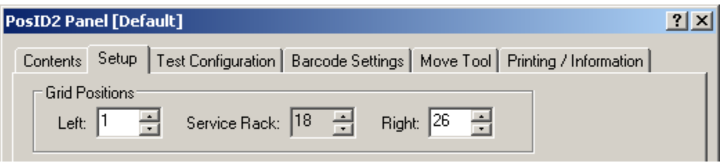
Purpose This procedure is determines the X-scaling factor and the X and Y-offsets relative to the position of the reference pin # 1.

Procedure

1 On the Contents page, select the **Determine Scaling and Offsets** check box.

2 If necessary, change to the **Setup** page and set the left and right grid positions.

In most cases you can accept the default values that appear on the screen.



Grid Positions
Left: 1
Service Rack: 18
Right: 26

Fig. 8-18 PosId 2, Setup page

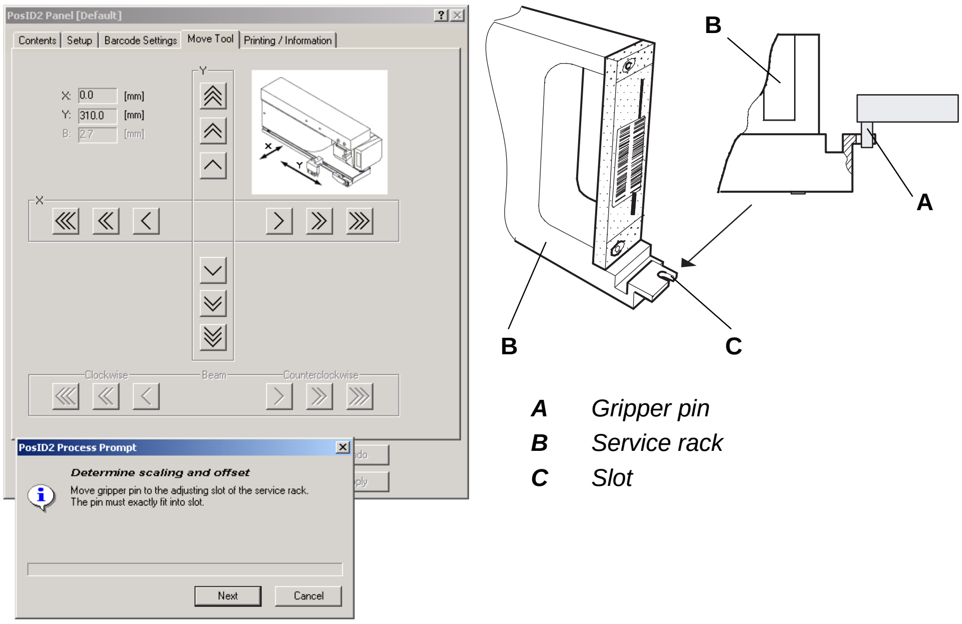
3 Click **Next**.

You are guided through the procedure by a series of prompts. Always follow the instructions on the screen.

4 When prompted to do so, insert the service rack into the left grid position as indicated on the prompt. Do not push the rack to its end stop. Leave a distance of approx. 10 mm between the rack and the PosID 2.

5 Click **Next** when done.

The Move Tool with a process prompt appears



X: 0.0 [mm]
Y: 310.0 [mm]
B: 2.7 [mm]

Determine scaling and offset
Move gripper pin to the adjusting slot of the service rack.
The pin must exactly fit into slot.

Fig. 8-19 Aligning the gripper finger with service rack

6 Use the **Move Tool** to move the gripper pin (A) before the center of the slot (C) of the service rack.

7 Carefully push the service rack backwards into its end position. If necessary, correct the position of the PosID 2 and the gripper until the gripper finger is in the center of the slot and just touches the end of the slot.

8 Click **Next** to continue.

The PosID moves to the right position and the next prompt appears.

9 Now insert the service rack into the right grid position as indicated on the prompt. Do not push the rack to its end stop.Click **Next** when done.

10 Repeat the above steps 6 and 7 for the right position.

11 Click **Next** to continue.

8.4.14 Setup: Mechanical Adjustment

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this setup procedure is to align the laser beam of the barcode scanner mechanically with the vertical and horizontal reference lines on the service rack.

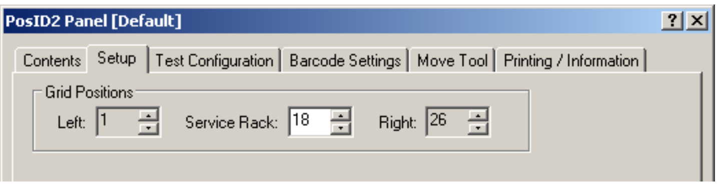
Procedure

To adjust the barcode scanner mechanically:

1 On the Contents page, select the **Mechanical adjustment** check box.

2 If necessary, change to the **Setup** page and use the **Service Rack** spin box to set the grid position in which you want to perform the setup.

In most cases you can accept the default value that appears on the screen.



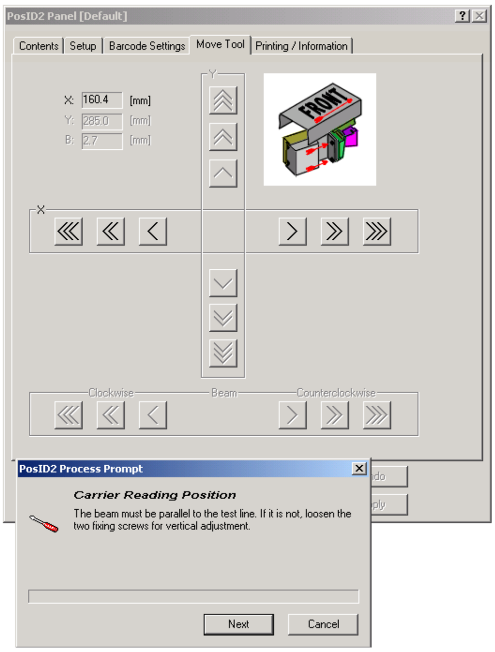
Left: 1
Service Rack: 18
Right: 26

Fig. 8-20 Setup page

3 Click **Start** to begin.

4 When prompted to do so, slide the service rack into the grid position that appears on the prompt. Click **Next** when done.

The Move Tool together with a process prompt appears.



X: 160.4 [mm]
Y: 285.0 [mm]
B: 2.7 [mm]

PosID2 Process Prompt

Carrier Reading Position

The beam must be parallel to the test line. If it is not, loosen the two fixing screws for vertical adjustment.

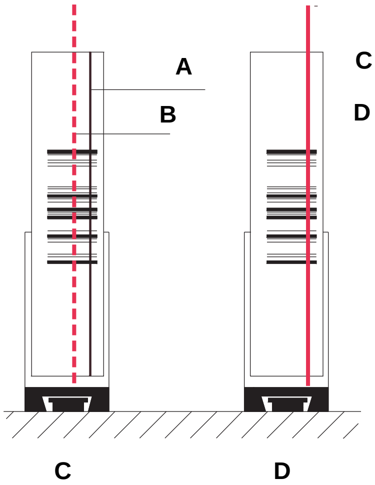


Fig. 8-21 *Vertical adjustment at the rear of the service rack*

A	*Guide line*	***C***	*Correct - beam parallel to guide line*
B	*Laser beam*	***D***	*Wrong - beam not parallel*

5 Use the **Move Tool** to move the PosID 2 in the X-axis so that the beam (B) of the barcode scanner is near the vertical guide line (A) on the barcode label at the rear of the service rack.

6 Check if the laser beam is parallel to the guide line (see above figure, item C).

7 If the beam is not parallel to the guide line, loosen the lower fixing screw (G_{fx}) as shown in the following figure, and adjust the barcode by turning round the screw (G_{pv}) that serves as the pivot point. Do not loosen the screw (G_{pv}).

8 Tighten the screw (G_{fx}) when finished.

9 Click **Next** to continue.

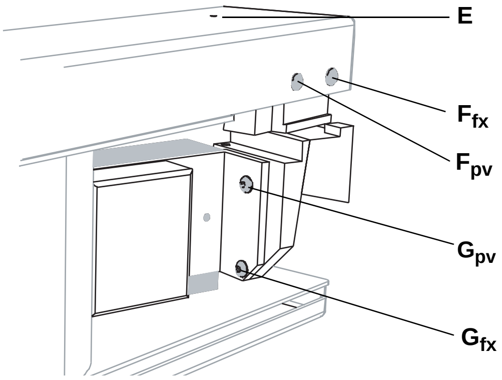


Fig. 8-22 *Mechanical adjustment of the barcode scanner*

E	*Access hole for mechanical beam height adjustment*
F_{fx}	*Fixing screw for vertical barcode scanner adjustment*
F_{pv}	*Serves as the pivot for the vertical barcode scanner adjustment*
G_{fx}	*Fixing screw for vertical beam angle adjustment*
G_{pv}	*Serves as the pivot for the horizontal barcode scanner adjustment*

The barcode scanner is now turned until it faces the right side of the service rack. Then the rack is pulled in the Y-axis along the left side of the PosID 2.

10 Use the Move Tool to pull the service rack along the left side of the PosID 2 until the laser beam is near the center of the reference window of the service rack.

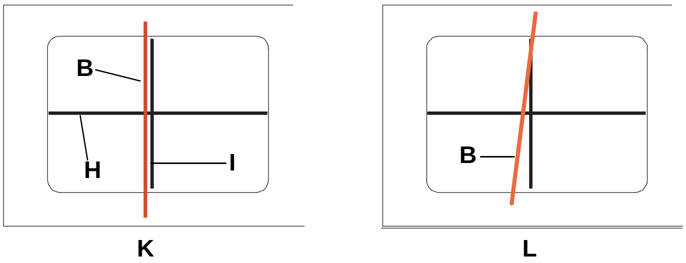


Fig. 8-23 *Aligning the vertical beam in the reference window of the service rack*

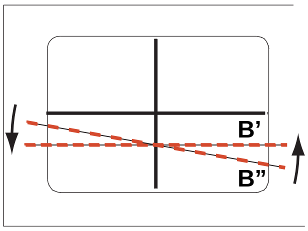
B	*Laser beam*	***K***	*Correct - beam parallel to guide line*
H	*Horizontal guide line*	***L***	*Wrong - beam not parallel*
I	*Vertical guide line*		

11 If the beam is not parallel to the guide line, loosen the fixing screw (F_{fx}) near the front as shown in Fig. 8-22 , 🗎 8-26, and adjust the barcode scanner by turning it round the screw (F_{pv}) that serves as a pivot point. Do not loosen the screw (F_{pv}).

12 Tighten the screw (F_{fx}) when finished.

13 Click **Next** to continue.

The barcode scanner is now moved into the horizontal position. Its front still faces the reference window of the service rack.



B"	*Beam inclined*
B'	*Beam horizontal*

Fig. 8-24 *Turning the beam into the horizontal position*

14 Use the Move Tool to rotate the beam (B”) in the B-axis until it is parallel to the horizontal guide line.

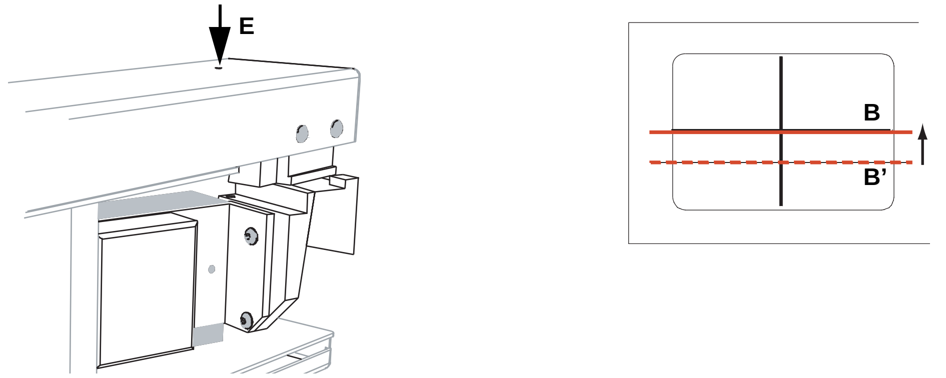


Fig. 8-25 Aligning the beam horizontally

E	*Access hole for mechanical beam height adjustment*	*B*	*Laser beam aligned exactly with horizontal guide line*
B'	*Laser beam parallel to horizontal guide line*		

15 After you have done this, turn the screw (E) to lift or lower the beam until it is exactly aligned with the horizontal guide line.

16 Click **Next** when done.

8.4.15 Setup: Determine Change Position

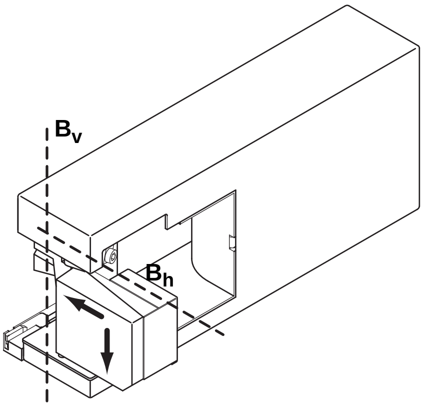
Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This setup procedure is used to "teach" the change position of the barcode scanner.

Change Position



The change position is the position where the edges marked with arrows are parallel to the vertical B-axis (B_v) and the horizontal B-axes (B_h).

In this position, the rotation round the B_v-axis changes into one round the B_h-axis.

Fig. 8-26 Change position

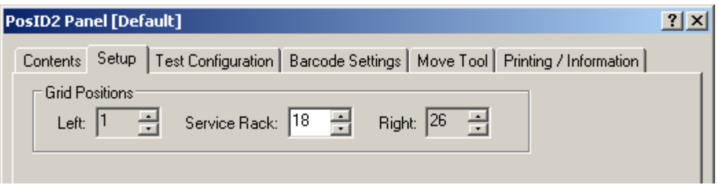
***Note:** You do not need the service rack for this setup procedure*

Procedure To determine the change position.

1 On the **Contents** page, select the **Determine Change Position** check.

2 If necessary, change to the **Setup** page and set the grid position in which you want to perform the setup.

In most cases you can accept the default value that appears on the screen.

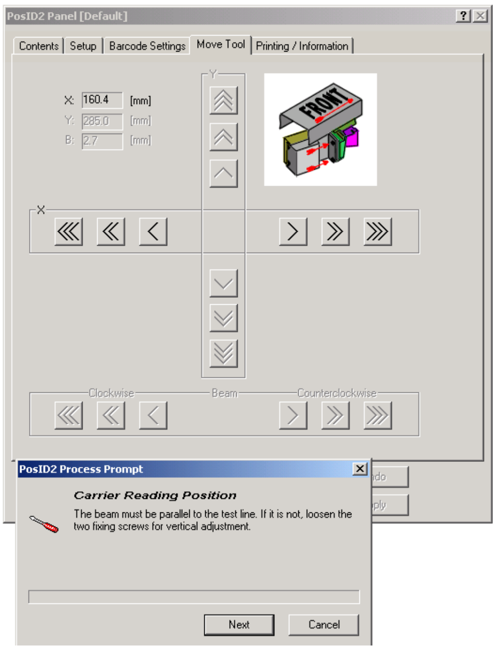


Left: 1
Service Rack: 18
Right: 26

Fig. 8-27 Setup page

3 Click **Start** to begin.

The PosID 2 moves to the defined grid position. The Move Tool appears together with a process prompt.



X: 160.4 [mm]
Y: 285.0 [mm]
B: 2.7 [mm]

Carrier Reading Position

The beam must be parallel to the test line. If it is not, loosen the two fixing screws for vertical adjustment.

Fig. 8-28 Determine change position

4 Follow the instructions on the screen.

5 Use the [>>] **CCW** button (step size = 1 step) to move the barcode scanner counter-clockwise round the B_V-axis to make sure that is not already in or beyond the change position.

6 Now turn the barcode scanner back in **CW** direction until it does no longer turn round the B_V-axis.

7 Count the steps needed until the barcode scanner starts turning round the B_h-axis.

8 Now move it back, in **CCW** direction, by half of the number of steps plus two additional steps.

These two additional steps serve for compensating for the mechanical play of the system.

9 Repeat these two steps, but in **CW** direction to arrive exactly at the change position.

10 If, at this point, the barcode scanner is not in the change position repeat the described adjustment with a step size of 0.1 (using the [>] buttons).

11 Confirm with **OK** when finished.

8.4.16 Determine Barcode Reading Positions

Cross References

References to information provided in other sections.

Information	Reference
Mechanical adjustment of the barcode scanner	See section 8.4.14, 🗎 8-25

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this procedure is to align the laser beam exactly with the guide lines at the rear side and in the reference window of the service rack. In addition, the position of the rearmost openings in the service rack and the “reading window” of the barcode scanner are determined.

ATTENTION

Make sure the barcode scanner has been properly adjusted mechanically.

Procedure

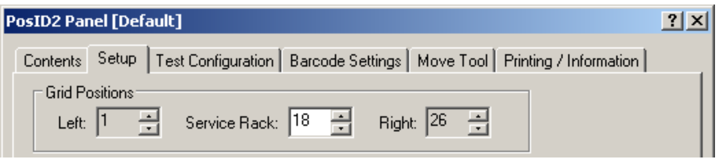
Start

To determine the barcode reading positions:

1 On the Contents page, select the **Determine barcode reading positions** check box.

2 If necessary, change to the **Setup** page and set the grid position in which you want to perform the setup.

In most cases you can accept the default value that appears on the screen.



Left: 1
Service Rack: 18
Right: 26

Fig. 8-29 Setup page

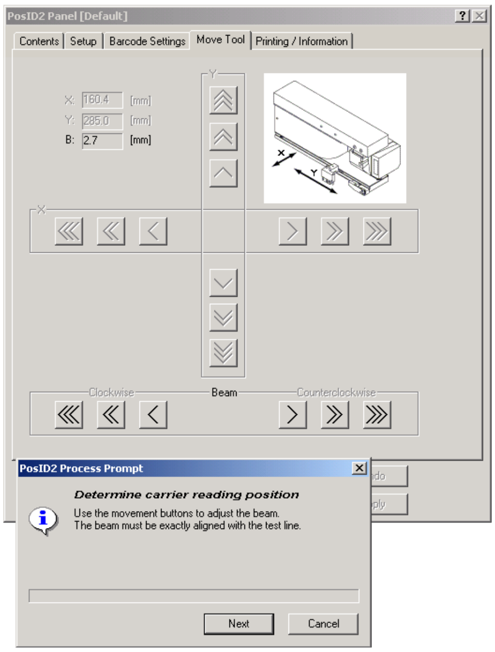
3 Click **Start** to begin.

Label at the Rear

4 When prompted to do so, slide the service rack into the grid position that appears on the prompt. Click **Next** when done.

*The **Move Tool** with the **Determine carrier reading positions** process prompt appears . The PosID 2 moves behind the service rack and turns the barcode scanner until it faces the barcode label at the back of the service rack.*

In this position the beam should be visible on the label and must be parallel to the vertical guide line (see following figure). If it is not you must repeat the mechanical adjustment (→ Cross References).



X: 160.4 [mm]
Y: 285.0 [mm]
B: 2.7 [mm]

Determine carrier reading position

Use the movement buttons to adjust the beam.
The beam must be exactly aligned with the test line.

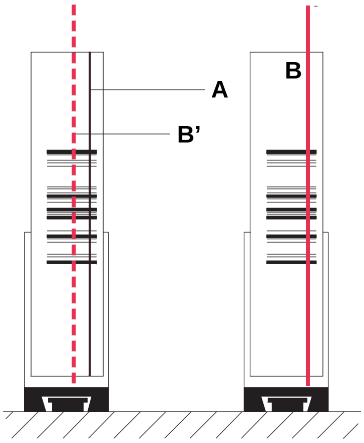
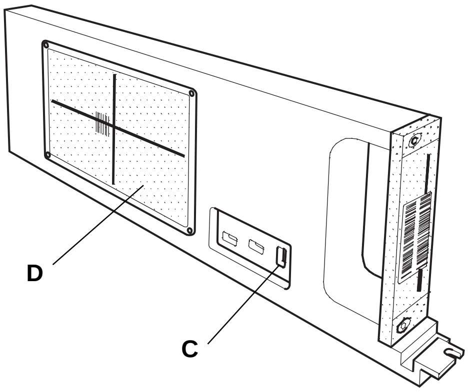


Fig. 8-30 *Determine barcode reading positions*

5 Use the **Move Tool** to move the beam in the B-axis until it is exactly aligned with the guide line (see following figure). Click **Next** when done.

The barcode scanner is now turned until it faces the right side of the service rack. Then the rack is pulled in the Y-axis along the left side of the PosID 2.

Position of Opening



While the service rack moves along the PosID 2 the “No Tube” sensor determines the position (beginning and end) of the opening (C). This is done automatically.

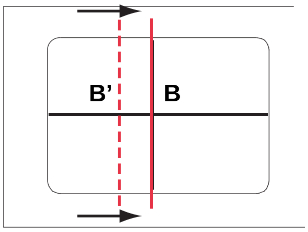
You are notified by process prompts when the beginning and the end of the opening are being detected.

Fig. 8-31 *Opening and reference window*

Guides in Reference Window

After the determination of the position of the opening the Move Tool reappears. You are prompted to align the laser beam exactly with the horizontal and vertical guide lines in the reference window . Follow the instructions provided on the screen.

First you have to align the beam with the vertical guide line (see following figure).



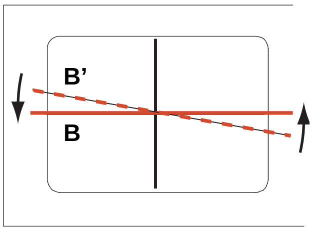
At this point the beam should already be parallel to the vertical guide line. If it is not you must repeat the mechanical adjustment (→ Cross References).

Fig. 8-32 *Vertical alignment*

6 Use the **Move Tool** to move the beam (B') until it is aligned exactly with the vertical guide line (position B).

7 Click **Next** when done.

Next the scanner head is turned into the horizontal position. You are prompted to align the beam with the horizontal guide line.



At this point the beam should already be at the correct height (it should cross the horizontal guide line near the intersection point of the guides). If it is not you must repeat the mechanical adjustment (→ Cross References).

Fig. 8-33 *Vertical alignment*

8 Use the **Move Tool** to turn the beam (B') until it is aligned exactly with the horizontal guide line (B).

9 Click **Next** when done.

Reading Window

The next part of the procedure is performed automatically. The software now determines the “window” within which the barcode scanner can read and decode the barcode in the reference window (see following figure).

- First the range covered by the laser beam is shifted towards the front of the service rack (beam b_1, window w_1) until the point is reached where the barcode in the window can no longer be read.
- Then the range is shifted towards the rear of the service rack and the procedure is repeated (beam b_2, window w_2).
- The distance between the frontmost and rearmost ends of the w_1 and w_2 allows the software to determine the total reading window w_t.

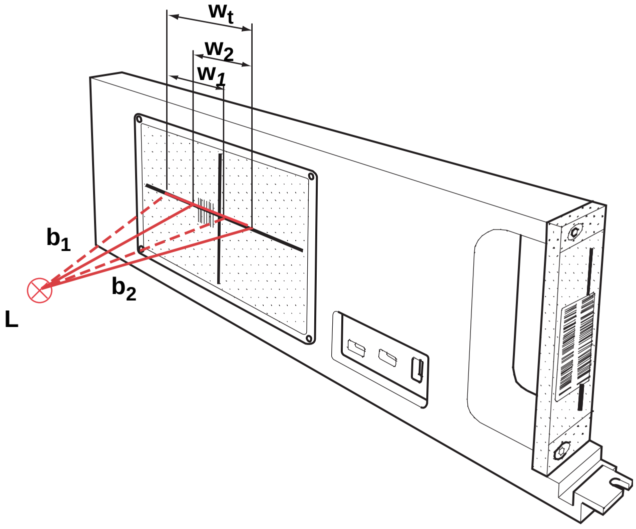


Fig. 8-34 *Determination of reading window*

10 When the setup is finished click OK to finish.

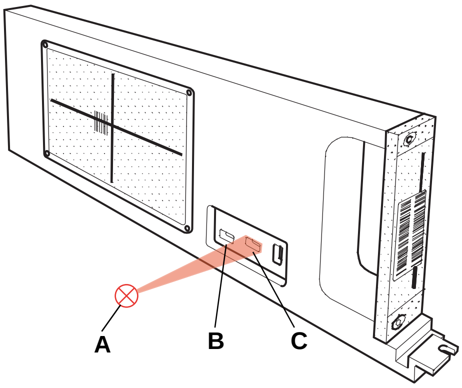
The determined values are written to the PosID 2.

8.4.17 “No Tube” Sensor Test

Purpose

This test is used to check if the light emitted by the “No Tube” sensor passes through the openings (C) and (B) when the service rack is moved past the sensor.

Note: *Light emitted by the light source of the sensor passes only through one of the openings at a time.*



A	*“No Tube” sensor (in PosID 2)*
B	*Lower opening*
C	*Upper opening*

Fig. 8-35 *“No Tube” sensor test*

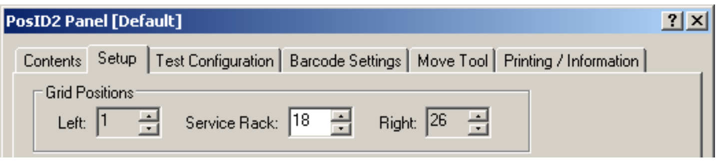
Procedure

To perform the test:

1 On the **Contents** page, select the **No Tube Sensor test** check box.

2 If necessary, change to the **Setup** page and set the grid position in which you want to perform the setup.

In most cases you can accept the default value that appears on the screen.



Left: 1
Service Rack: 18
Right: 26

Fig. 8-36 Setup page

3 Click **Start** to begin.

4 When prompted to do so, slide the service rack into the grid position that appears on the prompt. Click **Next** when done.

The PosID 2 grips the service rack and moves it back and forth along the left side. When the test is done a corresponding Test: Passed or Failed message appears on the screen.

5 Click **OK** to finish.

Pass/Fail Criteria

The test is passed if the “No Tube” sensor can “see” through both openings.

8.4.18 Barcode Reading Test

Cross References

References to information provided in other sections.

Information	Reference
Loading test configuration data	See section 6.7, 🗎 6-17

Purpose

This test checks if the PosID can scan and decode the barcodes applied to the various objects on the worktable correctly for a given number of test cycles.

Test Principle

The PosID 2 scans and decodes the information provided by the barcode labels carriers, racks, microplates and tubes as follows:

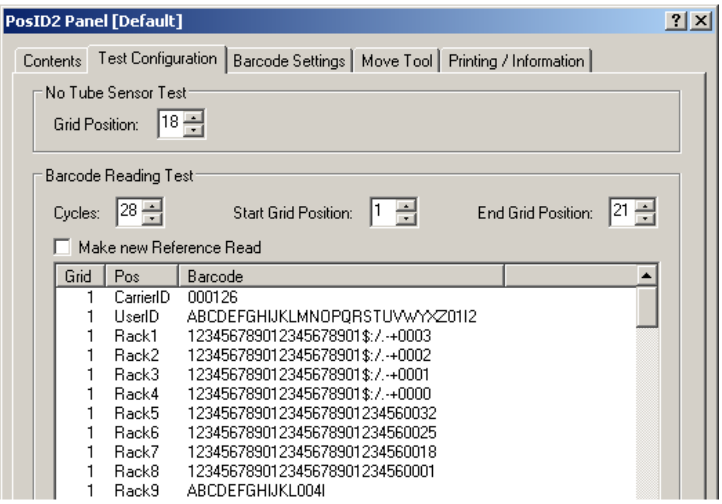
- It checks the barcodes of all objects that are placed between two predefined left and right grid positions.
- To read labels at the rear of objects the PosID 2 moves along the X-axis.
- To read labels on the right side of objects the carriers on which they are placed on carriers, it moves them along its left side.
- The results are compared against those obtained in a reference reading cycle.
- The test is repeated for a predefined number of test cycles.

Procedure

To perform the barcode reading test:

1 Place the objects you want to check on the worktable. Make sure that they are labeled properly and that no barcode labels are damaged.

2 On the **Contents** page, select the **Barcode reading test** check box and change to the **Test Configuration** page.



No Tube Sensor Test

Grid Position: 18

Barcode Reading Test

Cycles: 28 Start Grid Position: 1 End Grid Position: 21

☐ Make new Reference Read

Grid	Pos	Barcode
1	CarrierID	000126
1	UserID	ABCDEFGHIJKLMNOPQRSTUVWYXZ01I2
1	Rack1	123456789012345678901$:/.-+0003
1	Rack2	123456789012345678901$:/.-+0002
1	Rack3	123456789012345678901$:/.-+0001
1	Rack4	123456789012345678901$:/.-+0000
1	Rack5	123456789012345678901234560032
1	Rack6	123456789012345678901234560025
1	Rack7	123456789012345678901234560018
1	Rack8	123456789012345678901234560001
1	Rack9	ABCDEFGHIJKL004I

Fig. 8-37 *Test Configuration page*

3 Set the following parameters in the frame **Barcode Reading Test** or accept the suggested values:

- **Cycles:** Number of cycles the test is performed.
- **Start/End Grid Position:** These values define the area in which the objects to be tested are placed.
- **Make Reference Read:** Select this check box if you want to use the codes on your labes as a reference for future tests. If you select this check box an extra reading cycle will be performed.

Note:

- *You can save your reference data after the test with **Save As** in a *.any file. Choose an appropriate directory and give the file a meaningful name.*
- *Previously defined reference barcodes (together with the other settings) can be reloaded with **System > Test Configuration**.*

4 Click **Start** to begin.

The test cycles are performed. At the end of the test you are notified whether or not the test was successful.

5 Click **OK** to finish.

Pass / Fail Criteria

The test is passed if a valid barcode was read where applicable, i.e. if the barcodes determined correspond to the reference reading according to the **Test Configuration** page.

If the Test Fails:

Try the following:

- Check if the barcode settings are correct.
- Check whether any barcode labels are missing, damaged, or otherwise unreadable and whether they are applied correctly to tubes, racks, or carriers.
- Replace any suspect barcode labels.
- Repeat the **Barcode Reading** test when finished.
- Call your nearest service representative if necessary.

8.4.19 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

***Note:** The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

***Note:** With the PosID 2, there is a difference between the **Test Configuration** page and the QC-Report, if no barcode label is detected on a piece of labware (tube, rack, carrier). In such a case the column **Barcode** shows the following:*

- *It is blank on the **Test Configuration** page.*
- *It shows three *** (asterisks) on the QC-Report.*

8.5 PosID-3 Functions

8.5.1 Brief Overview

Overview

The following figure provides an overview of the PosID-3.

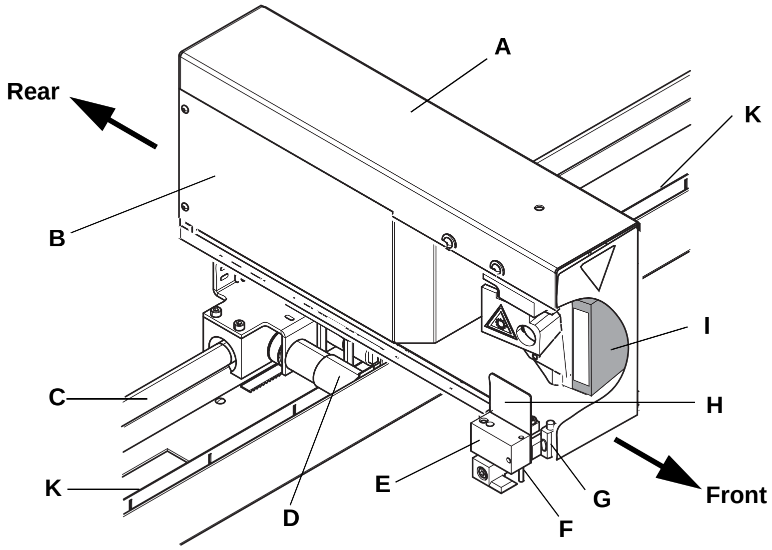


Fig. 8-38 PosID 3, overview

A	*Casing*
B	*Side & bottom cover*
C	*X-shaft*
D	*X-motor*
E	*Gripper*
F	*Gripper pin*
G	*“No Tube” sensor*
H	*Barcode flag (with horizontal and vertical reference barcodes)*
I	*Barcode scanner*
K	*Position bar*
Front	*Instrument front*
Rear	*Rear side of instrument*

Parts of PosID-3

The following lists provides a brief description of some parts of the PosID-3 as far as they concern the setup and test procedures described in this section.

- **Barcode scanner:** The barcode scanner (I) at the front uses a laser beam to scan and read the barcodes on the labels applied to carriers, racks and tubes. The barcode scanner can be turned round both a vertical and a horizontal axis. See “movement axes” later in this section.
- **Gripper:** The gripper (E) is driven by an electronically controlled motor (not visible in figure) and can move along the left side of the PosID-3. Its gripper pin (F) can engage with movable carriers for objects like tubes, microplates, troughs, etc. and move them back and forth. In this way, the objects move past the barcode scanner so that the latter can read the barcode labels.
- **Barcode flag**: The barcode flag (H) is mounted to the gripper. It contains a horizontal and a vertical reference barcode that allow the system to check whether the barcode scanner faces the flag and whether the gripper is in its front position.
- **“No Tube” sensor:** The “No Tube” sensor (G) is a reflective optosensor that is used to detect the absesence or presence of tubes and racks.

- **X-motor**: This motor (D) moves the PosID-3 along the worktable in the X-axis (left ↔ right). Also see following figure.

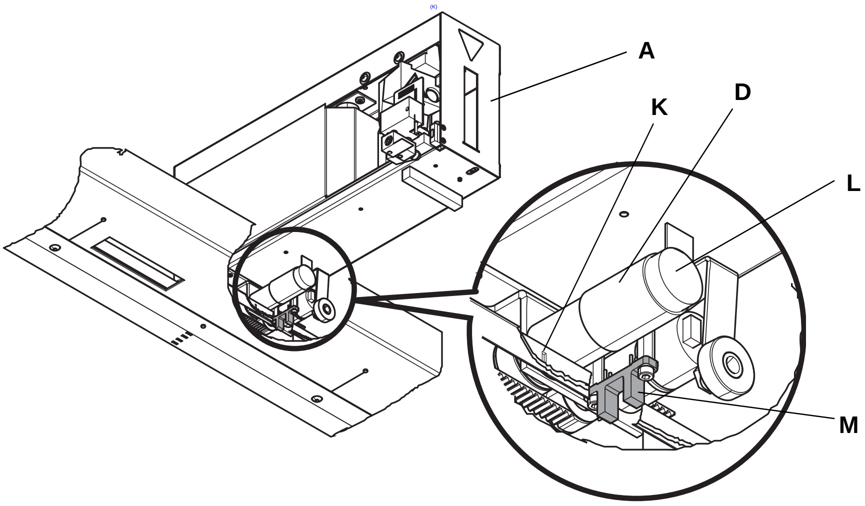


Fig. 8-39 *Home sensor at bottom of PosID-3*

A	*PosID-3*	***L***	*Encoder*
D	*X-motor*	***M***	*Home position sensor*
K	*Position bar*		

- **Home position sensor:** The home position sensor (M) is a fork-type optical sensor, located on the bottom side of the PosID-3 next to the X-motor. The position bar (K) has a number of position slots and is arranged between the prongs of the home position sensor. Please note:
  - The leftmost position slot of the position bar corresponds to the sensor’s home position. Its width differs from that of the other position slots[1]. This concept enables the firmware to check whether the PosID-3 has really reached its home position when it cannot move any further towards the left.
  - In addition, the distance between two neighboring position slots varies from position slot to position slot[2].
  - These features are used during the initialization of the PosID-3 in the X-axis:
    - They allow the firmware to find out the current position of the PosID-3 quickly, when it moves along the X-axis and to adapt the travelling speed, i.e. to accelerate or slow down the PosID-3 depending on its distance from the home position.
    - If, during the X-initialization, the PosID-3 cannot move any further towards the left without having reached the home position slot, it may be stuck by an obstacle on the worktable.
  - Also note that devices like incubators, etc. must not be placed on the left side of the worktable, as they might prevent the PosID-3 from reaching its home position.
- **Encoders:** After the initialization phase the firmware determines the exact position of the PosID-3 by counting and comparing the steps of two encoders. One of them (item L in the figure) is mounted to the back of the X-motor; a second one is located on the right side of the motor (not visible in figure).

---

[1] *Width: 1st slot (home position): 5 mm; 2nd slot: 8mm; all other slots: 2 mm*

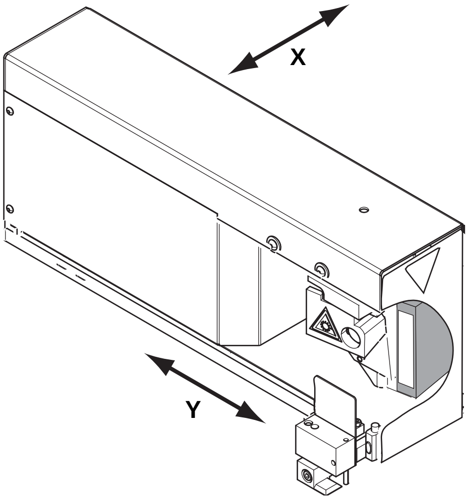
[2] *Slot distances: 1st to 2nd: 100 mm, 2nd to 3rd: 50 mm, then distance increases by 5 mm from slot to slot*

While the PosID-3 moves along the X-axis, the firmware continuously checks if the steps of the two encoders are equal.

Movement Axes

The whole PosID-3 or parts of it can be moved as follows:

- **X-axis**. Movement of the whole PosID-3 from left ↔ right along the X-shaft below the worktable
- **Y-axis.** Movement of gripper front ↔ rear along the left side of the PosID-3



X	*X-axis (whole PosID-3)*
Y	*Y-axis (gripper)*

Fig. 8-40 *PosID-3 X and Y axes*

- **B-axis**. The barcode scanner can be moved in the so-called B-axis as shown in the two following figures:
  - **Vertical B-axis (B_v):** The barcode scanner can turn round this axis so that it can read labels attached to the rear side of objects as well as vertical labels placed on the right side of objects (see above figure).
  - **Change position.** If the reader is moved beyond the change position it starts turning into a horizontal position.
  - **Horizontal B-axis (B_h):** This is the axis around which the barcode scanner reader turns after it has moved beyond the change position. It can turn round the B_h-axis until it reaches the position shown on the right side of the following figure. This position enables the barcode scanner to scan and read horizontal labels applied to the right side of movable objects.

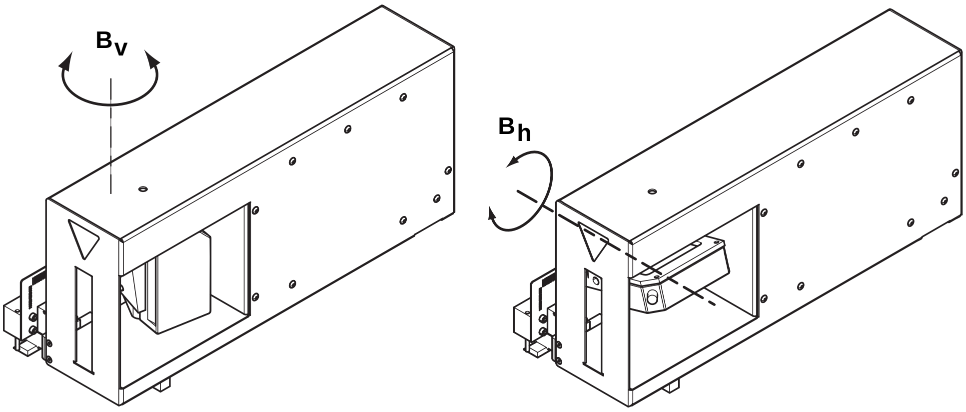


Fig. 8-41 *Vertical movement axis (left) and change position (right)*

Safety Precautions

As has been said before the barcode scanner generates a laser beam to scan the barcode labels. Therefore be careful when setting up or testing the PosID-3.

WARNING

Laser light (CLASS 2 LASER PRODUCT).

- Do not stare into beam nor into its reflections on metallic parts.
- Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Ensure appropriate FDA regulatory actions have been taken for any Class II laser products.

ATTENTION

To avoid collisions with other parts make sure the worktable is empty and free of obstacles during the execution of the test procedures.

- Collisions can damage devices or cause misadjustments.

8.5.2 Tools

To perform the setup and test procedures described in this section you need two tools:

- The PosID-3 Service Rack.
- The PosID-3 adjustment tool.

8.5.2.1 PosID-3 Service Rack

Cross References

References to information provided in other sections.

Information	Reference
Alignment of PosID-3 with service rack	See section 8.5.10, 🗎 8-53

Brief Description

The PosID Service Rack serves for adjusting (partly together with the adjustment tool) the gripper and the barcode scanner mechanically and to set up certain reading positions with the aid of the software.

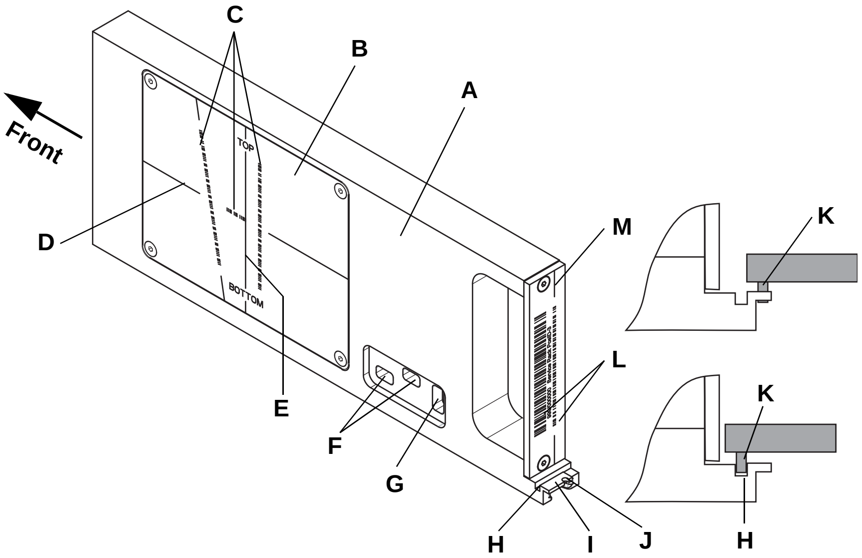


Fig. 8-42 *PosID-3 service rack*

A	*Complete service rack*
B	*Window with reference lines and barcodes*
C	*Reference barcodes*
D	*Horizontal reference line*
E	*Vertical reference line*
F	*Openings for “No Tube” sensor test*
G	*Opening for position setup in Y-axis*
H	*Groove that engages with gripper pin for moving the rack*
I	*Flange at rear side of service rack*
J	*Gripper adjustment slot*
K	*Gripper pin of PosID*
L	*Vertical reference barcodes*
M	*Vertical reference line*
→	*(Arrow) Points to front of instrument*

Parts of Service Rack

The following table provides an overview of those parts of the PosID-3 that are involved in mechanical adjustments, software setups or tests.

Tab. 8-12 *Parts of Service Rack*

Item	Description	Mech. Adj.	SW Setup	Test
B	Translucent window, contains reference lines and barcodes	X	X	X
C	Reference barcodes (barcode scanner)		X	X
D	Horizontal reference line (barcode scanner)	X	X	
E	Vertical reference line (barcode scanner)	X	X	
F	2 openings (setup and test of “No Tube” sensor”)			X
G	Opening for setup of Y-axis and for “No Tube” sensor test.		X	X

Tab. 8-12 *Parts of Service Rack*

Item	Description	Mech. Adj.	SW Setup	Test
H	Groove that engages with the gripper pin (K) of the PosID. Allows to move the service rack back and forth along the PosID during setups and tests.	X	X	X
J	Slot for aligning the gripper pin (K) of the PosID with the service rack (→ Cross References)	X	X	
L	Vertical reference barcodes (barcode scanner)		X	X
M	Vertical reference line (barcode scanner)	X	X	

8.5.2.2 Adjustment Tool

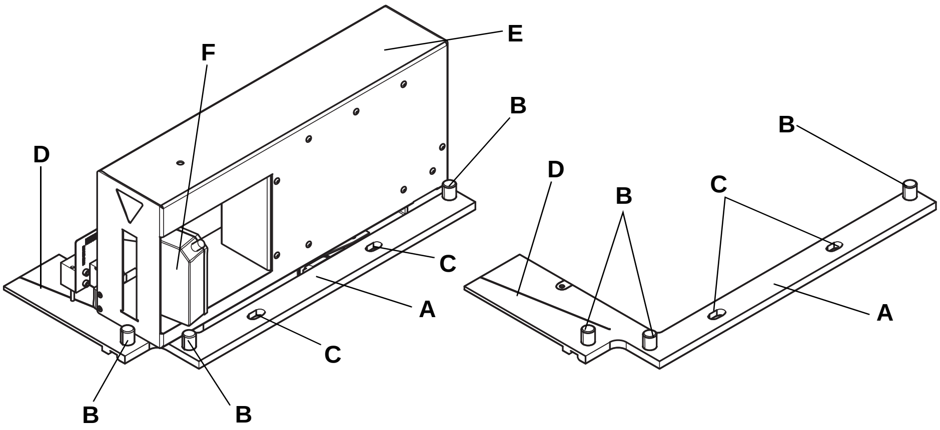


Fig. 8-43 *PosID-3 adjustment tool*

A	*Adjustment tool*	***D***	*Groove (10° inclination)*
B	*Stop pins*	***E***	*PosID-3*
C	*Slotted holes*	***F***	*Barcode scanner*

This tool is used for adjustments of the PosID-3 during the assembly of the instrument at the factory and in the field. As the above figure shows, the tool has two slotted holes (C), into which two grid pins on the worktable fit, that allow aligning the tool with the worktable grid.

- During the assembly of the instrument the tool is used to align the whole PosID-3 mechanically with the worktable grid.
- In principle, this tool can also be the field to adjust the mechanical position of the barcode scanner and to align the laser beam exactly with the inclined groove (D).

Note: *The adjustment tool is not always available in the field. However, it is also possible to carry out the mechanical adjustment of the barcode scanner and the alignment of the laser beam with the help of the PosID service rack.*

8.5.3 Logical Positions

Unlike its predecessor model, the PosID-3 does not have any “logical positions” to which it can be moved directly. To move the PosID-3 in the X-axis to a certain target position, it is necessary to move it by the required number of steps with respect to the home position.

8.5.4 PosID-3 Panel

Cross References

References to information provided in other sections.

Information	Reference
User Management System	See section 6.5, 🗎 6-3
Using the panel	See section 5.2, 🗎 5-13
Setting the serial number	See section 7.1.3, 🗎 7-7

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 8-13 *PosID-3 Functions and User Permissions*

Function	Type	User	FSE
Set defaults in EEPROM	Setup		X
Autodetection of home position	Setup		X
Autorange	Setup		X
Determine connect positions (scaling and offset)	Setup		X
Autodetection of “No Tube” sensor	Setup		X
Set up reading positions	Setup		X
Reading positions test	Test	X	X
“No Tube” sensor test	Test	X	X
Barcode reading test	Test	X	X
Move Tool	Tool	X	X
Printing / Information	Page	X	X

Files, Directories

The PosID-3 function creates the following files:

- **Result Files:** Test results are stored in *.any files.

Directory: <data_path>\Results

File name: PosID3_<serial_number>_<date>_<time>.any

- Test Configuration Files

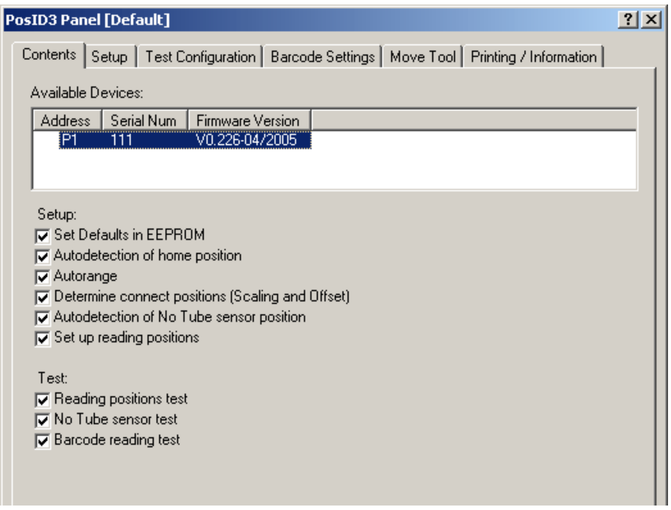
Directory:	user defined
File name:	<name>.any

Starting the Panel

To set up and test the PosID-3:

1 Start the panel with **System Devices > PosID-3**.

*The **PosID-3** panel with activated **Contents** page appears. After starting the panel, no check box is selected and not all tabs are visible.*



Available Devices:

Address	Serial Num	Firmware Version
P1	111	V0.226-04/2005

Setup:
☑ Set Defaults in EEPROM
☑ Autodetection of home position
☑ Autorange
☑ Determine connect positions (Scaling and Offset)
☑ Autodetection of No Tube sensor position
☑ Set up reading positions

Test:
☑ Reading positions test
☑ No Tube sensor test
☑ Barcode reading test

Fig. 8-44 *PosID-3, Contents page*

Pages

The **PosID-3** panel is subdivided into the following pages

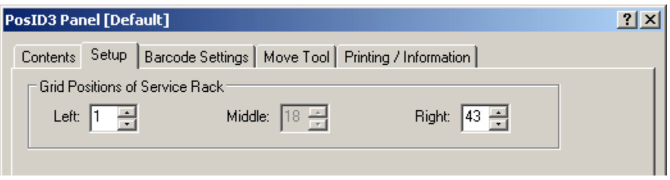
Tab. 8-14 *Pages of PosID 2 panel*

Pages	Function
Contents	General overview, procedure selection.
Setup	Setup of grid positions
Test Configuration	Settings for **Readings position test** and **No Tube sensor test** and Readings position test
Barcode Settings	Lets you configure various barcodes
Move Tool	For moving the whole PosID-3, the gripper and the barcode scanner
Printing / Information	Print selection for the QC-report

8.5.5 Setup Page

Purpose

This page lets you define the grid positions for service rack in various setup procedures.



Grid Positions of Service Rack

Left: 1

Middle: 18

Right: 43

Fig. 8-45 PosID-3, Setup page

Controls

The three spin boxes in the frame **Grid Positions of Service Rack** are used to set the position(s) into which to put the service rack during certain setup procedures:

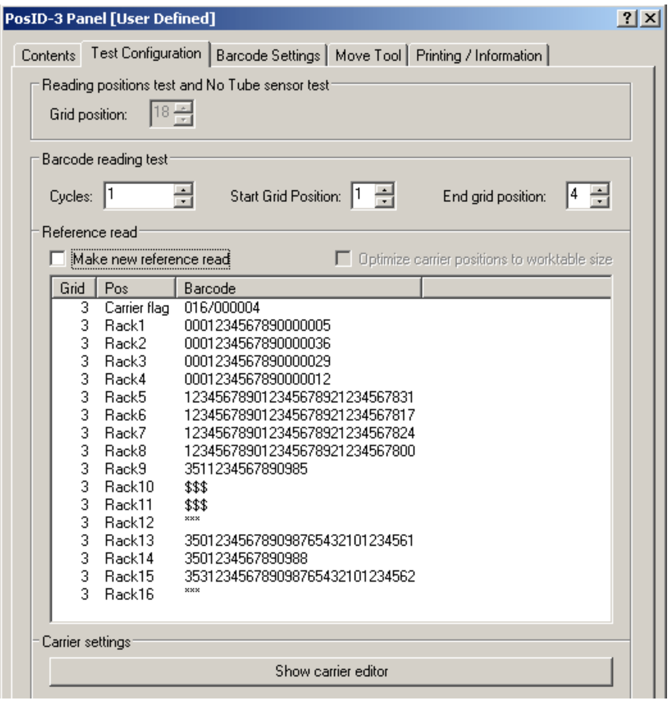
- **Left** and **Right** grid positions: They let you set the left and right grid positions of the service rack for the procedure **Determine connect positions** that must be performed in a left and a right grid position.
- In the spin box **Middle** you can enter the position of the service rack for a setup procedure that is performed only in one grid position.

Note: *In most cases, you can accept the default value(s), as proposed automatically by the software.*

8.5.6 Test Configuration Page

Purpose

This page allows you to set the parameters for the **Reading positions test**, the **“No Tube” sensor test** and the **Barcode reading test.** In addition, it lets you access the **Carrier Editor**.



Reading positions test and No Tube sensor test

Grid position: 18

Barcode reading test

Cycles: 1

Start Grid Position: 1

End grid position: 4

Reference read

☐ Make new reference read

☐ Optimize carrier positions to worktable size

Grid	Pos	Barcode
3	Carrier flag	016/000004
3	Rack1	0001234567890000005
3	Rack2	0001234567890000036
3	Rack3	0001234567890000029
3	Rack4	0001234567890000012
3	Rack5	12345678901234567892123456783 1
3	Rack6	123456789012345678921234567817
3	Rack7	123456789012345678921234567824
3	Rack8	123456789012345678921234567800
3	Rack9	3511234567890985
3	Rack10	$$$
3	Rack11	$$$
3	Rack12	***
3	Rack13	350123456789098765432101234561
3	Rack14	3501234567890988
3	Rack15	353123456789098765432101234562
3	Rack16	***

Carrier settings

Fig. 8-46 PosID-3 panel - Test Configuration page

Controls

Reading positions test and No Tube sensor test	Contains a spin box for the **Grid Position** of the service rack in which the tests are to be performed.
Barcode Reading Test	Frame containing the controls for the **Barcode Reading Test**.
- **Cycles**	For setting the number of test cycles
- **Start Grid Position**	For setting the position of the leftmost carrier to be checked
- **End grid position**	For setting the position of the rightmost carrier to be checked
- **Make new reference read**	- If this check box is selected the barcodes are read anew and the new values are used as a reference. - If the check box is cleared the values from the last reference reading are used instead or can be loaded from a file.
- **Optimize carrier positions to selected grid range**	- If this check box is selected, the system automatically calculates the grid positions for the carriers to be used during the barcode reading test, taking into consideration possible cutouts in the worktable. The calculated grid positions are shown in the window below in the column **Grid**.
Window in lower part	Shows the values from the last reference read:
- **Grid**	Grid position of the carrier on which the racks are placed. If the “Optimize carrier positions…” check box is selected, these positions are calculated by the system.
- **Pos**	Shows the type of identification, such as • Carrier flag: Identifies the carrier type • Rack x: Identifies the rack position
Barcode	- If a barcode was read, it appears in this column. - *** (3 asterisks): The PosID-3 did not read any barcode. Possible reasons: • Wrong barcode settings • A tube has been detected (by “No Tube” sensor), but no barcode label is applied to it, or the label is damaged or otherwise unreadable. • “No tube sensor” is inactive. • If a microplate was expected: - MP is not present or placed incorrectly - MP has no barcode label or the label is damaged **$$$** (3 dollar signs): No object was detected by the “No Tube” sensor: Possible reasons: • No tube present • No tube rack present.
Carrier settings	The command button **Show carrier editor** opens the **Carrier Editor**. Users can view carrier settings, import carriers or define customized carriers (for expert users only). For more details see 8.5.7, 🗎 8-47.

8.5.7 Carrier Editor

8.5.7.1 Overview

Functions and User Rights

The **Carrier Editor** is a tool that provides the following functions:

- Shows the settings of carriers (all users).
- Allows users to import predefined carrier definitions (experienced users, mostly FSEs)
- In addition, expert users (both customers and specialists) may create, edit and delete custom-defined carriers.
  - This feature is reserved to specilists who know exactly what consequences the modification of PosID parameters may have.
  - Pay attention to the warning note in section "Create, Edit Modify User-Defined Files", 🗎 8-48.

Format

Carrier definitions are *.xml files

Carrier Types

Carrier types fall into two categories:

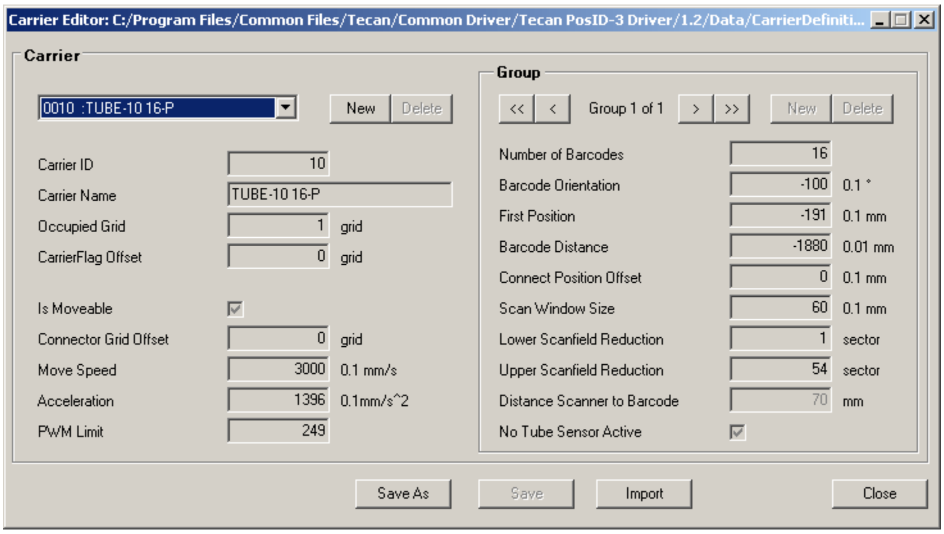
- Predefined carriers:
  - Defined at the factory.
  - Carrier ID range: 0…499 and 900…999
  - Availability: Contact the customer service department for available carriers,
- User-defined carriers:
  - Defined either by specialists or expert users
  - Carrier ID range: 500…899

Brief Description of the Main Functions

Viewing Existing Carriers

If an existing carrier has been selected from the drop down list near the upper left corner (see figure below), the editor shows its settings.

Note: *This feature may be used by all users.*



Carrier Editor: C:/Program Files/Common Files/Tecan/Common Driver/Tecan PosID-3 Driver/1.2/Data/CarrierDefiniti...

Carrier

0010 :TUBE-10 16-P

Carrier ID 10
Carrier Name TUBE-10 16-P
Occupied Grid 1 grid
CarrierFlag Offset 0 grid
Is Moveable ☑
Connector Grid Offset 0 grid
Move Speed 3000 0.1 mm/s
Acceleration 1396 0.1mm/s^2
PWM Limit 249

Group

Group 1 of 1

Number of Barcodes 16
Barcode Orientation -100 0.1 °
First Position -191 0.1 mm
Barcode Distance -1880 0.01 mm
Connect Position Offset 0 0.1 mm
Scan Window Size 60 0.1 mm
Lower Scanfield Reduction 1 sector
Upper Scanfield Reduction 54 sector
Distance Scanner to Barcode 70 mm
No Tube Sensor Active ☑

Fig. 8-47 *Carrier editor, setting of a predefined rack*

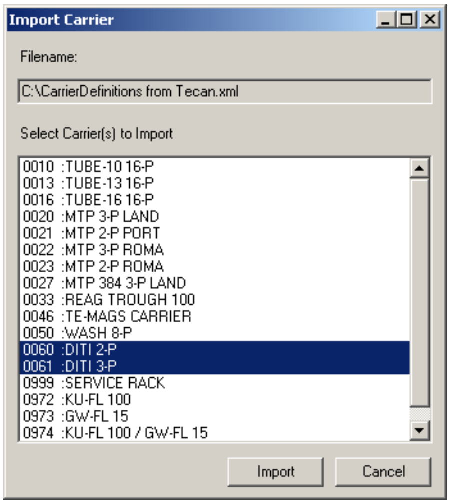
Import New Carrier Definitions

New carrier definitions can be imported with the **Import** command button near the bottom of the editor window. The imported carrier appears in the drop down list box near the top left corner.

To import a carrier definition:

1. On the **Test Configuration** page, click the command button **Show Carrier Editor**.
2. On the **Carrier Editor** dialog, click the **Import** button.

   *This opens the Windows **Open** dialog.*
3. On the **Open** dialog, select the directory and the where the rack definitions are stored. and click on **Open**.



Filename: C:\CarrierDefinitions from Tecan.xml

Select Carrier(s) to Import

0010 :TUBE-10 16-P
0013 :TUBE-13 16-P
0016 :TUBE-16 16-P
0020 :MTP 3-P LAND
0021 :MTP 2-P PORT
0022 :MTP 3-P ROMA
0023 :MTP 2-P ROMA
0027 :MTP 384 3-P LAND
0033 :REAG TROUGH 100
0046 :TE-MAGS CARRIER
0050 :WASH 8-P
0060 :DITI 2-P
0061 :DITI 3-P
0999 :SERVICE RACK
0972 :KU-FL 100
0973 :GW-FL 15
0974 :KU-FL 100 / GW-FL 15

Fig. 8-48 *Import carrier*

*The **Import Carrier** dialog, shown on the left side appears.*

4. From the list, select the carrier definitions to import
5. Click **Import**.
6. Back on the **Carrier Editor**, locate the imported files and examine their settings to make sure you have imported the correct files.

Create, Edit Modify User-Defined Files

This feature is for expert users only. Pay attention to the following:

WARNING

Risk of contamination, mechanical damage and incorrect barcode readings if PosID parameters are defined incorrectly.

- Use this feature only if you are an expert user who knows exactly what consequences the modification of PosID-related parameters may have.
- Contact the customer service department if in doubt.

8.5.8 Barcode Settings

Purpose

The **Barcode Settings** page is a tool that allows users to load, view, change and store barcode settings. These settings are used by the **Barcode Reading Test**.

Example

The following figure shows a barcode of the type “Code 39 Standard”. Information about barcodes may be found in literature supplied by the manufacturer barcode or test kit.

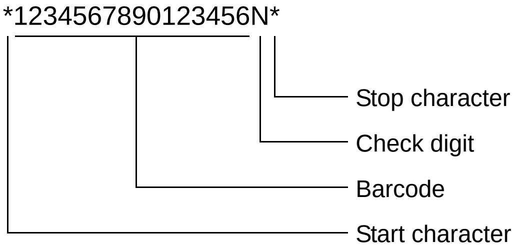


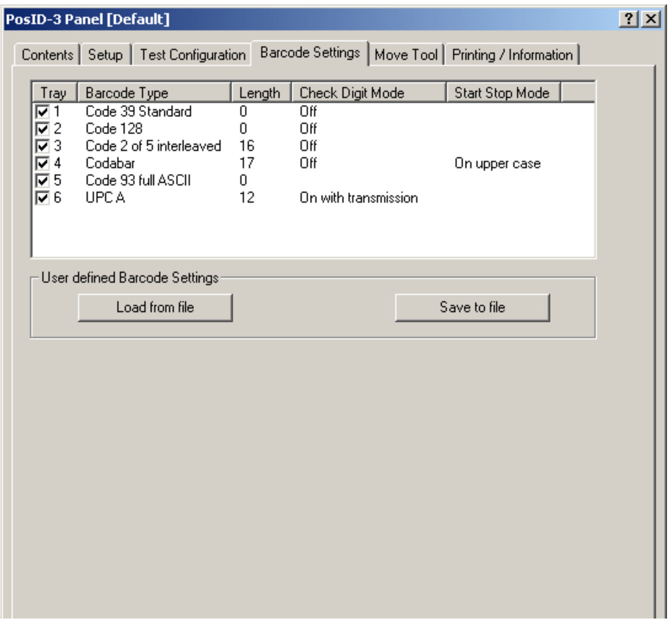
Fig. 8-49 Key to Barcode “Code 39 Standard”

Normally, the barcodes are set at the factory. However, both field service engineers and operators can alter the settings depending on the barcode types on the carriers used for the **Barcode Reading Test**. When reading problems occur (e.g., when whole racks cannot be read), the barcode settings must be checked. The PosID-3 can read six different barcodes simultaneously in one run.

The Setup and Service software supports six different barcode types as listed in the tables later in this section.

Barcode Settings Page

This page is always available to users as long as the PosID-3 panel is open.



Tray	Barcode Type	Length	Check Digit Mode	Start Stop Mode
☑ 1	Code 39 Standard	0	Off	
☑ 2	Code 128	0	Off	
☑ 3	Code 2 of 5 interleaved	16	Off	
☑ 4	Codabar	17	Off	On upper case
☑ 5	Code 93 full ASCII	0		
☑ 6	UPC A	12	On with transmission	

Fig. 8-50 PosID-3, Barcode settings

List in upper part	Shows the current barcode settings. Depending on the barcode type certain settings can be altered.
- **Tray**	Lists the barcodes the PosID-3 can read (the term “tray” denotes the memory place where the settings are physically stored). The check boxes beside the designation allow the user to enable/disable the corresponding “tray”. - **1 to 6:** These “trays” contain the barcode data of labels applied to microplates and tubes.
- **Barcode Type**	Drop down list boxes from which a barcode type can be assigned to each tray.
- **Length**	Length (= number of digits) of the barcode. - **0:** Lenght is variable (max. 32 characters, only possible for barcodes with start and stop digits) - **n:** Barcode has a defined length of n characters
- **Check Digit Mode**	With certain barcode types a check digit can be added to the actual barcode. If the check digit is enabled the correctness of a barcode reading can be verified. There are 3 possible modes: - **Off:** Check digit is disabled, no verification. - **On with transmission**: Check digit is enabled and is transmitted to the PosID-3 when the barcode is read. - **On without transmission:** Check digit is enabled, but is not transmitted when the barcode is read.
- **Start/Stop**	With certain barcode types a start and a stop character can be added at the beginning and the end of the code digits.

Codabar	**Other barcodes**
• **Off** • **On upper case** • **On lower case**	Cannot be set

Load from file	Loads previously stored barcode settings from the corresponding file Folder: <installation>\Modules\PosID3BarcodeSettings.any
Save to file	Stores the current settings in the corresponding .any file. Previous settings will be overwritten. Folder: <installation>\Modules\PosID3BarcodeSettings.any

Load, Store and Apply Settings

Barcode settings are loaded, stored and applied as follows:

- **At the start of the panel**: When the panel is started the settings that are currently stored in the PosID's EEPROM appear on the **Barcode Settings** page.
- **Read from file:** If you click this button, previously stored settings in the PosID3BarcodeSettings.any file are loaded. If no settings have been stored before an error message appears.
- **Store to Files:** Writes the current settings shown on the **Barcode Setting** page to the PosID3BarcodeSettings.any file. If no settings have ever been stored earlier the file does not exist and will be created first.
- **Default:** If you click this button (at the bottom of the panel) the default barcode settings as defined by the prdoduction department are loaded.
- **Apply:** If you click this button (at the bottom of the panel) the settings shown on the page are written to the EEPROM on the Te-CU board. When the panel is started up the next time these settings will be loaded into the page.

Available Barcodes

The following table lists the available barcodes.

Tab. 8-15 Available Barcodes

Code Type	Barcode Length	Check Digit Mode	Start/Stop character
Code 2 of 5 interleaved	enabled	enabled	-
Code 39 Standard	enabled	enabled	-
Code 39 Full ASCII	enabled	enabled	-
Codabar	enabled	enabled	enabled
Code 128	enabled	-	-
EAN 128	enabled	enabled	-
Code 93 full ASCII	enabled	-	-
UPCA	12	enabled	-

8.5.9 Move Tool

Cross References

References to information provided in other sections.

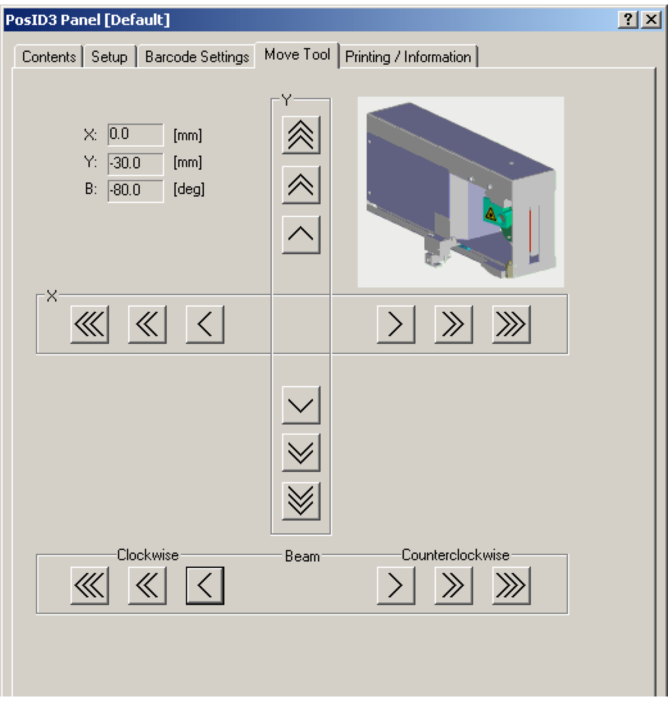
Information	Reference
Movement axes	See section 8.5.1, 🗎 8-37

Purpose

The **Move Tool** allows you to move the whole PosID-3 or parts of it in the X-, Y or B-axes.

- Whole PosID-3: In the X-axis (left ↔ right).
- Gripper: In the Y-axis (front ↔ rear):
- Barcode scanner: B-axis
- For more information about the movement axes (→ Cross References).

Note: *Not all movement axes are enabled during each setup or test procedure. However, the software always enables the possible movement directions automatically.*



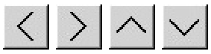
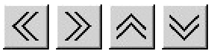
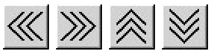
X: 0.0 [mm]
Y: -30.0 [mm]
B: -80.0 [deg]

Fig. 8-51 *PosID-3, Move Tool*

Controls

The PosID-3 **Move Tool** page contains the following controls:

X	Frame containing the movement buttons for the X-axis
Y	Frame containing the movement buttons for the Y-axis
Beam	Frame containing the movement buttons for the B-axis. The barcode scanner can be turned clockwise and counterclockwise in the horizontal and vertical axes (→ Cross References)

	Single step movement buttons (X- and .Y-axes 1/10 [mm], B-axis 0.1 [degree]
	Ten steps movement buttons (X- and .Y-axes 1 [mm], B-axis 1 [degree]
	Continuous movement buttons (if button is kept pressed).
Text boxes in upper left corner	Show the current positions in the three movement axes.

Note:

- *The arrows on the movement buttons indicate the direction in which the respective parts will be moved.*
- *If you place the mouse pointer over a movement button, a text appears that explains what you can do with the button (so-called “tool tip”)*

Keyboard Control

It is also possible to use the keyboard for the movements in the various axes. You can use the corresponding keys of the numeric keypad or the keys in the key blocks left of the numeric keypad.

Tab. 8-16 *Moving PosID-3 with the Keyboard*

Key (left of numeric keypad)	Key in numeric pad	Movement axes PosID
→	6 →	X+ (right)
←	4 ←	X- (left)
↓	2 ↓	Y+ (front)
↑	8 ↑	Y- (rear)
Page Up	PgUp 9	B+ (CW)
Page Down	PgDn 3	B- (CCW)

Steps

The movable parts of the PosID-3 are moved as follows:

- Every time you hit one of the above keys the part is moved by one step (0.1 mm or 0.1 degree).
- If you keep the key pressed it is moved continuously at a speed of approx. five steps per second.
- You can press a key continuously and at the same time press the Ctrl key. In this case, the arm is moved continuously at a relatively high, constant speed.

8.5.10 Aligning the PosID-3 with the Service Rack

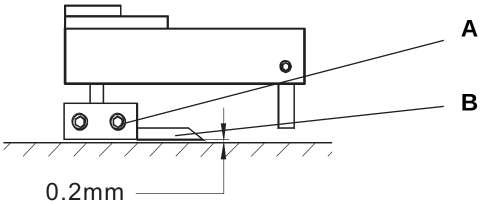
Purpose

Before the PosID-3 can be set up with the aid of the Setup and Service software it must be aligned properly with the service rack and with the alignment tool.

Note: *For the mechanical alignment with the aid of the alignment tool, refer to the Service Manual of the instrument.*

Procedure To align the service rack with the PosID-3:

1. Switch off the instrument.
2. Use a feeler gauge to check the gap between the release finger of the PosID-3 and the workable surface as in the following figure.



A	*Fixing screws*
B	*Release finger*

Fig. 8-52 *Release finger adjustment*

3. If necessary loosen the two fixing screws (A) and adjust the release finger as shown in the above figure. Tighten the screws when done.
4. Insert the service rack into a grid position on the worktable. See following figure.
5. Check the distance between the worktable surface and the gripper pin (C) gap Adjust this distance to 8 ± 0.5 mm as shown in the figure.
6. Manually move the PosID gripper pin (C) into the groove (E) of the service rack as shown in the figure. Visually check if the gap between the gripper finger and the bottom of the groove is large enough. Otherwise repeat step 5.

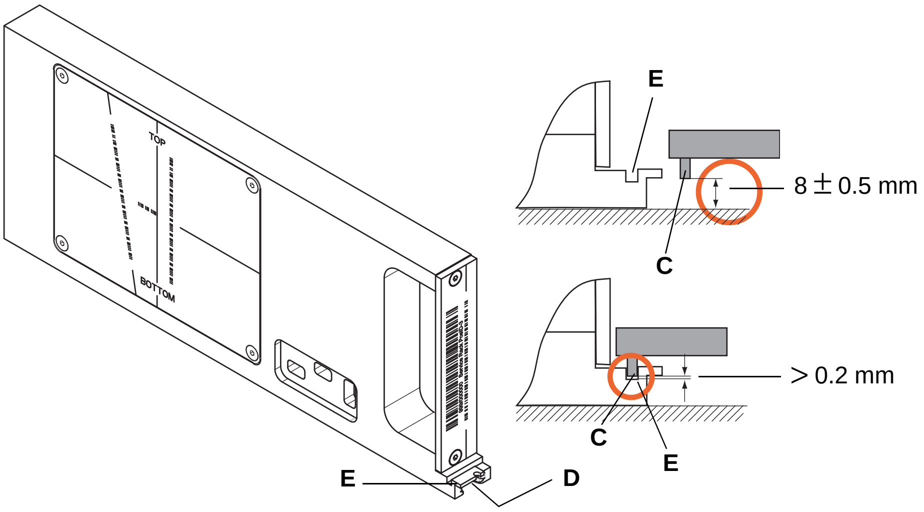


Fig. 8-53 *Mechanical adjustment*

C	*Gripper pin*	***E***	*Groove*
D	*Flange at rear of service rack*	***F***	*Gap between gripper pin and groove*

7. Switch the instrument on.

8.5.11 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box.

   No further parameters need to be defined.
2. Download the default values to the PosID-3 and have them re-read by the software with **Start**.

8.5.12 Autodetection of Home Position

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The procedure moves the PosID-3 along the X-axis into its home position (leftmost position hole in position bar) to determine the exact position of the home position hole.

Procedure

To perform the procedure:

1. On the **Contents** page, select the **Autodetection of home position** check box.

   No further parameters need to be defined.
2. Click **Start**.to begin.

   *If the home position could be detected, the **Setup: Done** message is displayed.*
3. Confirm with **OK**.

8.5.13 Setup: Autorange

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Autorange** procedure moves the PosID-3 in all possible axes to determine the available ranges. The values found are written to the PosID-3.

Procedure

To perform the **Autorange** procedure:

1. On the **Contents** page, select the **Autorange** check box. No further entries need to be made.
2. Click **Start** to begin.

   *At the end of the procedure, the **Setup: Done** message is displayed.*
3. Confirm with **OK**.

8.5.14 Setup: Determine Connect Positions

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

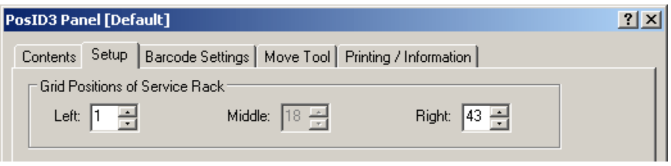
Purpose

This procedure is used to set up the “connect positions” of the PosID-3, i.e. the exact positions in which the PosID-3 can grip a carrier or rack.

Procedure

1. On the Contents page, select the **Determine connect positions** check box.
2. If necessary, change to the **Setup** page and set the left and right grid positions in which you wish to perform the setup.

   In most cases you can accept the default values that appear on the screen.



Grid Positions of Service Rack

Left: 1

Middle: 18

Right: 43

Fig. 8-54 *PosID-3, Setup page*

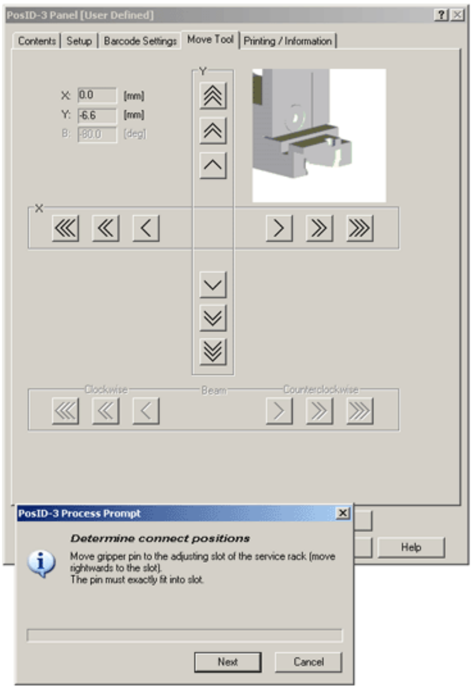
3. Click **Next**.

   You are guided through the procedure by a series of prompts. Always follow the instructions on the screen.

4 When prompted to do so, insert the service rack into the left grid position as indicated on the prompt. Do not push the rack to its end stop. Leave a distance of approx. 10 mm between the rack and the PosID-3.

5 Click **Next** when done.

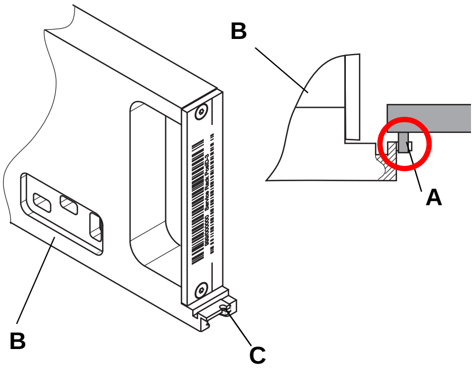
The Move Tool with a process prompt appears



X: 0.0 [mm]
Y: -6.6 [mm]
B: -80.0 [deg]

Determine connect positions

Move gripper pin to the adjusting slot of the service rack (move rightwards to the slot).
The pin must exactly fit into slot.



A	*Gripper pin*
B	*Service rack*
C	*Slot*

Fig. 8-55 *Aligning the gripper finger with service rack*

6 Carefully push the service rack backwards into its end position.

7 Ensure that the PosID is on the left side of the service rack (seen from the instrument front) before you start with the alignment. If necessary, use the **Move Tool** to move it leftward.

8 Now, use the **Move Tool** to move the PosID in the X-axis from left to right (seen from the instrument front) until the gripper pin (A) is in front of the center of the slot (C) of the service rack.

9 Click **Next** to continue.

The PosID-3 moves to the right position and the next prompt appears.

10 Now insert the service rack into the right grid position as indicated on the prompt. Do not push the rack to its end stop. Click **Next** when done.

11 Repeat the above steps 6 and 7 for the right position.

12 Click **Next** to continue.

8.5.15 Autodetection of “No Tube” Sensor

Field Service Engineers

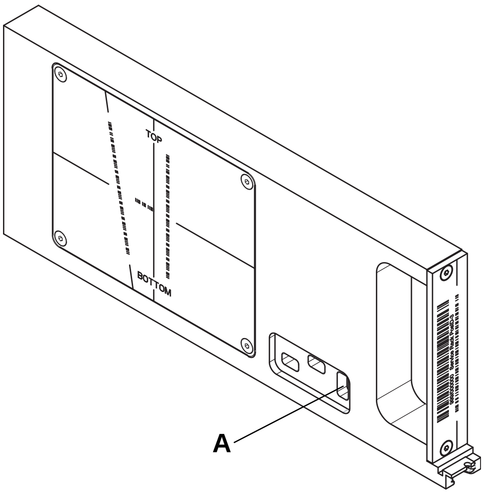
This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure moves the service rack along the left side of the PosID-3 and determines the start and end positions (= left and right edges) of the opening for the “No Tube” sensor. It must be carried out after replacing the “No Tube” sensor.

Procedure

To perform the setup procedure:



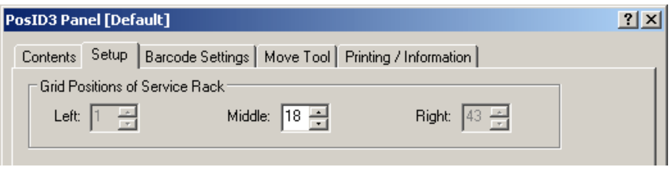
A *Opening for “No Tube” sensor*

1 On the Contents page, select the check box **Autodetection of No Tube sensor**.

Fig. 8-56 *PosID-3 service rack*

2 If necessary, change to the **Setup** page and use the **Middle** spin box to set the grid position in which you want to perform the setup.

In most cases you can accept the default value that appears on the screen.



Grid Positions of Service Rack

Left: 1

Middle: 18

Right: 43

Fig. 8-57 *PosID-3 Setup page TODO*

3 Click **Start** to begin.

4 When prompted to do so, slide the service rack in the indicated grid position and click **Next**.

The PosID-3 now grips the service rack and moves it in the Y-axis along its left side, thereby determining the start and end positions of the opening (A) for the “No Tube” sensor.

During the procedure you will be notified by process prompts about which edge of the opening has been detected.

5 At the end of the procedure, the **Setup: Done** message is displayed.

6 Confirm with **OK**.

8.5.16 Set up Reading Positions

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this setup procedure is to align the laser beam of the barcode scanner mechanically with the reference lines on the service rack and on the adjustment tool.

8.5.16.1 Procedure

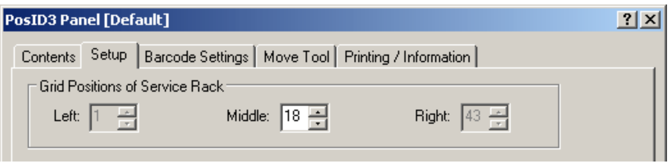
To set up the reading positions, proceed as described below.

Start Function

1 On the **Contents** page, select the **Set up reading positions** check box.

2 If necessary, change to the **Setup** page and use the **Service Rack** spin box to set the grid position in which you want to perform the setup.

In most cases you can accept the default value that appears on the screen.



Left: 1 Middle: 18 Right: 43

Fig. 8-58 *PosID-3 Setup page*

3 Click **Start** to begin.

Vertical Adjustment on Rear Side

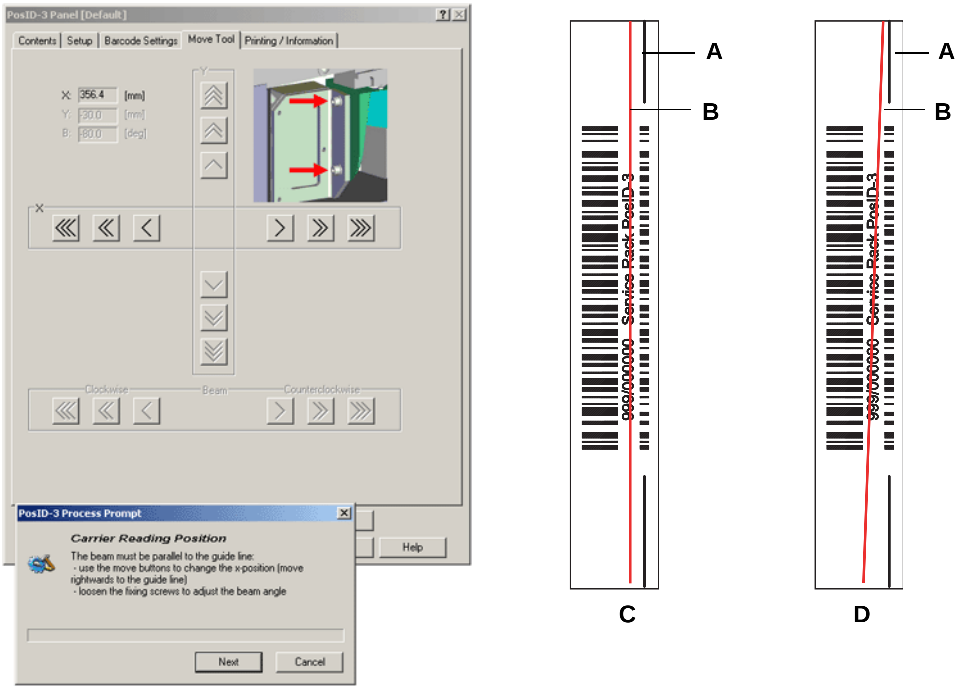
First, the barcode scanner must be adjusted vertically with the label applied to the rear side of the service rack.

1 When prompted to do so, slide the service rack into the grid position that appears on the prompt. Click **Next** when done.

The ***Move Tool*** *together with a process prompt appears.*

2 Use the **Move Tool** to move the PosID-3 in the X-axis from left to right (seen from the instrument front) so that the beam (B) of the barcode scanner is near the vertical guide line (A) on the barcode label at the rear of the service rack.

3 Check if the laser beam is parallel to the guide line (see following figure, item C).



Carrier Reading Position

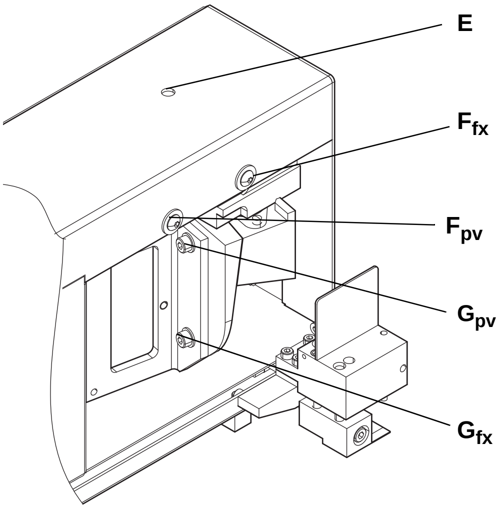
The beam must be parallel to the guide line:
- use the move buttons to change the x-position (move rightwards to the guide line)
- loosen the fixing screws to adjust the beam angle

Fig. 8-59 *Vertical adjustment at the rear of the service rack*

A	*Guide line*	***C***	*Correct - beam parallel to guide line*
B	*Laser beam*	***D***	*Wrong - beam not parallel*

4 If the beam is not parallel to the guide line, loosen the lower fixing screw (G_{fx}), as shown in the following figure, and adjust the barcode by turning round the screw (G_{pv}) that serves as the pivot point. Do not loosen the screw (G_{pv}).

5 Tighten the screw (G_{fx}) when finished.



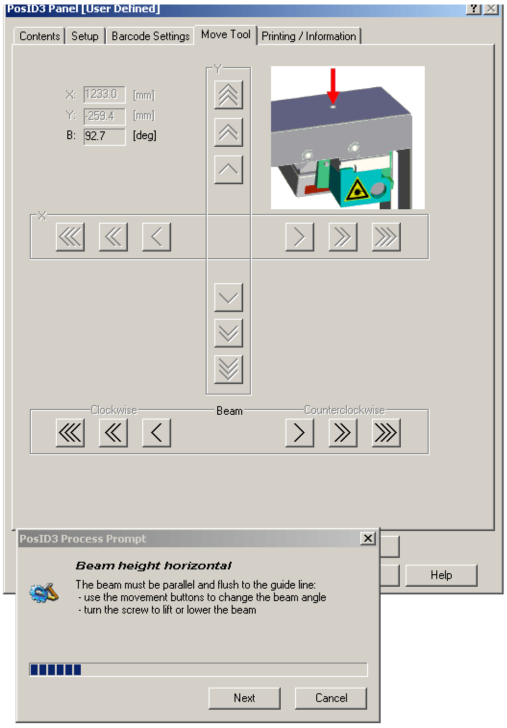
E	*Access hole for mechanical beam height adjustment*
F_{fx}	*Fixing screw for vertical barcode scanner adjustment*
F_{pv}	*Serves as the pivot for the vertical barcode scanner adjustment*
G_{fx}	*Fixing screw for vertical beam angle adjustment*
G_{pv}	*Serves as the pivot for the horizontal barcode scanner adjust-*

Fig. 8-60 *Mechanical adjustment of the barcode scanner*

6 Click **Next** to continue.

Adjustment on the Right Side

Next, the barcode scanner is turned until it is in a horizontal position and faces the right side of the service rack. Then the rack is pulled in the Y-axis until the laser beam is in the reference window.



X: 1233.0 [mm]
Y: -259.4 [mm]
B: 92.7 [deg]

Beam height horizontal

The beam must be parallel and flush to the guide line:
- use the movement buttons to change the beam angle
- turn the screw to lift or lower the beam

Fig. 8-61 *Alignment on right side*

The **Move Tool,** along with a process prompt appears.

The laser beam must be parallel to the horizontal guide line in the window as shown in the following figure.

1 If necessary, use the **Move Tool** to rotate the beam (B”) in the B-axis until it is parallel to the horizontal guide line.

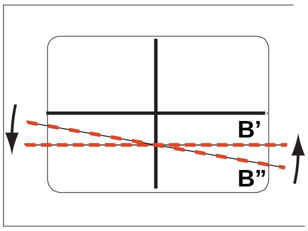


Fig. 8-62 *Turning the beam into the horizontal position*

B”	*Beam inclined*
B’	*Beam horizontal*

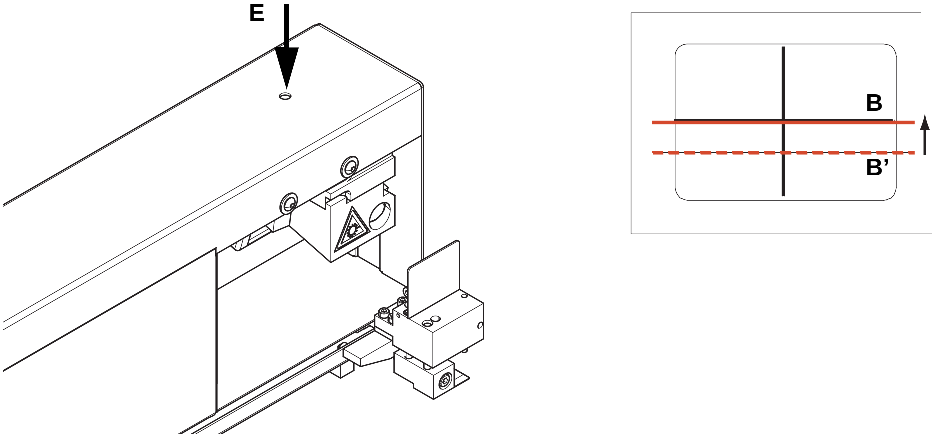


Fig. 8-63 Aligning the beam horizontally

E	*Access hole for mechanical beam height adjustment*
B’	*Laser beam parallel to horizontal guide line*
B	*Laser beam aligned exactly with horizontal guide line*

2 After you have done this, turn the screw (E) to lift or lower the beam until it is exactly aligned with the horizontal guide line.

3 Click **Next** when done.

10° Angle Alignment with Adjustment Tool

Note: *If you have no adjustment tool at your disposal, see “10° Angle Alignment with Service Rack”, 🗎 8-64.*

If you have an adjustment tool, place the tool and the service rack on the worktable as shown in the figure below and on the screenshot Fig. 8-65 , 🗎 8-63.

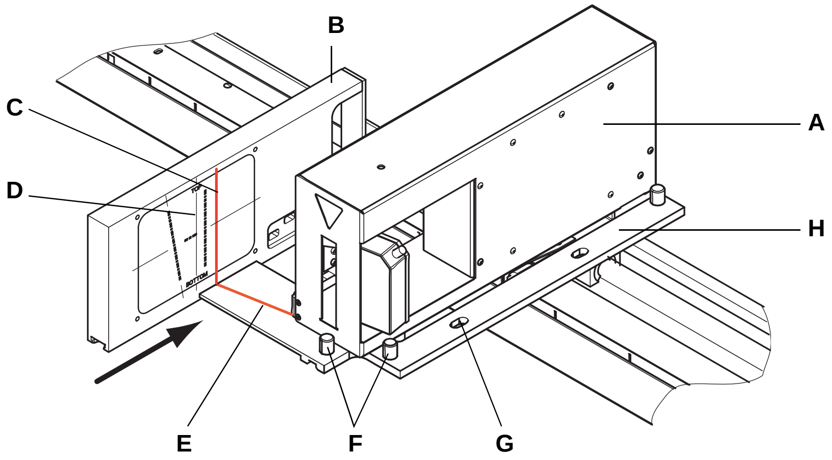


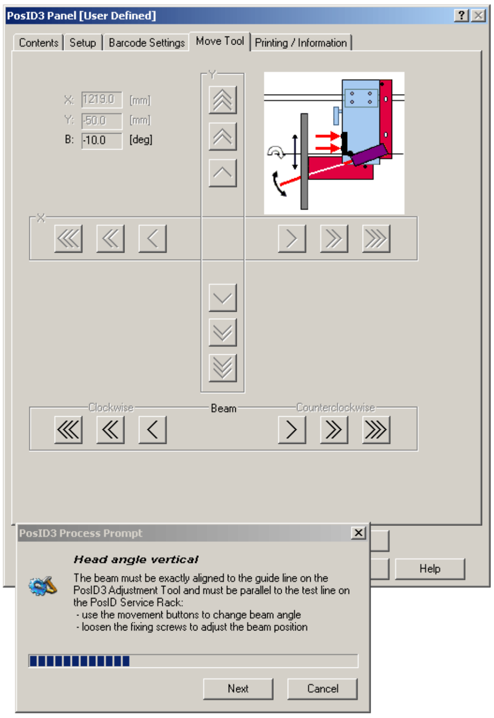
Fig. 8-64 PosID-3 with alignment tool and service rack

A	*PosID-3*
B	*Service rack*
C	*Vertical laser beam*
D	*Vertical reference line*
E	*Groove in reference tool*
F	*Positioning pins on adjustment tools*
G	*Slotted hole for positioning pin on worktable*

1 Place the adjustment tool on the worktable as shown below.
   - The slotted hole (G) in the right leg of the adjustment tool must be positioned on a worktable positioning pin.
   - The front and the right sides of the PosID must just touch the protruding pins (F) on the adjustment tool. You can move the PosID by hand.

2 Place the service rack on the worktable on the left side of the adjustment tool as shown in the figure.

3 Click **Next** on the prompt when done.



X: 1219.0 [mm]
Y: -50.0 [mm]
B: -10.0 [deg]

PosID3 Process Prompt

Head angle vertical

The beam must be exactly aligned to the guide line on the PosID3 Adjustment Tool and must be parallel to the test line on the PosID Service Rack:
- use the movement buttons to change beam angle
- loosen the fixing screws to adjust the beam position

Fig. 8-65 *Move tool with process prompt*

The **Move Tool** appears, along with the process prompt as shown in the following figure.

4 Use the movement buttons in the **Beam** frame of the **Move Tool** to align the laser beam exactly with the groove.

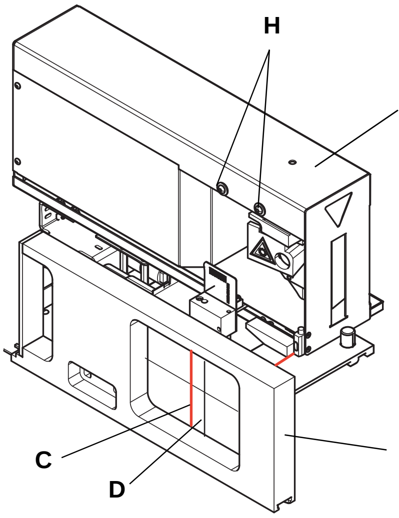


Fig. 8-66 *Vertical alignment*

5 If the laser beam (C) is not parallel to the guide line (D), or if it is not exactly aligned with the groove in the adjustment tool, adjust the mechanical position of the barcode scanner with the screws (H).

6 Carefully check the adjustment and repeat the previous steps as necessary.

10° Angle Alignment with Service Rack

It is also possible to carry out the 10° angle alignment with the service rack only, without using the adjustment tool. For this purpose you must lay the service rack on the worktable on the left side of the PosID-3 as shown in the following figure. In this position you can use the inclined line in the reference window for the alignment.

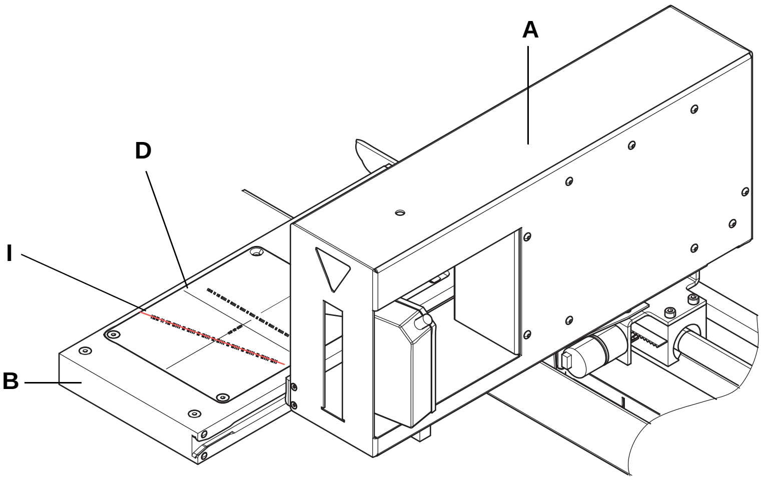


Fig. 8-67 10° angle alignment with service rack only

To align the laser beam with the inclined bar code (I):

1 Lay the service rack on the worktable as shown above.

2 Make sure the service rack is exactly parallel to the PosID-3 and that its Y-position is as shown in the following figure.

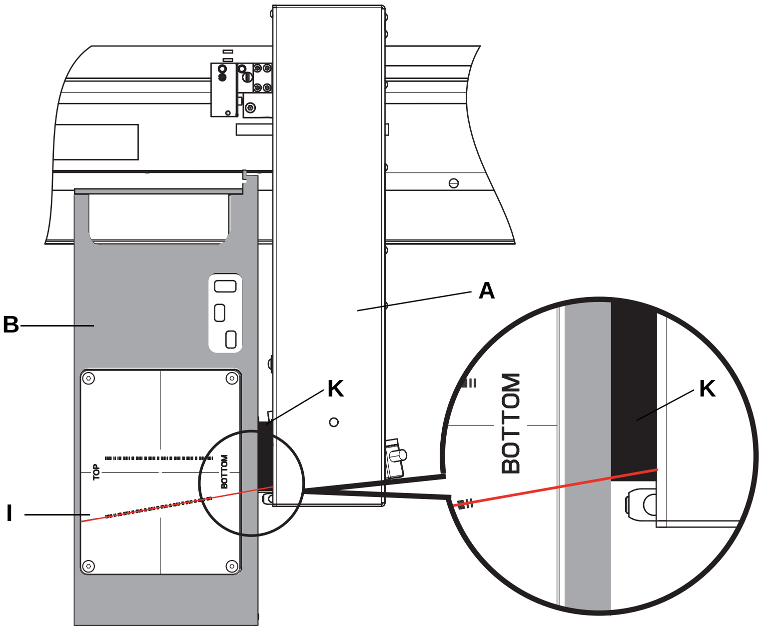
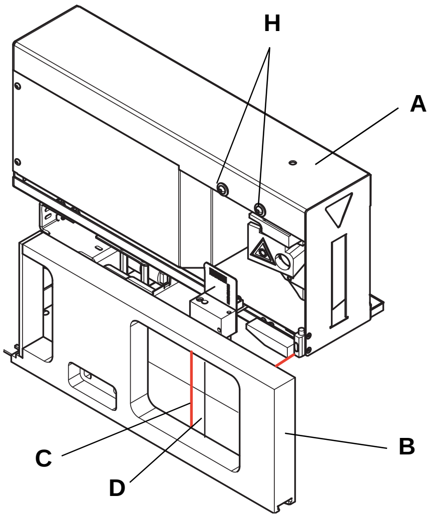


Fig. 8-68 Aligning the service rack with the PosID-3, top view

3 Use the **Move Tool** to align the laser beam exactly with reference line in the reference window. If the alignment is correct the laser beam should go through the lower left corner of the part (K) and must be exactly parallel to the inclined reference line in the reference window.

4 If the beam does not run through the left corner of the part (K) you must adjust the mechanical position of the barcode scanner with the screws (H).

5 Check if the laser beam is parallel with the vertical reference line (D). Slide the service rack in its normal, upright position on the worktable as shown in the following figure.



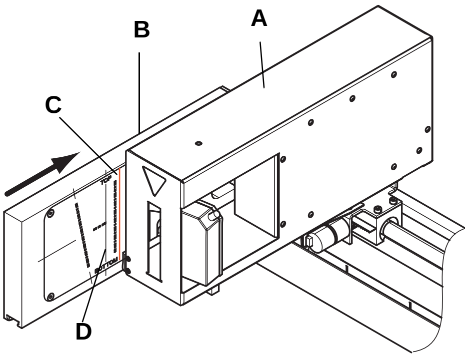
6 If the laser beam (C) is not parallel to the vertical guide line (D), adjust the mechanical position of the barcode scanner with the screws (H).

7 Carefully check the adjustment and repeat the previous steps as necessary.

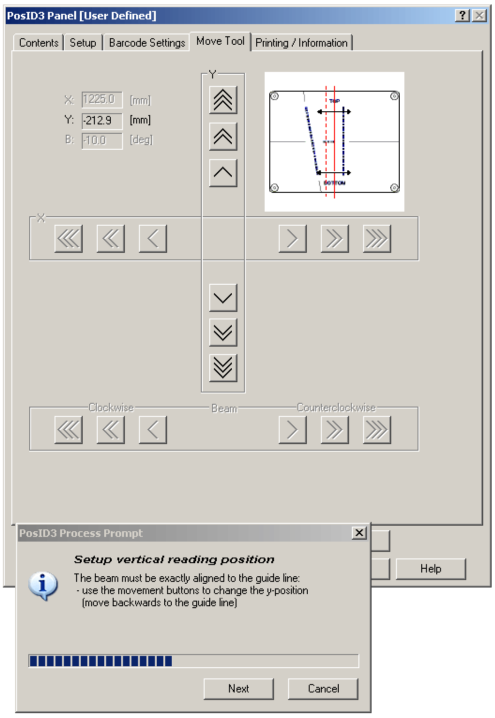
Fig. 8-69 *Vertical alignment*

Vertical Reading Position

After the beam has been aligned as described in the previous paragraphs, continue as described below.



A	*PosID-3*
B	*Service rack*
C	*Laser beam*
D	*Vertical reference line*



X: 1225.0 [mm]
Y: -212.9 [mm]
B: -10.0 [deg]

Setup vertical reading position

The beam must be exactly aligned to the guide line:
- use the movement buttons to change the y-position
(move backwards to the guide line)

Fig. 8-70 *Setting the vertical reading position*

You are prompted to do the following:

- To remove the adjustment tool from the worktable (click on **Next** when done)
- To place the service rack in the grid position indicated on the prompt (click on **Next** when done).

The PosID-3 now grips the service rack and the **Move Tool**, along with a process prompt appears (see previous figure).

1 Use the **Move Tool** to pull the service rack in the direction of the black arrow towards the rear until the vertical reference line (D) exactly covers the laser beam (C).

ATTENTION

Misadjustment possible if the service rack is pulled in the wrong direction.

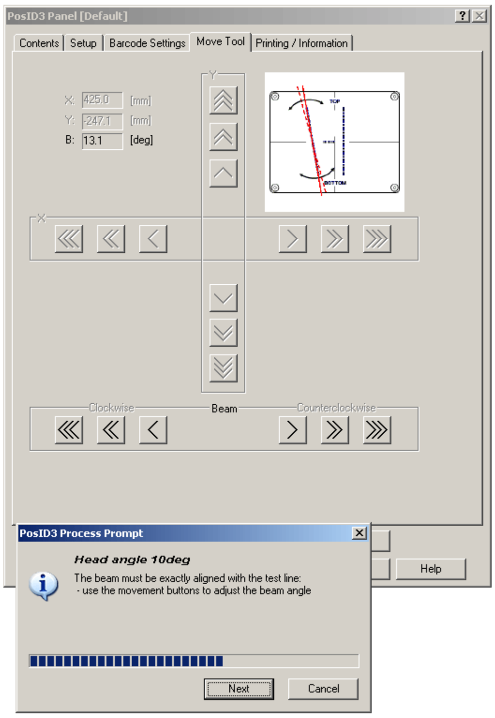
- Make sure you move the service rack towards the rear side as shown in the figure.
- Move it in 1 mm steps until the distance of the line is about 1mm, then move in 1/10 mm steps.

2 If you have moved the service rack too far, move it some millimeters towards the front until the guide line is again nearer to the instrument front than the laser beam; then repeat the procedure.

3 Click on **Next** on the prompt when done.

Beam Angle

Next, the service rack is moved further towards the rear side until the laser beam intersects with the inclined reference line. The **Move Tool**, along with a process prompt appears.



X: 425.0 [mm]
Y: -247.1 [mm]
B: 13.1 [deg]

Head angle 10deg

The beam must be exactly aligned with the test line:
- use the movement buttons to adjust the beam angle

Fig. 8-71 *Aligning the laser beam with the inclined reference line*

To adjust the beam angle:

1 Use the **Move Tool** to turn the barcode scanner until the laser beam is exactly aligned with the inclined reference line in the reference window. Also see following figure.

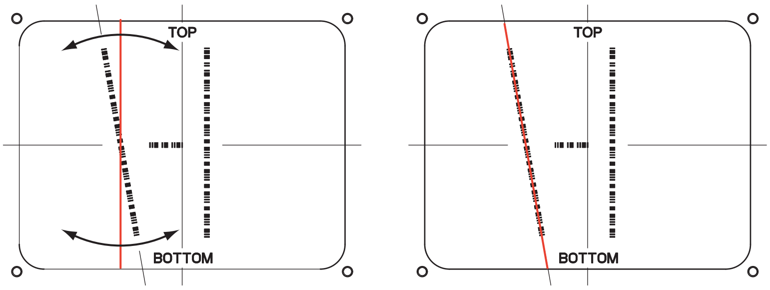


Fig. 8-72 *Aligning the laser beam with the inclined reference line*

2 Click on **Next** when done.

Horizontal Alignment of the Laser Beam

After the laser beam has been aligned with the incline reference line, the same must be done with the horizontal line. For this purpose, the barcode scanner is turned by 80° into a position that is approximately horizontal. At the same time, the **Move Tool** opens along with a corresponding process prompt.

To align the beam horizontally:

1. Use the **Move Tool** to turn the barcode scanner until the laser beam is exactly aligned with the inclined reference line in the reference window. Also see following figure.
2. Click on **Next** when done.

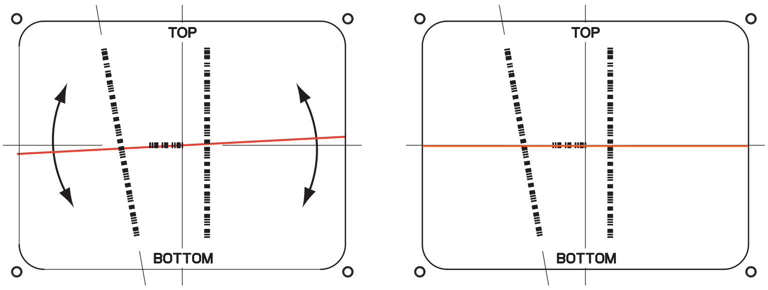


Fig. 8-73 Aligning the beam with the horizontal reference line

Reading Window

The next part of the procedure is performed automatically. The software now determines in which position within its reading range the barcode scanner recognizes the beginning of the horizontal reference barcode.

Please note (also see following figure):

- Physically, the horizontal barcode begins in the middle of the service rack's reference window, i.e. in the same position as the vertical reference line.
- If the optical axis of the barcode scanner were exactly at an angle of 90° with respect to the reference window (dashed line D), the barcode scanner (C) would "see" the beginning of the reference barcode in the center of its reading window (w_1).
- However, due to mechanical tolerances of the barcode scanner or its components, it is possible that the optical axis is not at an exact right angle to the reference window. In such a case, the real reading window (w_2) is displaced by an offset (y) to the vertical reference line in the reference window.
- The procedure determines the value of this offset and writes it to the EEPROM.

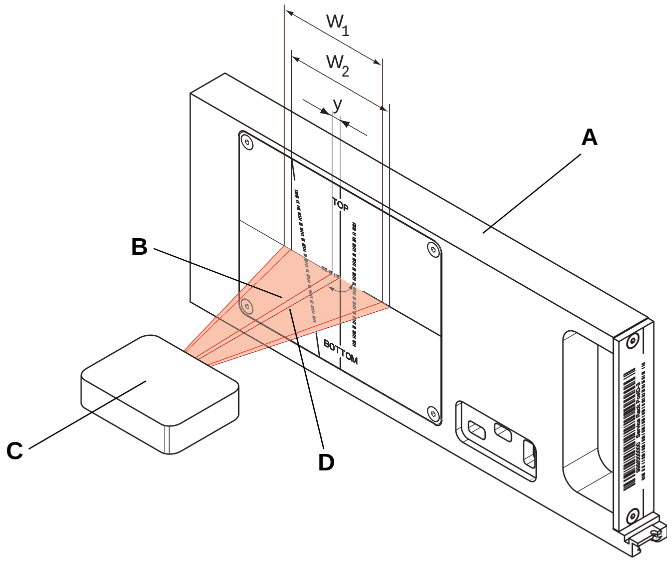


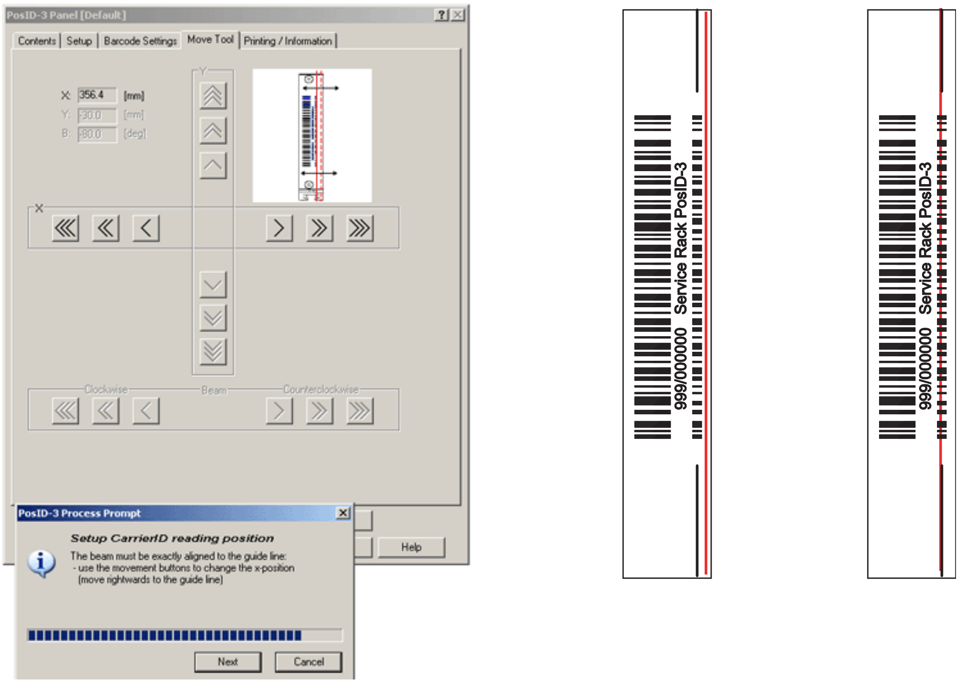
Fig. 8-74 Position in which the scanner recognizes the beginning of the barcode

A	*Service rack*	***y***	*Offset*
B	*Displaced optical axis*	***W_1***	*Ideal reading window*
C	*Barcode scanner*	***W_2***	*Displaced reading window*
D	*Ideal optical axis of scanner*		

Carrier ID Reading Position

For the last adjustment in this setup procedure, the PosID-3 pushes the service rack towards the instrument front into the “connect position” and detaches its gripper from the rack. Then the PosID-3 moves in the X-axis towards the left until it faces the service rack and turns the scanner into the “carrier position”. Again, the **Move Tool**, along with a process prompt, appears.

You are prompted to align the vertical laser beam exactly with the reference line on the label (see following figure).



PosID-3 Panel [Default]

Setup CarrierID reading position

The beam must be exactly aligned to the guide line:
- use the movement buttons to change the x-position
(move rightwards to the guide line)

X: 356.4 [mm]
Y: -30.0 [mm]
B: -80.0 [deg]

Fig. 8-75 *Aligning the laser beam*

To align the laser beam:

1 Ensure that the beam is on the left side (seen from the instrument front) before you start with the alignment. If necessary, use the **Move Tool** to move it first leftward.

2 Now shift the laser beam in the X-axis from left to right (seen from the instrument front) until it covers the vertical reference line.

3 Click **Next** when done.

This concludes this setup procedure.

8.5.17 Reading Positions Test

Purpose

In this test, the reading positions as set with the procedure **Set up reading positions** are tested.

Procedure

To test the reading positions:

1 On the **Contents** page, select the check box **Reading positions test**.

2 If necessary, change to the **Test Configuration** page and set the grid position in which you want to perform the test.

3 Click **Start** to begin.

4 If a process prompt appears, place the service rack in indicated grid position and click on **Next**.

The PosID-3 now grips the service rack and checks all reading positions. At the end of the test, a prompt appears notifying you whether or not the test was successful.

Pass / Fail Criteria

The test is passed when all reading positions have been read correctly.

If the Test Fails

Try the following (contact the customer service department if necessary):

- Check if the service rack is gripped correctly.
- Repeat the procedure **Set up reading positions** or have it repeated by an authorized specialist.

8.5.18 “No Tube” Sensor Test

Purpose

This procedure checks the correct function of the “No Tube” sensor.

Principle

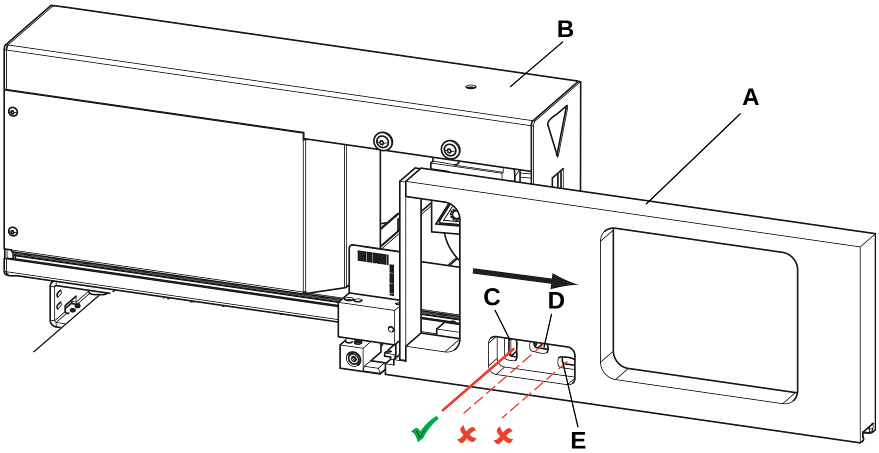


Fig. 8-76 *“No Tube” sensor test*

At the beginning of the test, the PosID-3 (B) grips the service rack (A) and pulls it towards the rear of the instrument until the three slots (C), (D) and (E) are behind the “No Tube” sensor (not visible in above figure). Then, the service rack is pushed towards the front. During this forward movement, the system checks if the light beam, emitted by the “No Tube” sensor test, passes through the three slots (C), (D), and (E). The test is successful if light passes only through slot (C), but not through (D) and (E).

Procedure

1. On the **Contents** page, select the check box **No Tube Sensor test**.
2. If necessary, change to the **Test Configuration** page and set the grid position in which you want to perform the test.
3. Click **Start** to begin.
4. If a process prompt appears, place the service rack in indicated grid position and click on **Next**.

   The PosID-3 now grips the service rack moves it as described above. At the end of the test, a prompt appears notifying you whether or not the test was successful.

Pass / Fail Criteria

The test is passed when the following conditions are fulfilled:

- Light must pass through slot (C).
- No light must pass through the slots (D) and (E).

If the Test Fails

Try the following (contact the customer service department if necessary)

- Repeat the procedure **Autodetection of No Tube Sensor position** and this test.
- Check the connection of the “No Tube” sensor”.
- Replace the “No Tube” sensor.
- Replace the whole PosID-3.

8.5.19 Barcode Reading Test

Cross References

References to information provided in other sections.

Information	Reference
Loading test configuration data	See section 6.7, 🗎 6-17

Purpose

This test checks if the PosID-3 properly can scan and decode the barcodes, applied to the various objects on the worktable, for a given number of test cycles.

Test Principle

The PosID-3 scans and decodes the information provided by the barcode labels carriers, racks, microplates and tubes as follows:

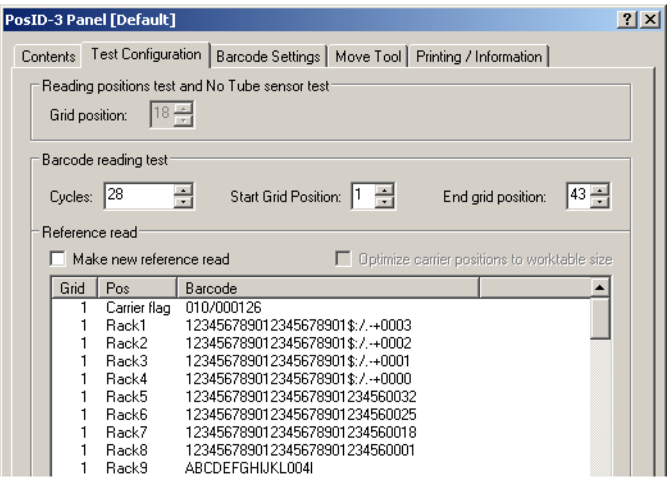
- It checks the barcodes of all objects that are placed between two predefined left and right grid positions.
- To read labels at the rear of objects the PosID-3 moves along the X-axis.
- To read labels on the right side of objects the carriers on which they are placed, it moves them in the Y-axis along its left side.
- The results are compared against those obtained in a reference reading cycle.
- The test is repeated for a predefined number of test cycles.

Procedure

To perform the barcode reading test:

1 Place the objects you want to check on the worktable. Make sure that they are labeled properly and that no barcode labels are damaged.

2 On the **Contents** page, select the **Barcode reading test** check box and change to the **Test Configuration** page.



Reading positions test and No Tube sensor test

Grid position: 18

Barcode reading test

Cycles: 28 Start Grid Position: 1 End grid position: 43

Reference read

☐ Make new reference read ☐ Optimize carrier positions to worktable size

Grid	Pos	Barcode
1	Carrier flag	010/000126
1	Rack1	123456789012345678901$:/.-+0003
1	Rack2	123456789012345678901$:/.-+0002
1	Rack3	123456789012345678901$:/.-+0001
1	Rack4	123456789012345678901$:/.-+0000
1	Rack5	123456789012345678901234560032
1	Rack6	123456789012345678901234560025
1	Rack7	123456789012345678901234560018
1	Rack8	123456789012345678901234560001
1	Rack9	ABCDEFGHIJKL004I

Fig. 8-77 Test Configuration page

3 Set the following parameters in the frame **Barcode Reading Test** or accept the suggested values:

- **Cycles:** Number of cycles the test is performed.
- **Start/End Grid Position:** These values define the area in which the objects to be tested are placed.
- **Make new reference read:** Select this check box if you want to use the codes on your labels as a reference for future tests. If you select this check box an extra reading cycle will be performed.
- **Optimize carrier positions to selected grid range:** This check box is only available if the Start and End Grid Positions cover the whole worktable
  - 100 cm instrument: **Start Grid Position** = 1, **End Grid Position** = 28
  - 150 cm instrument: **Start Grid Position** = 1, **End Grid Position** = 43
  - 200 cm instrument: **Start Grid Position** = 1, **End Grid Position** = 67

  If you select this check box, the system automatically calculates the optimum grid positions for the carriers to be placed within the selected grid range, taking into consideration possible worktable cutouts. In ths case you must place the carriers according to the list shown on the **Test Configuration** page.

Note:

- *You can save your reference data after the test with **Save As** in a *.any file. Choose an appropriate directory and give the file a meaningful name.*
- *Previously defined reference barcodes (together with the other settings) can be reloaded with **System > Test Configuration**.*

4 Check the barcode settings and change them if necessary.

5 Click **Start** to begin.

The test cycles are performed. At the end of the test you are notified whether or not the test was successful.

6 Click **OK** to finish.

Pass / Fail Criteria

The test is passed if a valid barcode was read where applicable, i.e. if the barcodes determined correspond to the reference reading according to the **Test Configuration** page.

If the Test Fails:

Try the following:

- Check if the barcode settings are correct.
- Check whether any barcode labels are missing, damaged or otherwise unreadable and whether they are applied correctly to tubes, racks, or carriers.
- Replace any suspect barcode labels.
- Repeat the **Barcode Reading** test when finished.
- Call your nearest service representative if necessary.

8.5.20 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

8.6 Liquid Handling Arm for Freedom EVO

Purpose of This Section

This section describes the setup, test, alignment and verification procedures necessary for a Liquid Handling Arm (LiHa) installed on a Freedom EVO.

8.6.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Tip types	See section 8.6.2, 🗎 8-77
Te-PS positioning system	See section 8.6.3, 🗎 8-78

Liquid Handling Arm (LiHa) for Freedom EVO

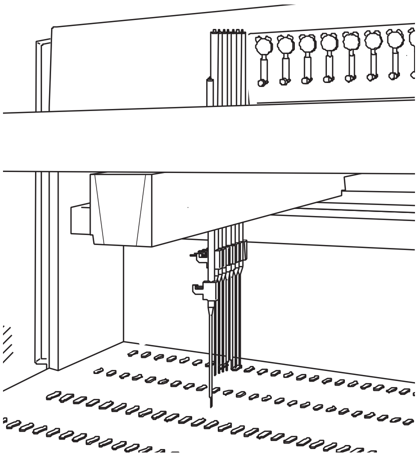


Fig. 8-78 *Liquid Handling arm (LiHa)*

Freedom EVO instruments may be equipped with one or two LiHa with two, four or eight tips. The new, improved design makes the arm suitable for the following:

- traditional reagent tubes
- 96-well microplates
- 384-well microplates
- 1536-well microplates

Freedom EVO 75 instruments may be equipped with one LiHa with one or two tips or an 8 Plus 1 Access tip array. The Freedom EVO 75 LiHa is suitable for:

- traditional reagent tubes
- 96-well microplates
- 384-well microplates

Note: *The use of 1536-well microplates is possible thanks to the new Te-PS positioning system described later in this section.*

Movement Axes

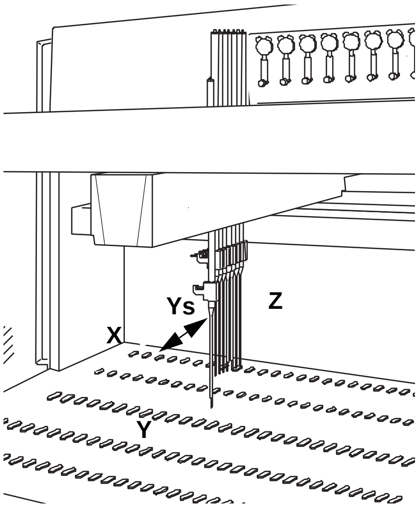


Fig. 8-79 *LiHa movement axes*

The LiHa's movements are coordinated with other system devices such as RoMa and PnP. There are four different movement axes:

X	*Arm movement left - right*
Y	*Arm movement forward - backward*
Ys	*Horizontal tip spacing*
Z	*Tip movement up - down*

Tip Types

The LiHa can be equipped with a variety of tip types. Mixed tip configurations are possible (→ Cross References).

Positioning System (Te-PS)

The Te-PS is an option that allows the use of 1536-well microplates. For a detailed description (→ Cross References).

Required Tools

The tools required for performing the adjustments and tests described in this section depend on the installed tips:

- **Reference tip:** The reference tip is necessary for setting up the Te-PS Carrier, for checking the Z-range and the reference positions in the X- and Y-axis.
- **Te-PS Sensor plate:** This sensor plate, which is part of the Te-PS, is used for the mechanical alignment and test of the Te-PS carrier and the various tip types. Details (→ Cross References).
- **Allen Key for Tip Nuts:** In order to align adjustable tips (e.g., Te-PS tips) you need a small hex key (size 0.71 mm).
- **Allen Key for Te-PS Carrier:** A 4-mm Allen key is needed for the mechanical adjustment of the Te-PS Carrier.

Note: *You can use the PosID service rack or a wash station, for example.*

Safety Precautions

Please pay attention to the following points.

WARNING

During certain setup and test procedures the LiHa will move in the X-axis at considerable speed.

- Keep off the moving range during such procedures.

WARNING

Be careful during setup and test procedures in which the tips are moved downwards.

- Keep your hands off the area in which they move.

ATTENTION

During some of the following setup and test procedures the LiHa will move to different positions on the worktable.

- Make sure there are no objects installed that could be in the way during the execution of these procedures.
- Also ensure that the instrument was setup with **Instrument > Basic Setup**.

8.6.2 Tip Types

Tip Types

The following tip types are supported by the Setup and Service software:

Tab. 8-17 *Available Tips*

Tip Name	L_{diff} [mm] a)	Explanations
Reference tip	0	The reference tip is used in alignment procedures and is not suitable for pipetting.
Standard tip	39.0	The Setup and Service software treats the following types as Standard Tips: Standard Tip, 384 Standard, 384 LowVol, Standard LowVol, Ceramic and 384 inner coated tip
Te-PS tips	-27.0	This new tip type is suitable for 1536-well microplates.
DiTi adapter	-50.0	Serve to hold DiTis (disposable tips)
DiTi adapter for LiHa 8 Plus 1 Access	-43.6	Serve to hold DiTis (disposable tips) on the LiHa 8 Plus 1 Access of the Freedom EVO 75 - sensing of DiTis not possible - liquid detection not possible
User Defined Tips	None of the above	These are tips whose length corresponds with none of the above. Such tips appear as “User-Defined” on the Channel page.

a) L_{diff} = Length difference in [mm] relative to reference tip (also see below)

Length Differences

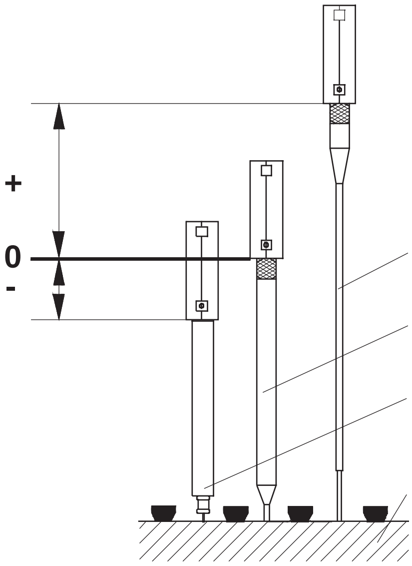


Fig. 8-80 Differences in length from reference tip

A *Standard tip*
B *Reference tip*
C *DiTi adapter*

The figure on the left shows the differences in length of some tip types with respect to the reference tip.

- If a tip is longer than the reference tip, the difference value must always be positive (e.g., 39.0 mm).
- If it is shorter than the reference tip, the difference value must always be negative (e.g., -50.0 mm).

Mixed Tip Configurations

In principle, the LiHa can be equipped with various combinations of tip types. However, it is advisable to group tips of the same type together. Tips of the same type can be selected together for a test. If tip types differ, the test may have to be run once per tip type, testing all the tips of one type each time.

Note: *It is possible that some tip combinations are not supported by the application software.*

8.6.3 Positioning System (Te-PS)

Cross References

List of cross references to information provided in other sections:

Information	References
Document number of Freedom EVO Service Manual	See section 1.2, 🗎 1-3

The use of 1536-well microplates requires a much higher precision of the plate position alignment and the tip alignment than is needed for 96 or 384-well microplates. This precision is achieved with the Te-PS (Positioning System) that consists of the components described below:

Te-PS Carrier

During normal operation, this carrier can hold up to three (1536-well) microplates. Each of these microplates is held in position by a clamp (A) and four positioning pins (B). The Te-PS Carrier is also used together with the Te-PS sensor plate for tip alignment and test procedures.

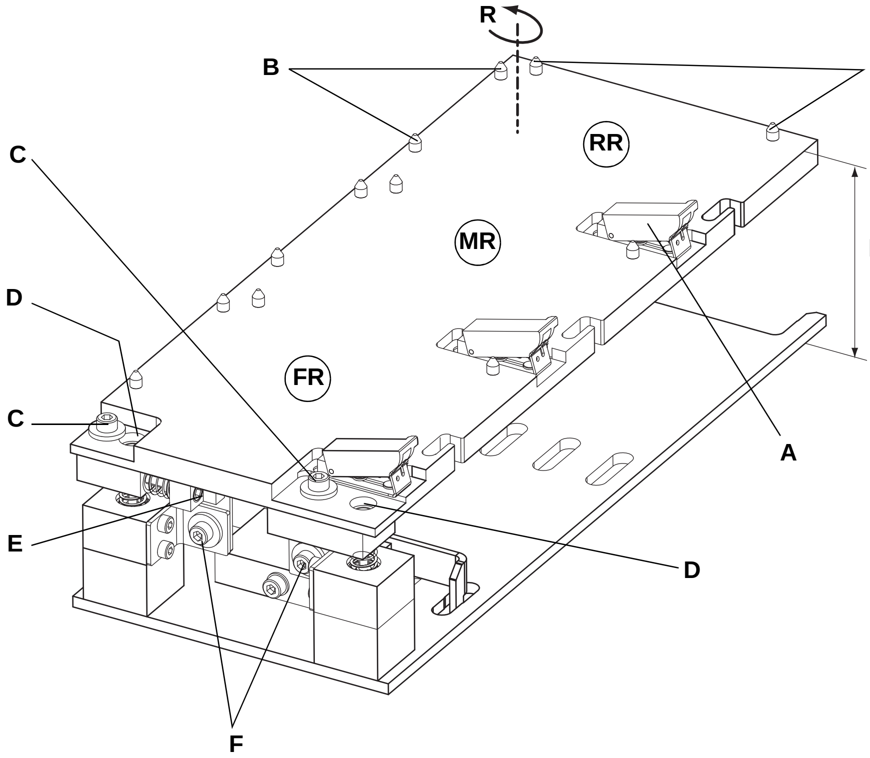


Fig. 8-81 Te-PS carrier

A	*Clamp for fixing plate*	***h***	*Nominal height (84 mm)*
B	*Positioning pins*	***R***	*Rotation axis of carrier plate*
C	*Fixing screws (angle alignment)*	***FR***	*Front rack position*
D	*Adjusting screws (Z-plane)*	***MR***	*Middle rack position*
E	*Adjusting screw (angle alignment)*	***RR***	*Rear rack position*
F	*Fixing screw (Z-plane)*		

Before the Te-PS carrier can be used it must be aligned mechanically: This is done with the aid of the Te-PS sensor plate (see below).

- It must be parallel to the Y-axis of the LiHa. For this adjustment, the surface can be rotated round the R-axis (so-called angle alignment).
- In addition, its surface must be parallel to the worktable surface. This is done in the Z-plane alignment procedure.

Te-PS Sensor Plate

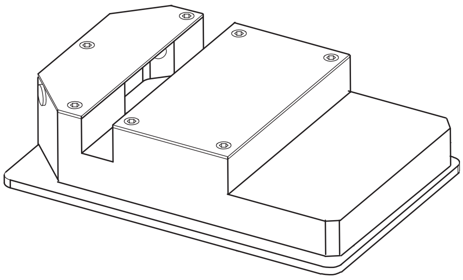


Fig. 8-82 Te-PS sensor plate

The Te-PS sensor plate is a tool needed for aligning the following:

- The Te-PS carrier before it can be used
- Te-PS tips (for 1536 well microplates), ActiveTips and 384-well tips.

Inside the Te-PS sensor plate there are two laser diodes L_1 and L_2 whose beams cross the measuring slot and two receivers on the opposite side.

During alignment and test procedures the sensor plate is put in the rear and, where necessary, the front rack position of the Te-PS carrier. The tips move through the slot to detect the points P_1, P_2 or P_3 as necessary. This enables the software to calculate the deviations from the X, Y and Z values.

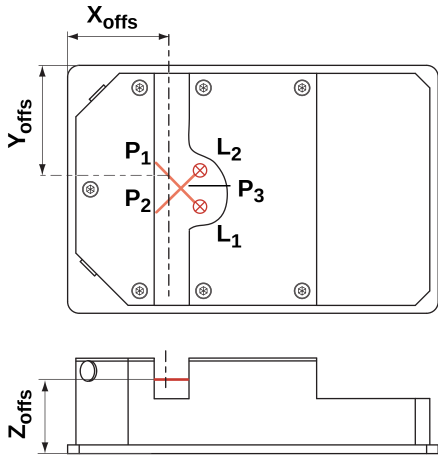


Fig. 8-83 Measuring points

The Te-PS sensor plate must be properly connected via its connection cable to the J6 or J7 connector on the Optibo DCU board. This board is located behind the left access door of the instrument.

ATTENTION

Always switch the instrument off before connecting the Te-PS sensor plate to the Optibo DCU board.

- Electronic parts may be damaged otherwise.

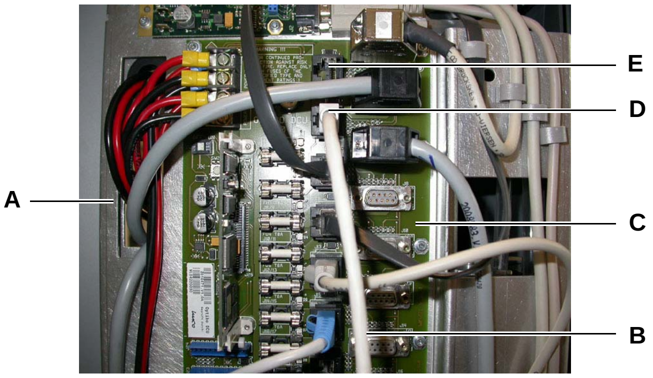


Fig. 8-84 Connection of Te-PS sensor plate to Optibo board

A	*Left service door*	***C***	*Optibo board*
B	*Connection cable of Te-PS sensor plate*	***D***	*RJ45 connector plugged in J7*
		E	*Socket J6*

For additional information about the connection of the Te-PS sensor plate see Freedom EVO Service Manual.

8.6.4 LiHa Panel

Cross References

List of cross references to information provided in other sections:

Information	References
Firmware compatibility list	See section 4.5, 🗎 4-21
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

***Tab. 8-18** LiHa Functions and User Permissions*

Function	Type	User	FSE
Reset Setup	Setup		X
Set Default Parameters	Setup		X
Determine Range	Setup		X
Calibrate Lower DiTi Eject	Setup		X
Determine Reference Positions (Scaling and Offset)	Setup		X
Te-PS Carrier Angle Alignment	Setup	X	X
Te-PS Carrier Z-Plane Alignment	Setup	X	X
Arm Position Accuracy a)	Test		
Te-PS Compliance Test	Test		X
Te-PS Carrier Alignment Test	Test	X	X
Tip Adapter	Test	X	X
Reed Crosstalk	Test		
Tip Alignment	Alignment	X	X
Individual-Z with Te-PS Sensor Plate	Alignment	X	X
Individual-Z	Alignment	X	X
Tip Verify	Verify	X	X
Individual-Z Verify	Verify	X	X

__Tab. 8-18__ LiHa Functions and User Permissions

Function	Type	User	FSE
Reference Positions Verify	Verify	X	X
Move LiHa	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

a) Special test, for production department only

LiHa Files

The LiHa function can create the following files:

- **Result Files:** Test results are stored in *.any files.

Directory: <data_path>\Results

File name: LiHa_<serial_number>_<date>_<time>.any

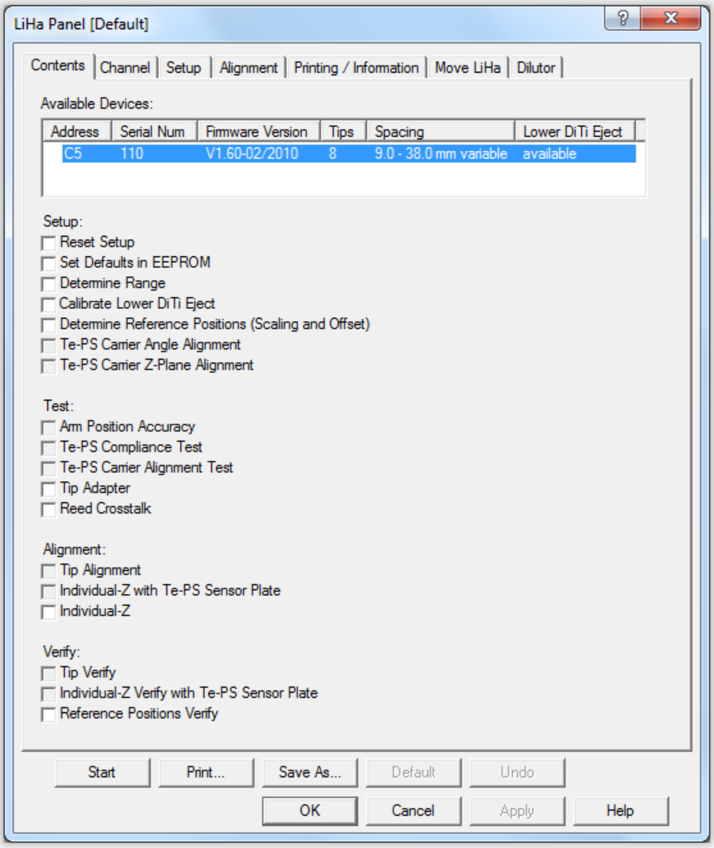
Starting the LiHa Panel

To set up and test the LiHa proceed as described below.

ATTENTION

Make sure that the correct firmware version is loaded. For details refer to the “Firmware compatibility list” (→ Cross References).

1 Start the panel with **System Devices > LiHa**.
*The LiHa panel with activated **Contents** page appears. After starting the LiHa panel no startup or test check box is selected and not all tabs are visible.*



Available Devices:

Address	Serial Num	Firmware Version	Tips	Spacing	Lower DiTi Eject
C5	110	V1.60-02/2010	8	9.0 - 38.0 mm variable	available

Setup:
☐ Reset Setup
☐ Set Defaults in EEPROM
☐ Determine Range
☐ Calibrate Lower DiTi Eject
☐ Determine Reference Positions (Scaling and Offset)
☐ Te-PS Carrier Angle Alignment
☐ Te-PS Carrier Z-Plane Alignment

Test:
☐ Arm Position Accuracy
☐ Te-PS Compliance Test
☐ Te-PS Carrier Alignment Test
☐ Tip Adapter
☐ Reed Crosstalk

Alignment:
☐ Tip Alignment
☐ Individual-Z with Te-PS Sensor Plate
☐ Individual-Z

Verify:
☐ Tip Verify
☐ Individual-Z Verify with Te-PS Sensor Plate
☐ Reference Positions Verify

Fig. 8-85 *LiHa panel - contents page*

Pages The LiHa panel is subdivided into the following pages:

Tab. 8-19 *Pages of the LiHa Panel*

Page	Description
Contents	General overview, procedure/test selection.
Channel	Setup/check of tips (length/types) and syringe sizes.
Alignment	Alignment/test of Te-PS Carrier, alignment/verification of tips, Te-PS Compliance Test
Setup	Definition of tips (and other parameters) for the tests.
Test Configuration	For **Tip Adapter** test, **Reed Crosstalk** test and **Arm Position Accuracy** test (**Arm Accuracy** test is for Production only).
Printing / Information	Print selection for the QC-report.
Move LiHa	Movement tool.
Diluter	Tool that lets you check diluters and tubings.

8.6.5 Channel Page

Cross References

List of cross references to information provided in other sections:

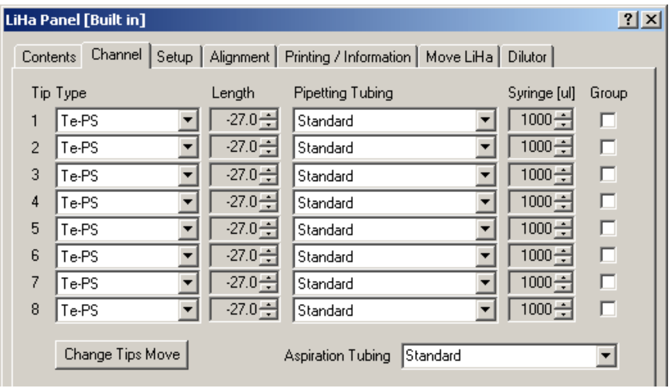
Information	References
Determine Reference Positions	See section 8.6.14, 🗎 8-99

8.6.5.1 Introduction

Purpose

The Channel page lets you check and define the following:

- Tip type.
- Lengths of user-defined tips (requires field service engineer password)
- Type of pipetting and aspiration tubing
- Syringe size (requires field service engineer password)
- Low volume option



Tip	Type	Length	Pipetting Tubing	Syringe [ul]	Group
1	Te-PS	-27.0	Standard	1000	☐
2	Te-PS	-27.0	Standard	1000	☐
3	Te-PS	-27.0	Standard	1000	☐
4	Te-PS	-27.0	Standard	1000	☐
5	Te-PS	-27.0	Standard	1000	☐
6	Te-PS	-27.0	Standard	1000	☐
7	Te-PS	-27.0	Standard	1000	☐
8	Te-PS	-27.0	Standard	1000	☐

Aspiration Tubing: Standard

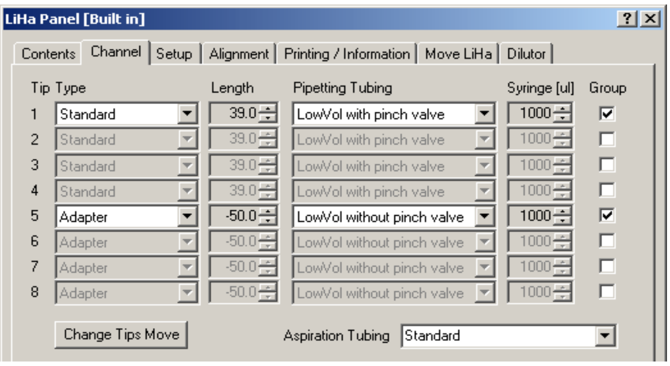
Fig. 8-86 LiHa - Channel page configured for Te-PS tips

Controls

The **Channel** page contains the following controls:

Tip	Tip number. Tip number 1 is the rearmost tip.
Type	List from which the type of the installed tip can be selected. • Adapter (for DiTis) • Standard (fixed tips) • Te-PS • Reference (for reference tips)
Length	Length difference in mm of the tip relative to the reference tip. A positive value indicates that the tip is longer than the reference tip, a negative value that it is shorter.
Pipetting tubing	List from which the pipetting tubing type can be selected: • Standard • Standard with Te-Fill • Low volume with pinch valve • Low volume without pinch valve
Syringe	Syringe volume in µl (micro liter).

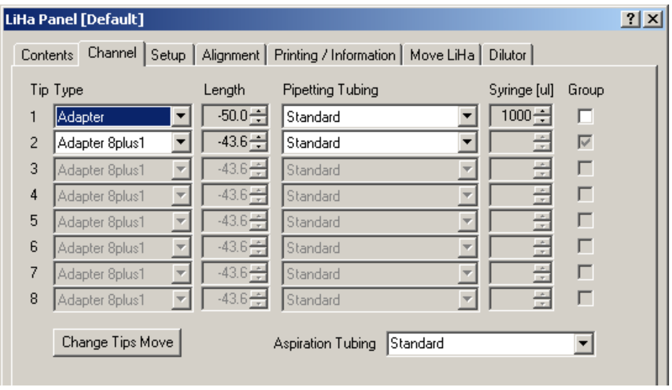
Aspiration Tubing	List from which the aspiration tubing type can be selected: • Standard • Chemical resistant type a or b • DMSO resistant
Group	Check boxes to set identical parameters for multiple channels. In the example in Fig. 8-87, 🗎 8-85, channels 1 to 4 are equipped with standard tips; channels 5 to 8 with DiTi adapters. You can set the parameters for channels 1 and 5, and select their **Group** boxes. The parameters of the channels below them (provided their **Group** boxes are not selected) are set equal to those of channels 1 and 5, respectively. In the example in Fig. 8-88, 🗎 8-85, channels 2 to 8 of a LiHa 8 Plus 1 Access are automatically grouped and cannot be set individually.
Change Tips Move	If you click on this button the LiHa is moved over the left reference position (as defined with **Define Reference Positions** → Cross References), and spreads the tips so that they can be installed or removed easily. In addition, the power supply of the X- and Y-axes is switched off and the z-move buttons on the Move Page are enabled so that the LiHa or parts of it can be moved by hand to another position. At the end, the Z-axes will be initialized and the Channel Settings will be stored to the instrument.


LiHa Panel [Built in]

Tip	Type	Length	Pipetting Tubing	Syringe [ul]	Group
1	Standard	39.0	LowVol with pinch valve	1000	☑
2	Standard	39.0	LowVol with pinch valve	1000	☐
3	Standard	39.0	LowVol with pinch valve	1000	☐
4	Standard	39.0	LowVol with pinch valve	1000	☐
5	Adapter	-50.0	LowVol without pinch valve	1000	☑
6	Adapter	-50.0	LowVol without pinch valve	1000	☐
7	Adapter	-50.0	LowVol without pinch valve	1000	☐
8	Adapter	-50.0	LowVol without pinch valve	1000	☐

Aspiration Tubing: Standard

Fig. 8-87 *Channel page - Example of group selection*


LiHa Panel [Default]

Tip	Type	Length	Pipetting Tubing	Syringe [ul]	Group
1	Adapter	-50.0	Standard	1000	☐
2	Adapter 8plus1	-43.6	Standard		☑
3	Adapter 8plus1	-43.6	Standard		☐
4	Adapter 8plus1	-43.6	Standard		☐
5	Adapter 8plus1	-43.6	Standard		☐
6	Adapter 8plus1	-43.6	Standard		☐
7	Adapter 8plus1	-43.6	Standard		☐
8	Adapter 8plus1	-43.6	Standard		☐

Aspiration Tubing: Standard

Fig. 8-88 *Channel page - Example of* 8 Plus 1 Access *LiHa on Freedom EVO 75*

8.6.5.2 Setting Up the Tips

Setting the Tip Configuration

To configure the tips that are physically installed:

1. Start the LiHa panel with **System Devices > LiHa** and change to the **Channel** page.
2. Configure the channels according to the installed tips. Start with Channel # 1 and set the following tip parameters. For more details refer to the explanations and figures in section 8.6.5.1 “Introduction”, 🗎 8-84.
   - **Type**: Select the installed tip type.
   - **Length**: Use the corresponding **Length** spin box to set the difference in length with respect to the standard tip.
   - **Pipetting tubing**: Select the type of the pipetting tubing (**Standard**, **Standard with Te-Fill**, **LowVol with pinch valve**, **LowVol without pinch**). Make sure you select the correct type.
   - **Syringe volume**: Use the corresponding **Syringe** spin box to define the correct syringe volume.
   - **Group**: Select this check box if the parameters of one or or more of the following tips are identical with those of the current tip. Clear it otherwise.
3. Repeat step 2 if there are more channels or channel groups to configure.

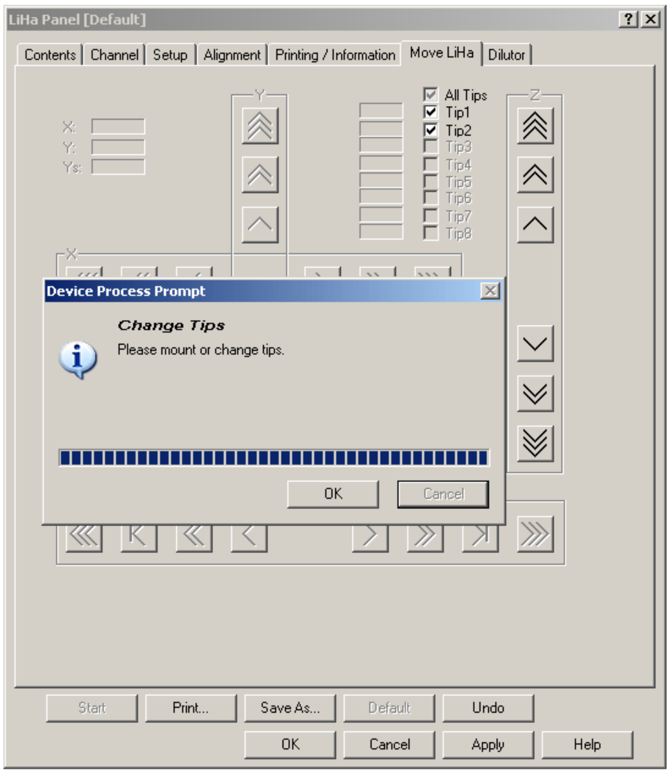
Aspiration Tubing

4. After you have configured the individual channels, use the list **Aspiration tubing** to select the aspiration tubing type.
5. Click **Apply** to write your entries to the LiHa.

8.6.5.3 Mounting or Changing Tips

Mounting or Changing Tips

If you want to change the tips without performing a setup or test procedure you can click on the **Change Tips Move** button on the channel page. As has been explained before, the LiHa then moves over the left reference position, spreads the tips and switches off the power supply of the X- and Y-axes. The following prompt appears:



Change Tips

Please mount or change tips.

Fig. 8-89 *Change Tips prompt*

To change the tips:

1 If necessary, move the LiHa by hand to a position that is more convenient for you, spread the tips and, if necessary, move the Z-axis using the Move Page.

2 Change, replace or mount the required tips as necessary.

3 Click again on **OK** when finished.

The Z-axis of the LiHa will be reinitialized.

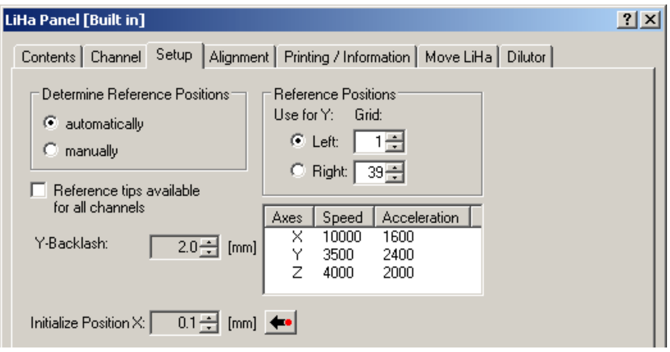
4 Channel settings will be stored to the instrument.

Note: *The above prompt appears only if you want to change or mount tips* ***outside a setup or test procedure****. If it is necessary to mount, remove or change tips within a setup of test procedure, an appropriate (and more specific) prompt will appear automatically.*

8.6.6 Setup Page

Purpose

The **Setup** page provides the controls for setting the parameters for the various setup procedures.



Determine Reference Positions
● automatically
○ manually

Reference Positions
Use for Y: Grid:
● Left: 1
○ Right: 39

☐ Reference tips available for all channels

Y-Backlash: 2.0 [mm]

Axes	Speed	Acceleration
X	10000	1600
Y	3500	2400
Z	4000	2000

Initialize Position X: 0.1 [mm]

Fig. 8-90 LiHa - Setup page

Controls

The **Setup** page contains the following controls:

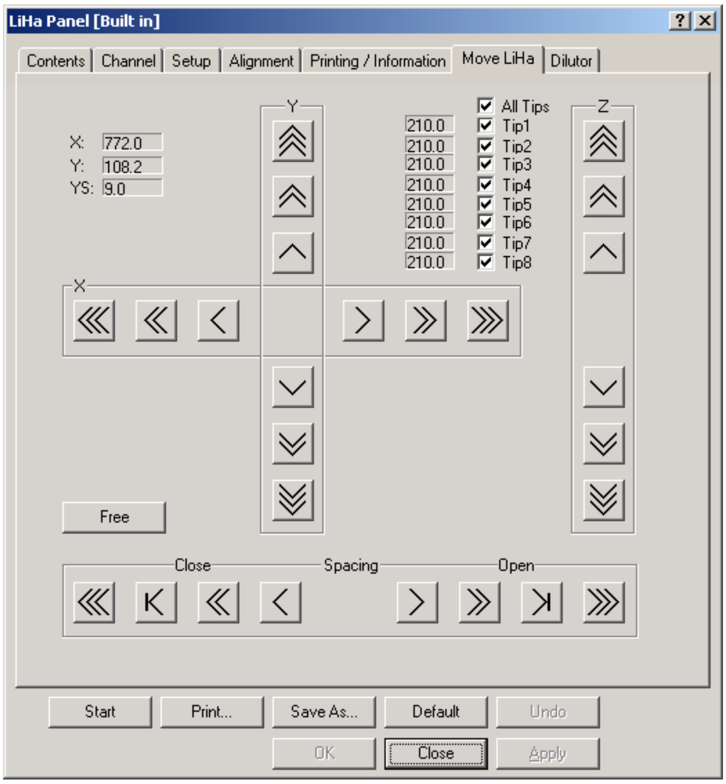
Determine Reference Positions	Frame with the controls for specifying the conditions for determining the reference positions
- **automatically**	Option button for automatic determination
- **manually**	Option button for manual determination
Reference Positions	Frame for setting the reference positions
- **Grid**	Spin boxes for setting left/right reference grid positions
- **Use for Y**	Option buttons to specify if reference positions in Y-axis are determined at left or right reference position
Reference tips available for all channels	Check box to be selected if a reference tip is available for each tip adapter.
Y- Backlash	The value is set to 2.0 mm by default and should be altered in special cases only.
Initialize Position X	This spinbox must be used if the **Initialize to front feature** has been enabled on the **Basic Setup > Worktable** page. It defines the position (relative to grid position # 1) in which the arm is to be initialized. The position must be chosen so that no collisions of the arm during initialization are possible. Example: If the required grid position is 18, then the spin box must be set to (18 - 1) x 25 mm = 425 mm (Note that the X-distance between two neighboring grid positions is 25 mm).
⬅●	Allows setting the current arm position as the initialization position

Table below Reference Positions frame	Shows current speed and acceleration in X, Y and Z axes.

8.6.7 Move LiHa

Purpose

The **Move LiHa** page lets you move the whole LiHa or parts of it in the appropriate axes: X, Y, YS, Z1 to Z8.



X: 772.0
Y: 108.2
YS: 9.0

210.0	☑ Tip1
210.0	☑ Tip2
210.0	☑ Tip3
210.0	☑ Tip4
210.0	☑ Tip5
210.0	☑ Tip6
210.0	☑ Tip7
210.0	☑ Tip8

☑ All Tips

Fig. 8-91 Move LiHa page

Controls

The **Move LiHa** page contains the following controls:

All Tips/Tip1 ... Tip8	Check boxes to select the tips to be moved in Z-direction.
‹ › ∧ ∨	Single step (1/10 mm) movement buttons.
« » ︽ ︾	Ten steps (1 mm) movement buttons.
⋘ ⋙ ⩓ ⩔	Continuous movement buttons (if button is kept pressed).
|‹ ›|	Buttons to increase/decrease spacing to the following logical positions (9/18/27/36 mm).
Free	Moves all other arm devices (e.g., RoMa and PnP) to their extreme positions.
X, Y, YS	Text boxes indicating the X/Y position of the frontmost tip (with respect to reference position # 1) and the spacing.
Text boxes left of **Tips** check boxes	Show the Z-position of each individual tip (distance from worktable).

Note:

- *The arrows on the movement buttons indicate the direction in which the respective parts will be moved.*
- *If you place the mouse pointer over a movement button, a text appears that explains what you can do with the button (so-called “tool tip”)*
- *Continuous spacing may change the Y-position of tip1 slightly.*

Keyboard Control

It is also possible to use the keyboard for the movements in the various axes. You can use the corresponding keys of the numeric keypad or the keys in the key blocks left of the numeric keypad.

Tab. 8-20 *Moving LiHa with the Keyboard*

Key (left of numeric keypad)	Key in numeric pad	Movement axes LiHa
→	6 →	X+ (right)
←	4 ←	X- (left)
↓	2 ↓	Y+ (front)
↑	8 ↑	Y- (rear)
Page Up	PgUp 9	Z+ (up)
Page Down	PgDn 3	Z- (down)
Delete	**.** Delete	YS+ (increase) [a]
Insert	0 Insert	YS- (decrease) [a]

a) Increase/decrease spacing between tips

Steps

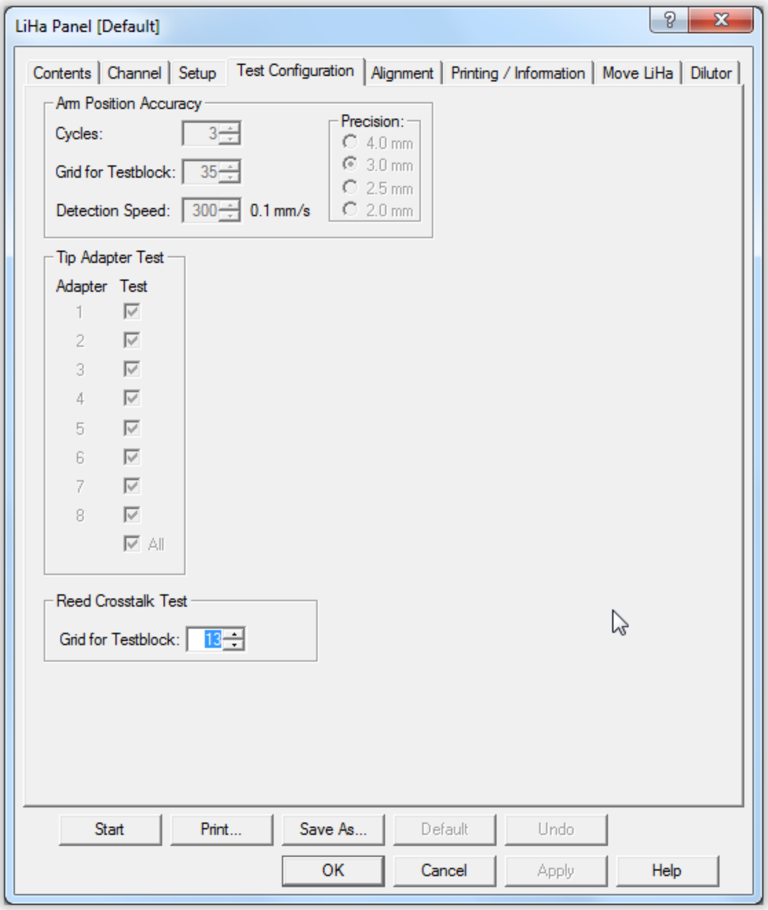
The movable parts of the LiHa are moved as follows:

- Every time you hit one of the above keys the part is moved by one step (0.1 mm).
- If you keep the key pressed it is moved continuously at a speed of approx. five steps per second.
- You can press a key continuously and at the same time press the Ctrl key. In this case, the arm is accelerated until it reaches a maximum speed.

8.6.8 Test Configuration Page

Purpose

The test configuration page provides the controls for the **Arm Accuracy Test**, **Tip Adapter** test and **Reed Crosstalk** test.



Cycles: 3
Grid for Testblock: 35
Detection Speed: 300 0.1 mm/s

○ 4.0 mm
● 3.0 mm
○ 2.5 mm
○ 2.0 mm

1 ☑
2 ☑
3 ☑
4 ☑
5 ☑
6 ☑
7 ☑
8 ☑
☑ All

Grid for Testblock: 13

Fig. 8-92 LiHa, Test Configuration page

Controls

Arm Position Accuracy	These controls are for the production department only and cannot be activated by other users.
Tip Adapter Test	The controls in this frame let you select the tip adapters to test.
Reed Crosstalk Test	The control allows you to choose the grid position.
- **Adapter 1…8**	Channel number (1 = rearmost, 8 = frontmost)
- **Test**	8 check boxes, 1 per channel. Note that only the check boxes of those channels are available where a tip adapter is physically mounted. The check boxes let you select the tip adapters you want to include in the test.
- **All**	If you select this check box all possible tip adapters are included in the test.

8.6.9 Alignment Page

Cross References

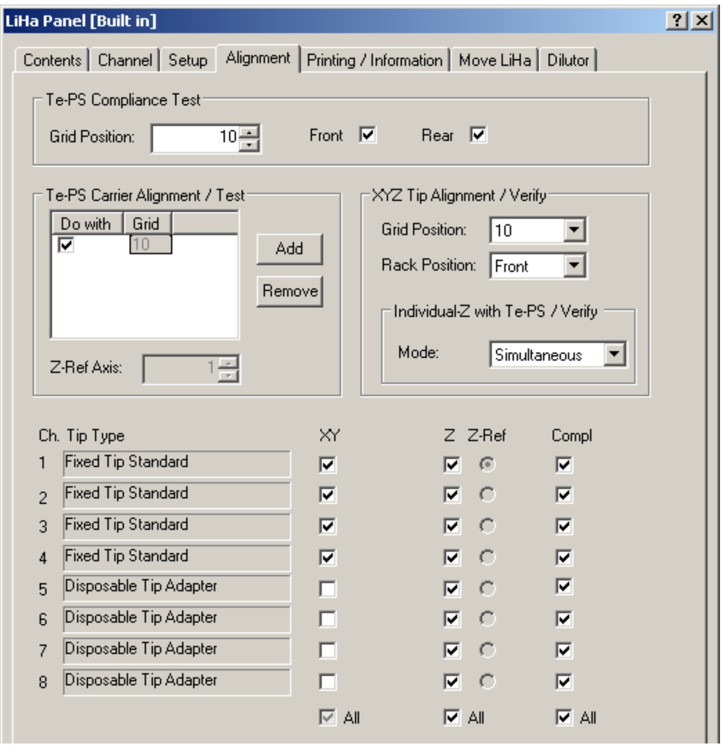
List of cross references to information provided in other sections:

Information	References
Adding Te-PS Carriers	See section 8.6.16, 🗎 8-102

Purpose

This page allows you to check/set the parameters for the following:

- Te-PS Carrier alignment and test
- X/Y/Z alignment and verification of 384-well tips, ActiveTips and Te-PS tips (for 1536-well microplates).
- Te-PS Compliance Test.



Te-PS Compliance Test

Grid Position: 10 Front ☑ Rear ☑

Te-PS Carrier Alignment / Test

Do with	Grid
☑	10

Z-Ref Axis: 1

XYZ Tip Alignment / Verify

Grid Position: 10

Rack Position: Front

Individual-Z with Te-PS / Verify

Mode: Simultaneous

Ch.	Tip Type	XY	Z	Z-Ref	Compl
1	Fixed Tip Standard	☑	☑	●	☑
2	Fixed Tip Standard	☑	☑	○	☑
3	Fixed Tip Standard	☑	☑	○	☑
4	Fixed Tip Standard	☑	☑	○	☑
5	Disposable Tip Adapter	☐	☑	○	☑
6	Disposable Tip Adapter	☐	☑	○	☑
7	Disposable Tip Adapter	☐	☑	○	☑
8	Disposable Tip Adapter	☐	☑	○	☑
		☑ All	☑ All		☑ All

Fig. 8-93 Alignment page

Controls

The **Alignment** page contains the following controls.

Te-PS Carrier Alignment / Test	The controls in this frame let you add and select Te-PS carriers for alignments and tests or remove carriers that are no longer used.
- **Add**	This button is used to add a new Te-PS carrier to the list. For the exact procedure (→ Cross References).
- **Remove**	Lets you remove the Te-PS carrier (selected with **Do with**) from the list.
- **Do with**	Check box to select the carrier you want to align, verify or remove.

- **Grid Position**	Shows the grid position of an installed carrier. When a new carrier is added to the list its grid position can be typed directly in this field (in-place edit).
- **Z-Ref Axis**	Lets you define the channel you want to use as the reference channel in future alignments. For more details see note after the table.
XYZ Tip Alignment / Verify	The controls in this frame are for X, Y, and Z-tip alignment and verification procedures and serve for selecting the grid and rack positions for the corresponding procedure.
- **Grid position**	Lets you select the grid position of a carrier
- **Rack position**	To select the rack position (front, middle, rear) on the carrier.
- **Individual-Z with Te-PS / Verify**	Lets you select the **Mode** in which the **Alignment** and **Verify** procedures are to be carried out: - **Simultaneous:** During the procedure the lower ends of all selected tips are only a few mm above the Te-PS sensor slot. - **Sequential**: During the procedure only the tip that is currently aligned or verified is lowered into the slot, the other tips remain in their top position.
Te-PS Compliance Test	Spin box that lets you define the grid position for the **Te-PS Compliance Test**.
Controls for tip alignment	The controls in the lower part of the **Alignment** page allow you to select the positions of the tips with which you want to perform an alignment or verification procedure. There is one control of each type per channel.
- **Ch**	Indicates the channel number
- **Tip Type**	Indicates the tip type installed in the corresponding channel position (to be set on the **Channel** page)
- **XY**	Selection of tips for alignment in X and Y-axes
- **Z**	Selection of tips for **Individual-Z**
- **Z-Ref**	Selection of the reference tip position (only enabled if the Te-PS is not installed)
- **Compl**	Selection of tips for the **Te-PS Compliance Test**
- **All**	If you select the **All** check box at the bottom of a column all installed tips of that column will be selected.

Note: Z-Ref Axis.

- *This spin box is only active before the very first Te-PS carrier is aligned (Angle and Z-Plane Alignments). After the alignment the spin box is dimmed and is unavailable until the carrier is removed from the list.*
- *When you perform a procedure that requires the installation of a reference tip you will be prompted to mount it to the **Z-Ref Axis** channel.*

8.6.10 Reset Setup

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

ATTENTION

Do not start this function unnecessarily. After performing this function it will be necessary to readjust all ranges and reference positions.

Purpose

This function resets the drive properties to their default values. It should be used only in the following cases:

- When a new instrument is set up for the first time.
- After certain repairs from which misadjustment may have resulted.

Procedure

To set the default parameters:

1. On the **Contents** page, select the **Reset Setup** check box and click **Start**.
2. When finished, you must adjust all ranges and reference positions with the respective functions.

8.6.11 Set Default Parameters in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box.

   No further parameters need to be defined.
2. Download the default values to the LiHa and have them re-read by the software with **Start**.

8.6.12 Determine Range

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Determine Range** procedure does the following:

- It moves all tips back and forth in Y-direction to determine the available Y-range.
- It moves the tips one by one down to the worktable to determine the available Z-ranges. A reference tip must be mounted at each tip position.

  Note: *When running the procedure with an 8* Plus 1 Access *LiHa on a Freedom EVO 75, a reference tip must be mounted at tip position 1 and 5.*
- The determined values are written to the LiHa.

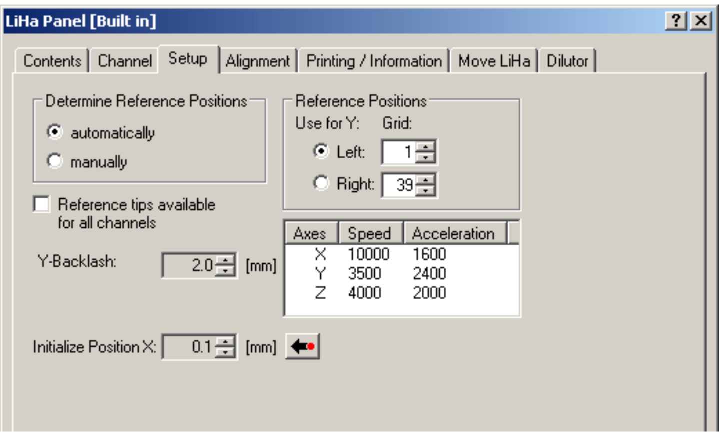
Procedure

The instructions to be followed vary slightly depending on the number of reference tips you have at your disposal:

- If there is only one reference tip available the program will prompt you when to mount it to a particular tip position.
- If there are enough reference tips available, you can mount a reference tip to each position.

To determine the range:

1 On the **Contents** page select the **Determine Range** check box and change to the **Setup** page.



Determine Reference Positions
● automatically
○ manually

☐ Reference tips available for all channels

Y-Backlash: 2.0 [mm]

Reference Positions
Use for Y: Grid:
● Left: 1
○ Right: 39

Axes	Speed	Acceleration
X	10000	1600
Y	3500	2400
Z	4000	2000

Initialize Position X: 0.1 [mm]

Fig. 8-94 *Reference positions*

2 Select the check box **Reference tips available for all channels** if you have enough reference tips for all tip positions. Clear it otherwise.

3 You can accept the default value for the **Y-Backlash** in most cases.

Note: *The* ***Y-Backlash*** *is set to 2 mm by default. It should be changed in special cases only.*

4. Set the **Left** and **Right** grid positions in the corresponding **Grid** spin boxes in the **Reference Positions** frame.
5. Select the grid position at which you wish to determine the Y-range with the **Use for Y** option buttons. **Use for Y** is set to **Left** by default.
6. Start the procedure with **Start**.
   - If you have only one reference tip you are prompted to mount it to the first tip position.
   - If the check box **Reference tips available for all channels** on the **Setup** page is selected, you are prompted to mount a reference tip to each tip position.

   Note*: On an* 8 Plus 1 Access *LiHa a reference tip must be mounted only on tip position 1 and 5.*
7. Make sure the reference tip(s) are mounted to the required position(s) and confirm with **Done**.
8. Beginning with the first position, one tip adapter after the other is now moved downwards until the reference tip mounted to it touches the worktable surface. After the Z-range is determined in this way, the respective tip is moved up again.
   - If you have only one reference tip you are prompted to fix it to the next position. Confirm with **Done** when you have done so. Then, the program continues with the next position.
   - If there is a reference tip at each position the program automatically continues with the next position.
9. After the Z-ranges of all tip positions are determined you are prompted to remove the reference tip(s).
10. Confirm with **Done**. The procedure has finished and the values are written to the LiHa.

Note: *If you intend to perform the* ***Determine Reference Positions*** *procedure, carry it out before removing the reference tips.*

8.6.13 Calibrate Lower DiTi Eject

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Calibrate Lower DiTi Eject** function calibrates the put back and disposal ejection heights for the Lower DiTi eject. It is only enabled when the appropriate hardware is installed. The function must be performed before the **Lower DiTi eject** function is used.

Note: *During this calibration, tip position # 1 (rearmost tip) is used. No tip may be mounted to this position during the calibration.*

Procedure

To calibrate the lower DiTi:

1. On the **Contents** page, select the **Calibrate Lower DiTi eject** check box and change to the **Setup** page.
2. If not done yet, set the **Left** and **Right** grid positions in the corresponding **Grid** spin boxes in the **Reference Positions** frame.
3. Select the grid position where you wish the calibration to be performed with the **Use for Y** option buttons. **Use for Y** is set to **Left** by default.
4. Start the calibration with **Start**.
5. If there is a fixed tip (reference tip, standard tip) mounted to tip position # 1 (rearmost position) you will be prompted to remove it. Confirm with **Done** when you have removed it.

   Note*: On an* 8 Plus 1 Access *LiHa tip position # 2 and # 3 are used and you will not be prompted to remove any tip.*

   Now, the calibration is performed automatically. No further user interventions are required.
6. Confirm the **Calibration Complete** message with **OK** when the calibration is terminated.

8.6.14 Determine Reference Positions

Cross References

List of cross references to information provided in other sections:

Information	References
Move LiHa	See section 8.6.7, 🗎 8-90

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

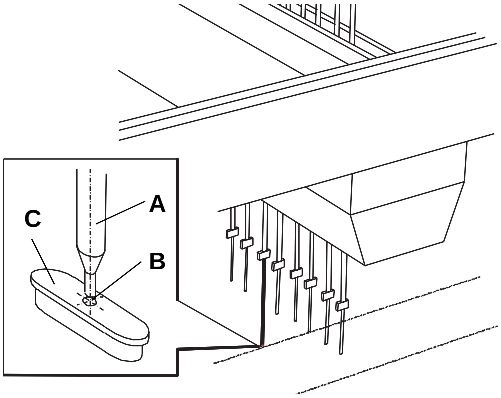
The **Determine Reference Positions** procedure moves the LiHa with the driven tips1) to the selected reference positions in sequence.

- To determine the positions and to calibrate the X- and Y-axes.
- To write the results to the LiHa.

---

1) *Driven tips: The outermost tips, i.e. tips 1 + 2 (2-tip LiHa), 1 + 4 (4-tip LiHa), 1 + 8 (8-tip LiHa), only tip 1 (8 Plus 1 Access LiHa)*

Reference Positions



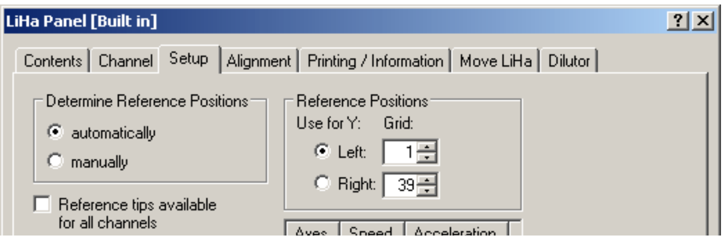
A *Reference tip*
B *Reference point*
C *Reference pin on worktable*

Fig. 8-95 *Reference position*

Procedure

To determine the reference positions:

1 On the **Contents** page select the **Determine Reference Positions** check box and change to the **Setup** page.



Determine Reference Positions
● automatically
○ manually

☐ Reference tips available for all channels

Reference Positions
Use for Y: Grid:
● Left: 1
○ Right: 39

Fig. 8-96 *Setup page - Determine reference positions*

2 Select the check box **Reference tips available for all channels** if you have a reference tip for each required tip position, otherwise clear it.

3 In the **Determine Reference Positions** frame select the mode in which you wish to determine the reference positions:

- Select the **Manually** option button if you wish to determine the reference positions manually.
- Select the **Automatically** option button if you wish the reference positions to be determined automatically (default selection).

4 In the frame **Reference Positions**, set the **Left** and **Right** grid positions in the corresponding **Grid** spin boxes.

5 Select the grid position at which you wish to determine the Y-range with the **Use for Y** option buttons. **Use for Y** is set to **Left** by default.

6 Start the procedure with **Start**.

- If you have only one reference tip you are prompted to mount it to the first tip position (position 1).
- If you have selected the check box **Reference tips available for all channels**, you are prompted to mount a reference tip to the required tip positions. Make sure there are reference tips in: Positions 1 and 2 on a 2-tip LiHa, 1 and 4 on a 4-tip LiHa, 1 and 8 on an 8-tip LiHa.

Note: *With an 8 Plus 1 Access LiHa this test is only done with a reference tip on tip position # 1.*

7 Confirm with **Done** if the reference tip(s) is (are) in the correct position(s).

8 If you selected **Automatically** on the **Setup** page, the driven tips search the reference positions automatically.

- If there is only one reference tip the program notifies you when to mount it to another position.
- Continue with step 13.

9 If you selected **Manually** on the **Setup** page, the **Move LiHa** page is activated and the **Use move tool to determine first reference point** message appears (→ Cross References).

10 Adjust the position in X- and Y-direction according to Fig. 8-95 , 🗎 8-100.

- If there is only one reference tip the program notifies you when to mount it to another position.

11 If the reference tip is in the correct position, confirm with **Done**.

12 Repeat steps 10 and 11 for all required positions.

13 After checking all reference positions, the **Please remove reference tips** message appears. Confirm with **Done**.

8.6.15 Mechanical Prealignment of the Te-PS Carrier

Cross References

List of cross references to information provided in other sections:

Information	References
Te-PS Carrier	See section 8.6.3, 🗎 8-78
Te-PS Carrier Angle Alignment	See section 8.6.16, 🗎 8-102
Te-PS Z-Plane Alignment	See section 8.6.17, 🗎 8-106

Purpose

Before carrying out the alignment procedures **Te-PS Carrier Angle Alignment** and **Te-PS Carrier Z-Plane Alignment** with the aid of the Te-PS sensor plate it is advisable to check the distance of the carrier plate surface from the worktable as shown later in this section.

Note: *The above alignments might not be possible otherwise.*

Tools

For this alignment you need the following tools:

- Allen key 4 mm.
- Caliper or precise ruler.

Prerequisite

To carry out this alignment the Te-PS carrier must be installed mechanically according to the instructions given in the Operating manual.

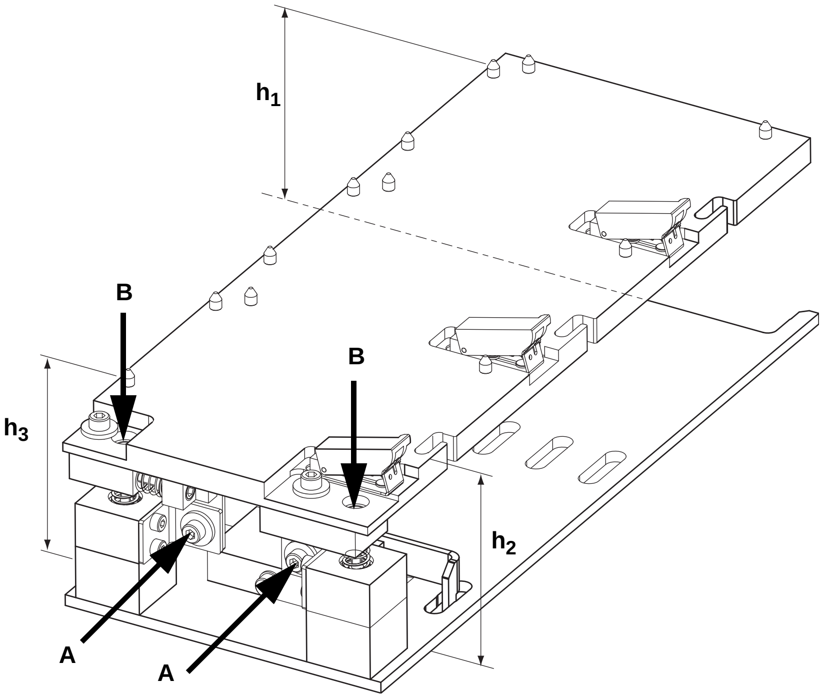


Fig. 8-97 *Mechanical prealignment of Te-PS carrier*

A	*Fixing screws*	***h_2***	*Distance to be verified/adjusted*
B	*Adjusting screws*	***h_3***	*Distance to be verified/adjusted*
h_1	*Nominal distance, 84 mm*		

The distances h_2 and h_3 should be 84 mm ± 1 mm. If they are not within this tolerance limit it might not be possible to carry out the alignments with the aid of the Te-PS sensor plate.

Procedure

To prealign the carrier mechanically proceed as follows:

1. Loosen the fixing screws (A).
2. Turn the adjusting screws (B) clockwise or counterclockwise until the distances h_2 and h_3 are within the above tolerance limit.
3. Tighten the fixing screws when finished.

8.6.16 Te-PS Carrier Angle Alignment

Cross References

List of cross references to information provided in other sections:

Information	References
Te-PS carrier and sensor plate	See section 8.6.3, 🗎 8-78
Prealign Te-PS carrier mechanically	See section 8.6.15, 🗎 8-101
Alignment page	See section 8.6.9, 🗎 8-94

Purpose

This procedure allows you to align a Te-PS carrier exactly with the Y-Axis of the LiHa. It calculates the X-offset, Y-offset and the LiHa Y-scaling factor and stores the determined values on the LiHa DCU.

Tools

For this alignment you need the following tools:

- Reference Tip
- Te-PS sensor plate.
- Allen key 4 mm.

Prerequisites

To carry out this alignment the following parts must be installed:

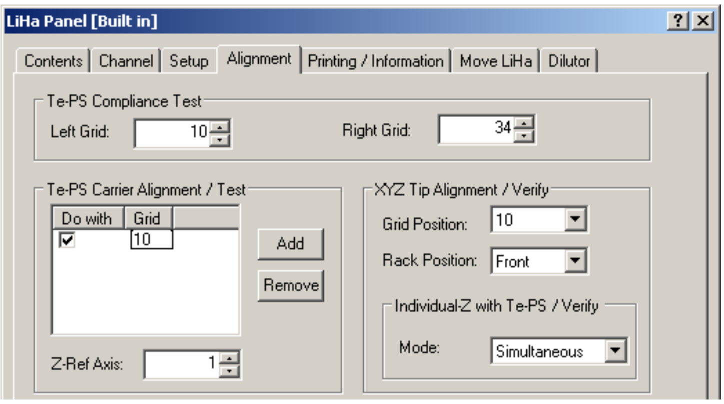
- The Te-PS carrier must be installed mechanically according to the instructions given in the Operating manual.
- The Te-PS carrier must be mechanically prealigned (→ Cross References).
- The Te-PS sensor plate must be connected to the Optibo DCU board (behind left service door). For more details (→ Cross References).

Adding a Te-PS Carrier

If the Te-PS carrier to align is not yet available in the list **Te-PS Carrier Alignment/Test** on the **Alignment** page proceed as follows:

1 On the **Contents** page, select both the **Te-PS Carrier Angle Alignment** and the **Te-PS Carrier Z-Plane Alignment** check boxes; then change to the **Alignment** page.

*The **Add** button on the **Alignment** page is now active. If you are going to add a Te-PS carrier for the first time (list empty) then the **Z-Ref Axis** spin box is enabled (not dimmed).*



Left Grid: 10
Right Grid: 34

Do with	Grid
☑	10

Z-Ref Axis: 1
Grid Position: 10
Rack Position: Front
Mode: Simultaneous

Fig. 8-98 *LiHa - alignment page*

2 Click the **Add** button.

A new entry appears in the list.

3 If the **Z-Ref Axis** spin box is enabled define the channel you want to use as your reference channel in the future.

4 Type the grid position of the carrier directly in the field **Grid** in the list and click **Start.**

After the first Te-PS channel has been added to the list the Z-Ref Axis spin box is dimmed and can no longer be used.

5 Continue with paragraph “Angle Alignment” later in this section.

Selecting an Existing Carrier

If the Te-PS carrier to align is already available in the list **Te-PS Carrier Alignment/Test** on the **Alignment** page, proceed as follows:

1. On the On the **Contents** page, select the **Te-PS Carrier Angle Alignment** check box and change to the **Alignment** page.
2. From the list **Te-PS Carrier Alignment / Test** list, select the **Do with** check box of the carrier you want to align.
3. Click **Start**.
4. Continue with the paragraph “Angle Alignment” later in this section.

Angle Alignment

After you have added a new Te-PS carrier to the list on the **Alignment** page or have selected an existing one from the list you will be guided through the alignment by a series of process prompts. Follow the instructions on the screen.

1. If you are prompted to mount the reference tip install it at the channel indicated on the prompt.
2. Click **OK** on the prompt to continue.

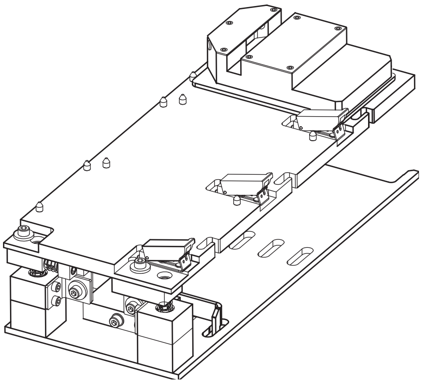


Fig. 8-99 *Sensor plate in rear position*

3. When prompted to do so place the Te-PS sensor plate in the rear rack position on the Te-PS carrier and fasten it with the corresponding clamp.

   The sensor slot must be on the left side.
4. Click **OK** on the prompt to continue.

   The reference tip is moved into the slot and determines the crossing points with the laser beams (P1 and P2). The next prompt appears.
5. Follow the instructions and place the Te-PS carrier in the front rack position on the carrier with the sensor slot on the left side as shown in the following figure.
6. Click **OK** on the prompt when done.

   Again, the reference tip is moved into the slot and determines the crossing points P1 and P2 with the laser beams. The next prompt appears.

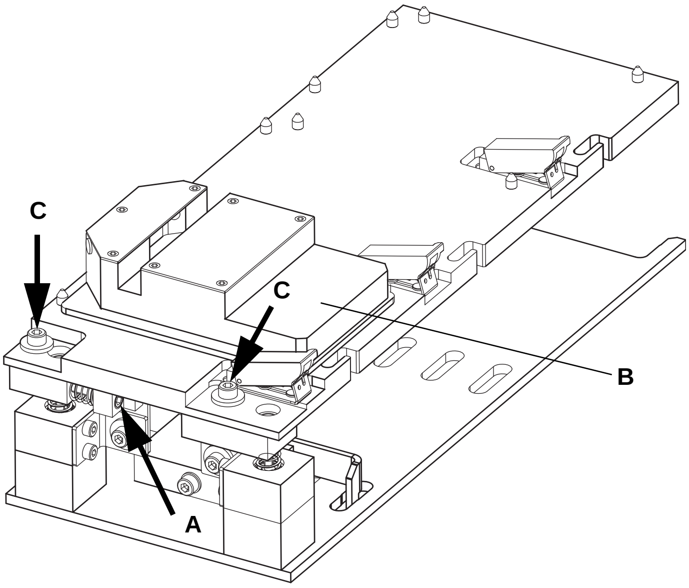
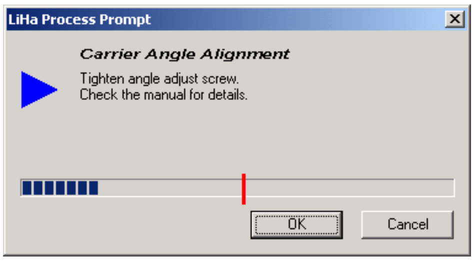


Fig. 8-100 *Angle adjustment*

A	*Adjusting screw*	***C***	*Fixing screws*
B	*Te-PS sensor plate*		

7 Before continuing loosen the two fixing screws (C).

8 Strictly follow the instructions on the screen:

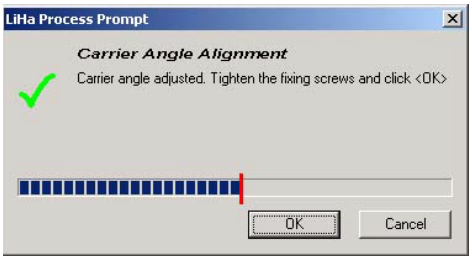


Carrier Angle Alignment

Tighten angle adjust screw.
Check the manual for details.

9 Tighten/loosen the adjusting screw (A) as shown on the prompt.

The arrow on the prompt indicates in which direction the progress bar must move to adjust.



Carrier Angle Alignment

Carrier angle adjusted. Tighten the fixing screws and click <OK>

10 If the progress bar is in the middle of the prompt click the **OK** button.

When the adjustment is correct the progress bar just touches the red mark in the middle of the prompt.

Fig. 8-101 *Angle alignment*

11 Tighten the fixing screws (C).

If, by tightening the screws, the alignment has changed too much another prompt appears.

12 In this case, loosen the fixing screws again, readjust (if necessary approach from opposite side) and retight.

8.6.17 Te-PS Carrier Z-Plane Alignment

Cross References

List of cross references to information provided in other sections:

Information	References
Te-PS carrier and sensor plate	See section 8.6.3, 🗎 8-78
Prealign Te-PS carrier mechanically	See section 8.6.15, 🗎 8-101
Alignment page	See section 8.6.9, 🗎 8-94

Purpose

This procedure allows you to align a Te-PS carrier exactly with the Z-plane of the LiHa.

Tools

For this alignment you need the following tools:

- Reference Tip
- Te-PS sensor plate.
- Allen key 4 mm.

Prerequisites

To carry out this alignment the following parts must be installed:

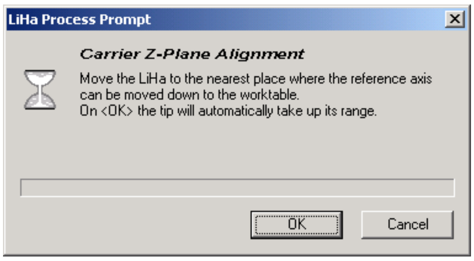
- The Te-PS carrier must be installed mechanically according to the instructions given in the Operating manual.
- The Te-PS carrier must be mechanically prealigned (→ Cross References).
- The Te-PS sensor plate must be connected to the Optibo DCU board (behind left service door). For more details (→ Cross References).

Procedure

To perform the Z-plane alignment for the Te-PS carrier:

1. If not done yet do the following:
   - On the **Contents** page, select the **Carrier Z-Plane Alignment** check box and change to the **Alignment** page.
   - From the list **Te-PS Carrier Alignment / Test**, select the carrier for which you want to carry out the alignment by selecting the corresponding **Do with** check box.
   - Click **Start** to begin.

   You will be guided through the alignment by a series of process prompts
2. When you are prompted to mount the reference tip install it to the channel indicated on the prompt.
3. Click **OK** on the prompt to continue.



Carrier Z-Plane Alignment

Move the LiHa to the nearest place where the reference axis can be moved down to the worktable.
On <OK> the tip will automatically take up its range.

First, the Z-range is determined. The LiHa is automatically moved to an initial position. The prompt shown on the left along with the Move LiHa page appears.

Fig. 8-102 *Z-Range*

4. Do the following:

- If the LiHa is in a position where the reference tip can reach the worktable click **OK** to continue.
- If an object that can be removed easily is below the reference position remove it first (tube rack, 384 carrier, etc.), then click **OK** to continue.
- If an object that cannot be removed temporarily is installed below the reference tip, use the Move Tool page to move the LiHa a little into another position, then click **OK** to continue.

The Z-range is now determined.

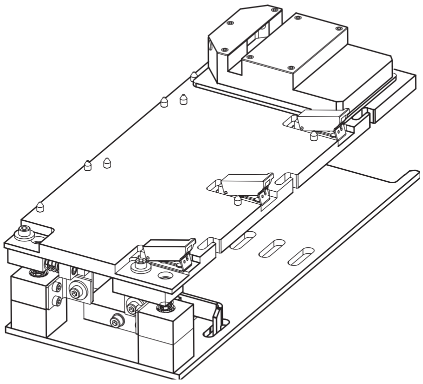


Fig. 8-103 *Sensor plate in rear position*

5. When prompted to do so place the Te-PS sensor plate in the rear rack position on the Te-PS carrier and fasten it with the corresponding clamp.

   The sensor slot must be on the left side.

6. Click **OK** on the prompt to continue.

The reference tip is moved into the slot and determines the distance from the worktable surface at the crossing points with the laser beams. After a while the next prompt appears.

7. Follow the instructions and place the Te-PS carrier in the front rack position on the carrier with the sensor slot on the left side as shown below.

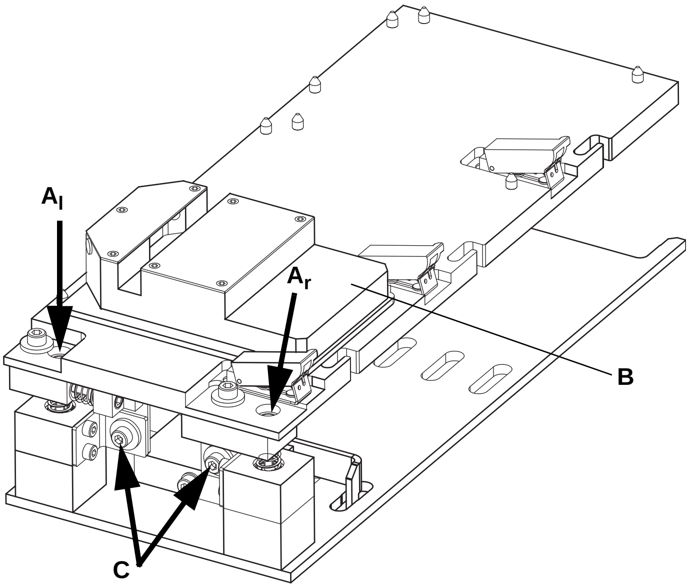


Fig. 8-104 *Angle adjustment*

A_l	*Left adjusting screw*	**B**	*Te-PS sensor plate*
A_r	*Right adjusting screw*	**C**	*Fixing screws*

8 Click **OK** on the prompt when done.

Again, the reference tip is moved into the slot and determines the distance from the worktable near the front of the carrier. The next prompt appears.

9 Loosen the fixing screws (C) as instructed by the prompt and click **OK** to confirm.

The next prompt appears. The instruction it shows depends on whether the distance from the worktable surface on the left side of the front rack position is greater or smaller than that measured in the previous step.

10 Follow the instructions on the prompt: Tighten the adjusting screw (A_l) or loosen it according to the process prompt.

11 When the progress bar is in the middle of the prompt (red mark) tighten the fixing screws (C).

The next process prompt appears.

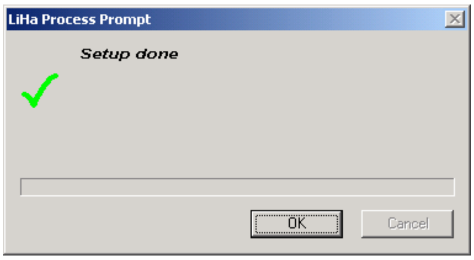
12 Turn the Te-PS sensor plate by 180° as instructed and place it again in the front rack position of the carrier (sensor slot on the right side). Confirm with **OK** when done.

The distance from the worktable surface is now checked on the right side of the front rack position.

13 Depending on the result you might have to carry out the following steps:

- Loosen the fixing screws again.
- Adjust the distance by tightening or loosing the right adjusting screws.
- Tighten the fixing screws.
- Turn the plate by 180° (slot on left side).
- Repeat the measurement for the left side.

14 Strictly follow the instructions on the prompt until the following message appears.



Setup done

15 Confirm with **OK.**

Fig. 8-105 *Setup Done prompt*

8.6.18 Arm Position Accuracy

Production

This procedure is for production and can only be carried out by users belonging at least to the SnS_Production user group.

8.6.19 Te-PS Compliance Test

Cross References

List of cross references to information provided in other sections:

Information	References
Te-PS Carrier and sensor plate	See section 8.6.3, 🗎 8-78
Connection of Te-PS sensor plate	See section 8.6.3, 🗎 8-78
Te-PS Carrier Angle Alignment	See section 8.6.16, 🗎 8-102
Te-PS Carrier Z-Plane Alignment	See section 8.6.17, 🗎 8-106
Alignment page	See section 8.6.9, 🗎 8-94

***Note:** This test cannot be executed if a Te-MO is installed on the instrument.*

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this test is to check if the tips can be positioned precisely enough for pipetting from/into 1536-well microplates.

Tools

For this test you need the following tools:

- Reference Tips for all LiHa channels to be tested
- Te-PS Sensor Plate

Prerequisites

To carry out the test the following conditions must be fulfilled:

- Normally, you need one 384 carrier.
- However, if a Te-PS carrier is installed at a grid position that is suitable for the test (see later in this section) you may use it instead of the 384 carrier. In this case the Te-PS Carrier must be installed properly and aligned with **Te-PS Carrier Angle Alignment** and **Te-PS Carrier Z-Plane Alignment** procedures (→ Cross References).
- The Te-PS sensor plate must be connected to the Optibo DCU board (behind left service door). For details see (see cross references).

Test Principle

The test consists of two cycles during which the carrier1) is placed in a predefined grid position on the worktable, one near the left side of the worktable. During each cycle, the Te-PS sensor plate is in a different carrier/rack position as shown in the following table:

---

1) Usually a 384 carrier

Tab. 8-21 *Carrier and Rack Positions of Te-PS Sensor Plate*

Cycle	Rack Position of Sensor Plate	Sensor Slot
1	Rear	Left
2	Front	Right

The following figure shows how the Te-PS sensor plate is placed in the corresponding rack positions during the test phases 1/2 and 3/4 and how a tip is moved towards the crossing point P_3 of the laser beams.

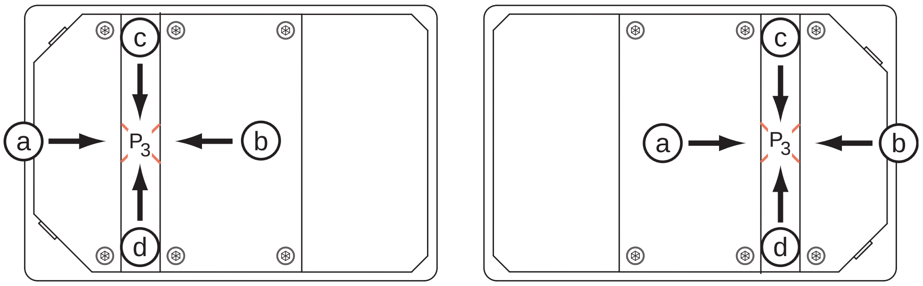


Fig. 8-106 *Principle of compliance test*

1 *Te-PS sensor plate in phase 1 (rear rack position on carrier)*
2 *Te-PS sensor plate in phase 2 (front rack position on carrier)*

a *Approach of tip from left side*
b *Approach of tip from right side*
c *Approach of tip from rear side*
d *Approach of tip from front side*

During each test phase the following procedure is carried out with each selected reference tip:

- The exact X and Y coordinates of the tip are determined at the crossing point of the two laser beams (point P_3).
- Then the tip is moved away from the crossing point and back towards it: First from the left (a), then from the right (b), then from the rear (c) and finally from the front (d).
- After each movement the system checks how precisely the previously determined position can be reproduced. The test is passed if:
  - $y_{max} - y_{min} \leq 0.3$ mm
  - $x_{max} - x_{min} \leq 0.3$ mm
- Possible deviations from the original position are mainly due to the mechanical play of the various parts.

Carrier and Rack Position

There must be at least 5 free grid positions on either side of the carrier.

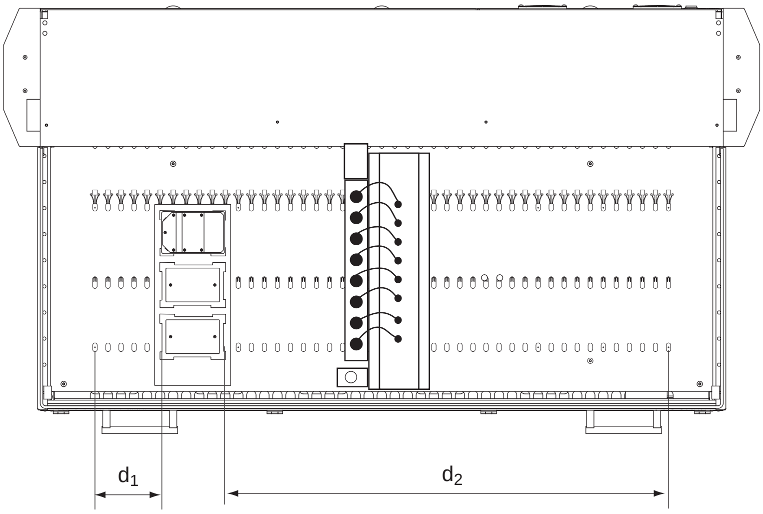


Fig. 8-107 *Rack and carrier positions*

d_1	*Minimum distance from leftmost grid position = 5 grid positions*	***d_2***	*Distance from rightmost grid position ($d_{2\ min}$ = 5 grid positions)*

Note: *Carrier type:*

- *In principle, the test can be performed with one 384 carrier that is placed on the worktable during the test phases 1 and 2 as shown above.*
- *However, if, for instance, a Te-PS carrier is already installed near one end of the worktable, you can use it during the corresponding test phases.*
- *The above figure shows an example where a Te-PS carrier is installed on the left side.*
- *If there is no Te-PS carrier , use a 384 carrier for the test.*

Procedure

Note: *Remember that this test cannot be performed if a Te-MO is installed on the instrument.*

To carry out the test:

1 On the **Contents Page**, select the **Te-PS Compliance Test** check box and change to the **Alignment** page.

2 Set the following parameters on the **Alignment** page:

  – In the frame **Te-PS Compliance Test**, set the value of the **Grid Position** and select the **Front** and **Rear** check boxes. If possible accept the suggested settings.

  – Select the **Compl** check boxes of those channels you want to test.

3 Click **Start** to begin.

You will be guided through the test with a series of process prompts.

4 When instructed to do so install reference tips at those channels you want to test. Click **OK** on the prompt when done.

5. Follow the instructions on the prompts that appear: Click **OK** on the prompt after you have carried out the instructions.
    - Test cycle 1: Place the Te-PS sensor plate on the rear rack position on the carrier with the sensor slot on the left side. Click **OK** on prompt. All selected tips are tested in this position.
    - Test cycle 2: Place sensor plate in the front rack position with the sensor slot on the right side. The selected tips are tested in this position.

At the end of the test you are notified by a ***Test Passed*** *or* ***Test Failed*** *message whether or not the test was successful.*

Pass/Fail Criteria

The test is passed if the movements of the tested tips from the various directions to the crossing point P3 can be reproduced with the accuracy stated in paragraph “Test Principle” earlier in this section, i.e.:

- $y_{max} - y_{min} \leq 0.3$ mm
- $x_{max} - x_{min} \leq 0.3$ mm.

In this case the tested LiHa channels can be used for pipetting from/into 1536 well microplates. Consult the QC-report for detailed results and pass/fail criteria.

If the Test Fails

If the test fails for ALL tips: Repeat the whole setup of the LiHa, beginning with the **Set Default Parameters** procedure.

ATTENTION

In this case you must repeat ALL setup and test procedures!

- If the test fails again the mechanical play of the parts of the LiHa is probably too large. Contact the customer service department in this case.

If the test fails for some of the tips:

- Decide whether these channels are used for 1536 pipetting in practice.
    - If, for example, DiTis or 384 tips will be installed at these channels their accuracy may nevertheless be sufficient.
    - If they are needed for 1536 pipetting, contact the customer service department.

8.6.20 Te-PS Carrier Alignment Test

Cross References

List of cross references to information provided in other sections:

Information	References
Te-PS carrier and sensor plate	See section 8.6.3, 🗎 8-78
Carrier Angle Alignment	See section 8.6.16, 🗎 8-102
Carrier Z-Plane Alignment	See section 8.6.17, 🗎 8-106
Alignment page	See section 8.6.9, 🗎 8-94

Purpose

This test procedure checks if a Te-PS carrier is aligned properly.

Tools

For this alignment you need the following tools:

- Reference Tip
- Te-PS sensor plate.

Prerequisites

To perform this test the following conditions must be fulfilled:

- The Te-PS carrier must be installed mechanically according to the instructions given in the Operating manual.
- The Te-PS sensor plate must be connected to the Optibo DCU board (behind left service door). For more details (→ Cross References).

***Note:** We strongly recommend performing the **Te-PS Carrier Angle Alignment** and the **Te-PS Carrier Z-Plane Alignment** procedures immediately before carrying out this test.*

Procedure

To test the carrier alignment:

1 On the **Contents** page, select the **Te-PS Carrier Alignment Test** check box and change to the **Alignment** page.

2 On the Alignment page, select the **Do with** check boxes of the Te-PS carriers to be tested.

3 Click **Start** to begin.

You will be guided through the test by several process prompts.

4 Follow the instructions provided on the prompts.

– When the first prompt appears place the carrier in the rear rack position (sensor slot on the left side) and click **OK** to continue.

The reference tip moves through the slot to determine the X, Y and Z-offsets.

– When the next prompt appears place the sensor plate in the front rack position (sensor slot on the left side) and click **OK** to continue.

The X, Y and Z-offsets will be checked in this position.

– The next prompt instructs you to place the sensor plate in the same rack position but with the sensor slot on the right side. Click **OK** on the prompt to continue.

The X, Y and Z-offsets will be checked in this position as well.

*When the test is finished a **Test** passed or **Failed** message appears .*

5 Confirm the message with **OK**.

If the Test Fails

If the test fails do the following:

- Check the QC-report to see which alignment is incorrect.
- Repeat the **Carrier Angle Alignment** and/or the **Carrier Z-Plane Alignment** procedures.

8.6.21 Tip Adapter

Purpose

The **Tip Adapter** test procedure allows you to check the electrical contact for the DiTi and liquid detection functions.

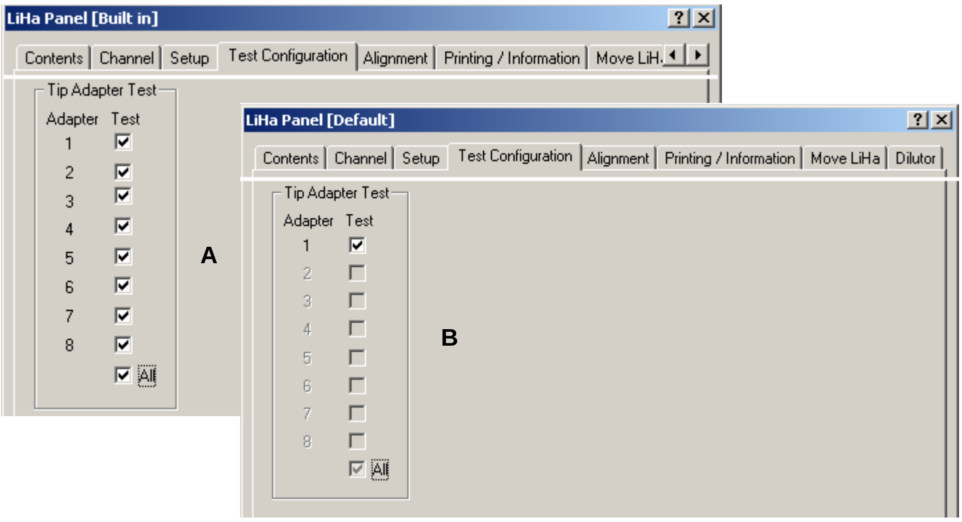
8 Plus 1 Access LiHa

On an 8 Plus 1 Access LiHa this test can only be done with tip # 1.
Tips # 2 to # 7 have no electrical contacts for DiTi and liquid detection functions.

Procedure

To check the tip adapters:

1. On the **Contents** page, select the **Tip Adapter** check box.
2. Remove all DiTis from the DiTi adapters and all other tips from the respective tip adapters. Change to the **Test Configuration** page.



Tip Adapter Test (A)

Adapter	Test
1	☑
2	☑
3	☑
4	☑
5	☑
6	☑
7	☑
8	☑
	☑ All

Tip Adapter Test (B)

Adapter	Test
1	☑
2	☐
3	☐
4	☐
5	☐
6	☐
7	☐
8	☐
	☑ All

Fig. 8-108 *Test Configuration page - Tip adapter test*

A	*8 channel LiHa*	***B***	*8 Plus 1 Access LiHa (Freedom EVO 75)*

3. Select the tip adapters to test and click **Start**.
4. You are now prompted to move up the first tip adapter.
5. Push it upwards according to the following figure.

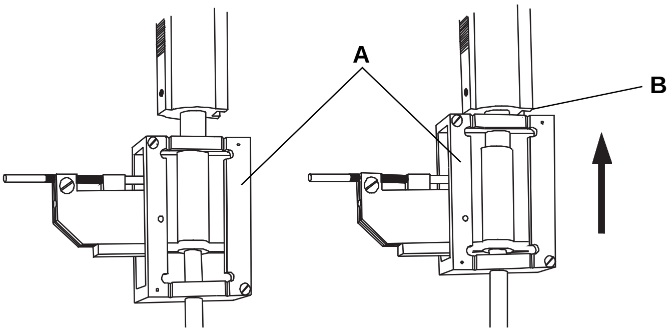
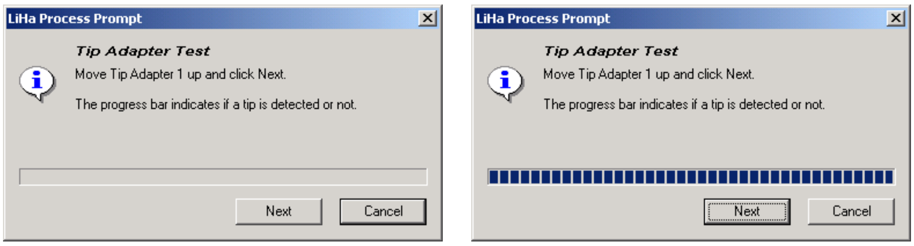


Fig. 8-109 *Checking the tip adapter*

A	*Tip adapter frame*	***A***	*Contact position*

6 Observe the process prompt that appears on the screen. When the tip adapter is in the contact position the blue progress bar must appear on the process prompt (see following figure).


LiHa Process Prompt

Tip Adapter Test

Move Tip Adapter 1 up and click Next.

The progress bar indicates if a tip is detected or not.

Fig. 8-110 *Tip adapter test*

7 Confirm with **Next** (still pushing the adapter upwards).

8 Repeat steps 5 to 7 until all tip adapters are tested.

8.6.22 Reed Crosstalk

Purpose

The **Reed Crosstalk** test allows you to detect tip-presence-sensors (Reed-switches) of a tip adapter that are influenced by the magnet of the neighboring channel. The adapter is influenced by the rear neighbor (i.e., the rearmost adapter (having no rear neighbor) does not need to be tested).

Procedure

1 On the **Contents** page, select the **Reed Crosstalk** check box.

2 On the **Test Configuration** page choose the grid for positioning the Testblock.

3 Position the Testblock on the chosen grid in the middle position, either in a trough carrier or directly on the worktable.

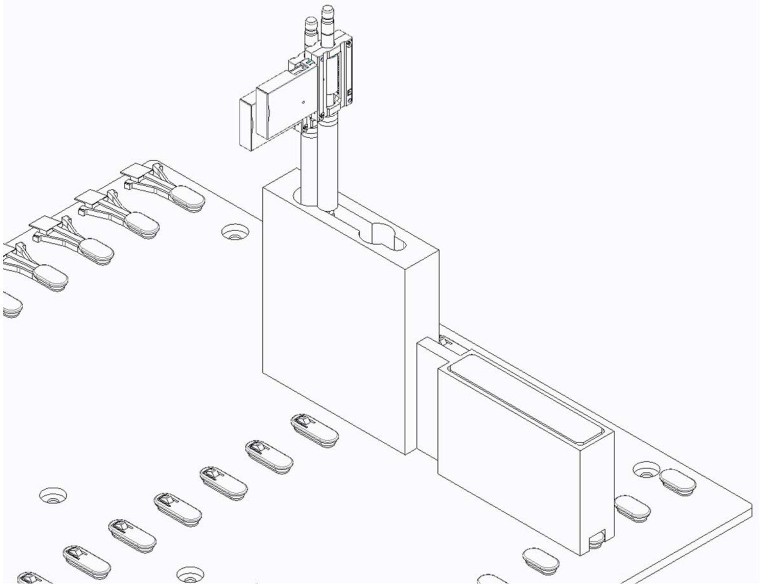


Fig. 8-111 *Position the Testblock*

4. Make sure that the tip adapters are aligned in parallel (no rotation).
5. Click **Start**.

If the Test Fails

If the test fails do the following:

- A tip adapter that fails the test needs to be replaced or it can be used on position one.

8.6.23 Tip Alignment

Cross References

List of cross references to information provided in other sections:

Information	References
Te-PS carrier and sensor plate	See section 8.6.3, 🗎 8-78
Required tools	See section 8.6.1, 🗎 8-75
Channel page	See section 8.6.5, 🗎 8-84
Alignment page	See section 8.6.9, 🗎 8-94

Purpose

The **Tip Alignment** procedure helps you to align Te-PS tips, 384-well tips and ActiveTips very precisely with the Te-PS sensor plate and Te-PS carrier or a 384 carrier .

Prerequisites

Make sure that the following conditions are fulfilled:

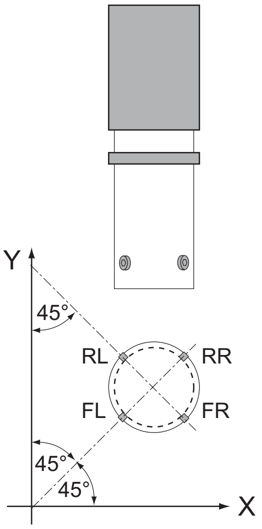
- If a Te-PS carrier is available it must be installed and aligned properly.
- If no Te-PS carrier is available a 384 carrier can be used instead.
- The Te-PS sensor plate must be connected to the Optibo DCU board (behind left access door).
- The tips must be installed properly according to the Operating Manual (also see following figure). Ensure that all tip adjusting screws are tightened.
- The correct tip types must be defined on the **Channel** page.

ATTENTION

The installed tips must be dry. Liquid droplets at the bottom end of the tips would lead to an incorrect alignment.

Tip Adjusting Screws

If the tip is installed properly the four tip adjusting screws should be arranged as shown in the following figure, otherwise it will be impossible to turn them during the alignment procedure. A line drawn through 2 opposite screws should be inclined by 45° to the X and Y-axes of the LiHa.



RR	*Rear right screw*
RL	*Rear left screw*
FL	*Front left screw*
FR	*Front right screw*

In the process prompts that appear on the screen the screws are referred to as REAR RIGHT, REAR LEFT, FRONT LEFT and FRONT RIGHT.

Fig. 8-112 *Tip adjusting screws*

Special Tool

For this alignment you need a small Allen key (0.71 mm).

General Procedure

1 If not done yet:
  - Install the tips for which you want to perform the Individual-Z (for details see Operating Manual and explanations earlier in this section).
  - Define them on the **Channel** page.
  - Place the Te-PS sensor plate in the desired rack position on the Te-PS carrier. The sensor slot must be on the left side.

2 On the **Contents** page, select the **Tip Alignment** check box and change to the **Alignment** page.

3 Set the following on the **Alignment** page:
  - Grid position of the carrier (frame **XYZ Tip Alignment / Verify**) you want to use.
  - Rack position on carrier where you intend to place the Te-PS sensor plate (frame **XYZ Tip Alignment / Verify**).
  - Select the **XY**check boxes of the channels for which you want to perform the **Tip Alignment** procedure.

4 Check your settings carefully and make any corrections now.

5 Click **Start** to continue.

You will be guided through the alignment procedure by a series of process prompts.

At the beginning the selected tips are examined automatically to determine their current states. Then you are prompted to align the selected tips.

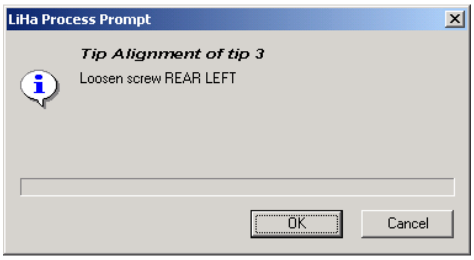
6 Strictly follow the instructions provided by the process prompts until all selected tips are aligned.

Example

The following example shows a possible alignment sequence as it might appear on the screen. The sequence demonstrates how the two opposite screws REAR LEFT and FRONT RIGHT of tip # 3 might be aligned.

***Note:** Keep in mind the following:*

- *The instructions you will be given in practice depend on the actual state of the tip and may differ from those shown in this example.*
- *It is possible that the number of prompts is not the same for all tips.*

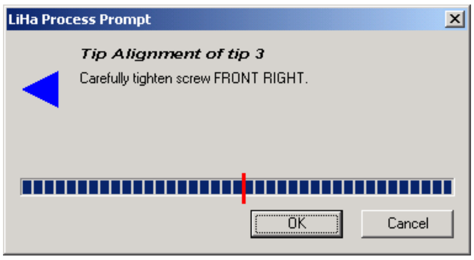


Tip Alignment of tip 3

Loosen screw REAR LEFT

1 For the indicated tip loosen the indicated screw.

2 Click **OK** when done.

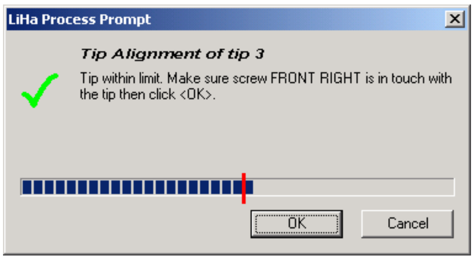


Tip Alignment of tip 3

Carefully tighten screw FRONT RIGHT.

3 Carefully tighten the indicated screw. As you turn the screw the progress bar should move towards the middle.

4 Click **OK** when done.

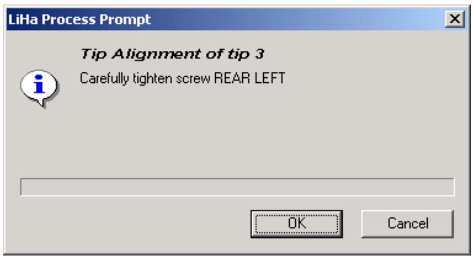


Tip Alignment of tip 3

Tip within limit. Make sure screw FRONT RIGHT is in touch with the tip then click <OK>.

5 To make sure the indicated screw touches the tip tighten it a little more until the progress bar starts moving again.

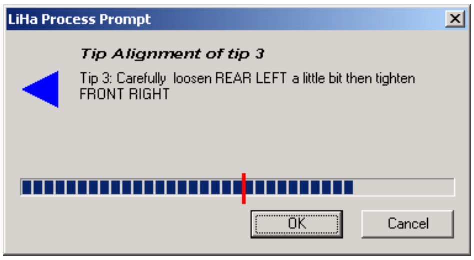
6 Click **OK** when done.



Tip Alignment of tip 3

Carefully tighten screw REAR LEFT

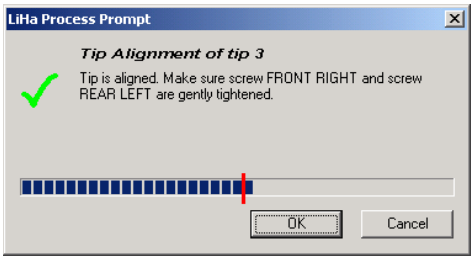
7 Secure the indicated screw and continue with **OK**.



Tip Alignment of tip 3

Tip 3: Carefully loosen REAR LEFT a little bit then tighten FRONT RIGHT

8 Turn the screw as indicated and continue with **OK**.



Tip Alignment of tip 3

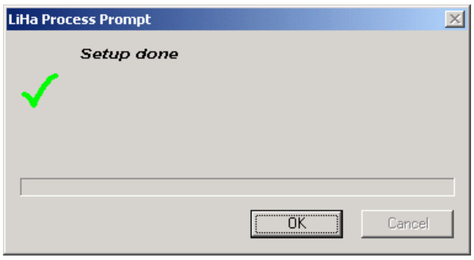
Tip is aligned. Make sure screw FRONT RIGHT and screw REAR LEFT are gently tightened.

Fig. 8-113 *Example of tip alignment*

9 Tip is aligned. Continue with **OK**.

10 A similar sequence follows for the REAR RIGHT and FRONT LEFT screws of the tip. Follow the instructions provided on the prompts.

11 More process prompts may appear as necessary until all tips are aligned as shown in the example. Read them and continue to follow the instructions.



Setup done

Fig. 8-114 *Setup done*

When all tips are aligned:

- The prompt shown on the left appears if no further setup has been selected on the **Contents** page.
- Otherwise the program continues directly with the next setup procedure.

8.6.24 Individual-Z with Te-PS Sensor Plate

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.6.1, 🗎 8-75
Channel page	See section 8.6.5, 🗎 8-84
Alignment page	See section 8.6.9, 🗎 8-94
Tip Alignment	See section 8.6.23, 🗎 8-116

Purpose

The purpose of this procedure is to set the bottom ends of the installed tips to the same height.

Note: *This procedure must be used for instruments equipped with a Te-PS sensor plate. The procedure is the same for all tip types (adjustable tips, standard tips, DiTi adapters).*

Prerequisites

Make sure that the following conditions are fulfilled:

- If a Te-PS carrier is available it must be installed and aligned properly.
- If no Te-PS carrier is available a 384 carrier can be used instead.
- The Te-PS sensor plate must be connected to the Optibo DCU board (behind left access door).

- The tips must be installed properly according to the Operating Manual (also see figure Fig. 8-112 , 🗎 8-117). Ensure that all tip adjusting screws are tightened.
- The correct tip types must be defined on the **Channel** page.

ATTENTION

The installed tips must be dry. Liquid droplets at the bottom end of the tips would lead to an incorrect alignment.

Procedure

To perform the Individual-Z:

1 If not done yet:
  - Install the tips for which you want to perform the Individual-Z (see Operating Manual for details).
  - Define them on the **Channel** page.
  - Place the Te-PS sensor plate in the desired rack position on the carrier. The sensor slot must be on the left side.

Note: *The rear rack position is the optimum position for this alignment.*

2 On the **Contents** page, select the **Individual-Z with Te-PS Sensor Plate** check box and change to the **Alignment** page.

3 Set the following on the **Alignment** page:
  - Grid position of the Te-PS carrier (frame **XYZ Tip Alignment / Verify**)
  - Rack position on carrier where you have placed the Te-PS sensor plate (frame **XYZ Tip Alignment / Verify**). The optimum position is the rear rack position.
  - Select the appropriate **Mode** from the list (**Simultaneous** or **Sequential**). The mode to select depends on the way in which the tips are mostly used in practice:
  - Select the **Z** check boxes of the channels for which you want to perform the **Individual-Z with Te-PS Sensor Plate**.

4 If your setting are correct click **Start** to begin.

The Individual-Z with Te-PS alignment will be performed automatically. The determined Z-offset values of the selected tips will be stored in EEPROM.

8.6.25 Individual-Z (without Te-PS Sensor Plate)

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.6.1, 🗎 8-75
Channel page	See section 8.6.5, 🗎 8-84
Move LiHa page	See section 8.6.7, 🗎 8-90
Alignment page	See section 8.6.9, 🗎 8-94

Purpose

The purpose of this **Individual-Z** procedure is to set the bottom ends of fixed tips to the same height in cases where no Te-PS sensor plates and no Te-PS-carriers are installed on the instrument.

Influence of Tip Lengths

The procedure to be followed depends on the installed tips:

- If some or all of the installed tips are at least as long as the reference tip you can choose one of them as the reference and do not need to mount a special reference tip.

ATTENTION

Before starting with the **Individual Z** make sure the correct tip types and lengths were set on the **Channel** page.

Configuration

The following example is based on the following tip configuration:

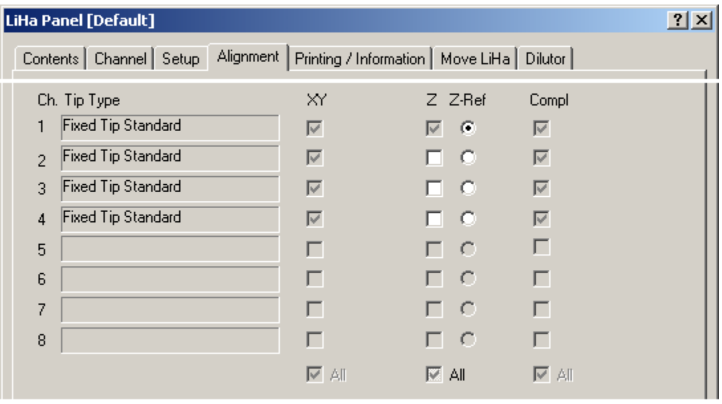
- Number of installed tips: 4.
- Axes 1 to 4: Standard tips.
- Reference axis: # 1 (has standard tip that is long enough to reach worktable surface, so no reference tip is needed in this case).

Note: *The instructions to be followed may vary with other tip configurations. The* ***LiHa*** *command prompt that appears on the screen always tells you what to do next.*

Procedure

To carry out the adjustment:

1 On the **Contents** page select the **Individual Z** check box and change to the **Alignment** page to check the settings (→ Cross References).



Ch.	Tip Type	XY	Z	Z-Ref	Compl
1	Fixed Tip Standard	☑	☑	●	☑
2	Fixed Tip Standard	☑	☐	○	☑
3	Fixed Tip Standard	☑	☐	○	☑
4	Fixed Tip Standard	☑	☐	○	☑
5		☐	☐	○	☐
6		☐	☐	○	☐
7		☐	☐	○	☐
8		☐	☐	○	☐
		☑ All	☑ All		☑ All

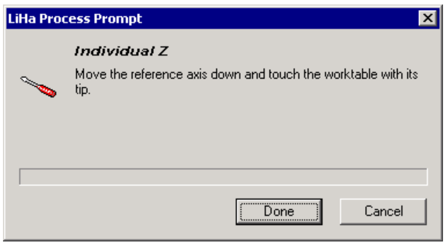
Fig. 8-115 *LiHa Alignment page*

2 Start the function with **Start**.

*The **LiHa Process Prompt** appears and asks you if the types of the physically installed tips correspond to those indicated on the **Alignment** page:*

- If they do not correspond abort the procedure with **Cancel**. Then go to the **Channel** page and enter the correct settings.
- Otherwise click **OK** to continue.

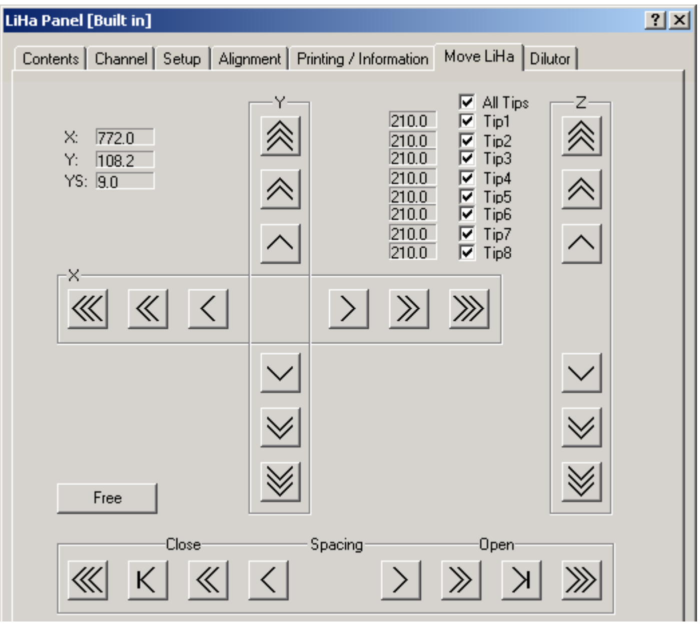
*The LiHa process prompt **Move the reference axis down and touch the worktable with its tip** and the **Move LiHa** page (→ Cross References) appear.*



Individual Z

Move the reference axis down and touch the worktable with its tip.

Fig. 8-116 *Move reference axis*



X: 772.0
Y: 108.2
YS: 9.0

210.0 ☑ All Tips
210.0 ☑ Tip1
210.0 ☑ Tip2
210.0 ☑ Tip3
210.0 ☑ Tip4
210.0 ☑ Tip5
210.0 ☑ Tip6
210.0 ☑ Tip7
☑ Tip8

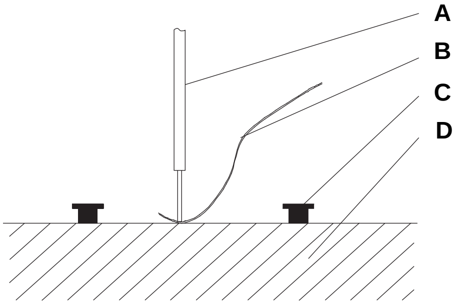
Fig. 8-117 *Move page*

You can use the movement buttons or the keyboard to move the LiHa or parts of it as needed.

3 Move the LiHa horizontally in X and Y direction to a position that allows you to adjust the tip at the reference axis first.

4 Carefully move the tip at the reference axis down:

- Move it continuously down until it is some millimeters above the worktable surface.
- Then move it further down until it just touches the worktable surface. You may move the tip in 1 mm steps as long as the distance to the worktable is larger than 1mm, then move it in 0.1 mm steps.
- Use a small piece of paper to check when the tip touches the worktable.



A	*Standard tip*
B	*Piece of paper*
C	*Grid*
D	*Worktable*

Fig. 8-118 *Individual Z-adjustment*

5 If the tip is in the correct position, confirm with **Done** on the **LiHa Process Prompt**.

The software prompts you to move the LiHa over the surface where the adjustment is to take place.

6 Repeat step 4 on this surface and confirm with **Done**.

The LiHa moves all selected tips down until they are approx. 10 mm above the surface.

7. Carefully repeat step 4 for each selected tip.

   *You can select them individually on the **Move LiHa** page (→ Cross References).*

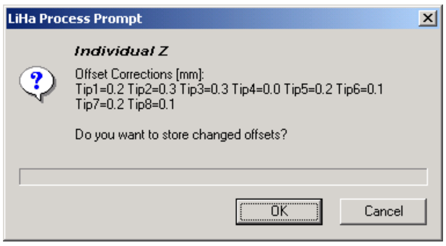
ATTENTION

Be careful to adjust all tip types correctly:

- With the Setup and Service software, the part that must just touch the surface is always the end of the tip.
- This applies to all fixed tip types.

8. After you have adjusted all selected tips on the surface confirm with **Done**.

   The following screen informs you about the offset corrections and asks you if you wish to store them.



Individual Z

Offset Corrections [mm]:
Tip1=0.2 Tip2=0.3 Tip3=0.3 Tip4=0.0 Tip5=0.2 Tip6=0.1
Tip7=0.2 Tip8=0.1

Do you want to store changed offsets?

Fig. 8-119 *Offset correction*

ATTENTION

If one or more of the displayed offset corrections exceed 1 mm, a warning symbol and text appear on the above prompt. Check if these large corrections are acceptable in your case. If they are not, or if you are not sure click **Cancel** and repeat the procedure.

9. If all offset corrections are acceptable confirm with **OK** to store them. A screen appears notifying you that the Individual Z adjustment is finished.
10. Confirm with **OK**.

8.6.26 Tip Verify

Cross References

List of cross references to information provided in other sections:

Information	References
Tip types	See section 8.6.2, 🗎 8-77
Channel page	See section 8.6.5, 🗎 8-84
Alignment page	See section 8.6.9, 🗎 8-94
Tip Alignment	See section 8.6.23, 🗎 8-116

Purpose

The purpose of this procedure is to test if the tip alignment of the selected tips is correct.

Prerequisites

Make sure that the following conditions are fulfilled:

- If a Te-PS carrier is available it must be installed and aligned properly.
- If no Te-PS carrier is available a 384 carrier can be used instead.
- The Te-PS sensor plate must be connected to the Optibo DCU board (behind left access door).
- The tips must be installed properly according to the Operating Manual and should be aligned with the **Tip Alignment** procedure (→ Cross References).
- The correct tip types must be defined on the **Channel** page.

ATTENTION

The installed tips must be dry. Liquid droplets at the bottom end of the tips would lead to incorrect test results.

Procedure

To perform the **Tip Verify**:

1. On the **Contents** page, select the **Tip Verify** check box and change to the **Alignment** page.
2. Set the following on the **Alignment** page:
   - Grid position of the Te-PS carrier (frame **XYZ Tip Alignment / Verify**) you want to use.
   - Rack position on carrier where you intend to place the Te-PS sensor plate (frame **XYZ Tip Alignment / Verify**).
   - Select the **XY** check boxes of the channels for which you want to perform the **Tip Verify** procedure.
3. Check your settings. If they are correct click **Start** to begin.
4. When prompted to do so place the Te-PS sensor plate in the selected rack position if not done yet. The sensor slot must be on the left side.
5. Click **OK** on the process prompt to continue.

   The selected tips are checked automatically.

   *When the test is finished a **Test passed** or **Failed** message appears .*
6. Confirm the message with **OK**.

   *The test results can be viewed on the **Printing / Information** page.*

Pass/Fail Criteria

The test is passed if the tested tips are within the tolerance limits shown in the following table. For details about the various tip types (→ Cross References).

Tab. 8-22 *Tolerance Limits for Various Tip Types*

Tip Type	Tolerance Limit
Standard tips.	± 0.2 mm
Te-PS Tips	± 0.12 mm
ActiveTips	± 0.15 mm

If the Test Fails

Try the following:

- Check if the tips are installed properly.
- Check if the tips are dry.
- Repeat the **Individual-Z with Te-PS** procedure.
- Realign the Te-PS carrier (**Angle Alignment** and **Z-Plane Alignment**).
- Contact the customer service department if the problem persists.

8.6.27 Individual-Z Verify

Cross References

List of cross references to information provided in other sections:

Information	References
Channel page	See section 8.6.5, 🗎 8-84
Alignment page	See section 8.6.9, 🗎 8-94
Tip Alignment	See section 8.6.23, 🗎 8-116

Purpose

The purpose of this procedure is to test if the **Individual-Z** alignment of the selected tips is correct.

Prerequisites

Make sure that the following conditions are fulfilled:

- If a Te-PS carrier is available it must be installed and aligned properly.
- If no Te-PS carrier is available a 384 carrier can be used instead.
- The Te-PS sensor plate must be connected to the Optibo DCU board (behind left access door).
- The tips must be installed properly according to the Operating Manual (also see figure Fig. 8-112 , 🗎 8-117). Ensure that all tip adjusting screws are tightened.
- The correct tip types must be defined on the **Channel** page.

ATTENTION

The installed tips must be dry. Liquid droplets at the bottom end of the tips would lead to incorrect test results.

Procedure

To perform the **Individual-Z Verify**:

1 On the **Contents** page, select the **Individual-Z Verify** check box and change to the **Alignment** page.

2 Set the following on the **Alignment** page:
   - Grid position of the Te-PS carrier (frame **XYZ Tip Alignment / Verify**) you want to use.
   - Rack position on carrier where you intend to place the Te-PS sensor plate (frame **XYZ Tip Alignment / Verify**).
   - Select the **Z** check boxes of the channels for which you want to perform the **Individual-Z Verify** procedure.

3 If your setting are correct click **Start** to begin.

4 When prompted to do so place the Te-PS sensor plate in the selected rack position if not done yet. The sensor slot must be on the left side.

5 Click **OK** on the process prompt to continue.

The selected tips are checked automatically.

*When the test is finished a **Test passed** or **Failed** message appears .*

6 Confirm the message with **OK**.

*The test results can be viewed on the **Printing / Information** page.*

If the Test Fails

Try the following:

- Check if the tips are installed properly.
- Check if the tips are dry.
- Repeat the **Individual-Z with Te-PS Sensor Plate** procedure.
- Realign the Te-PS carrier (**Angle Alignment** and **Z-Plane Alignment**).
- Contact the customer service department if the problem persists.

8.6.28 Reference Positions Verify

Purpose

This procedure allows you to verify whether the driven tips(1) can be moved over the whole X- and Y ranges and whether they can be positioned precisely over the reference positions. These were determined earlier with the **Determine Reference Positions** procedure.

Note: *The procedure is performed with the installed tips, i.e. it is not necessary to replace them with reference tips.*

Procedure

To verify the reference positions:

1 Make sure that the tips are installed properly and that they are defined correctly on the **Channel** page.

2 If everything is in order select the **Reference Positions Verify** check box on the **Contents** page and click **Start**.

You are guided through the procedure by a series of process prompts. The driven tips are moved over the holes of the reference tips.

3 For each tip and at reference pin do the following:
   - Verify if the tip is positioned over the hole.
   - Click **Next** on the process prompt to continue.

---

1) *Driven tips: The outermost tips, i.e. tips 1 + 2 (2-tip LiHa), 1 + 4 (4-tip LiHa), 1 + 8 (8-tip LiHa), only tip 1 (8 Plus 1 Access LiHa)*

If the Test Fails Contact the customer service department.

8.6.29 Dilutor Tool

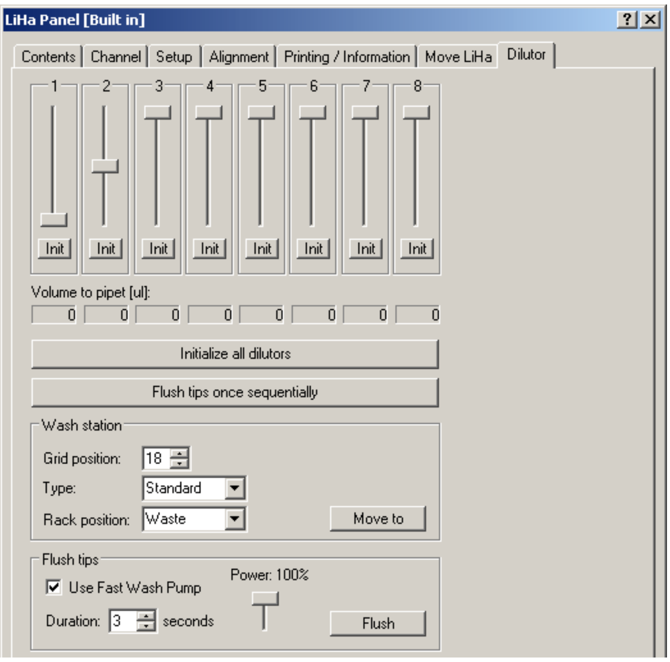
Cross References List of cross references to information provided in other sections:

Information	References
Wash station types	See section 10.2, 🗎 10-2

Description The **Dilutor** tool serves for checking the diluters and the associated tubings. Each diluter can be activated individually. For example, this tool allows the field service engineer to find out the following:

- Whether the diluter address switches are set correctly. If, for example, the same address is assigned to two different diluters, one of them cannot be activated.
- Whether each diluter is connected (via the tubing) to the correct LiHa channel. If, for example, the liquid coming from diluter # 1 is dispensed through tip # 3 then it is connected to the wrong channel.

***Note:** The **Dilutor** tool cannot be used to set or adjust any values that are stored in memory. SnS_Customer access rights are sufficient to operate the **Dilutor** tool.*



Volume to pipet [ul]: 0 0 0 0 0 0 0 0

Grid position: 18
Type: Standard
Rack position: Waste

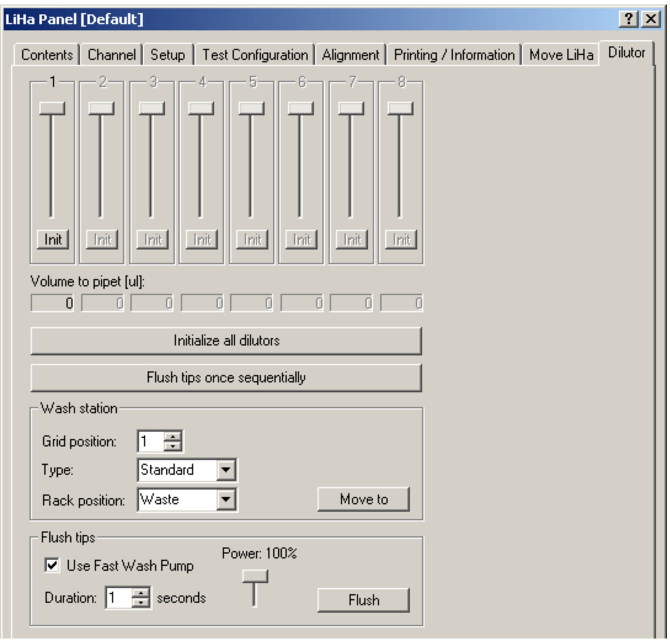
☑ Use Fast Wash Pump
Power: 100%
Duration: 3 seconds

__Fig. 8-120__ Dilutor tool

The **Dilutor** tool is subdivided into eight channels that are associated with the corresponding diluters, tubings, and tips. The control elements of those channels at which no diluter is recognized (because it is not installed, wrongly addressed or otherwise malfunctioning) are not enabled.

8 Plus 1 Access LiHa

On an 8 Plus 1 Access LiHa of a Freedom EVO 75 instrument you can only operate the diluter of tip # 1. The plungers of all channels are linked together and driven by this one diluter. For this reason on the diluter panel the channels # 2 to # 8 are deactivated.



Volume to pipet [ul]: 0 0 0 0 0 0 0 0

Grid position: 1
Type: Standard
Rack position: Waste

☑ Use Fast Wash Pump
Power: 100%
Duration: 1 seconds

Fig. 8-121 Dilutor tool, 8 Plus 1 Access LiHa

Note: *If one of the eight tips is defined as reference tip, all valves will be closed when you try to flush the tips, so that there is no water dripping out at the reference tip.*

Controls

The following list provides a brief overview of the control elements:

Sliders 1 to 8	There is one slider per channel. The sliders serve for aspirating and dispensing liquid through the associated diluters.
Init buttons 1 to 8	For initializing the diluters individually.
Text fields 1 to 8 Volume to pipet in [µl]	Show the volume in µl that will be aspirated or dispensed by the respective diluter. If the indicated value is positive, the indicated liquid quantity will be aspirated, if it is negative it will be dispensed.
Initialize all dilutors	Initializes all diluters at once. Note that any liquid that is in the syringes will be dispensed.
Flush tips once sequentially	Initializes the diluters one by one. The syringe volume, but not more than 1000 µl, will be aspirated and then dispensed through the respective tip.
Wash station	Controls to specify the position and type of the wash station. For a brief description of the various wash station types (→ Cross References).
- Grid	Grid position of Wash Station

- **Type**	Lets you select the wash station type: • Standard • Combo (combined wash and DiTi waste station) • EVO 75 wash station
- **Rack Position**	Lets you select the position and use of the wash station
- **Move to**	Lets you move the LiHa over the defined wash station.
Flush tips	Controls needed for flushing the tips.
- **Use Fast Wash Pump**	Check box to select the fast wash pump as the pumping device. - The check box can only be selected if a fast wash pump is installed. This pump is part of Fast Wash Option (FWO) or Monitored Pump Option (MPO). - If the check box is cleared, the system liquid needed for flushing will be pumped by the diluters.
- **Duration**	The flush duration will be set as follows: - in seconds if the fast wash pump is selected - number of diluter plunger strokes.
- **Power**	This slider is only enabled if the **Use Fast Wash Pump** check box is selected. It lets you set the power applied to the pump. The default setting is 100% (slider in top position).
- **Flush**	Starts the flush cycle.

***Note:** When you use the **Dilutor** tool, the selected diluter always aspirates system liquid and dispenses it through the associated tip. During normal operation it does not aspirate liquid through the tip and therefore does not contaminate the system liquid.*

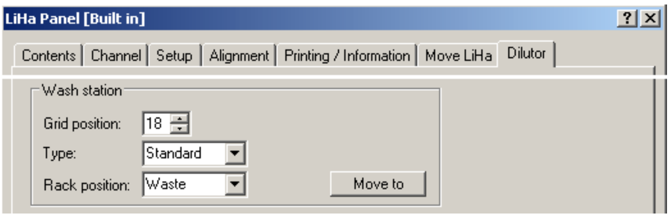
Wash Station

Please note the following

ATTENTION

Before you start initializing or testing the diluters it is absolutely necessary…

- to install a wash station on the worktable and to set the wash position. The corresponding controls are shown in the following figure.
- to make sure that the correct wash station is selected from the list and that the position is correctly set.
- to move the LiHa over the wash station. Use the button **Move to** on the **Dilutor** tool, in order that liquid dispensed during the following initialization and test procedures will not be splashed over the worktable.



Grid position: 18
Type: Standard
Rack position: Waste

__Fig. 8-122__ Setting the position of the wash station

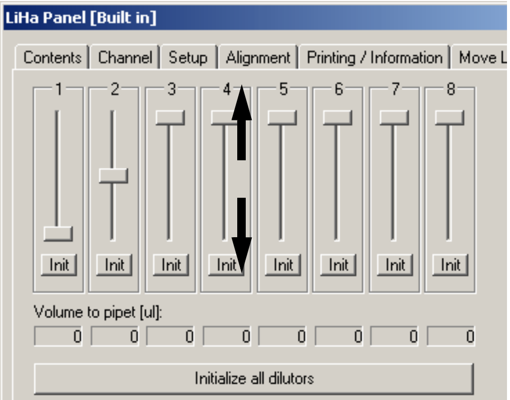
Initializing the Diluters

Before you can use the diluters you must initialize them. You can do this in two ways:

- You can initialize all diluters at once by clicking on the large command button **Intitialize all diluters.**
- You can also initialize the diluters one by one by clicking on the **Init** button of the respective channel. In this way you can only initialize one diluter at a time.

***Note:** Depending on the diluter type, the initialization may take some time. It is possible that liquid will be aspirated and dispensed during the initialization.*

Aspirating and Dispensing with the Diluters



Volume to pipet [ul]: 0 0 0 0 0 0 0 0

__Fig. 8-123__ Aspirating/dispensing liquid

The arrows in the figure on the right indicate in which direction a slider must be dragged to aspirate or dispense liquid.

- **Down arrow:** For determining the system liquid quantity to be aspirated.
- **Up arrow:** For determining the quantity to be dispensed.

Details see below.

To aspirate system liquid:

1. Use the mouse to point to the respective slider and drag the slider downwards (↓) until the text box below indicates the desired volume.
2. Release the mouse button. The diluter aspirates the defined quantity of system liquid.
3. Check if the correct diluter is activated.
   - – If you have dragged slider # 1, the leftmost diluter must aspirate liquid.
   - – Likewise, if you have dragged slider # 8, the rightmost diluter must aspirate liquid.

To dispense aspirated liquid:

1. With the mouse, point to the desired slider and push it upwards (↑) until the associated text box indicates the required quantity.
2. Release the mouse button. The diluter presses the defined quantity through the respective tubing and tip into the wash station.

3. Check whether the correct diluter is activated and whether the liquid emerges from the correct tip.
   - If you have pushed up slider # 1, liquid must be pressed out of the rearmost tip (channel # 1).
   - Likewise, if you have pushed up slider # 8, liquid must emerge from the front tip (channel # 8).

In case of errors:

- If the wrong diluter reacts check the address settings. Note that the address number corresponds to

  Diluter # minus 1 (i.e. diluter 1 has address 0, diluter 8 has address 7).
- If liquid flows out from the wrong tip check the connection of the tubings between the diluters and the tips.
- Also check the tubings for leakages and if they are not kinked or otherwise damaged. Replace damaged parts.
- Consult the appropriate Service Manual for detailed information.

Flushing the Diluters Sequentially

If you click the large command button **Flush Diluters Once Sequentially** below the text boxes, each diluter performs a single aspiration/dispensing cycle in sequence.

- Diluter # 1 (on the left side) is initialized. After the initialization, it aspirates the syringe volume, but not more than 1000 µl, and dispenses the aspirated quantity (e.g., if the syringe volume is 500 µl, then 500 µl will be aspirated and dispensed; if the syringe volume is 5000 µl, the aspirated/dispensed volume is 1000 µl).
- Then the program continues with the next diluter until all diluters that are recognized by the software are flushed.

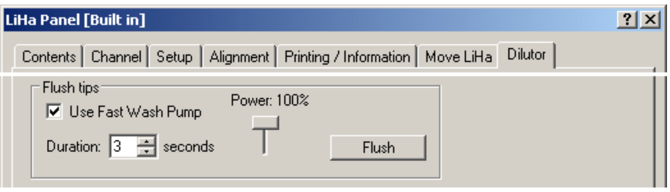
To flush the diluters:

1. If necessary, set the position of the wash station (**Grid** and **Postion**, see below)
2. Click the **Flush Diluters Once Sequentially** button.

   A prompt appears that asks you if the LiHa should be moved over the wash station.
3. Confirm with **OK** if necessary.
4. Observe the diluters and tips.
5. Take adequate corrective measures in case of wrong behavior.

Flushing the Tips

The controls in the **Flush tips** frame allow you to define how the tips should be flushed. For a detailed description see the description of the **Diluter** page at the beginning of this section.



☑ Use Fast Wash Pump
Power: 100%
Duration: 3 seconds

__Fig. 8-124__ Dilutor tool - Flushing the tips

To flush the tips:

1. If not done yet, set the position of the wash station.

2 Select or clear the check box **Use Fast Wash Pump** as necessary.
  - If a fast wash pump is installed this check box is selected by default.
  - If you clear the check box the diluters will be used to pump the system liquid through the tips.
  - If there is no fast wash pump the check box is inactive.

3 Set the flush **Duration**:
  - in **seconds** if the fast wash pump is selected.
  - in diluter **strokes** otherwise (the unit on the right side of the **Duration** spin box changes to **strokes** if the plungers are used for pumping).

4 Use the slider **Power** to reduce or increase the power applied to the pump according to your needs.

5 Click **Flush** to start the flushing cycle.

8.6.30 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

8.7 Air (Displacement) Liquid Handling Arm (Air LiHa)

Purpose of This Section

This section describes the setup, test, alignment and verification procedures necessary for an Air (displacement) Liquid Handling Arm (Air LiHa) installed on a Freedom EVO.

8.7.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Tip types	See section 8.7.2, 🗎 8-136
Te-PS positioning system	See section 8.7.3, 🗎 8-136
Multisense tip adapter test (PMP Function)	See section 10.6, 🗎 10-27

Liquid Handling Arm (Air LiHa) for Freedom EVO

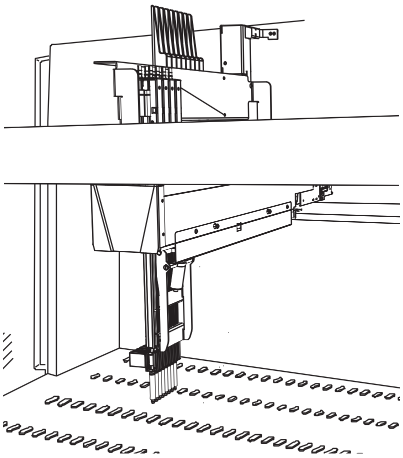


Fig. 8-125 Liquid Handling arm (Air LiHa)

Freedom EVO instruments may be equipped with one Air LiHa with four or eight tips. The design makes the arm suitable for the following labware:

- traditional reagent tubes
- 96-well microplates
- 384-well microplates
- 1536-well microplates

Note: *The use of 1536-well microplates is possible thanks to the Te-PS positioning system described in section 8.6 “Liquid Handling Arm for Freedom EVO”, 🗎 8-75.*

Movement Axes

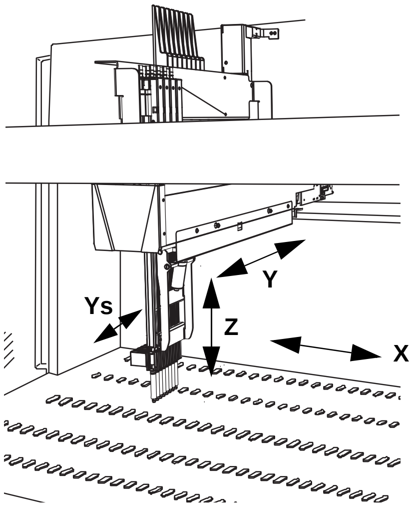


Fig. 8-126 Air LiHa movement axes

The Air LiHa's movements are coordinated with other system devices such as RoMa and PnP. There are four different movement axes:

X	*Arm movement left - right*
Y	*Arm movement forward - backward*
Ys	*Horizontal tip spacing*
Z	*Tip movement up - down*

Tip Adapters and Tip Types

The Air LiHa is equipped with special Tip Adapters (similar to MultiSense tip adapters) for use with various disposable tip (DiTi) types up to a volume of 1000 µl per tip. For the Air LiHa tip adapters the same tests can be used as for the Multisense tip adapters (→ Cross References).

DiTi Eject

The Air LiHa is equipped with the Lower DiTi Eject Option.

Positioning System (Te-PS)

The Te-PS is an option that allows the use of 1536-well microplates. For a detailed description (→ Cross References).

Required Tools

The tools required for performing the adjustments and tests described in this section depend on the installed tips:

- **Reference tip:** The reference tip is necessary for setting up the Te-PS Carrier, for checking the Z-range and the reference positions in the X- and Y-axis.
- **Te-PS Sensor plate:** This sensor plate, which is part of the Te-PS, is used for the mechanical alignment and test of the Te-PS carrier and the various tip types. Details (→ Cross References).
- **Allen Key for Te-PS Carrier:** A 4-mm Allen key is needed for the mechanical adjustment of the Te-PS Carrier.

Safety Precautions

Please pay attention to the following points.

WARNING

During certain setup and test procedures the Air LiHa will move in the X-axis at considerable speed.

- Keep off the moving range during such procedures.

WARNING

Be careful during setup and test procedures in which the tips are moved downwards.

- Keep your hands off the area in which they move.

ATTENTION

During some of the following setup and test procedures the Air LiHa will move to different positions on the worktable.

- Make sure there are no objects installed that could be in the way during the execution of these procedures.
- Also ensure that the instrument was setup with **Instrument > Basic Setup**.

8.7.2 Tip Types

Tip Types

The following tip types are supported on the Air LiHa by the Setup and Service software:

Tab. 8-23 *Available Tips*

Tip Name	**L_{diff} [mm]** [a)]	**Explanations**
Reference tip	0	The reference tip is used in alignment procedures and is not suitable for pipetting.
DiTi adapter	-50.0	Serve to hold DiTis (disposable tips)

a) L_{diff} = Length difference in [mm] relative to reference tip (also see below)

Length Differences

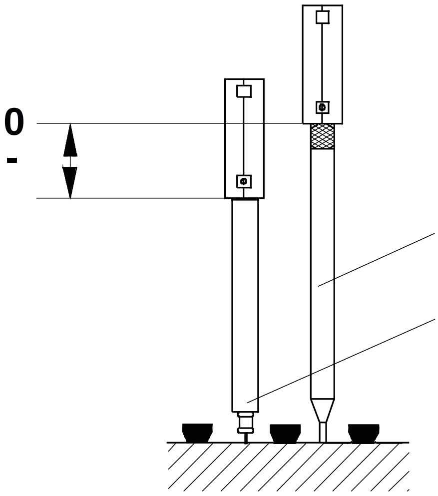


Fig. 8-127 *Difference in length of DiTi adapter and reference tip*

A	*Reference tip*
B	*DiTi adapter*

The figure on the left shows the difference in length of the DiTi adapter and the reference tip.

- Because the DiTi adapter is shorter than the reference tip the difference is negative, (e.g., -50.0 mm).

8.7.3 Positioning System (Te-PS)

See section 8.6.3 “Positioning System (Te-PS)”, 🗎 8-78

8.7.4 Air LiHa Panel

Cross References

List of cross references to information provided in other sections:

Information	References
Firmware compatibility list	See section 4.5, 🗎 4-21
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 8-24 *Air LiHa Functions and User Permissions*

Function	Type	User	FSE
Reset Setup	Setup		X
Set Default Parameters	Setup		X
Set Board and Axis Serial Numbers	Setup		X
Determine Range	Setup		X
Calibrate Lower DiTi Eject	Setup		X
Determine Reference Positions (Scaling and Offset)	Setup		X
Te-PS Carrier Angle Alignment	Setup	X	X
Te-PS Carrier Z-Plane Alignment	Setup	X	X
Arm Position Accuracy [a)]	Test		
Te-PS Compliance Test	Test		X
Te-PS Carrier Alignment Test	Test	X	X
Tip Adapter	Test	X	X
Reed Crosstalk	Test		
Tip Alignment	Alignment	X	X
Individual-Z with Te-PS Sensor Plate	Alignment	X	X
Individual-Z	Alignment	X	X
Tip Verify	Verify	X	X
Individual-Z Verify	Verify	X	X

Tab. 8-24 Air LiHa Functions and User Permissions

Function	Type	User	FSE
Reference Positions Verify	Verify	X	X
Move LiHa	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

a) Special test, for production department only

Air LiHa Files

The Air LiHa function can create the following files:

- **Result Files:** Test results are stored in *.any files.
-

Directory:	<data_path>\Results
File name:	Air LiHa_<serial_number>_<date>_<time>.any

Starting the Air LiHa Panel

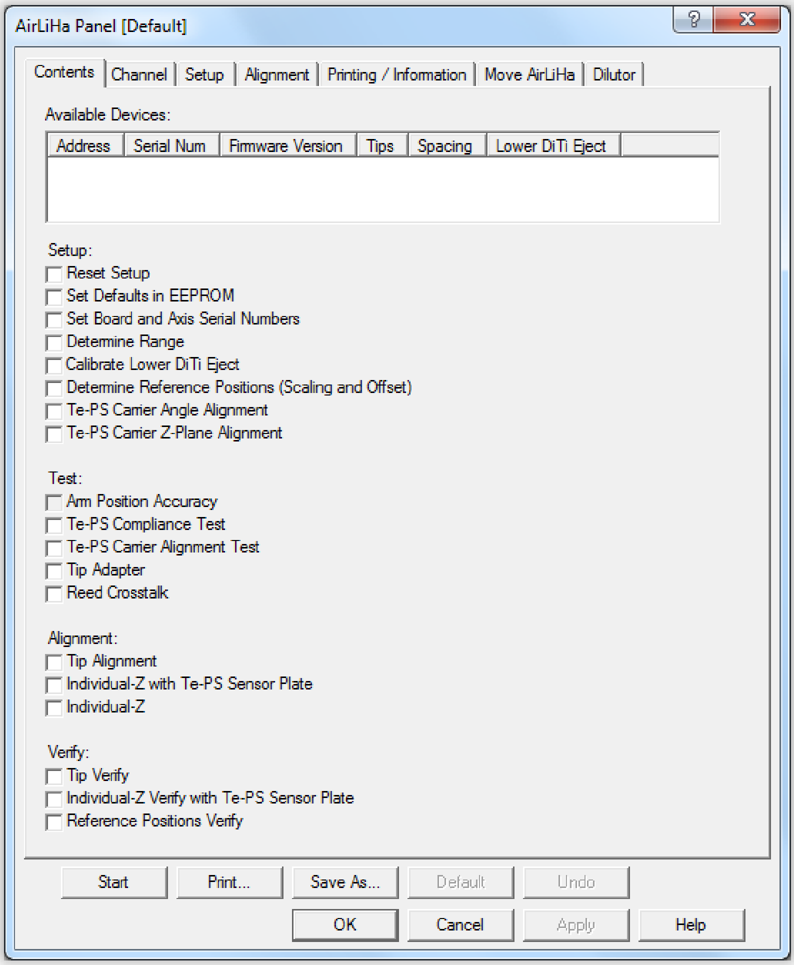
To set up and test the Air LiHa proceed as described below.

ATTENTION

Make sure that the correct firmware version is loaded. For details refer to the “Firmware compatibility list” (→ Cross References).

1 Start the panel with **System Devices > Air LiHa**.

*The Air LiHa panel with activated **Contents** page appears. After starting the Air LiHa panel no startup or test check box is selected and not all tabs are visible.*



Available Devices:

Setup:
☐ Reset Setup
☐ Set Defaults in EEPROM
☐ Set Board and Axis Serial Numbers
☐ Determine Range
☐ Calibrate Lower DiTi Eject
☐ Determine Reference Positions (Scaling and Offset)
☐ Te-PS Carrier Angle Alignment
☐ Te-PS Carrier Z-Plane Alignment

Test:
☐ Arm Position Accuracy
☐ Te-PS Compliance Test
☐ Te-PS Carrier Alignment Test
☐ Tip Adapter
☐ Reed Crosstalk

Alignment:
☐ Tip Alignment
☐ Individual-Z with Te-PS Sensor Plate
☐ Individual-Z

Verify:
☐ Tip Verify
☐ Individual-Z Verify with Te-PS Sensor Plate
☐ Reference Positions Verify

Fig. 8-128 *Air LiHa panel - Contents page*

Pages The Air LiHa panel is subdivided into the following pages:

Tab. 8-25 *Pages of the LiHa Panel*

Page	Description
Contents	General overview, procedure/test selection.
Channel	Setup/check of tips (length/types).
Alignment	Alignment/test of Te-PS Carrier, alignment/verification of tips, Te-PS Compliance Test
Setup	Serial number setting for Air LiHa boards. Definition of tips (and other parameters) for the tests.

Tab. 8-25 Pages of the LiHa Panel (cont.)

Page	Description
Test Configuration	For **Tip Adapter** test, **Reed Crosstalk** test and **Arm Position Accuracy** test (**Arm Accuracy** test is for Production only).
Printing / Information	Print selection for the QC-report.
Move LiHa	Movement tool.
Diluter	Tool that lets you check the plunger drives.

8.7.5 Channel Page

Cross References

List of cross references to information provided in other sections:

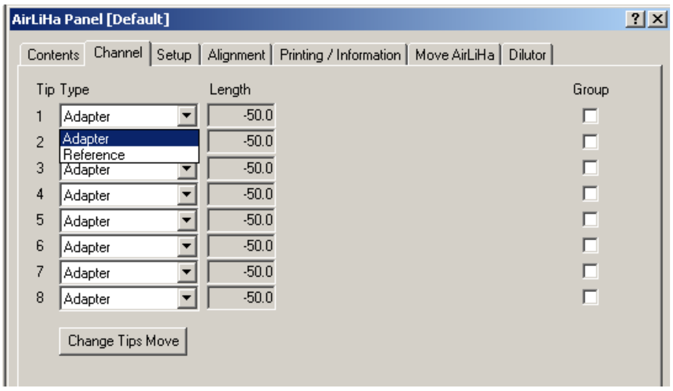
Information	References
Determine Reference Positions	See section 8.6.14, 🗎 8-99

8.7.5.1 Introduction

Purpose

The Channel page lets you check and define the following:

- **Tip type**.
- **Length** is automatically set based on Tip Type.



Tip	Type	Length	Group
1	Adapter	-50.0	☐
2	Adapter	-50.0	☐
3	Adapter	-50.0	☐
4	Adapter	-50.0	☐
5	Adapter	-50.0	☐
6	Adapter	-50.0	☐
7	Adapter	-50.0	☐
8	Adapter	-50.0	☐

Fig. 8-129 *Air LiHa - Channel page configured for tip adapters (DiTis)*

Controls

The **Channel** page contains the following controls:

Tip	Tip number. Tip number 1 is the rearmost tip.
Type	List from which the type of the installed tip can be selected. • Adapter (for DiTis) • Reference (for reference tips)
Length	Length difference in mm of the DiTi adapter relative to the reference tip. A negative value indicates that the DiTi adapter is shorter than the reference tip.
Group	Check boxes to set identical parameters for multiple channels. You can set the parameters for channels 1, and select its **Group** box. The parameters of the channels below (provided their **Group** boxes are not selected) are set equal to those of channel 1.
Change Tips Move	If you click on this button the Air LiHa is moved over the left reference position (as defined with **Define Reference Positions** → Cross References), and spreads the tips so that they can be installed or removed easily. In addition, the power supply of the X- and Y-axes is switched off and the z-move buttons on the Move Page are enabled so that the Air LiHa or parts of it can be moved by hand to another position. At the end, the Z-axes will be initialized and the Channel Settings will be stored to the instrument.

8.7.5.2 Setting Up the Tips

Setting the Tip Configuration

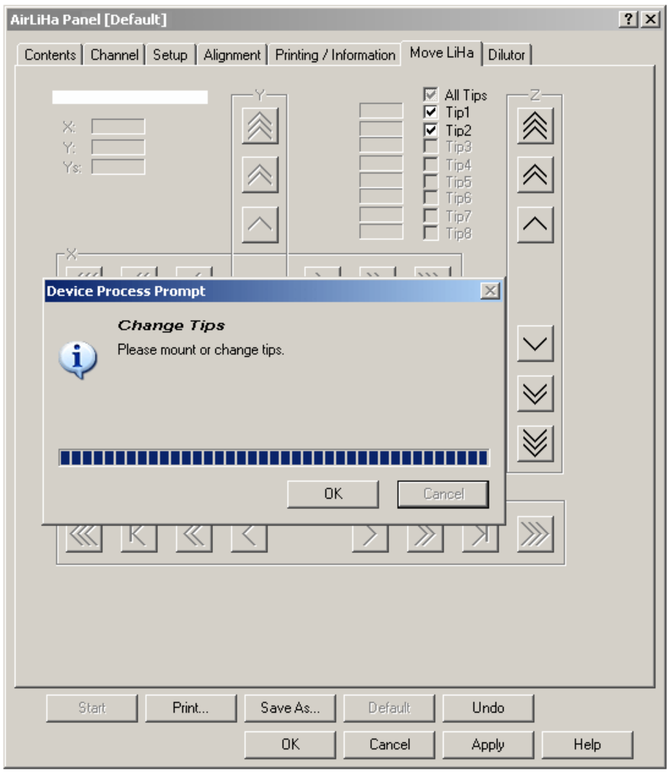
To configure the tips that are physically installed:

1. Start the Air LiHa panel with **System Devices > Air LiHa** and change to the **Channel** page.
2. Configure the channels according to the installed tips. Start with Channel # 1 and set the following tip parameters. For more details refer to the explanations and figures in section 8.7.5.1 “Introduction”, 🗎 8-141.
   - – **Type:** Select the installed tip type.
   - – **Length:** is automatically set based on selected Tip Type
   - – **Group**: Select this check box if the parameters of one or or more of the following tips are identical with those of the current tip. Clear it otherwise.
3. Repeat step 2 if there are more channels or channel groups to configure.
4. Click **Apply** to write your entries to the Air LiHa.

8.7.5.3 Mounting or Changing Tips

Mounting or Changing Tips

If you want to change the tips without performing a setup or test procedure you can click on the **Change Tips Move** button on the channel page. As has been explained before, the Air LiHa then moves over the left reference position, spreads the tips and switches off the power supply of the X- and Y-axes. The following prompt appears:



AirLiHa Panel [Default]

Device Process Prompt

Change Tips

Please mount or change tips.

☑ All Tips
☑ Tip1
☑ Tip2
☐ Tip3
☐ Tip4
☐ Tip5
☐ Tip6
☐ Tip7
☐ Tip8

Fig. 8-130 *Change Tips prompt*

To change the tips:

1. If necessary, move the Air LiHa by hand to a position that is more convenient for you, spread the tips and, if necessary, move the Z-axis using the Move Page.
2. Change, replace or mount the required tips as necessary.
3. Click again on **OK** when finished.

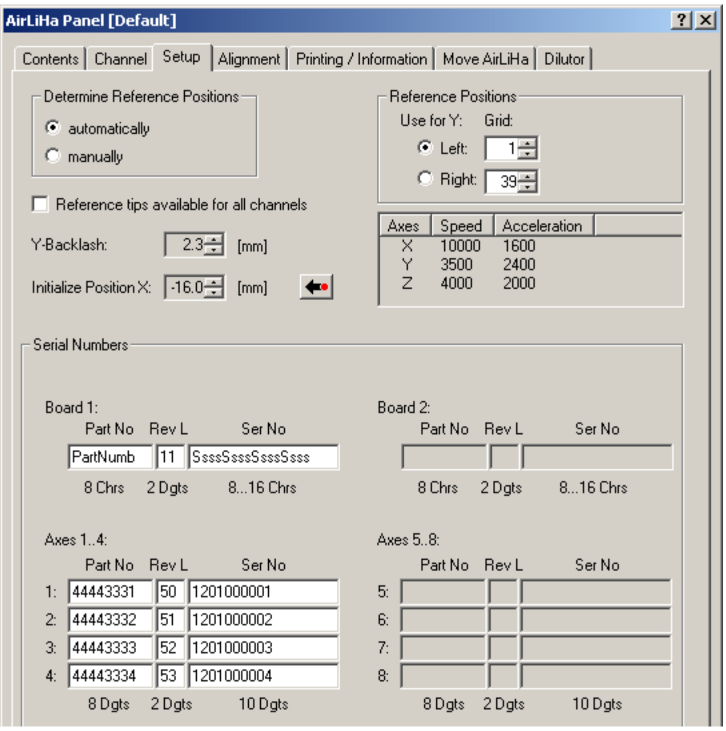
   The Z-axis of the Air LiHa will be reinitialized.
4. Channel settings will be stored to the instrument.

***Note:** The above prompt appears only if you want to change or mount tips **outside a setup or test procedure**. If it is necessary to mount, remove or change tips within a setup of test procedure, an appropriate (and more specific) prompt will appear automatically.*

8.7.6 Setup Page

Purpose

The **Setup** page provides the controls for setting the parameters for the various setup procedures and the serial numbers for the Air LiHa control boards and plunger drives.



Determine Reference Positions
● automatically
○ manually

☐ Reference tips available for all channels

Y-Backlash: 2.3 [mm]

Initialize Position X: -16.0 [mm]

Reference Positions
Use for Y: Grid:
● Left: 1
○ Right: 39

Axes	Speed	Acceleration
X	10000	1600
Y	3500	2400
Z	4000	2000

Serial Numbers

Board 1:

Part No	Rev L	Ser No
PartNumb	11	SsssSsssSsssSsss
8 Chrs	2 Dgts	8...16 Chrs

Board 2:

Part No	Rev L	Ser No
8 Chrs	2 Dgts	8...16 Chrs

Axes 1..4:

	Part No	Rev L	Ser No
1:	44443331	50	1201000001
2:	44443332	51	1201000002
3:	44443333	52	1201000003
4:	44443334	53	1201000004
	8 Dgts	2 Dgts	10 Dgts

Axes 5..8:

	Part No	Rev L	Ser No
5:			
6:			
7:			
8:			
	8 Dgts	2 Dgts	10 Dgts

***Fig. 8-131** Air LiHa - Setup page*

Controls

The **Setup** page contains the following controls:

Determine Reference Positions	Frame with the controls for specifying the conditions for determining the reference positions
- **automatically**	Option button for automatic determination

- **manually**	Option button for manual determination
Reference Positions	Frame for setting the reference positions
- **Grid**	Spin boxes for setting left/right reference grid positions
- **Use for Y**	Option buttons to specify if reference positions in Y-axis are determined at left or right reference position
Reference tips available for all channels	Check box to be selected if a reference tip is available for each tip adapter.
Y- Backlash	The value is set to 2.3 mm by default and should be altered in special cases only.
Initialize Position X	This spinbox must be used if the **Initialize to front feature** has been enabled on the **Basic Setup > Worktable** page. It defines the position (relative to grid position # 1) in which the arm is to be initialized. The position must be chosen so that no collisions of the arm during initialization are possible. Example: If the required grid position is 18, then the spin box must be set to (18 - 1) x 25 mm = 425 mm (Note that the X-distance between two neighboring grid positions is 25 mm).
⬅●	Allows setting the current arm position as the initialization position
Table below Reference Positions frame	Shows current speed and acceleration in X, Y and Z axes.
Serial Numbers	Frame with text boxes to check / enter the data for two Air LiHa control boards and eight plunger drives (Axes): Board 1 and Axes 1...4: pipetting channel 1 to 4 Board 2 and Axes 5...8: pipetting channel 5 to 8
- **Part No**	SAP part number of the board / plunger drive
- **Rev L**	Revision level of the board / plunger drive
- **Ser No**	Serial number of the board / plunger drive

8.7.7 Reset Setup

For a description of this procedure go to 8.6.10 “Reset Setup”, 🗎 8-96.

8.7.8 Set Defaults in EEPROM

For a description of this procedure go to 8.6.11 “Set Default Parameters in EEPROM”, 🗎 8-96.

8.7.9 Set Board and Axis Serial Numbers

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Setup** page displays the serial numbers of the Air LiHa control boards and the plunger drives (Axes) of the Air LiHa pipetting channels (see 8.7.6 “Setup Page”, 🗎 8-143). Where necessary, for example in a repair case, the numbers can be set or changed manually on this page.

Controls

The **Setup** page contains the frame **Serial Numbers** with the following controls See Fig. 8-131, 🗎 8-143:

Part No[a)]	Text field to enter / display the Tecan part number
Rev L[b)]	Text field to enter / display the revision level of the part
Ser No[a)]	Text field to enter the serial number of the part

a) For Air LiHa Boards: entry allows characters,
for Axes (plunger drives): entry allows digits only
b) Entry allows digits only

Procedures

To Display the Serial Numbers:

1 Go to the **Setup** page in the **Air LiHa** panel (see 8.7.6 “Setup Page”, 🗎 8-143).

To Enter or Change a Serial Number:

1 On the **Contents** page, select the **Set Board and Axis Serial Numbers** check box and change to the **Setup** page (see 8.7.6 “Setup Page”, 🗎 8-143).
2 If, in an exceptional case, an invalid serial number or no serial number is set for a device, select the corresponding text fields (**Part No, Rev L, Ser No**) and enter the valid serial number data.
3 Save your entries with **Start**.

***Note:** In case of a part replacement or field upgrade you always have to enter the new serial number data for each part manually.*

8.7.10 General LiHa Functions

Purpose of This Section

This section refers to the setup, test, alignment, and verification procedures that are listed on the Air LiHa panel and are valid for any Liquid Handling Arm (LiHa or Air LiHa) installed on a Freedom EVO.

Cross References

List of cross references to information provided in other sections:

Function / panel	**Reference**
Move LiHa	See section 8.6.7, 🗎 8-90
Test Configuration Page	See section 8.6.8, 🗎 8-92
Alignment Page	See section 8.6.9, 🗎 8-94
Reset Setup	See section 8.6.10, 🗎 8-96
Set Default Parameters in EEPROM	See section 8.6.11, 🗎 8-96
Determine Range	See section 8.6.12, 🗎 8-97
Calibrate Lower DiTi Eject	See section 8.6.13, 🗎 8-98
Determine Reference Positions	See section 8.6.14, 🗎 8-99
Mechanical Prealignment of the Te-PS Carrier	See section 8.6.15, 🗎 8-101
Te-PS Carrier Angle Alignment	See section 8.6.16, 🗎 8-102
Te-PS Carrier Z-Plane Alignment	See section 8.6.17, 🗎 8-106
Arm Position Accuracy	See section 8.6.18, 🗎 8-108
Te-PS Compliance Test	See section 8.6.19, 🗎 8-109
Te-PS Carrier Alignment Test	See section 8.6.20, 🗎 8-112
Tip Adapter	See section 8.6.21, 🗎 8-114
Tip Alignment	See section 8.6.23, 🗎 8-116
Reed Crosstalk	See section 8.6.22, 🗎 8-115
Individual-Z with Te-PS Sensor Plate	See section 8.6.24, 🗎 8-119
Individual-Z (without Te-PS Sensor Plate)	See section 8.6.25, 🗎 8-121
Tip Verify	See section 8.6.26, 🗎 8-125
Individual-Z Verify	See section 8.6.27, 🗎 8-126
Reference Positions Verify	See section 8.6.28, 🗎 8-127

8.7.11 Dilutor Tool

Why Dilutor Tool for Air LiHa?

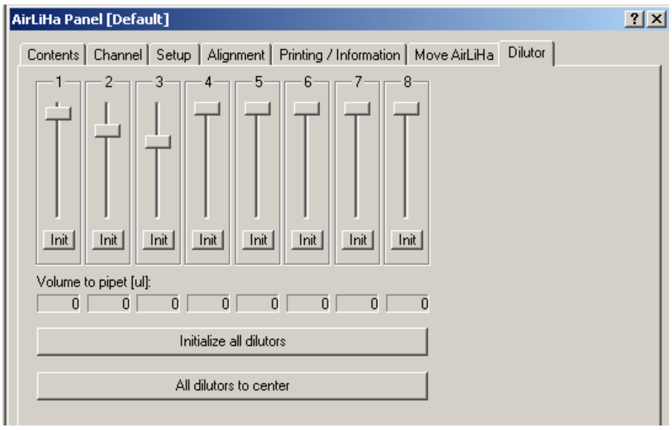
The Air (displacement) LiHa does not use system liquid and therefore does not use diluters. The diluters are substituted by plunger drives on the Air LiHa. In the Air LiHa tip adapter the air gap for pipetting is varied by a plunger controlled by a plunger drive instead of system liquid controlled by a diluter. In either case the air gap is used for pipetting. The **Dilutor** tool was created for a pipetting system with diluters and system liquid. But it can now also be used for the Air LiHa to check the individual pipetting channels for correct functioning.

Description

The **Dilutor** tool serves for checking the plunger drives. Each plunger drive can be activated individually. For example, this tool allows the field service engineer to find out the following:

- Whether the plunger drive address switches are set correctly. If, for example, the same address is assigned to two different plunger drives, one of them cannot be activated.
- Whether each plunger drive is connected to the correct LiHa channel.

Note: *The* ***Dilutor*** *tool cannot be used to set or adjust any values that are stored in memory. SnS_Customer access rights are sufficient to operate the* ***Dilutor*** *tool.*



Volume to pipet [ul]: 0 0 0 0 0 0 0 0

Fig. 8-132 *Dilutor tool*

The **Dilutor** tool is subdivided into eight channels that are associated with the corresponding plunger drives and tips. The control elements of those channels at which no plunger drive is recognized (because it is not installed, wrongly addressed or otherwise malfunctioning) are not enabled.

Controls

The following list provides a brief overview of the control elements:

Sliders 1 to 8	There is one slider per channel. The sliders serve for aspirating and dispensing air through the associated plunger drives.
Init buttons 1 to 8	For initializing the plunger drives individually.
Text fields 1 to 8 Volume to pipet in [µl]	Show the volume in µl that will be aspirated or dispensed by the respective plunger drive. If the indicated value is positive, the indicated air quantity will be aspirated, if it is negative it will be dispensed.
Initialize all dilutors	Initializes all plunger drives at once.
All dilutors to center	Moves all plungers to a center (middle) position

Initializing the Plunger Drives

Before you can use the plunger drives you must initialize them. You can do this in two ways:

- You can initialize all plunger drives at once by clicking on the large command button **Intitialize all diluters.**
- You can also initialize the plunger drives one by one by clicking on the **Init** button of the respective channel. In this way you can only initialize one plunger drive at a time.

Move plungers to center

Regardless of the current positions and initialization states of the plungers:

- You can move the plungers to a center (middle) position by clicking on the large command button **All dilutors to center**.

Note: *This function has to be performed before removing / installing any Air LiHa tip adapter.*

Aspirating and Dispensing with the Plunger Drives

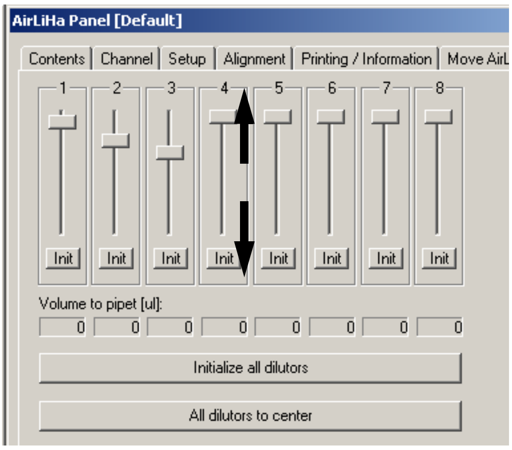


Fig. 8-133 Aspirating/dispensing air

The arrows in the figure on the left indicate in which direction a slider must be dragged to aspirate or dispense air.

- **Down arrow:** For determining the air quantity to be aspirated.
- **Up arrow:** For determining the quantity to be dispensed.

Details see below.

To aspirate air:

1. Use the mouse to point to the respective slider and drag the slider downwards (↓) until the text box below indicates the desired volume.
2. Release the mouse button. The plunger drive aspirates the defined quantity of air.
3. Check if the correct plunger drive is activated.
   - If you have dragged slider # 1, the leftmost plunger drive must aspirate air.
   - Likewise, if you have dragged slider # 8, the rightmost diluter must aspirate air.

To dispense aspirated air:

1. With the mouse, point to the desired slider and push it upwards (↑) until the associated text box indicates the required quantity.
2. Release the mouse button. The plunger drive presses the defined quantity of air through the tip.
3. Check whether the correct plunger drive is activated and whether the air emerges from the correct tip.
   - If you have pushed up slider # 1, air must be pressed out of the rearmost tip (channel # 1).
   - Likewise, if you have pushed up slider # 8, air must emerge from the front tip (channel # 8).

In case of errors:

- If the wrong plunger drive reacts check the address settings. Note that the address number corresponds to

  Diluter # minus 1 (i.e. plunger drive 1 has address 0, diluter 8 has address 7).
- If air is blown out from the wrong tip check the connection between the plunger drive and the tip.

- Consult the appropriate Service Manual for detailed information.

8.7.12 Test of Inline Filter and MultiSense Functionality

The Air LiHa tip adapter has MultiSense functionality integrated and comprises a special Inline filter to prevent the tip adapter pressure channel from contamination.

For descriptions of the MultiSense (PMP) test procedures including an Inline filter test refer to section 10.6 “PMP Function”, 🗎 10-27.

8.7.13 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

8.8 Multichannel Arm 384

Purpose of This Section

This section describes the setup, test and alignment procedures necessary for a Multichannel Arm 384 installed on a Freedom EVO-2.

What Is an MCA384?

The Multichannel Arm 384 is a pipetting arm that can move across the worktable. It is equipped with a 384 channel pipetting head, which can simultaneously pipette 384-well or 96-well microplates. Pipetting can be done in two ways:

- Using a 384 fixed tip adapter plate attached to the MCA384 head.
- Using 384 or 96 DiTis on an Adapter DiTi MCA384 to reduce the risk of carry over to a minimum.

An optional CGM gripper module can be mounted on the right side of the Multichannel Arm 384 that allows moving labware across the worktable (see 8.9 “CGM (MCA384 Gripper)”, 🗎 8-182).

MCA384 / CGM Precondition.

If a CGM is installed, it must be setup before the MCA384 setup.

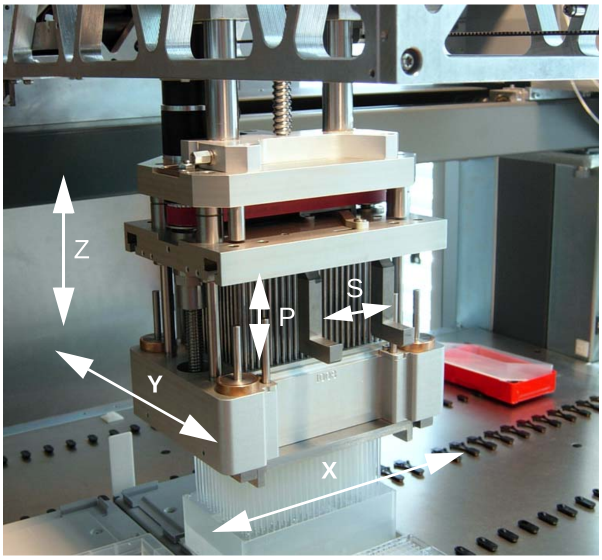


Fig. 8-134 Multichannel Arm 384, movement axes

Movement Axes

The MCA384 or parts of it can move in the following axes:

- X-axis, along the worktable
- Y-axis. The MCA384 head can move backwards and forward in the Y-axis.
- Z-axis. Parts of the head can move in the Z-axis to accomplish tasks like the following:
  - Move to up and down to pipetting position
  - Pick up / drop single rows or columns of DiTis
  - For setups, tests and mechanical alignments
- P-axis: Up / down movement of the plungers
  - Pick up / release the MCA384 Adapter
  - Pick up / dispose of DiTis
  - Pipetting
- S-axis: Switch the head mechanics between the functions:
  - Pick up / release the MCA384 Adapter

- Pick up / drop DiTis
- Pipetting

8.8.1 Required Tools

MCA384 Adapter

For mounting the reference pins, one of the following MCA384 Adapters must be available:

- Adapter QC MCA384
- Adapter DiTi MCA384
- Adapter DiTi Combo MCA384

Reference Pins

The reference pins (P/N 30020068) serve for the mechanical alignment of the MCA384 head and for some setup und test procedures. For the alignment of the head they are used in combination with reference holes (or pins) in the MCA384 System Carrier. Depending on the alignment, setup or test to be performed, the appropriate reference pins (A) must be fixed to the appropriate MCA384 Adapter (B) mounted on the MCA384 head:

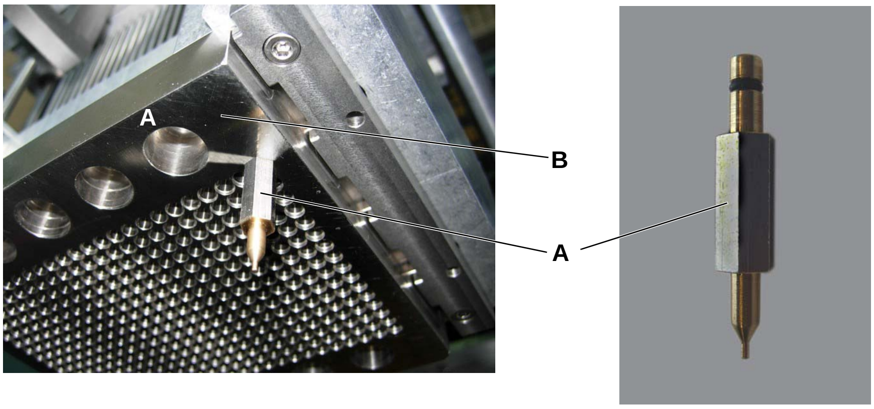


Fig. 8-135 *Reference pin mounting*

ID Board Sensor Test Tool

The ID board sensor test tool (P/N 30020069) serves to test the adapter sensors individually on the ID board.

Fig. 8-136 *ID board sensor test tool*

A	*ID board sensor test tool, shaft*	***B***	*Magnet*

8.8.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

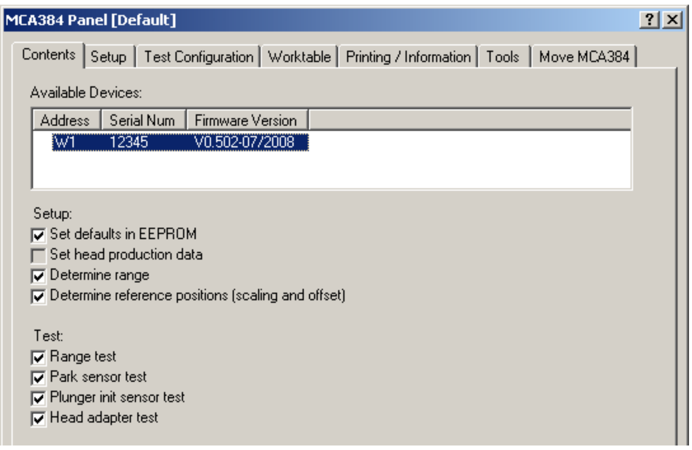
Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Function	Type	User	FSE
Set defaults in EEPROM	Setup		X
Set head production data	Setup		X
Determine range	Setup		X
Determine reference positions (scaling and offset)	Setup		X
Range test	Test	X	X
Park sensor test	Test	X	X
Plunger init sensor test	Test	X	X
Head adapter test	Test	X	X

Starting the Panel

1 Start the panel with **System Devices > MCA384**. The **MCA384** panel with activated **Contents** page appears. After starting the **MCA384** panel no setup or test check boxes are activated.



Available Devices:

Address	Serial Num	Firmware Version
W1	12345	V0.502-07/2008

Setup:
☑ Set defaults in EEPROM
☐ Set head production data
☑ Determine range
☑ Determine reference positions (scaling and offset)

Test:
☑ Range test
☑ Park sensor test
☑ Plunger init sensor test
☑ Head adapter test

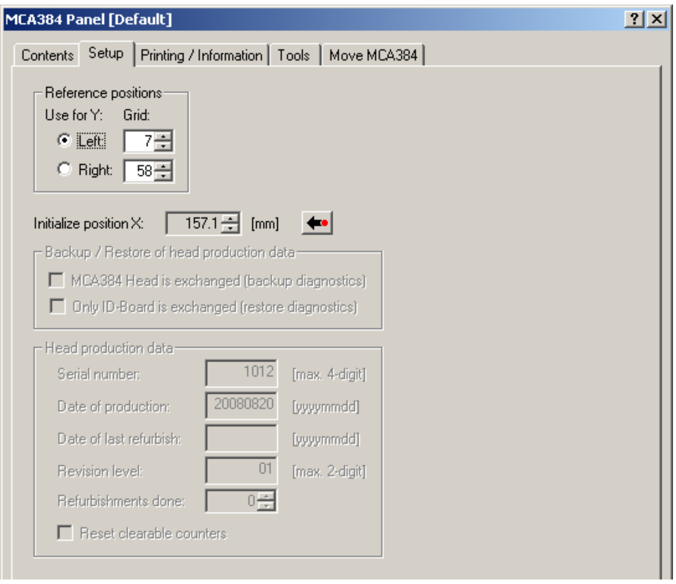
__Fig. 8-137__ MCA384 panel, Contents page

Tab. 8-26 Pages of the MCA384 panel

Pages	Function
Contents	General overview, device and procedure selection
Setup Page	Definition of setup parameters
Test Configuration	Lets you set the parameters for the head adapter test
Worktable	Selection of an appropriate worktable map
Printing / Information	Print selection for the QC-report
Tools	For removing, installing and aligning the pipetting head and for some sensor testing
Move MCA384	Lets you move the MCA384 to the required position

8.8.3 Setup Page

The **Setup** page provides the controls for setting the parameters for the various setup procedures



Reference positions
Use for Y: Grid:
● Left: 7
○ Right: 58

Initialize position X: 157.1 [mm]

Backup / Restore of head production data
☐ MCA384 Head is exchanged (backup diagnostics)
☐ Only ID-Board is exchanged (restore diagnostics)

Head production data
Serial number: 1012 [max. 4-digit]
Date of production: 20080820 [yyyymmdd]
Date of last refurbish: [yyyymmdd]
Revision level: 01 [max. 2-digit]
Refurbishments done: 0
☐ Reset clearable counters

Fig. 8-138 MCA384 panel, Setup page

Controls

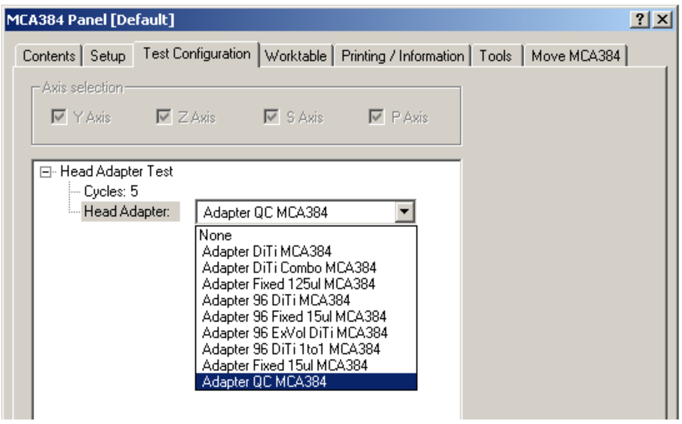
Reference positions	Frame for setting the reference positions.
- **Grid**	Spin boxes for setting left and right reference grid positions.
- **Use for Y**	Option buttons that let you specify whether the reference positions in the Y-axis should be determined in the left or right reference position.

Initialize position X	This spinbox must be used if the **Initialize to front feature** has been enabled on the **Basic Setup > Worktable** page. The spinbox defines the position (relative to grid position # 1) in which the arm is to be initialized. The position must be chosen so that no collisions of the arm during initialization are possible. Example: If the required grid position is 18, then the spin box must be set to (18 - 1) x 25 mm = 425 mm (Note that the X-distance between two neighboring grid positions is 25 mm).
⬅●	Allows you to set the current arm position as the initialization position.
Backup / Restore of head production data	Selection to make sure that the correct diagnostics is stored depending on a head exchange or an ID-board exchange.
- **MCA384 head is exchanged (backup diagnostics)**	If selected, the data from the head (ID board) will be written up to the MCA384 DCU board.
- **Only ID board is exchanged (restore diagnostics)**	If selected, the data from the MCA384 DCU board will be written down to the ID board.
Head production data	
- **Serial number**	For setting the serial number (max. 4 digits). **Set by the manufacturer**.
- **Date of production**	For setting the date of the production of the 384 channel head. **Set by the manufacturer**.
- **Date of last refurbish**	For setting the date of the last refurbishment of the 384 channel head (if ever). **Set by the manufacturer**.
- **Revision level**	For setting the revision level of the 384 channel head (max. 2 digits). **Set by the manufacturer**.
- **Refurbishments done**	Number of refurbishments done. **Set by the manufacturer**.
- **Reset clearable counters**	Resets the movement counters of the P- and S-axis after the last refurbishment. **Set by the manufacturer**.

8.8.4 Test Configuration Page

Purpose

The **Test Configuration** page lets you set the number of test cycles for the **Head Adapter Test** and select the MCA384 Adapter type.



Cycles: 5
Head Adapter: Adapter QC MCA384

Fig. 8-139 MCA384 panel, Test Configuration page

Controls

Axis selection	Only used in assembly line.
Head Adapter Test	
- **Cycles**	Allows to set the number of test cycles.
- **Head adapter**	Allows to select an MCA384 Adapter type for the test.

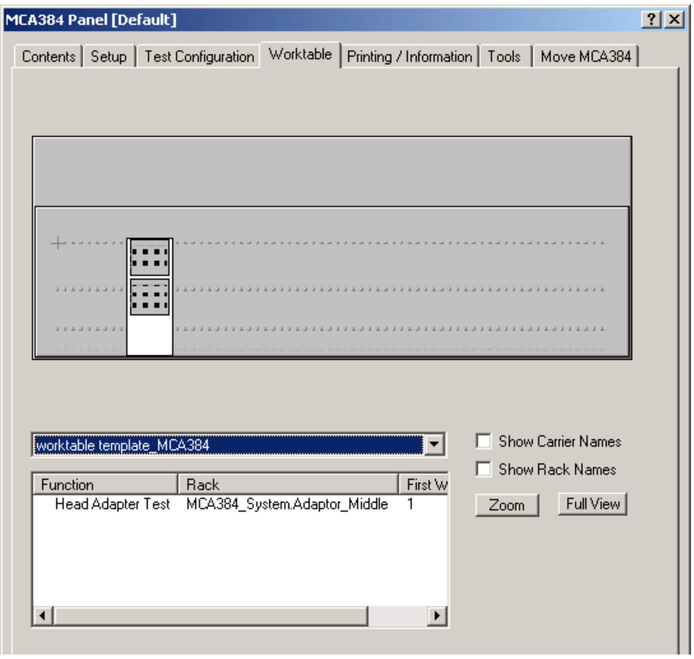
8.8.5 Worktable Page

Cross References

List of cross references to information provided in other sections:

Information	References
Description of the Worktable page	See section 5.2.7, 🗎 5-20
Worktable Complete Editor	See chapter 14, 🗎 14-1

The Worktable page lets you select an appropriate worktable map that is adapted to a specific function (→ Cross References).



worktable template_MCA384

Function	Rack	First W
Head Adapter Test	MCA384_System.Adaptor_Middle	1

Fig. 8-140 *MCA384 Worktable page*

The previous figure shows a predefined worktable layout for the MCA384 **Head Adapter Test**. If necessary the System Carrier shown on the worktable can be moved and repositioned with the mouse directly on the screen. In addition you can use the Worktable Complete Editor (see cross references) to adapt the worktable layout to the application run on the instrument.

8.8.6 Tools Page

Cross References

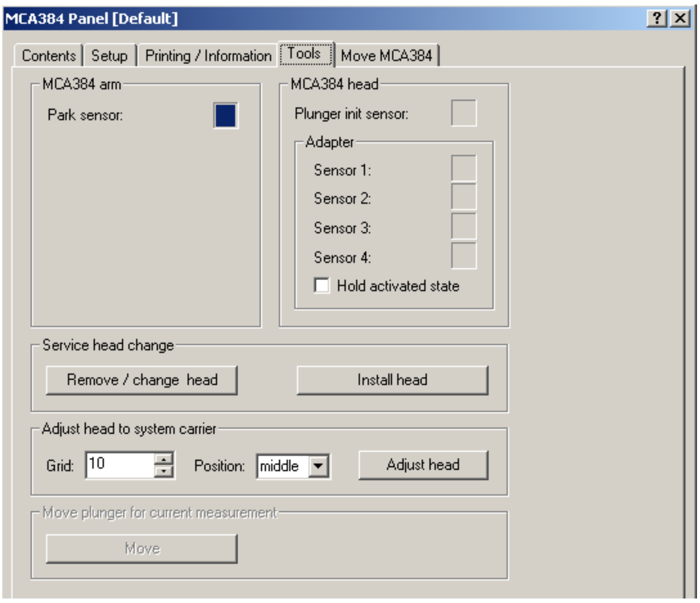
List of cross references to information provided in other sections:

Information	References
Remove the MCA384 head	Refer to the instrument’s Service Manual, chapter “Maintenance and Repair”
Install the MCA384 head	To reinstall the same head or install a new head, see Service Manual.
Move MCA384 page	See section 8.8.7, 🗎 8-159

Purpose

The **Tools** page contains the controls to remove / install and adjust the MCA384 head. The adjustment is carried out with reference pins and the System Carrier. For moving the head the **Move MCA384** page is used.

In addition, the **Tools** page contains indicators to help testing the **Park** sensor, **Plunger init** sensor and the **Adapter** plate sensors.



Grid: 10

Position: middle

Fig. 8-141 MCA384 panel, Tools page

Controls

MCA384 arm	
- **Park sensor**	Indicates if the MCA384 arm is in **park** position (Y- and Z-axis in park position).
MCA384 head	
- **Plunger init sensor**	Indicates if the plungers are in **“park”** position (shown with plunger test or manual plunger move).
- **Adapter** **- Sensor 1 - 4**	Indicators for sensor 1 to sensor 4 (Sensing the coding magnets in the adapter plates).
- **Adapter** **- Hold activated state**	When the check box “Hold activated state” is selected, the sensor indicators stay ON after a coding magnet is sensed.
Service head change	
- **Remove / change head**	Button to start the remove / change head procedure.
- **Install head**	Button to start the install head procedure.
Adjust head to System Carrier	
- **Grid**	Grid position of the System Carrier.
- **Position**	Rack position on the System Carrier.
- **Adjust head**	Button to start the head adjustment procedure.
Move plunger for current measurement	Current measurement in production only. (deactivated for FSE)
- **Move**	Current measurement in production only. (deactivated for FSE)

Using the Tools Page

Remove Head

This procedure lets you lower the pipetting head onto the worktable, so that you can disconnect and remove it. To protect the bottom part of the head do the following:

- If there is any of the available MCA384 Adapters installed on the head, drop it. Install instead the Adapter QC MCA384 (refer to section 8.8.9 “Picking Up and Dropping an MCA384 Adapter”, 🗎 8-162).
- Place the foam block that is provided with the head packaging on the worktable where you intend to lower the head for removal.

Note: *For a detailed description of the removal refer to the instrument’s Service Manual (see cross references).*

1 After starting the **MCA384** panel change to the **Tools** page.

2 Click on the button **Remove / change head**.

3 Follow the instructions on the screen and those provided in the Service Manual of the instrument *(see cross references)*.

Install Head

This procedure supports the installation of the pipetting head.

Note: *For details on how to remove and install the head refer also to the Service Manual of the instrument (see cross references).*

To install the head:

1 Start the **MCA384** panel and change to the **Tools** page.

2 Click on the button **Install head**.

3 Follow the instructions on the screen and those provided in the Service Manual of the instrument *(see cross references)*.

4 Check the correct alignment of the pipetting head. See below.

Adjust Head to System Carrier

This frame contains the elements you need to do the following:

- Check the alignment of the head and, if necessary, realign it. For details see 8.8.10 “Check Adjustment of MCA384 Head”, 🗎 8-165.

Adapter Sensor Test

To test the adapter sensors on the ID board individually you can use the special ID board sensor test tool (refer to 8.8.1 “Required Tools”, 🗎 8-151). With the magnet on the tool you can activate a particular sensor on the ID board. The frame **Adapter** on the **Tools** page will indicate the sensing (see Fig. 8-141, 🗎 8-157). If the check box **Hold activated state** is selected, the once sensed state will be kept on the display until you deselect the check box **Hold activated state.**

Note: *Remove any installed MCA384 Adapter prior to testing the sensors with the ID board sensor test tool.*

8.8.7 Move MCA384 Page

Cross References

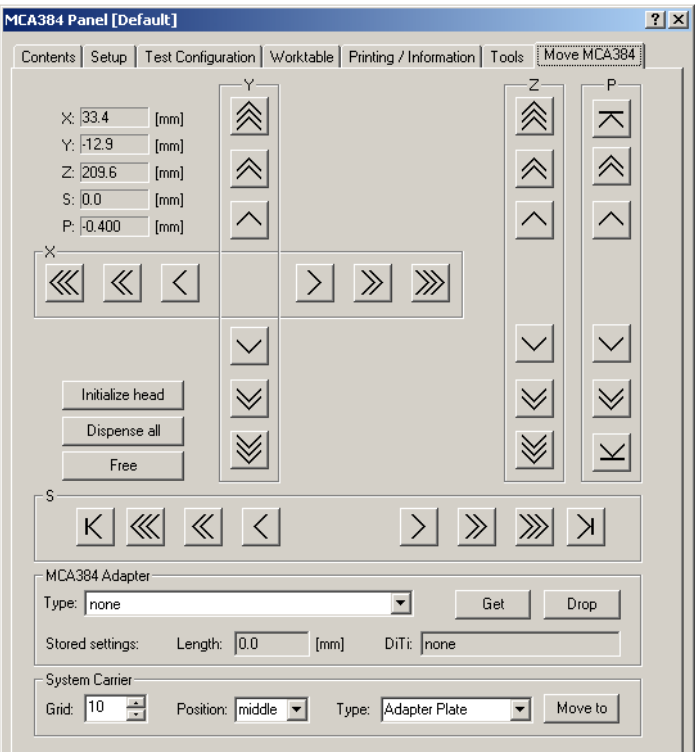
List of cross references to information provided in other sections:

Information	References
MCA384 movement axes	See section 8.8, 🗎 8-150
Pick up and drop an MCA384 Adapter	See section 8.8.9, 🗎 8-162

__Note:__ This function works only if the MCA384 has been selected before on the __Contents__ page.

Purpose

The **Move MCA384** page lets you move the whole MCA384 or parts of it in the appropriate axes: X, Y, Z, P and S(→ Cross References).



X: 33.4 [mm]
Y: -12.9 [mm]
Z: 209.6 [mm]
S: 0.0 [mm]
P: -0.400 [mm]

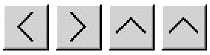
MCA384 Adapter
Type: none
Stored settings: Length: 0.0 [mm] DiTi: none

System Carrier
Grid: 10 Position: middle Type: Adapter Plate

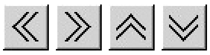
__Fig. 8-142__ Move MCA384 page

Controls

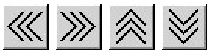
The **Move MCA384** page contains the following controls



Single step (1/10 mm) movement buttons.
(Plunger: 1/100 mm)



Ten steps (1 mm) movement buttons.
(Plunger: 1/10 mm)



Continuous movement buttons (if button is kept pressed).

⇤ ⇥ ⤒ ⤓	Logical movement buttons (move to next logical position). (Plunger: next mm)
Initialize head	Initializes the S- and P-axis (if necessary, the plungers will dispense all liquid first)
Dispense all	Moves plungers completely down to dispense possible remaining liquids
Free	Moves all other arms (LiHa, etc.) away from the selected device to their end positions.
X, Y	Text boxes indicating the current position of axis with respect to grid position # 1
Z	Current position of head in Z-axis (distance from worktable)
S	Current absolute position of the shift lever
P	Current plunger position (Z-distance from initial position)
MCA384 Adapter	Controls for picking up / dropping an adapter plate • **Type**: Allows to select an MCA384 Adapter type • **Lenght**: Shows the total length of the currently mounted MCA384 Adapter (thickness) plus tips (length). • **DiTi**: Shows the type of the currently mounted DiTi / Reference tip • **Get**: Button to pick up the MCA384 Adapter (see cross references). • **Drop**: Button to drop the MCA384 Adapter (see cross references).
System Carrier	Controls for defining the grid position of the System Carrier and the rack position within the System Carrier. • **Grid**: (Leftmost) grid position of the System Carrier • **Position**: Rack position (front, middle, rear) within the System Carrier where the MCA384 Adapter is located. • **Type**: item that is in the selected **Position** - Adapter Plate - Washstation • **Move to**: Moves the head over the predefined position.

Note:

- *The arrows on the movement buttons indicate the direction in which the respective part(s) will be moved.*
- *If you place the mouse pointer over a movement button, a text appears that shows the step size and explains what you can do with the button (so-called “tool tip”)*

Keyboard Control

It is also possible to use the keyboard for the movements in the various axes. You can use the corresponding keys of the numeric keypad or the keys in the key blocks left of the numeric keypad.

Tab. 8-27 Moving the arm with the keyboard

Key (left of numeric keypad)	Key in numeric pad (NumLock switched on)	Movement/rotation axes
Right arrow	6 Right arrow	X+ (right)
Left arrow	4 Left arrow	X- (left)
Down arrow	2 Down arrow	Y+ front
Up arrow	8 Up arrow	Y- (rear)
Page Up	PgUp 9	Z+ (up)
Page Down	PgDn 3	Z- (down)
	7 Home	S+
	1 End	S-
	+	P+ (up)
	-	P- (down)

Steps

The parts of the MCA384 are moved as follows:

- Every time you hit one of the above keys, the corresponding part is moved by one step (0.1 mm; plunger: 0.01 mm).
- If you keep a key pressed steps are continuously repeated until the key is released.
- You can keep a key pressed and at the same time press the Ctrl key. In this case, the arm is accelerated until it reaches a maximum speed.

ATTENTION

The plunger motor can get overheated and damaged when moving down with the P-axis move buttons to open the clamps and leave them open for too long (the motor generates in this situation a lot of force against the recuperating springs).

- Do not leave the clamps open (A in Fig. 8-143, 🗎 8-161) for more than 5 minutes after opening them with the P-axis move buttons.

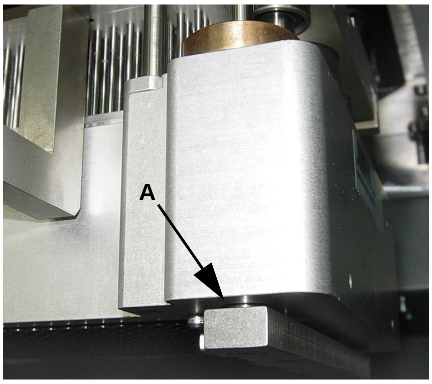


Fig. 8-143 Clamps open

8.8.8 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

8.8.9 Picking Up and Dropping an MCA384 Adapter

Purpose

This section describes how an MCA384 Adapter is picked up or dropped with the aid of the **Move MCA384** page.

Picking up an MCA384 Adapter

Note:

- *The following procedure shows how an MCA384 Adapter is picked up and dropped. The procedure to follow is for all adapters the same.*

To pick up an MCA384 Adapter, proceed as follows:

1 When prompted by the procedure, place the MCA384 Adapter (A) on the adapter block (B) on the System Carrier (C) as shown in the following figure.

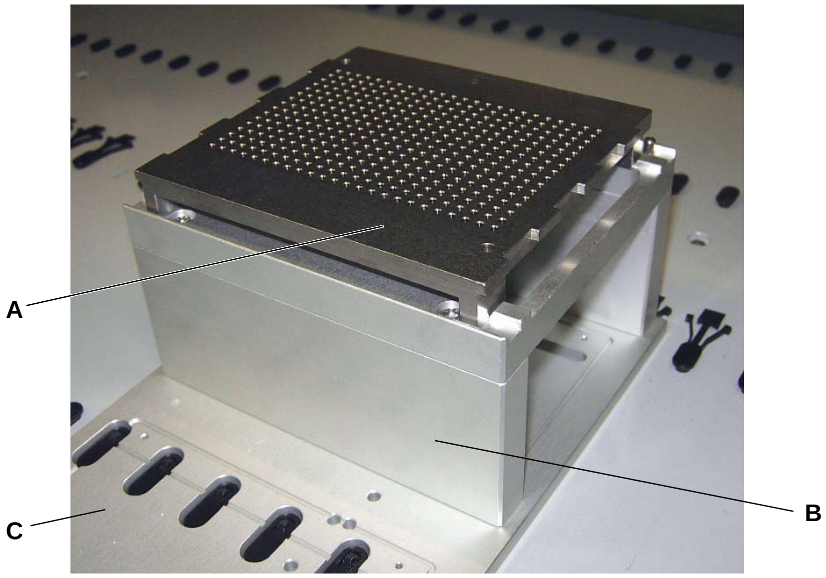
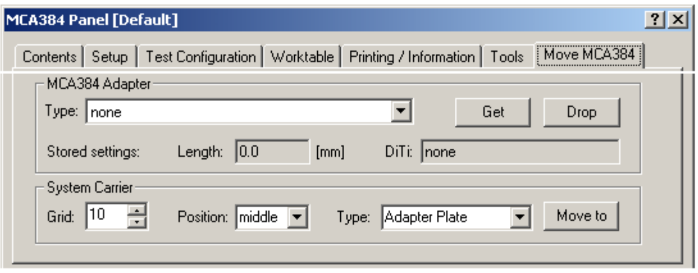


Fig. 8-144 *Place an MCA384 Adapter on the System Carrier*

A	*MCA384 Adapter*	*C*	*System Carrier*
B	*Adapter block*		

2 Open the **Move MCA384** page.


MCA384 Panel [Default]

MCA384 Adapter

Type: none

Stored settings: Length: 0.0 [mm] DiTi: none

System Carrier

Grid: 10 Position: middle Type: Adapter Plate

Fig. 8-145 *Move MCA384 page*

3 Enter the following parameters:

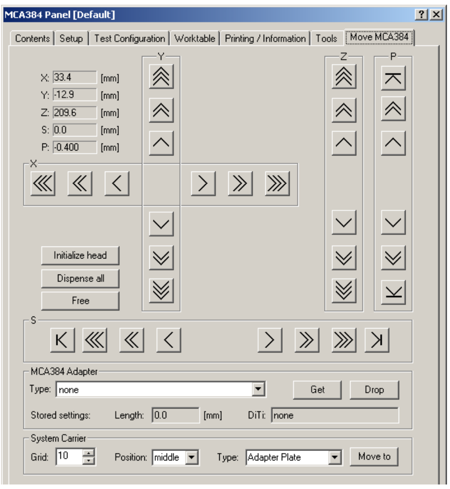
- Frame **MCA384 Adapter**: Select an MCA384 Adapter.
- Frame **System Carrier**:
  - **Grid**: Grid position of System Carrier (in our case **10**)
  - **Position**: Position of the MCA384 Adapter within the carrier (in our example **middle**)
  - **Type**: Select **Adapter Plate (get)**.

4 After you have made your entries click on the button **Move to**.

This moves the MCA384 head over the selected position on the service carrier.

5 Use the move buttons to move the head down until about 10 mm above the MCA384 Adapter**.**

6 Now move the head carefully into position:
   - The clamp noses must touch the MCA384 Adapter surface (Z-axis)
   - The head with the clamp noses must be centered to the MCA384 Adapter with equal spaces (C) on left and right (X-axis)
   - The front clamp noses must be aligned flush with the front of the MCA384 Adapter (D)

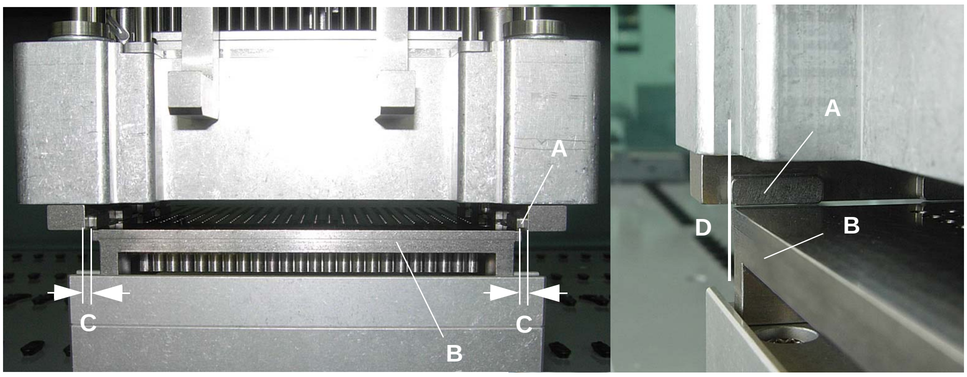


X: 33.4 [mm]
Y: -12.9 [mm]
Z: 209.6 [mm]
S: 0.0 [mm]
P: -0.400 [mm]

MCA384 Adapter
Type: none
Stored settings: Length: 0.0 [mm] DiTi: none

System Carrier
Grid: 10 Position: middle Type: Adapter Plate

A *Front clamp nose*
B *MCA384 Adapter*



WARNING

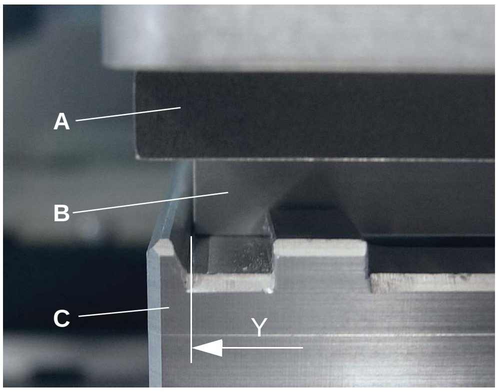
Incorrect height adjustment of the head before picking up the Adapter plate can lead to a wedged Adapter plate.

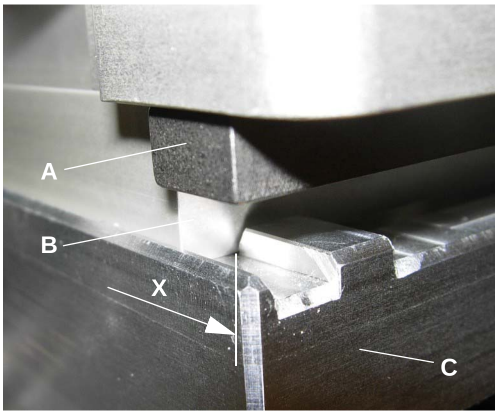
7 When the head is positioned properly, click **Get** on the **Move MCA384** page.

The MCA384 Adapter is picked up and you can use it for the required adjustment, check or setup procedure.

Put Back (Drop) an MCA384 Adapter

To put an MCA384 Adapter back on the adapter block, proceed as follows:





1 Click the **Move to** button on the **Move MCA384** page to move the MCA384 Adapter over the adapter block on the System Carrier.

2 Use the move buttons to lower the head until the adapter is, correctly positioned, laying on the adapter block, then click **Drop**.

This ejects the MCA384 Adapter and replaces it on the adapter block.

See positioning in X and Y in the figures on the left (arrows).

A	*Head (clamp)*
B	*MCA384 Adapter*
C	*Adapter block*

Picking up / Dropping DiTis

For a description of how to pick up or drop DiTis refer to the Freedom EVOware Software Manual.

8.8.10 Check Adjustment of MCA384 Head

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.8.1, 🗎 8-151
Move MCA384 page	See section 8.8.7, 🗎 8-159
Pick up / drop an MCA384 Adapter	See section 8.8.9, 🗎 8-162
Adjust the MCA384 head	Refer to the instrument’s Service Manual, chapter “Repair”

Purpose

This procedure explains how the alignment of the MCA384 head can be checked.

It is recommended that you verify the alignment of the head after you have installed it. The check can be carried out by an FSE.

Tools

You need the following tools:

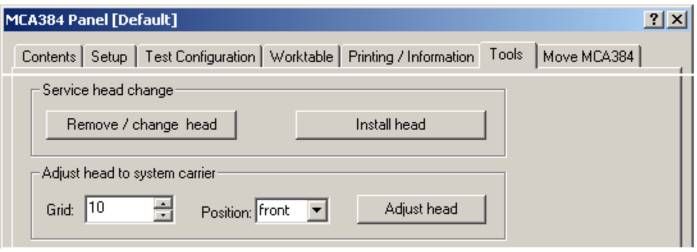
- One of the following MCA384 Adapters:
  - Adapter QC MCA384

  - Adapter DiTi MCA384
  - Adapter DiTi Combo MCA384
- Reference pins inserted in at least three of the four corner holes of the appropriate MCA384 Adapter.
- System Carrier with adjustment pins.

Checking the Alignment

To check the alignment of the MCA384 head:

1. If not done yet, start the MCA384 panel and change to the **Tools** page (see following figure).
2. On the **Tools** page, specify the following parameters:
   - **Grid**: Grid position of System Carrier (in our example **10**)
   - **Position**: Position within the System Carrier where you want to adjust the head (in our example **front**)

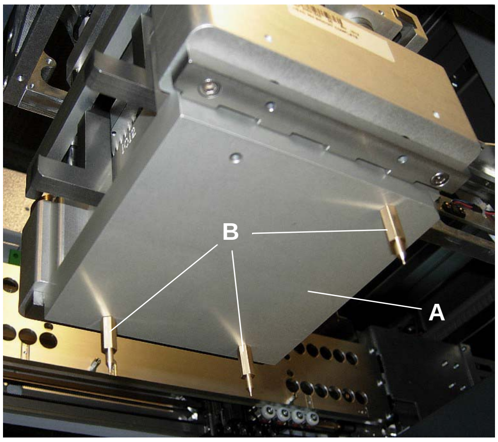


Grid: 10
Position: front

Fig. 8-146 *MCA384 Tools page*

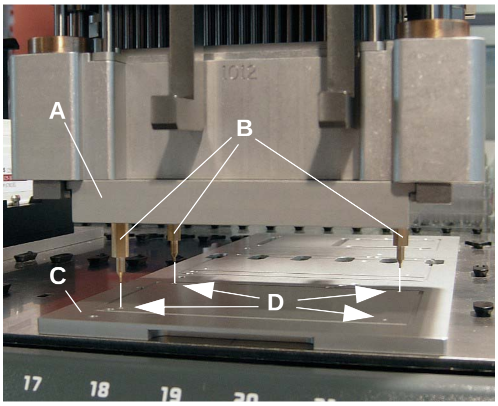
3. Click on the **Adjust head** button to start the procedure.

   You will be guided through the procedure by a series of process prompts. Always follow the instructions on the screen.



4 You are instructed to define and pick up one of the possible MCA384 Adapters and to mount the reference pins (min. three) in the corners of the MCA384 Adapter. For details on how to pick up an MCA384 Adapter (see cross references).

A	*MCA384 Adapter*
B	*Reference pins*
C	*System Carrier*
D	*Adjustment pins*



5 After you have done this, move the head with the MCA384 Adapter with mounted reference pins over the System Carrier as shown in the figure on the left.

6 Use the **Move MCA384** page to carefully lower the MCA384 Adapter until the reference pins just touch the adjustment pins on the System Carrier. The head is adjusted properly if the following conditions are fulfilled:

   – All reference pins touch the adjustment pins at the same time.

7 A process prompt will inform you when the procedure is finished.

8 If the MCA384 head is not aligned correctly it must be adjusted by an FSE as described in the Service Manual of the instrument (see cross references).

8.8.11 Backup / Restore Head Diagnostics

Purpose

This setting allows to synchronize the data correctly between MCA384 DCU and ID board after:

- exchanging the head (including the ID board) or exchanging the MCA384 DCU board
- exchanging the ID board only

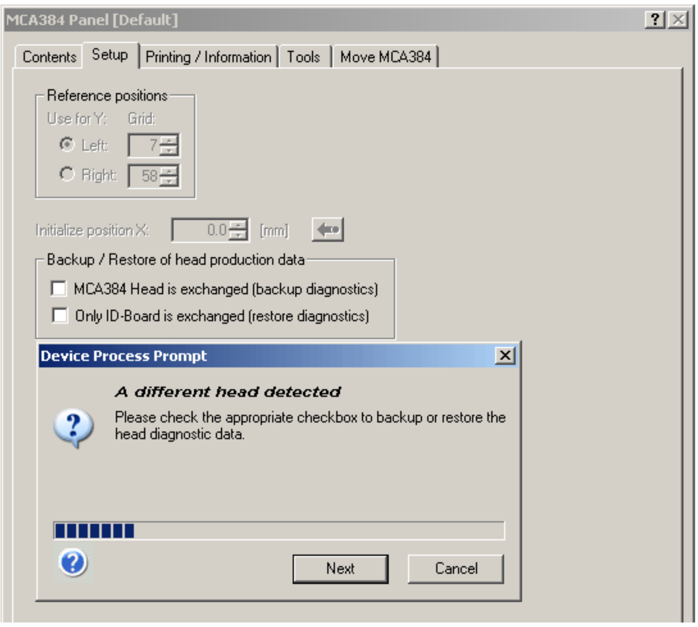
Procedure

As soon as you (re-) enter the **MCA384 Panel** in SnS after one of the above mentioned exchanges the system recognizes that the data on the MCA384 DCU is different from the data on the ID board and will prompt you to mark on the **Setup** page what you have exchanged (head or ID board only).

1 Click the appropriate check box (see Fig. 8-147, 🗎 8-168).

2 Click **Next** on the process prompt.

The head data will be synchronized.



Reference positions
Use for Y: Grid:
● Left: 7
○ Right: 58

Initialize position X: 0.0 [mm]

Backup / Restore of head production data
☐ MCA384 Head is exchanged (backup diagnostics)
☐ Only ID-Board is exchanged (restore diagnostics)

Device Process Prompt

A different head detected

Please check the appropriate checkbox to backup or restore the head diagnostic data.

Fig. 8-147 *MCA384 Setup page, head production data*

8.8.12 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure should be performed every time before doing a new setup. It must be done once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1 On the **Contents** page, select the **Set defaults in EEPROM** check box.

No further parameters need to be defined.

2 Download the default values to the MCA384 and have them re-read by the software with **Start**.

8.8.13 Set Head Production Data

Cross References

List of cross references to information provided in other sections:

Information	References
Setting the serial number of the MCA384 arm (not the one of the head!)	See section 7.1.3, 🗎 7-7
Remove the head covers	See Service Manual of the instrument

Purpose

The head production data is stored in the factory on the ID board attached to the head. The head production data cannot be set in the field. It can only be checked. The head production data informs about the history of the head.

Note:

- *The serial number of the head is not identical with the one of the whole MCA384 arm, so do not confuse these numbers.*
- *The serial number of the arm must be entered using the function* ***Instrument > Basic Setup > Serial Number Settings*** *(see cross references).*

Where to Find the Serial Number of the Head?

The head serial number is engraved on the front side of the head and noted on a barcode label applied on the right side of the head (see figure below).

To see the serial number you have to remove the head covers *(see cross references).*

WARNING

Injuries possible if you try to read the serial number with the instrument switched on.

- Switch off the instrument before reading the serial number.
- Make sure your head and hands are out of the danger zone before switching the instrument on again.

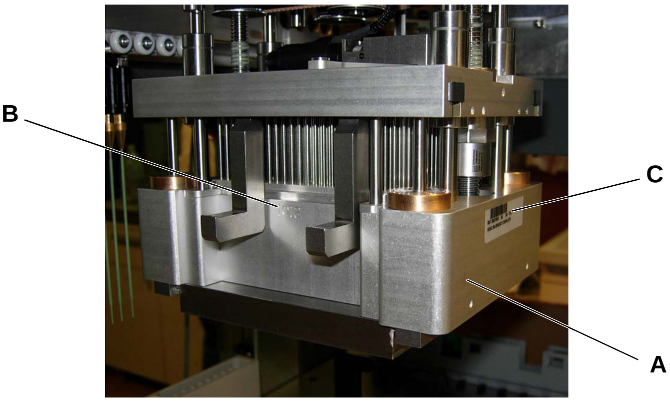


Fig. 8-148 *Location of the serial number*

A	*MCA384 head*	***C***	*Head serial number label*
B	*Head serial number (engraved)*		

8.8.14 Determine Range

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.8.1, 🗎 8-151
Move MCA384 page	See section 8.8.7, 🗎 8-159
Pick up / drop Adapter QC MCA384	See section 8.8.9, 🗎 8-162

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Determine Range** procedure moves the MCA384 head in the Y-, S- and Z-axes to their extreme positions to determine the available ranges. Note that the Y- and S-range is determined automatically, while the Z-range must be determined manually. The values found are then written to the MCA384.

Tools

For this setup you need one of the following MCA384 adapters:

- Adapter QC MCA384
- Adapter DiTi MCA384
- Adapter DiTi Combo MCA384

with a reference pin installed.

Preparation

1 Place one of the above listed MCA384 Adapters on the adapter block on the System Carrier.

Procedure

To determine the range:

Start

1 On the **Contents** page, select the **Determine Range** check box and change to the **Setup** page.

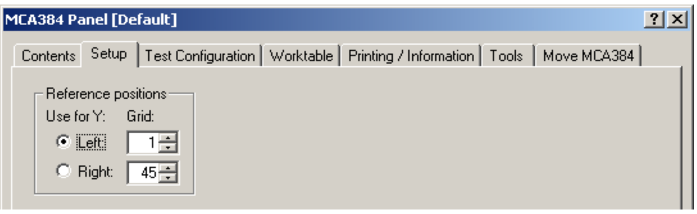


Fig. 8-149 *MCA384 panel, Setup page*

2 In the **Reference Positions** frame:

- click the appropriate **Use for Y** option button to select the reference position (**Left** or **Right**) in which you wish to determine the Z-range.
- set the **Left** or **Right** grid position in the corresponding spin boxes.

3 Start the procedure with **Start**.

You will be guided through the setup procedure by a series of process prompts. Always follow the instructions on the screen.

Y-Autorange

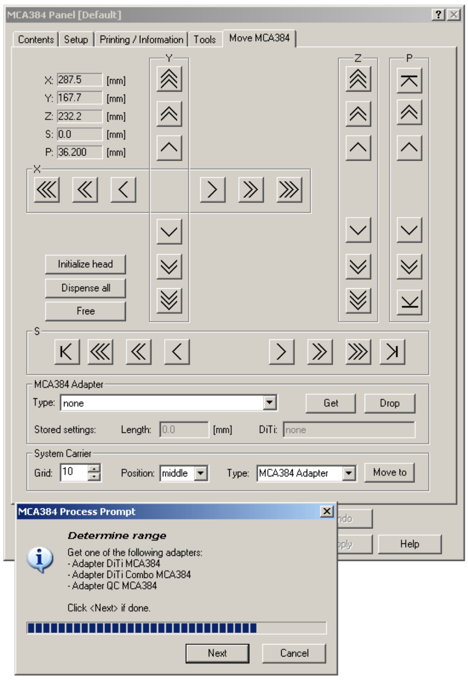
4 First, the MCA384 is initialized and an autorange of the Y-axis is automatically performed.

S-Autorange

5 After the Y-axis autorange the autorange of the S-axis is automatically performed. Please wait for the end of the S-autorange.

*The **Move MCA384** page, together with a process prompt appears.*

Z-Range



X: 287.5 [mm]
Y: 167.7 [mm]
Z: 232.2 [mm]
S: 0.0 [mm]
P: 36.200 [mm]

Type: none

Stored settings: Length: 0.0 [mm] DiTi: none

Grid: 10 Position: middle Type: MCA384 Adapter

MCA384 Process Prompt

Determine range

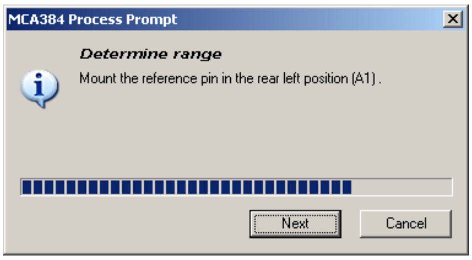
Get one of the following adapters:
- Adapter DiTi MCA384
- Adapter DiTi Combo MCA384
- Adapter QC MCA384

Click <Next> if done.

6 You are prompted to pick up one of the listed MCA384 Adapters. It is assumed that the appropriate MCA384 Adapter is located on the System Carrier.

For details on how to pick up an MCA384 Adapter
(see cross references).

7 Click **Next** when done.



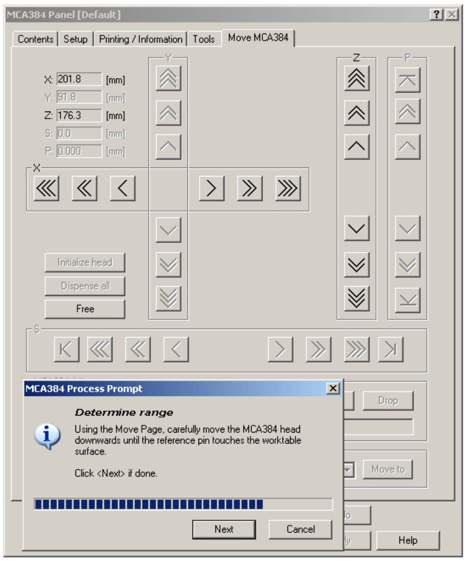
MCA384 Process Prompt

Determine range

Mount the reference pin in the rear left position (A1) .

8 You will be prompted to mount the reference pin (see Fig. 8-135, 🗎 8-151) in the rear left position (A1) of the adapter plate.

9 Click **Next** when done.



X: 201.8 [mm]
Y: 91.8 [mm]
Z: 176.3 [mm]
S: 0.0 [mm]
P: 0.000 [mm]

MCA384 Process Prompt

Determine range

Using the Move Page, carefully move the MCA384 head downwards until the reference pin touches the worktable surface.

Click <Next> if done.

10 Use the move buttons in the Z-frame on the **Move MCA384** page to move the head carefully downwards until the reference pin just touches the worktable.

11 Click **Next** when done.

12 Finally you are prompted to remove the reference pin.

13 Click **Next** when done.

14 If you do not need the MCA384 Adapter anymore you may drop it on the System Carrier.

For details on how to drop an MCA384 Adapter (see cross references)

8.8.15 Determine Reference Positions (Scaling and Offset)

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.8.1, 🗎 8-151
Move MCA384 page	See section 8.8.7, 🗎 8-159
Pick up / drop an MCA384 Adapter	See section 8.8.9, 🗎 8-162

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Determine reference positions** procedure serves for the determination of the MCA384 head’s worktable coordinates with the aid of an MCA384 Adapter with a reference pin. The head is moved to the reference positions, as selected on the **Setup** page, in sequence:

Tools

For this setup you need one of the following MCA384 adapters:

- Adapter QC MCA384 (A)
- Adapter DiTi MCA384
- Adapter DiTi Combo MCA384

with a reference pin installed in the appropriate position (see Fig. 8-150, 🗎 8-173).

Reference Positions

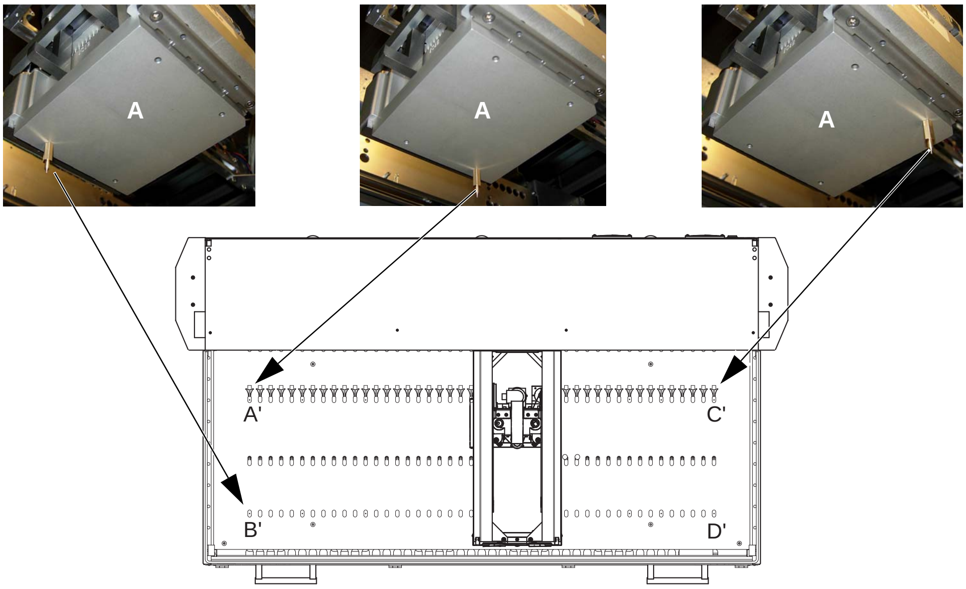


Fig. 8-150 *Determining the reference positions*

The previous Fig. 8-150, 🗎 8-173 and the Tab. 8-28, 🗎 8-174 below show in which position on the MCA384 Adapter the reference pin must be installed for use with the appropriate reference position on the worktable.

Note: *In our example it is assumed that the leftmost reference pin positions are for grid position # 1, the rightmost ones for grid position # 45. However, depending on the physical worktable layout (cutouts, installed arms, etc.) the reference pins might be in other grid positions.*

Tab. 8-28 *Assignment of reference pin position on adapter to reference positions on the worktable*

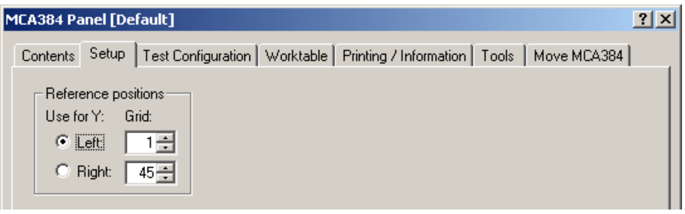
Y-coordinates on left side			**Y-coordinates on right side**		
Reference pin pos. on adapter	**Reference pos. (Grid position)**	**Sequence**	**Reference pin pos. on adapter**	**Reference pos. (Grid position)**	**Sequence**
A1: left rear	A’ (1)	1	A24: right rear	C’ (45)	1
P1: left front	B’ (1)	2	P24: right front	D’ (45)	2
A24: right rear	C’ (45)	3	A1: left rear	A’ (1)	3
P24: right front	n/a	n/a	P1: left front	n/a	n/a

Procedure

Start

To determine the reference positions:

1 On the **Contents** page, select the **Determine reference positions** check box and change to the **Setup** page.



Reference positions
Use for Y: Grid:
● Left: 1
○ Right: 45

Fig. 8-151 *MCA96 panel, Setup page*

2 In the **Reference Positions** frame:

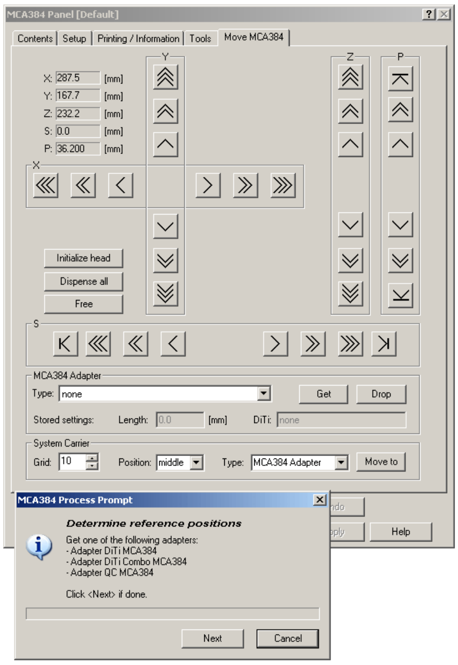
- click the appropriate **Use for Y** option button to select the reference position on the worktable (**Left** or **Right**).
- set the **Left** or **Right** grid position in the corresponding spin boxes.

3 Start the procedure with **Start**.

You will be guided through the setup procedure by a series of process prompts. Not all of them are shown here. Always follow the instructions on the screen.

The following example explains how to determine the reference position A’ (left rear).

Determine Reference Positions



MCA384 Panel [Default]

X: 287.5 [mm]
Y: 167.7 [mm]
Z: 232.2 [mm]
S: 0.0 [mm]
P: 36.200 [mm]

Type: none
Stored settings: Length: 0.0 [mm] DiTi: none
Grid: 10 Position: middle Type: MCA384 Adapter

MCA384 Process Prompt

Determine reference positions

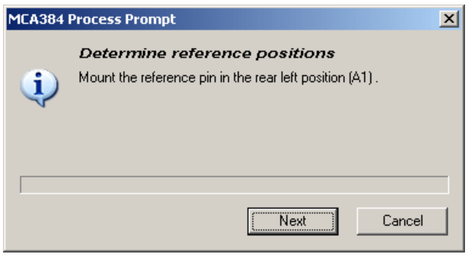
Get one of the following adapters:
- Adapter DiTi MCA384
- Adapter DiTi Combo MCA384
- Adapter QC MCA384

Click <Next> if done.

4 You are prompted to pick up an MCA384 Adapter. It is assumed that the MCA384 Adapter is already placed on the System Carrier.

For details on how to pick up an MCA384 Adapter (see cross references).

5 Confirm with **Next** when done.



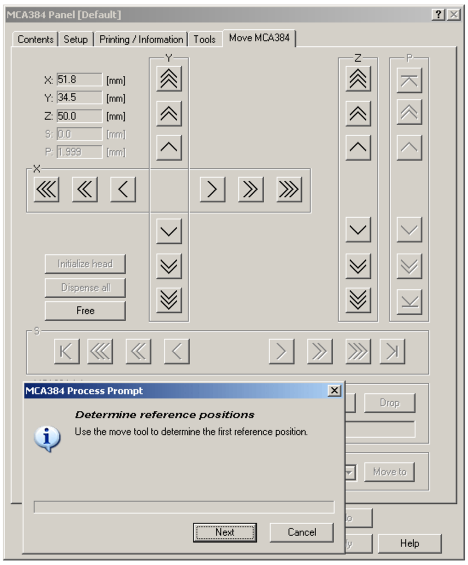
MCA384 Process Prompt

Determine reference positions

Mount the reference pin in the rear left position (A1) .

6 You will be prompted to mount a reference pin (see Fig. 8-135, 🗎 8-151) in the rear left position (A1) of the adapter plate.

7 Click **Next** when done.



MCA384 Panel [Default]

X: 51.8 [mm]
Y: 34.5 [mm]
Z: 50.0 [mm]
S: 0.0 [mm]
P: 1.999 [mm]

MCA384 Process Prompt

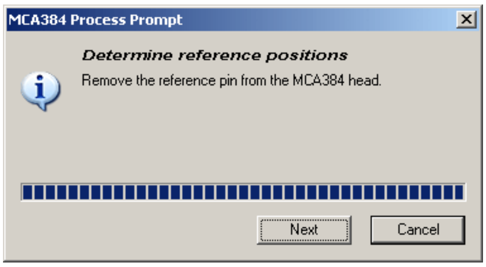
Determine reference positions

Use the move tool to determine the first reference position.

8 Use the move buttons to move the head carefully in the X, Y and Z-axes until the tip of the reference pin is in the center of the rear left reference position on the worktable.

9 Click **Next** when done.

10 After you have determined the X- and Y- displacement for the first reference position, you will be prompted to do the same for the remaining two reference positions (front left, rear right). Follow the instructions on the screen.



Determine reference positions

Remove the reference pin from the MCA384 head.

11 Finally you are prompted to remove any reference pin.

12 Click **Next** when done.

13 If you do not need the MCA384 Adapter anymore you may drop it on the System Carrier.

For details on how to drop an MCA384 Adapter (see cross references)

8.8.16 Range Test

Cross References

List of cross references to information provided in other sections:

Information	References
Determine range	See section 8.8.14, 🗎 8-170
Set X-drive properties	See section 7.1.5, 🗎 7-10
Determine reference positions	See section 8.8.15, 🗎 8-173

Purpose

This procedure checks if the stored range data of the different axis are within the expected values (plausibility test done with calculations).

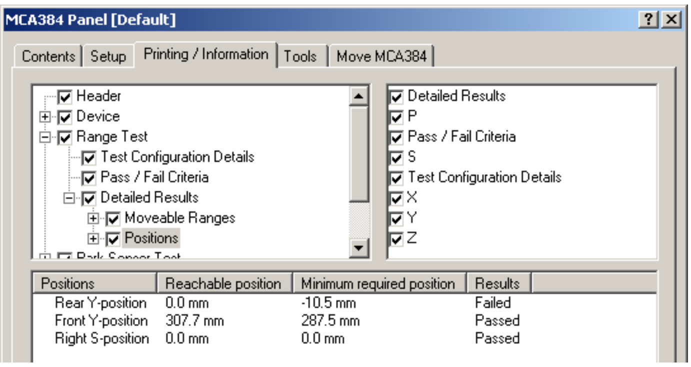
Procedure

To perform the **Range test**:

1. On the **Contents** page, select the check box **Range test**.
2. Click **Start** on the bottom of the panel.

Pass / Fail Criteria

The test is passed if the range data are within the expected values.
For detailed results go to the **Printing / Information** page:



- ☑ Header
- ☑ Device
- ☑ Range Test
  - ☑ Test Configuration Details
  - ☑ Pass / Fail Criteria
  - ☑ Detailed Results
    - ☑ Moveable Ranges
    - ☑ Positions

- ☑ Detailed Results
- ☑ P
- ☑ Pass / Fail Criteria
- ☑ S
- ☑ Test Configuration Details
- ☑ X
- ☑ Y
- ☑ Z

Positions	Reachable position	Minimum required position	Results
Rear Y-position	0.0 mm	-10.5 mm	Failed
Front Y-position	307.7 mm	287.5 mm	Passed
Right S-position	0.0 mm	0.0 mm	Passed

Fig. 8-152 *Range test results*

If the Test Fails

Try the following:

- Repeat the setup procedure **Determine range** (see cross references)
  If necessary redo **Set X-drive properties** (see cross references).
- Repeat the setup procedure **Determine reference positions** (see cross references).

8.8.17 Park Sensor Test

Cross References

List of cross references to information provided in other sections:

Information	References
Replacing the park sensor	See Freedom EVO Service Manual

Purpose

This procedure checks the hall sensor that detects the park position of the MCA384 (Y- and Z-axis position as after initialization).
The sensor is located on the rear left of the MCA (see cross references).

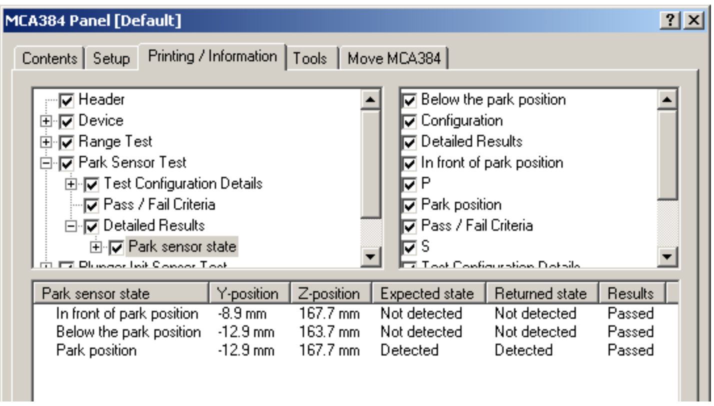
Procedure

To perform the **Park sensor test**:

1. On the **Contents** page, select the check box **Park sensor test**.
2. Click **Start** on the bottom of the panel.

Pass / Fail Criteria

The test is passed if the park sensor is found in the expected position.
For detailed results go to the **Printing / Information** page:



☑ Header
☑ Device
☑ Range Test
☑ Park Sensor Test
  ☑ Test Configuration Details
  ☑ Pass / Fail Criteria
  ☑ Detailed Results
    ☑ Park sensor state
☑ Plunger Init Sensor Test

☑ Below the park position
☑ Configuration
☑ Detailed Results
☑ In front of park position
☑ P
☑ Park position
☑ Pass / Fail Criteria
☑ S
☑ Test Configuration Details

Park sensor state	Y-position	Z-position	Expected state	Returned state	Results
In front of park position	-8.9 mm	167.7 mm	Not detected	Not detected	Passed
Below the park position	-12.9 mm	163.7 mm	Not detected	Not detected	Passed
Park position	-12.9 mm	167.7 mm	Detected	Detected	Passed

***Fig. 8-153** Park sensor test results*

If the Test Fails

Try the following:

- Check the sensor flag (hex bolt) and the sensor connection.
- Check the park sensor and replace if defective (see cross references).
- Repeat the **Park sensor test**.

8.8.18 Plunger Init Sensor Test

Cross References

List of cross references to information provided in other sections:

Information	References
Replacing the Plunger init sensor	See Freedom EVO Service Manual

Purpose

This procedure checks if the plunger init sensor (reflective) detects correctly the “park” position of the plungers.

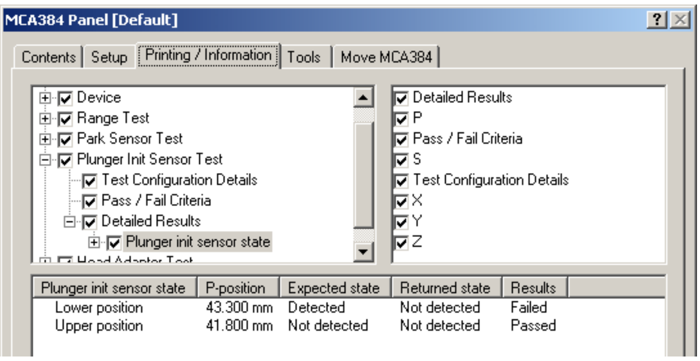
Procedure

To perform the **Plunger init sensor test**:

1. On the **Contents** page, select the check box **Plunger sensor init test**.
2. Click **Start** on the bottom of the panel.

Pass / Fail Criteria

The test is passed if the sensor detects the plunger “park” position correctly. For detailed results go to the **Printing / Information** page:



- ☑ Device
- ☑ Range Test
- ☑ Park Sensor Test
- ☑ Plunger Init Sensor Test
  - ☑ Test Configuration Details
  - ☑ Pass / Fail Criteria
  - ☑ Detailed Results
    - ☑ Plunger init sensor state

- ☑ Detailed Results
- ☑ P
- ☑ Pass / Fail Criteria
- ☑ S
- ☑ Test Configuration Details
- ☑ X
- ☑ Y
- ☑ Z

Plunger init sensor state	P-position	Expected state	Returned state	Results
Lower position	43.300 mm	Detected	Not detected	Failed
Upper position	41.800 mm	Not detected	Not detected	Passed

Fig. 8-154 *Plunger init sensor test results*

If the Test Fails

Try the following:

- Check the sensor flag.
- Change position of ID board or replace it if sensor is defective.
- Repeat the **Plunger init sensor test**.

8.8.19 Head Adapter Test

Cross References

List of cross references to information provided in other sections:

Information	References
Check adjustment of the MCA384 head	See section 8.8.10, 🗎 8-165
Move MCA384 page	See section 8.8.7, 🗎 8-159
Pick up / drop an MCA384 Adapter	See section 8.8.9, 🗎 8-162

Purpose

This procedure checks if an MCA384 Adapter can be picked from and replaced on the MCA384 System Carrier for a predefined number of test cycles.

Tools

For this test you need one of the following MCA384 adapters:

- Adapter QC MCA384
- Adapter DiTi MCA384
- Adapter DiTi Combo MCA384
- Adapter Fixed 125µl MCA384
- Adapter Fixed 15µl MCA384
- Adapter 96 DiTi MCA384

- Adapter 96 DiTi 1to1 MCA384
- Adapter 96 ExVol DiTi MCA384
- Adapter 96 Fixed 15µl MCA384

Preparation

To prepare the test:

1. If there is already an MCA384 Adapter installed on the head, make sure that there is an empty adapter block on the System Carrier available to replace the adapter.
2. Place one of the above listed MCA384 Adapters on another adapter block on the System Carrier.

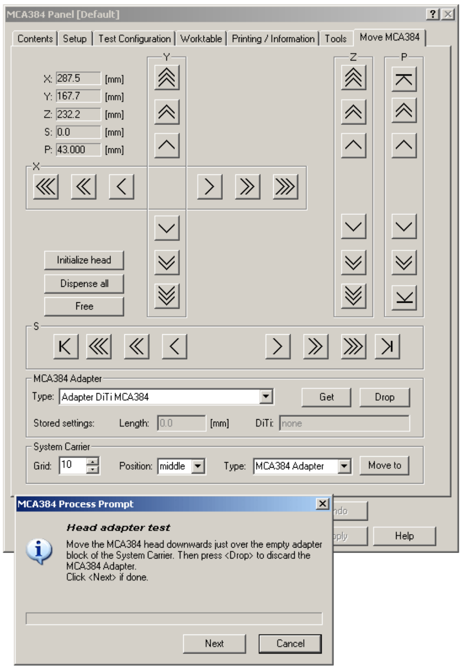
Procedure

To perform the **Head adapter test**:

1. On the **Contents** page, select the check box **Head adapter test** and change to the **Test Configuration** page.
2. Set the number of test **Cycles**.
3. Select as **Head Adapter** the MCA 384 Adapter that you placed on an adapter block on the System Carrier (see **"Preparation",** 🗎 8-179).
4. Go to the Worktable page and check / adjust the carrier and rack position according to the physical position of the selected **Head Adapter**.
5. Click **Start** on the bottom of the panel.

   You will be guided through the test by a series of process prompts. Not all of them are shown here. Always follow the instructions on the screen.

Head Adapter Test



X: 287.5 [mm]
Y: 167.7 [mm]
Z: 232.2 [mm]
S: 0.0 [mm]
P: 43.000 [mm]

MCA384 Adapter
Type: Adapter DiTi MCA384
Stored settings: Length: 0.0 [mm] DiTi: none

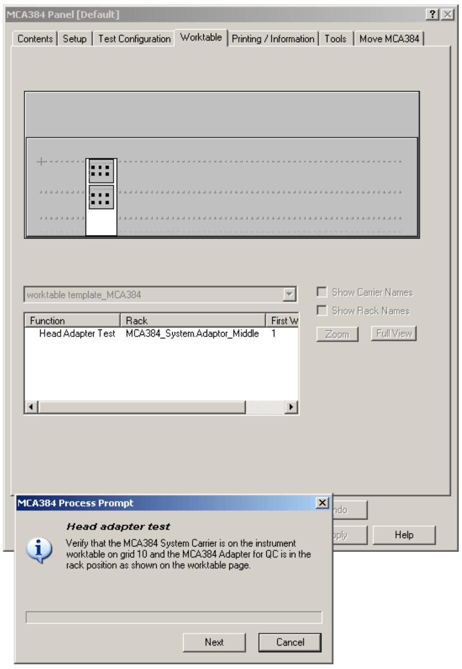
System Carrier
Grid: 10 Position: middle Type: MCA384 Adapter

Head adapter test

Move the MCA384 head downwards just over the empty adapter block of the System Carrier. Then press <Drop> to discard the MCA384 Adapter.
Click <Next> if done.

6. If an MCA384 Adapter is mounted on the head make sure your settings on the **Move MCA384** page for **Head adapter** and **System Carrier** (e.g., Grid 10, middle) are correct.
7. Drop the MCA384 Adapter on the empty adapter block on the System Carrier with the help of the **Move MCA384** page (see cross references).
8. Click **Next** when done.

   The worktable page opens.



Function	Rack	First W
Head Adapter Test	MCA384_System Adaptor_Middle	1

MCA384 Process Prompt

Head adapter test

Verify that the MCA384 System Carrier is on the instrument worktable on grid 10 and the MCA384 Adapter for QC is in the rack position as shown on the worktable page.

9 Make sure that the System Carrier with the MCA384 Adapter for the test is in the correct position according to the worktable layout for the **Head Adapter Test**.

10 Click **Next** when done.

The head moves to the MCA384 Adapter position (X-,Y-axis) and down until about 10 mm above the MCA384 Adapter (Z-axis).

11 With the help of the **Move MCA384** page move the head carefully into position:

- The clamp noses must touch the MCA384 Adapter surface (Z-axis)
- The head with the clamp noses must be centered to the MCA384 Adapter with equal spaces on left and right (X-axis)
- The front clamp noses must be aligned flush with the front of the MCA384 Adapter

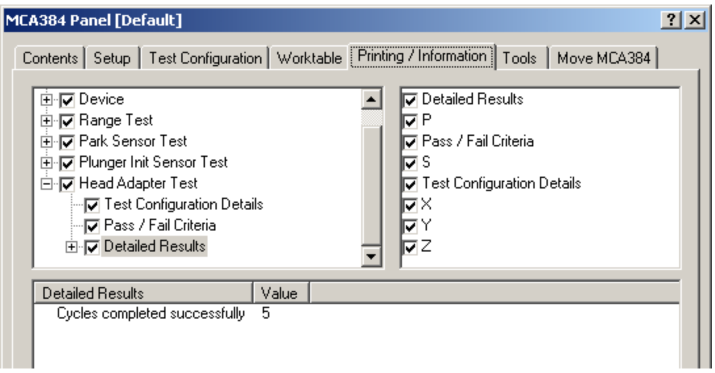
(see also section 8.8.9, 🖹 8-1628.8.9 “Picking Up and Dropping an MCA384 Adapter”, 🖹 8-162)

12 Click **Next** if the position is correct.

The head will now pick-up and drop the MCA384 Adapter for the number of ***Cycles*** *set in the* ***Test Configuration*** *page.*

Pass / Fail Criteria

The test is passed if the MCA384 Adapter could be picked up and replaced correctly in all test cycles.



Detailed Results	Value
Cycles completed successfully	5

Fig. 8-155 *Head adapter test results*

If the Test Fails

Try the following:

- Check if the physical worktable layout corresponds to the Worktable page.
- Check mechanical alignment of the MCA384 head and the adapter block on the System Carrier (see cross references).
- Repeat the setup procedures **Determine range** and **Determine reference positions**.
- Repeat the **Head adapter test**.

8.9 CGM (MCA384 Gripper)

Purpose of This Section

This section describes the setup, test and alignment procedures necessary for a CGM attached to an MCA384 on a Freedom EVO-2.

8.9.1 Overview

What is a CGM?

The term CGM is used in documentations for Tecan specialists (like this manual) as an abbreviation for the MCA384 gripper.

The CGM (Common Gripper Module) (A) can optionally be mounted on the right side of an MCA384 (B).

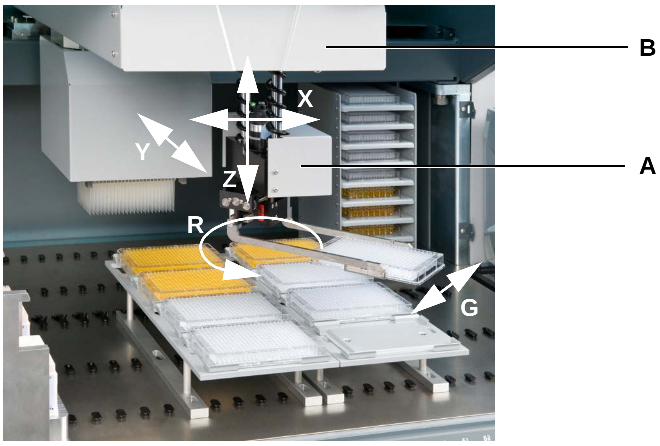


***Fig. 8-156** CGM*

A	*CGM with movement axes*	*B*	*MCA384*

The gripper will move simultaneously with the MCA384 in the X-axis but independently in the Y- and Z-axis. The rotor (R-axis) of the gripper can turn 360°. The gripper is intended to transport microplates and DiTi boxes to different positions on the worktable.

8.9.2 Required Tools

Cross References

List of cross references to information provided in other sections:

Information	References
Determine the reference positions	See section 8.9.14, 🗎 8-192
Adjust the displacement of the R- and G-axis	See section 8.9.15, 🗎 8-194
Plate move test	See section 8.9.19, 🗎 8-197

CGM Reference Tool

To **Determine the reference positions** (→ Cross References) the following tool is necessary:

- CGM reference tool, order no. 30020100

Fig. 8-157 *CGM reference tool*

A	*CGM reference tool*	***B***	*Magnetic ring*

Reference Plate

To **Adjust the displacement of the R- and G-axis** and the **Plate move test** (→ Cross References) the following tool is necessary:

- Reference plate, order no. 30033849

Fig. 8-158 *Reference plate*

8.9.3 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

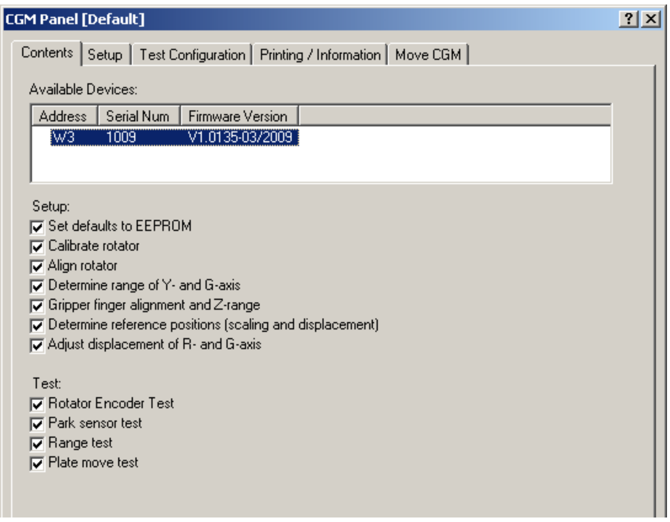
Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Function	**Type**	**User**	**FSE**
Set Defaults in EEPROM	Setup		X
Calibrate rotator	Setup		X
Align rotator	Setup		X
Determine range of Y- and G-axis	Setup		X
Gripper finger alignment and Z-range	Setup		X
Determine reference positions (scaling and displacement)	Setup		X
Adjust displacement of R- and G-axis	Setup		X
Rotator encoder test	Test	X	X
Park sensor test	Test	X	X
Range test	Test	X	X
Plate move test	Test	X	X

Starting the Panel

1 Start the panel with **System Devices > CGM**. The **CGM** panel with activated **Contents** page appears. After starting the **CGM** panel no setup or test check boxes are activated.



Available Devices:

Address	Serial Num	Firmware Version
W3	1009	V1.0135-03/2009

Setup:
☑ Set defaults to EEPROM
☑ Calibrate rotator
☑ Align rotator
☑ Determine range of Y- and G-axis
☑ Gripper finger alignment and Z-range
☑ Determine reference positions (scaling and displacement)
☑ Adjust displacement of R- and G-axis

Test:
☑ Rotator Encoder Test
☑ Park sensor test
☑ Range test
☑ Plate move test

Fig. 8-159 *CGM Panel, Contents page*

Pages

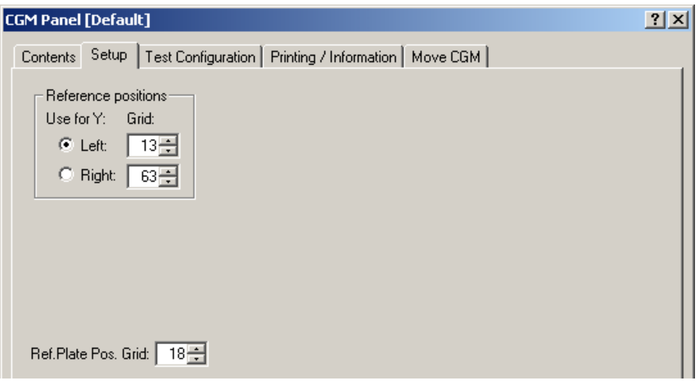
Tab. 8-29 Pages of the CGM Panel

Pages	Function
Contents	General overview, device and procedure selection
Setup Page	Definition of setup parameters
Test Configuration	Lets you set the test parameters
Printing / Information	Print selection for the QC-report
Move CGM	Lets you move the CGM to the required position

8.9.4 Setup Page

Purpose

The **Setup** page provides the controls for setting the parameters for various setup procedures.



Use for Y: Grid:
● Left: 13
○ Right: 63
Ref.Plate Pos. Grid: 18

Fig. 8-160 Setup page

Controls

Reference positions	Frame for setting the reference positions
- **Grid**	Spin boxes for setting left and right reference grid positions
- **Use for Y**	Option buttons that let you specify if the reference positions in the Y-axis should be determined in the left or right reference position
Ref.Plate Pos. Grid:	Spin box for setting the grid position for the reference plate

Note: *The installation of the CGM must be carried out by an FSE.*

8.9.5 Test Configuration Page

Purpose

The **Test Configuration** page lets you set the number of test cycles and the grid positions for the reference plate for the **Plate move Test.** The **Gripper Force Test** is only performed in production department. The **Gripper Force Test** frame is deactivated in the **Test Configuration** page for FSEs and Users.

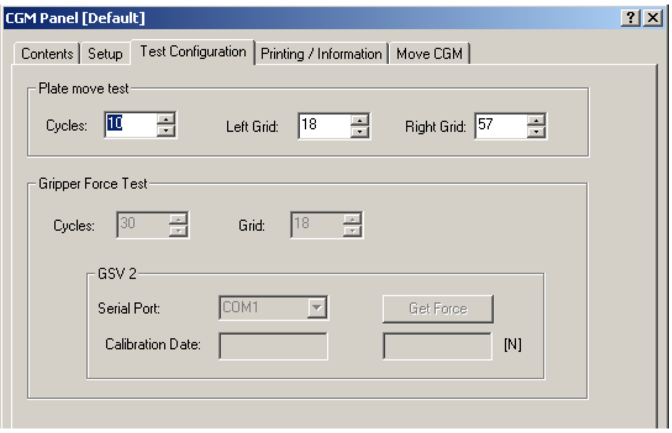


Plate move test
Cycles: 10
Left Grid: 18
Right Grid: 57

Gripper Force Test
Cycles: 30
Grid: 18

GSV 2
Serial Port: COM1
Calibration Date:
[N]

Fig. 8-161 *CGM panel, Test Configuration page*

Controls

Plate move test	Contains the spin boxes **Cycles, Left Grid** and **Right Grid** for setting the number of test cycles and the two grid positions for the reference plate.
Gripper Force Test	Settings only used by the production department.

8.9.6 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

8.9.7 Move CGM Page

Cross References

List of cross references to information provided in other sections:

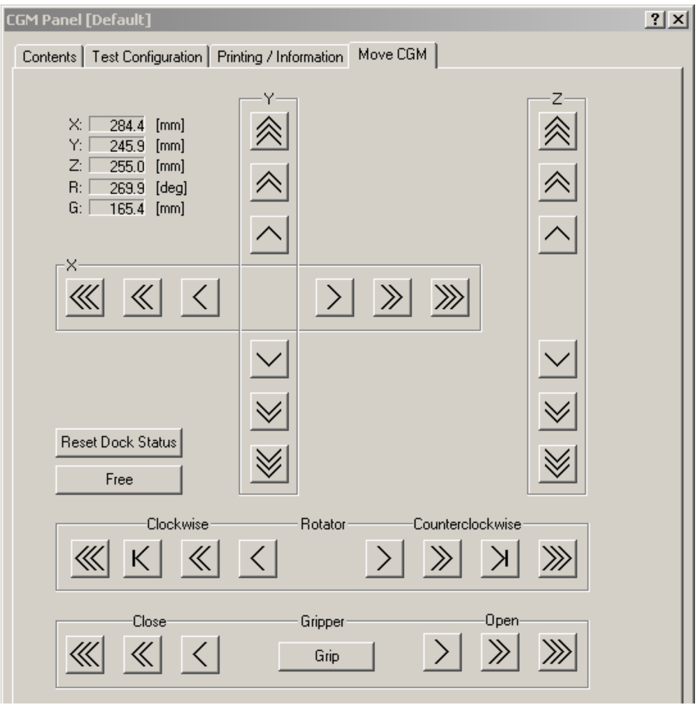
Information	References
CGM movement axes	See section 8.9.1, 🗎 8-182

Note: *This function works only if the CGM has been selected before on the* ***Contents*** *page.*

Purpose

The **Move CGM** page lets you move the CGM or parts of it in the appropriate axes: X, Y, Z, R and G (→ Cross References).

Note: *Movement in the X-axis will move the MCA384 with the mounted CGM.*

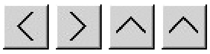
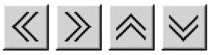
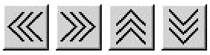


X: 284.4 [mm]
Y: 245.9 [mm]
Z: 255.0 [mm]
R: 269.9 [deg]
G: 165.4 [mm]

Fig. 8-162 *Move CGM page*

Controls

The **Move CGM** page contains the following controls

	Single step (1/10 mm) movement buttons.
	Ten steps (1 mm) movement buttons.
	Continuous movement buttons (if button is kept pressed).
Reset Dock Status	
Free	Moves all other arms (LiHa, etc.) away from the MCA384 with mounted CGM to their end positions.
Grip	Grips a (reference) plate or DiTi box.
X, Y	Text boxes indicating the current position of the horizontal axis with respect to grid position # 1.
Z	Current position of the gripper fingers in vertical Z-axis (distance from worktable).

R	Rotator position in degrees (CW). (Zero position: Gripper fingers pointing to the front of the instrument).
G	Current distance between gripper fingers.

Note:

- *The arrows on the movement buttons indicate the direction in which the respective part(s) will be moved.*
- *If you place the mouse pointer over a movement button, a text appears that explains what you can do with the button (so-called “tool tip”)*

Keyboard Control

It is also possible to use the keyboard for the movements in the various axes. You can use the corresponding keys of the numeric keypad or the keys in the key blocks left of the numeric keypad.

Tab. 8-30 *Moving the CGM with the keyboard*

Key (left of numeric keypad)	Key in numeric pad (NumLock switched on)	Movement/rotation axes
Right arrow	6 Right arrow	X+ (right)
Left arrow	4 Left arrow	X- (left)
Down arrow	2 Down arrow	Y+ front
Up arrow	8 Up arrow	Y- (rear)
Page Up	9 PgUp	Z+ (up)
Page Down	3 PgDn	Z- (down)
Delete	**.** Delete	G+ (open) [a]
Insert	0 Insert	G- (close) [a]
Home	7 Home	R (CW)
End	1 End	R (CCW)

a) Open/close gripper

Steps

The parts of the CGM are moved as follows:

- Every time you hit one of the above keys, the corresponding part is moved by one step (0.1 mm) in the appropriate direction.
- If you keep the key pressed it is moved continuously at a speed of about five steps per second.
- You can press a key continuously and at the same time press the Ctrl key. In this case, the CGM is accelerated until it reaches a maximum speed.

8.9.8 Initialization

System

For some setups the system may not be initialized yet since performing those setups are a pre-condition to initialize the system. On the other hand some setup or tests do not necessarily need the system to be initialized. In such cases the user is prompted to move the CGM to a position where it can move without collision. At this time the CGM and all other arms are powerless in X- and Y- axis and the user can move the arms out of the way.

MCA384

The MCA384 will only initialize if it is not in home position. In this case you are prompted to move the CGM to a position where the MCA can initialize without collision.

8.9.9 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box.

   No further parameters need to be defined.
2. Download the default values to the CGM and have them re-read by the software with **Start**.

8.9.10 Calibrate Rotator

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

Calibrate the rotator encoder signals.

Procedure

To calibrate the rotator:

Preparation

1. Move the CGM manually to a position where the rotator can spin without collision.

Start

2. On the **Contents** page, select the **Calibrate rotator** check box and click **Start**.

You will be guided through the setup procedure by a series of process prompts. Always follow the instructions on the screen.

8.9.11 Align Rotator

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The R-axis displacement is adjusted so that it reports the value of 270° when the gripper fingers are pointing to the right.

Procedure

To align the rotator:

Preparation

1 Manually align the rotator precisely parallel to the rotator block (see the yellow dashed line in Fig. 8-163, 🗎 8-190) and make sure that the embossed “R” on the rotator (C) is on the front side (gripper pointing to the right).

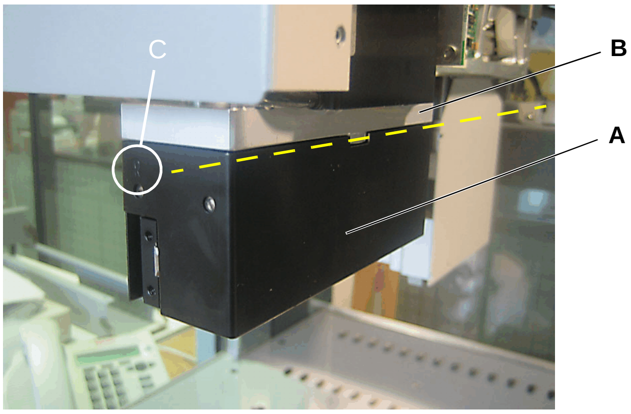


Fig. 8-163 *Align rotator*

A	*Rotator*	***B***	*Rotator block*

Start

2 On the **Contents** page, select the **Align rotator** check box and click **Start**.

You will be guided through the setup procedure by a series of process prompts. Always follow the instructions on the screen.

8.9.12 Determine Range of Y- and G-Axis

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The system performs an autorange and determines the range values for the Y- and G-Axis.

Procedure

To determine the range of the Y- and G-axis:

Start

1 On the **Contents** page, select the **Determine Range of Y- and G-Axis** check box and click **Start**.

You will be guided through the setup procedure by a series of process prompts. Always follow the instructions on the screen.

8.9.13 Gripper Finger Alignment and Z-Range

Cross References

List of cross references to information provided in other sections:

Information	**References**
Mount CGM gripper fingers	See Freedom EVO-2 Service Manual

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Gripper Finger Alignment and Z-Range** procedure serves for alignment of the gripper fingers and determination of the Z-range of the CGM.

Procedure

To align the gripper fingers and determine the Z-range:

Preparation

1 Mount the gripper fingers (→ Cross References).
   - Manually turn the rotator so that the embossed “R” (right) on the rotator is on the front side and the gripper fingers point to the right.
   - Make sure that the right gripper finger is fixed in the upper most position within the long screw holes.

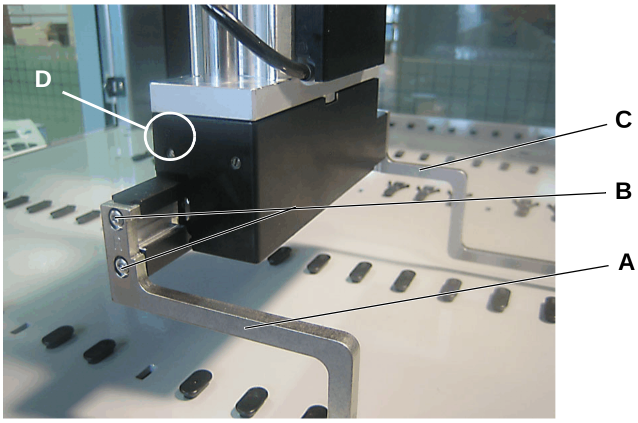


Fig. 8-164 *Gripper fingers mounted*

A	*Right gripper finger*	***C***	*Left gripper finger*
B	*Mounting screws in long screw holes*	***D***	*Embossed “R” (right)*

Start

2 On the **Contents** page, select the **Gripper Finger Alignment and Z-Range** check box and click **Start**.

You will be guided through the setup procedure by a series of process prompts. Always follow the instructions on the screen.

3 Use the Move Tool (**Move CGM**) to move the gripper down on a free worktable area until the left gripper finger (C) touches the worktable.

4 Loosen the mounting screws (B) of the right gripper finger (A) and align the finger so that it is also touching the worktable. Tighten the mounting screws.

The gripper fingers are now adjusted.

8.9.14 Determine Reference Positions (Scaling and Displacement)

Cross References

List of cross references to information provided in other sections:

Information	References
CGM reference tool	See Fig. 8-157, 🗎 8-183

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Determine reference positions** procedure serves for the determination of the CGM’s worktable coordinates with the aid of the CGM reference tool. The CGM is moved to the reference positions, as selected on the **Setup** page:

Tools

For this setup you need the following tool:

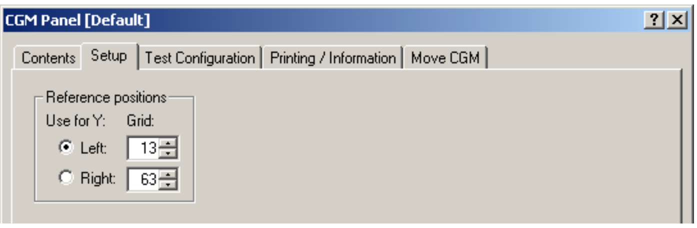
- CGM reference tool (→ Cross References)

Procedure

To determine the reference positions:

Preparation

1 On the **Contents** page, select the **Determine reference positions** check box and change to the **Setup** page.



Reference positions
Use for Y: Grid:
● Left: 13
○ Right: 63

Fig. 8-165 *CGM Panel, Setup page*

2 In the **Reference Positions** frame:

- click the appropriate **Use for Y** option button to select the reference position on the worktable (**Left** or **Right**).
- set the **Left** and **Right** grid positions in the corresponding spin boxes.

3 Install three reference pins (2xF, 1xG) on the worktable according to the setting in the Setup page:

- rear left (A')
- front left (B')
- rear right (C')

Reference Positions

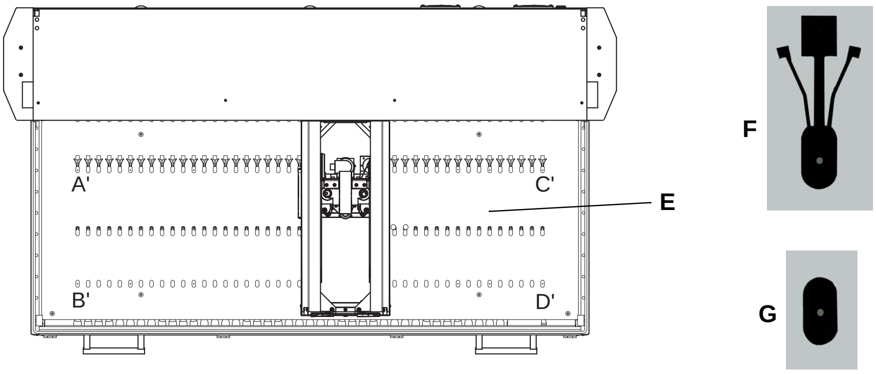


Fig. 8-166 *Reference positions*

A'	*Reference position rear left*	***E***	*Worktable*
B'	*Reference position front left*	***F***	*Reference lock pin*
C'	*Reference position rear right*	***G***	*Reference guide pin*

4 Make sure that the worktable area below the MCA384 with mounted CGM is free of labware or other objects.

Start

5 Start the procedure with **Start**.

You will be guided through the setup procedure by a series of process prompts. Not all of them are shown here. Always follow the instructions on the screen.

6 After initialization of the CGM:
Mount the CGM reference tool on the rotator.

The CGM reference tool is held in position by its magnet

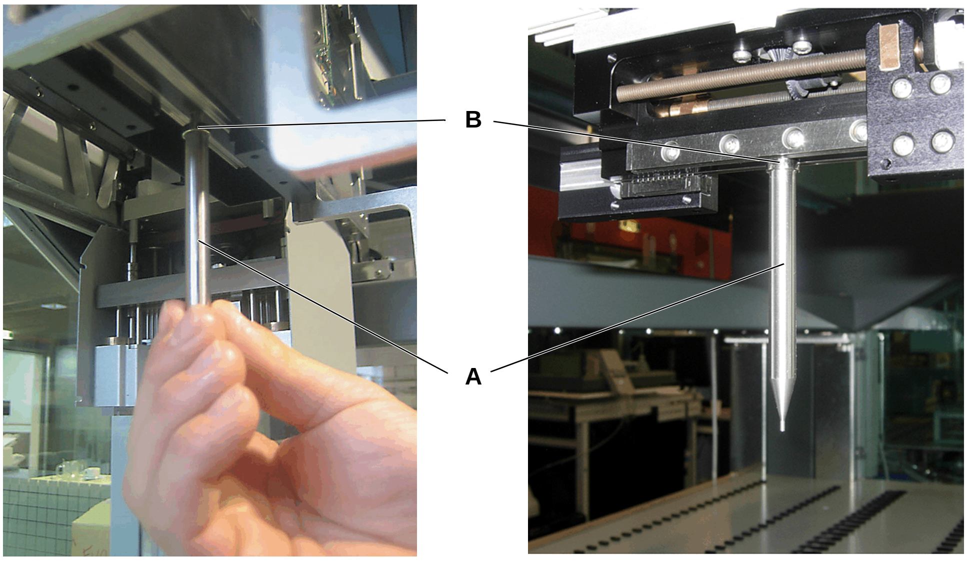
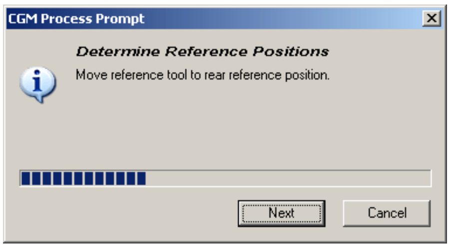


Fig. 8-167 *CGM reference tool mounting*

A	*CGM reference tool*	***B***	*Magnet*

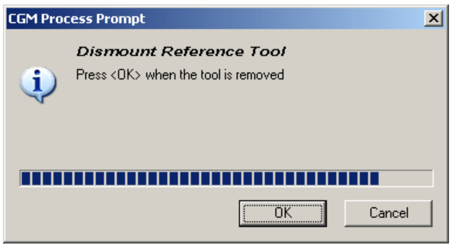


Determine Reference Positions

Move reference tool to rear reference position.

7 Use the Move Tool (**Move CGM**) to move the CGM with the CGM reference tool to the reference positions, guided by process prompts:

- rear left
- front left
- rear right



Dismount Reference Tool

Press <OK> when the tool is removed

8 After determination of the reference positions remove the CGM reference tool from the rotator.

8.9.15 Adjust Displacement of R- and G-Axis

Cross References

List of cross references to information provided in other sections:

Information	References
Reference plate	See Fig. 8-158, 🗎 8-183
Gripper finger mounting and alignment	See section 8.9.13, 🗎 8-191

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Adjust Displacement of R- and G-Axis** is a setup to compensate shape tolerances of the gripper fingers. The setup is performed with the aid of a reference plate.

Tools

For this setup you need the following tool:

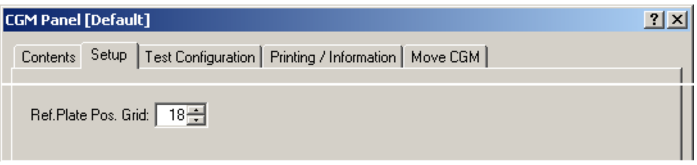
- Reference plate (→ Cross References)

Procedure

To adjust the displacement of the R- and G-axis:

Preparation

1 On the **Contents** page, select the **Adjust Displacement of R- and G-Axis** check box and change to the **Setup** page.



Ref.Plate Pos. Grid: 18

Fig. 8-168 *CGM Panel, Setup page*

2 Check / Set the grid position of the reference plate.

3 Mount the gripper fingers if not already done (→ Cross References).

Fig. 8-169 *Reference plate on worktable*

4 Place the reference plate on the worktable according to the grid position defined in the **Setup** page.

Start

5 Start the procedure with **Start**.

You will be guided through the setup procedure by a series of process prompts. Always follow the instructions on the screen.

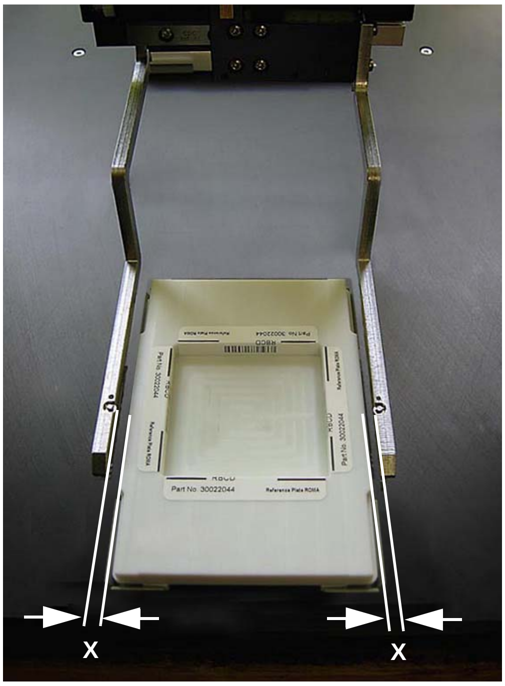


Fig. 8-170 *R- and G-axis adjustment*

6 Adjust the R- and G-axis of the gripper with the Move Tool (**Move CGM**) so that the gripper fingers are parallel and centered to the reference plate. Adjust the G-Axis so that the gripper fingers touch the reference plate (X < 0.5mm).

8.9.16 Rotator Encoder Test

Purpose

Checks if each position to which the rotator is moved to, corresponds to the reported encoder position.

Procedure

To perform the rotator encoder test:

Preparation

1 Move the CGM manually to a position where the rotator can spin without collision.

Start

2 On the **Contents** page, select the check box **Rotator encoder test**.

3 Click **Start** on the bottom of the panel.

You will be guided through the test by a series of process prompts. Not all of them are shown here. Always follow the instructions on the screen.

Pass / Fail Criteria

The test is passed if the reported encoder position is within an angle of +/- 0.6° of the rotator position.

8.9.17 Park Sensor Test

Purpose

Verification if the park sensor is mounted and working correctly.

Start

1 On the **Contents** page, select the check box **Park sensor test**.

2 Click **Start** on the bottom of the panel.

Pass / Fail Criteria

The test is passed if the park sensor is active or inactive at some predefined positions.

8.9.18 Range Test

Purpose

Verification whether the device is able to use its predefined ranges.

Start

1 On the **Contents** page, select the check box **Range test**.

2 Click **Start** on the bottom of the panel.

Pass / Fail Criteria

The test is passed if the reported ranges are corresponding to the expected values.

8.9.19 Plate Move Test

Cross References

List of cross references to information provided in other sections:

Information	References
Reference plate	See Fig. 8-158, 🗎 8-183
Gripper finger mounting and alignment	See section 8.9.13, 🗎 8-191

Purpose

The **Plate move test** serves for proofing if the CGM correctly fetches and releases plates in different locations on the worktable.

Tools

For this setup you need the following tool:

- Reference plate (→ Cross References)

Procedure

To perform the plate move test:

Preparation

1 Mount the gripper fingers if not already done (→ Cross References).

Fig. 8-171 Reference plate on worktable

2 Place the reference plate onto the worktable according to the setting for **Left Grid** in the **Test Configuration** page.

3 Make sure that the worktable area around the **Left** and **Right Grid** position is free of any objects.

4 Set the number of **Cycles** in the **Plate move test** frame in the **Test Configuration** page.

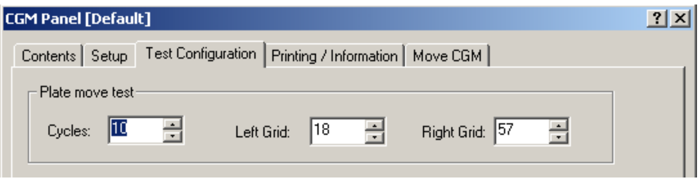


Plate move test
Cycles: 10
Left Grid: 18
Right Grid: 57

__Fig. 8-172__ Setting for plate move test

Start

5 On the **Contents** page, select the check box **Plate move test**.

6 Click **Start** on the bottom of the panel.

You will be guided through the test by a series of process prompts. Not all of them are shown here. Always follow the instructions on the screen.

Pass / Fail Criteria

The test is passed if the reference plate has been fetched and released correctly on each cycle.

8.9.20 Batch File for CGM Field Upgrade

Cross References

List of cross references to information provided in other sections:

Information	References
Serial number settings page	See section 7.1.3, 🗎 7-7
Command tool	See section 7.3, 🗎 7-20

Purpose

The CGM batch file described in the following has been designed to ease the setup when doing a CGM field upgrade. If used correctly this batch prevents from having to re-do the setup of the whole instrument after upgrading an MCA384 with a CGM. It is assuming that the instrument, including the MCA384, was correctly setup before the CGM upgrade.

ATTENTION

Do not use this batch file if:
- your instrument has not been setup.
- you have changed the sequence of the arms while upgrading with the CGM.

In the cases above just do the full instrument setup using SnS.

Prerequisites

- The instrument is setup correctly.
- It is advised to make a backup of the instrument setup.
- The CGM is installed with the shoulder extension at the right side of the MCA384 x-drive.

Preparation

1 Switch the instrument OFF and ON again.

2 Backup the system configuration.

3 Open the **Serial Number Settings** page (→ Cross References) and note the following:

 – the device addresses of the MCA384 and the CGM.

- the device addresses of the arms at the left side of the MCA384.
- the device addresses of the arms at the right side of the CGM.

4 Update the MCA384 FW version to the newest one (V 1.1 or higher).

Running the CGM Batch File

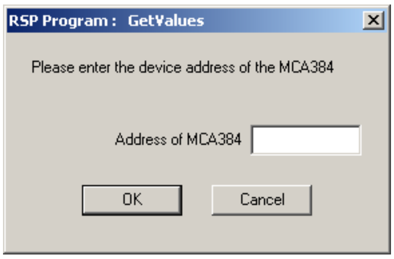
5 Open the **Command Tool** in SnS (→ Cross References)

6 Click the **Load pred…** button on the **Batch File Execution** page.

7 Open the **CGM** folder and select **MCA384_Gripper_upgrade.txt**

8 Click on the **Run All** button on the **Batch File Execution** page.

You will be guided through the batch file execution by a series of process prompts.

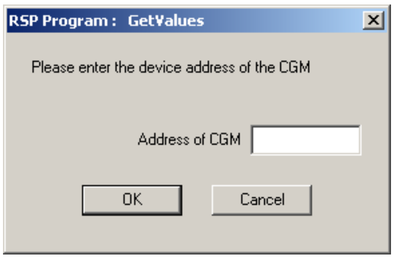


RSP Program : GetValues

Please enter the device address of the MCA384

Address of MCA384

9 Enter the device address of the MCA384.

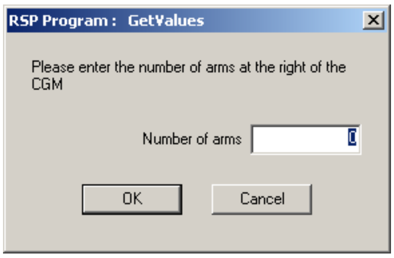


RSP Program : GetValues

Please enter the device address of the CGM

Address of CGM

10 Enter the device address of the CGM.



RSP Program : GetValues

Please enter the number of arms at the right of the CGM

Number of arms: 0

11 Enter the number of arms at the right side of the MCA384 / CGM.

Setup and Service

"The determined range difference is: " 600 "Use this value to con

12 The MCA384 performs an autorange of its X-axis.

The difference between the original range and the new range is calculated and shown in a message box (the value shown is in 1/10 mm).

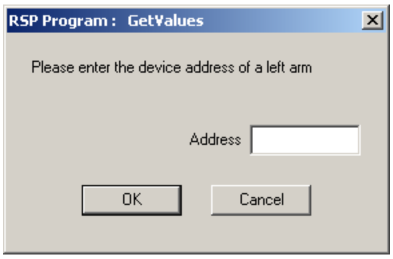
13 Click Yes to choose this value for further calculations.

The value is deducted from the range of the arms at the left side of the MCA384 / CGM.

The value is added to the displacement of the arms at the right side of the MCA384 / CGM.

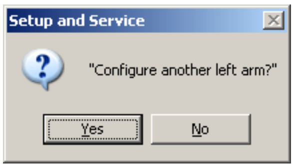
"Are there any left arms to configure?"

14 Are there any arms on the left side of the MCA / CGM to configure?



Please enter the device address of a left arm

15 If yes, enter the device address of the arm on the left side.



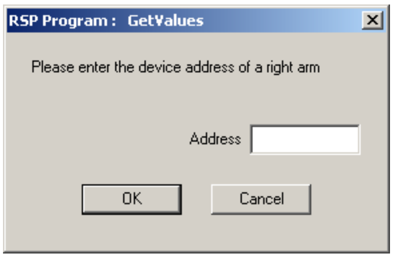
"Configure another left arm?"

16 Is there another arm on the left side of the MCA384 / CGM to configure ?

If Yes, the batch file execution goes to step 15.
If No, the batch file execution goes to step 17.

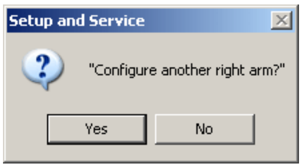
"Are there any right arms to configure?"

17 Are there any arms on the right side of the MCA384 / CGM to configure?



Please enter the device address of a right arm

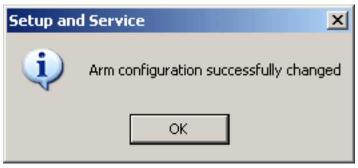
18 If yes, enter the device address of the arm on the right side.



"Configure another right arm?"

19 Is there another arm on the right side of the MCA384 / CGM to configure?

If Yes, the batch file execution goes to step 18.
If No, the batch file execution goes to step 20.



Arm configuration successfully changed

20 Click OK to finish the batch file execution.

Fig. 8-173 *CGM Batch file Process prompts*

After the Batch File Execution

21 Open the **CGM panel** and proceed with the setup of the gripper.

22 Verify that all labware teach positions are still correct.

ATTENTION

Be aware that entering a wrong or incomplete device address would possibly cause the batch file to stop and leave your system in an undefined configuration status.

- If you encounter any problems during the execution of the batch file, use the backup restore function in SnS to restore your system to the original configuration and try again to execute the batch file.

8.10 Multichannel Arm 96

Purpose of This Section

This section describes the setup, test and alignment procedures necessary for a Multichannel Arm 96 installed on a Freedom EVO-2.

8.10.1 Overview

What Is an MCA96?

The Multichannel Arm 96 is a pipetting arm that can move across the worktable. It is equipped with 96 channels and can simultaneously pipette 96-well microplates. Pipetting can be done in two ways:

- Using 96-tip block attached to the MCA96 head.
- Using DiTis to reduce the risk of carry over to a minimum.

The arm can be equipped with an optional gripper module that allows moving labware across the worktable. For possible configurations of the gripper module, see the following paragraph "Gripper Option", 🗎 8-204.

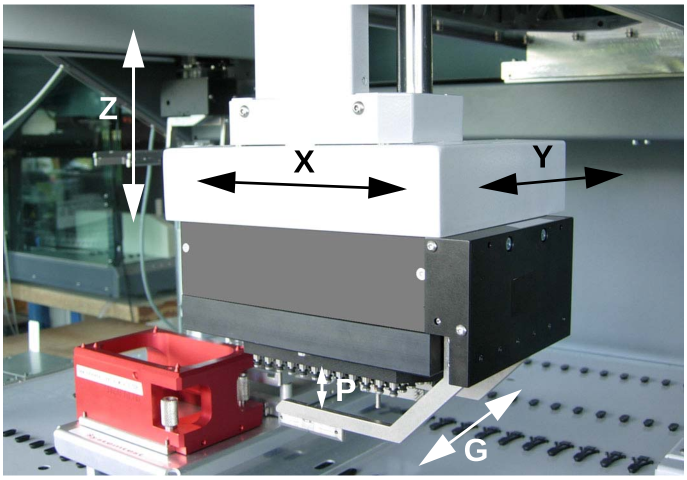


***Fig. 8-174** Multichannel Arm 96, movement axes*

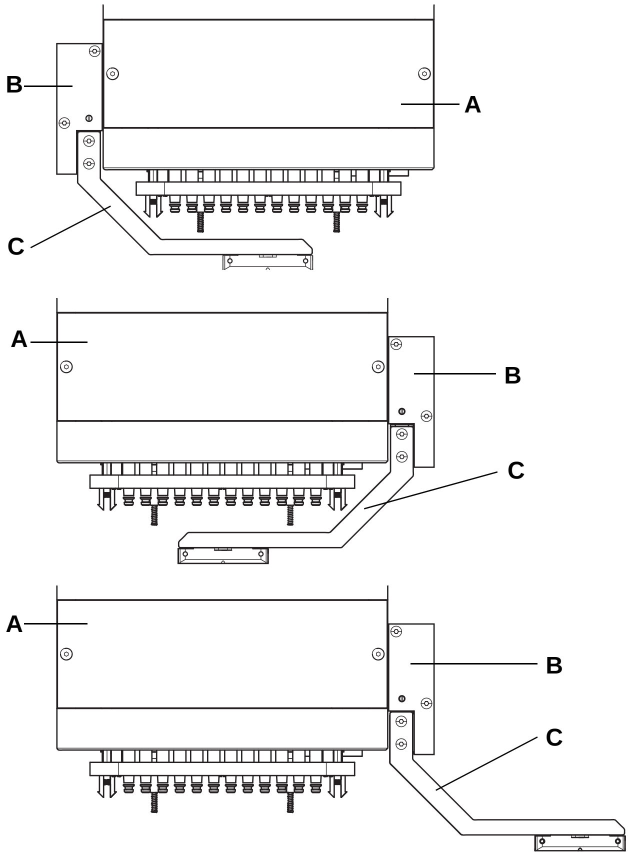
Movement Axes

The MCA96 or parts of it can move in the following axes:

- X-axis, along the worktable
- Y-axis. The MCA96 head can move backward and forward in the Y-axis.
- Z-axis. Parts of the head can move in the Z-axis to accomplish tasks like the following:
  - Pick up / release the tip block
  - Pick up / dispose of DiTis
  - Pipetting
  - For setups, tests and mechanical alignments
- P-axis: Up / down movement of the plungers
- G-axis: Open / close grippers (only If the MCA96 head is equipped with a gripper module).

Gripper Option

The MCA96 head can be equipped with an optional gripper module. The following configurations are possible:



A	*MCA96 head*
B	*Gripper module*
C	*Gripper fingers inside*

Configuration 1
- Gripper module left
- Gripper fingers inside

Configuration 2
- Gripper module right
- Gripper fingers inside

Configuration 3
- Gripper module right
- Gripper fingers outside

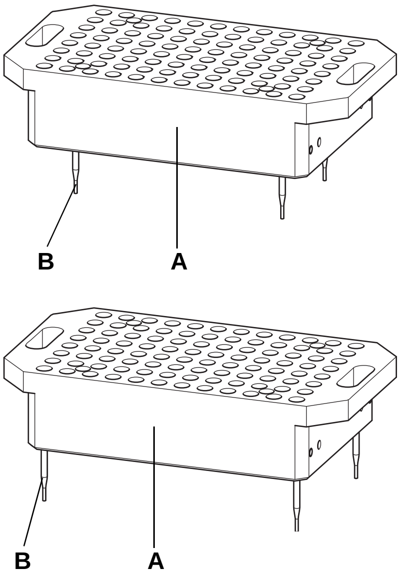
Fig. 8-175 *Gripper configurations*

8.10.2 Required Tools

Teach Block and Teach Pins

This teach block is the same as that used for Te-MO / Aquarius 96. Together with a set of teach pins, it serves for the mechanical alignment of the MCA96 head and for some setup und test procedures. For the alignment of the head it is used in combination with the MCA96 reference block. Depending on the alignment, setup or test to be performed, the appropriate teach pins must be fixed to the inner or outer mounting holes of the teach block:

- Either the precision teach pins, as shown in the following Fig. 8-176 , 🗎 8-205.
- or the standard teach pins.
- For the pin types, see paragraph “Teach Pin Types”, 🗎 8-205 below.



A	*Teach block*
B	*Precision pins (inner mounting holes)*

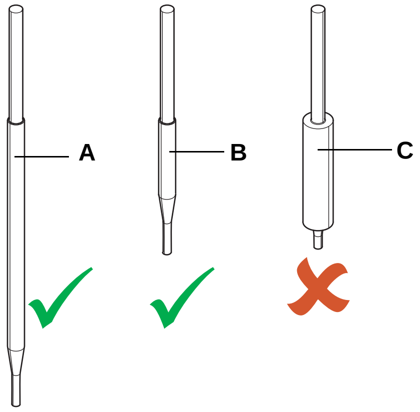
Teach pins in inner mounting holes, for example for determining the worktable coordinates, Z-range, etc.

A	*Teach block*
B	*Precision pins (outer mounting holes)*

The teach pins must be in the outer mounting holes if the MCA96 head or the site plate are to be aligned mechanically.

Fig. 8-176 *Teach block*

Teach Pin Types



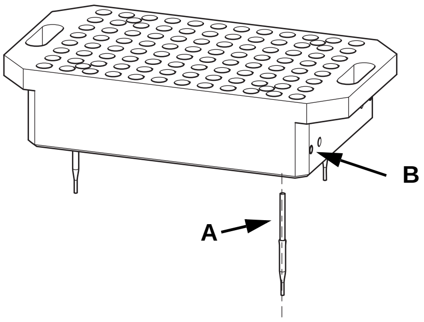
A	*Standard teach pin*
B	*Precision teach pin*
C	*Short teach pin (not for MCA96, do not use)*

The teach block is delivered with three sets of teach pins, as shown in the figure. Each set contains four pins.

Fig. 8-177 *Teach pin types*

Note that for aligning, setting up and testing the MCA96 you must use either the standard pins (A) or the precision pins (B), but not the pins of type (C). These are used for Te-MO and Aquarius.

Fixing the Pins to the Teach Block



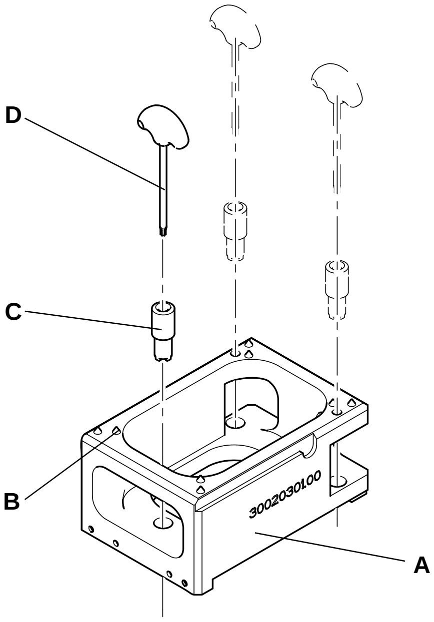
To fix the teach pins to the block:

1. Insert them in the appropriate holes at the bottom (arrow A). Push them inwards until the stop.
2. Tighten the associated set screws on the left and right sides of the block (arrow B).

Fig. 8-178 *Fixing the teach pins*

Reference Block

The MCA96 reference block is used in connection with the teach block. It can be used as follows:



A	*Reference block*
B	*Cone point*
C	*Height adjustment tool*
D	*Torx key*

◆

Fig. 8-179 *MCA96 reference block*

The reference block is needed for the following adjustments:

- Mechanical alignment of the MCA96 head. In this case the height adjustment tool (C) and the torx key (D) are not needed.
- Height adjustment of the site plates on the service carrier. For this adjustment the height adjustment tool (C) and the torx key (D) are needed.

8.10.3 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

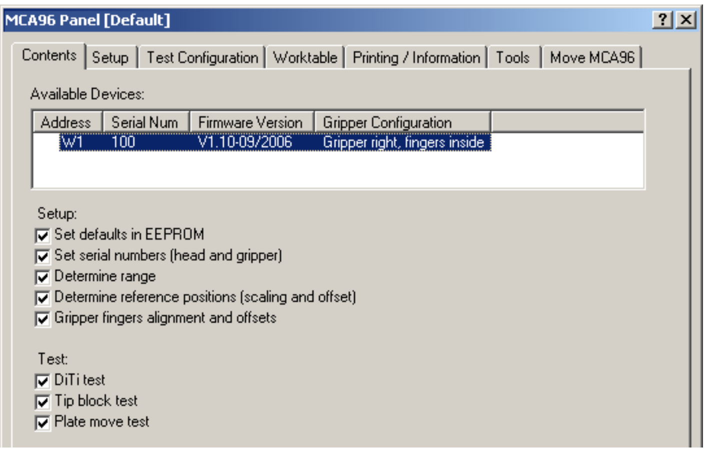
Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Function	Type	User	FSE
Set Defaults in EEPROM	Setup		X
Set Serial numbers	Setup		X
Determine Range	Setup		X
Determine Reference Positions (Scaling and Offset)	Setup		X
Gripper Fingers Alignment and Offsets	Setup		X
DiTi Test	Test	X	X
Tip Block Test	Test	X	X
Plate Move Test	Test	X	X

Starting the Panel

1 Start the panel with **System Devices > MCA96**. The **MCA96** panel with activated **Contents** page appears. After starting the **MCA96** panel no setup or test check boxes are activated.



Available Devices:

Address	Serial Num	Firmware Version	Gripper Configuration
W1	100	V1.10-09/2006	Gripper right, fingers inside

Setup:
☑ Set defaults in EEPROM
☑ Set serial numbers (head and gripper)
☑ Determine range
☑ Determine reference positions (scaling and offset)
☑ Gripper fingers alignment and offsets

Test:
☑ DiTi test
☑ Tip block test
☑ Plate move test

***Fig. 8-180** MCA96 panel, Contents page*

Pages

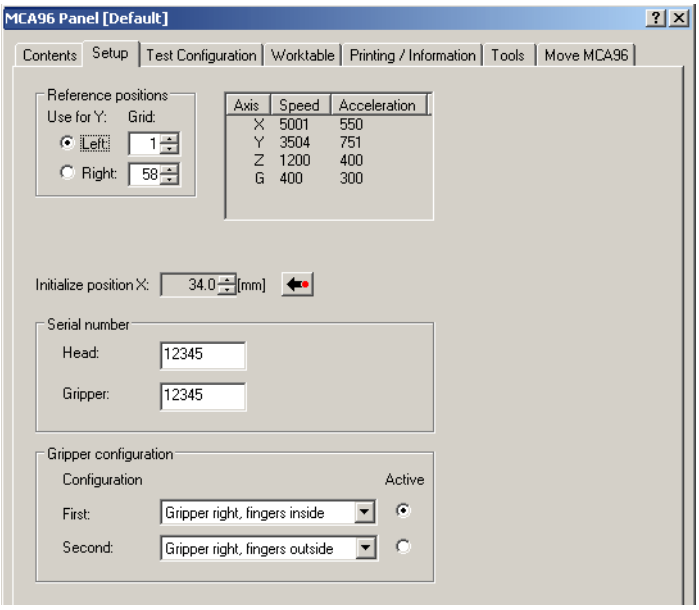
Tab. 8-31 Pages of the MCA96 panel

Pages	Function
Contents	General overview, device and procedure selection
Setup Page	Definition of setup parameters
Test Configuration	Lets you set the test parameters
Worktable	Selection of an appropriate worktable map
Printing / Information	Print selection for the QC-report
Tools	For removing and installing the pipetting head and for mechanical alignment of the head
Move MCA96	Lets you move the MCA96 to the required position

8.10.4 Setup Page

Purpose

The **Setup** page provides the controls for setting the parameters for the various setup procedures



Reference positions
Use for Y: Grid:
● Left: 1
○ Right: 58

Axis	Speed	Acceleration
X	5001	550
Y	3504	751
Z	1200	400
G	400	300

Initialize position X: 34.0 [mm]

Serial number
Head: 12345
Gripper: 12345

Gripper configuration

Configuration		Active
First:	Gripper right, fingers inside	●
Second:	Gripper right, fingers outside	○

Fig. 8-181 MCA96 panel, Setup page

Controls

Reference positions	Frame for setting the reference positions
- **Grid**	Spin boxes for setting left and right reference grid positions
- **Use for Y**	Option buttons that let you specify whether the reference positions in the Y-axis should be determined in the left or right reference position
Table on right side	Current speed and accelerations in X, Y, Z, R and G axes

Initialize position X	This spinbox must be used if the **Initialize to front feature** has been enabled on the **Basic Setup > Worktable** page. The spinbox defines the position (relative to grid position # 1) in which the arm is to be initialized. The position must be chosen so that no collisions of the arm during initialization are possible. Example: If the required grid position is 18, then the spin box must be set to (18 - 1) x 25 mm = 425 mm (Note that the X-distance between two neighboring grid positions is 25 mm).
⬅	Allows you to set the current arm position as the initialization position
Serial number	For setting the serial numbers
- **Head**	• Text box for the head serial number
- **Gripper**	• Text box for the gripper serial number
Gripper configuration	Lets you specify the configurations of the (optional) gripper module. Users can choose the configurations (see also Fig. 8-175 , 🗎 8-204 and following note): • Gripper right, fingers inside • Gripper right, fingers outside • Gripper left, fingers inside
- **First**	• Lets you select a first gripper / fingers configuration.
- **Second**	• As above for a second gripper / fingers configuration.
- **Active**	• Option buttons to specify which configuration (first / second) is currently active.

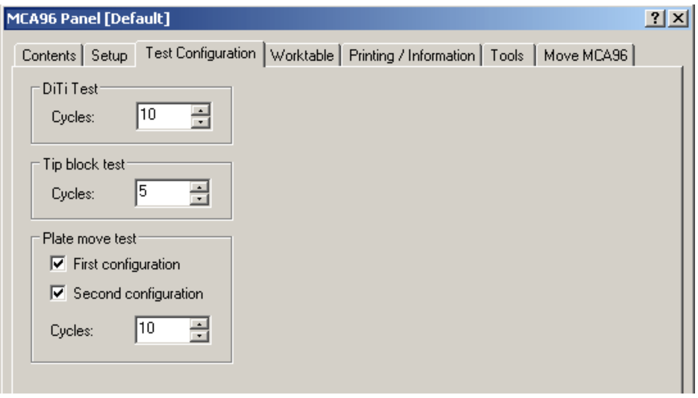
***Note:** When the MCA96 head is installed, the user decides on which side of the head he wishes the gripper module. The installation of the gripper must be carried out by an FSE.*

- *Once the gripper module is installed, the user can install (and align) the gripper fingers in two ways: fingers pointing to the inside or the outside.*
- *You can configure the two possible arrangements of the gripper fingers in advance (**First** and **Second**) and specify which one is currently active.*

8.10.5 Test Configuration Page

Purpose

The **Test Configuration** page lets you set the number of test cycles for the **DiTi Test** and the **Tipblock Test**.



DiTi Test
Cycles: 10

Tip block test
Cycles: 5

Plate move test
☑ First configuration
☑ Second configuration
Cycles: 10

Fig. 8-182 *MCA96 panel, Test Configuration page*

Controls

DiTi test	Contains the spin box **Cycles** for setting the number of test cycles for the **DiTi Test**.
Tip block test	As above for the **Tip block test**.
Plate move test	Controls for configuring the **Plate move test**.
- **First configuration**	• Includes the first configuration according to the Setup page in the test, if selected.
- **Second configuration**	• As above for the second configuration.
- **Cycles**	• Lets you specify the number of test cycles.

Note: *If you include both gripper finger configurations in the* ***Plate move*** *test, you will have to change the gripper finger configuration accordingly during the test.*

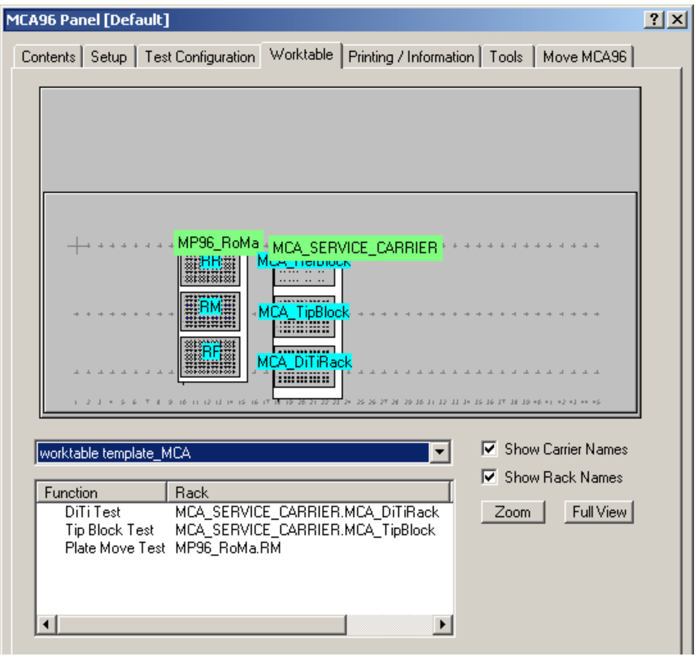
8.10.6 MCA96 Worktable Page

Cross References

List of cross references to information provided in other sections:

Information	**References**
Description of Worktable page	See section 5.2.7, 🗎 5-20
Worktable Complete Editor	See chapter 14, 🗎 14-1

The Worktable page lets you select an appropriate worktable map that is adapted to a specific function (→ Cross References).



worktable template_MCA

☑ Show Carrier Names

☑ Show Rack Names

Function	Rack
DiTi Test	MCA_SERVICE_CARRIER.MCA_DiTiRack
Tip Block Test	MCA_SERVICE_CARRIER.MCA_TipBlock
Plate Move Test	MP96_RoMa.RM

Fig. 8-183 *MCA96 Worktable page*

The previous figure shows a predefined worktable layout for the MCA96 carrier. You can use the Worktable Complete Editor (see cross references) to adapt it to the application run on the instrument.

8.10.7 Tools Page

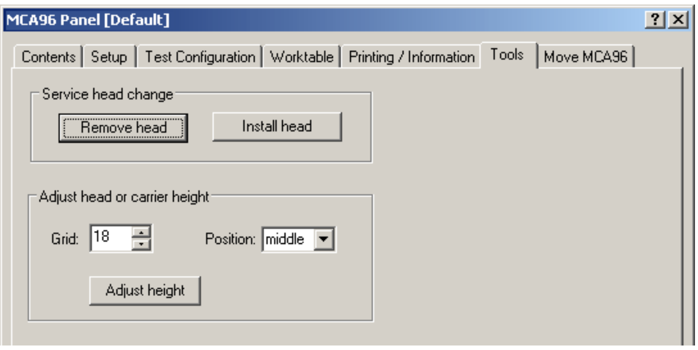
Cross References

List of cross references to information provided in other sections:

Information	References
Remove the pipetting head	Refer to the instrument's Operating Manual, chapter "Maintenance and Repair"
Install the pipetting head	• To reinstall the same head, see Operating Manual, "Maintenance and Repair" • To install a new head, see Service Manual.
Adjusting the Carrier Height	Refer to the instrument's Operating Manual, chapter "Maintenance and Repair"
Move MCA96 page	See section 8.10.8, 🗎 8-214

Purpose

The **Tools** page contains the controls that help you to remove / install the MCA96 head and to adjust the head or the carrier on the MCA96 service rack. These adjustments are carried out with the aid of the teach block, the reference block and the **Move MCA96** page.



Grid: 18
Position: middle

Fig. 8-184 *MCA96 panel, Tools page*

Controls

Service head change	Command buttons for removing or installing the MCA96 head
- **Remove head**	This command button starts a procedure that lets you remove the MCA96 head (e.g., for repair). See below.
- **Install head**	This command button starts a procedure that lets you install the MCA96 head (e.g., after repair). See below.
Adjust head or carrier height	Controls for the mechanical alignment of the MCA96 head or the site plates on the MCA96 service carrier.
- **Grid**	Lets you set the (leftmost) grid position of the MCA96 service carrier on which the reference block is to be placed.
- **Position**	Drop down list box that lets you select the position (front, middle, rear) of the reference block within the MCA96 service carrier.

- **Adjust height** For exceptional cases only. This command button starts a procedure that allows an experienced user to align the plates on the MCA96 service carrier. The adjustment is done with the aid of the teach block (attached to the MCA96 head), the reference block that is placed on the plate and the **Move MCA96** tool.

Using the Tools Page

Remove Head

This procedure lets you lower the pipetting head onto the worktable, so that you can disconnect and remove it. To protect the tip block you must use the foam block that is provided with the packaging.

***Note:** For a detailed description of the removal refer to the instrument's Operating Manual (see cross references).*

1. After starting the MCA96 panel change to the **Tools** page.
2. Click on the button **Remove head**.
3. Follow the instructions on the screen and those provided in the Operating Manual.

Install Head

This procedure supports the installation of the pipetting head.

Note:

- *If the head to install is the same as the one that was removed, it may be installed by an operator. In this case follow the instructions provided in the Operating Manual.*
- *If, on the other hand, the head must be replaced with another one, then only the installation and a subsequent check of the alignment could be carried out by the operator himself. However, if the replacement head needs to be adjusted, an FSE will be needed. Find the corresponding procedure in the Service Manual of the instrument (see cross references)*

To install the head:

1. Start the MCA96 panel change to the **Tools** page.
2. Click on the button **Install head**.
3. Follow the instructions on the screen and those provided in the Operating Manual or the Service Manual, respectively.
4. Check the correct alignment of the pipetting head. See below.

Adjust Head or Carrier Height

Please. pay attention to the following:

ATTENTION

Misadjustment possible if you try to adjust the head and the carrier height at the same time.

- Never attempt to carry out both adjustments at the same time, as this would lead to the loss of the adjustment basis.
- Either adjust the head with a properly adjusted carrier, or adjust the carrier with a correctly adjusted head.

This frame contains the elements you need to do the following:

- Check the alignment of the head and, if necessary, to realign it. For details see 8.10.11 “Check Adjustment of Pipetting Head”, 🗎 8-221.
- **Carrier height**: This procedure helps you to check the correct alignment of the site plates on the service carrier and to readjust the plates if necessary. The exact procedure can be carried out by an FSE or an experience user and is described in the Operating Manual of the instrument (see cross references).
- **Grid** and **Position**: See table above.

8.10.8 Move MCA96 Page

Cross References

List of cross references to information provided in other sections:

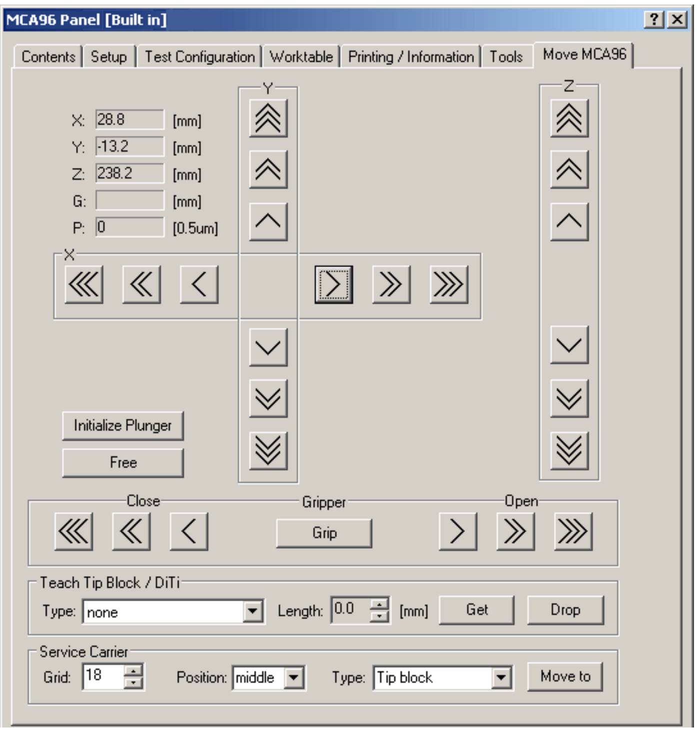
Information	References
MCA96 movement axes	See section 8.10.1, 🗎 8-203

Note: *This function works only if the MCA96 has been selected before on the* ***Contents*** *page.*

Purpose

The **Move MCA96** page lets you move the whole MCA96 or parts of it in the appropriate axes: X, Y, Z and G (→ Cross References).

Note: *Movement in the G-axis is only possible if the MCA96 is equipped with a gripper.*



X: 28.8 [mm]
Y: -13.2 [mm]
Z: 238.2 [mm]
G: [mm]
P: 0 [0.5um]

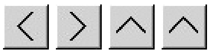
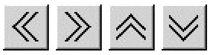
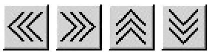
Teach Tip Block / DiTi
Type: none
Length: 0.0 [mm]

Service Carrier
Grid: 18
Position: middle
Type: Tip block

Fig. 8-185 *Move MCA96 page*

Controls

The **Move MCA96** page contains the following controls

	Single step (1/10 mm) movement buttons.
	Ten steps (1 mm) movement buttons.
	Continuous movement buttons (if button is kept pressed).
Initialize Plunger	Moves plunger in Z-axis into its initial position
Free	Moves all other arms (LiHa, etc.) away from the selected device to their end positions.
Grip	Only available if the gripper is installed. Grips the reference block.
X, Y	Text boxes indicating the current position of axis with respect to grid position # 1
Z	Current position of head in Z-axis (distance from worktable)
G	Current distance between gripper fingers
P	Current plunger position (Z-distance from initial position)
Teach Tip Block / DiTi	Contains the controls for picking up / dropping the tip block or the DiTis **Type**: Lets you select between the following: • **none**: nothing to select • **Standard Tip Block**: For a tip / teach block with standard tips • **High Precision Tip Block**: For a tip / teach block with high precision pins • **Lenght**: If a standard tip / teach block or DiTis are selected with **Type**, this control shows the tip length. • **Get**: Used to pick up the tip / teach block or the DiTis from the predefined position on the service carrier. Note that the MCA96 head must first be moved about 2 mm over the tip / teach block or DiTi rack before this function may be used. • **Drop**: Used to eject (drop) the tip / teach block or the DiTis at the predefined position of the service carrier. Note that the MCA96 head must first be moved about 2 mm over the corresponding adapter block or DiTi rack on the service carrier before this function may be used.
Service Carrier	Controls for defining the grid position of the service carrier and the position within the carrier Move where a tip / teach block, DiTis or the reference block is located. • **Grid**: (Leftmost) grid position of the service carrier • **Position**: The position (front, middle, rear) within the service carrier where the teach block, tip block, DiTis or the reference block is located. • **Move to**: Moves the head over the predefined position.

Note:

- *The arrows on the movement buttons indicate the direction in which the respective part(s) will be moved.*
- *If you place the mouse pointer over a movement button, a text appears that explains what you can do with the button (so-called “tool tip”)*
- *If no grippers are installed (gripper electronics disconnected) the controls within the frame* ***Gripper*** *are disabled.*

Keyboard Control

It is also possible to use the keyboard for the movements in the various axes. You can use the corresponding keys of the numeric keypad or the keys in the key blocks left of the numeric keypad.

Tab. 8-32 *Moving the arm with the keyboard*

Key (left of numeric keypad)	Key in numeric pad (NumLock switched on)	Movement/rotation axes
Right arrow	6 Right arrow	X+ (right)
Left arrow	4 Left arrow	X- (left)
Down arrow	2 Down arrow	Y+ front
Up arrow	8 Up arrow	Y- (rear)
Page Up	PgUp 9	Z+ (up)
Page Down	PgDn 3	Z- (down)
Delete	**.** Delete	G+ (open) [a]
Insert	0 Insert	G- (close) [a]

a) Open/close grippers

Steps

The parts of the arm device are moved as follows:

- Every time you hit one of the above keys, the corresponding part is moved by one step (0.1 mm).
- If you keep the key pressed it is moved continuously at a speed of about five steps per second.
- You can press a key continuously and at the same time press the Ctrl key. In this case, the arm is accelerated until it reaches a maximum speed.

8.10.9 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

8.10.10 Picking up and Dropping the Teach (Tip) Block / DiTis

Purpose

This section describes how the tip block, teach block or a set of DiTis are picked up and dropped with the aid of the **Move MCA96** page.

Picking up the Teach (Tip) Block

Note:

- *The following procedure shows how a teach block is picked up and dropped. The procedure to follow for a tip block (or for the DiTis) is practically the same.*
- *If you are using a teach block make sure it is equipped with the correct teach pins in the correct mounting holes, as required by the procedure.*

To pick up the teach (tip) block:

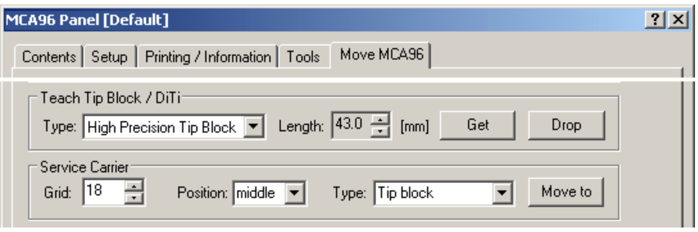
1 When prompted by the procedure, place the teach (tip) block (C) on the adapter block (D) on the service carrier (A) as shown in the following figure. Note that the adapter block itself rests on a special rack (E).

Depending on the procedure to carry out, other items, for examole, the reference block (B) may be on the service carrier.

Fig. 8-186 *Place tip / teach block on service carrier*

A	*Service carrier*		***D***	*Adapter block*
B	*Reference block*		***E***	*Rack for adapter block*
C	*Teach (tip) block*			

2 Open the **Move MCA96** page.



Teach Tip Block / DiTi
Type: High Precision Tip Block
Length: 43.0 [mm]

Service Carrier
Grid: 18
Position: middle
Type: Tip block

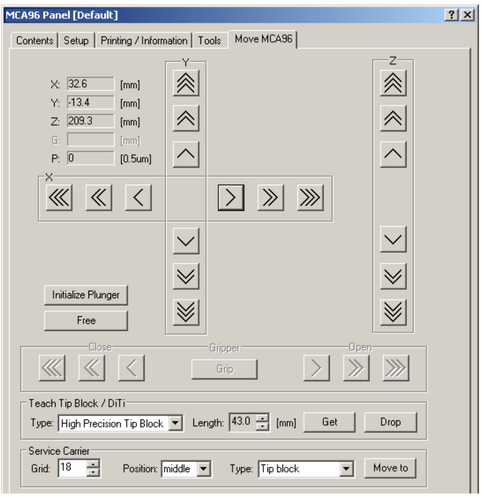
Fig. 8-187 *Move MCA96 page*

3 Enter the following parameters:

- **Frame Tip Block DiTi**: Select the appropriate block with the correct tips.
- **Frame Service Carrier**:
  - **Grid**: Grid position of service carrier (in our case **18**)
  - **Position**: Position of the teach (tip) block within the carrier (in our example **middle**)
  - **Type**: Select **Tip block**.

4 After you have made your entries click on the button **Move to**.

This moves the pipetting head over the selected position on the service carrier.



X: 32.6 [mm]
Y: -13.4 [mm]
Z: 209.3 [mm]
G: [mm]
P: 0 [0.5um]

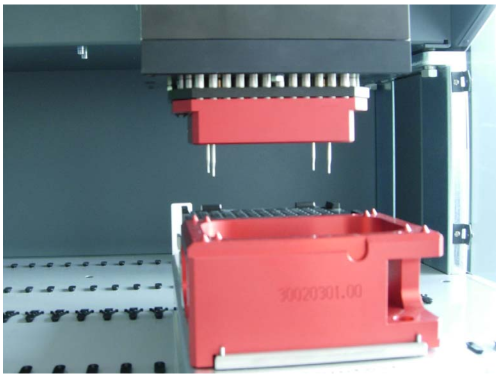
Teach Tip Block / DiTi
Type: High Precision Tip Block Length: 43.0 [mm]

Service Carrier
Grid: 18 Position: middle Type: Tip block

5 Use the move buttons to move the head about 2 mm over the teach (tip) block as shown in the figure below.

6 When the head is positioned properly, click **Get** on the **Move MCA96** page.

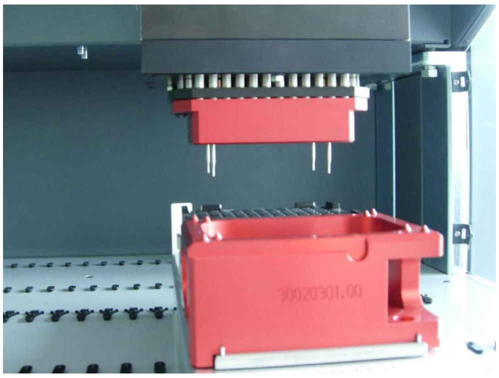
The teach (tip) block is now picked up.



7 Now you can use the teach (tip) block for the required adjustment, check or setup procedure.

Put Back (Drop) Teach (Tip) Block

To put the teach (tip) block back on the adapter block:



1. Click the **Move to** button on the **Move MCA96** page to move the teach (tip) over the adapter block on the service carrier.
2. Use the move buttons to lower the head until it is correctly positioned some few millimeters over the block adapter, then click **Drop**.

This ejects the teach (tip) block and replaces it on the adapter block.

Picking up / Dropping DiTis

Fig. 8-188 *DiTi block*

The procedure for picking up / dropping DiTis is practically the same as that for a teach (tip) block.

1. Place a DiTi block or box on the carrier and define the DiTi type and the Position on the **Move MCA96** page.
2. Then pick up and drop the DiTis with the aid of the **Move MCA96** page.

8.10.11 Check Adjustment of Pipetting Head

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.10.2, 🗎 8-204
Move MCA96 page	See section 8.10.8, 🗎 8-214
Pick up / put back teach block	See section 8.10.10, 🗎 8-217
Adjust the pipetting head	Refer to the instrument's Service Manual, chapter “Repair”

Purpose

This procedure explains how the alignment of the pipetting head can be checked. It is recommended that you verify the alignment of the head after you have installed it. The check can be carried out by on operator.

Tools

You need the following tools:

- Teach block with the teach pins inserted in the outer mounting holes.
- Reference block.

Checking the Alignment

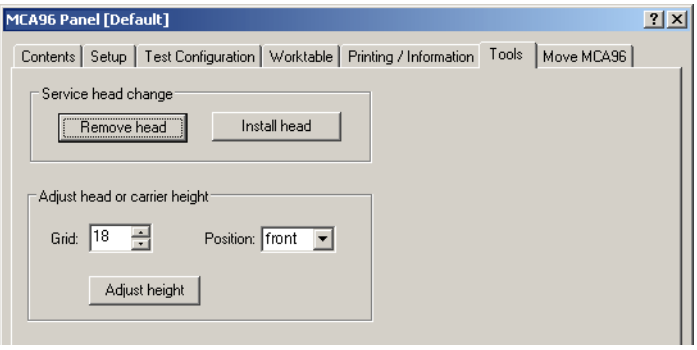
To check the alignment of the pipetting head:

1 If not done yet, start the MCA96 panel and change to the **Tools** page (see following figure).

2 On the **Tools** page, specify the following parameters:

  – **Grid**: Grid position of service carrier (in our example **18**)

  – **Position**: Position of the reference block within the service carrier (in our example **front**)



Grid: 18
Position: front

Fig. 8-189 *MCA96 Tools page*

3 Click on **Adjust height** button to start the procedure.

You will be guided through the procedure by series of process prompts. Always follow the instructions on the screen.

4 You are instructed to define and pick up the teach block and to place the reference block on the service carrier.
For details on how to pick up the teach block (see cross references).

5 After you have done this, move the head with the teach block over the reference block as shown in the following figure.

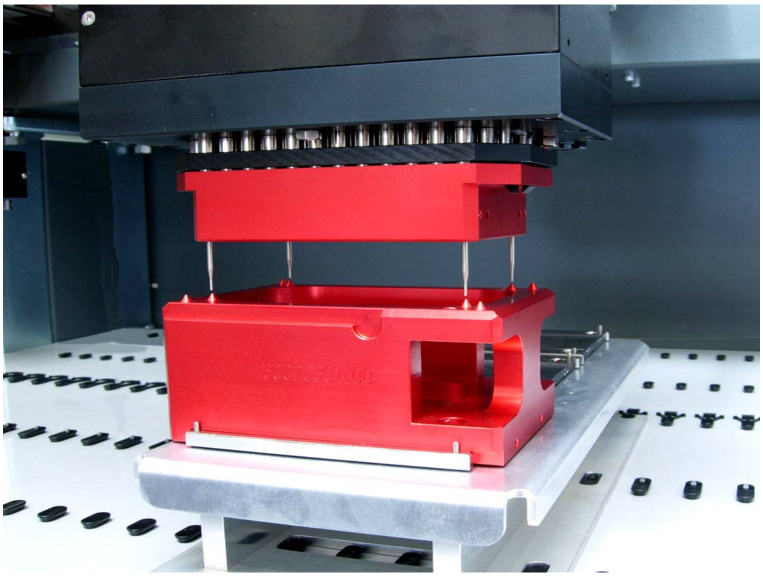
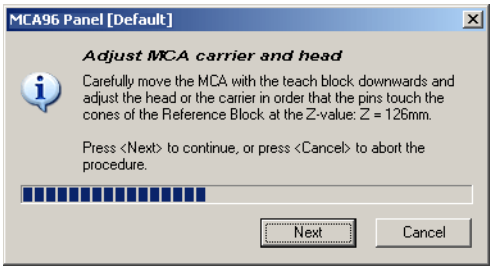


Fig. 8-190 *Checking the alignment of the pipetting head*

6 Use the **Move MCA96** page to carefully lower the teach block until the teach pins just touch the inner cone points on the reference block. The head is adjusted properly if the following conditions are fulfilled:

- The cone pins should just touch the centers of the teach pins.
- In this position, the **Z-value** indicated on the **Move MCA96** page must correspond to the value indicated on the corresponding process prompt. See following figure.



MCA96 Panel [Default]

Adjust MCA carrier and head

Carefully move the MCA with the teach block downwards and adjust the head or the carrier in order that the pins touch the cones of the Reference Block at the Z-value: Z = 126mm.

Press <Next> to continue, or press <Cancel> to abort the procedure.

Fig. 8-191 *Adjust MCA96 carrier and head*

Make sure that the value indicated on this prompt and the **Z-value** on the ***Move MCA96*** page are equal.

7 If the alignment of the pipetting head is in order you can put the teach block back on the service carrier (see cross references).

8 If the pipetting head is not aligned correctly it must be adjusted by an FSE as described in the Service Manual of the instrument (see cross references).

8.10.12 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box.

   No further parameters need to be defined.
2. Download the default values to the MCA96 and have them re-read by the software with **Start**.

8.10.13 Set Serial Numbers (Head and Gripper)

Cross References

List of cross references to information provided in other sections:

Information	References
Setting the serial number of the MCA96 arm (not those of the head and the gripper!)	See section 7.1.3, 🗎 7-7

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This setup procedure lets you enter the serial numbers of the MCA96 head and that of the gripper module (if installed).

Note:

- *The serial numbers of the head and the gripper module are not identical with that of the whole MCA96 arm, so do not confuse these numbers.*
- *The serial number of the arm must be entered using the function*
  Instrument > Basic Setup > Serial Number Setings
  (see cross references).
- *Since the serial numbers of the head and the gripper cannot be stored in the head electronics, they must be entered separately.*

When to Set the Serial Numbers?

The head and gripper serial numbers must be checked and, if necessary, entered anew, in the following cases:

- When the MCA96 panel is called up for the first time.
- After the whole arm has been replaced.
- After the head has been replaced with another one.
- After the gripper module has been replaced with another one.

Where to Find the Serial Numbers?

The head serial number and the gripper serial number are printed on stickers applied to the respective assemblies according to the following figure.

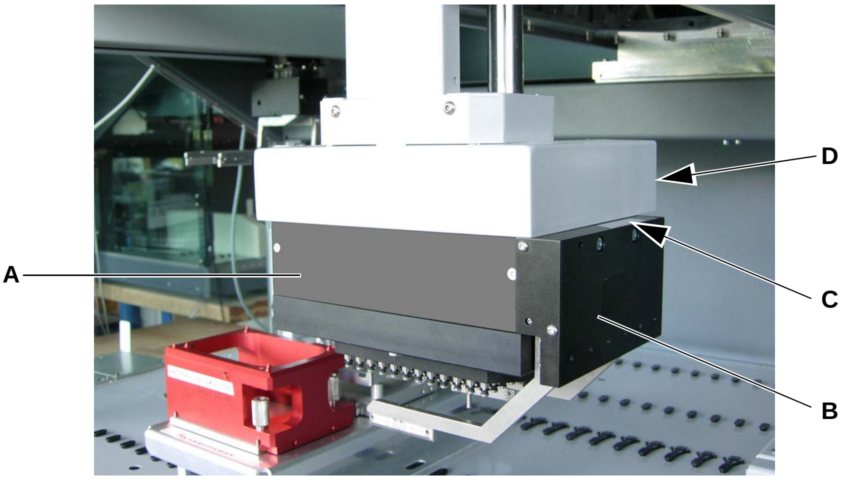


Fig. 8-192 *Location of serial numbers*

A	*MCA96 head*	***C***	*Location of gripper serial number*
B	*Gripper module*	***D***	*Head serial number (on rear side)*

WARNING

injuries possible if you try to read the numbers with the instrument switched on.

- Switch off the instrument before reading the numbers.
- Make sure your head and hands are out of the danger zone before switching the instrument on again.

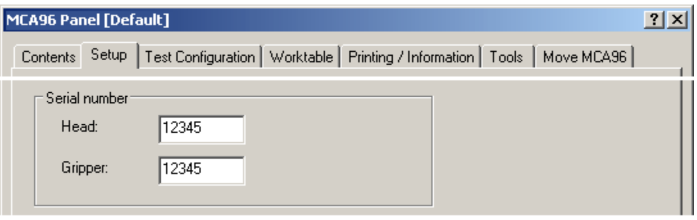
To read the number:

1. Switch off the instrument.
2. Open the front safety panel and manually pull the MCA96 arm to its front position.
3. Now you should be able to read and note down the numbers.
4. After you have done this and your head and hands are out of the danger zone, switch the instrument on again.

Procedure

To enter the serial numbers:

1 On the **Contents** page, select the check box **Set serial numbers (head and gripper)** and change to the **Setup** page (see following figure).



Serial number
Head: 12345
Gripper: 12345

Fig. 8-193 *MCA96 panel, Setup page*

2 Type the head serial number in the field **Head**.

3 Type the gripper serial number in the field **Gripper**.

4 Click **Start** at the bottom of the panel when done.

The numbers are written to the MCA96 arm's EEPROM and remain stored until they are entered anew.

8.10.14 Determine Range

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.10.2, 🗎 8-204
Move MCA96 page	See section 8.10.8, 🗎 8-214
Pick up / put back teach block	See section 8.10.10, 🗎 8-217

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Determine Range** procedure moves the MCA96 head (or parts of it) in the Y- and Z-axes to their extreme positions to determine the available ranges. Note that the Y-range is determined automatically, while the Z-range must be determined manually. The values found are then written to the MCA96.

Tools

For this setup you need the teach block with appropriate teach pins (standard or precision) installed in the inner holes.

Preparation

1 Insert the teach pins in the inner holes of the teach block and fix them.

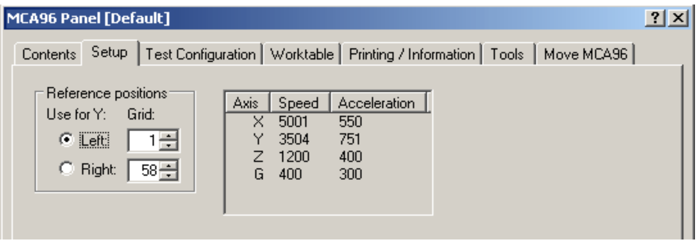
2 Place the teach block on the adapter block on the service carrier.

Procedure

To determine the range:

Start

1 On the **Contents** page, select the **Determine Range** check box and change to the **Setup** page.



Use for Y: ● Left: Grid: 1
○ Right: Grid: 58

Axis	Speed	Acceleration
X	5001	550
Y	3504	751
Z	1200	400
G	400	300

Fig. 8-194 *MCA96 panel, Setup page*

2 Make the following entries:
- Click the appropriate **Use for Y** option button to select the reference position (**Left** or **Right**) in which you wish to determine the Z-range.
- In the **Reference Positions** frame, set the **Left** or **Right** grid position in the corresponding spin boxes.

3 Start the procedure with **Start**.

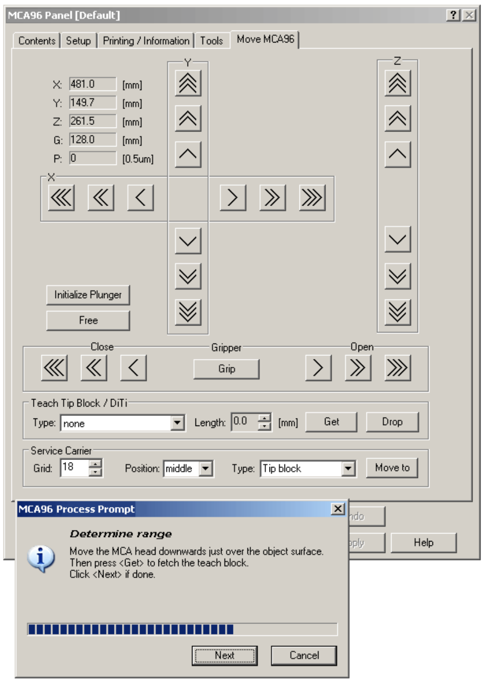
You will be guided through the setup procedure by a series of process prompts. Always follow the instructions in the screen.

Y-Autorange

4 First, the MCA96 arm is initialized and an autorange of the Y-axis is automatically performed. Please wait for the end of the Y-autorange.

*The **Move MCA96** page, together with a process prompt appears.*

Z-Range



X: 481.0 [mm]
Y: 149.7 [mm]
Z: 261.5 [mm]
G: 128.0 [mm]
P: 0 [0.5um]

Teach Tip Block / DiTi
Type: none
Length: 0.0 [mm]

Service Carrier
Grid: 18
Position: middle
Type: Tip block

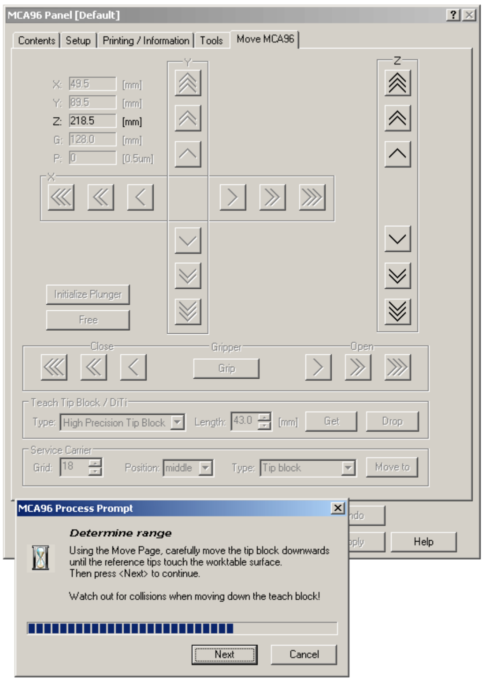
Determine range

Move the MCA head downwards just over the object surface.
Then press <Get> to fetch the teach block.
Click <Next> if done.

5 Next, you are prompted to pick up the teach block. It is assumed that the teach pins are installed and that the teach block is on the service carrier.

For details on how to pick up the teach block (see cross references).

6 Click **Next** when done.



X: 49.5 [mm]
Y: 89.5 [mm]
Z: 218.5 [mm]
G: 128.0 [mm]
P: 0 [0.5um]

Teach Tip Block / DiTi
Type: High Precision Tip Block
Length: 43.0 [mm]

Service Carrier
Grid: 18
Position: middle
Type: Tip block

MCA96 Process Prompt

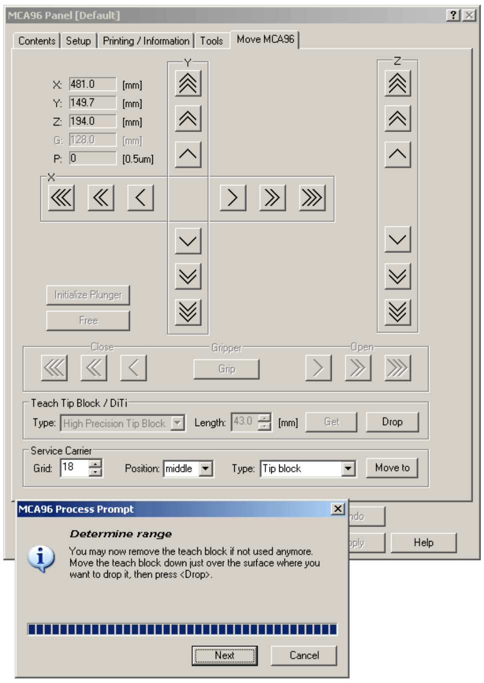
Determine range

Using the Move Page, carefully move the tip block downwards until the reference tips touch the worktable surface.
Then press <Next> to continue.

Watch out for collisions when moving down the teach block!

7 Use the move buttons in the **z**-frame on the **Move MCA96** page to move the head carefully downwards until the teach tips just touch the worktable.

8 Click **Next** when done.



X: 481.0 [mm]
Y: 149.7 [mm]
Z: 194.0 [mm]
G: 128.0 [mm]
P: 0 [0.5um]

Teach Tip Block / DiTi
Type: High Precision Tip Block
Length: 43.0 [mm]

Service Carrier
Grid: 18
Position: middle
Type: Tip block

MCA96 Process Prompt

Determine range

You may now remove the teach block if not used anymore.
Move the teach block down just over the surface where you want to drop it, then press <Drop>.

9 Next, you are prompted to put the teach block back on the service carrier

For details on how to put back the teach block (see cross references).

10 Click **Next** when done.

8.10.15 Determine Reference Positions (Scaling and Offset)

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.10.2, 🗎 8-204
Move MCA96 page	See section 8.10.8, 🗎 8-214
Pick up / put back teach block	See section 8.10.10, 🗎 8-217

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Determine Reference Positions** procedure serves for the determination of the MCA96 head’s worktable coordinates with the aid of the teach block. The head is moved the reference positions as selected on the **Setup** page in sequence:

Tools

For this setup you need the teach block with appropriate teach pins (standard or precision) installed in the inner holes.

Preparation

1. insert the teach pins in the inner holes of the teach block and fix them.
2. Place the tip block on the appropriate support on the service carrier.

Reference Positions

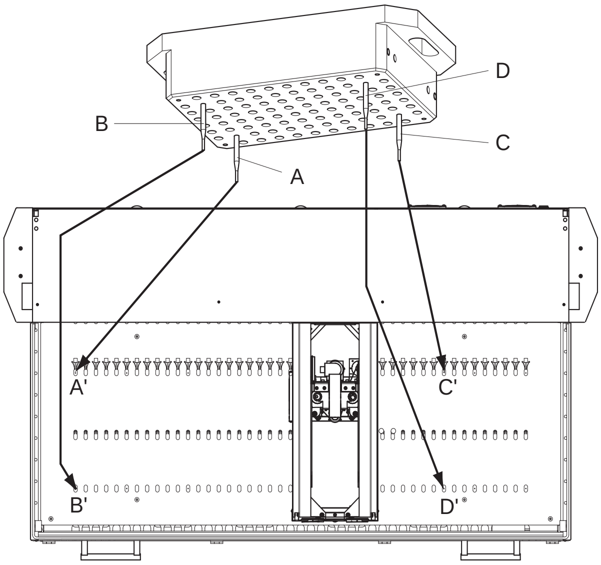


Fig. 8-195 Determining the reference positions

The previous Fig. 8-195, 🗎 8-228 and Tab. 8-33, 🗎 8-229 below show which teach pin must used to determine the X- and Y-coordinates of which reference pin on the worktable.

Note: *In our example it is assumed that the leftmost references pins are in grid position # 1, the rightmost ones in grid position 37. However, depending on the physical worktable layout (cutouts, installed arms, etc.) the reference pins might be in other grid positions.*

Tab. 8-33 *Assignment of teach pin to reference positions*

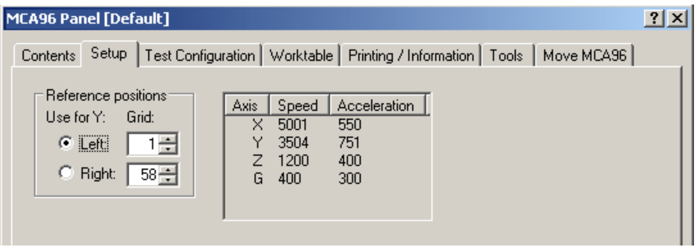
Y-coordinates on left side			**Y-coordinates on right side**		
Teach pin	**Reference pin (Grid position)**	**Sequence**	**Teach pin**	**Reference pin (Grid position)**	**Sequence**
A: left rear	A’: (1)	1	A: left rear	A’ (1)	1
B: left front	B’ (1)	2	C: right rear	C’ (37)	2
C: right rear	C’ (37)	3	D: right front	D’ (1)	3
D: right front	n/a	n/a	D: left front	n/a	n/a

Procedure

Start

To determine the reference positions:

1 On the **Contents** page, select the **Determine Reference Positions** check box and change to the **Setup** page.



Reference positions
Use for Y: Grid:
● Left: 1
○ Right: 58

Axis	Speed	Acceleration
X	5001	550
Y	3504	751
Z	1200	400
G	400	300

Fig. 8-196 *MCA96 panel, Setup page*

2 If not done yet, make the following entries:

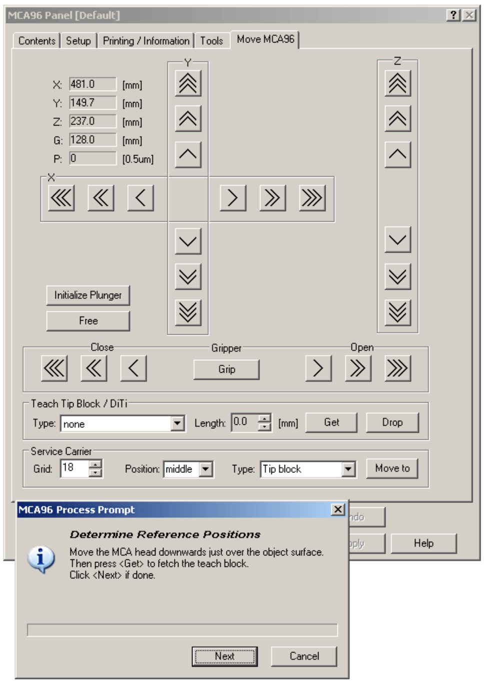
- Click the appropriate **Use for Y** option button to select the reference position (**Left** or **Right**) in which you wish to determine the Z-reference positions.
- In the **Reference Positions** frame, set the **Left** or **Right** grid position in the corresponding spin boxes.

3 Start the procedure with **Start**.

You will be guided through the setup procedure by a series of process prompts. Not all of them are shown here. Always follow the instructions in the screen.

The following example explains how to determine the reference position A’ (rear left).

Determine Reference Position



X: 481.0 [mm]
Y: 149.7 [mm]
Z: 237.0 [mm]
G: 128.0 [mm]
P: 0 [0.5um]

Teach Tip Block / DiTi
Type: none
Length: 0.0 [mm]

Service Carrier
Grid: 18
Position: middle
Type: Tip block

MCA96 Process Prompt

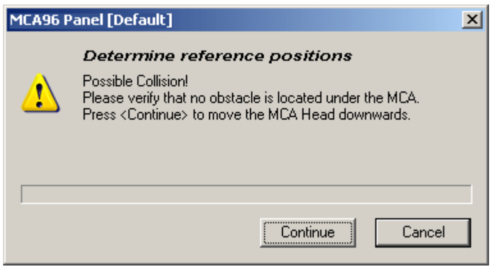
Determine Reference Positions

Move the MCA head downwards just over the object surface.
Then press <Get> to fetch the teach block.
Click <Next> if done.

4 First, you are prompted to pick up the teach block. It is assumed that the teach pins are installed correctly and that the teach block is on the service carrier.

For details on how to pick up the teach block (see cross references).

5 Confirm with **Next** when done.



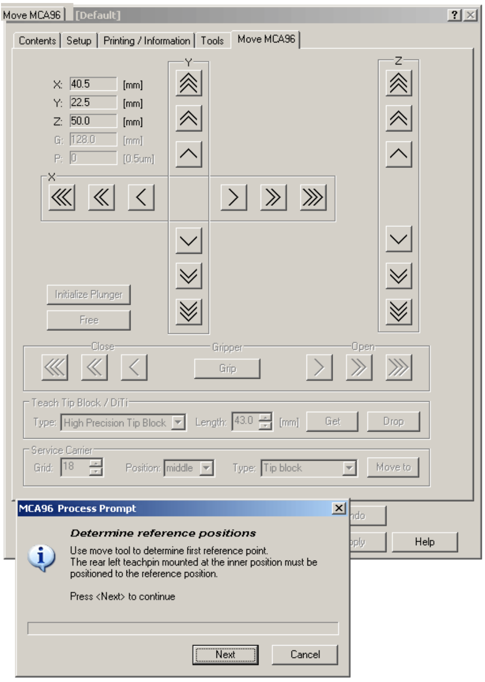
MCA96 Panel [Default]

Determine reference positions

Possible Collision!
Please verify that no obstacle is located under the MCA.
Press <Continue> to move the MCA Head downwards.

6 Make sure there is no object under the head. Remove any obstacle before continuing.

7 Click **Continue** when done.



X: 40.5 [mm]
Y: 22.5 [mm]
Z: 50.0 [mm]
G: 128.0 [mm]
P: 0 [0.5um]

Teach Tip Block / DiTi
Type: High Precision Tip Block
Length: 43.0 [mm]

Service Carrier
Grid: 18
Position: middle
Type: Tip block

MCA96 Process Prompt

Determine reference positions

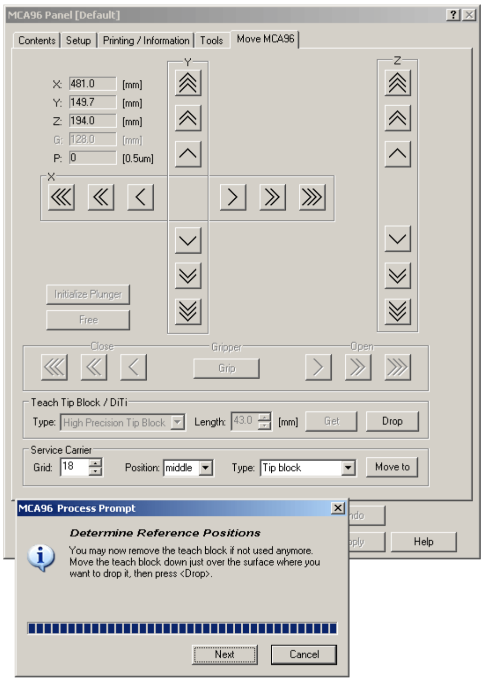
Use move tool to determine first reference point.
The rear left teachpin mounted at the inner position must be positioned to the reference position.

Press <Next> to continue

8 Use the move buttons to move the head carefully in the X, Y and Z-axes until the tip of teach pin indicated on the prompt (in our example the rear left one) is in the center of the corresponding reference pin on the worktable.

9 Click on **Next** when done.

10 After you have determined the X- and Y- displacement for the first reference pin, you will be prompted to do the same for the remaining two reference pins. Follow the instructions on the screen.



X: 481.0 [mm]
Y: 149.7 [mm]
Z: 194.0 [mm]
G: 128.0 [mm]
P: 0 [0.5um]

Teach Tip Block / DiTi
Type: High Precision Tip Block Length: 43.0 [mm]

Service Carrier
Grid: 18 Position: middle Type: Tip block

MCA96 Process Prompt

Determine Reference Positions

You may now remove the teach block if not used anymore. Move the teach block down just over the surface where you want to drop it, then press <Drop>.

Next Cancel

11 Next, you are prompted to put the teach block back on the service carrier.

For details on how to put back the teach block (see cross references).

12 Confirm with **Next** when done.

8.10.16 Gripper Fingers Alignment and Offsets

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.10.2, 🗎 8-204
Test Configuration page	See section 8.10.5, 🗎 8-210
Move MCA96 page	See section 8.10.8, 🗎 8-214
MCA96 Worktable page	See section 8.10.6, 🗎 8-210

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

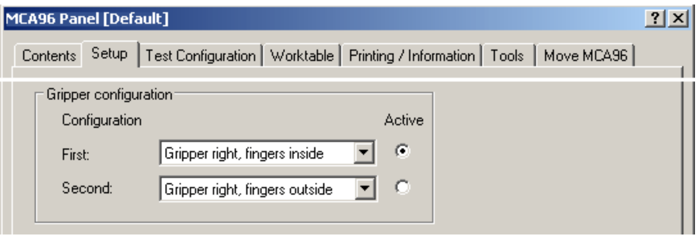
Purpose

During this setup, the gripper fingers of the MCA96 gripper module are aligned with the MCA96 reference block. This enables the MCA96 to transport labware (microplates, DiTi boxes and DiTi racks) safely across the worktable.

Prerequisites It is assumed that the whole MCA96 head and the gripper fingers have been mechanically prealigned by an FSE. For details, refer to the instrument’s Service Manual.

Procedure To align the gripper fingers:

1 On the **Contents** page, select the check box **Gripper Fingers Alignment and Offsets** and change to the **Setup** page.



Gripper configuration
Configuration Active
First: Gripper right, fingers inside ●
Second: Gripper right, fingers outside ○

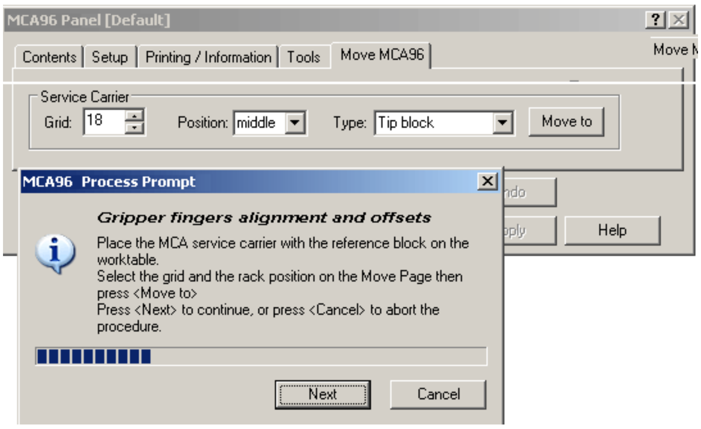
Fig. 8-197 *Setup page, gripper configuration*

2 Use the controls in the **Gripper Configuration** frame to set gripper configuration according to your physical MCA96 head:

- – **First** and **Second** configuration.
- – Use the **Active** option buttons to select the currently active configuration.

3 Click **Start** near the bottom of the panel to begin.

You will be guided through the alignment by a series of process prompts. Not all of them are shown here. Always follow the instructions on the screen.



Service Carrier
Grid: 18 Position: middle Type: Tip block

Gripper fingers alignment and offsets

Place the MCA service carrier with the reference block on the worktable.
Select the grid and the rack position on the Move Page then press <Move to>
Press <Next> to continue, or press <Cancel> to abort the procedure.

Fig. 8-198 *Define position of service carrier and reference block*

4 First, you are prompted to place the service carrier with the MCA96 reference tool on the worktable and to specify the following on the **Move MCA96** page:

- – **Grid**: Grid position of the service carrier (in our example grid position 18)
- – **Position**: Site within the service carrier where the reference block is to be placed (in our example the middle site is selected).
- – **Type**: Select the type from the list (in our example **Reference Block**).
- – Click on the button **Move to** when done.

5 Next, you are prompted to install the gripper fingers according to the settings on the **Setup** page. Click on **Next** when done.

The MCA96 head is now moved over the reference block. The gripper fingers are automatically closed somewhat so that they can rest on the surface of the reference block.

6 Move the MCA96 head in the Z-axis downward until the gripper fingers just touch the surface of the reference block, as shown in the following figure.

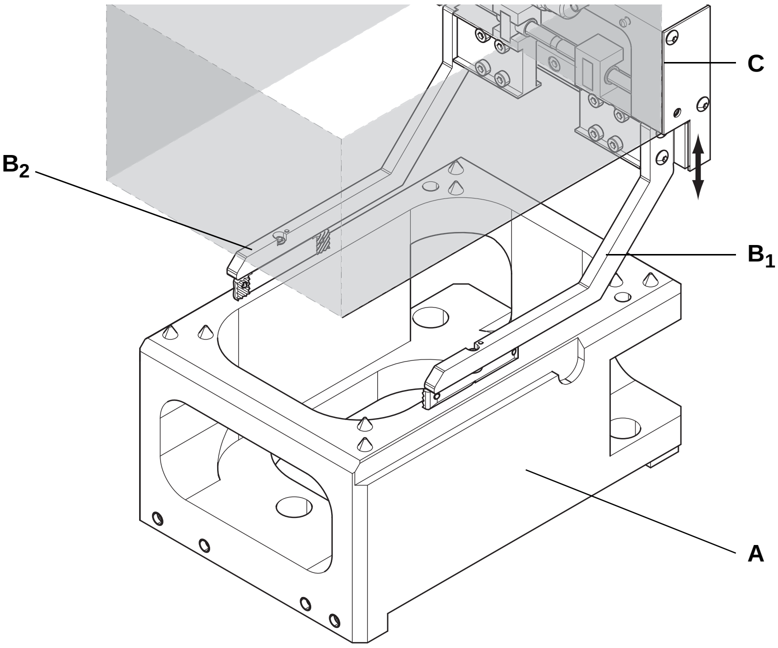
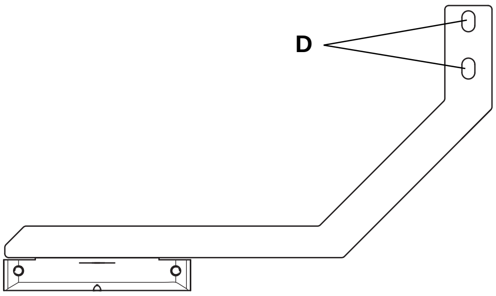


Fig. 8-199 *Check parallelism of gripper fingers*

A	*Reference block*	***B_2***	*Gripper finger (without slotted holes)*
B_1	*Gripper finger (with slotted holes)*	***C***	*Gripper module*



7 Check whether both gripper fingers touch the surface of the reference block over their hole lengths. If necessary, adjust the height of the finger with the slotted holes (in our example finger (B_1).

Fig. 8-200 *Gripper finger with slotted holes*

8 Click on **Next** on the process prompt when done.

On the following prompt you are instructed to align the gripper fingers to the milled shoulder on the reference block. See following figure.

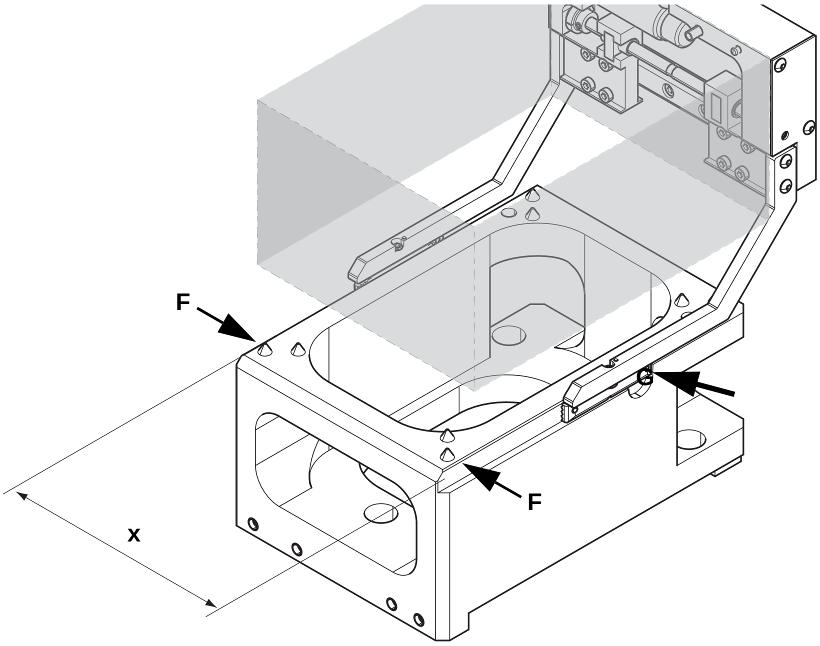


Fig. 8-201 *Aligning the gripper fingers with the milled shoulder*

9 When prompted to do so, use the **Move MCA96** page to do the following:

- Open the grippers until their distance is approximately 1 mm larger than the width x of the milled shoulders.
- Carefully move the head downward until the lower edges of the gripper fingers just touch the shoulders (F).
- Center the gripper fingers with respect to the reference block then close the grippers until their inner sides just touch the respective sides of the shoulders.
- Depending on the configuration, move the head horizontally in the X-axis until the front or rear edges of the gripper fingers just touch the edges (G) of the shoulders.
  - If the gripper fingers point to the right side, you must align their front edges to the edges (G), see picture (1).
  - If the gripper fingers point to the left side you must align their rear edges to the edges (G), see picture (2).

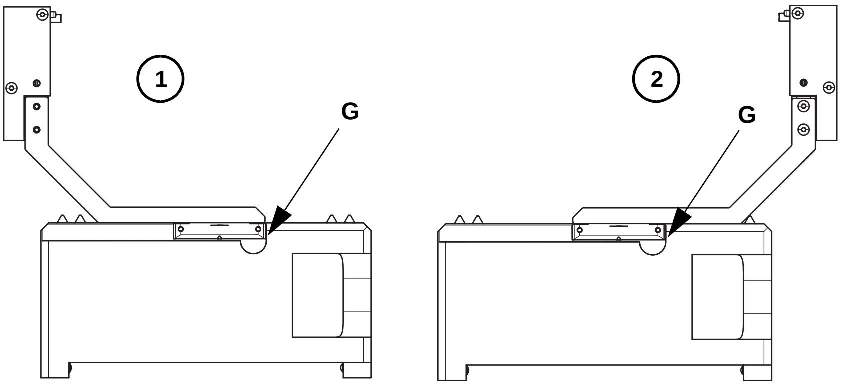


Fig. 8-202 *Aligning the gripper fingers to the edge (G)*

10 Click on **Next** when done.

The values determined are written to the EEPROM.

11 Repeat the steps 5 to 10 for the second configuration.

8.10.17 DiTi Test

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.10.2, 🗎 8-204
Test Configuration page	See section 8.10.5, 🗎 8-210
Move MCA96 page	See section 8.10.8, 🗎 8-214
MCA96 Worktable page	See section 8.10.6, 🗎 8-210

Purpose

This procedure checks whether a set of DiTis can be picked from and replaced on a DiTi rack (or in a DiTi box) for a predefined number of test cycles.

Preparation

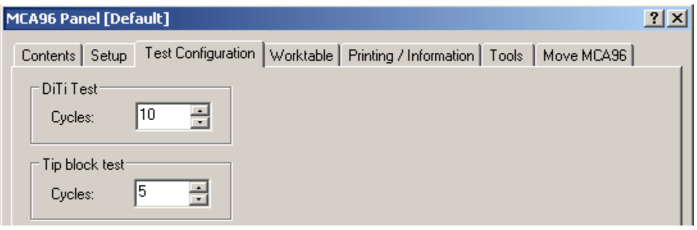
To prepare the test:

1. Load an appropriate worktable map that contains the MCA96 service carrier (see cross references).
2. Place a DiTi rack or box on the carrier according to the worktable map.
3. Ensure that the physical worktable layout corresponds to the worktable map.

Procedure

To perform the **DiTi Test**:

1. On the **Contents** page, select the check box **DiTi Test** and change to the **Test Configuration** page.



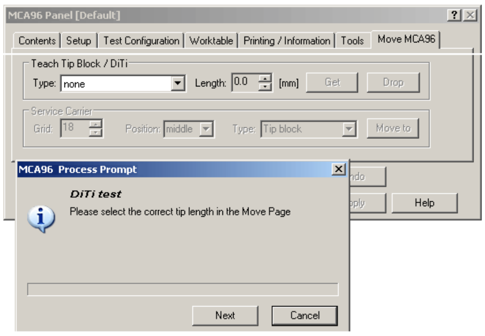
DiTi Test
Cycles: 10

Tip block test
Cycles: 5

Fig. 8-203 Test Configuration page

2. Use the spin box **Cycles** in the frame **DiTi Test** to set the number of test cycles.
3. Click **Start** on the bottom of the panel.

   You will be guided through the test by a series of process prompts. Not all of them are shown here. Always follow the instructions on the screen.



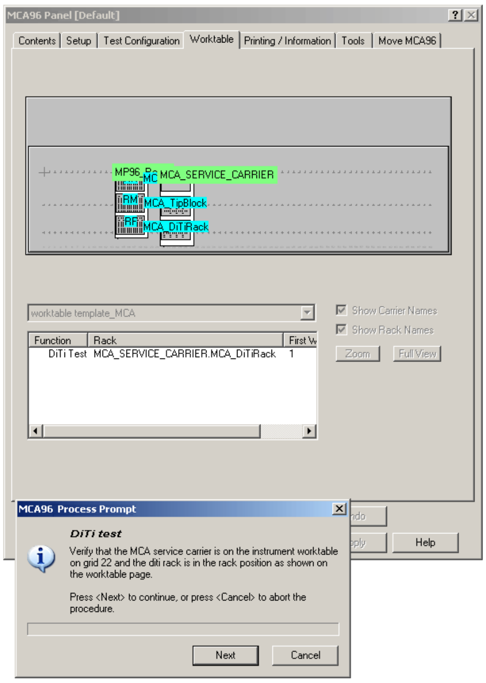
Type: none
Length: 0.0 [mm]
Grid: 18
Position: middle
Type: Tip block

DiTi test

Please select the correct tip length in the Move Page

4 First you are prompted to select the length of the DiTis to be used from the list box **Type** on the **Move MCA96** page.

5 Click on **Next** when done.



Function	Rack	First W
DiTi Test	MCA_SERVICE_CARRIER.MCA_DiTiRack	1

DiTi test

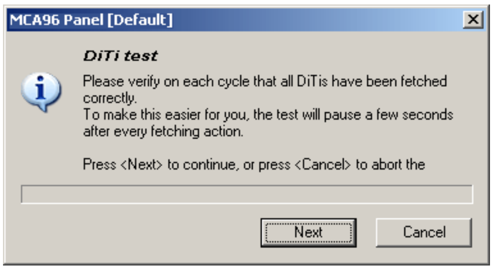
Verify that the MCA service carrier is on the instrument worktable on grid 22 and the diti rack is in the rack position as shown on the worktable page.

Press <Next> to continue, or press <Cancel> to abort the procedure.

6 Before the actual test is started you are prompted to verify the following on the **Worktable** page:

- Grid position of service carrier.
- Position of DiTi rack or box within the service carrier.

7 Make the necessary corrections now, then click on **Next**.



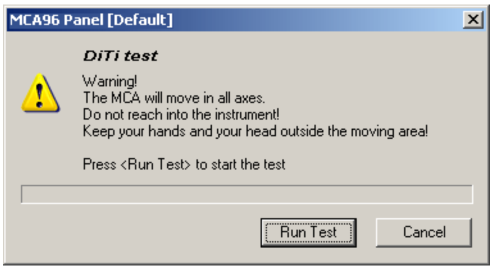
DiTi test

Please verify on each cycle that all DiTis have been fetched correctly.
To make this easier for you, the test will pause a few seconds after every fetching action.

Press <Next> to continue, or press <Cancel> to abort the

8 You are prompted to check whether all DiTis are picked up and put back correctly for the predefined number of test cycles.

9 Click on **Next** to continue.



DiTi test

Warning!
The MCA will move in all axes.
Do not reach into the instrument!
Keep your hands and your head outside the moving area!

Press <Run Test> to start the test

10 To avoid injuries you are strongly advised to keep your hands and head outside the instrument.

11 Click on **Run Test** to start the test.

12 The test is now started. Visually check whether the DiTis are picked up and replaced correctly in all test cycles.

Pass / Fail Criteria

The test is passed if all DiTis could picked up and put back in all test cycles.

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Check whether the physical worktable layout corresponds to the Worktable page.
- Check mechanical alignment of the pipetting head and the carrier.
- Repeat the procedures **Determine Range** and **Determine Reference Positions**.

8.10.18 Tip Block Test

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.10.2, 🗎 8-204
Test Configuration page	See section 8.10.5, 🗎 8-210
Move MCA96 page	See section 8.10.8, 🗎 8-214
Worktable page	See section 8.10.6, 🗎 8-210

Purpose

This procedure checks whether a tip / teach block can be picked from and replaced on the MCA96 service carrier for a predefined number of test cycles.

Preparation

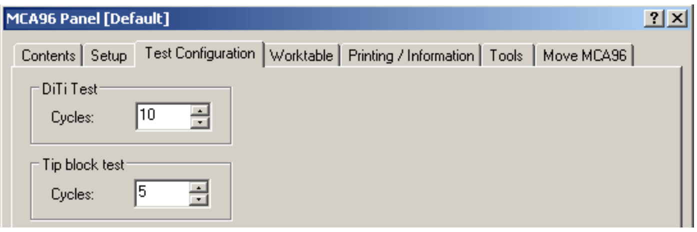
To prepare the test:

1. Load an appropriate worktable map that contains the MCA96 service carrier (see cross references).
2. Place the appropriate tip / teach block (standard or high precision) on the carrier according to the worktable map.
3. Ensure that the physical worktable layout corresponds to the worktable map.

Procedure

To perform the **Tip Block** test:

1. On the **Contents** page, select the check box **Tip Block Test** and change to the **Test Configuration** page.



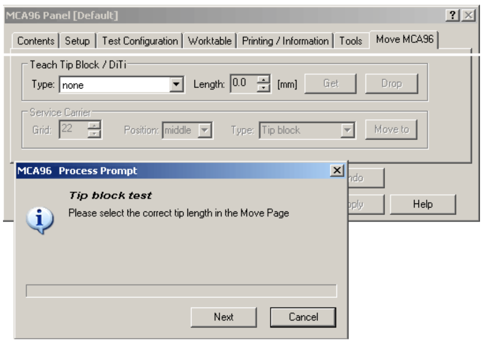
DiTi Test
Cycles: 10

Tip block test
Cycles: 5

Fig. 8-204 *Test Configuration page*

2. Use the spin box **Cycles** in the frame **Tip Block Test** to set the number of test cycles.
3. Click **Start** on the bottom of the panel.

You will be guided through the test by a series of process prompts. Not all of them are shown here. Always follow the instructions on the screen.



Teach Tip Block / DiTi
Type: none
Length: 0.0 [mm]
Service Carrier
Grid: 22
Position: middle
Type: Tip block

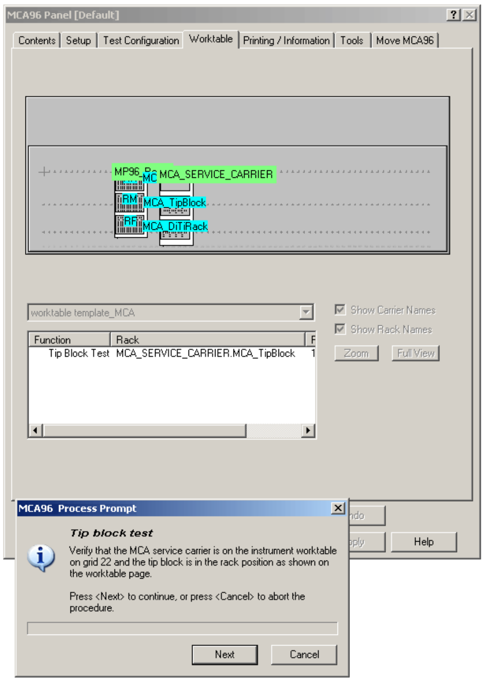
MCA96 Process Prompt

Tip block test

Please select the correct tip length in the Move Page

4 First you are prompted to select the correct tip block type from the list box **Type** on the **Move MCA96** page.

5 Click **Next** on the prompt when done.



worktable template_MCA
☑ Show Carrier Names
☑ Show Rack Names

Function	Rack	F
Tip Block Test	MCA_SERVICE_CARRIER.MCA_TipBlock	1

MCA96 Process Prompt

Tip block test

Verify that the MCA service carrier is on the instrument worktable on grid 22 and the tip block is in the rack position as shown on the worktable page.

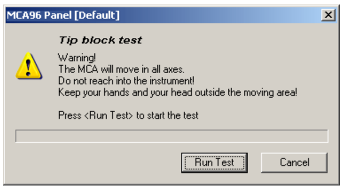
Press <Next> to continue, or press <Cancel> to abort the procedure.

6 Before the actual test is started you are prompted to verify the following on the **Worktable** page:

– Grid position of service carrier.

– Position of tip block within the service carrier.

7 Make the necessary corrections now, then click **Next**.



MCA96 Panel [Default]

Tip block test

Warning!
The MCA will move in all axes.
Do not reach into the instrument!
Keep your hands and your head outside the moving area!

Press <Run Test> to start the test

8 To avoid injuries you are strongly advised to keep your hands and head outside the instrument.

9 Click on **Run Test** to start the test.

10 The test is now started. Visually check whether the tip block is picked up and replaced correctly in all test cycles.

Pass / Fail Criteria

The test is passed if the tip block was properly picked up and put back in all test cycles.

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Check whether the physical worktable layout corresponds to the Worktable page.
- Check mechanical alignment of the pipetting head and the carrier.
- Repeat the setup procedures **Determine Range** and **Determine Reference Positions**.

8.10.19 Plate Move Test

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 8.10.2, 🗎 8-204
Test Configuration page	See section 8.10.5, 🗎 8-210
Move MCA96 page	See section 8.10.8, 🗎 8-214
Worktable page	See section 8.10.6, 🗎 8-210

Purpose

The test checks whether a microplate can be picked up, transported across the worktable and put back correctly for a predefined number of test cycles.

Preparation

To prepare the test:

1. Load an appropriate worktable map that contains a microplate carrier (see cross references).
2. Place one microplate on the carrier according to the worktable map. Remove all other labware items from the rack.
3. Ensure that the physical worktable layout corresponds to the worktable map.

Procedure

To carry out the test:

1. On the **Contents** page, select the check box **Plate Move Test** and change to the **Test Configuration** page.

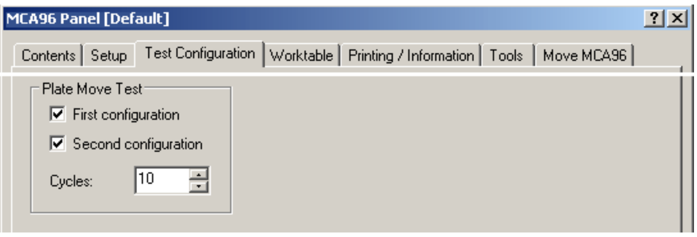


Plate Move Test
☑ First configuration
☑ Second configuration
Cycles: 10

Fig. 8-205 Test configuration page

2. Use the controls in the frame Plate Move Test to set the following:
   - Select the gripper configurations you wish to include in the test by selecting / clearing the check boxes **First configuration** and **Second configuration**.
   - Use the spin box **Cycles** to set the number of test cycles.
3. Click **Start** to begin.

You will be guided through the test by a series process prompts. Not all of them are shown here. Always follow the instructions provided on the process prompts.

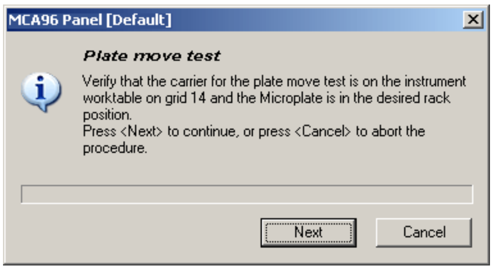


Plate move test

Verify that the carrier for the plate move test is on the instrument worktable on grid 14 and the Microplate is in the desired rack position.
Press <Next> to continue, or press <Cancel> to abort the procedure.

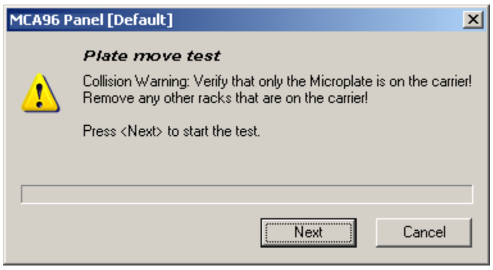


Plate move test

Collision Warning: Verify that only the Microplate is on the carrier! Remove any other racks that are on the carrier!

Press <Next> to start the test.

4 First, ensure that both the carrier and the microplate are positioned according to the worktable map.

5 Make the necessary corrections, then click on **Next** to continue.

6 To avoid collisions, remove all labware from the carrier that is not needed for this test.

7 Click on **Next** to start the test.

8 Next, a message appears that warns you not to reach into the instrument while the test is running. Click on **Next** to continue.

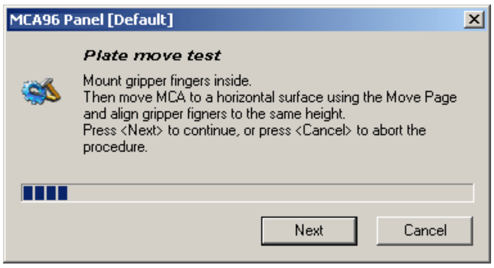


Plate move test

Mount gripper fingers inside.
Then move MCA to a horizontal surface using the Move Page and align gripper figners to the same height.
Press <Next> to continue, or press <Cancel> to abort the procedure.

*The following prompt instructs you to mount the gripper fingers according to the selections you have made on the **Test Configuration** page.*

9 Depending on the test configuration proceed as follows:
  - – If the gripper finger configuration already corresponds to the one indicated on the prompt and if the gripper fingers are already aligned correctly, then click on **Next** to continue.
  - – If the gripper finger configuration does not correspond to the one indicated on the prompt, do the following:
    - Mount the fingers as indicated on the prompt.
    - Use the **Move Tool** to align them mechanically with a horizontal surface (e.g., the worktable).
    - Click on **Next** when done.

10 The test is now started. Visually check whether the microplate is properly picked up from and replaced on the carrier in all test cycles.

11 If you have selected both the first and the second gripper finger configuration on the **Test Configuration** page, repeat the above steps 4 to 10.

At the end, a message appears that informs you whether or not the test was successful.

Pass / Fail Criteria

The test is passed if the microplate could be picked up and replaced correctly in all test cycles.

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Check whether the physical worktable layout corresponds to the Worktable page.
- Check mechanical alignment of the pipetting head and the carrier.
- Repeat the setup procedures **Determine range** and **Determine reference positions**.
- Repeat the setup procedure **Gripper fingers alignment and offsets**.

After the Test

If you changed the gripper finger configuration during the test, restore the original standard configuration if necessary. It is recommended that you repeat the procedure **Gripper fingers alignment and offsets** in this case.

9 System Devices 2

9.1 System Devices Menu

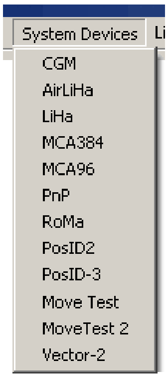


Fig. 9-1 System Devices menu

The **System Devices** menu contains the commands listed below.

Tab. 9-1 System Devices Menu

Menu Item	Function	See section
PosID 2	Setup and test of PosID 2	8.4, 🗎 8-5
PosID-3	Setup and test of PosID-3	8.5, 🗎 8-37
LiHa	Setup and test of the liquid handling arm	8.6, 🗎 8-75
AirLiHa	Setup and test of the Air liquid handling arm	8.7, 🗎 8-134
MCA96	As above for the Multichannel Arm 96	8.10, 🗎 8-203
MCA384	As above for the Multichannel Arm 384	8.8, 🗎 8-150
CGM	As above for the CGM	8.9, 🗎 8-182
Move Test	Range and random move test for LiHa, MCA, RoMa, PnP and PosID.	9.3, 🗎 9-9
Move Test-2	Special Move Test for Cellerity (only if Cellerity has been selected during installation)	9.3, 🗎 9-9
PnP	Setup and test of the Pick and Place Arm	9.4, 🗎 9-23
RoMa	Setup and test of the Robotic Manipulator Arm	9.5, 🗎 9-40
Vector-2	Setup and test of RoMa access for shelf, room temperature incubator(s), loading ports, heated incubator(s), plate washer, plate reader and BEP III (instruments 30045716, 30045717 and 30045718)	9.6, 🗎 9-72

Note: *The PosID 2, PosID-3, LiHa, MCA96, MCA384 and CGM panels are dealt with in chapter "System Devices 1".*

9.2 Move Test

9.2.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Range Test	See section 9.3.5, 🗎 9-19
Random Move Test	See section 9.3.6, 🗎 9-20

Purpose

The **Move Test** panel allows you to check whether the drives of the LiHa, MCA, RoMa, PnP (Genesis Freedom and Freedom EVO Instruments only) and PosID work properly. It comprises a **Range Test** and a **Random Move Test** that correspond to the burn-in and validation procedures of other options.

Safety Precautions

Please pay attention to the following points.

WARNING

During the test procedures the arm devices will move in the X-axis at considerable speed.

- Keep off the moving range during such procedures.
- Fast moving devices may cause injuries.

ATTENTION

To avoid collisions with other parts make sure the worktable is empty and free of obstacles during the execution of the test procedures.

- Collisions can damage devices or cause misadjustments.

9.2.2 Move Test Panel

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

The test(s) described in this section can be carried out by users belonging at least to the SnS_Customer group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 9-2 *Move Test Functions and User Permissions*

Function	Type	User	FSE
Range	Test		X
Random	Test		X
Results	Page	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Files, Directories

The Move Test function creates the following files:

- **Result Files:** Test results are stored in *.any files.

Directory:	<data_path>\Results
File name:	MoveTest_<serial_number>_<date>_<time>.any

- Test Configuration Files

Directory:	user defined
File name:	<name>.any

Starting the Panel

Start the panel with **System Devices > Move Test**. The **Move Test** panel with activated **Contents** page appears.

Contents Page

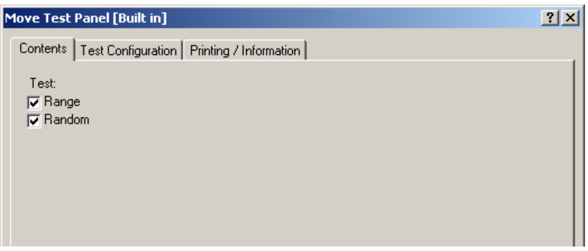

Move Test Panel [Built in]
Contents | Test Configuration | Printing / Information
Test:
☑ Range
☑ Random

Fig. 9-2 *Move Test panel - Contents page*

Pages

The Move Test panel is subdivided the following pages:

Page	Function
Contents	General overview, test selection
Test Configuration	Configuration of the Random Move Test
Printing / Information	Print selection for the QC-report

9.2.3 Preparatory Steps

ATTENTION

Before starting the **Range Test** or the **Random Move Test** procedure, pay attention to the following:

- If a LiHa is installed remove all tips.
- If a RoMa with eccentric gripper fingers is installed, remove the fingers from the gripper module.
- Make sure that the 'Initialize position X' of the arms is set to a position, where the arms can move downwards to the worktable without crashing.
- If an MCA96 is installed remove the following parts:
  - Tip block, teach block or any DiTis.
    - This particularly important if you intend to include the plungers in the test.
    - If you do not remove these parts beforehand, they will be ejected during the test. Teach / tip blocks may be damaged in this case.
  - If the MCA96 is equipped with a gripper module, remove the gripper fingers as well.
- If an MCA384 is installed the following head adapters
  - might be installed:
    - Adapter DiTi MCA384 (without DiTis)
    - Adapter DiTi Combo MCA384 (without DiTis)
    - Adapter 96 DiTi MCA384 (without DiTis)
- If a CGM is installed, remove the gripper fingers.
- The front safety panel of the instrument must be closed.

9.2.4 Range Test

Cross References

List of cross references to information provided in other sections:

Information	References
PosID 2: Perform Autorange	See section 8.4.11, 🗎 8-22
PosID-3: Perform Autorange	See section 8.5.13, 🗎 8-56
LiHa: Determine Range	See section 8.6.12, 🗎 8-97
MCA96: Determine Range	See section 8.10.14, 🗎 8-225
MCA384: Determine Range	See section 8.8.14, 🗎 8-170
PnP: Determine Range	See section 9.4.7, 🗎 9-31
RoMa: Determine Range	See section 9.5.9, 🗎 9-54
CGM: Determine Range	See section 8.9.12, 🗎 8-190

Purpose

The **Range Test** procedure checks if the installed devices, LiHa, MCA96, MCA384, CGM, RoMa, PnP and PosID, can be moved over their whole ranges.

Each device moves along its axes to its extreme positions. After the initialization the difference between stored missing or remaining steps and the actual value is evaluated. The test lasts about 5 to 10 minutes (depending on the number of installed devices).

Preparatory Steps

Refer to section 9.2.3 “Preparatory Steps”, 🗎 9-4.

Procedure

To perform the range test:

1. On the **Contents** page, select the **Range** check box. No further parameters need to be defined.
2. Start the procedure with **Start**. The **Ranges Move Test** progress message appears.
3. At the end of the test, a **Range Move Test: Passed** or **Failed** message appears.
4. Confirm with **OK**.

Pass/Fail Criteria

See **Printing / Information** page. The test is passed, if the evaluated **Deviation** does not exceed the specified **Deviation Limit** and if the **Range** is **ok**. Concrete values depend on the device and the axis.

If the Test Fails

Depending on the device, perform the following tests:

- LiHa, MCA96, MCA384, CGM, PnP and RoMa: Perform the **Determine Range** procedure.
- PosID 2, PosID-3: Perform the **Autorange** procedure.
- Also see → Cross References.

9.2.5 Random Move Test

Purpose

The **Random Move Test** procedure checks whether the mechanics of the LiHa, MCA96, MCA384, CGM (without R-axis), RoMa, PnP and PosID work properly. All devices are moved at random for a predefined number of cycles. After a defined number of moves, a device is reinitialized and the number of lost steps is evaluated for each axis.

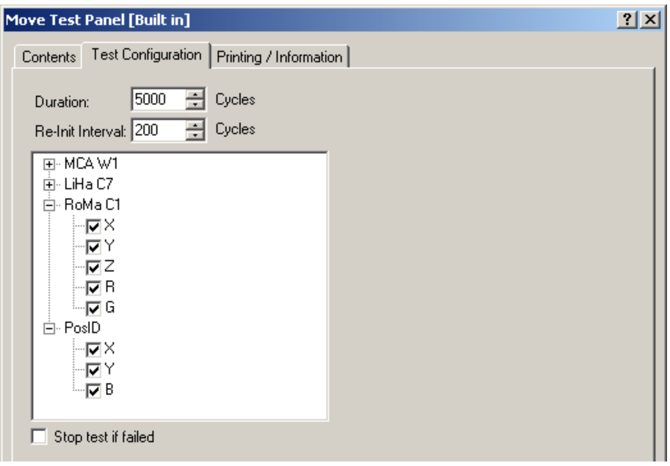
Preparatory Steps

Refer to section 9.2.3 “Preparatory Steps”, 🗎 9-4.

Procedure

To perform the random move test:

1. On the **Contents** page, select the **Random** check box and change to the **Test Configuration** page.



Duration: 5000 Cycles
Re-Init Interval: 200 Cycles

- MCA W1
- LiHa C7
- RoMa C1
  - ☑ X
  - ☑ Y
  - ☑ Z
  - ☑ R
  - ☑ G
- PosID
  - ☑ X
  - ☑ Y
  - ☑ B

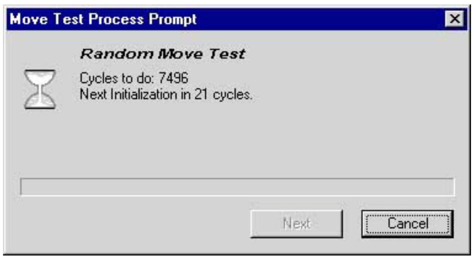
☐ Stop test if failed

Fig. 9-3 *Test Configuration*

2. Enter the number of cycles to be performed in the **Duration** input field (default: 5000, lasts about 8 to 16 hours).
3. Enter the number of cycles after which the device is to be reinitialized in the **Re-Init Interval** input field (default: 200).
4. From the list box, select the arm devices and the axes you want to include in the **Random Move** test. Select or clear the corresponding check boxes.
5. Select the check box **Stop test if failed** If you want the test to stop if the number of lost steps exceeds the predefined **Deviation Limit**.

   *The **Stop test if failed** check box is deselected by default. The **Deviation Limit** cannot be set by the user.*
6. Click **Start** to begin.

   *The **Random Move Test** process prompt appears.*



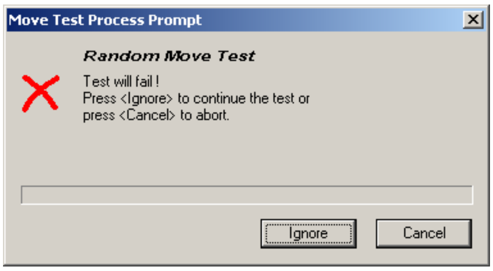
Random Move Test

Cycles to do: 7496
Next Initialization in 21 cycles.

Fig. 9-4 *Random Move Test process prompt*

Note: *If during the test the number of lost steps exceeds the predefined **Deviation Limit** you will be notified by an appropriate message.*

- *If you have selected the check box **Stop test if failed** the message looks as shown in the following figure.*
- *The test is halted in this case.*



Random Move Test

Test will fail !
Press <Ignore> to continue the test or
press <Cancel> to abort.

Fig. 9-5 *Test will fail message*

7 If the above message appears do one of the following:
- Click **Ignore** to resume the test.
- Click **Cancel** to abort the test.

*At the end of the test, a **Random Move Test: Passed** or **Failed** message appears.*

8 Confirm with **OK**

Pass/Fail Criteria

See **Printing / Information** page. The test is passed, if the evaluated **Maximal Deviation** does not exceed the predefined **Deviation Limit** and if the **Exceed Counter** is 0.

If the Test Fails

If the test fails, perform the corresponding setup functions.

There is a mechanical problem, if the test fails again. Call your nearest service organization and mail the corresponding result file or fax the QC-report.

9.2.6 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

9.3 Move Test 2

9.3.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Range Test	See section 9.3.5, 🗎 9-19
Move test for Freedom EVO instruments	See section 9.2, 🗎 9-2
Move Test-2 (instruments like Cellerity).	See section 9.3.6, 🗎 9-20

Purpose

The **Move Test 2** panel allows advanced users to test whether the drives of the LiHa, RoMa, PnP, PosID, MCA96, MCA384 and CGM work properly on instruments like Cellerity. It comprises a **Range Test** and a **Move Test** that correspond to the burn-in and validation procedures of other options.

***Note:** Skip this section If the instrument to set up and test is a Freedom EVO instrument. For detailed information on how to run the Move Test for Freedom EVO (see cross references).*

About the Move Test 2

The **Move Test 2** is a further development of its predecessor version and has been designed to meet the requirements of new instruments, such as Cellerity. With these instruments, it is not possible to remove all objects from the worktable in order to run a **Random Move Test** in the field.

Safety Precautions

Please pay attention to the following points.

WARNING

During the test procedures the system devices will move in the X-axis at considerable speed.

- Keep off the moving range during such procedures.
- Fast moving devices may cause injuries.

ATTENTION

To avoid collisions with other parts, make sure that the worktable vectors have been taught and tested correctly, before performing the **Move Test**.

- Collisions can damage devices or cause misadjustments.

9.3.2 Move Test 2 Panel

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Field Service Engineers

The procedures described in this sections are for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

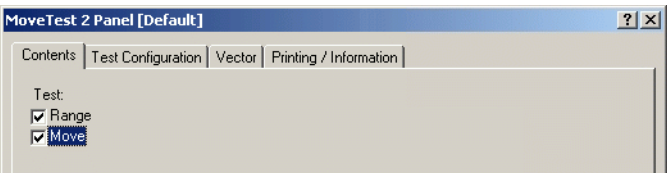
Tab. 9-3 Move Test Functions and User Permissions

Function	Type	User	FSE
Range test	Test		X
Move test	Test		X
Test configuration	Page		X
Vector	Page		X
Printing / Information	Page		X
QC-report	Report		X

Starting the Panel

Start the panel with **System Devices > Move Test 2**. The **Move Test 2** panel with activated **Contents** page appears.

Contents Page



Test:
☑ Range
☑ Move

Fig. 9-6 Move Test panel - Contents page

Pages

The Move Test panel is subdivided the following pages:

Page	Function
Contents	General overview, test selection
Test Configuration	Configuration of the Move Test
Vector	For specialists only. Lets you define and test the vectors to which the various devices can move safely.
Printing / Information	Print selection for the QC-report

9.3.3 Test Configuration Page

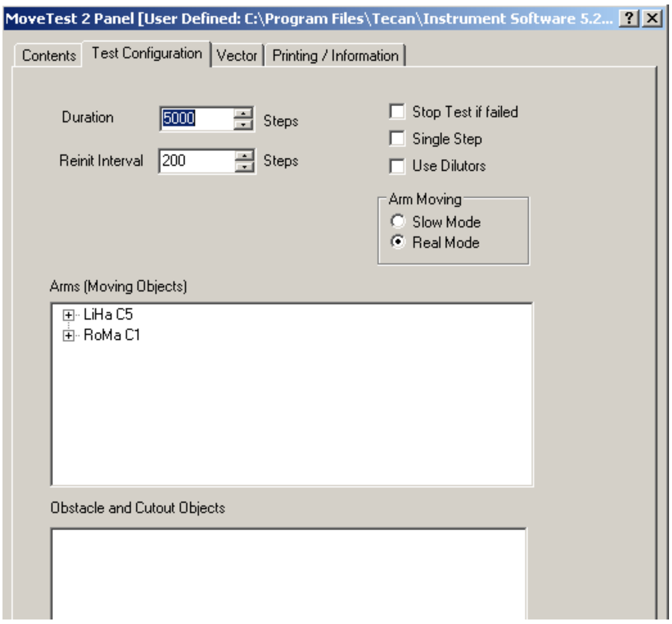
Purpose

The **Test Configuration** page allows you to set the parameters for the **Move Test**.

Overview

The following two figures provide an overview of the **Test Configuration** page. Detailed information is given after the figures.

Full Page



MoveTest 2 Panel [User Defined: C:\Program Files\Tecan\Instrument Software 5.2...

Duration 5000 Steps

Reinit Interval 200 Steps

☐ Stop Test if failed

☐ Single Step

☐ Use Dilutors

Arm Moving

○ Slow Mode

● Real Mode

Arms (Moving Objects)

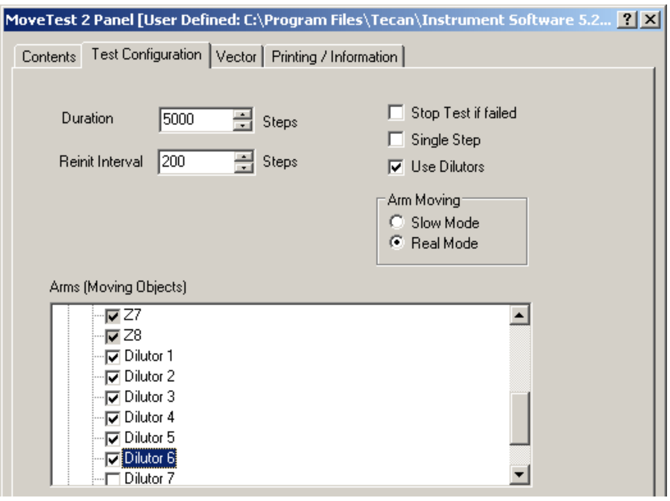
LiHa C5

RoMa C1

Obstacle and Cutout Objects

Fig. 9-7 Move Test 2, Test Configuration page, full page

Expansion of a Device (Example)



Duration 5000 Steps
Reinit Interval 200 Steps
☐ Stop Test if failed
☐ Single Step
☑ Use Dilutors

Arm Moving
○ Slow Mode
● Real Mode

Arms (Moving Objects)
☑ Z7
☑ Z8
☑ Dilutor 1
☑ Dilutor 2
☑ Dilutor 3
☑ Dilutor 4
☑ Dilutor 5
☑ Dilutor 6
☐ Dilutor 7

Fig. 9-8 Move Test 2, Test Configuration page, LiHa expanded

Controls

The **Test Configuration** page contains the following controls. Additional information is provided below.

Duration	Spin box that lets you enter the number of test steps. Note that a test cycle is subdivided into a number of consecutive steps. For further explanations see below.
ReInit Interval	Number of test steps after which the devices to test are reinitilized. If the **Reinit Interval** is not a whole number multiple of the number of steps within one cycle, all steps of the last test cycle will be finished before the devices are reinitialized. For further explanations see below.
Stop Test if failed	If you select this check box, the test is stopped if the number of lost steps of a device exceeds the predefined deviation limit.
Single Step	This check box serves for testing purposes. If you select it, the test halts after each step so that you can check visually whether it is carried out correctly.
Use Dilutors	With this check box, you can include the preselected diluters (see Fig. 9-8 , 🗎 9-12) in the test or exclude them from it. Also see description of window **Arms (Moving Objects)** below.
Arm Moving	Option buttons that let you select the speed at which the system devices should be moved during the Move Test: • **Slow mode**: For testing purposes • **Real mode**: If you select this option, the devices are moved at their normal operating speed.
Arms (Moving Objects)	This window lists the devices to be included in the Move Test (see Fig. 9-7 , 🗎 9-11). If you expand a list item (by clicking on the (+) sign on the left), the movement axes of the device are shown (see example Fig. 9-8 , 🗎 9-12). You can deselect the diluters you do not wish to include in the test.
Obstacle and Cutout Objects	Reserved for phase 2.

Additional Explanations

Parameters After Starting the Panel

***Note:** After starting the panel, the **Test Configuration** page always contains the Tecan standard test parameters.*

- *You can accept the suggested parameters (recommended in most cases).*
- *In special cases (e.g., for testing a newly defined Vector page) you can modify them according to your needs.*

Duration, Step, Cycle, Reinit Interval

The following figure illustrates the terms “Duration, Step, Cycle, Rinit Interval”.

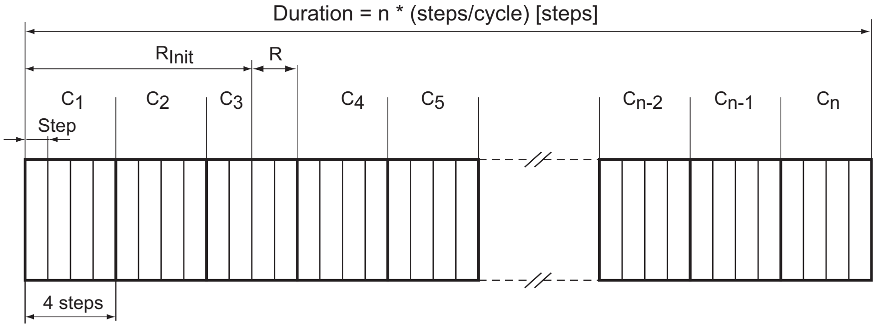


***Fig. 9-9** Duration, Step, Cycle, Reinit Interval*

- **Duration**: As the figure shows, the **Duration** consists of a number of **Cycles** (C_1 to C_n), each of which consists of a number of consecutive steps.
- **Step**: A step defines the vectors (positions of its X, Y, Z, R-axes, etc.) of each device. During the test the devices will be moved to these predefined positiions.
- **Cycle**: A set of steps after which a predefined movement pattern is repeated.
- **Rinit Interval**: Number of steps after which the devices are reinitialized. If the end of the Rinit Interval is in the middle of a cycle (as shown in the figure), the corresponding cycle will be finished before the devices are reinitialized. The software automatically adds the remaining steps **R** to the **Rinit Interval**.

Behavior After an Initialization (Example)

To avoid collisions, the system devices are moved according to the following table during the first cycle that follows an initialization (when the panel is started) or a reinitialization. In this example it is assumed that there are four system devices installed.

***Tab. 9-4** Arm movements after an initialization*

Cycle	Step in cycle	Arm device			
		1 (left)	**2**	**3**	**4 (right)**
n	1	x	x	x	move
	2	x	x	move	move
	3	x	move	move	move
	4	move	move	move	move

Arm movements after initialization.

- First step: Only the rightmost arm device is moved.
- Second step: Devices 1 and 2 are moved
- etc.

From the second cycle onwards until the next reinitialization, the arms are moved according to the definitions of the **Vector** page.

The movements are performed in the following sequence:

1. Moves Z to the uppermost position
2. Moves all axes except the Z-axis to the new target positions
3. Moves Z-axis to the new target position

9.3.4 Vector Page

Cross References

List of cross references to information provided in other sections:

Information	**References**
Using the panel	See section 5.2, 🗎 5-13
Loading a previously defined vector list	See section 6.7, 🗎 6-17

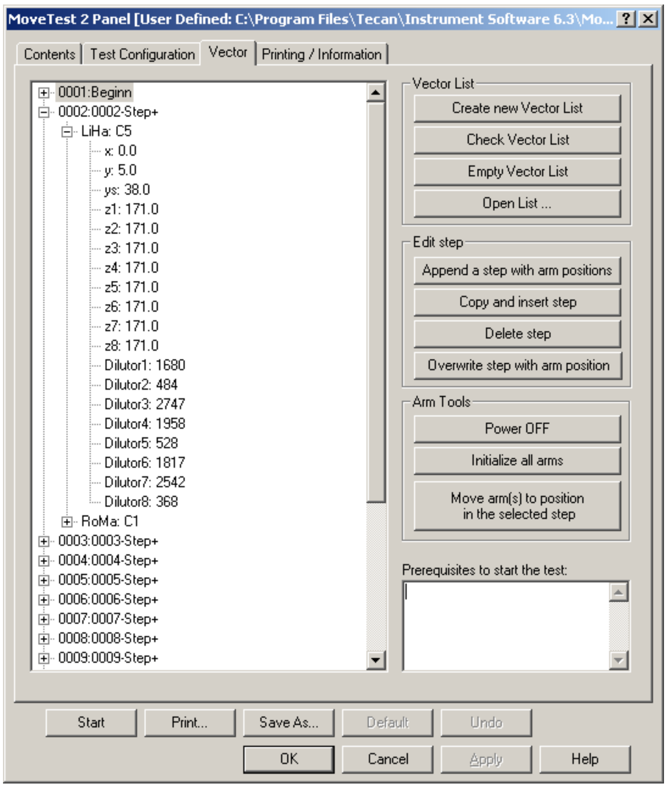
Purpose

The **Vector Page** lets you define, modify and test a sequence of steps in which the positions in the various movement axes are defined for each device.

Overview

Vector Page

The following figure shows the **Vector** page with an example of a vector list.



MoveTest 2 Panel [User Defined: C:\Program Files\Tecan\Instrument Software 6.3\Mo...

0001:Beginn
0002:0002-Step+
LiHa: C5
x: 0.0
y: 5.0
ys: 38.0
z1: 171.0
z2: 171.0
z3: 171.0
z4: 171.0
z5: 171.0
z6: 171.0
z7: 171.0
z8: 171.0
Dilutor1: 1680
Dilutor2: 484
Dilutor3: 2747
Dilutor4: 1958
Dilutor5: 528
Dilutor6: 1817
Dilutor7: 2542
Dilutor8: 368
RoMa: C1
0003:0003-Step+
0004:0004-Step+
0005:0005-Step+
0006:0006-Step+
0007:0007-Step+
0008:0008-Step+
0009:0009-Step+

Prerequisites to start the test:

Fig. 9-10 Move Test, Vector page

Controls

The **Vector** page contains the following controls. Additional information is provided after the table.

Vector List	Lets you create, empty and test vector lists.
- **Create new Vector List**	• Enters the first vector in the list. After starting the panel, the instrument is initialized if not done yet. In this case, the initial device positions are written into the first vector.
- **Check Vector List**	• Checks the vector list for errors and indicates possible collisions of devices.
- **Empty Vector List**	• Removes all steps from a vector list. The action cannot be undone.
- **Open List ...**	• Allows to load a Tecan defined vector list, delivered with SnS (e.g., Move Test Vectorlist Cellerity.anz)
Edit Step	Tools for editing vectors
- **Append a step with arm positions**	• Appends a new step containing the current device positions after the current step.
- **Copy Step**	• Copies the selected step and inserts it as the subsequent step in the list.
- **Delete Step**	• Removes the selected step from the list. The action cannot be undone.

- **Get arm positions and write them into the selected step.**	• The current device positions are read and written into the selected step. Depending on whether you select a step in the list of an individual device within the step, the values are written into all steps or the selected step. For detailed explanations see below.
Arm Tools	Tools for managing system devices
- **Power ON / OFF**	• Toggle function that turns the power supplies of all system devices on or off. After you have turned the power on, the caption on the button changes from **Power On** to **Power OFF** and vice versa.
- **Initialize all arms**	• The system devices are initialized and moved to their initial positions.
- **Move arm(s) to positions) in selected step.**	• Depending on whether you select a step in the list of an individual device within the step, all devices or the selected device are moved to the defined positions. For detailed explanations see below.
Prerequisites to start the test	This list box allows to enter information about prerequisites BEFORE running a test sequence. The entry may also be predefined by the software. When starting the test sequence a message window will be displayed showing the information about the prerequisites from this list box. If there is no entry in the list box the message window does not appear.

Additional Explanations

Loading a User-Defined Vector List

To load a user-defined vector list into the **Vector** page:

1. If not done yet, open the panel, and select the **Move Test** on the **Contents** page.
2. Select the function **System > Configuration > Open**.
3. On the **Windows** standard **Open** dialog, search the directory and *.any file that contains the required vector list.
4. Click **Open** on the dialog.

   *The required vector list should now appear on the **Vector** page.*

Storing a Vector List

After you have defined a new vector list or modified an existing one, you can store it under a different name. Proceed as follows:

1. Make sure you have tested the list thoroughly before you store it.
2. Use the **Save As…** button at the bottom of the panel.

   *This opens the Windows standard **Save As…** dialog.*
3. Store the list under a meaningful name in a directory of your choice.

Check Vector List

This function is especially useful when you define a new list. You can call up the **Check Vector List** function manually at any time.

***Note:** When you start the **Move Test,** the vector list is tested automatically before the test is run.*

Get Arm Positions / Move to Arm Positions

The effect of the commands **Get arm positions and write them into the selected step** and **Move arm(s) to position in the selected step** depends on whether a step or a device is selected.

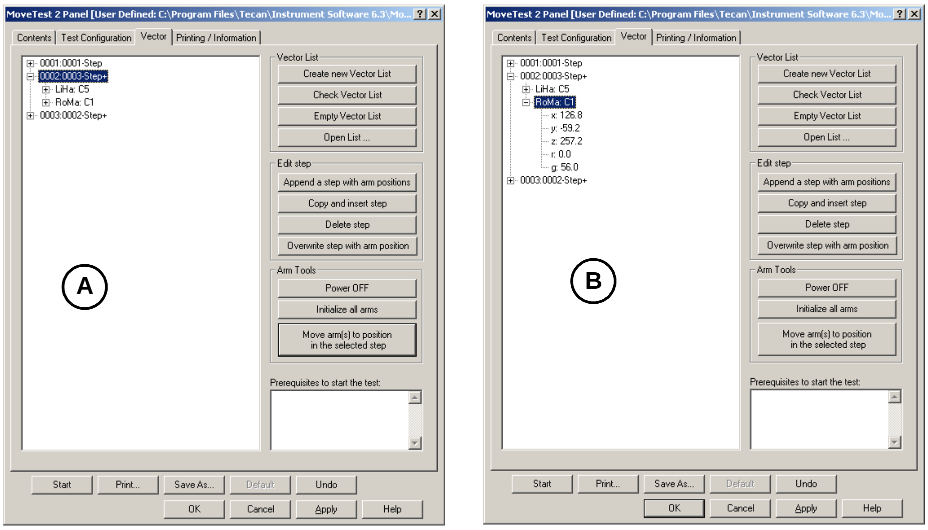
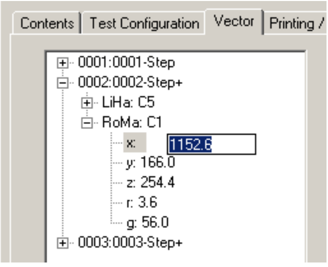


Fig. 9-11 Get arm positions

- If you select a step, as shown in picture (A), then the command applies to all devices within this step.
- If, on the other hand, you select an individual device within a step, as shown in picture (B), then the command applies only to the selected device.

Editing a Step



To edit a value, you can click on the desired parameter and edit it directly as required (so-called in-line editing).

Fig. 9-12 Editing a step

Building a Vector List

Procedure

To build a new vector list you can proceed as follows:

1. Start the panel and select the **Move Test** check box on the **Contents** page. In this way the **Vector** tab becomes visible.

   After the start the Vector list is empty.
2. Use the command **Create new Vector List**. This inserts the first step in the list. The devices should be in their initial positions.
3. Move the devices to a different position. You can do this in two ways:
   - Either switch the devices off, using the Power OFF button and move the arms manually to the required position, then switch them on again.
   - Or move them using the Move Tools of the corresponding device panels.

4. Do one of the following:
   - Either select a step and use the command **Copy Step** to insert it after the selected step. Then use the command **Get arm positions and write them into the selected step**.
   - Or use the command **Append a step with arm positions**.
5. Check the values of the individual devices and axes and alter them as necessary (in-line edit).
6. Add more steps to the list as necessary.

Safety Precautions

To make a vector list portable to different instruments, pay attention to the following.

ATTENTION

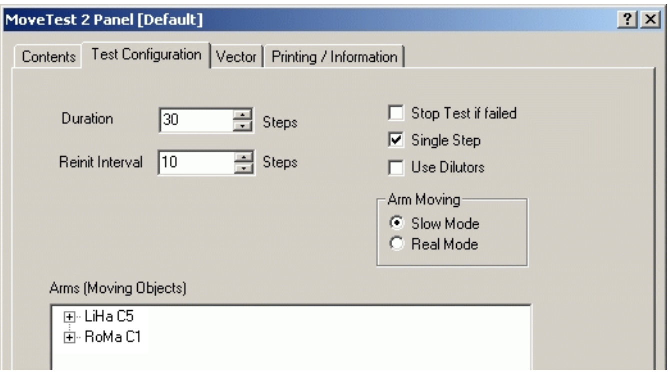
Damage to installed arm devices, labware or the instrument itself possible if the following safety precautions are disregarded:

- Keep a safety distance of about 5 mm in all axes from the mechanical end stops on the instrument.
- Shorten the maximum movement ranges of the devices in all axes by about 5 mm.
- Define all device positions in such a way that no collisions with neighboring devices are possible.
- When you move your devices back into their initial positions, take care you begin with the device that is closest to the initial position.

Testing the List

After you have built your list you should test it thoroughly before running a **Move Test** under real conditions. Possible procedure:

1. In a first step, use the function **Check Vector List** to see whether your list contains possible collisions of arms and make the necessary corrections.
2. In a second step, use the **Test Configuration** page and configure a special test, with only a low **Duration**, **Single Step** mode and **Slow Mode**. A possible example is shown in the following figure.



Duration 30 Steps

Reinit Interval 10 Steps

☐ Stop Test if failed

☑ Single Step

☐ Use Dilutors

Arm Moving

● Slow Mode

○ Real Mode

Arms (Moving Objects)

LiHa C5

RoMa C1

Fig. 9-13 Special Test Configuration

3. Start the **Move Test**.
4. Your test will halt after each step display the current arm positions on a prompt.

5 You can then proceed with the next step or abort the test.

If this simple **Move Test** can be carried out without errors, you can use your **Vector** list for a **Move Test** under real conditions.

9.3.5 Range Test

Cross References

List of cross references to information provided in other sections:

Information	References
PosID 2: Perform Autorange	See section 8.4.11, 🗎 8-22
PosID-3: Perform Autorange	See section 8.5.13, 🗎 8-56
LiHa: Determine Range	See section 8.6.12, 🗎 8-97
MCA96: Determine Range	See section 8.10.14, 🗎 8-225
MCA384: Determine Range	See section 8.8.14, 🗎 8-170
CGM: Determine Range	See section 8.9.12, 🗎 8-190
PnP: Determine Range	See section 9.4.7, 🗎 9-31
RoMa: Determine Range	See section 9.5.9, 🗎 9-54

Purpose

The **Range Test** procedure checks if the installed devices, LiHa, RoMa, PnP, MCA96, MCA384, CGM and PosID, can be moved over their whole ranges. Each device moves along its axes to its extreme positions. After initialization the difference between stored missing of remaining steps and the actual value is evaluated. The test lasts about 5 to 10 minutes (depending on the number of installed devices).

ATTENTION

Before starting the **Range Test** procedure, check the following:

- Same conditions as stated in section 9.2.3 “Preparatory Steps”, 🗎 9-4.

Procedure

To perform the range test:

1 On the **Contents** page, select the **Range** check box. No further parameters need to be defined.

2 Start the procedure with **Start**. The **Ranges Move Test** progress message appears.

3 At the end of the test, a **Range Move Test: Passed** or **Failed** message appears.

4 Confirm with **OK**.

Pass/Fail Criteria

See **Printing / Information** page. The test is passed, if the evaluated **Deviation** does not exceed the specified **Deviation Limit** and if the **Range** is **ok**. Concrete values depend on the device and the axis.

If the Test Fails

Depending on the device, perform the following setup procedures:

- LiHa: Perform the **Determine Range** procedure.
- MCA96: Perform the **Determine Range** procedure.
- MCA384: Perform the **Determine Range** procedure.
- CGM: Perform the **Determine Range** procedure.
- PnP: Perform the **Determine Range** procedure.
- RoMa: Perform the **Determine Range** procedure.
- PosID 2, PosID-3: Perform the **Autorange** procedure.
- Also see → Cross References.

9.3.6 Move Test

Purpose

The **Move Test** procedure checks whether the mechanics of the system devices (according to the **Setup** page) work properly. All devices are moved step by step as defined on the **Vector** page for a predefined number of cycles (duration). After the **Re-Init** interval, the devices are reinitialized and the number of lost encoder steps is evaluated for each axis.

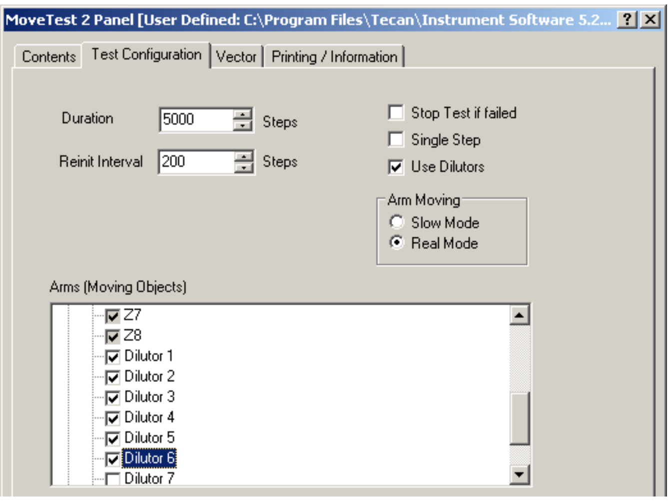
ATTENTION

If diluters are used, we recommend you to empty the liquid system before starting the **Move** test procedure.

Procedure

To perform the **Move** test:

1 On the **Contents** page, select the **Move** check box and change to the **Test Configuration** page.


MoveTest 2 Panel [User Defined: C:\Program Files\Tecan\Instrument Software 5.2...

Duration 5000 Steps

Reinit Interval 200 Steps

☐ Stop Test if failed
☐ Single Step
☑ Use Dilutors

Arm Moving
○ Slow Mode
● Real Mode

Arms (Moving Objects)
☑ Z7
☑ Z8
☑ Dilutor 1
☑ Dilutor 2
☑ Dilutor 3
☑ Dilutor 4
☑ Dilutor 5
☑ Dilutor 6
☐ Dilutor 7

Fig. 9-14 Test Configuration

2 Enter the number of steps to be performed in the **Duration** input field (default: 5000, lasts about 8 to 16 hours).

3 Enter the number of steps after which the device is to be reinitialized in the **Re-Init Interval** input field (default: 200).

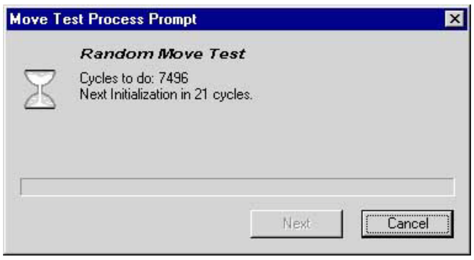
4 From the list box, you can select the diluters you want to include in the **Move Test**. Select or clear the corresponding check boxes.

5 Select the check box **Stop test if failed** If you want the test to stop if the number of lost encoder steps exceeds the predefined **Deviation Limit**

*The **Stop test if failed** check box is deselected by default. The **Deviation Limit** cannot be set by the user.*

6 Click **Start** to begin.

*The **Move Test** process prompt appears.*


Move Test Process Prompt

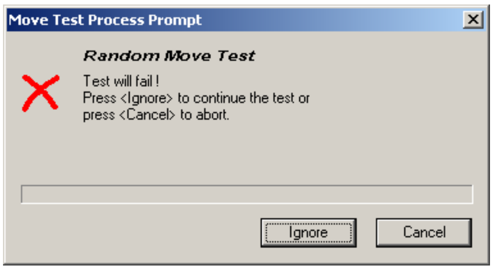
Random Move Test

Cycles to do: 7496
Next Initialization in 21 cycles.

Fig. 9-15 Random Move Test process prompt

***Note:** If during the test the number of lost steps exceeds the predefined **Deviation Limit** you will be notified by an appropriate message.*

- *If you have selected the check box **Stop test if failed** the message looks as shown in the following figure.*
- *The test is halted in this case.*


Move Test Process Prompt

Random Move Test

Test will fail !
Press <Ignore> to continue the test or
press <Cancel> to abort.

Fig. 9-16 Test will fail message

7 If the above message appears do one of the following:
   - Click **Ignore** to resume the test.
   - Click **Cancel** to abort the test.

*At the end of the test, a **Random Move Test: Passed** or **Failed** message appears.*

8 Confirm with **OK**

Pass/Fail Criteria

See **Printing / Information** page. The test is passed, if the evaluated **Maximal Deviation** does not exceed the predefined **Deviation Limit** and if the **Exceed Counter** is 0.

If the Test Fails

If the test fails, perform the corresponding setup functions.

There may a mechanical problem, if the test fails again. Call your nearest service organization and mail the corresponding result file or fax the QC-report.

9.3.7 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

9.4 Pick and Place Arm (PnP)

9.4.1 Introduction

Purpose

The PnP is a robotic arm with gripper fingers that serves for gripping and moving tubes within the working area of Freedom EVO instruments.

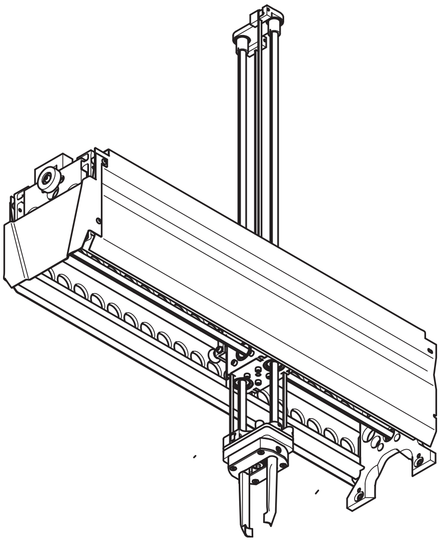
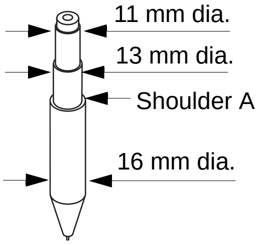


Fig. 9-17 Pick and Place arm

For further information refer to the Freedom Operating Manual.

Required Tool



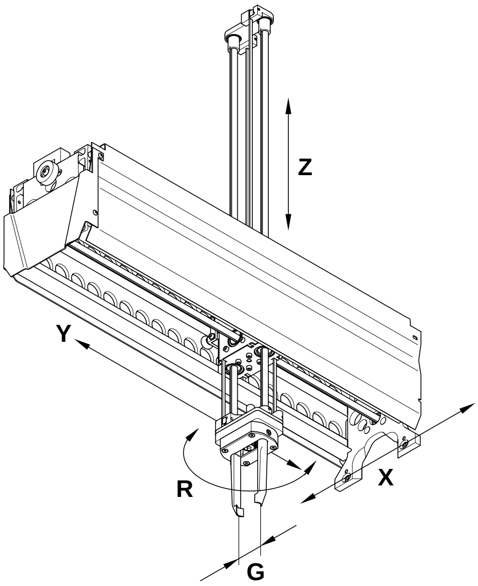
The PnP reference Tool p/n 625 002 is required for setting up the PnP.

Fig. 9-18 PnP Reference tool

Movement Axes

The PnP’s movements are coordinated with other system devices such as LiHa and RoMa. There are five different movement axes:

X-axis	Movement of the PnP left - right
Y-axis	Movement of the PnP forward - backward
Z-axis	Movement of the PnP gripper head up - down
G-axis	Movement of the PnP gripper fingers open - close
R-axis	Rotational motion of the PnP gripper head



X	*Arm movement left – right*
Y	*Arm movement forward – backward*
Z	*Gripper head movement up – down*
R	*Gripper head rotation*
G	*Gripper finger open – close*

Fig. 9-19 *Movement axes*

9.4.2 PnP Panel

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3
Setting the serial number	See section 5.4.1, 🗎 5-31

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 9-5 *PnP Functions and User Permissions*

Function	Type	User	FSE
Reset Setup	Setup		X
Set Defaults in EEROM	Setup		X
Determine Range	Setup		X
Teach Tube Diameter	Setup		X
Determine Reference Positions	Setup		X
Tube Move	Test	X	X

Tab. 9-5 *PnP Functions and User Permissions*

Function	Type	User	FSE
Reference Position Verify	Test	X	X
Move PnP	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Safety Precautions

Please pay attention to the following points.

WARNING

During the certain procedures the PnP will move in the X-axis at considerable speed.

- Keep off the moving range during such procedures.
- Fast moving devices may cause injuries.

ATTENTION

To avoid collisions with other parts make sure the worktable is empty and free of obstacles during the execution of the test procedures.

- Collisions can damage devices or cause misadjustments.

PnP Files

The PnP function can create the following files:

- **Result Files:** Test results are stored in *.any files.

Directory: <data_path>\Results

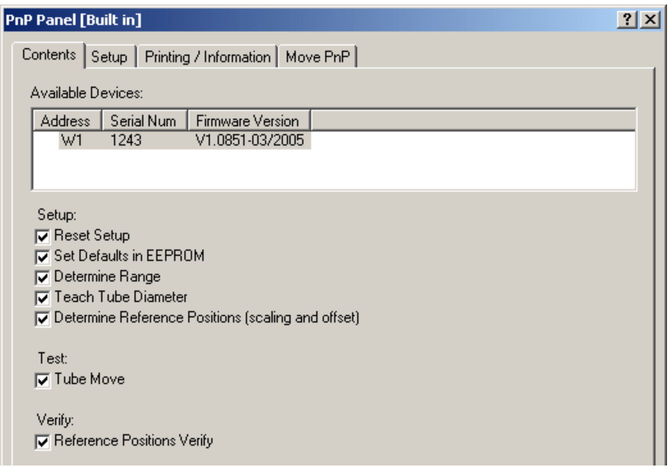
File name: PnP_<serial_number>_<date>_<time>.any

Starting the Panel

To set up the PnP:

1 Start the PnP panel with **System Devices > PnP.**

The PnP panel with activated Contents page appears. After starting the panel, no check box is selected and not all tabs are visible.



Available Devices:

Address	Serial Num	Firmware Version
W1	1243	V1.0851-03/2005

Setup:
- ☑ Reset Setup
- ☑ Set Defaults in EEPROM
- ☑ Determine Range
- ☑ Teach Tube Diameter
- ☑ Determine Reference Positions (scaling and offset)

Test:
- ☑ Tube Move

Verify:
- ☑ Reference Positions Verify

Fig. 9-20 *PnP Contents page*

Pages

The PnP panel is subdivided into the following pages:

Page	Function
Contents	General overview, test selection
Setup	For setting the setup parameters
Move PnP	Movement tool
Printing / Information	Print selection for the QC-report

9.4.3 Move PnP

Cross References

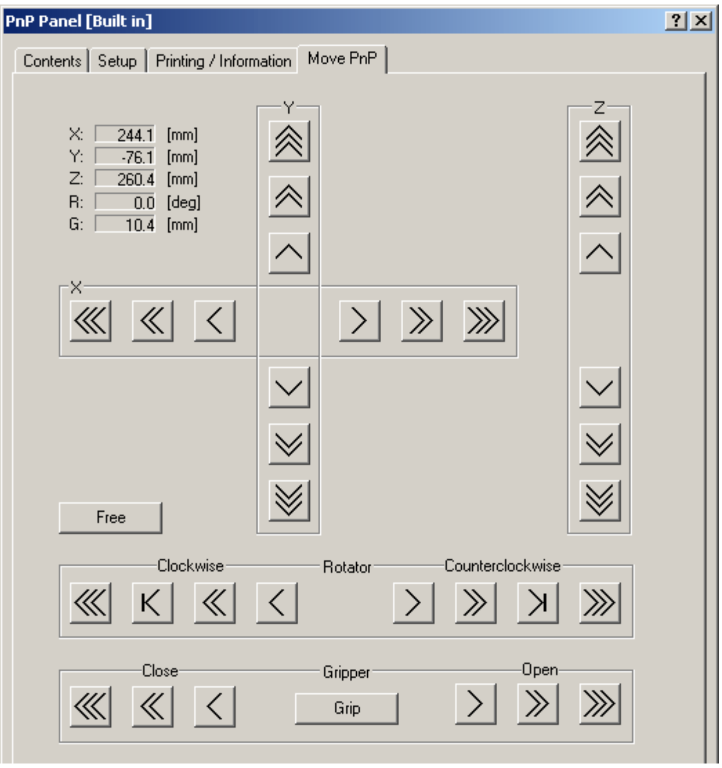
List of cross references to information provided in other sections:

Information	References
PnP Movement axes	See section 9.4.1, 🗎 9-23

Note: *This function works only if the PnP has been selected before on the* ***Contents*** *page.*

Purpose

The **Move PnP** page lets you move the whole PnP or parts of it in the appropriate axes: X, Y, Z, G and R (→ Cross References).



X: 244.1 [mm]
Y: -76.1 [mm]
Z: 260.4 [mm]
R: 0.0 [deg]
G: 10.4 [mm]

Fig. 9-21 Move PnP page

Controls The **Move** page contains the following controls

‹ › ˄ ˅	Single step (1/10 mm or 1/10°) movement/rotation buttons.
« » ︽ ︾	Ten steps (1 mm or 1°) movement/rotation buttons.
⋘ ⋙ ⤊ ⤋	Continuous movement buttons (if button is kept pressed).
K ⋊	Rotation buttons that let you turn the gripper head to the following positions: 90°/180°/270°/360°.
Free	Moves all other arms (LiHa etc.) away from the selected device to their end positions.
Grip	Grips the reference tool.
X, Y	Text boxes indicating the current position of the rotation axis with respect to grid position # 1
Z	Current position in Z-axis (distance of grippers from worktable)
R	Current rotational angle of gripper module
G	Current distance between grippers

Note:

- *The arrows on the movement buttons indicate the direction in which the respective parts will be moved.*
- *If you place the mouse pointer over a movement button, a text appears that explains what you can do with the button (so-called “tool tip”)*

Note: *There are no continuous buttons in the Gripper and Rotator sections of the **Move PnP** page.*

Keyboard Control

It is also possible to use the keyboard for the movements in the various axes. You can use the corresponding keys of the numeric keypad or the keys in the key blocks left of the numeric keypad.

Tab. 9-6 *Moving the arm with the keyboard*

Key (left of numeric keypad)	Key in numeric pad (NumLock switched on)	Movement/rotation axes
Right arrow	6 Right arrow	X+ (right)
Left arrow	4 Left arrow	X- (left)
Down arrow	2 Down arrow	Y+ front
Up arrow	8 Up arrow	Y- (rear)
Page Up	PgUp 9	Z+ (up)
Page Down	PgDn 3	Z- (down)
Home	7 Home	R+ (CW) a)
End	1 End	R- (CCW) a)
Delete	**.** Delete	G+ (open) b)
Insert	0 Insert	G- (close) b)

a) Rotation of gripper head clockwise/counterclockwise
b) Open/close grippers

Steps

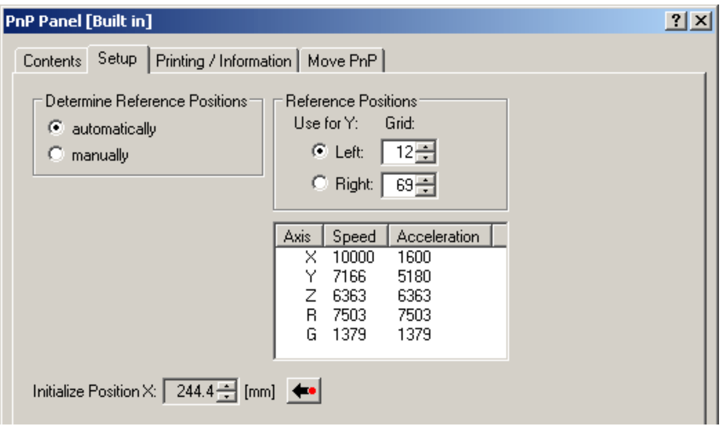
The parts of the arm device are moved as follows:

- Every time you hit one of the above keys the part is moved/rotated by one step (0.1 mm or 0.1 degree).
- If you keep the key pressed it is moved/rotated continuously at a speed of about five steps per second.
- You can press a key continuously and at the same time press the Ctrl key. In this case, the arm is accelerated until it reaches a maximum speed.

9.4.4 Setup Page

Purpose

The **Setup** Page provides the controls for setting the parameters for the various setup procedures.



Determine Reference Positions
● automatically
○ manually

Reference Positions
Use for Y: Grid:
● Left: 12
○ Right: 69

Axis	Speed	Acceleration
X	10000	1600
Y	7166	5180
Z	6363	6363
R	7503	7503
G	1379	1379

Initialize Position X: 244.4 [mm]

Fig. 9-22 *PnP - Setup page*

Controls

The **Setup** page contains the following controls:

Determine Reference Positions	Frame with 2 option buttons that let you set the mode in which the reference positions are determined
automatically	Select this button if you want to have determined the reference positions automatically
manually	Select this button if you prefer to determine the reference positions manually.
Reference Positions	Frame for setting the reference positions
Grid	Spin boxes for setting left and right reference grid positions
Use for Y	Option buttons that let you specify whether the reference positions in the Y-axis should be determined at the left or right references position
Initialize Position X	This spinbox must be used if the **Initialize to front feature** has been enabled on the **Basic Setup > Worktable** page. The spinbox defines the position (relative to grid position # 1) in which the arm is to be initialized. The position must be chosen so that no collisions of the arm during initialization are possible. Example: If the required grid position is 18, then the spin box must be set to (18 - 1) x 25 mm = 425 mm (Note that the X-distance between two neighboring grid positions is 25 mm)
⬅	Allows setting the current arm position as the initialization position
Table on right side	Current speed and accelerations in X, Y, Z, R and G axes

ATTENTION

Make sure you set all parameters correctly.

Note: *Find additional information about the entries to be made in descriptions of the respective setup procedures.*

9.4.5 Reset Setup

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This function resets reference positions, ranges and offsets to the original values. It should be used only:

- When a new instrument is set up for the first time
- After certain repairs from which misadjustment may have resulted (e.g., removal and reinstallation of the worktable, replacement of whole PnP, etc.).

ATTENTION

Do not start this function unnecessarily. After performing this function it will be necessary to readjust all ranges and reference positions.

Procedure

To set the default parameters:

1 On the **Contents** page, select the **Reset Setup** check box and click **Start**.
2 When finished, you must adjust all ranges and reference positions with the respective functions.

9.4.6 Set Default Parameters in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1 On the **Contents** page, select the **Set Defaults in EEPROM** check box.

No further parameters need to be defined.

2 Download the default values to the LiHa and have them re-read by the software with **Start**.

9.4.7 Determine Range

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

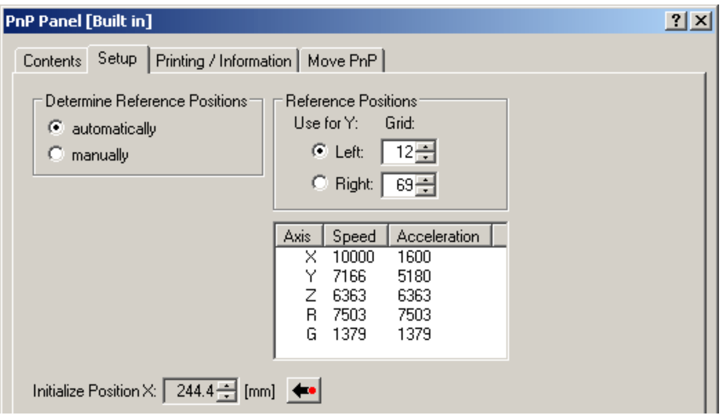
Purpose

The **Determine Range** procedure moves the PnP in Y- and Z-direction to its extreme positions to find the available ranges. The values found are then written to the PnP.

Procedure

To determine the range:

1 On the **Contents** page, select the **Determine Range** check box and change to the **Setup** page.



Determine Reference Positions
● automatically
○ manually

Reference Positions
Use for Y: Grid:
● Left: 12
○ Right: 69

Axis	Speed	Acceleration
X	10000	1600
Y	7166	5180
Z	6363	6363
R	7503	7503
G	1379	1379

Initialize Position X: 244.4 [mm]

Fig. 9-23 Setup page

2 In the **Reference Positions** frame, set the **Left** and **Right** grid positions in the corresponding spin boxes.

3 Click the appropriate **Use for Y** option button to select the reference position (**Left** or **Right**) at which you wish to determine the Z-range.

4 Start the procedure with **Start**.

9.4.8 Teach Tube Diameter

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Teach Tube Diameter** procedure serves for adjusting the gripper to the tube diameter with the aid of the PnP reference tool. The value found is then written to the PnP.

Procedure

To adjust the diameter:

1. On the **Contents** page, select the **Teach Tube Diameter** check box. No further parameters need to be defined.

   *Start the procedure with **Start**.*
   *Depending on the installed PnP you are prompted with one or two **Ready to Proceed** messages to hold the reference tool between the grippers as shown in the figure below.*
2. Follow the instructions on the prompt(s) and hold the reference tool into the gripper module according to the following:
   - Freedom EVO : Lower edge of 13 mm zone.
   - Freedom EVO-2: When the first prompt appears in zone d_1 (11 mm), at the second prompt in zone d_3 (16 mm).

ATTENTION

Make sure that the reference tool is gripped in the correct positions as indicated on the prompts, otherwise you may obtain incorrect results.

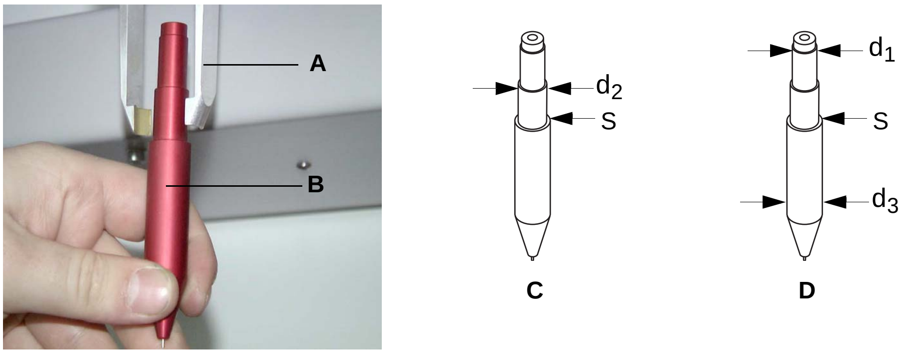


Fig. 9-24 *Installing the PnP reference tool*

A	*PnP grippers*	***d_1***	*Reference diameter 11 mm*
B	*Reference tool*	***d2***	*Reference diameter 13 mm*
C	*Reference zone for Freedom EVO*	***d3***	*Reference diameter 16 mm*
D	*Reference zones for Freedom EVO-2*	***S***	*Shoulder between 13 & 16 mm zones*

3 After each step, confirm the corresponding **Ready to proceed** message(s) with **OK** to write the value(s) found to the PnP.

9.4.9 Determine Reference Positions

Cross References

List of cross references to information provided in other sections:

Information	References
Teach tube diameter	See section 9.4.8, 🗎 9-32
Move PnP page	See section 9.4.3, 🗎 9-26

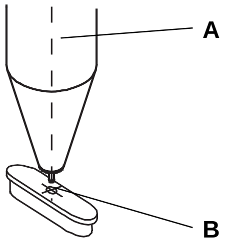
Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Determine Reference Positions** procedure moves the PnP to the selected reference positions in sequence:

- To adjust them and therefore to determine the X and Y scale factors as well as the X and Y displacements.
- To check the reference positions.



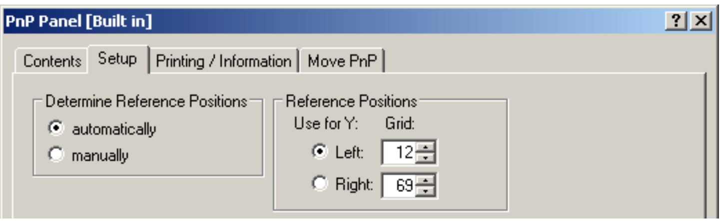
A	*Reference tool*
B	*Reference pin*

Fig. 9-25 *Reference position*

Procedure

To determine the reference positions:

1 On the **Contents** page, select the **Determine Reference Positions** check box and change to the **Setup** page.


PnP Panel [Built in]

Determine Reference Positions
● automatically
○ manually

Reference Positions
Use for Y: Grid:
● Left: 12
○ Right: 69

Fig. 9-26 *PnP, Setup page*

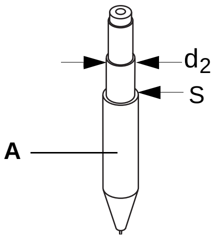
2 In the **Determine Reference Positions** frame select the mode in which you wish to determine the reference positions:
   - Select the **Manually** option button if you wish to determine the reference positions manually (only for previous version of Pick and Place arm).
   - Select the **Automatically** option button if you wish the reference positions to be determined automatically (default selection).

***Note:** The manual mode is not available for the new Pick and Place arm (Freedom EVO-2).*

3 In the **Reference Positions** frame, define the **Left** and **Right** reference positions for the PnP.

4 Click the appropriate **Use for Y** option button to select the reference position (**Left** or **Right**) at which you wish to move in the Y-direction.

5 Start the procedure with **Start**. The **Mount Reference Tool** message appears.



A	*Reference tool*
d_2	*13 mm zone*
S	*Shoulder*

Fig. 9-27 *PnP reference tool*

6 Insert the reference tool into the gripper module and click **OK** to grip the tool. Make sure it is installed correctly, i.e. the grippers must grip the tool in the 13 mm zone and must touch the shoulder S.

7 Confirm the **Ready to proceed** message with **OK**.

8 If you selected **Automatically** or **Manually** on the **Setup** page, the reference positions are determined automatically. Continue with step 10.

9 If you selected **Automatically** on the **Setup** page, the **Move PnP** page is activated (→ Cross References) and the **Use move tool to determine first reference point** process prompt appears. Proceed as follows:
   - Adjust the position in X- and Y-axis according to Fig. 9-25 , 🗎 9-33.
   - If the reference tool is in the correct position, confirm with **Next**.
   - Repeat the above steps for all required positions.

10 After adjusting all reference positions, the **Unmount Reference Tool** process prompt appears.

11 Hold the reference tool in the gripper, then click **OK**. The reference tool will be released and the values found are written to the PnP.

9.4.10 Tube Move Test

Purpose

The purpose of this procedure is to test whether reagent tubes can be transported correctly from one tube rack to another.

Test Principle

Two strip racks are placed in predefined grid positions on the worktable (usually specified in a previous setup procedure). The left strip rack (the source rack) is filled with 16 tubes of appropriate diameter. When the test is started, the PnP moves the tubes one by one to the corresponding tube position of the destination rack. Note that during this movement the gripper head rotates by 1.5 turns round its R-axis.

***Note:** Before the PnP picks up the next tube from the source rack, its gripper head is rotated back into the original position.*

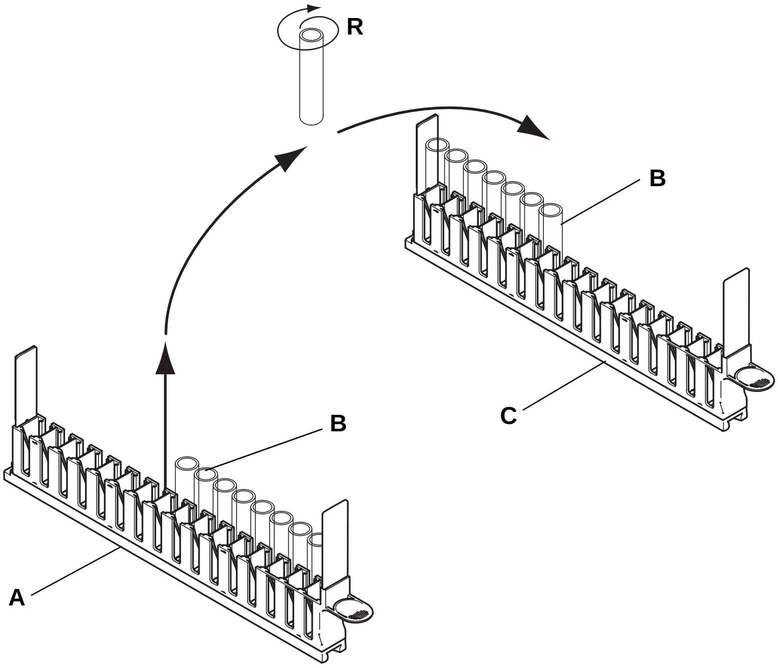


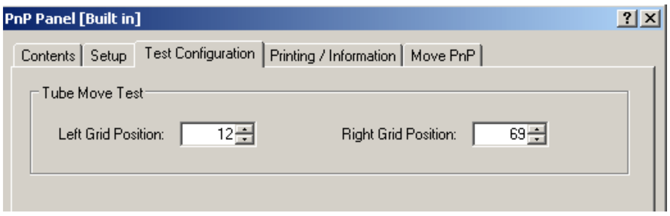
Fig. 9-28 *PnP, Tube Move test*

A	*Source tube rack*	***C***	*Destination tube rack*
B	*Tubes*	***R***	*Rotating the tube*

Preparation

To prepare the test:

1. On the **Contents** page, select the **Tube Move** check box and change to the **Test Configuration** page.



Left Grid Position: 12

Right Grid Position: 69

Fig. 9-29 *PnP, Test configuration page*

2 Check whether the suggested **Left/Right Grid Positions** for the source and the destination tube rack are in order in your case.

Usually, you can accept the suggested grid positions. You should change them only in exceptional cases.

3 Slide a source and a destination tube rack in the corresponding positions.

The source rack is on the left side, the destination rack on the right side.

ATTENTION

Make sure you place the tube racks in the correct positions to avoid collisions and damage to tubes and other objects on the worktable.

4 Fill the source rack with appropriate (empty!) reagent tubes.

5 Change to the **Printing / Information** page and fill out the **Comment** field as necessary.

Test Procedure

To run the test:

1 Click **Start** to begin.

A process prompt appears instructing you to place the source and a destination rack in the required grid positions.

2 Click on **OK** when done.

The PnP arm starts moving the tubes one by one from the source to the destination rack as described in "Test Principle", 🖹 9-35.

3 Visually check whether the tubes are moved from the source to the destination properly.

At the end of the test you are prompted to confirm whether or not the test was successful.

4 Click on **OK** when the tubes were moved correctly, **Cancel** otherwise.

Pass / Fail Criteria

The test is passed if all of the tubes were moved properly from the source to the destination rack.

If the Test Fails

Try the following:

- Perform the **Verify Reference Positions** test.
- If necessary, repeat the procedure **Determine Reference Positions**.
- Call your nearest service organization for assistance if necessary.

9.4.11 Reference Position Verify

Cross References

List of cross references to information provided in other sections:

Information	References
Determine Reference Positions	See section 9.4.9, 🗎 9-33
Move PnP page	See section 9.4.3, 🗎 9-26

Purpose

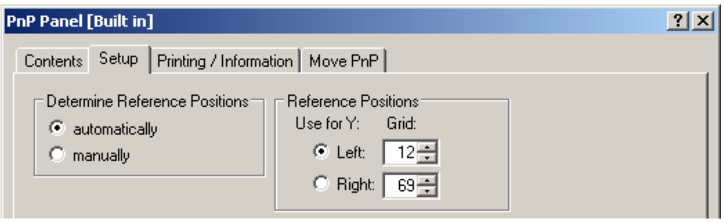
This procedure serves to verify previously determined reference positions.

Note: *The procedure described below is very similar to the procedure Determine Reference Positions. The difference is that the procedure described in this section only checks the reference positions, but does not readjust them and does not write any values to the EEPROM.*

Procedure

To determine the reference positions:

1 On the **Contents** page, select the **Determine Reference Positions** check box and change to the **Setup** page.



Determine Reference Positions
● automatically
○ manually

Reference Positions
Use for Y: Grid:
● Left: 12
○ Right: 69

Fig. 9-30 *PnP, Setup page*

Note: *The test must be carried out in the manual mode. The automatic mode is not available during this test.*

2 In the **Reference Positions** frame, define the **Left** and **Right** reference positions for the PnP.

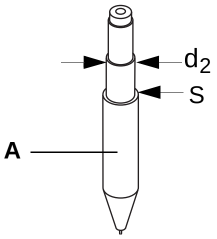
3 Click the appropriate **Use for Y** option button to select the reference position (**Left** or **Right**) at which you wish to move in the Y-direction.

4 In the **Determine Reference Positions** frame select the mode in which you wish to determine the reference positions:

- Select the **Manually** option button if you wish to determine the reference positions manually (only for previous version of Pick and Place arm).
- Select the **Automatically** option button if you wish the reference positions to be determined automatically (default selection).

Note: *The manual mode is not available for the new Pick and Place arm (Freedom EVO-2).*

5 Start the procedure with **Start**. The **Mount Reference Tool** process prompt appears.



A	*Reference tool*
d_2	*13 mm zone*
S	*Shoulder*

Fig. 9-31 *PnP reference tool*

6 Insert the reference tool into the gripper module and click **OK** to grip the tool. Make sure it is installed correctly, i.e. the grippers must grip the tool in the 13 mm zone and must touch the shoulder S.

7 Confirm the **Ready to proceed** message with **OK**.

- If the instrument is a Freedom EVO-2, the test is performed automatically. Continue with step 9.
- If the instrument is a Freedom EVO, the **Move PnP** page is activated (→ Cross References) and the **Use move tool to determine first reference point** process prompt appears. The reference tool is moved above the first reference position.

8 Check the reference positions **only** using the command buttons in the Z-direction (up and down).

- Carefully move the reference tool downwards (first in 1 mm steps, then in 1/10 mm steps) to check whether you can move its tip into the hole in the reference pin.
- Take care to **avoid** using in X- and Y-movement buttons.
- If the reference tool is in the correct position, confirm with **Next**, otherwise click on **Cancel**.
- Repeat the above steps for all required positions.

9 After adjusting all reference positions, the **Unmount Reference Tool** process prompt appears.

10 Hold the reference tool in the gripper, then click **OK**. The reference tool will be released and the values found are written to the PnP.

Pass / Fail Criteria

The test is passed if the reference positions determined with the procedure **Determine Reference Positions** can be reached again.

If the Test Fails

Try the following:

- Repeat the procedure **Determine Range**.
- Repeat the procedure **Determine Reference Positions**.
- Call your nearest service organization for assistance if necessary.

9.4.12 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

9.5 Robotic Manipulator Arm (RoMa)

9.5.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Firmware compatibility list	See section 4.5, 🗎 4-21
Vector-2 panel	See section 9.6, 🗎 9-72

Purpose

The Robotic Manipulator Arm (RoMa) is used to transport objects of the format of microplates, such as reagent blocks, deep well plates, etc. to different positions or for storage onto the shelf. Freedom EVO instruments can be equipped with one or two RoMas.

Note: *The RoMa types, gripper fingers and rotation directions, described in the following, are important for setting up the RoMa correctly.*

RoMa Types

The following types of RoMa are supported by the Setup and Service software:

- RoMa Freedom standard and RoMa Freedom long. These RoMa types can be found on Freedom EVO that were delivered until October 2005.

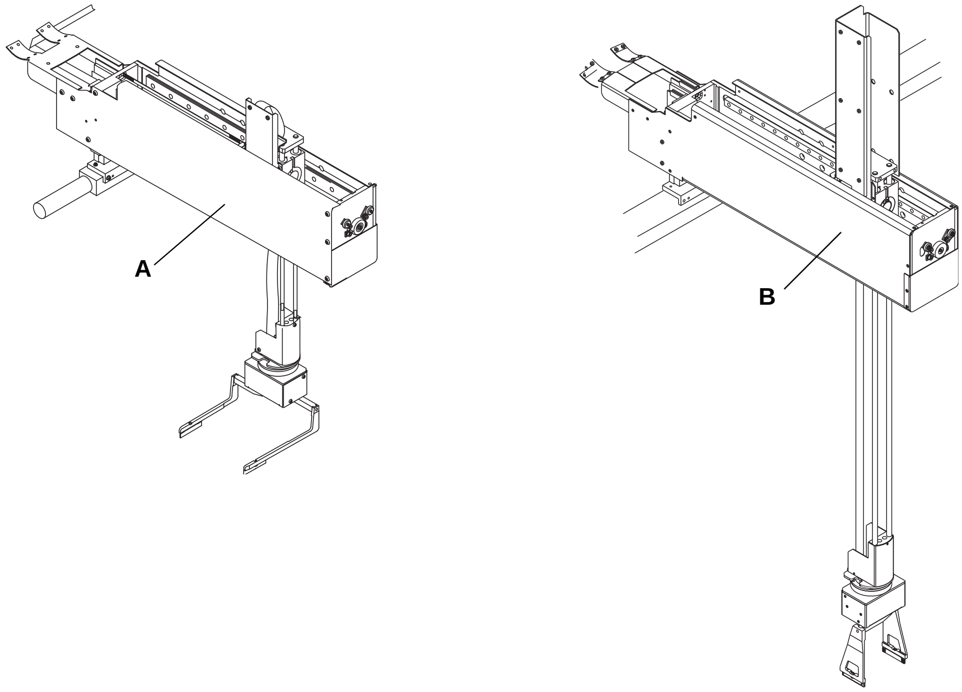


Fig. 9-32 *RoMa Freedom*

A *RoMa Freedom standard* ***B*** *RoMa Freedom long*

- RoMa-3 standard and RoMa-3 long. These RoMa types look very similar to their predecessor models but have an improved mechanical construction. In addition, they can be equipped with a barcode scanner (see following figure Fig. 9-34 , 🗎 9-41. RoMa-3 (without barcode scanner) can be found on Freedom EVO-2 and Freedom EVOlyzer instruments.

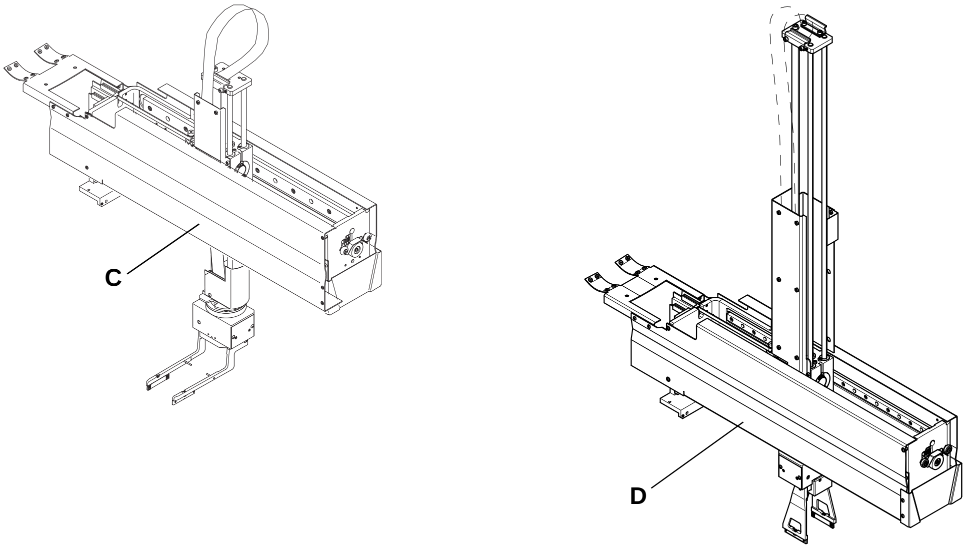


Fig. 9-33 *RoMa-3*

C	*RoMa-3 standard*	D ***D***	*RoMa-3 long*

- RoMa-3 standard with barcode scanner (for instruments 30045716, 30045717 and 30045718).

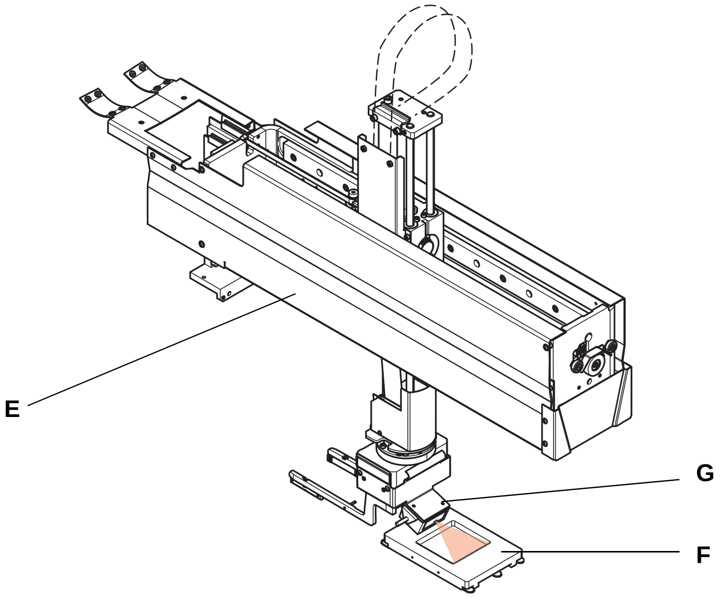


Fig. 9-34 *RoMa-3 with barcode scanner*

E	*RoMa-3 standard*	***G***	*Barcode scanner*
F	*RoMa-3 reference plate*		

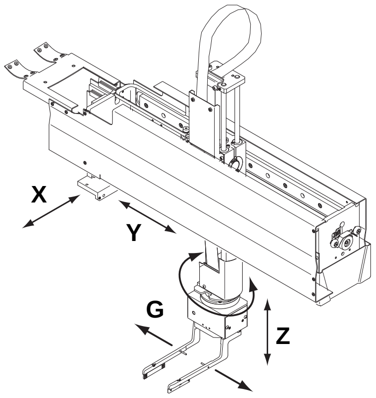
Note: *RoMa-3 with barcode scanner:*

- *For the time being (December 2005), the barcode scanner is only used for instruments 30045716, 30045717 and 30045718 and is only added to RoMa-3 standard.*
- *The RoMa-3 with barcode scanner requires a different firmware version (see cross references).*

Movement Axes

The RoMa’s movements are coordinated with other system devices such as LiHa and PnP. There are five different movement axes:

X-axis	Movement of the RoMa left - right
Y-axis	Movement of the RoMa forward - backward
Z-axis	Movement of the RoMa gripper head up - down
G-axis	Movement of the RoMa gripper fingers open - close
R-axis	Rotational motion of the RoMa gripper head



X	*Arm movement left - right*
Y	*Arm movement forward - backward*
Z	*Gripper head movement up - down*
G	*Gripper fingers open - close*
R	*Gripper head: Rotation axis*

Fig. 9-35 *RoMa movement axes*

Rotation Directions

RoMa Freedom and RoMa Long can be set mechanically so that they can be rotated in two ways:

- **CW** (clockwise) within a range 0° to 270°, start position: 0° (see following figure, right side)
- **CCW** (counterclockwise) within a range 360° to 90°, start position: 360° (see following figure, left side)

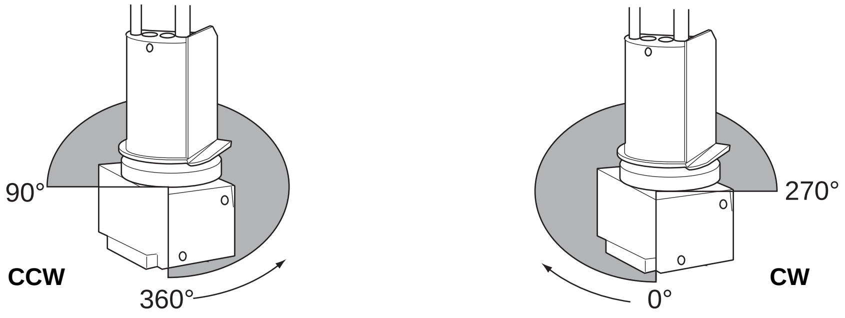


Fig. 9-36 *RoMa Rotation directions*

Gripper Types

Different types of gripper fingers can be mounted on the rotator of a RoMa (see following figure):

- Eccentric gripper fingers (A) can be used for all types of RoMa.
- Eccentric gripper fingers for Te-MO (B) are necessary if a Te-MO is installed on to the instrument. They are also used for instruments 30045716, 30045717 and 30045718.
- Centric long gripper fingers (C) are normally installed on RoMa Long.
- Centric short gripper fingers (D).

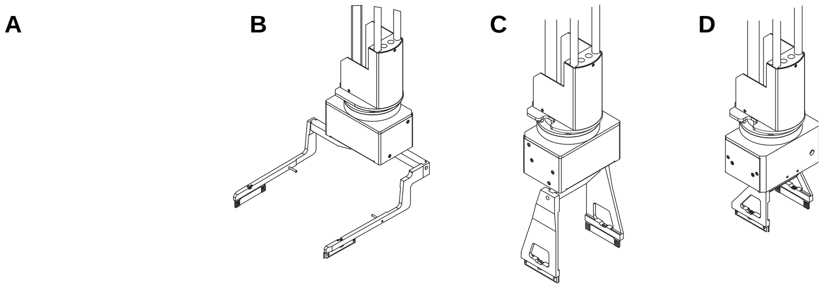


Fig. 9-37 *Gripper finger types*

A	*Eccentric fingers*
B	*Eccentric fingers (Te-MO and instruments 30045716, 30045717 and 30045718*
C	*Centric long fingers (RoMa Long)*
D	*Centric short fingers*

Reference Tool

The “RoMa Reference Tool” is required for setting up and testing the RoMa reference positions. In the field, you may encounter the following reference tools

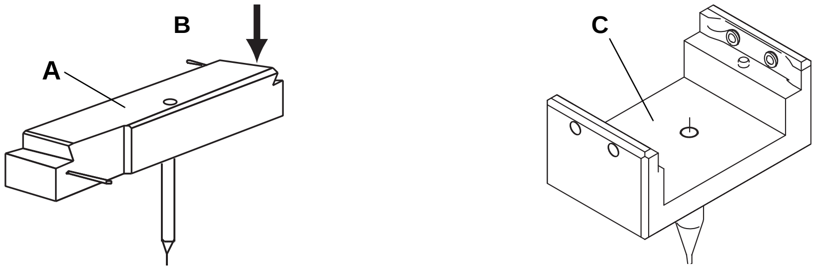


Fig. 9-38 *RoMa reference tools*

A	*Reference tool V2*	***C***	*RoMa-3 reference tool (necessary for RoMa-3)*
B	*Protruding screw*		

The following table shows in which cases the gripper fingers and/or the barcode scanner (if present) must be removed in order to install the reference tool.

Tab. 9-7 *Criteria for removing the gripper fingers or the barcode scanner*

Reference Tool	RoMa Type	Gripper Type	Remove Grippers	Remove Barcode Scanner
Tool V2	RoMa 2	Eccentric	No	---
		Te-MO	No	---
		Centric	Yes	---
Tool for RoMa-3	RoMa-3 without barcode scanner	Eccentric	No	---
		Te-MO	No	---
		Centric	No	---
Tool for RoMa-3	RoMa-3 with barcode scanner (instruments 30045716, 30045717 and 30045718)	Eccentric	No	Yes
		Te-MO	No	Yes
		Centric	Yes	Yes

As the above table shows, the barcode scanner must be removed before the reference tool for RoMa-3 can be installed. For details on how to remove/install the barcode scanner refer to section 9.5.2, 🗎 9-46.

Reference Plate

The “RoMa reference plate” is used to test whether the RoMa picks up, transports and places objects like microplates, DiTi boxes, etc. correctly. It is also used by the Vector panel to set up and test the access to shelf positions, incubators, loading ports, plate readers, plate washers and BEP trays (instruments 30045716, 30045717 and 30045718).

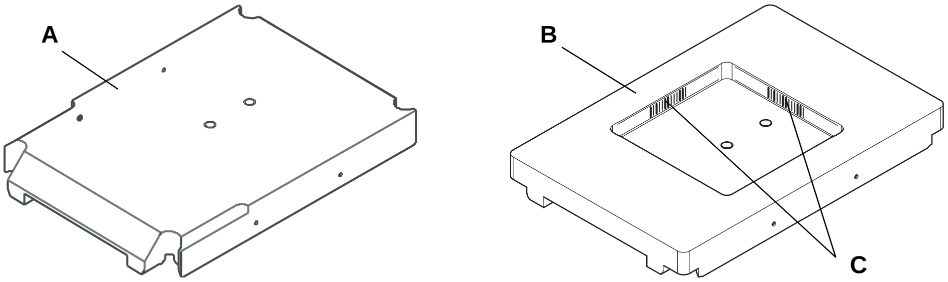


Fig. 9-39 *RoMa reference plates*

A	*RoMa reference plate*	***C***	*Barcode labels*
B	*RoMa-3 reference plate*		

In the field you are likely to encounter the plates shown in the above figure:

- “Traditional” RoMa reference plate, made of black plastic.This reference plate can be used for Freedom EVO and Freedom EVO-2 instruments. Note that this reference plate can only be gripped on the long side.
- New RoMa-3 reference plate. This plate is made of white plastic and has a square depression to the four walls of which barcode labels are applied. This reference plate can be used for all Freedom EVO instruments. Please note:
  - Unlike the traditional reference plate, it can be gripped on both the long and the short sides.
  - If must be used for setting up and testing the RoMa-3 with barcode scanner and for the setup and test procedures of the Vector-2 panel.

9.5.2 Removing / Installing the Barcode Scanner

Purpose

If the RoMa-3 to be set up and tested is equipped with a barcode scanner, the latter must be removed before those setup procedures requiring the RoMa reference tool can be performed. The procedures are:

- Determine Range
- Determine Reference Positions (scaling and offset).

Recommended Procedure

In order to set up and test the RoMa-3 with barcode scanner efficiently, we recommend proceeding as follows:

1. Before starting the panel, remove the barcode scanner as described below.
2. Start the panel.
3. Set the **Contents** page as follows: Select the procedures **Reset Setup** through **Adjust Rotator (offset and scaling)** and deselect the subsequent setup and test procedures.
4. After performing the above setup procedures switch the instrument off, reinstall the barcode scanner as described below; then switch the instrument on again.
5. Now deselect the above setups on the **Contents** page and select the remaining setup and test procedures.
6. Perform these procedures.

Remove Barcode Scanner

To remove the barcode scanner:

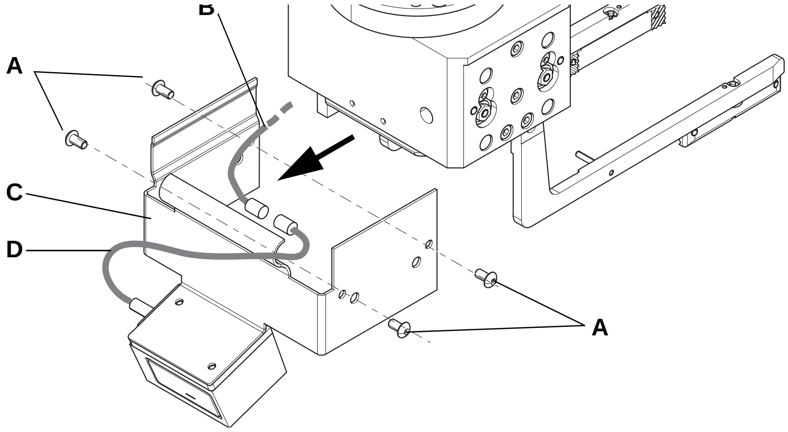


Fig. 9-40 RoMa barcode scanner

1. Remove the four screws (A).
2. Carefully pull the barcode scanner holder (C) in the direction of the black arrow.
3. Carefully disconnect the barcode scanner cable (D) from the interconnection cable (B). The two connectors are behind the barcode scanner holder.

Reinstall Barcode Scanner

1. To reinstall the barcode scanner carry out the above steps in reverse order. Be careful not to damage the cable.

9.5.3 RoMa Panel

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3
Setting the serial number	See section 5.4.1, 🗎 5-31

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 9-8 RoMa Functions and User Permissions

Function	Type	User	FSE
Reset setup	Setup		X
Set Defaults in EEPROM	Setup		X
Determine Range	Setup		X
Set Type	Setup		X
Determine Reference Positions (scaling and offset)	Setup		X
Align Gripper Fingers	Setup		X
Adjust Rotator (scaling and offset)	Setup		X
Determine reading positions of barcode scanner	Setup		X
Reference Plate	Test	X	X
Barcode Scanner positioning test	Test	X	X
Barcode Scanner reading test	Test	X	X
Move RoMa	Tool	X	X
Printing / Information	Page	X	X
QC- Report	Report	X	X

Safety Precautions

Please pay attention to the following points.

WARNING

During the certain procedures the PnP will move in the X-axis at considerable speed.

- Keep off the moving range during such procedures.
- Fast moving devices may cause injuries.

ATTENTION

To avoid collisions with other parts make sure the worktable is empty and free of obstacles during the execution of the test procedures.

- Collisions can damage devices or cause misadjustments.

RoMa Files

The RoMa function can create the following files:

- **Result Files:** Test results are stored in *.any files.

Directory: <data_path>\Results

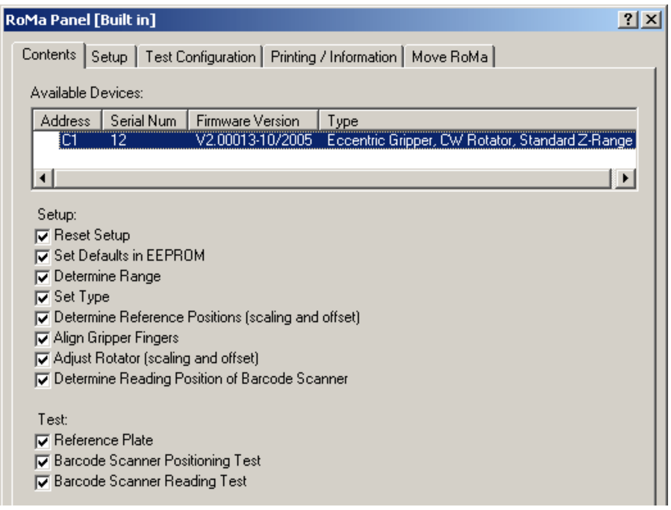
File name: RoMa_<serial_number>_<date>_<time>.any

Starting the Panel

To setup the RoMa:

1 Start the panel with **System Devices > RoMa**.

*The **RoMa** panel with activated **Contents** page appears. After starting the panel, no check box is selected and not all tabs are visible.*



Available Devices:

Address	Serial Num	Firmware Version	Type
C1	12	V2.00013-10/2005	Eccentric Gripper, CW Rotator, Standard Z-Range

Setup:

☑ Reset Setup
☑ Set Defaults in EEPROM
☑ Determine Range
☑ Set Type
☑ Determine Reference Positions (scaling and offset)
☑ Align Gripper Fingers
☑ Adjust Rotator (scaling and offset)
☑ Determine Reading Position of Barcode Scanner

Test:

☑ Reference Plate
☑ Barcode Scanner Positioning Test
☑ Barcode Scanner Reading Test

Fig. 9-41 RoMa Contents page

Pages

The **RoMa** panel is subdivided into the following pages:

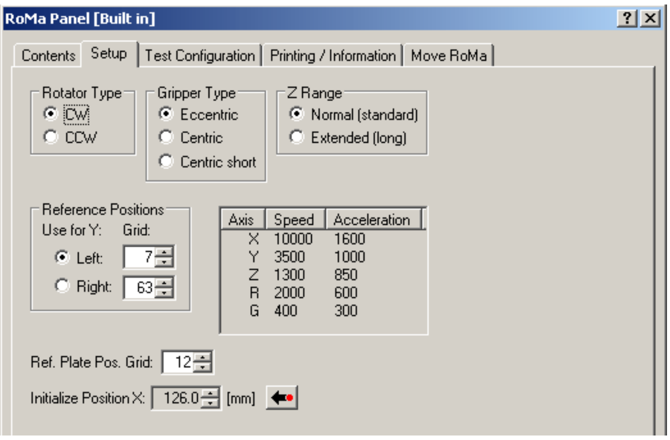
Tab. 9-9 Pages in RoMa Panel

Page	Function
Contents	General overview, setup and test selection
Setup	RoMa configuration.
Test Configuration	For configuring the reference plate and barcode scanner tests.
Printing / Information	Print selection for the QC-report
Move RoMa	Movement tool

9.5.4 Setup Page

Purpose

The **Setup** page provides the controls for setting the parameters for the various setup procedures.



RoMa Panel [Built in]

Rotator Type: ● CW ○ CCW

Gripper Type: ● Eccentric ○ Centric ○ Centric short

Z Range: ● Normal (standard) ○ Extended (long)

Reference Positions

Use for Y: Grid:

● Left: 7

○ Right: 63

Axis	Speed	Acceleration
X	10000	1600
Y	3500	1000
Z	1300	850
R	2000	600
G	400	300

Ref. Plate Pos. Grid: 12

Initialize Position X: 126.0 [mm]

Fig. 9-42 Setup page

Controls

The **Setup** page contains the following controls:

Rotator Type	Specification of rotation direction (clockwise, counterclockwise)
Gripper Type	Specification of gripper type (eccentric, centric, centric short)
Z-Range	Specification of Z-range (standard for RoMa Freedom, or long for RoMa Long.
Reference Positions	Frame for setting the reference positions
Grid	Spin boxes for setting left and right reference grid positions
Use for Y	Option buttons that let you specify whether the reference positions in the Y-axis should be determined at the left or right reference position
Ref. Plate Pos. Grid	Spin box to set the grid position of the reference plate

Initialize Position X	This spinbox must be used if the **Initialize to front feature** has been enabled on the **Basic Setup > Worktable** page. The spinbox defines the position (relative to grid position # 1) in which the arm is to be initialized. The position must be chosen so that no collisions of the arm during initialization are possible. Example: If the required grid position is 18, then the spin box must be set to (18 - 1) x 25 mm = 425 mm (Note that the X-distance between two neighboring grid positions is 25 mm)
⬅●	Allows you to set the current arm position as the initialization position
Table on right side	Current speed and accelerations in X, Y, Z, R and G axes

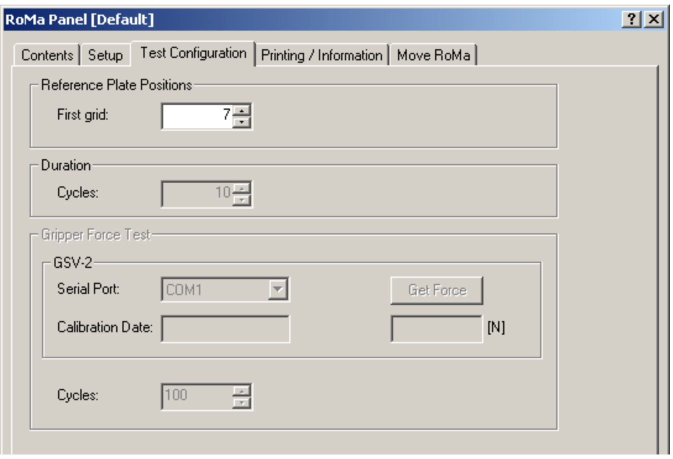
***Note:** Find additional information about the entries to be made in the descriptions of the respective setup procedures.*

9.5.5 Test Configuration Page

Purpose

This page lets you set the parameters for the test procedures.

Controls



RoMa Panel [Default]

Contents | Setup | Test Configuration | Printing / Information | Move RoMa

Reference Plate Positions
First grid: 7

Duration
Cycles: 10

Gripper Force Test
GSV-2
Serial Port: COM1
Get Force
Calibration Date:
[N]
Cycles: 100

Fig. 9-43 Test Configuration page

Reference Plate Positions

First grid	Spin box to define the grid position in which the reference plate is placed during the tests.

Duration

Cycles	Spin box to set the number of test cycles.
Gripper Force Test	Only used by the manufacturer.

9.5.6 Move RoMa

Cross References

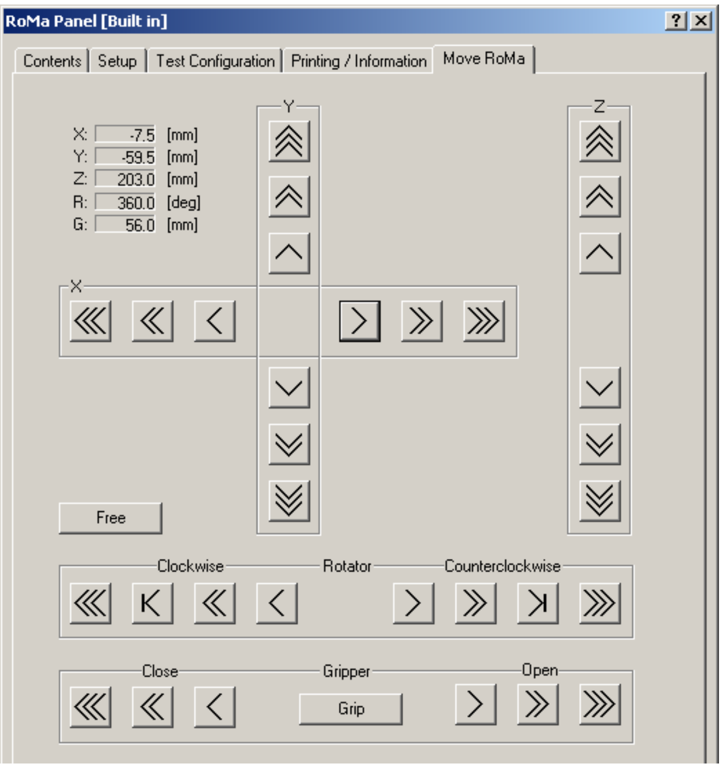
List of cross references to information provided in other sections:

Information	References
RoMa Movement axes	See section 9.5.1, 🗎 9-40

Note: *This function works only if the PnP has been selected before on the* ***Contents*** *page.*

Purpose

The **Move RoMa** page lets you move the whole RoMa or parts of it in the appropriate axes: X, Y, Z, G and R (→ Cross References).



X: -7.5 [mm]
Y: -59.5 [mm]
Z: 203.0 [mm]
R: 360.0 [deg]
G: 56.0 [mm]

Fig. 9-44 *Move RoMa page*

Controls

The **Move** page contains the following controls

‹ › ˄ ˅	Single step (1/10 mm or 1/10°) movement/rotation buttons.
« » ︽ ︾	Ten steps (1 mm or 1°) movement/rotation buttons.
⋘ ⋙ ⤊ ⤋	Continuous movement buttons (if button is kept pressed).
⇤ ⇥	Rotation buttons that let you turn the gripper head to the following positions: 90°/180°/270°/360°.

Free	Moves all other arms (LiHa etc.) away from the selected device to their end positions.
Grip	Grips the reference tool.
X, Y	Text boxes indicating the current position of the rotation axis with respect to grid position # 1
Z	Current position in Z-axis (distance of grippers from worktable)
R	Current rotational angle of gripper module
G	Current distance between grippers

Note:

- *The arrows on the movement buttons indicate the direction in which the respective parts will be moved.*
- *If you place the mouse pointer over a movement button, a text appears that explains what you can do with the button (so-called “tool tip”)*

Keyboard Control

It is also possible to use the keyboard for the movements in the various axes. You can use the corresponding keys of the numeric keypad or the keys in the key blocks left of the numeric keypad.

Tab. 9-10 *Moving the arm with the keyboard*

Key (left of numeric keypad)	Key in numeric pad (NumLock switched on)	Movement/rotation axes
Right arrow	6 Right arrow	X+ (right)
Left arrow	4 Left arrow	X- (left)
Down arrow	2 Down arrow	Y+ front
Up arrow	8 Up arrow	Y- (rear)
Page Up	PgUp 9	Z+ (up)
Page Down	PgDn 3	Z- (down)
Home	7 Home	R+ (CW) [a]
End	1 End	R- (CCW) [a]
Delete	**.** Delete	G+ (open) [b]
Insert	0 Insert	G- (close) [b]

[a] *Rotation of gripper head clockwise/counterclockwise*
[b] *Open/close grippers*

Steps

The parts of the arm device are moved as follows:

- Every time you hit one of the above keys the part is moved/rotated by one step (0.1 mm or 0.1 degree).
- If you keep the key pressed it is moved/rotated continuously at a speed of about five steps per second.

- You can press a key continuously and at the same time press the Ctrl key. In this case, the arm is accelerated until it reaches a maximum speed.

9.5.7 Reset Setup

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

ATTENTION

Do not start this function unnecessarily. After performing this function it will be necessary to readjust all ranges and reference positions.

Purpose

This function resets all reference positions, ranges and offsets to the original (factory-set) values. It should be used only:

- When a new instrument is set up for the first time
- After certain repairs from which misadjustment may have resulted (e.g., removal and reinstallation of the worktable, replacement of whole RoMa, etc.).

Procedure

To reset the default parameters:

1. On the **Contents** page, select the **Reset Setup** check box and click **Start**.
2. When finished, you must adjust all ranges, reference positions and rotation settings with the respective functions.

9.5.8 Set Default Parameters in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box.

   No further parameters need to be defined.

2 Download the default values to the RoMa and have them re-read by the software with **Start**.

9.5.9 Determine Range

Cross References

List of cross references to information provided in other sections:

Information	References
Removal of grippers, overview	See section 9.5.1, 🗎 9-40
Remove / install barcode scanner	See section 9.5.2, 🗎 9-46
Align gripper fingers	See section 9.5.13, 🗎 9-59

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Determine Range** procedure moves the RoMa in Y-, Z- and R-direction to its extreme positions to find the available ranges. The values found are then written to the RoMa. The G-range is set to a predefined value.

Note: *Please remember:*

- *If the RoMa is equipped with centric gripper fingers and you are using the (old) V2-reference tool, you must remove the gripper fingers before you can mount the reference tool (see cross references).*
- *If the RoMa you are setting up is equipped with a barcode scanner (RoMa-3), it must be removed before you can mount the RoMa-3 reference tool (see cross references).*

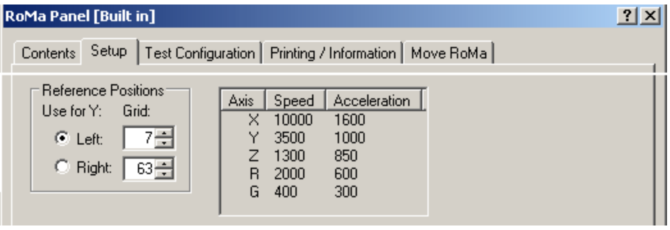
Tools

RoMa reference tool.

Procedure

To determine the range:

1 On the **Contents** page, select the **Determine Range** check box and change to the **Setup** page.



Reference Positions
Use for Y: Grid:
● Left: 7
○ Right: 63

Axis	Speed	Acceleration
X	10000	1600
Y	3500	1000
Z	1300	850
R	2000	600
G	400	300

Fig. 9-45 *Setup page - Reference positions*

2 In the **Reference Positions** frame, select the following:

   - Use the **Grid** spin boxes to set the left and right grid positions.
   - Click the appropriate **Use for Y** option button to select the reference position (**Left** or **Right**) at which you wish to determine the Z-range.

3 Start the procedure with **Start**.

   *The **Mount Reference Tool** message appears.*

4 Do one of the following:

   - V2 reference tool: Hold it against the gripper module and click **OK**. The grippers open and close again, so that the reference tool is held firmly between them.
   - RoMa-3 reference tool: Push it against the gripper module until the retaining pins snap into the corresponding holes, then click **OK**.

5 Confirm the **Ready to proceed message** with **OK**.

   *After determining the range, the **Unmount Reference Tool** message appears.*

6 Do one of the following:

   - V2 reference tool: Hold the tool to prevent it from falling onto the worktable and click **OK**. The reference tool will be released.
   - RoMa-3 reference tool: Hold the tool and pull it off the gripper module, then click **OK**.

   The values found are now written to the RoMa.

9.5.10 Set Type

Cross References

List of cross references to information provided in other sections:

Information	References
Rotation directions	See section 9.4.1, 🗎 9-23
Setup page	See section 9.5.4, 🗎 9-49

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

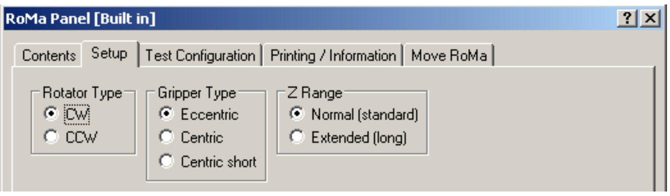
The **Set Type** procedure lets you define the following:

- Rotation direction of gripper head
- Gripper finger types
- The RoMa Z-range to set up (for RoMa Freedom, RoMa Long, RoMa-3).

Procedure

To set the RoMa type:

1 Select the **Set Type** check box and change to the **Setup** page.


RoMa Panel [Built in]

Rotator Type
● CW
○ CCW

Gripper Type
● Eccentric
○ Centric
○ Centric short

Z Range
● Normal (standard)
○ Extended (long)

Fig. 9-46 Setup page

2. Use the option buttons in the frames **Rotor Type**, **Gripper Type** and **Z-Range** to make your selection. Your selection must exactly correspond to the physical device installed on the instrument.
3. Save your selections with **Start**. A message showing your changes appears.
4. Confirm the changes with **OK**. The values are written to the RoMa.

9.5.11 Determine Reference Positions

Cross References

List of cross references to information provided in other sections:

Information	References
Removal of grippers, overview	See section 9.5.1, 🗎 9-40
Remove / install barcode scanner	See section 9.5.2, 🗎 9-46
Move RoMa page	See section 9.5.6, 🗎 9-51

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Determine Reference Positions** procedure moves the RoMa to the selected reference positions in sequence:

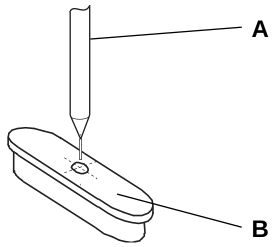
- To adjust them and therefore to determine the X and Y scale factors as well as the X and Y displacements.
- To check the reference positions.

Note: *Please remember:*

- *If the RoMa is equipped with centric gripper fingers and you are using the (old) V2-reference tool, you must remove the gripper fingers before you can mount the reference tool (see cross references).*
- *If the RoMa you are setting up is equipped with a barcode scanner (RoMa-3), it must be removed before you can mount the RoMa-3 reference tool (see cross references).*

Tools

RoMa reference tool.



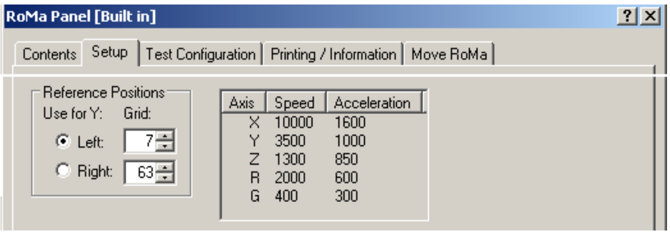
A	*Reference tool*
B	*Reference pin*

Fig. 9-47 *Reference position*

Procedure

To determine the reference positions:

1 On the **Contents** page, select the **Determine Reference Positions** check box and change to the **Setup** page.



Reference Positions
Use for Y: Grid:
● Left: 7
○ Right: 63

Axis	Speed	Acceleration
X	10000	1600
Y	3500	1000
Z	1300	850
R	2000	600
G	400	300

Fig. 9-48 *Reference positions on Setup page*

2 Define the **Left** and **Right** reference position for the RoMa.

3 With the **Use for Y** option button select the **Left** or **Right** reference position using for movement in Y-direction.

4 Start the procedure with **Start**.

The ***Mount Reference Tool*** *message appears.*

5 Do one of the following:

- V2 reference tool: Hold it against the gripper module and click **OK**. The grippers open and close again, so that the reference tool is held firmly between them.
- RoMa-3 reference tool: Push it against the gripper module until the retaining pins snap into the corresponding holes, then click **OK**.

6 Confirm the **Ready to proceed message** with **OK**.

The ***Move RoMa*** *page is activated (→ Cross References) and the* ***Use move tool to determine first reference point*** *message appears.*

7 Adjust the position in X- and Y-direction according to Fig. 9-48 , 🗎 9-57.

8 If the reference tool is in the correct position, confirm with **Next**.

9 Repeat steps 7 and 8 for all indicated positions.

After all reference positions have been adjusted, the ***Unmount Reference Tool message*** *appears.*

10 Do one of the following:

- V2 reference tool: Hold the tool to prevent it from falling onto the worktable and click **OK**. The reference tool will be released.
- RoMa-3 reference tool: Hold the tool and pull it off the gripper module, then click **OK**.

9.5.12 Check Reference Positions

Cross References

List of cross references to information provided in other sections:

Information	References
Determine Reference Positions	See section 9.5.11, 🗎 9-56
Setup page	See section 9.5.4, 🗎 9-49

Note: *This procedure is very similar to the one for determining the reference positions (→ Cross References). The difference is that the procedure described in this section is only used to check reference positions, but not to determine them.*

To check the reference positions:

1 On the **Contents** page, select the **Determine Reference Positions** check box and change to the **Setup** page.

2 Define the **Left** and **Right** reference positions.

3 With the **Use for Y** option buttons select the **Left** or **Right** reference position using for movement in Y-direction.

4 Start the procedure with **Start**.

The ***Mount Reference Tool*** *message appears.*

5 Do one of the following:

- V2 reference tool: Hold it against the gripper module and click **OK**. The grippers open and close again, so that the reference tool is held firmly between them.
- RoMa-3 reference tool: Push it against the gripper module until the retaining pins snap into the corresponding holes, then click **OK**.

6 Confirm the **Ready to proceed message** with **OK**. The **Move RoMa** page is activated and the **Use move tool to determine first reference point message** appears.

ATTENTION

Use only the command buttons for the Z-direction for this test, but not those for the X- and Y-directions. As long as you do not change the X- and Y-positions the adjustment of the reference positions will not be changed.

7 Check the reference Position **only** using the command buttons in Z-direction.

8 To check the next position, confirm with **Next**.

9 Repeat steps 7 and 8 for all indicated positions.

After you have checked all reference positions, the ***Unmount Reference Tool*** *message appears.*

10 Do one of the following:

- V2 reference tool: Hold the tool to prevent it from falling onto the worktable and click **OK**. The reference tool will be released.
- RoMa-3 reference tool: Hold the tool and pull it off the gripper module, then click **OK**.

9.5.13 Align Gripper Fingers

Cross References

List of cross references to information provided in other sections:

Information	References
Determine range	See section
Determine Reference Positions	See section 9.5.11, 🗎 9-56

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure allows you to align the RoMa gripper fingers mechanically with the worktable and to determine the range of the RoMa in the Z-axis.

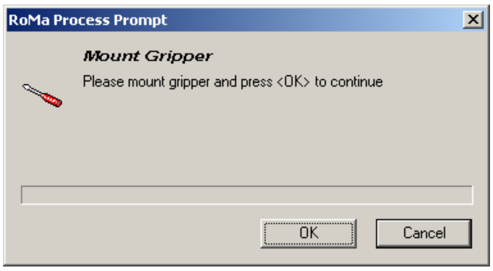
Procedure

To align the gripper fingers:

1 On the **Contents** page, select the **Align Gripper Fingers** check box and click **Start** to begin.

You will be guided through the setup procedure by a series of process prompts. Always follow the instructions provided on the prompts.

*First, the RoMa moves over the left reference position, as defined in the procedure **Determine Reference Positions** (→ Cross References). Then the rotator is turned into a position that lets you mount the gripper fingers easily.*

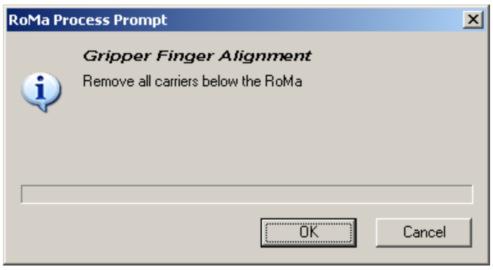

RoMa Process Prompt

Mount Gripper

Please mount gripper and press <OK> to continue

2 If not done yet, mount the gripper fingers.

3 Click on **OK** when done.

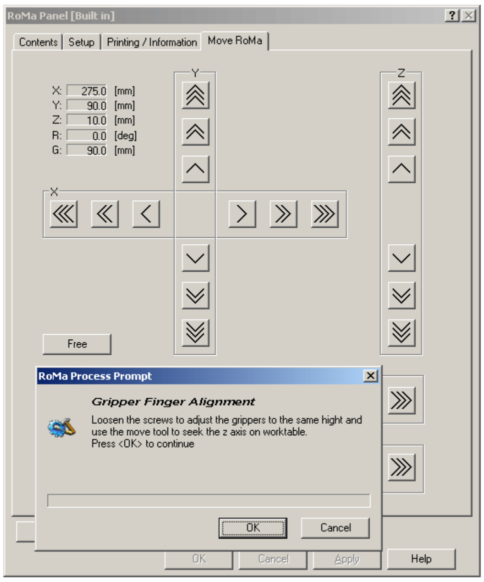

RoMa Process Prompt

Gripper Finger Alignment

Remove all carriers below the RoMa

4 Next, you must remove all carriers below the RoMa so that it can be moved down to the worktable.

5 Click on **OK** when done.



X: 275.0 [mm]
Y: 90.0 [mm]
Z: 10.0 [mm]
R: 0.0 [deg]
G: 90.0 [mm]

RoMa Process Prompt

Gripper Finger Alignment

Loosen the screws to adjust the grippers to the same hight and use the move tool to seek the z axis on worktable.
Press <OK> to continue

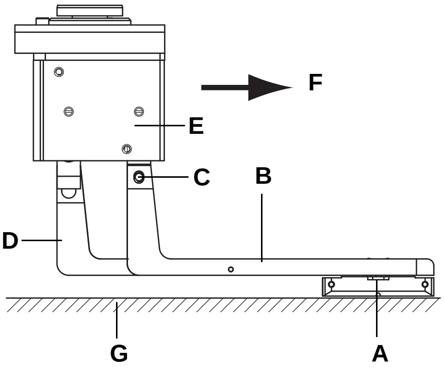
The rotator of the RoMa is moved downwards until the gripper fingers are approx. 10 mm above the surface of the worktable.

6 Loosen the fixing screws (C) of the gripper fingers (see following figure).

7 Use the **Move RoMa** tool to move the rotator further down in 1/10 mm steps until grippers of the RoMa just touch the worktable surface.

8 To adjust a gripper fingers proceed as follows (see following figure):

- Adjust the short finger so that the lower edge of the jaw (A) is parallel to the worktable and just touches the worktable over its whole length. Fasten the screw when done.
- Do the same with the long gripper finger.

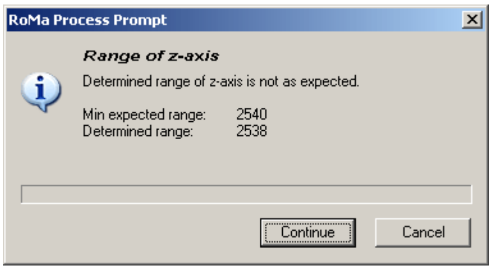


A	*Jaw*
B	*Short gripper finger*
C	*Fixing screw of short finger*
D	*Long gripper finger*
E	*Rotator*
F	*Instrument front*
G	*Worktable surface*

Fig. 9-49 *Adjust gripper fingers*

9 Click on **OK** on the prompt when done.

Range of Z-Axis too Short



Range of z-axis

Determined range of z-axis is not as expected.

Min expected range: 2540
Determined range: 2538

__Fig. 9-50__ Range of z-Axis

This message appears if the range of the z-axis is too short.

If the z-range is too short it is possible that the RoMa cannot reach high positions (e.g., the external tray at the top of the loading port).
Recommendation:

- Try mounting the gripper fingers a little higher, then repeat the adjustment.
- If this does not work contact the nearest customer service.

9.5.14 Adjust Rotator

Field Service Engineers

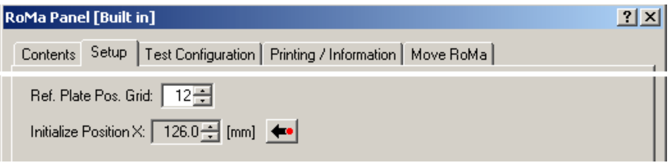
This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose This procedure adjusts the rotator.

Required Tool RoMa reference plate.

Procedure To adjust the offset and scaling of the rotator:

1 On the **Contents** page, select the **Adjust Rotator** check box and change to the **Setup** page.



Ref. Plate Pos. Grid: 12
Initialize Position X: 126.0 [mm]

__Fig. 9-51__ Setup page - Reference Positions

2 Use the **Reference Plate Position** spin box to define the position of the test plate (front left corner).

3 Start the procedure with **Start**. The **Mount Gripper** message appears.

4 Mount the gripper fingers if they were removed and confirm with **OK**. The **Please put reference plate on worktable** message is displayed.

5 Put the test plate on the worktable at the selected grid position (front left corner) and continue with **OK**. The rotator is now automatically adjusted and the values found are written to the RoMa.

9.5.15 Determine Reading Positions of Barcode Scanner

Cross References

List of cross references to information provided in other sections:

Information	References
Barcode scanner positioning test	See section 9.5.17, 🗎 9-66
Barcode scanner reading test	See section 9.5.18, 🗎 9-68
Barcode scanner orientation	See Fig. 9-62, 🗎 9-68

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure is used for a barcode scanner mounted for **rear scanning** (see cross references).
The procedure determines the position from which the barcode scanner on the RoMa-3 can read the barcode labels applied to the RoMa reference plate.

Tools

RoMa-3 reference plate.

Principle

The procedure determines the following parameters (see following figure):

- Beam angle β
- z-position of the RoMa-3
- The procedure determines these parameters from two different distances y and heights.

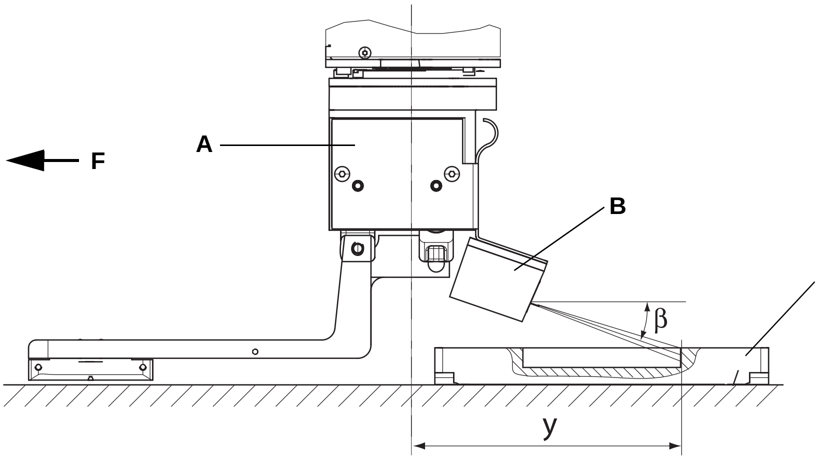


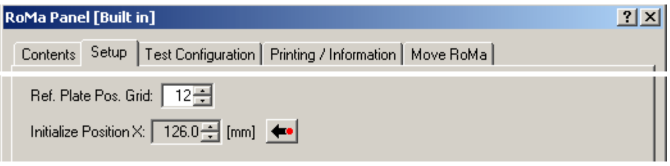
Fig. 9-52 Determine barcode reading position

A	*Rotator*	*C*	*Reference plate*
B	*Barcode scanner*	*F*	*Instrument front*
β	*Beam angle*	*y*	*Distance between rotational axis of RoMa and barcode label*

Procedure

To determine the reading positions:

1 On the **Contents** page, select the check box **Determine Reading Positions of Barcode Scanner** and change to the **Setup** page.



Ref. Plate Pos. Grid: 12

Initialize Position X: 126.0 [mm]

Fig. 9-53 *Setup page - Reference Positions*

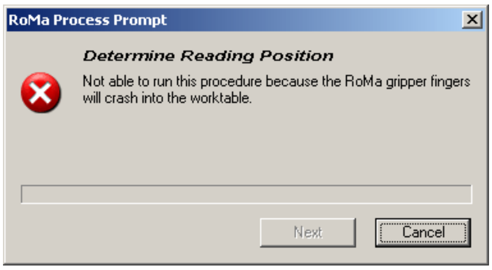
2 Use the **Reference Plate Position** spin box to define the position of the test plate (front left corner).

3 Start the procedure with **Start**. The **Please put reference plate on worktable** message is displayed.

4 Put the test plate on the worktable in the selected grid position (front left corner) and continue with **OK**.

The reading position is now automatically determined and the values found are written to the RoMa.

Possible Error Message



Determine Reading Position

Not able to run this procedure because the RoMa gripper fingers will crash into the worktable.

This message appears if the long centric gripper fingers are used.

In such a case the barcode scanner cannot be lowered enough to move the laser beam between the guidelines on the barcode label.

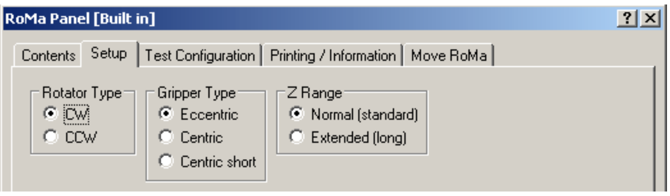
Fig. 9-54 *Not able to run procedure*

Procedure if Long Centric Grippers Are Used

If, in a special case. you need long centric gripper fingers on a RoMa-3 with barcode scanner, proceed as follows:

1 Remove the centric gripper fingers.

2 Go to the **Setup** page and choose another (short) gripper finger type (e.g., **Eccentric** or **Centric short**).



Rotator Type
● CW
○ CCW

Gripper Type
● Eccentric
○ Centric
○ Centric short

Z Range
● Normal (standard)
○ Extended (long)

Fig. 9-55 *Setup page*

3 Now perform the procedure **Determine Reading Positions**.

4 It is recommended that you perform the following test procedures immediately afterwards:

- **Barcode Scanner Positioning Test**
- **Barcode Scanner Reading Tests**

  – Details (see cross references)

5. After you have successfully completed the tests, reinstall the original (long) centric gripper fingers.
6. Perform the procedure Align Gripper Fingers

9.5.16 Test Reference Plate

Cross References

List of cross references to information provided in other sections:

Information	References
Determine Reference Positions	See section 9.5.11, 🗎 9-56
Adjust Rotator	See section 9.5.14, 🗎 9-61

Purpose

This test procedure allows you to test whether the RoMa reference plate can be properly picked up and replaced on the worktable.

Principle

The reference plate is placed in a predefined grid position (to be set on the **Test Configuration** page) as shown in the figure below. After starting the test the following is carried out for a number test cycles (can also be set on the **Test Configuration** page):

- The RoMa picks the reference plate up from grid position n (P1 in figure) and lifts it by some cm.
- Then the RoMa turns the reference plate by 180° and puts it back in grid position n (P2 in figure).
- Then the RoMa turns by 180°. Again, it grips and lifts the plate and turns it by 180°. Then it replaces the plate in grid position n (P3 in figure).

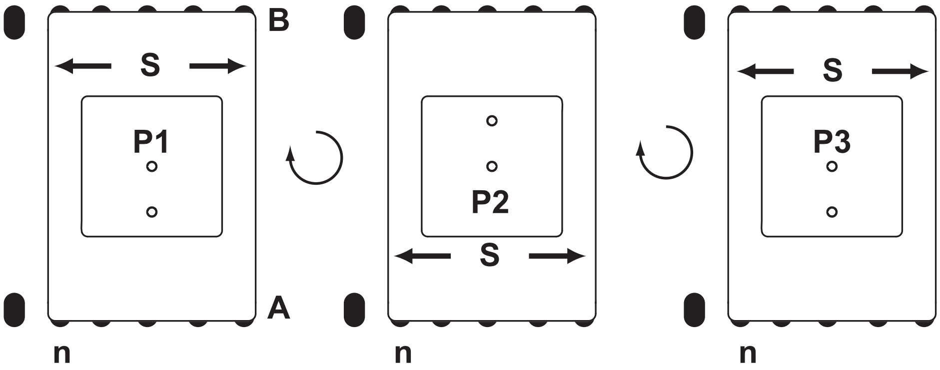


Fig. 9-56 Positioning the reference plate during the test

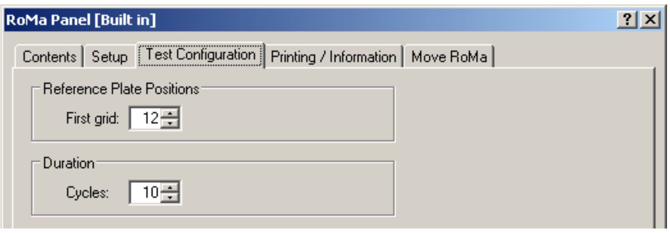
A	*Positioning pins in front row*	***P2***	*Plate turned by 180°*
B	*Positioning pins in second row*	***P3***	*Plate again turned by 180° (back in original position)*
n	*Predefined grid position*	***S***	*Shoulders*
P1	*Plate in original position*		

Procedure

To test whether the RoMa picks up and replaces the reference plate properly:

1 Place the RoMa reference plate in a suitable grid position (n) on the worktable, as shown in the above figure (P1). The holes in the RoMa-3 plate should be closer the front row (A).

2 On the **Contents** page, select the **Reference Plate** check box and change to the **Test Configuration** page.



First grid: 12

Cycles: 10

Fig. 9-57 Test configuration page

3 Set the following parameters on the **Test Configuration** page:

- **First grid**. Set the spin box to grid position n.
- Number of **Cycles**

4 Click on **Start** to begin.

5 The first prompt that appears reminds you to place the reference plate in the predefined grid position as shown in Fig. 9-57 , 🗎 9-65. Click **Next** when done.

The RoMa now picks the reference plate, turns it by 180° and replaces it the other way round in grid position n. Then, it picks up the plate again, turns it by 180° and places it in its original orientation in grid position n. This is repeated for the predefined number of cycles.

6 Observe the movements and visually check whether the plate is properly placed between the positioning pins in each cycle.

- The plate must be seated properly between the positioning pins.
- The plate must not collide with the positioning pins.
- When the plate is set down it should not “hang” on a pin and then slide down into the final position because of its own weight.

Pass/Fail Criteria

The test is passed if the reference plate can be picked up from and replaced on the worktable in all test cycles as described above.

If the Test Fails

Try the following:

- Perform the procedure **Determine Reference Positions** (→ Cross References).
- Perform the procedure **Adjust Rotator** (→ Cross References).
- If the problems persist contact your nearest service organization for assistance).

9.5.17 Barcode Scanner Positioning Test

Cross References

List of cross references to information provided in other sections:

Information	References
Determine reading positions of barcode scanner	See section 9.5.15, 🗎 9-62
Barcode scanner orientation	See Fig. 9-62, 🗎 9-68

Purpose

This procedure is used for a barcode scanner mounted for **rear scanning** (see cross references).

The procedure checks whether the laser beam of the RoMa-3 barcode scanner moved into the reading zone of each barcode label applied to the RoMa-3 reference plate.

Tools

RoMa-3 reference plate.

Principle

The test is carried out in five steps. The RoMa moves the barcode scanner into a predefined distance in front of each label on the reference plate:

- In the first two steps, the procedure tests from two different positions of the RoMa whether the laser beam is between the guidelines of the rear label.
- In the following three steps, the procedure tests in a similar manner whether the laser beam is between the guidelines of the front, then the left and then the right label. In each of these steps the RoMa is moved into one predefined position.
- After each step, the user must confirm that the laser beam is between the guide lines of the corresponding label.

The following figure shows the RoMa-3 testing the scanner position for rear the label.

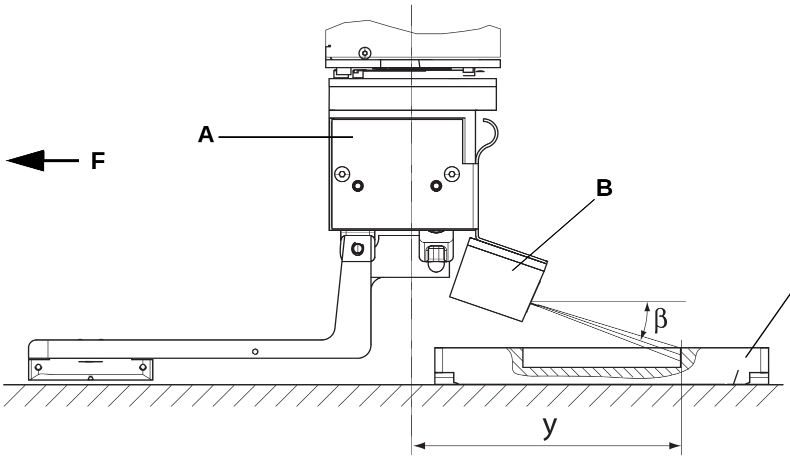


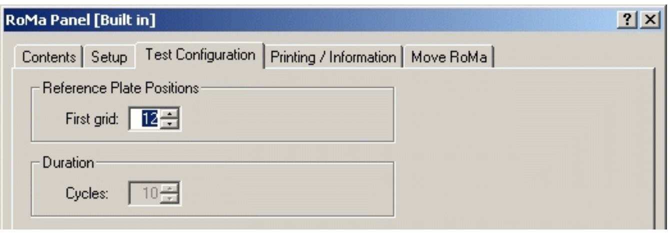
Fig. 9-58 Testing a barcode reading position.

A	*Rotator*	*C*	*Reference plate*
B	*Barcode scanner*	*F*	*Instrument front*
β	*Beam angle*	*y*	*Distance between rotational axis of RoMa and barcode label*

Procedure

To perform the test:

1 On the **Contents** page, select the **Barcode Scanner Positioning Test** check box and change to the **Test Configuration** page.



First grid: 12

Cycles: 10

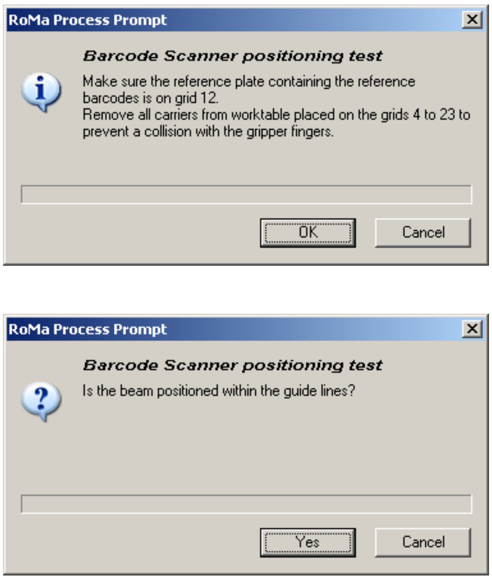
Fig. 9-59 Test configuration page

2 On the **Test Configuration** page, use the spin box **First grid** to set the grid position in which you want to place the reference plate.

3 Click **Start** to begin.

You will be guided through the test by a series of process prompts. Always follow the instructions provided on the prompts.

The RoMa is first positioned in front of the rear label on the reference plate as shown in Fig. 9-58 , 🖹 9-66.



Barcode Scanner positioning test

Make sure the reference plate containing the reference barcodes is on grid 12.
Remove all carriers from worktable placed on the grids 4 to 23 to prevent a collision with the gripper fingers.

Barcode Scanner positioning test

Is the beam positioned within the guide lines?

4 Put the reference plate in the indicated grid position (as defined before on the **Test Configuration** page).

5 Remove all objects in the indicated zone from the worktable to avoid collisions.

6 Click **OK** when done.

7 Visually check whether the laser beam is between the guidelines of the barcode label.

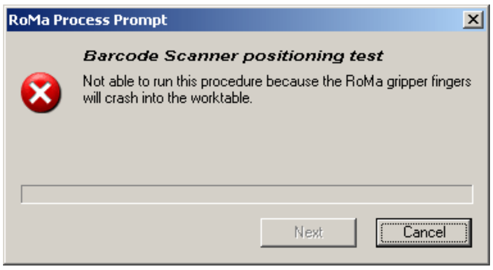
8 Click on **OK** on the prompt if this is the case, **Cancel** otherwise.

Fig. 9-60 Barcode scanner position test

9 Now, the test is repeated for the other four positions: Rear label from another distance, then the front, left and finally the right label.

- Visually check in each position whether the beam is between the guidelines of the corresponding label.
- Click **OK** on the prompt if in order, **Cancel** otherwise.

Possible Error Message


RoMa Process Prompt

Barcode Scanner positioning test

Not able to run this procedure because the RoMa gripper fingers will crash into the worktable.

This message appears if the long centric gripper fingers are used. In such a case the barcode scanner cannot be lowered enough to move the laser beam between the guidelines on the barcode label.

Fig. 9-61 *Not able to run procedure*

For information on what to do in such a case, refer to the explanations provided at the end of the procedure **Determine Reading Positions of Barcode Scanner** (see cross references)**.**

Pass / Fail Criteria

The test is passed if the laser beam was between the guidelines of the corresponding label in each tested position.

If the Test Fails

Try the following:

- Repeat the procedure **Determine Reading Positions of Barcode Scanner**
- Repeat the **Barcode Scanner Positioning Test**.
- If this does not help call the nearest customer service.

9.5.18 Barcode Scanner Reading Test

Cross References

List of cross references to information provided in other sections:

Information	**References**
Determine reading positions of barcode scanner	See section 9.5.15, 🗎 9-62

Barcode Scanner Orientation

Barcode scanners can be mounted for rear scanning or for front scanning:

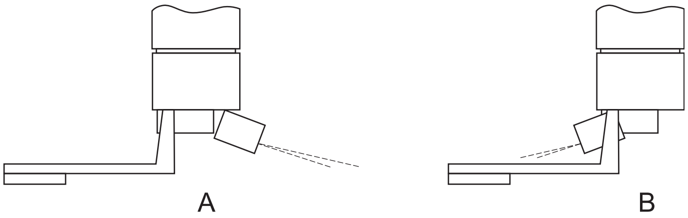


Fig. 9-62 *Barcode scanner orientation*

A *Rear scanning (BeeFree only)* ***B*** *Front scanning*

Purpose

This procedure checks whether the barcodes on the labels applied to the Reference Plate can be read correctly.

Tools

RoMa-3 reference plate.

Principle

Rear Scanning

The test is carried out in five steps. The RoMa moves the barcode scanner into a predefined distance in front of each label on the reference plate:

- In the first two steps, the barcode scanner reads the barcode on the rear label from two different positions of the RoMa and compares it with an internal nominal value.
- In the following three steps, the barcodes on the front, the left and the right label are read and compared. In each of these steps the RoMa is moved into one predefined position.

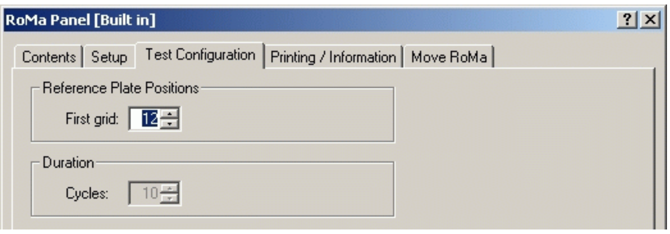
Front Scanning

The RoMa moves the barcode scanner into a predefined position with the laser beam below the barcode label to be scanned. Then the RoMa moves upwards for a defined Z-distance while the laser beam is trying to scan the barcode label.

Procedure for Rear Scanning

To perform the test:

1 On the **Contents** page, select the **Barcode Scanner Reading Test** check box and change to the **Test Configuration** page.



Reference Plate Positions
First grid: 12

Duration
Cycles: 10

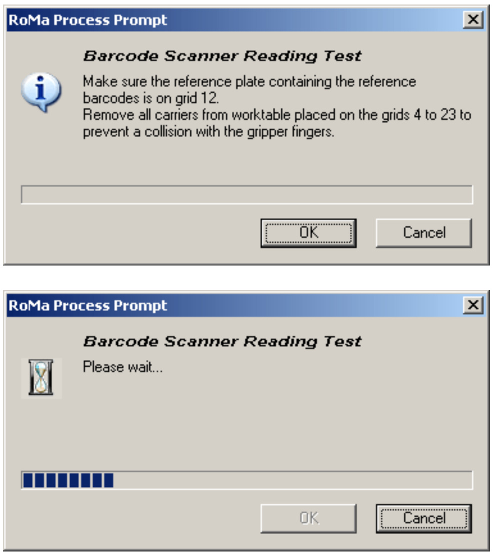
Fig. 9-63 *Test configuration page*

2 On the **Test Configuration** page, use the spin box **First grid** to set the grid position in which you want to place the reference plate.

3 Click **Start** to begin.

You will be guided through the test by a series of process prompts. Always follow the instructions provided on the prompts.

The RoMa is first positioned in front of the rear label on the reference plate as shown in Fig. 9-58 , 🗎 9-66.



Barcode Scanner Reading Test

Make sure the reference plate containing the reference barcodes is on grid 12.
Remove all carriers from worktable placed on the grids 4 to 23 to prevent a collision with the gripper fingers.

Barcode Scanner Reading Test

Please wait...

Fig. 9-64 *Barcode reading test*

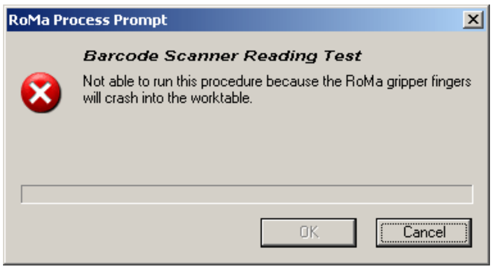
4 Put the reference plate in the indicated grid position (as defined before on the **Test Configuration** page).

5 Remove all objects in the indicated zone from the worktable to avoid collisions.

6 Click **OK** when done.

The barcodes on all labels are now tested as described in “Principle”. At the end of the test, a message notified you whether or not the test was successful.

Possible Error Message



Barcode Scanner Reading Test

Not able to run this procedure because the RoMa gripper fingers will crash into the worktable.

Fig. 9-65 *Not able to run procedure*

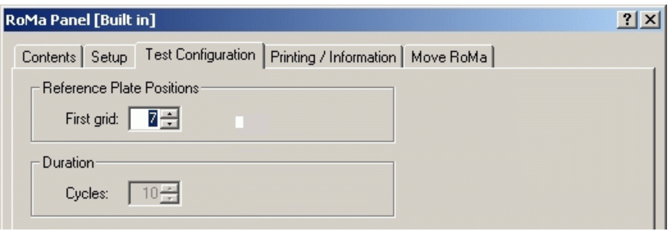
This message appears if the long centric gripper fingers are used. In such a case the barcode scanner cannot be lowered enough to move the laser beam between the guidelines on the barcode label where the barcode can be read safely.

For information on what to do in such a case, refer to the explanations provided at the end of the procedure **Determine Reading Positions of Barcode Scanner** (see cross references)**.**

Procedure for Front Scanning

To perform the test:

1 On the **Contents** page, select the **Barcode Scanner Reading Test** check box and change to the **Test Configuration** page.



First grid: 7

Cycles: 10

Fig. 9-66 *Test configuration page 2*

2 On the **Test Configuration** page, use the spin box **First grid** to set the grid position in which you want to place the reference plate.

3 Click **Start** to begin.

You will be guided through the test by a series of process prompts. Always follow the instructions provided on the prompts.

Pass / Fail Criteria

The test is passed if the barcodes were read correctly in each tested position.

If the Test Fails

Try the following:

- Check whether the barcode labels are soiled, scratched or otherwise damaged. Replace RoMa-3 reference plate if necessary.
- Clean the barcode scanner window with alcohol. Also see chapter “Maintenance” of Operating Manual of corresponding instrument.

Front Scanning:

- Adjust the barcode scanner mechanically and repeat the **Barcode Scanner Reading Test.**

Rear Scanning:

- Repeat the procedure **Align Gripper Fingers**.
- Repeat the procedure **Determine Reading Positions of Barcode Scanner**.
- Repeat the **Barcode Scanner Positioning Test**.
- Repeat the **Barcode Scanner Reading Test**
- If this does not help call the nearest customer service.

9.5.19 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

***Note:** The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

9.6 Vector-2

9.6.1 Introduction

Purpose

This panel is used to determine, adjust and test the proper access positions for the RoMa to the following devices: shelf, room temperature incubator(s), loading ports, heated incubator(s), plate washer, plate reader and BEP III (instruments 30045716, 30045717 and 30045718).

When To Use This Panel?

Note: *Not all of the application software packages use the values determined with the aid of this panel. Therefore…*

- *use this panel to determine and test the RoMa access positions if they cannot be set up and tested with the application software of a specific instrument.*
- *otherwise skip this section and use the corresponding functions of the application software itself.*
- *consult the appropriate Application Software Manual if in doubt.*

Example

While an application is running, it is often necessary to move racks (e.g., microplates) from one location or device on the worktable to another. For example, a microplate may be fed manually into the instrument via the room temperature incubator, from where it is picked up by the RoMa and deposited temporarily on a tray of the shelf. Later, the microplate is moved on a carrier on the worktable where its wells are filled with samples. Then the plate may be stored for a certain time in a heated incubator. Again later, after all analyses have been completed our microplate may be washed by the plate washer and then transported back to the shelf where it is deposited until it is used again, etc.

Why Adjust?

Before an application program can use the RoMa to move microplates between the devices mentioned under **Purpose**, it is necessary to determine and store the following parameters for these devices:

- X, Y and Z-distances between the reference grid position and the trays or slots of the devices.

Reasons:

- Due to mechanical tolerances of the devices, the X, Y and Z-distances are not equal on all instruments.
- If the access positions to the devices are not determined and adjusted correctly, collisions are possible or microplates might not be placed or picked up properly.

About instruments 30045716, 30045717 and 30045718

Instruments 30045716, 30045717 and 30045718 are “frozen” solutions. It is based on a Freedom EVO-2 200 instrument that is equipped as shown below.

Note: *Components that are set up and tested with the Vector-2 panel (or used for such setups and tests) are marked with an asterisk (*) in the following list:*

- One Posid-3
- One LiHa-2 with 8 tips
- One RoMa-3 with barcode scanner (*)
- One 4 x 10 shelf (*)
- Three loading ports, variant for instruments 30045716, 30045717 and 30045718 (*)
- Loading Interface
- Sunrise plate reader (*)

- One or more BEP III (*), for example two BEP III on the rear side or one BEP III on the right side of the instrument.

BEP III on Right Side

The following figure shows a BEP III attached to the right side of the instrument.

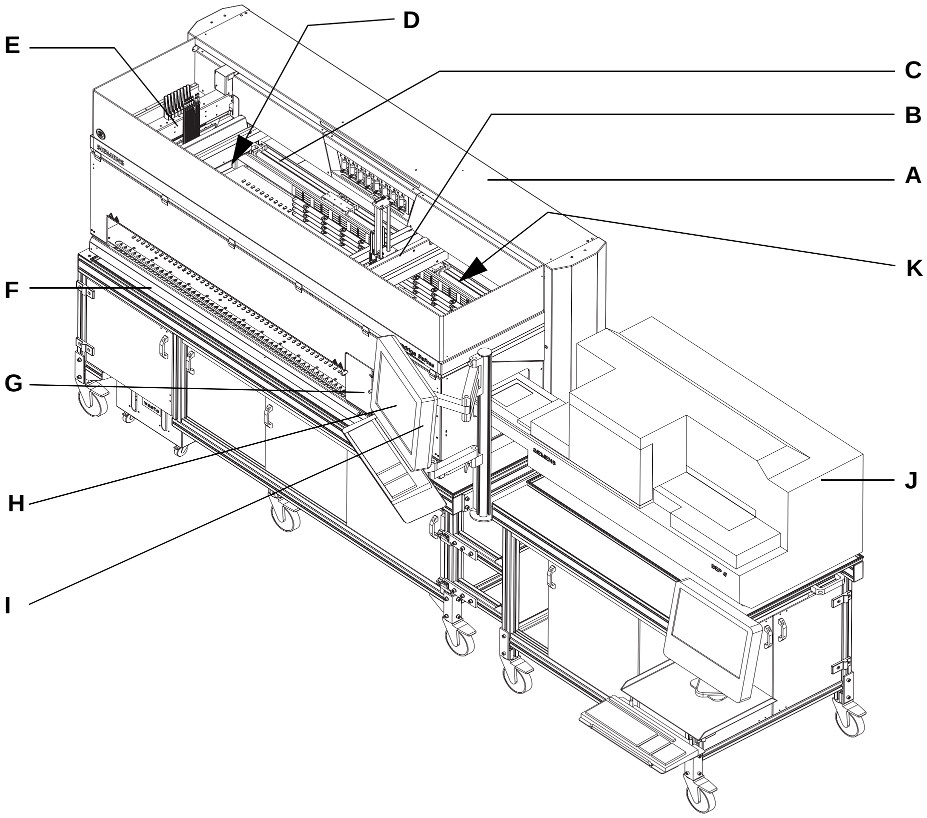


***Fig. 9-67** Instruments 30045716, 30045717 and 30045718 with BEP on right side*

A	*Freedom EVO-2 200 instrument*	***G***	*Loading port 3 (left)*
B	*RoMa-3 (with barcode scanner)*	***H***	*Loading port 2 (middle)*
C	*4 x 10 shelf*	***I***	*Loading port 1 (right)*
D	*PosID-3 (not visible on drawing)*	***J***	*BEP III (# 1, on right side)*
E	*LiHa-2 (8 channels)*	***K***	*Sunrise plate reader (not visible)*
F	*Loading interface*		

BEP III on Rear Side

The following figure shows an example of an instrument 30045716, 30045717 or 30045718 with two BEP III attached to the rear side of the instrument.

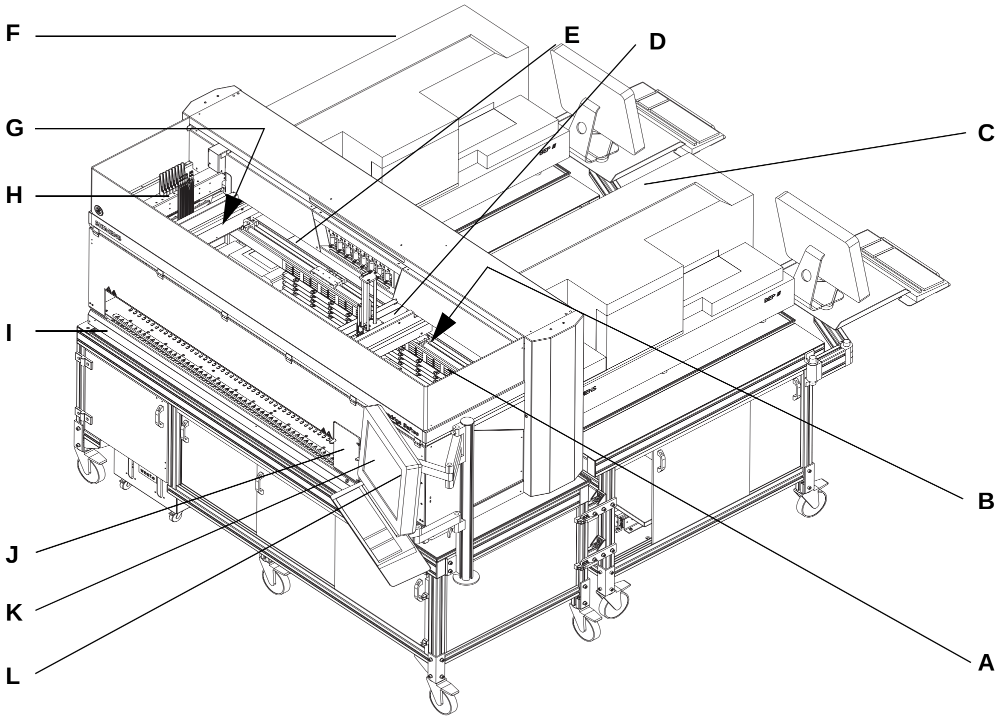


Fig. 9-68 Instruments 30045716, 30045717 and 30045718 with BEP on right side

A	*Freedom EVO-2 200 instrument*	*G*	*PosID-3 (not visible on drawing)*
B	*Sunrise plate reader (not visible)*	*H*	*LiHa-2*
C	*BEP III, (# 2 rear right)*	*I*	*Loading interface*
D	*RoMa-3 (with barcode scanner)*	*J*	*Loading port 3 (left)*
E	*4 x 10 shelf*	*K*	*Loading port 2 (middle)*
F	*BEP III, (# 3, rear left)*	*L*	*Loading port 1 (right)*

Required Tools

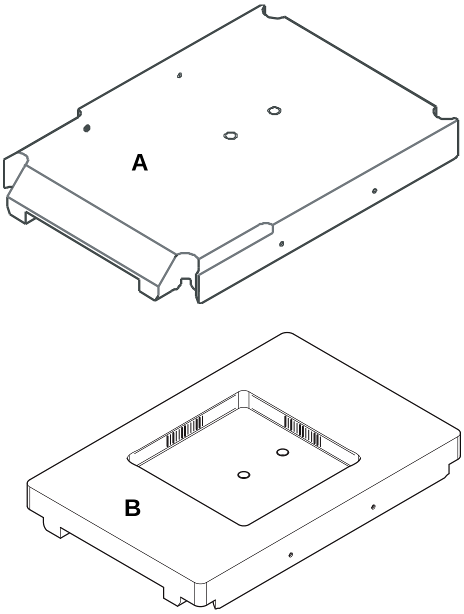


Fig. 9-69 *Reference plates*

To carry out the setup and test procedures described in this section, you need one of the RoMa reference plates shown on the left.

A	*Reference plate for RoMa (black)*
B	*Reference plate for RoMa-3 with barcode scanner (white)*

9.6.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 9-11 *Vector-2, Functions and User Permissions*

Function	Type	User	FSE
Set vectors to Default	Setup		X
Set up vectors of the shelf	Setup		X
Set up vectors of the room temperature (RT) incubators	Setup		X
Set up vectors of the loading ports	Setup		X
Set up vectors of the heated incubators	Setup		X
Set up vectors of the plate reader	Setup		X

Tab. 9-11 Vector-2, Functions and User Permissions

Function	Type	User	FSE
Set up vectors of the plate washer	Setup		X
Set up vectors of the BEP III	Setup		X
Test vectors of the shelf	Test	X	X
Test vectors of the room temperature (RT) incubators	Test	X	X
Test vectors of the loading ports	Test	X	X
Test vectors of the heated incubators	Test	X	X
Test vectors of the plate reader	Test	X	X
Test vectors of the plate washer	Test	X	X
Test vectors of the BEP III	Test	X	X
Plate move test	Test	X	X
Move RoMa	Tool	X	X
Configuration page	Page	X	X
Worktable	Page	X	X
Vector Editor	Page	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Files, Directories

The Vector panel creates the following files:

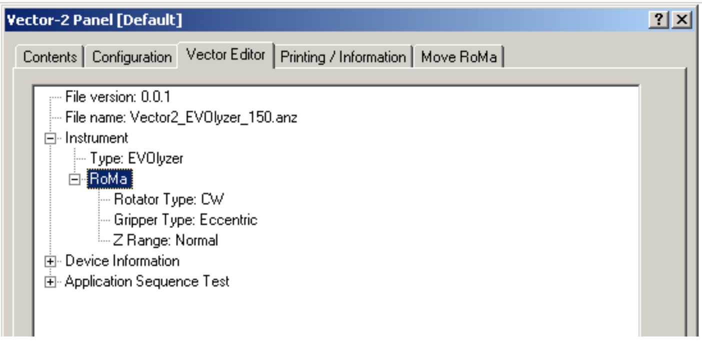
- **Result Files:** Test results are stored in *.any files.

Directory:	<data_path>\Results
File name:	Vector2_<serial_number>_<date>_<time>.any

Prerequisites

You cannot start the **Vector-2** panel unless the following conditions are fulfilled:

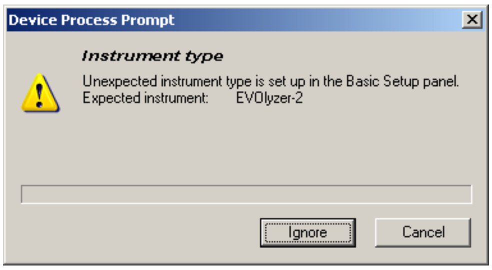
- The instrument type must be set with **Basic Setup > Worktable** (e.g., EVOlyzer).
- The RoMa type defined on the **Setup** page of the **RoMa** panel must correspond to the instrument set with **Basic Setup > Worktable**.
(the RoMa type can be checked on the Vector Editor page; see figure below)



File version: 0.0.1
File name: Vector2_EVOlyzer_150.anz
Instrument
  Type: EVOlyzer
  RoMa
    Rotator Type: CW
    Gripper Type: Eccentric
    Z Range: Normal
Device Information
Application Sequence Test

Fig. 9-70 Vector-2 panel - RoMa type

If you nevertheless try to start the **Vector-2** panel, a corresponding error message appears. The message text depends on the error found. See following example.



Instrument type

Unexpected instrument type is set up in the Basic Setup panel.
Expected instrument: EVOlyzer-2

This message informs you that the instrument type set in the **Basic Setup** panel is not correct.

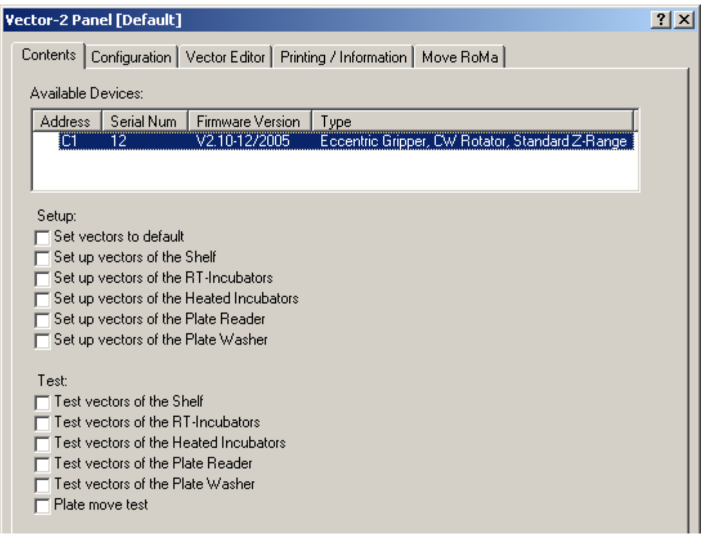
Fig. 9-71 Unexpected instrument type

Starting the Panel

To set up or test the access to the devices handled by the **Vector-2** panel:

1 Start the panel with **System Devices > Vector-2**.

*After the successful start the **Vector-2** panel with activated **Contents** page appears. Only those setups and tests are displayed that are available for the instrument set in the Basic Setup. No setup or test check boxes are selected at the beginning.*



Available Devices:

Address	Serial Num	Firmware Version	Type
C1	12	V2.10-12/2005	Eccentric Gripper, CW Rotator, Standard Z-Range

Setup:

☐ Set vectors to default
☐ Set up vectors of the Shelf
☐ Set up vectors of the RT-Incubators
☐ Set up vectors of the Heated Incubators
☐ Set up vectors of the Plate Reader
☐ Set up vectors of the Plate Washer

Test:

☐ Test vectors of the Shelf
☐ Test vectors of the RT-Incubators
☐ Test vectors of the Heated Incubators
☐ Test vectors of the Plate Reader
☐ Test vectors of the Plate Washer
☐ Plate move test

Fig. 9-72 Vector-2 panel - Contents page EVOlyzer

Pages

The **Vector-2** panel is subdivided into the following pages:

Tab. 9-12 Pages on Vector-2 panel

Page	Function
Contents	General overview, device and procedure selection.
Configuration	Lets you select and specify the devices to set up and test.
Worktable	Lets you select the instrument (worktable)
Vector Editor	Selection of an appropriate worktable map
Move RoMa	Lets you move the RoMa to the required position.
Printing / Information	Print selection for the QC-report

9.6.3 Configuration Page

Purpose

This page allows you to do the following:

- Select the **Communication** (COM / USB) for plate reader and plate washer.
- Select the devices to set up and test.
- Define which trays of the shelf are physically installed and whether the shelf should be set up and tested:
- Define the **Grid position** where the RoMa can pick up and deposit the RoMa reference plate needed for the setups and tests.
- Set the number of **Cycles** for the plate move test.

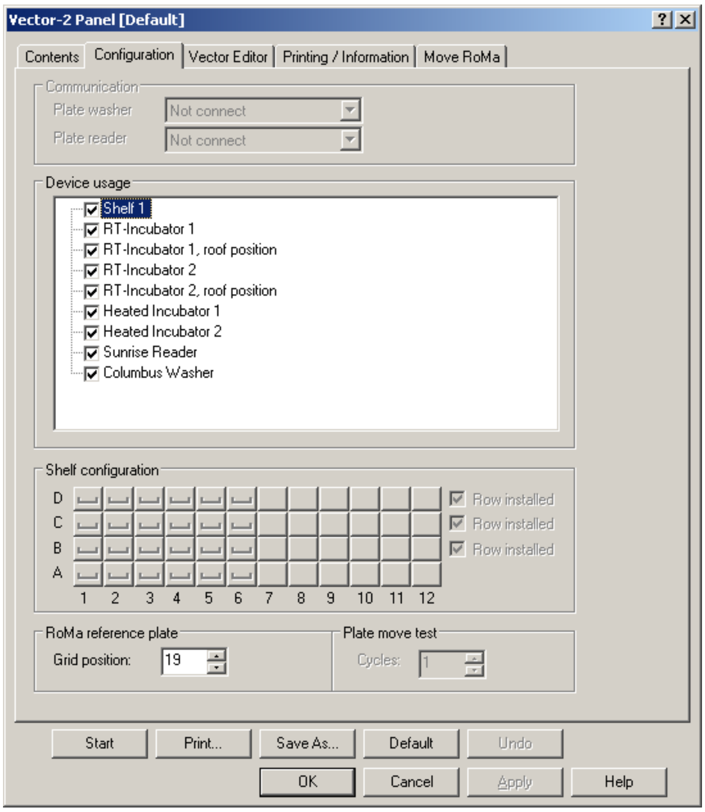


Plate washer: Not connect

Plate reader: Not connect

☑ Shelf 1
☑ RT-Incubator 1
☑ RT-Incubator 1, roof position
☑ RT-Incubator 2
☑ RT-Incubator 2, roof position
☑ Heated Incubator 1
☑ Heated Incubator 2
☑ Sunrise Reader
☑ Columbus Washer

☑ Row installed
☑ Row installed
☑ Row installed

Grid position: 19

Cycles: 1

__Fig. 9-73__ Configuration page

***Note:** The Configuration page contains a number of instrument-dependent controls that could be selected or deselected individually. After the start of the panel the components are preselected as shown in the previous figure.*

Controls

The **Configuration** page may contain the following controls.

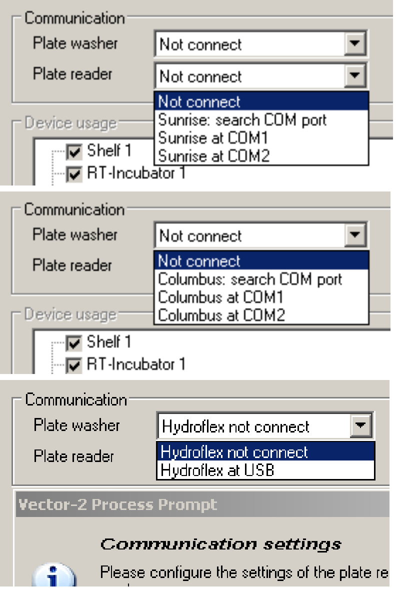
Frame Communication	Lets you select the connection of the plate reader and the plate washer.
- **Plate washer**	• Drop down list box for selecting the connection of the plate washer (COM port, USB).
- **Plate reader**	• Drop down list box for selecting the connection of the plate reader (COM port).
Device usage	Lets you select the devices to set up and test.
- **Shelf 1**	• Check box to select the shelf.
- **RT-incubator n, n = 1, 2**	• Check box to select the RT-incubators.
- **RT-incubators (roof positions)**	• Check box to select the roof positions of RT-incubators.
- **Loading Port n, n = 1, 2, 3**	• Check boxes to select the inner positions (slots 1 + 7) of loading ports.

- **Loading Ports (roof positions)**	• Check boxes to select the external tray at the top (roof) of loading ports.
- **Heated incubator n, n = 1, 2**	• Check box to select the heated incubators.
- **Sunrise reader**	• Check box to select the Sunrise reader.
- **Diagast reader**	• Check box to select the Diagast reader.
- **Columbus washer**	• Check box to select the Columbus washer.
- **Hydroflex washer**	• Check box to select the Hydroflex washer.
- **BEP III 1 (right)** **BEP III 2 (rear right)** **BEP III 3 (rear left)**	• Check boxes to select the BEP III.
Shelf configuration	This frame lets you select / deselect the components of the shelf individually. After the start of the panel all of them are preselected by default.
- **Tray buttons**	The frame contains a number of active toggle buttons. In principle, they can be selected / deselected individually. After the start of the panel all of them are preselected by default. - ⎵ If a tray is selected the button looks like this. - ☐ If a tray is not selected the button looks like this.
- **Row installed**	Check boxes that let you select or deselect all trays of the corresponding row. After the start of the panel all of them are preselected by default.
Frame RoMa Reference Plate	Contains a spin box **Grid position** to specify the grid position where the RoMa can pick up and deposit the reference plate needed for setups and tests.
Frame Plate move test	Contains a spin box **Cycles** to specify the number of test cycles for the **Plate move test.**

Additional Explanations

COM Port, USB Selection

Note: *The selection of the plate reader and the plate washer connection is only possible immediately after the start of the panel. The drop down list is available only then.*



Communication settings

Please configure the settings of the plate re

Fig. 9-74 COM port / USB selection

Please note:

- You can directly select the COM ports to which the Sunrise reader and the Columbus washer are connected.
- You can also have the COM port searched automatically.
- You can select the Hydroflex washer to be connected to USB.

Note: *Searching the COM port automatically can take some time.*

9.6.4 Worktable Page

Cross References

List of cross references to information provided in other sections:

Information	References
Description of Worktable page	See chapter 5.2.7, 🗎 5-20

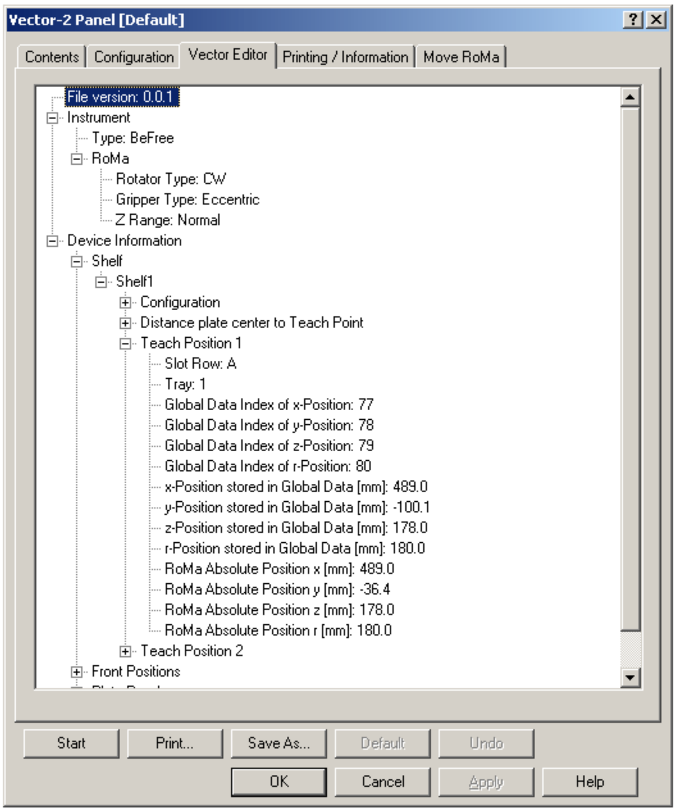
The Worktable page lets you select an appropriate worktable map that is adapted to a specific function (→ Cross References).

9.6.5 Vector Editor Page

Purpose

The **Vector Editor** page is intended primarily for developers and application specialists. It provides useful information for advanced users. Therefore, only a very brief description is given here.

Vector Editor Page



- File version: 0.0.1
- Instrument
  - Type: BeFree
  - RoMa
    - Rotator Type: CW
    - Gripper Type: Eccentric
    - Z Range: Normal
- Device Information
  - Shelf
    - Shelf1
      - Configuration
      - Distance plate center to Teach Point
      - Teach Position 1
        - Slot Row: A
        - Tray: 1
        - Global Data Index of x-Position: 77
        - Global Data Index of y-Position: 78
        - Global Data Index of z-Position: 79
        - Global Data Index of r-Position: 80
        - x-Position stored in Global Data [mm]: 489.0
        - y-Position stored in Global Data [mm]: -100.1
        - z-Position stored in Global Data [mm]: 178.0
        - r-Position stored in Global Data [mm]: 180.0
        - RoMa Absolute Position x [mm]: 489.0
        - RoMa Absolute Position y [mm]: -36.4
        - RoMa Absolute Position z [mm]: 178.0
        - RoMa Absolute Position r [mm]: 180.0
      - Teach Position 2
  - Front Positions

Fig. 9-75 *Vector Editor page*

Note: *The parameters shown on this page cannot be altered in the field.*

As the previous Fig. 9-75 , 🗎 9-82 shows, the **Vector Editor** provides information in a tree view. The various items can be expanded or collapsed.

- Instrument: This item shows the following:
  - Instrument type (e.g., 30045716, 30045717 or 30045718)
  - RoMa type (rotator, gripper types, Z-range)
- Device information. This part shows vector-related parameters (storage index in Global Data, x, y and z positions with respect to the reference positions) of the devices that are accessed by the RoMa.

9.6.6 Move RoMa Page

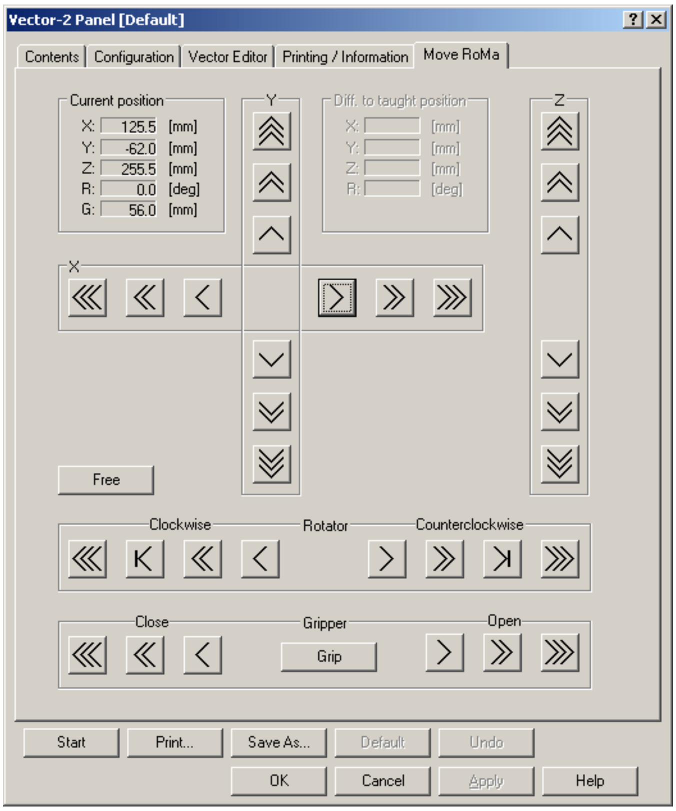
Cross References

List of cross references to information provided in other sections:

Information	References
General description of Move RoMa page	See section 9.5.6, 🗎 9-51

Purpose

The **Move RoMa** page is needed to align the RoMa reference plate precisely with the device to set up.



Current position
X: 125.5 [mm]
Y: -62.0 [mm]
Z: 255.5 [mm]
R: 0.0 [deg]
G: 56.0 [mm]

Diff. to taught position
X: [mm]
Y: [mm]
Z: [mm]
R: [deg]

Fig. 9-76 *Move RoMa page*

Controls

In principle, the controls on the **Move RoMa** page correspond to those described in chapter “System Devices”, section “Robotic Manipulator Arm (RoMa)”. They let you move and rotate the RoMa in the required axes. For more details (→ Cross References).

In addition to the Move RoMa page as described in (see cross references), the page contains the frame **Diff. to taught positions**, that shows the differences between the current positions (shown in frame **Current position** and the taught positions).

9.6.7 Preparatory Steps

Cross References

List of cross references to information provided in other sections:

Information	References
Move RoMa page	See sections 9.6.6, 🗎 9-82 and 9.5.6, 🗎 9-51
RoMa Reference Plate test	See section 9.5.16, 🗎 9-64
Service Manuals	See section 1.2, 🗎 1-3

Purpose

Before starting the setup and test procedures it is advisable to carry out the preparatory steps described in this section.

WARNING

Setups and tests might be incorrect and result in RoMa crashes if the concerned modules are not installed and aligned correctly.

- Check the mechanical alignment of the concerned module before running any vector setup. Refer to the appropriate Service Manual (→ Cross References).
- Check the alignment and condition of the RoMa before running any vector setup. Refer to the appropriate Service Manual and RoMa tests in this manual (→ Cross References).

Procedure

1 Remove all objects (tube racks, carriers, etc.) from the worktable that might prevent the RoMa from moving freely over the worktable and from reaching all shelf trays, incubator slots, the trays of the plate reader and washer and of other devices to be set up and tested.

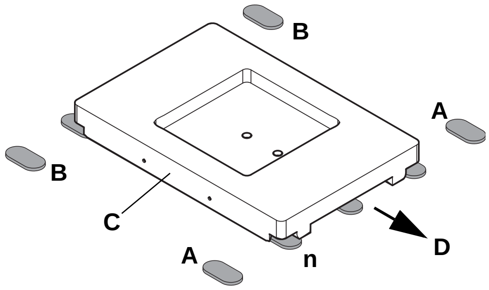


Fig. 9-77 *Placing the reference plate for RoMa-3 with barcode scanner on the worktable*

A	*Front row of positioning pins*
B	*Second row of positioning pins*
C	*RoMa reference plate*
D	*Machine front*
n	*Grid position of RoMa reference plate*

2 Place the RoMa reference plate on the worktable between the positioning pin rows (A) at the instrument front and (B) as shown in the figure.

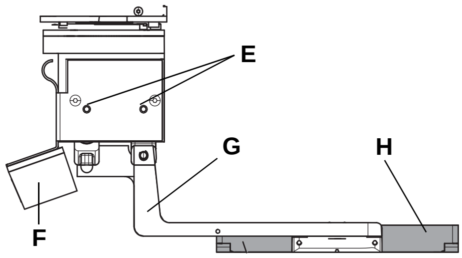


Fig. 9-78 *Removing an object from the RoMa*

E	*Screws to open/close the grippers mechanically*
F	*Barcode scanner*
G	*Gripper fingers*
H	*Object held by grippers*

3 If there is an object (e.g., a microplate) held by the grippers (G) of the RoMa, it is advisable to remove it now.

- If the panel has already been started, use the corresponding buttons on **Move RoMa** page to open the grippers.
- If, in an exceptional case, this does not work and the plate remains jammed between the grippers, you can also open the grippers mechanically by turning one of the screws (E) with a screwdriver.

4 During the setup and test procedures described in this section, the RoMa reference plate is picked up and placed in a predefined grid position. To test beforehand whether this works satisfactorily you can perform the “RoMa Reference Plate test” (→ Cross References).

9.6.8 Set Vectors to Default

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This function resets all previously taught vector positions, as well as a previous shelf definition, to their original (factory-set) values. It should be used only when a new instrument is set up for the first time.

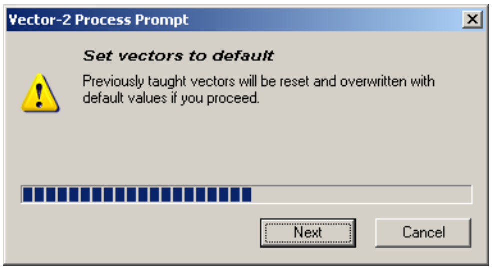
ATTENTION

Do not start this function unnecessarily. After performing this function it will be necessary to readjust and test all vector positions.

Procedure

To reset the vectors to their default values:

1 On the **Contents** page, select the **Set vectors to default** check box and click **Start**.



Vector-2 Process Prompt

Set vectors to default

Previously taught vectors will be reset and overwritten with default values if you proceed.

Fig. 9-79 *Set vectors to default*

The prompt that appears reminds you that all taught values will be overwritten.

2 Click **Next** to continue or **Cancel** to abort.

If you have decided to continue, the default values will be written to the EEPROM. The action cannot be undone.

3 When finished, you must readjust the vectors of all devices using the respective functions.

9.6.9 Set up Vectors of the Shelf

Cross References

List of cross references to information provided in other sections:

Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This setup procedure allows you to specify the shelf configuration and to set up the access positions of the RoMa to the trays of the shelf.

Structure of Shelf

A shelf consists of a number of trays that are arranged in rows and columns.

- Number of rows: 1 to 4, designated A to D. If there is only one row installed it is arranged at the bottom of the shelf (row A).
- Number of columns: 1 up to 12.
- The following figure shows an example of a shelf with 4 rows and 6 columns. Rows A and B contain 6 trays each, whereas rows C and contain 4 rows each.

***Note:** The following applies to all installed shelves:*

- *A physically installed shelf always has at least one row at the bottom (row A).*
- *Row A usually contains 4, 6, 8 or 12 consecutive trays, beginning with tray A1. No gaps between trays are allowed in row A.*
- *Rows B, C and D:*
  - These rows may contain as many trays as row A.
  - Gaps between the trays are permitted. However, the rightmost tray may not be farther right than the rightmost tray of row A.
  - Rows B, C and D may also be empty.

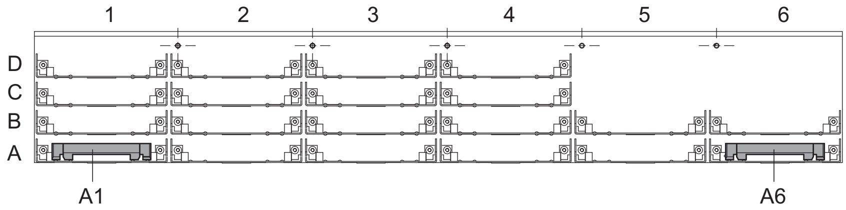


***Fig. 9-80** Example of a shelf with 4 rows and 6 columns*

Structure of Shelf for instruments 30045716, 30045717 and 30045718

The shelf installed on an instrument 30045716, 30045717 or 30045718 consists of 40 trays that are arranged in 4 rows and 10 columns. See following figure.

- Rows: 1 to 4, designated A to D.
- Columns: 1 to 10.

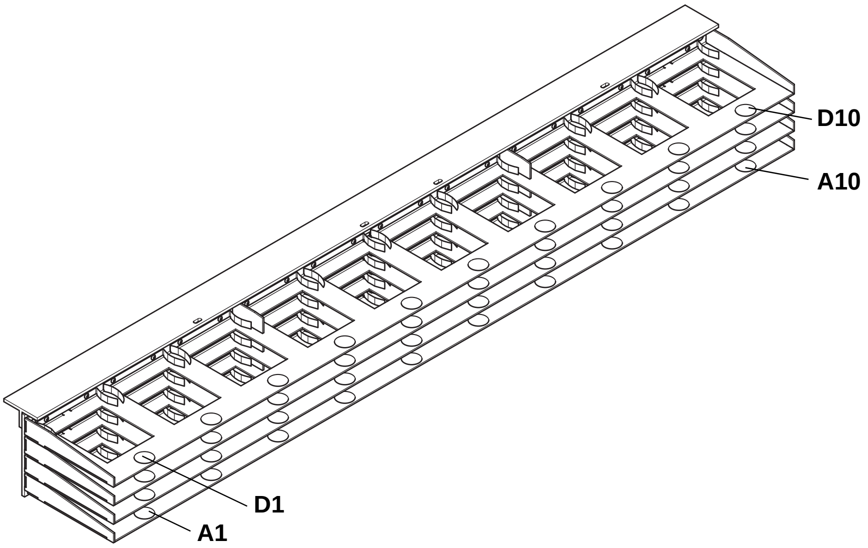


Fig. 9-81 *4 x 10 shelf for instruments 30045716, 30045717 and 30045718*

A1	*Tray A1 (bottom left)*	***D1***	*Tray D1 (top left)*
A10	*Tray A10 (bottom right)*	***D10***	*Tray D10 (top left)*

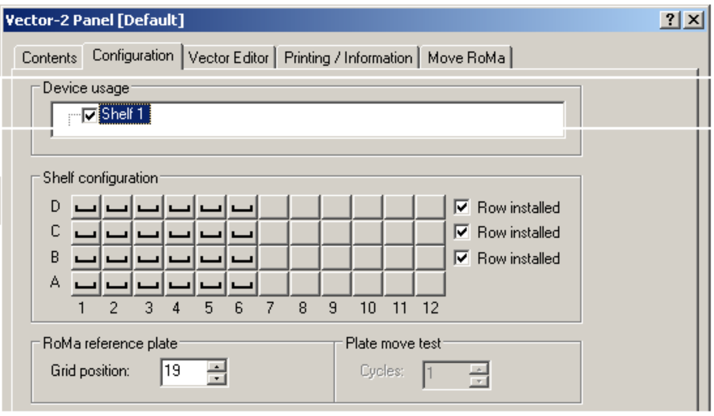
Taught Position

During this setup procedure the RoMa reference plate must be aligned with the tray A1 at the bottom left corner of the shelf.

Procedure

To determine the access positions of the RoMa to the trays of the shelf:

1. If not done yet, carry out the preparatory steps, described in (→ Cross References).
2. On the **Contents** page, select the check box **Set up vectors of the Shelf** and change to the **Configuration** page.



☑ Shelf 1

☑ Row installed
☑ Row installed
☑ Row installed

Grid position: 19

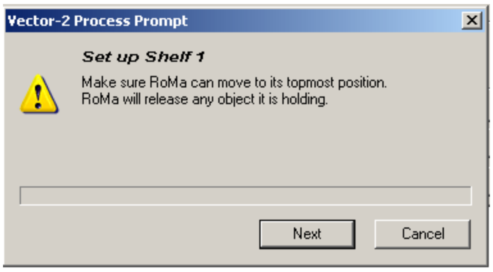
Fig. 9-82 *Setup configuration of shelf*

3. If necessary, set the following on the **Configuration** page:
   - Usually you can accept all default settings that concern the shelf (check boxes **Shelf1** and **Row installed**).

- Activate the tray buttons that correspond to the physically installed trays by clicking on them. Deselect any buttons that correspond to gaps. Make sure you select the correct trays. Please note:
  - By clicking on a button in row A you select/deselect all buttons of the corresponding column.
  - By selecting or clearing one of the check boxes **Row installed** (rows B, C and D) you can select or deselect all buttons of the corresponding row.
- Set the **Grid position** of the RoMa reference plate.

4 Click **Start** to begin.

You will be guided through the setup procedure by a series of process prompts. Not all of them are shown here. Always follow the instructions provided on screen.



Vector-2 Process Prompt

Set up Shelf 1

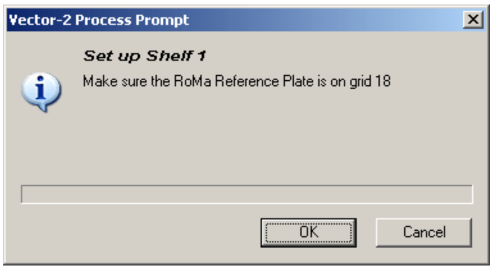
Make sure RoMa can move to its topmost position.
RoMa will release any object it is holding.

The warning shown on the left reminds you that the RoMa must have free access to the topmost position and that it will release any object it is still holding with its grippers.

Fig. 9-83 *Warning*

5 If there is still an object between the grippers of the RoMa, use the appropriate buttons on the **Move RoMa** page to move the RoMa in a suitable position and to open the grippers; then remove the object.

6 Click **Next** when everything is in order.



Vector-2 Process Prompt

Set up Shelf 1

Make sure the RoMa Reference Plate is on grid 18

The next prompt reminds you to place the RoMa reference plate in the predefined grid position.

7 If not done yet, place the plate in the indicated position and click **OK** to continue.

Fig. 9-84 *Reminder to put plate on worktable*

The RoMa picks up the reference plate from the predefined position and moves it in front of the tray A1. See following figure.

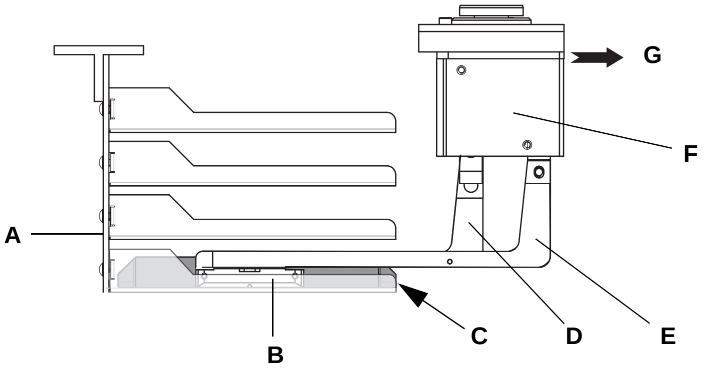


Fig. 9-85 Aligning the RoMa reference plate with the shelf

A	*Shelf (view from left side)*	***E***	*Long gripper finger*
B	*Reference plate in final position*	***F***	*RoMa rotator*
C	*Edge of plate to be aligned*	***G***	*Instrument front*
D	*Short gripper finger*		

8 Use the **X, Y** and **Z** movement buttons of the **Move RoMa** page to align the edge (C) of the reference plate (B) precisely with the front edge of the tray A1.

- – The plate must be centered to the tray.
- – The bottom of the plate should just touch the bottom of the tray.

9 Click **Next** on the corresponding process prompt when the alignment is completed.

The RoMa moves the reference plate in front of the right most bottom tray.

10 Verify the position of the right most bottom tray.

- – if necessary re-teach the position of the tray A1

When the setup is completed the RoMa deposits the reference plate in the predefined grid position.

9.6.10 Set up Vectors of the Room Temperature (RT) Incubators

Cross References

List of cross references to information provided in other sections:

Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

With this setup procedure, the access of the RoMa to the slots of the room temperature incubators (RT-incubators), installed at the front of the worktable, is set up.

Taught Positions

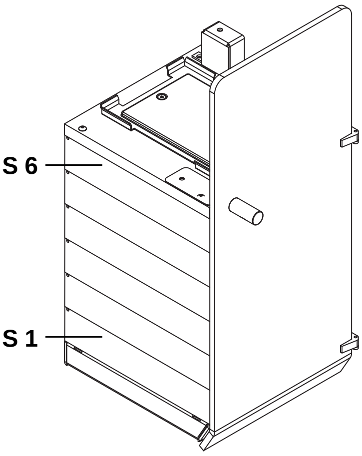


Fig. 9-86 RT-incubator

During this setup procedure the RoMa reference plate must be aligned with the following slots:

- Slot 1 (S 1) at the bottom
- Slot 6 (S 6) at the top
- Roof position

Procedure

To determine the access positions of the RoMa to the slots of the RT-incubators:

1. If not done yet, carry out the preparatory steps, described in (→ Cross References).
2. On the **Contents** page, select the check box **Set up vectors of the RT-Incubators** and change to the **Configuration** page.
3. Set the following on the **Configuration** page:
   - In the frame **Device usage**:
     - Select the check box **RT-Incubator 1 (and 2)** if you want to set up the access to the corresponding incubator.
     - Select the check box **RT-Incubator 1 (and 2) roof position** if you want to set up the access to the corresponding external tray on top of the RT-incubator.
   - If not done yet, set the **Grid position** of the RoMa reference plate.
4. Click **Start** to begin

   You will be guided through the setup procedure by a series of process prompts (not shown here).
5. Follow the instructions provided on the prompts.
   - The first warning reminds you that RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
   - The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

   The RoMa picks up the reference plate from the predefined position and moves it in front of the bottom slot of the rightmost RT-incubator that has been selected.

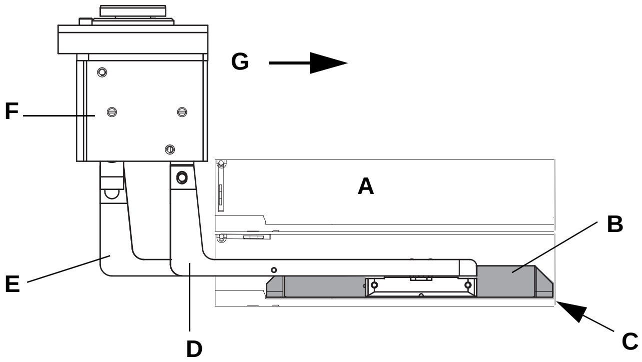


Fig. 9-87 Aligning the RoMa reference plate with the heated incubator

A	*RT-incubator (view from left)*	*E*	*Long gripper finger*
B	*Ref. plate aligned with front of slot*	*F*	*RoMa rotator*
C	*Edge to be aligned with front of slot*	*G*	*Instrument front*
D	*Short gripper finger*		

6 Use the **X**, **Y** and **Z** movement buttons of the **Move RoMa** page to move the reference plate from the back of the RT-incubator into the slot.

7 Align the edge (C) of the reference plate (B) precisely with the front edge of the incubator slot.

- The reference plate must be centered to the front edge of the incubator slot.
- The bottom of the reference plate must just touch the bottom of the slot.

8 Click **Next** when done.

The RoMa moves the reference plate into the top slot of the RT- incubator (same X- and Y-position as taught for the bottom slot).

9 Check the X- and Y-position according to step 7 and teach the Z-position as described in step 7, using the **Z** movement button of the **Move RoMa** page (only the Z movement button is activated).

ATTENTION

Deviations in X-/Y-position in the top slot compared to the bottom slot. Device slanted caused by mechanical problems.

- Check for correct mounting and alignment of the device. See preparatory steps (→ Cross References).
- Repeat the setup.

10 Click **Next** when done.

The RoMa moves the reference plate above the roof position on top of the RT-incubator.

11 You are prompted to align the reference plate with the external tray at the top of the RT-incubator (roof position). Adjust the RoMa reference plate as follows:

- The plate should be in the center of the tray.
- Its bottom should just touch the bottom of the tray.

12 Click **Next** on the corresponding process prompt when the alignment of the RT-incubator is completed.

If you have chosen more RT- incubators to set up, the RoMa first places the reference plate in the defined worktable position, picks it up again and moves it in front of the bottom slot of the next incubator.

13 Perform the setup procedure for the next RT-incubator as described above.

When the setup is completed the RoMa deposits the reference plate in the predefined grid position.

9.6.11 Set up Vectors of the Loading Ports

Cross References

List of cross references to information provided in other sections:

Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

With this setup procedure, the access positions of the RoMa to the trays of the loading ports, installed at the front of the worktable, are set up.

Taught Positions

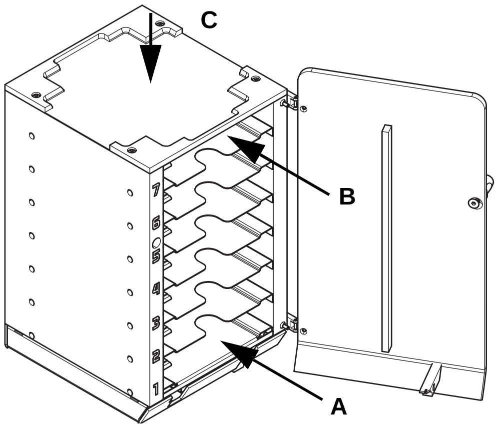


Fig. 9-88 Loading port

During this setup procedure the RoMa reference plate must be aligned with the following trays of the loading ports:

- A: Tray in slot 1 (bottom)
- B: Tray in slot 7 (top)
- C: External tray at the top

Procedure

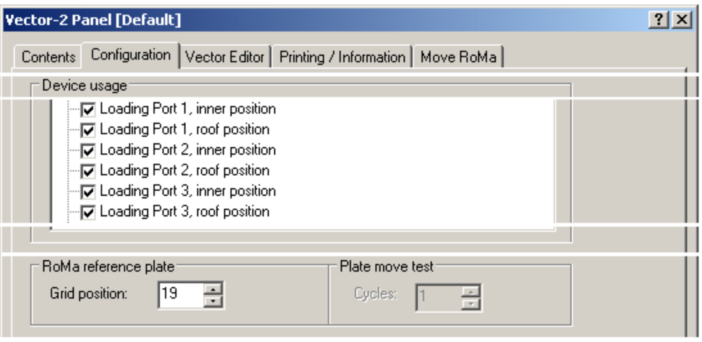
To determine the access positions of the RoMa to the trays of the loading ports:

1 If not done yet, carry out the preparatory steps, described in (→ Cross References).

2 On the **Contents** page, select the check box **Set up vectors of the Loading Ports** and change to the **Configuration** page.

3 If not done yet, set the following on the **Configuration** page:

- In the frame **Device usage**, the check boxes **Loading port, inner position** and **Loading port, roof position** must be selected for the loading ports you wish to set up (usually for all three loading ports).
- Set the **Grid position** of the RoMa reference plate.



Device usage
☑ Loading Port 1, inner position
☑ Loading Port 1, roof position
☑ Loading Port 2, inner position
☑ Loading Port 2, roof position
☑ Loading Port 3, inner position
☑ Loading Port 3, roof position

RoMa reference plate
Grid position: 19

Cycles: 1

Fig. 9-89 Configuration of loading ports

4 Click **Start** to begin.

You will be guided through the setup procedure by a series of process prompts (not shown here).

5 Follow the instructions provided on the prompts.

- The first warning reminds you that the RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
- The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

The RoMa picks up the reference plate and moves to the rear side of the bottom slot of the rightmost loading port that has been selected.

6 Open the front door of the loading port.

7 Use the **X**, **Y** and **Z** movement buttons of the **Move RoMa** page to move the reference plate from the back of the loading port into the bottom slot (slot # 1).

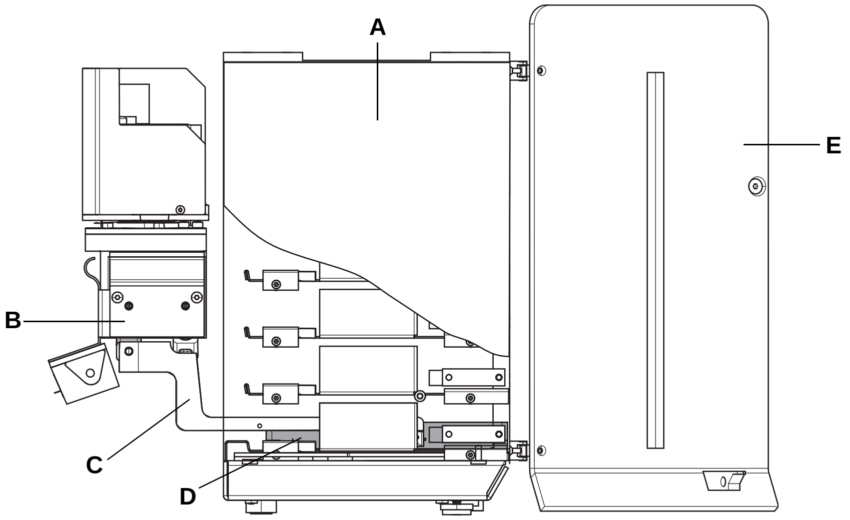


Fig. 9-90 *Aligning the RoMa reference plate with the loading port*

A	*Loading port (view from left)*	***D***	*RoMa reference plate on bottom tray*
B	*RoMa rotator*	***E***	*Front door (open)*
C	*Gripper finger*		

8 Align the front edge of the reference plate (D1) with the front edge of the tray in the slot.
  - The reference plate must be centered with respect to the front edge of the tray.
  - The bottom of the reference plate must just touch the bottom of the tray.

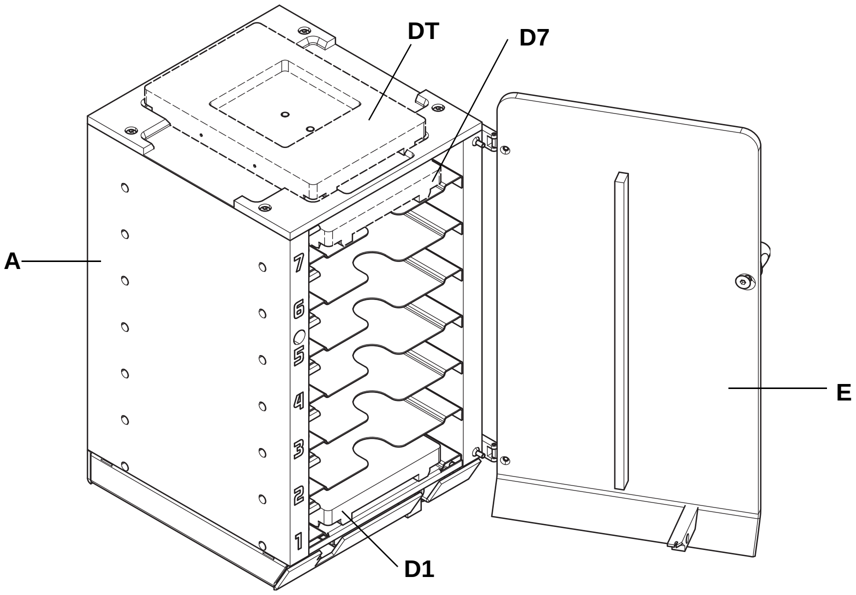


Fig. 9-91 *Aligning the RoMa reference plate with the loading port*

A	*Loading port (view from left)*	***DT***	*RoMa reference plate on external tray (roof)*
D1	*RoMa reference plate in slot # 1*	***E***	*Front door (open)*
D7	*RoMa reference plate in slot # 7*		

9 Click **Next** on the process prompt when done.

10 You are prompted to verify the position of the top slot (slot # 7).

ATTENTION

Device slanted caused by mechanical problems. Deviation in the top slot position shown in the frame **Diff. to taught position** on the **Move RoMa** page.

- Check for correct mounting of the device and repeat the setup.

11 Click **Next** on the prompt when done.

12 After you have done this, you are prompted to align the reference plate with the external tray at the top of the loading port (roof position). Adjust the RoMa reference plate as follows:

  - The plate should be in the center of the tray.
  - Its bottom should just touch the bottom of the tray.

13 Click **Next** on the prompt when done.

If you have chosen more loading ports to set up (normal case), the RoMa first places the reference plate in the defined worktable position, picks it up again and moves it in front of the bottom slot of the next loading port.

14 Perform the setup procedure for the remaining loading ports as described above.

When the setup is completed the RoMa deposits the reference plate in the predefined grid position.

9.6.12 Set up Vectors of the Heated Incubators

Cross References

List of cross references to information provided in other sections:

Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

With this setup procedure, the access of the RoMa to the slots of the heated incubators, installed at the rear of the worktable, is set up.

Taught Positions

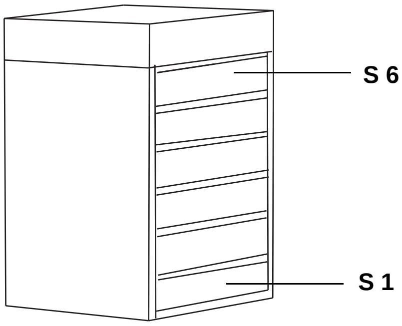


Fig. 9-92 Heated incubator

During this setup procedure the RoMa reference plate must be aligned with the following slots:

- Slot 1 (S 1) at the bottom
- Slot 6 (S 6) at the top

Procedure

To determine the access positions of the RoMa to the slots of the heated incubators:

1. If not done yet, carry out the preparatory steps, described in (→ Cross References).
2. On the **Contents** page, select the check box **Set up vectors of the Heated Incubators** and change to the **Configuration** page (see following figure).
3. Set the following on the **Configuration** page:
   - In the frame **Device usage**:
     - Select the check box **Heated incubator 1 (and 2)** if you want to set up the access to the corresponding incubator.
   - If not done yet, set the **Grid position** of the RoMa reference plate.
4. Click **Start** to begin

   You will be guided through the setup procedure by a series of process prompts (not shown here).
5. Follow the instructions provided on the prompts.
   - The first warning reminds you that RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
   - The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

   The RoMa picks up the reference plate from the predefined grid position and moves it in front of the bottom slot of the rightmost heated incubator that has been selected. See following figure.

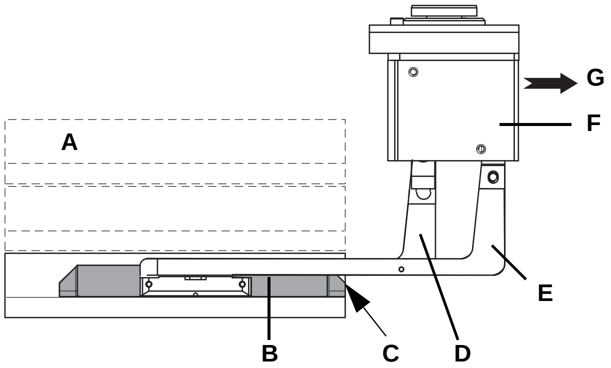


Fig. 9-93 Aligning the RoMa reference plate with the heated incubator

A	*Heated incubator (view from left)*	*E*	*Long gripper finger*
B	*Ref. plate aligned with front of slot*	*F*	*RoMa rotator*
C	*Edge to be aligned with front of slot*	*G*	*Instrument front*
D	*Short gripper finger*		

6 Use the **X**, **Y** and **Z** movement buttons of the **Move RoMa** page to move the reference plate (B) into the slot and align the edge (C) precisely with the front edge of the incubator slot.

- The reference plate must be centered to the front edge of the incubator slot.
- The bottom of the reference plate should just touch the bottom of the slot.

7 Click **Next** when done.

The RoMa moves the reference plate into the top slot of the heated incubator (same X- and Y-position as taught for the bottom slot).

8 Check the X- and Y-position according to step 6 and teach the Z-position as described in step 6, using the **Z** movement button of the **Move RoMa** page (only the Z movement button is activated).

ATTENTION

Deviations in X-/Y-position in the top slot compared to the bottom slot. Device slanted caused by mechanical problems.

- Check for correct mounting and alignment of the device. See preparatory steps (→ Cross References).
- Repeat the setup.

9 Click **Next** on the corresponding process prompt when the alignment of the incubator is completed.

If you have chosen more heated incubators to set up, the RoMa first places the reference plate in the predefined worktable position, picks it up again and moves it in front of the bottom slot of the next incubator.

10 Perform the setup procedure as described above.

When the setup is completed the RoMa deposits the reference plate in the predefined grid position.

9.6.13 Set up Vectors of the Plate Reader

Cross References

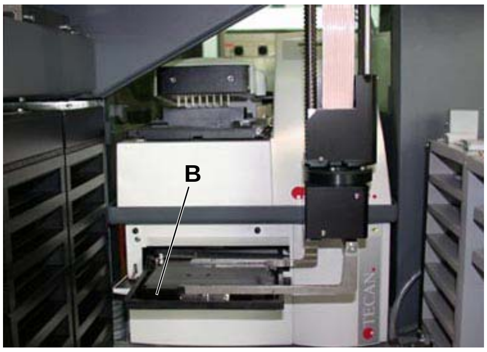
Information	Reference
Preparatory steps	See section 9.6.7, 🗎 9-83
COM port selection (Configuration page)	See Fig. 9-74, 🗎 9-81

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

With this setup procedure, the access of the RoMa to the tray of the plate reader is set up.



During this setup procedure the RoMa reference plate must be aligned with the tray (B) of the plate reader.

Fig. 9-94 *Tray of the plate reader*

Procedure

Before You Start

Make sure that the following conditions are fulfilled:

- If not done yet, you must carry out the preparatory steps as described in (→ Cross References).
- BEFORE selecting the corresponding check box on the **Contents page**, you must define the COM-port connection of the plate reader on the **Configuration** page. Please note:
  - The **Configuration** page opens automatically after the start of the **Vector-2** panel (see cross references).
  - If necessary close and reopen the **Vector-2** panel.

Perform the Setup

To determine the access position of the RoMa to the tray of the plate reader:

1. On the **Contents** page, select the check box **Set up vectors of the Plate Reader** and change to the **Configuration** page.
2. If not done yet, set the following on the **Configuration** page:

- In the frame **Device usage**, select the check box **Sunrise Reader** or **Diagast Reader**.
- Set the **Grid position** of the RoMa reference plate.

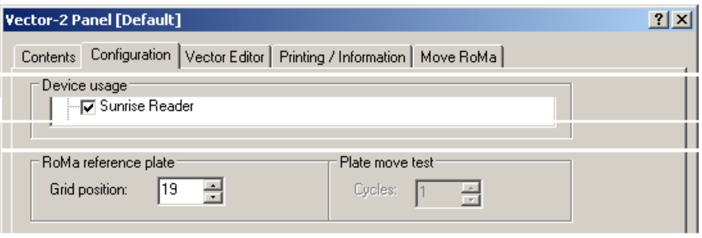


Fig. 9-95 Configuration of the Sunrise reader

3 Click **Start** to begin

You will be guided through the setup procedure by a series of process prompts (not shown here).

4 Follow the instructions provided on the prompts.

- The first warning reminds you that the RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
- The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

The RoMa picks up the reference plate from the predefined position and moves it over the tray of the plate reader (Sunrise) or in front of the reader slot (Diagast 3).

5 Continue with step 6 for a Sunrise plate reader

Or go to step 9 if you have to make the alignment for a Diagast 3 plate reader.

6 When prompted to do so, use the **X**, **Y** and **Z** movement buttons of the **Move RoMa** page to place the reference plate in the reader tray as shown in the figures below.

7 Make sure the plate touches the protruding parts (D), as well as the bottom of the tray.

8 Click **Next** when done.

When the setup is completed the RoMa deposits the reference plate in the predefined grid position.

Plate Reader on Right Extension

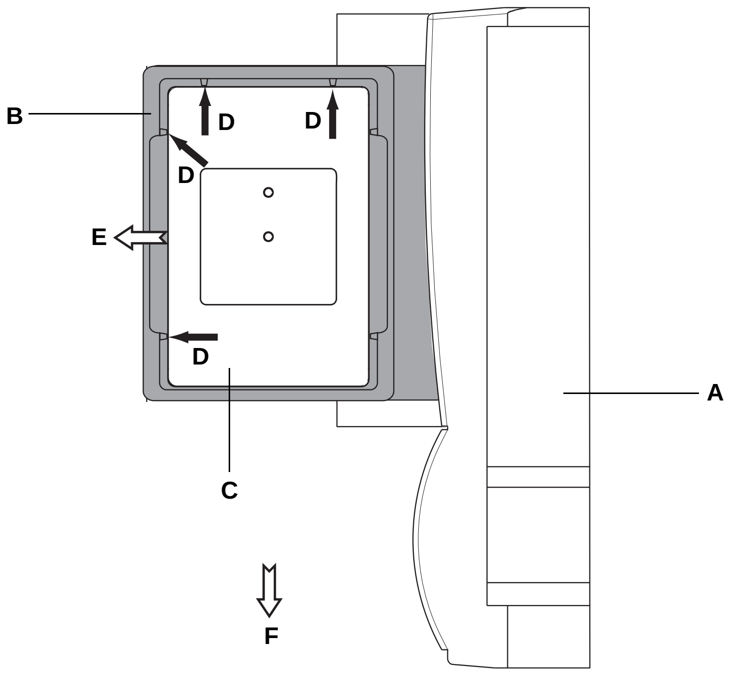


Fig. 9-96 Aligning the plate reader installed on the right extension

A	*Sunrise reader (top view)*	*D*	*Protruding parts*
B	*Reader tray (ejected)*	*E*	*Reader front*
C	*RoMa reference plate*	*F*	*Instrument front*

Plate Reader on Worktable

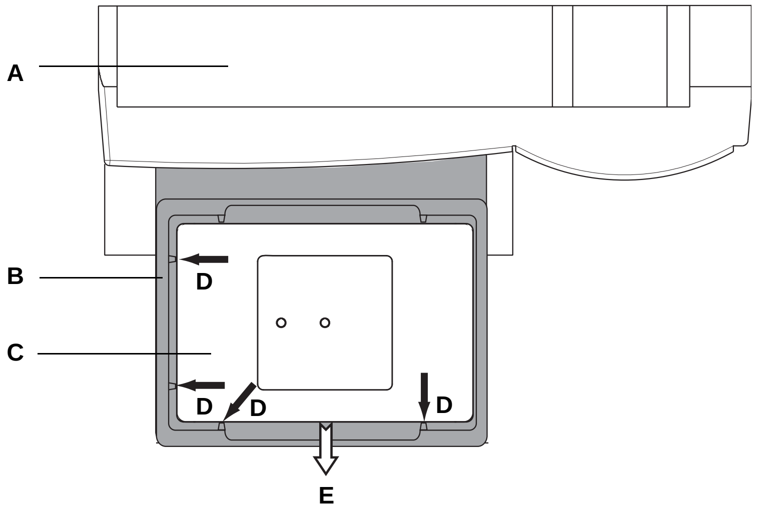


Fig. 9-97 Aligning the plate reader installed on the worktable

A	*Sunrise reader (top view)*	*D*	*Protruding parts*
B	*Reader tray (ejected)*	*E*	*Instrument front and reader front*
C	*RoMa reference plate*		

Instruments 30045716, 30045717 and 30045718 with Reader on Worktable

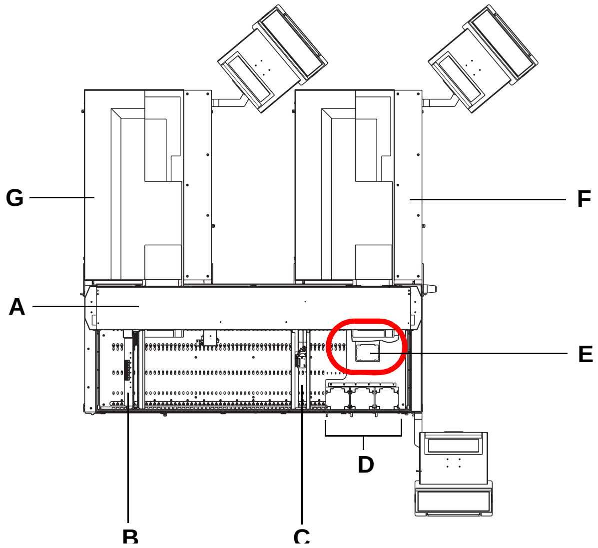


Fig. 9-98 *Location of Sunrise reader on an instrument 30045716, 30045717 or 30045718(top view)*

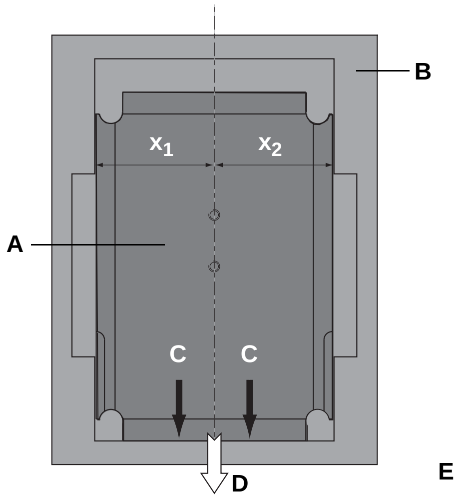
A	*Instruments 30045716, 30045717 and 30045718*	*D*	*Three loading ports*
		E	*Sunrise plate reader*
B	*LiHa-2*	*F*	*BEP III (rear right side)*
C	*RoMa-3*	*G*	*BEP III (rear left side)*

Alignment with Diagast 3 Plate Reader (OEM)

If the reader to align is a Diagast plate reader (OEM product), proceed as described below. Note that this alignment is comparatively difficult, since the tray of the Diagast reader cannot be ejected from its compartment.

To facilitate the alignment it is recommended that you illuminate the compartment (e.g., with a flashlight).

9 When prompted to do so, use the **Move RoMa** page to place the reference plate in the reader tray as shown in the figure.



A	*RoMa reference plate*
B	*Reader tray*
C	*Front edge reader tray*
D	*Reader front and Instrument front*
x_1, x_2	*Distances from center line*

Fig. 9-99 *Aligning the reference plate with reader tray (Diagast 3)*

10 Make sure the reference plate is aligned as follows:

- Its front edge must touch the front edge (C) of the reader tray (black arrows).
- It must be in the center of the tray ($x_1 \approx x_2$).
- It must lie flat on the bottom of the tray.

11 Click **Next** when done.

When the setup is completed the RoMa deposits the reference plate in the predefined grid position.

9.6.14 Set up Vectors of the Plate Washer

Cross References

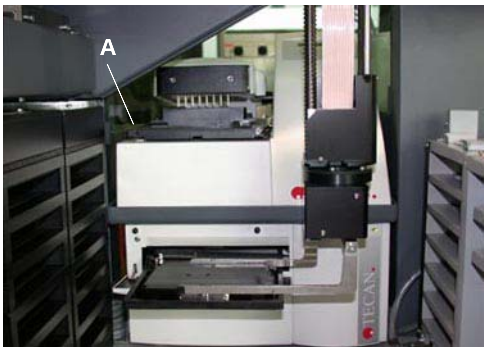
Information	Reference
Preparatory steps	See section 9.6.7, 🗎 9-83
COM port / USB selection (Configuration page)	See section Fig. 9-74, 🗎 9-81

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

With this setup procedure, the access of the RoMa to the trays of the plate washer installed on the worktable extension is set up.



During this setup procedure the RoMa reference plate must be aligned with the tray (A) of the plate washer.

Fig. 9-100 *Tray of the plate washer*

Procedure

Before You Start

Make sure that the following conditions are fulfilled:

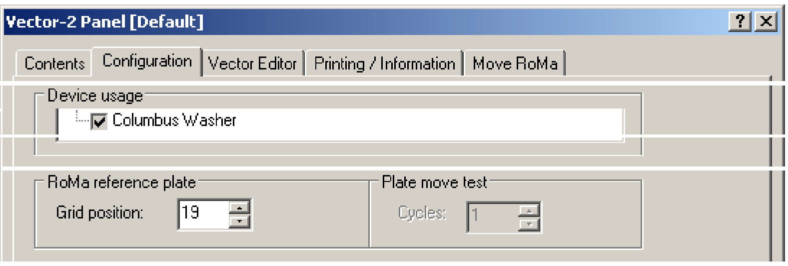
- If not done yet, you must carry out the preparatory steps as described in (→ Cross References).
- BEFORE selecting the corresponding check box on the **Contents page**, you must define the COM-port or USB connection of the plate washer on the **Configuration** page. Please note:

- The **Configuration** page opens automatically after the start of the **Vector-2** panel (see cross references).
- If necessary close and reopen the **Vector-2** panel.

Perform the Setup

To determine the access position of the RoMa to the tray of the plate washer:

1. On the **Contents page**, select the check box **Set up vectors of the Plate Washer**.
2. Change to the **Configuration** page and make the following entries:
   - In the frame **Device usage**, select the check box **Columbus Washer** or **Hydroflex Washer**.
   - Set the **Grid position** of the RoMa reference plate.



Device usage
☑ Columbus Washer

RoMa reference plate
Grid position: 19

Plate move test
Cycles: 1

Fig. 9-101 Vector, configuration of Columbus plate washer

3. Click **Start** to begin

   You will be guided through the setup procedure by a series of process prompts (not shown here).
4. Follow the instructions provided on the prompts.
   - The first warning reminds you that the RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
   - The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

   The RoMa picks up the reference plate from the predefined position and moves it over the tray of the plate washer.

Alignment with Tray of the Plate Washer

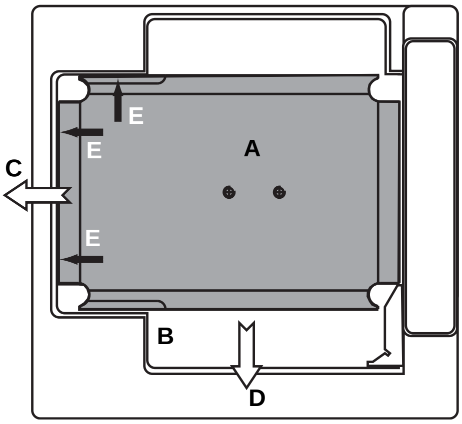


Fig. 9-102 Aligning the reference plate with the washer tray

A	*RoMa reference plate*
B	*Washer tray*
C	*Washer front*
D	*Instrument front*

1. When prompted to do so, use the **X**, **Y** and **Z** movement buttons of the **Move RoMa** page to place the reference plate in the washer tray as shown in the figure.
2. Make sure the plate touches the edges (E), as well as the bottom of the tray.

3 Click **Next** when done.

When the setup is completed the RoMa deposits the reference plate in the predefined grid position.

9.6.15 Set up Vectors of the BEP III

Cross References

List of cross references to information provided in other sections:

Information	Reference
Preparatory steps	See section 9.6.7, 🗎 9-83
Overview of BEP III	See section 9.6.1, 🗎 9-72

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

With this setup procedure, the access of the RoMa to the tray(s) of the BEP III is set up.

Locations of BEP III

Remember that the BEP III can be installed on the rear side of the instrument or on the right side. The following figure shows an example with one BEP III installed on the right side.

Taught Positions

During this setup procedure the RoMa reference plate must be aligned with the tray (C) of the BEP III. This tray is located on a slide and can be moved into a loading position where the RoMa can place or pick up microplates.

Note: *The tray cannot be moved directly under the control of the Setup and Service software. However, it is moved into its loading position as soon as the BEP III is operational after a startup of the BEP III software.*

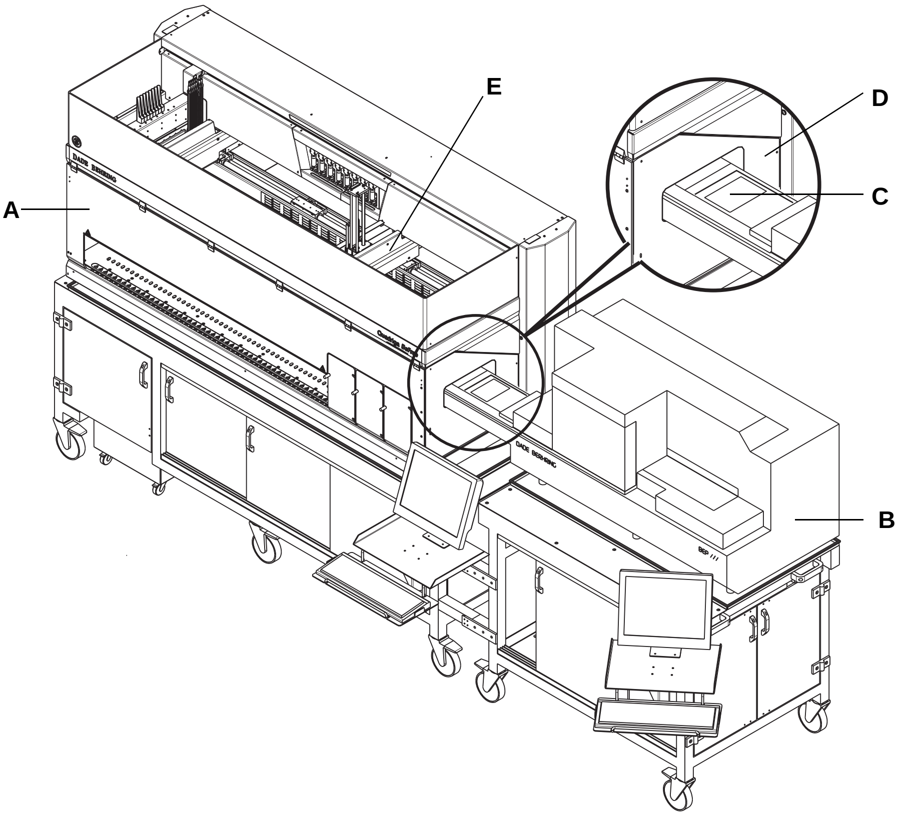


Fig. 9-103 *instruments 30045716, 30045717 and 30045718 with BEP III on right side*

A	*Instruments 30045716, 30045717 and 30045718*	***C***	*Movable tray*
B	*BEP III*	***D***	*Side safety panel*
		E	*RoMa-3*

Before You Start

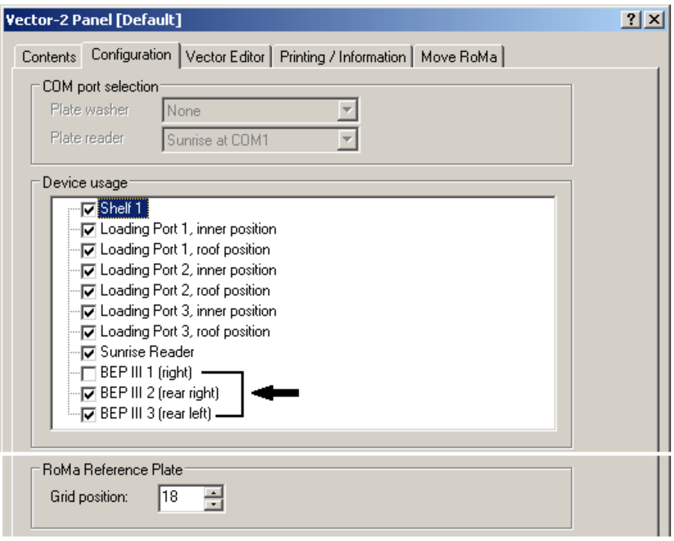
Make sure that the following conditions are fulfilled:

- If not done yet, carry out the preparatory steps as described in (→ Cross References).
- Ensure that the trays of the BEP III for which you want to set up the RoMa access are in their loading positions. As has been mentioned earlier, this is the case as soon as a BEP III is operational after a startup.

Procedure

To determine the access positions of the RoMa to the tray of a BEP III device:

1. On the **Contents page**, select the check box **Set up vectors of the BEP**.
2. Change to the **Configuration** page and make the following entries:
   - Select the appropriate BEP III arrangement in the frame **Device usage** (near the black arrow in the following figure):
   - In the frame **RoMa Reference plate**, check the **Grid position** where the reference plate will be picked up and replaced. Change the grid position as necessary.



COM port selection
Plate washer: None
Plate reader: Sunrise at COM1

Device usage
☑ Shelf 1
☑ Loading Port 1, inner position
☑ Loading Port 1, roof position
☑ Loading Port 2, inner position
☑ Loading Port 2, roof position
☑ Loading Port 3, inner position
☑ Loading Port 3, roof position
☑ Sunrise Reader
☐ BEP III 1 (right)
☑ BEP III 2 (rear right)
☑ BEP III 3 (rear left)

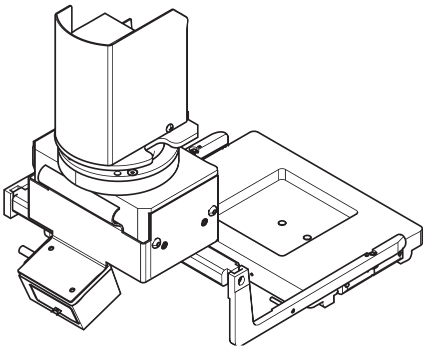
RoMa Reference Plate
Grid position: 18

Fig. 9-104 *Configuration of BEP III*

3. Click **Start** to begin

   You will be guided through the setup procedure by a series of process prompts (not shown here).
4. Follow the instructions provided on the prompts.
   - The first warning reminds you that the RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
   - The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

   The RoMa picks up the reference plate from the predefined grid position and moves it over the tray of the corresponding BEP III.



Note: In contrast to other setup and test procedures, the RoMa picks up the reference plate on the short sides.

Fig. 9-105 *RoMa holding reference plate on short sides.*

Alignment with BEP III Tray

To align the RoMa reference plate with the tray of a BEP III:

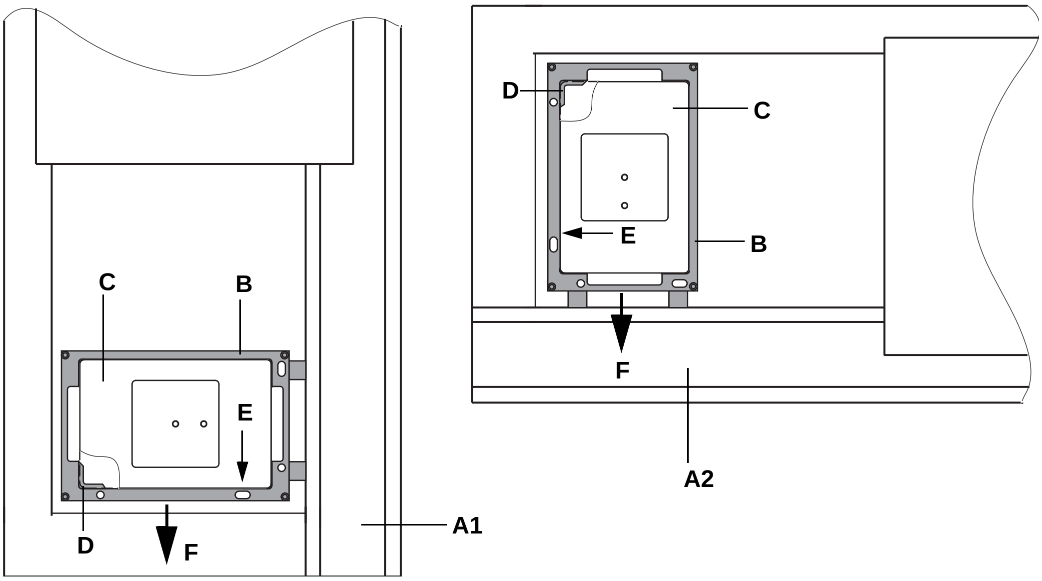


Fig. 9-106 *Alignment with tray of BEP III*

A1	*BEP III on rear side*		***D***	*Support angle (one in each corner)*
A2	*BEP III on right side*		***E***	*Edge of tray from which objects are loaded/unloaded*
B	*Movable tray*		***F***	*Instrument front*
C	*RoMa reference plate*			

1 When prompted to do so, use the **X**, **Y** and **Z** movement buttons of the **Move RoMa** page to place the reference plate in the BEP III tray as shown in the above figure.
   - The RoMa reference plate should just touch the edge (E) the tray. Depending on whether the BEP III is installed on the rear or on the right side of the instrument, this edge faces the instrument front or the right side of the worktable.
   - The distances between the short sides of the RoMa reference plate and the corresponding edges of the tray should be equal.

- – The bottom of the plate should just touch the supports (D) in the four corners of the tray.

2 Click **Next** when done.

3 If there is a second BEP III to align repeat the above steps for the corresponding BEP III.

9.6.16 Test Vectors of the Shelf

Cross References

List of cross references to information provided in other sections:

Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83
Set up Vectors of Shelf	See section 9.6.9, 🗎 9-85
RoMa Reference Plate test	See section 9.5.16, 🗎 9-64

Purpose

This procedure tests whether the RoMa has access to all trays of the Shelf.

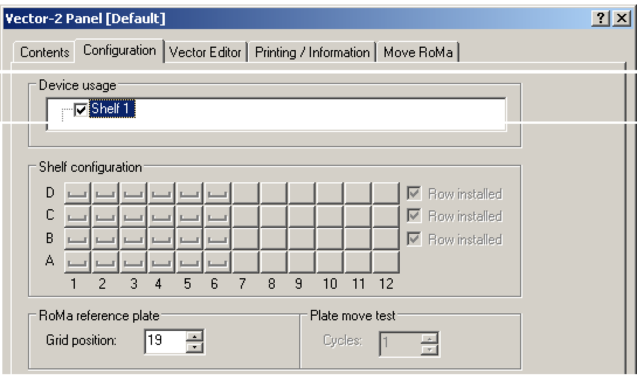
Procedure

To test the access positions of the RoMa to the trays of the shelf:

1 If not done yet, carry out the preparatory steps, described in (→ Cross References).

2 On the **Contents** page, select the check box **Test Vectors of the Shelf** and change to the **Configuration** page (see following figure).

3 If necessary, set the **Grid Position** of the RoMa reference plate on the **Configuration** page:



☑ Shelf 1

☑ Row installed
☑ Row installed
☑ Row installed

Grid position: 19

Cycles: 1

Fig. 9-107 Test configuration of shelf

4 If necessary, set the following on the **Configuration** page:
   - – Set the **Grid Position** of the RoMa reference plate.

5 Click **Start** to begin

You will be guided through the test procedure by a series of process prompts (not shown here).

6 Follow the instructions provided on the prompts.

- The first warning reminds you that the RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
- The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

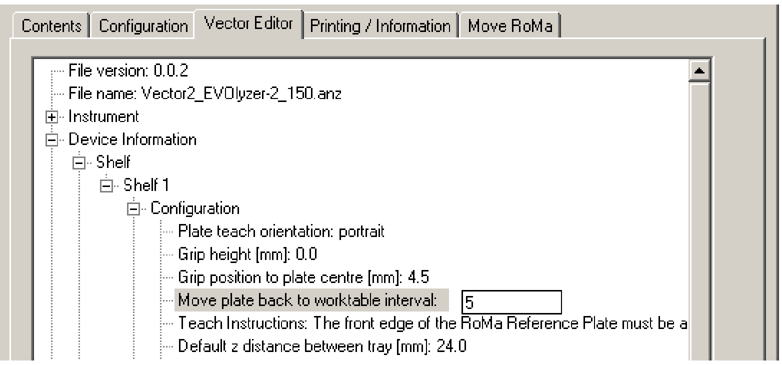
The RoMa picks up the reference plate from the predefined grid position. Beginning with the bottom left tray (A1), it places the plate in each tray of the shelf until all trays are tested.

7 Observe the movements of the RoMa and visually check for each tray whether…

- the RoMa can move the plate into the shelf unhindered
- the RoMa places the plate on the tray correctly and picks it up properly afterwards (after a defined number of trays the RoMa moves the reference plate back into the predefined grid position before continuing with the next tray).
- the RoMa moves the reference plate correctly to the subsequent tray until the access to each tray is tested.

The RoMa places the reference plate back on the worktable into the predefined grid position:

- during the test procedure based on the setting of the configuration **Move plate back to worktable interval** (see figure below).
- when all trays are tested.



- File version: 0.0.2
- File name: Vector2_EVOlyzer-2_150.anz
- Instrument
- Device Information
  - Shelf
    - Shelf 1
      - Configuration
        - Plate teach orientation: portrait
        - Grip height [mm]: 0.0
        - Grip position to plate centre [mm]: 4.5
        - Move plate back to worktable interval: 5
        - Teach Instructions: The front edge of the RoMa Reference Plate must be a
        - Default z distance between tray [mm]: 24.0

Fig. 9-108 *Move plate back to worktable interval*

8 Check whether the RoMa can place the reference plate properly back on the worktable:

Pass/Fail Criteria

The test is passed if the RoMa places the reference plate properly on all trays of the shelf and replaces it correctly on the worktable afterwards.

If the Test Fails

Try the following:

- Repeat the **Set up Vectors of the Shelf** procedure (or have it repeated by a service specialist), then repeat the test.
- If the plate is not picked up from the predefined grid position properly, perform the “RoMa Reference Plate test” (→ Cross References).

9.6.17 Test Vectors of the Room Temperature (RT) Incubators

Cross References

List of cross references to information provided in other sections:

Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83
Set up Vectors of the RT-incubators	See section 9.6.10, 🗎 9-89
RoMa Reference Plate test	See section 9.5.16, 🗎 9-64

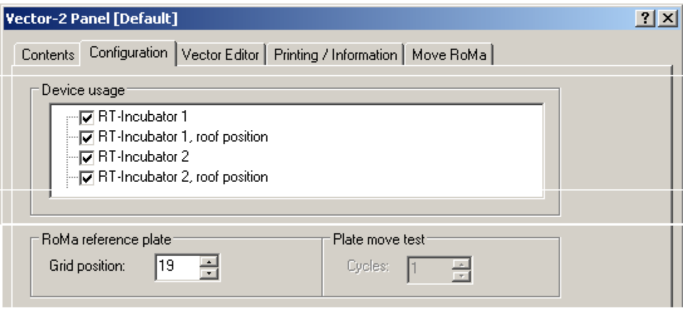
Purpose

This procedure tests whether the RoMa has access to all slots of the room temperature incubators (RT-incubators), installed at the front of the worktable.

Procedure

To test the access positions of the RoMa to the slots of the RT-incubators:

1. If not done yet, carry out the preparatory steps, described in (→ Cross References).
2. On the **Contents** page, select the check box **Test vectors of the RT-incubators** and change to the **Configuration** page (see following figure).
3. If necessary, set the following on the **Configuration** page:
   - In the frame **Device usage** select the check box **RT-Incubator 1 (and 2)** if you want test the access to the corresponding incubator.
   - In the frame **Device usage** select the check box **RT-Incubator 1 (and 2), roof position** if you want test the access to the corresponding incubator roof position.
   - Set the **Grid Position** of the RoMa reference plate.



Device usage
☑ RT-Incubator 1
☑ RT-Incubator 1, roof position
☑ RT-Incubator 2
☑ RT-Incubator 2, roof position

RoMa reference plate
Grid position: 19

Plate move test
Cycles: 1

Fig. 9-109 Vectors, configuration of RT-incubators

4. Click **Start** to begin

   You will be guided through the test procedure by a series of process prompts (not shown here).
5. Follow the instructions provided on the prompts.
   - The first warning reminds you that RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
   - The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

   The RoMa picks up the reference plate from the predefined grid position. Beginning with the bottom slot of the rightmost RT-incubator that has been *selected, it places the plate in each slot of the incubator and in the external tray (roof position) until all slots and the external tray are tested.*

6. Observe the movements of the RoMa and visually check for each slot whether…
   - the RoMa can move the plate into the slot unhindered
   - the RoMa places the plate into the slot correctly and picks it up properly afterwards.
   - the RoMa moves the plate correctly to the subsequent slot.

   The RoMa places the reference plate back on the worktable into the predefined grid position when all slots are tested.
7. Observe whether the RoMa can place the reference plate properly back on the worktable.

   If you have selected more incubators on the ***Configuration*** *page, the RoMa picks up the plate again and continues with the next device.*
8. Repeat the above test for the other selected incubators.

Pass/Fail Criteria

The test is passed if the RoMa places the reference plate properly in all slots of the selected incubators and replaces it correctly on the worktable afterwards.

If the Test Fails

Try the following:

- Repeat the **Set up Vectors of the RT-incubators** procedure (field service engineer, FSE, required), then repeat the test (→ Cross References).
- If the plate is not properly picked up from the predefined grid position, perform the “RoMa Reference Plate test” (→ Cross References).

9.6.18 Test Vectors of the Loading Ports

Cross References

List of cross references to information provided in other sections:

Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83
Set up Vectors of front positions	See section 9.6.11, 🗎 9-92
RoMa Reference Plate test	See section 9.5.16, 🗎 9-64

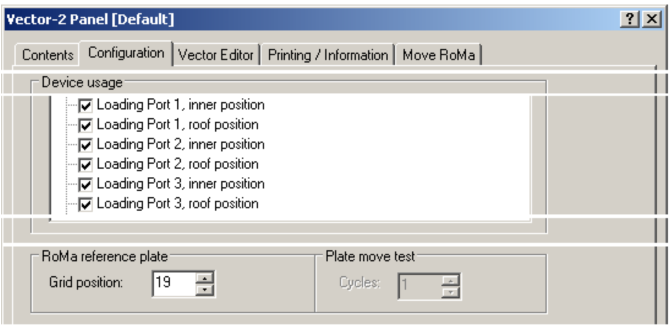
Purpose

This procedure tests whether the RoMa has access to all trays of the loading ports, installed at the front of the worktable.

Procedure

To test the access positions of the RoMa to the trays of the loading ports:

1. If not done yet, carry out the preparatory steps, described in (see cross references).
2. On the Contents page, select the check box **Test vectors of the Loading Ports** and change to the **Configuration** page.
3. If not done yet, set the following on the **Configuration** page:
   - In the frame **Device usage**, select the check boxes **Loading Port 1 (2 and 3), inner position and / or roof position.**
   - Set the **Grid Position** of the RoMa reference plate.



Device usage
- ☑ Loading Port 1, inner position
- ☑ Loading Port 1, roof position
- ☑ Loading Port 2, inner position
- ☑ Loading Port 2, roof position
- ☑ Loading Port 3, inner position
- ☑ Loading Port 3, roof position

RoMa reference plate
Grid position: 19

Plate move test
Cycles: 1

Fig. 9-110 *Vectors, configuration of the Loading Ports*

4 Click **Start** to begin

You will be guided through the test procedure by a series of process prompts (not shown here).

5 Follow the instructions provided on the prompts.

- The first warning reminds you that RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
- The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

The RoMa picks up the reference plate from the predefined grid position. Beginning with the bottom slot of the rightmost loading port that has been selected, it places the plate on each tray of the loading port and on the external tray at the top until all trays are tested.

6 Observe the movements of the RoMa and visually check for each tray whether…

- the RoMa can move the plate into the slot unhindered
- the RoMa places the plate on the tray correctly and picks it up properly afterwards.
- the RoMa moves the plate correctly to the subsequent tray.

The RoMa places the reference plate back on the worktable into the predefined grid position when all slots and trays are tested.

7 Observe whether the RoMa can place the reference plate properly back on the worktable.

*If you have selected more loading ports on the **Configuration** page (normal case), the RoMa picks up the plate again and continues with the next device.*

8 Repeat the above test for the other loading ports selected.

Pass/Fail Criteria

The test is passed if the RoMa places the reference plate properly on all trays of the selected loading ports and replaces it correctly on the worktable afterwards.

If the Test Fails

Try the following:

- Repeat the **Set up vectors of the Loading Ports** procedure (or have it repeated by a service specialist), then repeat the test (→ Cross References).
- If the plate is not properly picked up from the predefined grid position, perform the “RoMa Reference Plate test” (→ Cross References).

9.6.19 Test Vectors of the Heated Incubators

Cross References

List of cross references to information provided in other sections:

Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83
Set up Vectors of the heated incubators	See section 9.6.12, 🗎 9-95
RoMa Reference Plate test	See section 9.5.16, 🗎 9-64

Purpose

This procedure tests whether the RoMa has access to all slots of the heated incubators, installed on the rear side of the worktable.

Procedure

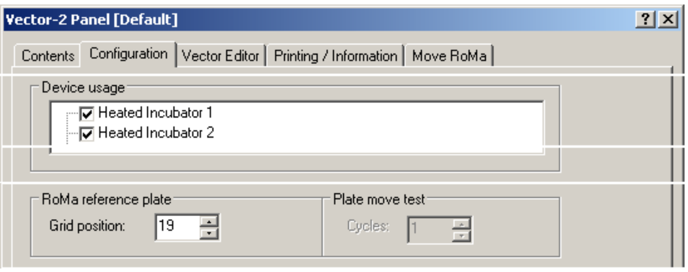
To test the access positions to the slots of the heated incubators:

1 if not yet done, carry out the preparatory steps, described in (see cross references).

2 On the **Contents page**, select the check box **Test vectors of the heated incubators** and change to the **Configuration** page.

3 If necessary, set the following on the **Configuration** page:

- In the frame **Device usage** select the check box **Heated Incubator 1 (2 and 3)** if you want test the access to the corresponding incubator.
- Set the **Grid Position** of the RoMa reference plate.



☑ Heated Incubator 1
☑ Heated Incubator 2

Grid position: 19

Fig. 9-111 Vectors, configuration of the heated incubators

4 Click **Start** to begin

You will be guided through the test procedure by a series of process prompts (not shown here).

5 Follow the instructions provided on the prompts.

- The first warning reminds you that the RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
- The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

The RoMa picks up the reference plate from the predefined grid position. Beginning with the bottom slot of the rightmost heated incubator that has been selected, it places the plate in each slot of the incubator and removes it from there until all slots are tested.

6 Observe the movements of the RoMa and visually check for each slot whether…

   - the RoMa can move the plate into the slot unhindered.
   - the RoMa places the plate into the slot correctly and picks it up properly afterwards.
   - the RoMa moves the plate correctly to the subsequent slot.

   The RoMa places the reference plate back on the worktable into the predefined grid position when all slots are tested.

7. Observe whether the RoMa can place the reference plate properly back on the worktable.

   *If you have selected more incubators on the **Configuration** page, the RoMa picks up the plate again and continues with the next device.*

8. Repeat the above test for the other selected incubators.

Pass/Fail Criteria

The test is passed if the RoMa places the reference plate properly in all slots of the selected incubators and replaces it correctly on the worktable afterwards.

If the Test Fails

Try the following:

- Repeat the **Set up vectors of the Heated Incubators** procedure (field service engineer, FSE, required), then repeat the test (→ Cross References).
- If the plate is not properly picked up from the predefined grid position, perform the “RoMa Reference Plate test” (→ Cross References).

9.6.20 Test Vectors of the Plate Reader

Cross References

List of cross references to information provided in other sections:

Information	References
COM port selection (Configuration page)	See Fig. 9-74, 🗎 9-81
Preparatory steps	See section 9.6.7, 🗎 9-83
Set up vectors of the plate reader	See section 9.6.13, 🗎 9-98
RoMa Reference Plate test	See section 9.5.16, 🗎 9-64

Purpose

This procedure tests whether the RoMa has access to the trays of the plate reader, installed on the worktable or on the right extension.

Procedure

Before You Start

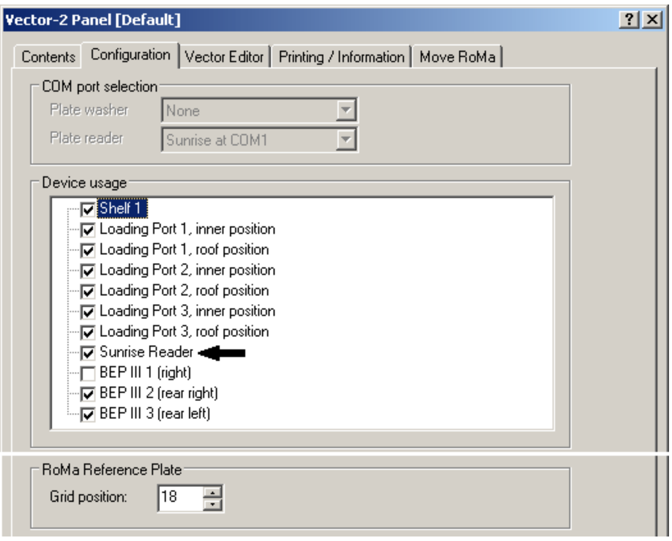
Make sure that the following conditions are fulfilled:

- If not done yet, you must carry out the preparatory steps as described in (→ Cross References).
- BEFORE selecting the corresponding check box on the **Contents page**, you must define the COM-port connection of the plate reader on the **Configuration** page. Please note:
  - The **Configuration** page opens automatically after the start of the **Vector-2** panel (see cross references).
  - If necessary close and reopen the **Vector-2** panel.

Perform the Test

To test the access positions of the RoMa to the trays of the plate reader:

1. On the **Contents page**, select the check box **Test Vectors of the Plate Reader**.
2. Change to the **Configuration** page and make the following entries:
   - – In the frame **Device usage** select the Sunrise or Diagast (Qwalys 3) reader.
   - – Set the **Grid Position** of the RoMa reference plate.



COM port selection
Plate washer: None
Plate reader: Sunrise at COM1

Device usage
- ☑ Shelf 1
  - ☑ Loading Port 1, inner position
  - ☑ Loading Port 1, roof position
  - ☑ Loading Port 2, inner position
  - ☑ Loading Port 2, roof position
  - ☑ Loading Port 3, inner position
  - ☑ Loading Port 3, roof position
  - ☑ Sunrise Reader
  - ☐ BEP III 1 (right)
  - ☑ BEP III 2 (rear right)
  - ☑ BEP III 3 (rear left)

RoMa Reference Plate
Grid position: 18

Fig. 9-112 *Configuration of Sunrise plate reader*

3. Click **Start** to begin

   You will be guided through the test procedure by a series of process prompts (not shown here).
4. Follow the instructions provided on the prompts.
   - – The first warning reminds you that the RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
   - – The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

   The RoMa now picks up the reference plate, moves the plate to the reader and places it on the tray, then moves it back to the predefined grid position.
5. Observe the movements of the RoMa and visually check whether the RoMa moves the plate to the reader, places it properly on its tray, picks it up again and replaces it correctly on the worktable.

Pass/Fail Criteria

The test is passed if the RoMa places the reference plate properly on the tray of the reader and replaces it correctly on the worktable afterwards.

If the Test Fails

Try the following:

- Repeat the procedure **Set up Vectors of the Plate Reader** (or have it repeated by a service specialist), then repeat the test (→ Cross References).
- If the plate is not properly picked up from the predefined grid position, perform the “RoMa Reference Plate test” (→ Cross References).

9.6.21 Test Vectors of the Plate Washer

Cross References

List of cross references to information provided in other sections:

Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83
Set up vectors of the plate washer	See section 9.6.14, 🗎 9-102
COM port selection (Configuration page)	See Fig. 9-74, 🗎 9-81
RoMa Reference Plate test	See section 9.5.16, 🗎 9-64

Purpose

This procedure tests whether the RoMa has access to the tray of the plate washer.

Procedure

Before You Start

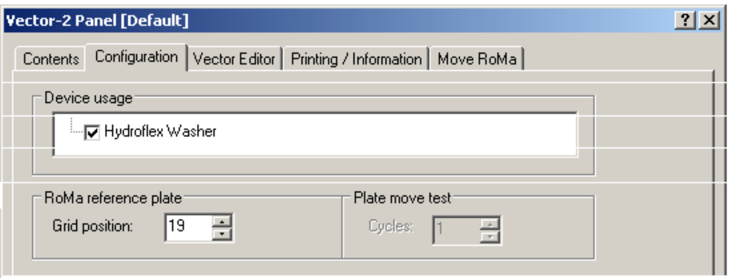
Make sure that the following conditions are fulfilled:

- If not done yet, you must carry out the preparatory steps as described in (→ Cross References).
- BEFORE selecting the corresponding check box on the **Contents page**, you must define the COM-port connections of the plate washer on the **Configuration** page. Please note:
  - The **Configuration** page opens automatically after the start of the **Vector-2** panel (see cross references).
  - If necessary close and reopen the **Vector-2** panel.

Perform the Test

To test the access position of the RoMa to the tray of the plate washer:

1. On the **Contents page**, select the check box **Test vectors of the plate washer**.
2. Change to the **Configuration** page and make the following entries:
   - In the frame **Device usage**, select the Hydroflex or Columbus washer.
   - Set the **Grid Position** of the RoMa reference plate.



Device usage
☑ Hydroflex Washer

RoMa reference plate
Grid position: 19

Plate move test
Cycles: 1

Fig. 9-113 Vector, configuration of the plate washer

3. Click **Start** to begin

   You will be guided through the test procedure by a series of process prompts (not shown here).

4. Follow the instructions provided on the prompts.
   - The first warning reminds you that the RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
   - The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

   The RoMa now picks up the reference plate, moves the plate to the washer, places it on the tray and then moves it back to the predefined grid position.
5. Observe the movements of the RoMa and visually check whether the RoMa moves the plate to the device, places it properly on its tray, picks it up again and replaces it correctly on the worktable.

Pass/Fail Criteria

The test is passed if the RoMa places the reference plate properly on the tray of the washer and replaces it afterwards correctly on the worktable.

If the Test Fails

Try the following:

- Repeat the procedure **Set up vectors of the Plate Washer** (field service engineer, FSE, required), then repeat the test (→ Cross References).
- If the plate is not properly picked up from the predefined grid position, perform the “RoMa Reference Plate test” (→ Cross References).

9.6.22 Test Vectors of the BEP III

Cross References

List of cross references to information provided in other sections:

Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83
Set up vectors of the BEP III	See section 9.6.15, 🗎 9-104
RoMa Reference Plate test	See section 9.5.16, 🗎 9-64

Purpose

This procedure tests whether the RoMa has access to the trays of the BEP III devices, installed either on the right side or the rear side of the instrument.

Procedure

Before You Start

Make sure that the following conditions are fulfilled:

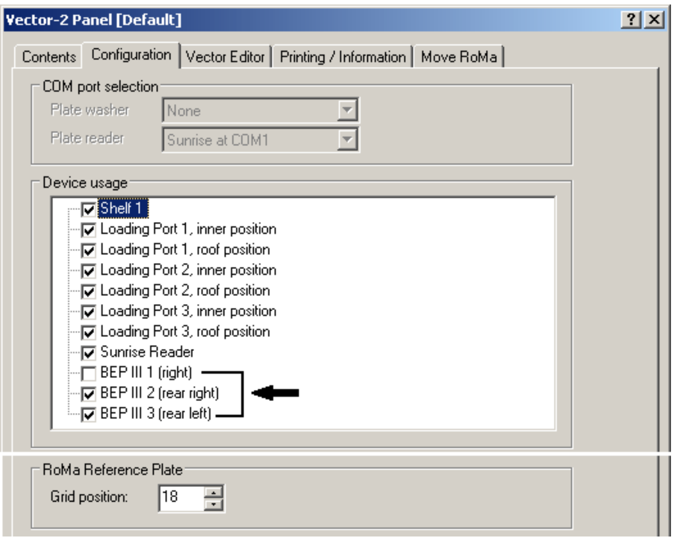
- If not done yet, carry out the preparatory steps as described in (→ Cross References).
- Ensure that the trays of the BEP III devices for which you want to test the RoMa access are in their loading positions. As has been mentioned earlier, this is the case as soon as the BEP III becomes operational after a startup.

Perform the Test

To test the access positions of the RoMa to the trays of the BEP III devices:

1. On the **Contents page**, select the check box **Test Vectors of the BEP III**.
2. Change to the **Configuration** page and make the following entries:
   - Select the appropriate BEP III arrangement in the frame **Device usage** (near the black arrow in the following figure):

- In the frame **RoMa Reference plate**, check the **Grid position** where the reference plate will be picked up and replaced. Change the grid position as necessary.



COM port selection
Plate washer: None
Plate reader: Sunrise at COM1

Device usage
☑ Shelf 1
☑ Loading Port 1, inner position
☑ Loading Port 1, roof position
☑ Loading Port 2, inner position
☑ Loading Port 2, roof position
☑ Loading Port 3, inner position
☑ Loading Port 3, roof position
☑ Sunrise Reader
☐ BEP III 1 (right)
☑ BEP III 2 (rear right)
☑ BEP III 3 (rear left)

RoMa Reference Plate
Grid position: 18

Fig. 9-114 *Vector, configuration of BEP III*

3 Click **Start** to begin.

You will be guided through the test procedure by a series of process prompts (not shown here).

4 Follow the instructions provided on the prompts.

- The first warning reminds you that the RoMa must have free access to the topmost position and that it will release any object it is holding. Take the necessary measures and click **Next** when done.
- The following prompt reminds you to place the RoMa reference plate in the predefined grid position. Click on **OK** when done.

The RoMa now picks up the reference plate, moves the plate to the corresponding BEP III and places it on the tray, then moves it back to the predefined grid position.

5 Observe the movements of the RoMa and visually check whether the RoMa moves the plate to the BEP III, places it properly on its tray, picks it up again and replaces it correctly on the worktable.

6 If a second BEP III is to be tested, check whether the RoMa access to its tray works properly too.

Pass/Fail Criteria

The test is passed if the RoMa places the reference plate properly on the tray(s) of the BEP III and replaces it correctly on the worktable afterwards.

If the Test Fails

Try the following:

- Repeat the procedure **Set up Vectors of the BEP III** (or have it repeated by a service specialist), then repeat the test (→ Cross References).
- If the plate is not properly picked up from the predefined grid position, perform the “RoMa Reference Plate test” (→ Cross References).

9.6.23 Plate Move Test

Cross References

List of cross references to information provided in other sections:

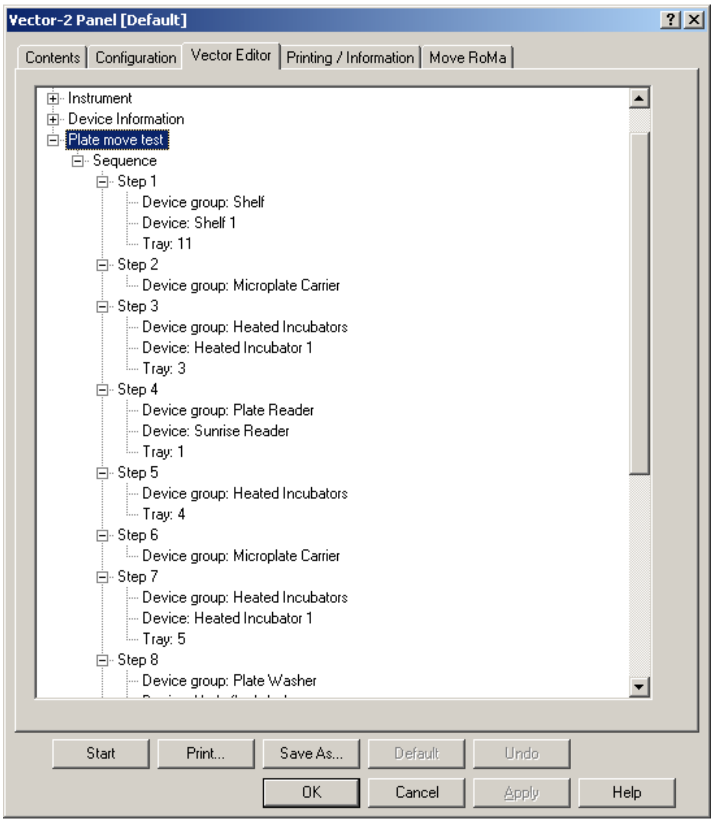
Information	References
Preparatory steps	See section 9.6.7, 🗎 9-83
Configuration page	See section 9.6.3, 🗎 9-78
Worktable page	See section 9.6.4, 🗎 9-81 and 5.2.7, 🗎 5-20

Purpose

This procedure tests whether the RoMa can transport an object (microplate or RoMa reference plate) safely from one device to other devices in a predefined sequence and for a predefined number of test cycles.

Test Principle

The reference plate is picked up by the RoMa from the predefined carrier position and transported to the devices selected on the **Configuration** page. The path over which the plate is transported depends on the selected devices. On each of the selected devices the plate is placed on the tray, picked up again and transported to the next device. The test is performed for a user-defined number of test cycles. At the end of the last cycle, the reference plate is replaced in the predefined carrier position.



- Instrument
- Device Information
- Plate move test
  - Sequence
    - Step 1
      - Device group: Shelf
      - Device: Shelf 1
      - Tray: 11
    - Step 2
      - Device group: Microplate Carrier
    - Step 3
      - Device group: Heated Incubators
      - Device: Heated Incubator 1
      - Tray: 3
    - Step 4
      - Device group: Plate Reader
      - Device: Sunrise Reader
      - Tray: 1
    - Step 5
      - Device group: Heated Incubators
      - Tray: 4
    - Step 6
      - Device group: Microplate Carrier
    - Step 7
      - Device group: Heated Incubators
      - Device: Heated Incubator 1
      - Tray: 5
    - Step 8
      - Device group: Plate Washer

Fig. 9-115 *Vector page, plate move test*

Procedure

Before You Start

Make sure that the following conditions are fulfilled:

- If not done yet, you must carry out the preparatory steps as described in (→ Cross References).
- BEFORE selecting the corresponding check box on the **Contents page**, you must define the COM-port / USB connections of the plate reader and washer on the **Configuration** page. Please note:
  - – The **Configuration** page opens automatically after the start of the **Vector-2** panel (see cross references).
  - – If necessary close and reopen the **Vector-2** panel.

Perform the Test

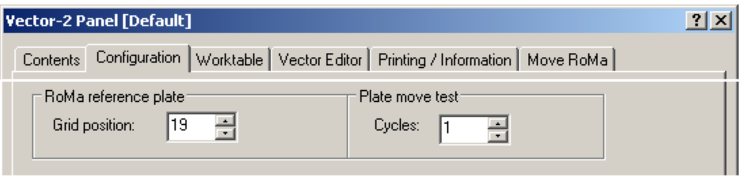
To perform the **Plate Move Test**:

1 On the **Contents** page, select the **Plate Move Test** check box.

2 Select the devices you wish to include in your test (shelf, RT-incubators, loading ports, heated incubators, plate reader, etc.).

3 In the frame **Plate Move Test**, set the number of **Cycles**.

***Note:** You must select at least one device, otherwise the reference plate will not be moved to any device (it will only picked up several times from the predefined carrier position and then replaced).*



RoMa reference plate
Grid position: 19

Plate move test
Cycles: 1

***Fig. 9-116** Vector, configuration of plate move test*

4 Go to the **Worktable** page, and load a suitable worktable map. Make sure that the physical worktable layout corresponds exactly with the worktable map (see cross references).

5 Click **Start** to begin.

You will be guided through the test by a series of process prompts.

6 Follow the instructions provided on the prompts.

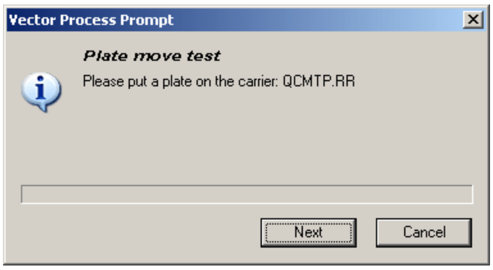


Plate move test
Please put a plate on the carrier: QCMTP.RR

A message like this prompts you to put the plate in the indicated start -position.

***Fig. 9-117** Prompt at the start*

7 Visually check whether …

- – the plate is moved properly to the preselected device, placed on the corresponding tray and picked up again.
- – there are no collisions with any other parts or devices.

  – whether the plate is not lost during the test.

Pass/Fail Criteria

The test is passed if the visual check according to step 7 does not reveal any irregularities.

If the Test Fails

Try the following:

- If the RoMa does not pick up the plate from the predefined carrier position, and then replaces it properly, perform the “RoMa Reference Plate test” (→ Cross References).
- Repeat the setup and test procedures for the tested devices (field service engineer, FSE, required for setup), then repeat the test.

9.6.24 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

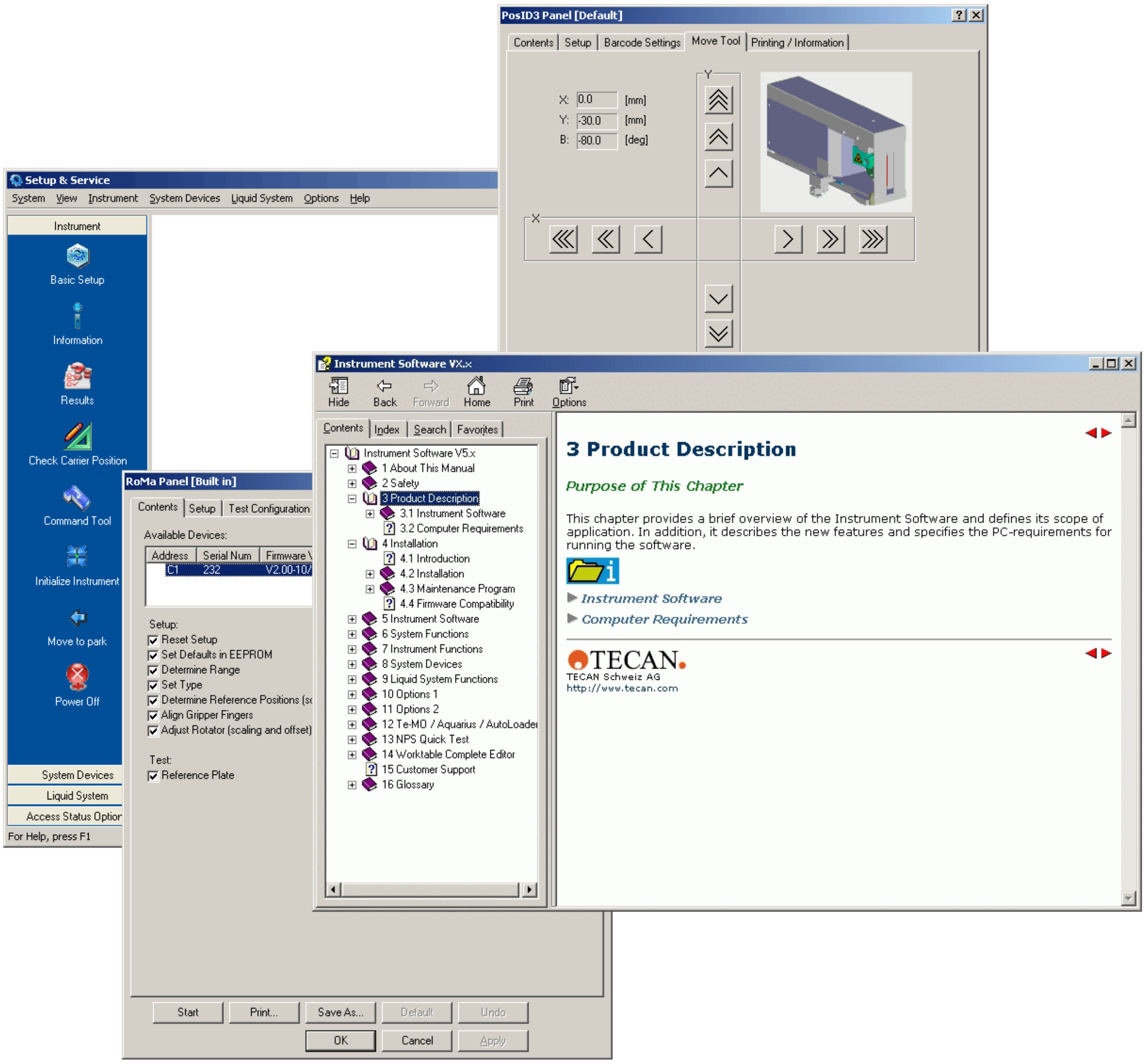
Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

Software Manual

Instrument Software V8.0
Part 2



X: 0.0 [mm]
Y: -30.0 [mm]
B: -80.0 [deg]

Available Devices:

Address	Serial Num	Firmware V
C1	232	V2.00-10/

Setup:
☑ Reset Setup
☑ Set Defaults in EEPROM
☑ Determine Range
☑ Set Type
☑ Determine Reference Positions (s
☑ Align Gripper Fingers
☑ Adjust Rotator (scaling and offset)

Test:
☑ Reference Plate

3 Product Description

Purpose of This Chapter

This chapter provides a brief overview of the Instrument Software and defines its scope of application. In addition, it describes the new features and specifies the PC-requirements for running the software.

Document Status Sheet

Title:	Instrument Software V8.0, Software Manual			**Part number:**	30132342.00
ID:	392888, en, Version 6.5			**Translated from:**	---
Version	**Revision**	**Issue**	**Document History**		
1	0	2003-07-31	New manual covering Freedom EVO, Genesis Instruments, Aquarius and AutoLoader. Replacement for document 390791.		
1	1	2003-08-22	Minor changes, correction of errors		
2	0	2004-04-05	Adaptations for EVOlyzer, new Vector panel, User Administration System		
2	1	2004-09-30	Corrections and adaptations in Vector panel (new shelf), for new wash station and new incubator panel. Additional or modified tests in RoMa and Move Test panels.		
2	2	2005-02-21	Corrections of minor errors. Modified: LiHa setup page, test of Te-MO 96 wash station. Added: Description of user-defined gravimetric test procedure. Dropped: Impulse.		
3	0	2005-10-07	Corrections of minor errors. Adaptation of manual to Instrument Software V5.0. Modified: various panels. New: Tecan Communication server, PosID-3 panel, Liquid System Functions completely redesigned, Send Utility, Logging Viewer., RSS-panel (EVO 75), panels for OEM-customers.		
3	1	2006-01-31	Correction of minor errors. Adaptations for instruments 30045716, 30045717 and 30045718. Basic Setup: Worktable page. System devices 2: New Vector 2 panel. Options 2: Implementation of new Loading Port panel.		
3	2	2006-04-07	Correction of minor errors. Adaptations to Instrument Software V5.2. PMP panel, adaptations for Cellerity (Flipper, CPO, SMIO for Cellerity panel).		
3	3	2006-06-30	Adaptations to Instrument Software V5.3. MCA panel and Te-Stack panels.		
3	4	2006-09-30	Correction of minor errors. Adaptations to Instrument Software V5.4. MCA head with gripper, Te-Thermix, adaptations for Paradigm		
3	5	2006-11-08	Correction of minor errors. Adaptations to Instrument Software V5.5. Te-Fill option, adaptations for Paradigm.		
3	6	2007-01-05	Correction of minor errors. Adaptations to Instrument Software V5.6. Updates for Firmware Download and Te-Thermix.		

Document Status Sheet

Title:	Instrument Software V8.0, Software Manual		**Part number:**	30132342.00
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Version	**Revision**	**Issue**	**Document History**
4	0	2007-05-15	Correction of minor errors. Adaptations to instrument Software V6.0. Updates to worktables, Incubator, washer (Hydroflex), Vector-2. (see cross references)
4	1	2007-10-24	Correction of minor errors. Adaptations to instrument Software V6.0 SP1. Updates to Vector-2, firmware compatibility list.
4	2	2007-11-01	Correction of minor errors. Adaptations to instrument Software V6.1. Windows Vista Business, UMS, Updates to LiHa panel, DiTi panel, System Liquid panel, new Colorimetric Test, firmware compatibility list.
4	3	2008-09-18	Correction of minor errors. Adaptations to instrument Software V6.2. New MCA384 panel, New MCA wash panel, Updates to RoMa panel, Liquid System panel, Instrument Functions.
4	4	2009-03-17	Correction of minor errors. Adaptations to instrument Software V6.3. New CGM panel; Basic Setup panel, MCA384 panel, Move Test panel and Move Test 2 panel modified.
4	5	2010-03-30	Correction of minor errors. Adaptations to instrument Software V6.4. Description of remote support tool (Netviewer).
4	6	2012-04-12	Support for Air LiHa added.
5	0	2013-03-20	Support for standard user rights under Windows 7.
5	1	2014-02-26	Adaptations to instrument Software V7.1, firmware compatibility list.
6	0	2014-07-07	Adaptations to instrument Software V7.2, New LiHa and Air LiHa panel test: Reed Crosstalk test.
6	1	2015-03-13	Adaptations to Instrument Software V7.3, New Option: Slide-In BCR.

Document Status Sheet

Title:	Instrument Software V8.0, Software Manual		**Part number:**	30132342.00
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Version	**Revision**	**Issue**	**Document History**
6	2	2015-07-15	Updated firmware compatibility list, updated user permissions for Reed Cross-talk test in LiHa and Air LiHa panel.
6	3	2016-02-18	Update Software 7.5; Update Firmware
6	4	2016-04-19	Update Software 7.6
6	5	2017-06-26	Update Software 8.0 Added: Carrier locking test; Support Windows 10

10 Liquid System Functions

10.1 Liquid System Menu

The new **Liquid System** menu contains a number of items over which you can call up the appropriate panels that contain all associated setups and tests.

The **Liquid System** menu contains the commands listed below.

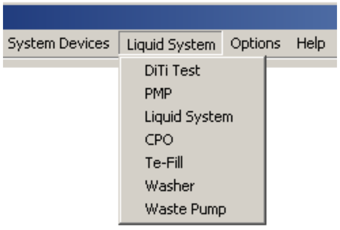


Fig. 10-1 Liquid System menu

Tab. 10-1 Liquid System Menu

Menu Item	Function	Details see section
DiTi Test	Panel for DiTi tests: DiTi Eject test and Lower DiTi Eject test	10.5, 🗎 10-20
PMP	Used for testing the PMP option	10.6, 🗎 10-27
Liquid System	Panel containing Liquid System functions: • FaWa test • Liquid Level Detection • Gravimetric test	10.9, 🗎 10-65
CPO	Panel for setting up and testing the CPO (appears in menu only if Cellerity configuration is installed)	10.4, 🗎 10-7
Te-Fill	Panel for setting up and testing the Te-Fill option	10.7, 🗎 10-43
Washer	Panel for setting an alias name for the washer and testing the liquid system	10.10, 🗎 10-104
Waste Pump	For testing the Waste Pump	10.8, 🗎 10-59

10.2 Wash Stations

With several of the functions described in this chapter (**DiTi**, **Liquid Detection**, **FaWa**, **Gravimetric Test, Colorimetric Test** and Balance setup) you will have to load a worktable map that corresponds to the wash station that is installed on your instrument. This section provides a brief description of the wash stations you are likely to encounter in the field.

DiTi Wash Waste Station

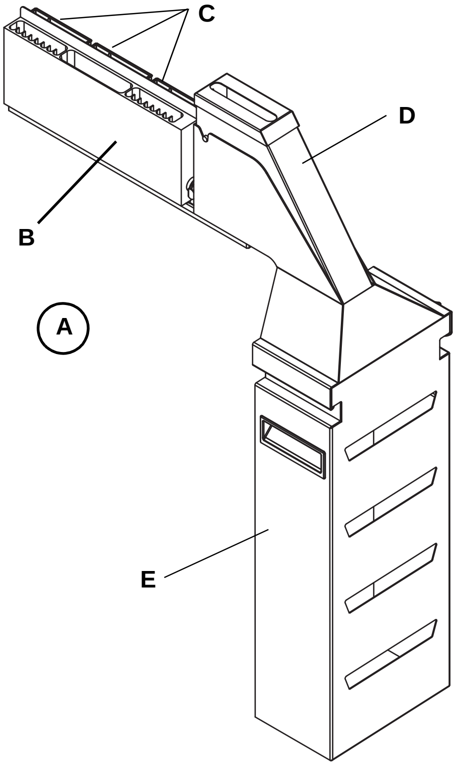


Fig. 10-2 DiTi wash waste station

A	*DiTi Wash Waste Station complete*
B	*Wash station*
C	*3 troughs*
D	*DiTi waste rack*
E	*DiTi waste container*

The DiTi Wash Waste Station (A) combines a wash station (B), 3 troughs (C) and a DiTi waste rack (D) with attached DiTi waste container (E) or DiTi waste bag into one unit.

- It occupies two grid positions on the worktable.
- The DiTi Wash Waste station is referred to as the **Combo Wash Station** by the Setup and Service software.
- This combined DiTi Wash Waste station has originally been designed for Freedom EVOlyzer instruments, but can be used on other instruments as well.

Freedom EVO 75 Wash Station

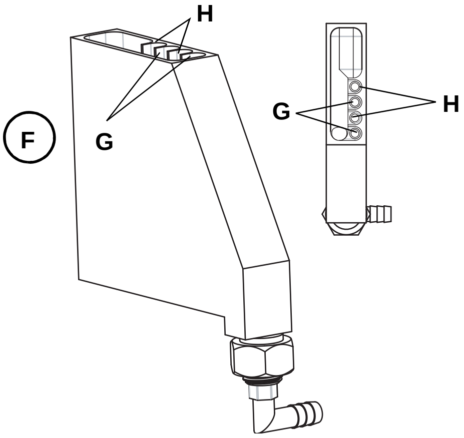


Fig. 10-3 EVO 75 wash station

F	*Freedom EVO 75 wash sta<tion*
G	*Shallow wash positions*
H	*Deep wash positions*

This small wash station is used for Freedom EVO 75 instruments that are equipped with a 2-tip LiHa.

Note the arrangement of the shallow and the deep wash positions.

The wash station occupies one grid position on the worktable.

Standard Wash Station

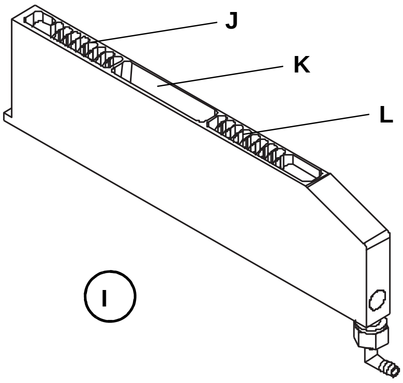


Fig. 10-4 Standard wash station

I	*Standard wash station*
J	*8 shallow wash positions at rear*
K	*Waste position at center*
L	*8 deep wash positions at front*

The standard wash station can be used on most instruments (Genesis Classic, Genesis Freedom, Freedom EVO). It occupies one grid position on the worktable.

Other Types of Wash Stations

Apart from the above wash stations the following variants of the standard wash station are also available. Note that they look similar to the standard wash station and occupy one grid position on the worktable:

- Low volume wash station, used with low volume option

Note: *The Setup and Service software treats these variants as "standard" wash stations.*

Additional Information

For additional information about the various types and variants of wash stations and their properties consult the corresponding Operating and Service Manuals.

10.3 Liquid System Pages

This section describes two pages that are used by various Liquid System functions. The pages are automatically put at the user's disposal when they are needed in a specific context.

10.3.1 Worktable Page

Cross References

List of cross references to information provided in other sections:

Information	References
Description of Worktable page	See chapter 5.2.7, 🗎 5-20

The Worktable page lets you select an appropriate worktable map that is adapted to a specific function (→ Cross References).

10.3.2 Test Configuration Page

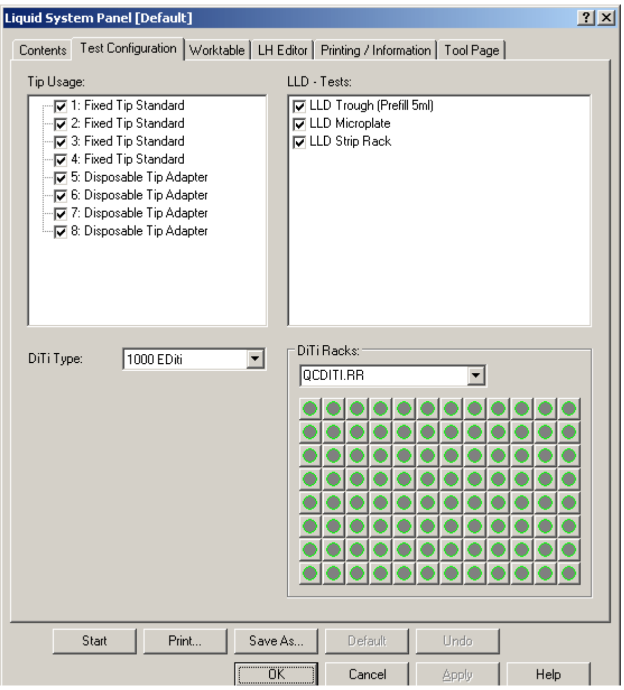
Cross References

List of cross references to information provided in other sections:

Information	**References**
Gravimetric Test	See chapter 10.9.7, 🗎 10-84

Purpose The **Test Configuration** page lets you specify the test conditions for the Liquid System test (FaWa, DiTi, Gravimetric tests, Colorimetric test, etc.).

Example The example in the following figure shows the **Test Configuration** page for the **Liquid Level Detection** test.



Tip Usage:
- ☑ 1: Fixed Tip Standard
- ☑ 2: Fixed Tip Standard
- ☑ 3: Fixed Tip Standard
- ☑ 4: Fixed Tip Standard
- ☑ 5: Disposable Tip Adapter
- ☑ 6: Disposable Tip Adapter
- ☑ 7: Disposable Tip Adapter
- ☑ 8: Disposable Tip Adapter

LLD - Tests:
- ☑ LLD Trough (Prefill 5ml)
- ☑ LLD Microplate
- ☑ LLD Strip Rack

DiTi Type: 1000 EDiti

DiTi Racks: QCDITI.RR

Fig. 10-5 Test Configuration page

Tab. 10-2 Controls on Test Configuration page

Element	**Description**
Tip usage	Shows the installed tips according to the LiHa channel page. You can select the tips you want to include in the test by selecting or clearing the corresponding check box(es).
LLD Tests	Lets you select the carriers, troughs and microplates you want to include in the test.
DiTi Type	Allows you to define the DiTis to be used for the test

Tab. 10-2 Controls on Test Configuration page (cont.)

Element	Description
DiTi Racks	The frame **DiTi Racks** contains two elements: • List box that allows you to select a DiTi rack or DiTi box. In this case a graphical representation of the selected DiTi rack or DiTi box appears below the list box. • Graphical representation of the selected DiTi rack or DiTi box. You can select / deselect individual DiTis (e.g., you can deselect the positions of the DiTi box that contain no DiTis, or where no DiTis should be picked up). • For more detailed information see paragraph "How DiTis are Picked Up", 🗎 10-6 later in this section.

Explanations

Tip Usage Window

If the **Gravimetric Test** has been selected, the **Tip** entries are expandable. This lets you adapt the tip parameters for the **Gravimetric Test**. For more details (see cross references).

LLD Tests Window

Note that this window is only needed for the **Prefill for Liquid Level Detection** function and for the **Liquid Level Detection** test. It has no significance for all other tests. It contains only elements if the **Liquid Level Detection** test has been selected

Selecting / Deselecting DiTis

In the graphical representation of a DiTi box, DiTis appear as follows:

- Selected DiTis appear green. During the test the system assumes that there is a DiTi in each selected position.
- Deselected DiTis appear red. During the test the system assumes that there are no DiTis in the corresponding positions.
- You can select individual tips, multiple tips or all tips at once.

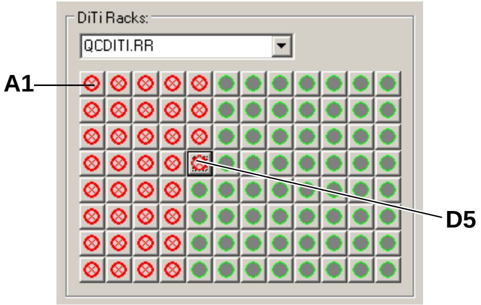
WARNING

To avoid worktable contamination and splashes of liquid on the worktable, make sure you use only new and uncontaminated DiTis for the tests described in this section.

To select / deselect individual DiTis:

1 Click the DiTi(s) you want to select / deselect. Selected (green) DiTis are deselected and vice versa.

The following figure explains how you can select / deselect multiple tips. To obtain the result shown in the figure below proceed as follows:



1 With all DiTis selected (green) click the DiTi symbol in position A1.

2 Hold down the **Shift** key and click the DiTi symbol in the required position (e.g., D5).

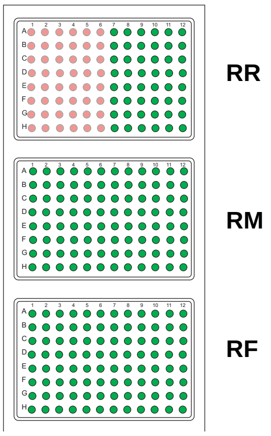
The result is shown on the left.

Fig. 10-6 *Deselecting multiple DiTis*

Likewise, you can select or deselect other groups of DiTis or all DiTis of a DiTi rack or DiTi box.

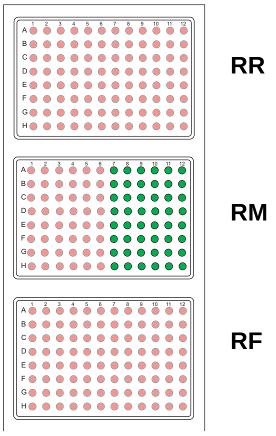
How DiTis are Picked Up

After a procedure has been started, DiTis are picked up from all the DiTi boxes where you have preselected DiTis, beginning with the rearmost DiTi box. The following figures explain how this is done.



In the configuration shown on the left side the DiTis will be picked up from the rear DiTi box (RR), then from the middle box (RM) , then from the front DiTi box (RF).

This arrangement can be used, as long as all the DiTi boxes contain the same type of DiTi.



However, if there are boxes with different DiTi types, it may be necessary to pick up the DiTis from one specific DiTi box only (e.g., from RM).

In this case you must deselect the DiTis from the neighboring boxes (RR) and (RF) to prevent their DiTis from being picked up as well.

Fig. 10-7 *Selecting the DiTi boxes from which DiTis can be picked up*

10.4 CPO Function

10.4.1 Overview

What is a CPO?

The CPO (Controlled Pump Option) is a part of the liquid system in Cellerity. Its purpose is to transport larger amounts of liquid to the worktable (to the liquid handling arm, wash stations, troughs, etc.). The following figure shows how the CPO is integrated in the instrument's liquid system. The CPO itself is located on the left side of the instrument.

Liquid System

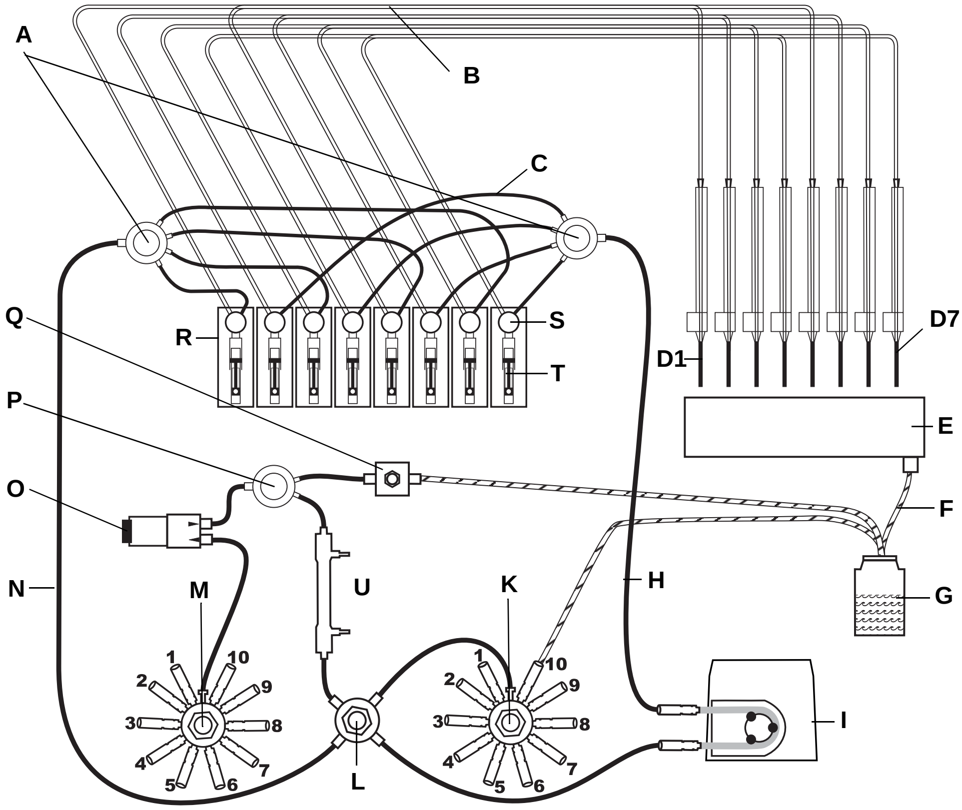


Fig. 10-8 Liquid system: principal components

A	*Distributors 1 to 4 (PVDF)*	*L*	*4-port 2-way valve*
B	*Pipetting tubing*	*M*	*10-way valve (source)*
C	*Interconnecting tubing*	*N*	*Aspirating tubing media side*
D1-7	*Tips 1 (rearmost) to 7 (frontmost)*	*O*	*CPO (Controlled Pump Option)*
E	*Wash station*	*P*	*Distributor 1 to 2 (PVDF)*
F	*Waste tubing*	*Q*	*Pressure relief valve*
G	*Waste container*	*R*	*Diluters*
H	*Aspirating tubing Peristaltic pump side*	*S*	*3-way valve*
I	*Peristaltic pump*	*T*	*Syringe*
K	*10 way valve (destination)*	*U*	*Media warmer (heat exchange)*

***Note:** Only the tips 1, 3, 5 and 7 are connected to the CPO.*

Tools

To carry out the **Valve Test,** you need two service tubes, which are included in the shipment.

10.4.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3

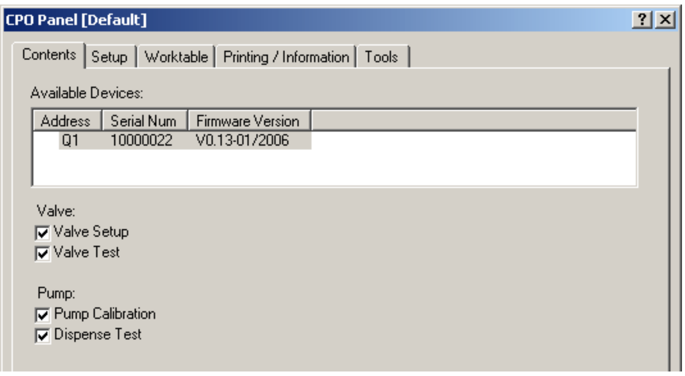
Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Function	Type	User	FSE
Valve Setup	Setup		X
Valve Test	Test	X	X
Pump Calibration	Setup		X
Dispense test	Test	X	X
Setup page	Page		X
Worktable page	Page	X	X
Tools	Tool	X	X
Printing / Information	Page	X	X
QC-Report	Report	X	X

Starting the Panel

1 Start the panel with **Liquid System > CPO**. The **CPO** panel with activated **Contents** page appears. After starting the **CPO** panel no setup or test check boxes are activated.



Available Devices:

Address	Serial Num	Firmware Version
Q1	10000022	V0.13-01/2006

Valve:
☑ Valve Setup
☑ Valve Test

Pump:
☑ Pump Calibration
☑ Dispense Test

Fig. 10-9 *CPO panel, Contents page*

Pages

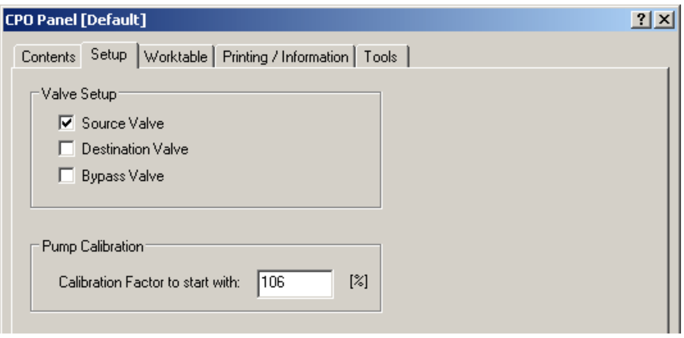
Tab. 10-3 Pages of the CPO panel

Pages	Function
Contents	General overview, device and procedure selection
Setup Page	Definition of setup parameters
Worktable	Selection of an appropriate worktable layout
Printing / Information	Print selection for the QC-report
Tools	For an informal test of the CPO functions.

10.4.3 Setup Page

Purpose

The **Setup** page lets you select the valves to set up and define a start value for **Pump Calibration Factor**.



☑ Source Valve
☐ Destination Valve
☐ Bypass Valve

Calibration Factor to start with: 106 [%]

Fig. 10-10 CPO-panel, Setup page

Controls

Valve Setup	Controls to specify the valves to set up
- **Source valve**	- Selects the source valve
- **Destination Valve**	- Selects the destination valve
- **Bypass Valve**	- Selects the bypass valve
Pump Calibration	Specification of a start value for the calibration factor
- **Calibration factor to start with**	- The field shows either the factory-set default value or the calibration factor from the last calibration. If the indicated factor is comparatively high, it may be advisable to write a reduced value in the field before starting a new calibration (e.g., after replacing the pump) in order to prevent possible liquid overflow.

10.4.4 Worktable Page

Cross References

List of cross references to information provided in other sections:

Information	References
Worktable Complete Editor	See chapter 14, 🗎 14-1

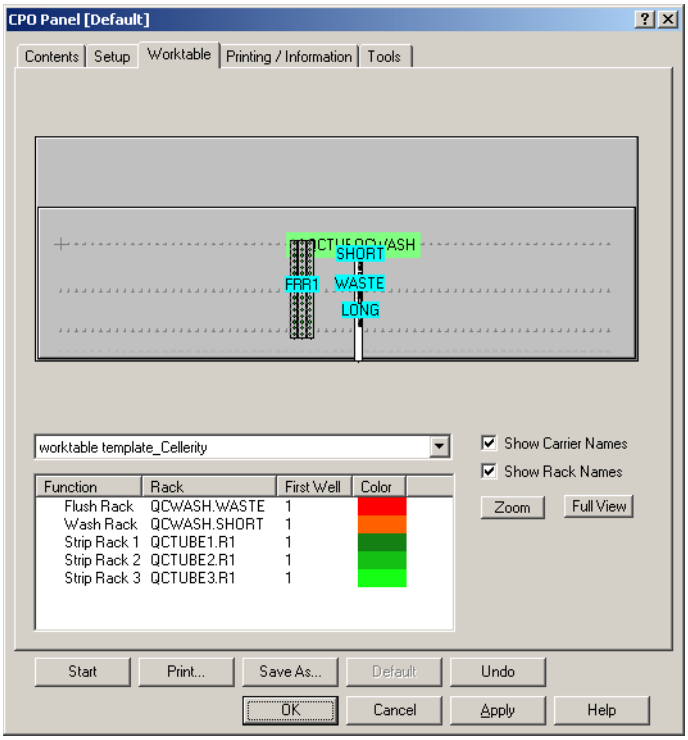
Worktable Prerequisites

To run the CPO tests you need a suitable worktable map and you must ensure that the instrument's physical worktable corresponds to the worktable map. The labware items you need are:

- Three strip racks with sixteen 100 ml tubes.
- One wash station (for flushing the tips)

There is a worktable template for Cellerity that you can use for the CPO test. If necessary, you can use the "Worktable Complete Editor" (see cross references) to adapt this template according to your needs and store it under a different name.

Worktable Template for Cellerity



worktable template_Cellerity

☑ Show Carrier Names
☑ Show Rack Names

Function	Rack	First Well	Color
Flush Rack	QCWASH.WASTE	1	🟥
Wash Rack	QCWASH.SHORT	1	🟧
Strip Rack 1	QCTUBE1.R1	1	🟩
Strip Rack 2	QCTUBE2.R1	1	🟩
Strip Rack 3	QCTUBE3.R1	1	🟩

Fig. 10-11 *CPO panel, Worktable page*

10.4.5 Tools Page

Purpose

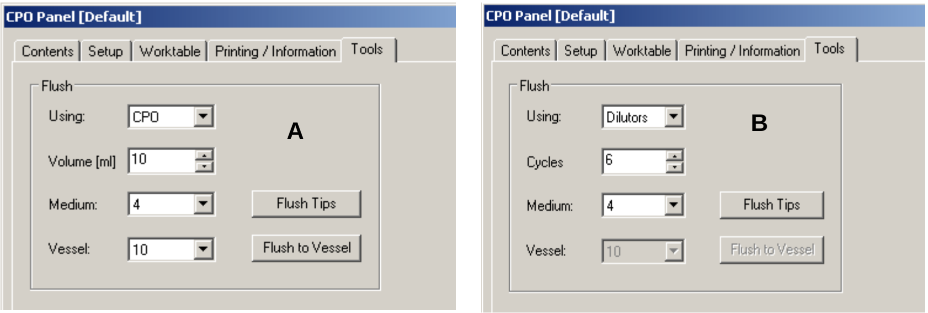
The **Tools** page contains the controls for flushing the system.

When to Flush the System

Flushing the system serves for filling the liquid system with liquid and for eliminating air bubbles from the tubings. The system should be flushed before…

- calibrating or testing the pump.
- also before switching the valves for LLD and Gravimetric test.

Tools Page



A: Using: CPO; Volume [ml]: 10; Medium: 4; Vessel: 10

B: Using: Dilutors; Cycles: 6; Medium: 4; Vessel: 10

Fig. 10-12 *CPO panel, Tools page*

A *Flushing device is CPO*

B *Diluters are used for flushing*

Controls

Note: *The* ***Tools*** *page looks slightly differently, depending on whether you choose the CPO or the diluters for flushing.*

Frame Flush	Controls for setting the flush parameters and for flushing.
- **Using**	- Lets you select the pump device, either the CPO or the diluters
- **Volume / Cycles**	- If you have selected the CPO as the flushing device, this spin box lets you set the volume to pump in [ml] - If you have selected the diluters for flushing, the spin box lets you set the number of aspirate / dispense cycles used by the diluters,
- **Medium**	- Specifies the source valve connector to which the container with the source liquid is connected
- **Vessel**	- Specifies the destination valve connector to which the destination container is connected
- **Flush Tips**	- If you click this button the flushing liquid will be directed through the LiHa tips 1, 3, 5 and 7.
- **Flush to Vessel**	- This button is only available if the CPO is used for flushing. If you click this button the flushing liquid will be directed to the waste container.

10.4.6 Valve Setup

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

In this setup, the software sets the RS-232 bus address of each selected valve (source, bypass, destination valve as specified on the **Setup** page) and stores the address in the memory of the corresponding valve.

This is necessary for two reasons:

- Contrary to USB devices, the addresses of devices connected to an RS-232 bus cannot be assigned dynamically at the startup.
- After replacing a defective valve, a wrong address may still be stored in the replacement valve.

ATTENTION

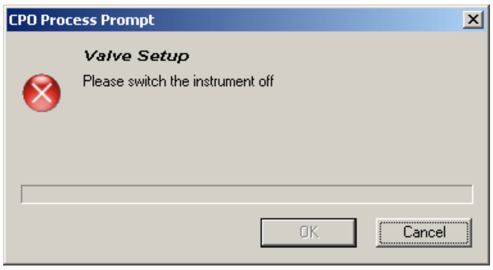
Possible damage to electronic circuits if valves are connected or disconnected while the instrument power supply is switched on.

- Always switch the instrument off before connecting or disconnecting a valve.

Procedure

To perform the **Valve Setup** procedure:

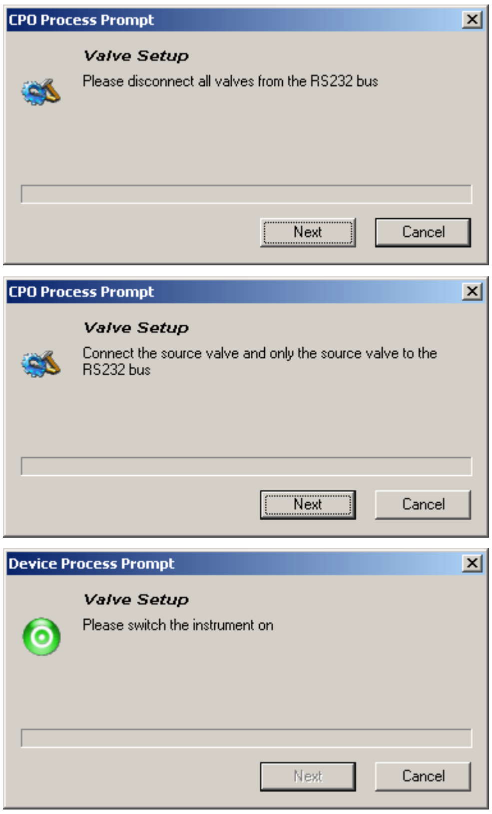
1. On the **Contents** page, select the **Valve Setup** check box and change to the **Setup** page.
2. On the **Setup** page, select the valves to include in the setup procedure.
3. Click **Start** near the bottom of the panel to begin.
   You will be guided through the setup procedure by a series of process prompts. The following prompts show how the source valve is set up. Follow the instructions provided on the prompts.



Valve Setup

Please switch the instrument off

4. Switch the instrument off.
   This is necessary to prevent damage to the electronic circuits of the valves.


CPO Process Prompt

Valve Setup

Please disconnect all valves from the RS232 bus

CPO Process Prompt

Valve Setup

Connect the source valve and only the source valve to the RS232 bus

Device Process Prompt

Valve Setup

Please switch the instrument on

Fig. 10-13 *Setting up the source valve*

5 Disconnect all valves from the RS-232 bus (source and destination valves from Port A). Do not disconnect any other cables.

6 Click **Next** when done.

7 Now connect the source valve to the bus. Do not connect any other valve.

It is irrelevant which of the three cables you use, since all of them are connected in parallel.

8 Click **Next** when done.

9 Switch the instrument on.

Now the address is set and stored in the valve.

10 In a series of further process prompts you will have to do the same for the destination valve (if selected).

11 Finally you will be prompted to do the same for the bypass valve (if selected).

Now, each valve "knows" its own bus address.

12 At the end of the setup you are prompted to reconnect the valves.

If the Setup Fails

Repeat the setup procedure. Make sure that the valves connected during the setup correspond to the ones shown on the process prompts.

10.4.7 Valve Test

Purpose

With this procedure you can test whether the liquid transport from the source valve to the destination valve works properly.

Tools

You need two service tubes, called "source service tube" and "destination service tube" and a liquid container. During the test, liquid will be pumped from the source liquid container through the source service tube to the source valve, then from the destination valve through the destination service tube into the destination liquid container.

Procedure

To perform the test:

1 On the **Contents** page, select the **Valve Test** check box and click **Start** to begin.

You will be guided through the test procedure by a series of process prompts. Follow the instructions provided on the prompts.

2 Remove all inlet tubes from the source valve and all outlet tubes from the destination valve.

3 Click **Next** when done.

4 Connect the service tubes as follows:

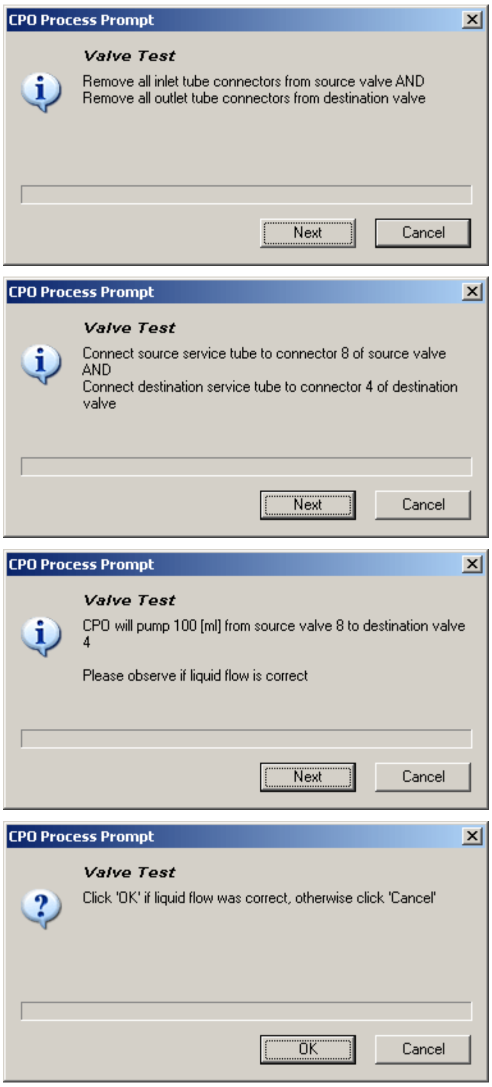
- Source tube to connector 8 of the source valve. Put the other end into the source liquid container.
- Destination tube to connector 4 of destination valve. Put the other end into the destination container.

5 Click **Next** when done.

6 The indicated amount of liquid will be pumped from the source valve to the destination valve.
Click **Next** to start the pump.

7 Carefully observe whether the liquid flows properly from the source to the destination.

8 Confirm with **OK** if the liquid flow was correct (click **Cancel** otherwise).


CPO Process Prompt

Valve Test

Remove all inlet tube connectors from source valve AND
Remove all outlet tube connectors from destination valve

CPO Process Prompt

Valve Test

Connect source service tube to connector 8 of source valve
AND
Connect destination service tube to connector 4 of destination valve

CPO Process Prompt

Valve Test

CPO will pump 100 [ml] from source valve 8 to destination valve 4

Please observe if liquid flow is correct

CPO Process Prompt

Valve Test

Click 'OK' if liquid flow was correct, otherwise click 'Cancel'

Fig. 10-14 *Valve test*

9 After you have done this, you will be prompted to do same with the service tubes connected as follows:

- Source service tube from source container to connector 4 of source valve.
- Destination service tube from connector 8 of destination valve to destination container.

10 Follow the instructions provided on the prompts.

At the end of the test you are notified whether or not the test was successful.

11 Reconnect the original tubes when the test is finished.

Pass / Fail Criteria

The test is passed if the liquid flow was correct in both parts of the test and you have confirmed accordingly on the prompts.

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- If the test cannot be started (one or more valves not available), repeat the valve setup.
- Check all tube connections. Replace faulty parts.
- Check the electrical connections of the valves.
- If a valve does not work properly, replace the whole valve or have it replaced. After replacing a valve you must repeat the valve setup for all valves.

10.4.8 Pump Calibration

Cross References

List of cross references to information provided in other sections:

Information	References
Liquid level detection	See section 10.9.6, 🗎 10-77

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

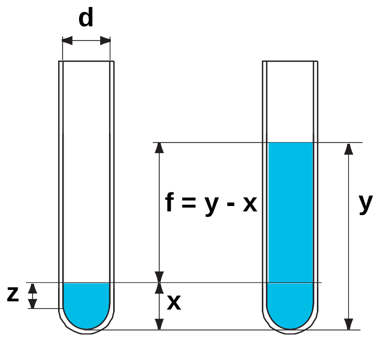
This procedure measures the liquid quantities pumped into a number of tubes and determines the liquid distribution (accuracy) and calculates the pump calibration factor. The resulting calibration factor written to the device.

Principle

The procedure consists of 12 cycles in each of which the following steps are carried out:

- All 48 tubes are prefilled with 1 ml, so that the liquid level of each tube is within the cylindrical part (level x, see following figure Fig. 10-15 , 🗎 10-16).
- The exact liquid level x is determined by means of the liquid level detection feature, LLD (see cross references).
- Then, 10 ml of liquid are added to each tube and the resulting liquid level y is again determined with LLD.
- From the difference f = y - x the software determines the real filling volume of each tube.

After the above sequence has been carried out for all tubes, the software determines the liquid distribution and its accuracy (CV = coefficient of variation). The newly calculated pump calibration factor is written to the device. If the CV exceeds 8%, a warning message is displayed.



d	*Inner tube diameter*
x	*Prefilled liquid, 1 ml*
y	*Liquid level at end of test*
z	*Cylindrical part of prefilled liquid*
f	*Filling height, f = y - x*

Fig. 10-15 *Pump calibration*

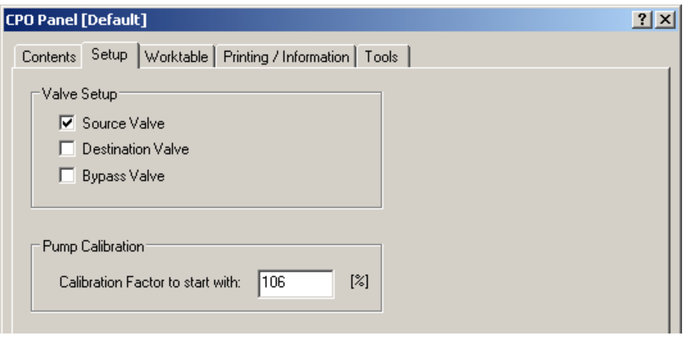
Before You Start

- Connect the source service tube to connector # 4 of the source valve.
- Load the strip racks with 3 x 16 = 48 (empty) tubes (100 ml, 16 mm).
- Make sure that the correct worktable map is loaded and that the physical arrangement of labware on the worktable corresponds to the worktable map.
- It is recommended that you fill and flush the liquid system (use the Tools page).

Procedure

To calibrate the pump:

1 On the **Contents** page, select the **Pump Calibration** check box and change to the **Setup** page.



Valve Setup
☑ Source Valve
☐ Destination Valve
☐ Bypass Valve

Pump Calibration
Calibration Factor to start with: 106 [%]

Fig. 10-16 *CPO panel, Setup page*

2 On the **Setup** page, check the value in the field **Calibration factor to start with**[1]. If it exceeds 100%, it may be advisable to reduce this value to 100% in order to prevent possible liquid overflow.

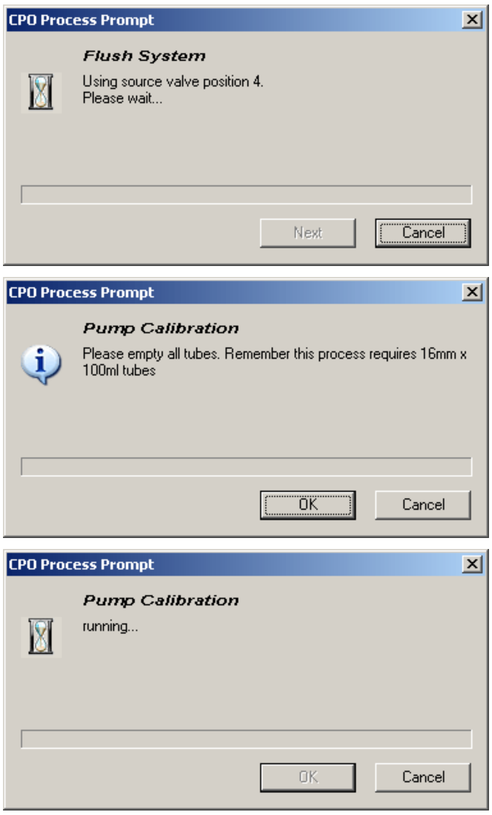
3 Also make sure that the system is prefilled, that the tubes are empty and that the correct worktable map is used.

4 Click **Start** to begin.

You will be guided through the setup procedure by a series of process prompts. Follow the instructions provided on the prompts.

---

[1] *The value corresponds either to the factory-set default or to the pump calibration factor determined in a previous calibration.*



Flush System

Using source valve position 4.
Please wait...

First the system is flushed. Wait…

Pump Calibration

Please empty all tubes. Remember this process requires 16mm x 100ml tubes

5 If not done yet, empty all tubes and put them back into the strip racks.

6 Click **OK** when done.

Pump Calibration

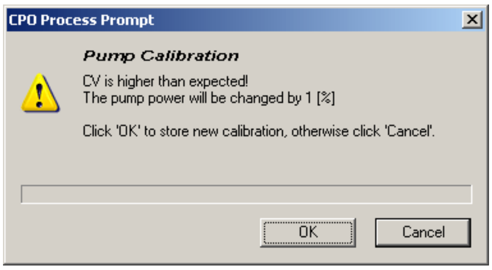
running...

Now, liquid is dispensed into the tubes and the levels are measured with LLD. Wait…

Fig. 10-17 *Pump calibration*

At the end of the calibration the calibration factor is written to the device.

Warning Message



Pump Calibration

CV is higher than expected!
The pump power will be changed by 1 [%]

Click 'OK' to store new calibration, otherwise click 'Cancel'.

If a warning message like this appears, the CV over all tubes is higher than expected.

Fig. 10-18 *CV % too high*

To fix the problem you should examine the liquid system carefully:

- Did you flush the system before starting the calibration?
- Have you used the correct tubes (100 ml, 16 mm) ?
- Are there any kinked, jammed or clogged tubings?
- Are there clogged or damaged tips?

After you have fixed the problem you should repeat the calibration.

10.4.9 Dispense Test

Purpose

This procedure measures the liquid quantities pumped into a number of tubes and determines the liquid distribution (accuracy) and the CV %. The results are compared with the expected values.

Principle

In principle, the procedure does the same as that for the pump calibration, except that nothing is written to the device. The results are compared against the pass / fail criteria (see QC-report).

Before You Start

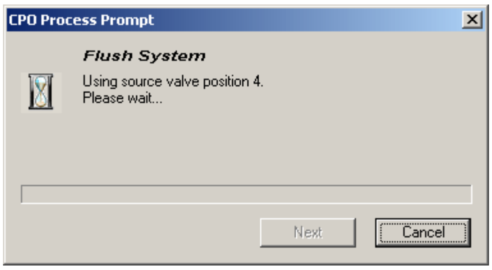
- Connect the source service tube to connector # 4 of the source valve.
- Load the strip racks with 3 x 16 = 48 empty tubes (100 ml, 16 mm).
- Make sure that the correct worktable map is loaded and that the physical arrangement of labware on the worktable corresponds to the worktable map.
- It is recommended that you fill and flush the liquid system (use the Tools page).

Procedure

To perform the test:

1 On the **Contents** page, select the check box **Dispense** Test and click **Start** to begin.

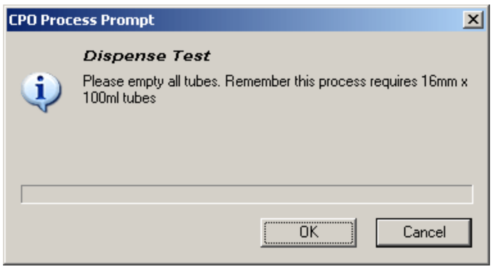
You will be guided through the test procedure by a series of process prompts. Follow the instructions provided on the prompts.



Flush System

Using source valve position 4.
Please wait...

First the system is flushed. Wait…



Dispense Test

Please empty all tubes. Remember this process requires 16mm x 100ml tubes

2 Empty the tubes when prompted to do so, then put them back into the strip racks.

3 Click **OK** to continue when done.

The test is now performed.

***Fig. 10-19** Dispense test*

At the end of the test a pass/fail message appears notifying you whether or not the test was successful. You can view the results on the Printing / Information page and on the QC-report.

Pass / Fail Criteria

The test is passed if:

- The accuracy (mean deviation from average): -10% ≤ accuracy ≤ +10%
- CV %: ≤ 10%

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Examine the QC-report. Are there any individual channels that are outside the tolerance limits. If there are “bad” channels check the following:
  - Are there any kinked, jammed or clogged tubings?
  - Are there clogged or damaged tips?
  - Have you used the correct tubes (length 100 mm, diameter 16 mm)?
- If the CV% is within the limits, but the accuracy is outside the tolerance limits:
  - Repeat the pump calibration and test
  - Check the source and destination valves, the tubings for damage.
  - Replace any faulty parts.

10.4.10 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

10.5 DiTi Test Function

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3

10.5.1 DiTi Test Panel

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 10-4 *DiTi test and User Permissions*

Function	Type	User	FSE
DiTi eject test	Test	X	X
Lower DiTi eject test	Test	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Before You Start

Pay attention to the following:

ATTENTION

Before starting the panel you must open the **Channel** page on the **LiHa** panel and check (and, if necessary correct) the tip configuration.

- You cannot rectify the settings after you have started the panel.
- If you notice errors in the tip configuration only after you have started the panel, it will be necessary to quit it, rectify the settings on the **Channel** page and then restart the panel.

8 Plus 1 Access LiHa

Because on the 8 Plus 1 Access LiHa the channels # 2 to # 8 are mechanically linked together and function as a block, the following restrictions apply to the tests described in this section:

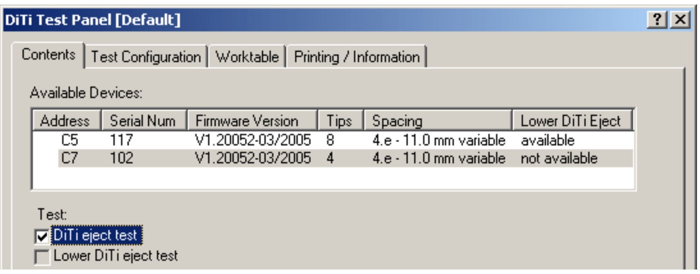
- Checking the eject position of the tips (see "Using the Lower DiTi Eject Tool", 🗎 10-22) is done with tip # 1 to tip # 3 only.
- When selecting tips for a test in the **Tip Usage** window of the **Test Configuration** page (see 10.5.2 "Test Configuration Page", 🗎 10-21) you can only select tip # 1 and / or Tip # 2 to Tip # 8 (as a block), otherwise you will get an error message.

Starting the DiTi Test Panel

After you have checked the tip configuration on the LiHa Channel page, you can perform the DiTi test functions as follows:

1 Start the panel with **Liquid System > DiTi Test.**

The DiTi Test panel with activated ***Contents*** *page appears. After starting the DiTi panel no check box is selected and not all tabs are visible.*



Available Devices:

Address	Serial Num	Firmware Version	Tips	Spacing	Lower DiTi Eject
C5	117	V1.20052-03/2005	8	4.e - 11.0 mm variable	available
C7	102	V1.20052-03/2005	4	4.e - 11.0 mm variable	not available

Test:

☑ DiTi eject test
☐ Lower DiTi eject test

Fig. 10-20 *DiTi Test panel, Contents page*

Pages

The DiTi Test panel consists of the following pages:

Tab. 10-5 *Pages of the DiTi Test panel*

Page	Description
Contents	General overview, procedure/test selection.
Test Configuration	For setting the test parameters
Worktable	Selection of an appropriate worktable map
Printing / Information	Print selection for the QC-report.

10.5.2 Test Configuration Page

Cross References

List of cross references to information provided in other sections:

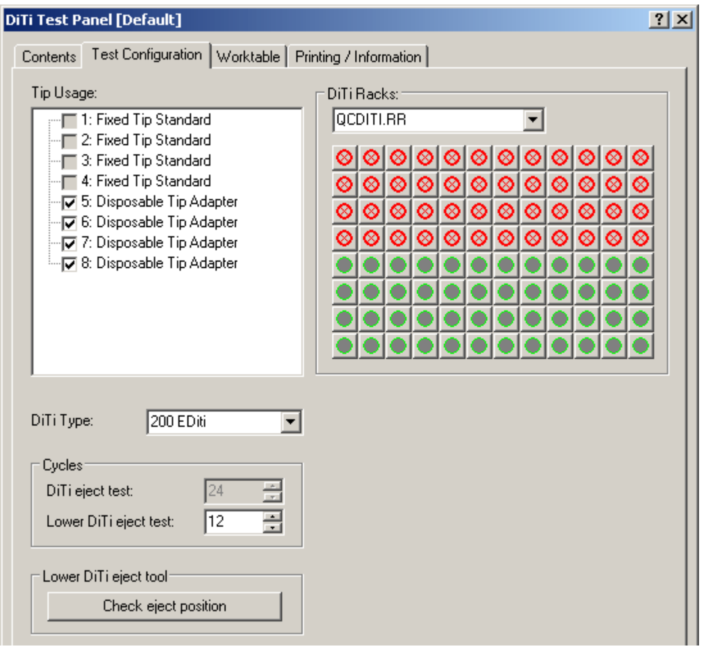
Information	References
General description of test configuration page for the Liquid System	See section 10.3.2, 🗎 10-3
Lower DiTi eject test	See section 10.5.5, 🗎 10-25

Purpose

This section briefly describes the elements of the T**est Configuration** page that are specific to the **DiTi** test and the **Lower DiTi Eject** test.

Test Configuration Page

The following figure shows an example of a Test Configuration page for the **Lower DiTi Eject** test.



Tip Usage:

- ☐ 1: Fixed Tip Standard
- ☐ 2: Fixed Tip Standard
- ☐ 3: Fixed Tip Standard
- ☐ 4: Fixed Tip Standard
- ☑ 5: Disposable Tip Adapter
- ☑ 6: Disposable Tip Adapter
- ☑ 7: Disposable Tip Adapter
- ☑ 8: Disposable Tip Adapter

DiTi Racks: QCDITI.RR

DiTi Type: 200 EDiti

Cycles
DiTi eject test: 24
Lower DiTi eject test: 12

Lower DiTi eject tool

*Fig. **10-21** DiTi tests, Test configuration page*

Controls

The following table contains a brief description of the controls used for the **DiTi / Lower DiTi eject** tests.

***Note:** For detailed information, for example on how DiTis are picked up from a DiTi rack*
(see cross references).

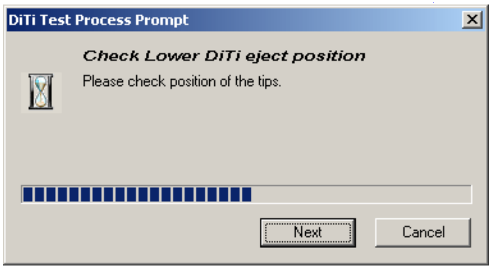
*Tab. **10-6** Controls on Test Configuration page*

Element	Description
Tip usage	Selection of the tips to include in test.
DiTi Type	Definition of the DiTis used for the test
DiTi Racks	The frame contains two controls: • List box: Selection of a DiTi rack or DiTi box. • Graphical representation: Lets you select / deselect the DiTis on the rack.you have selected from the list.
Cycles	The two spin boxes let you set the number of test cycles for the **DiTi eject** test and the **Lower DiTi eject** test.
Lower DiTi eject tool	The command button **Check eject position** allows you to test the eject position semi-manually and informally. See below.

Using the Lower DiTi Eject Tool

This tool allows you to visually check the Z-height of the DiTis shortly before they are ejected by the corresponding rocker installed on the LiHa. It is especially useful if the **Lower DiTi eject** test fails.

If you click the button **Check eject position**, DiTis are picked up according to your settings on the Test configuration page (**Tip Usage**, **DiTi Type** and **DiTi Racks).** Then the LiHa moves over the DiTi waste station and stops.



Check Lower DiTi eject position

Please check position of the tips.

The prompt shown in the figure appears and instructs you to check the eject position of the DiTis.

Fig. 10-22 *Check eject position*

To check the eject position:

1. Slightly press the eject rocker manually against the DiTis.
2. Visually check the heights of the individual DiTis to see whether all of them will be stripped off.
3. If their heights are correct click **Next** and check whether they are ejected properly.

If the Test with the Tool Fails

For the pass / fail criteria and possible measures refer to the **Lower DiTi eject test** (see cross references).

10.5.3 Worktable Page

Cross References

List of cross references to information provided in other sections:

Information	References
Worktable page	See section 5.2.7, 🗎 5-20

The Worktable page lets you select an appropriate worktable map that is adapted to a specific function (→ Cross References).

10.5.4 DiTi Eject Test

Cross References

List of cross references to information provided in other sections:

Information	References
Worktable page	See section 10.3.1, 🗎 10-3
Test configuration page	See sections 10.5.2, 🗎 10-21 and 10.3.2, 🗎 10-3

Purpose

The **DiTi Eject Test** function checks whether the DiTis are picked up and ejected properly.

Test Sequence

The LiHa starts picking up DiTis from the rearmost DiTi rack where DiTis have been preselected.

- If, for instance, the LiHa is equipped with eight DiTi channels and the DiTi rack is filled with 96 DiTis at the beginning, the test sequence is as follows:
  The test begins with the DiTis in the 1st (leftmost) column of the DiTi rack and continues with the 2nd, 3rd, … 12th column as follows:
  - The DiTis are picked up from the n^{th} column (A_n to H_n), where $1 \leq n \leq 12$.
  - In a second step, LiHa moves **over the leftmost column of the rearmost rack**, but does **not eject any DiTis.** Note that this rack is not necessarily identical with the rack from where the DiTis were picked up.
  - Then the LiHa moves over the DiTi waste where the DiTis are ejected.
- If, for example, the LiHa has only four DiTi channels, then each column would be emptied in two consecutive steps (A_n to D_n then E_n to H_n).

WARNING

To avoid worktable contamination and splashes of liquid on the worktable, make sure you use only new and uncontaminated DiTis for the tests described in this section.

Procedure

1. On the **Contents** page, select the **DiTi eject test** check box.
2. If necessary, change to the **Worktable** page, and load a suitable worktable map. Make sure that the physical worktable layout corresponds exactly with the worktable map (see cross references).
3. Change to the **Printing / Information** page and fill out the **Comments** field as necessary.
4. Change to the **Test Configuration** page (see following figure) and make the necessary entries.
   - Select the tips you want to include in the test in the window **Tip Usage**.
   - Select the appropriate **DiTi Type** from the corresponding list.
   - Set the number of test cycles from the spin box in the frame **Cycles**.
   - Use the controls in the frame **DiTi Racks** to select the DiTi boxes and the corresponding graphical representations to select or deselect the available / unavailable DiTis (see cross references).
   - Remember that you must deselect the DiTis from racks that do not contain the DiTi type you need for your test.
5. Click **Start** to begin.

   *At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the test was successful.*

If the Test Fails

If the test fails perform the following LiHa tests (→ Cross References):

- If the DiTis were not picked up properly, then perform the procedure **Verify Reference Positions**. If they are not correct, perform the procedure **Determine Reference Positions**.
- If the DiTis were picked up, but an error message indicates, that the DiTis could not be picked up, then perform the **Tip Adapter** test to check the electrical contact of the DiTi.

Note: *If the test fails again, call your nearest service organization.*

10.5.5 Lower DiTi Eject Test

Cross References

List of cross references to information provided in other sections:

Information	References
Worktable page	See section 10.3.1, 🗎 10-3
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3

Purpose

The **Lower DiTi Eject Test** function checks whether the DiTis are picked up and ejected properly on LiHas equipped with the lower DiTi eject option.

Test Sequence

The LiHa starts picking up DiTis from the rearmost DiTi rack where DiTis have been preselected.

- If, for instance, the LiHa is equipped with eight DiTi channels and the DiTi rack is filled with 96 DiTis at the beginning, the test sequence is as follows:
  The test begins with the DiTis in the 1st (leftmost) column of the DiTi rack and continues with the 2nd, 3rd, … 12th column as follows:
  - The DiTis are picked up from the n^{th} column (A_n to H_n), where $1 \leq n \leq 12$.
  - In a second step, the LiHa moves **over the leftmost column of the rearmost rack**, where the DiTis are deposited temporarily (positions A_1 to H_1). Note that this rack is not necessarily identical with the rack from where the DiTis were picked up.

Note: In order to avoid collisions, this column must not contain any DiTis after the start of the test.

  - In a third step, the LiHa picks up the DiTis again, moves over the DiTi waste and finally ejects them.

- If, for example, the LiHa has only four DiTi channels, then each column would be emptied in two consecutive steps (A_n to D_n then E_n to H_n).

WARNING

To avoid worktable contamination and splashes of liquid on the worktable, make sure you use only new and uncontaminated DiTis for the tests described in this section.

Procedure

1. On the **Contents** page, select the **Lower DiTi eject test** check box.
2. If necessary, change to the **Worktable** page, and load a suitable worktable map. Make sure that the physical worktable layout corresponds exactly with the worktable map (see cross references).
3. Change to the **Printing / Information** page and fill out the **Comments** field as necessary.

4. Change to the **Test Configuration** page (see following figure) and make the necessary entries.
   – Select the tips you want to include in the test in the window **Tip Usage**.
   – Select the appropriate **DiTi Type** from the corresponding list.
   – Set the number of test cycles from the spin box in the frame **Cycles**.
   – Use the controls in the frame **DiTi Racks** to select the DiTis available for the test or to deselect those that are not available, respectively (see cross references).
   – Remember that you must deselect the DiTis from racks that do not contain the DiTi type you need for your test.

ATTENTION

Be careful if the LiHa will not start picking up DiTis from the leftmost column of the rearmost rack.

- During the test, the DiTis will be deposited temporarily in this column before they are ejected.
- To avoid collisions and damage to material, make sure that this column does not contain any DiTis during the test in such a case.

5. Click **Start** to begin.

   At the end of the test a ***Test Passed*** *or* ***Test Failed*** *message notifies you whether or not the test was successful.*

If the Test Fails

If the test fails perform the following LiHa procedures (→ Cross References):

- If the DiTis were not picked up properly, then perform the procedure **Verify Reference Positions**. If they are not correct, perform the procedure **Determine Reference Positions**.
- If the DiTis were picked up, but an error message indicates, that the DiTis could not be picked up, then perform the **Tip Adapter Test** to check the electrical contact of the DiTi.
- If the DiTis are not ejected properly perform the procedure **Calibrate Lower DiTi Eject**.
- Call your nearest service organization if necessary.

10.6 PMP Function

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3“

10.6.1 Introduction

About the PMP Option

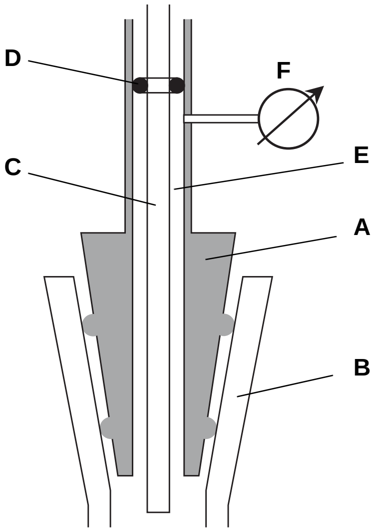
The PMP Option (PMP = Pressure Monitored Pipetting) is a pipetting module that monitors the pressure of the air gap between sample and system liquid during aspiration, sample transport and dispensing, using disposable tips. It is used for aspiration and dispense control, clot detection and liquid level detection.

Air LiHa

The Air (displacement) LiHa does not use system liquid. The diluters of a liquid system are substituted by plunger drives on the Air LiHa. For this reason the pressure between plunger and sample is monitored on the Air LiHa.

PMP Tip Adapter Structure

The PMP option uses a special tip adapter containing a pressure sensor.

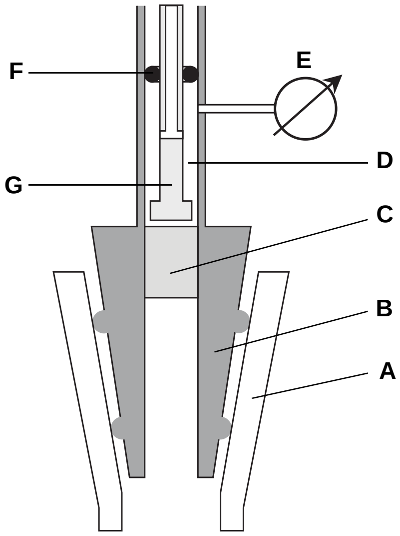


A	*DiTi cone*
B	*DiTi*
C	*Tubing*
D	*O-ring sealing*
E	*P-channel*
F	*Pressure sensor*

Fig. 10-23 *PMP tip adapter principle*

Air LiHa Tip Adapter Structure

The air displacement liquid handling arm (Air LiHa) uses always the PMP functionality by means of special Air LiHa tip adapters. These tip adapters do not have tubing connection (as in a liquid system). The air pressure in the p-channel is varied by a plunger moving up and down in the Z-shaft. An Inline filter in the DiTi cone shall prevent from sample liquid entering the p-channel.



A	*DiTi*
B	*DiTi cone*
C	*Inline filter*
D	*P-channel*
E	*Pressure sensor*
F	*Sealing*
G	*Air tube*

Fig. 10-24 *Air LiHa tip adapter principle*

Definitions

Clogged Pressure Channel

This is the case if liquid clogs the pressure channel (p-channel) completely so that the pressure sensor cannot not detect the pressure in the DiTi anymore.

Leaking

Leaking occurs when air enters in any other way than by the tip opening, for example if the sealings are not tight.

Tests

WARNING

To avoid worktable contamination and splashes of liquid on the worktable, make sure you use only new and uncontaminated DiTis for the tests described in this section.

PMP Channel Test

Overpressure is generated in all channels, one by one. Each channel must only “see” the corresponding dilutor (or plunger drive).

Clogging Test

Ambient pressure is measured. Then the tip is sealed on the PMP Leakage Test Block, overpressure is built up and measured and finally the tip is unsealed again. The ambient pressure before and after the overpressure is compared (must be the same if not clogged).

Leakage Test

The leakage test applies over and under pressure as the defect could behave like a valve only leaking in one direction.

Note: *To test leakage, relative high pressure must be applied. This may unclog a previously clogged pressure channel. Measure: Perform the clogging test before running the leakage test*

P-Sensor Test

First the ambient pressure is measured and afterwards overpressure (80 mbar) is generated several times to check if the pressure values are repeatable within the allowed tolerance.

Filter Test

The filter test is only available for Air LiHa tip adapters. During the test the plunger is moved up and down several times. The pressure difference between “up” and “down” is measured and compared to a nominal bandwidth. If the pressure is too high the filter is clogged, if the pressure is too low the filter leaks or is absent.

Pressure Liquid Level Detection Test

On detection of liquid the pressure based liquid level detection pLLD is compared simultaneously with the capacitive liquid level detection cLLD. The result from pLLD must be returned within a defined time-frame (max. 16 ms after the cLLD).

10.6.2 Required Tools

PMP Leakage Test Block

A key procedure for PMP Option tests is sealing the DiTis using the PMP Leakage Test Block. This tool has a soft plastic slab on its surface. The tips are moved down to this slab and must be pressed with a defined force onto it in order to close the tips. The PMP Leakage Test Block can be installed directly on the worktable or in a trough carrier that is placed on the worktable.

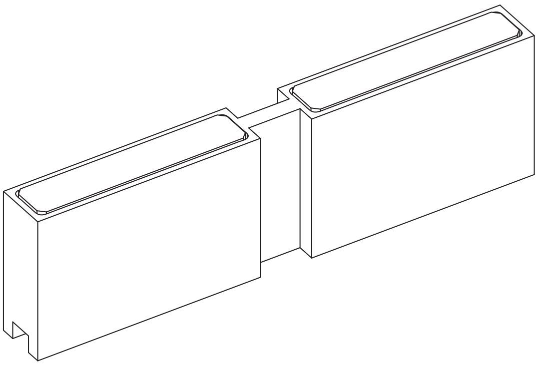


Fig. 10-25 *PMP Leakage Test Block*

10.6.3 PMP Panel

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 10-7 PMP functions and User Permissions

Function	Type	User	FSE
USB Test	Test	X	X
PMP Channel Test	Test	X	X
Clogging Test	Test	X	X
Leakage Test	Test	X	X
P-Sensor Test	Test	X	X
Filter Test (Air LiHa only)	Test	X	X
Pressure Liquid Level Detection Test	Test	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Starting the PMP Panel

Perform the **PMP Option** test functions as follows:

1 Start the panel with **Liquid System > PMP.**

*The **PMP** panel with activated **Contents** page appears. After starting the panel no check box is selected.*

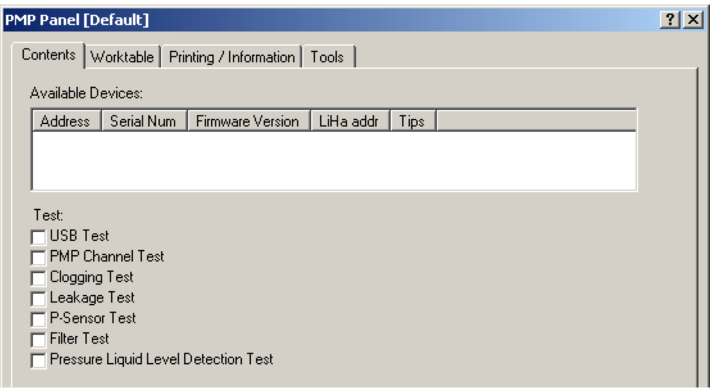


***Fig. 10-26** PMP Panel, Contents page*

Pages

The **PMP** panel consists of the following pages:

Tab. 10-8 Pages of the PMP panel

Page	Description
Contents	General overview, procedure / test selection.
Test Configuration	For setting the test parameters
Worktable	Selection of an appropriate worktable layout
Printing / Information	Print selection for the QC-report.
Tools	Tools for flushing tips, resetting pressure errors. Also shows the current pressure measured by the pressure sensors.

10.6.4 PMP Test Configuration Page

Cross References

List of cross references to information provided in other sections:

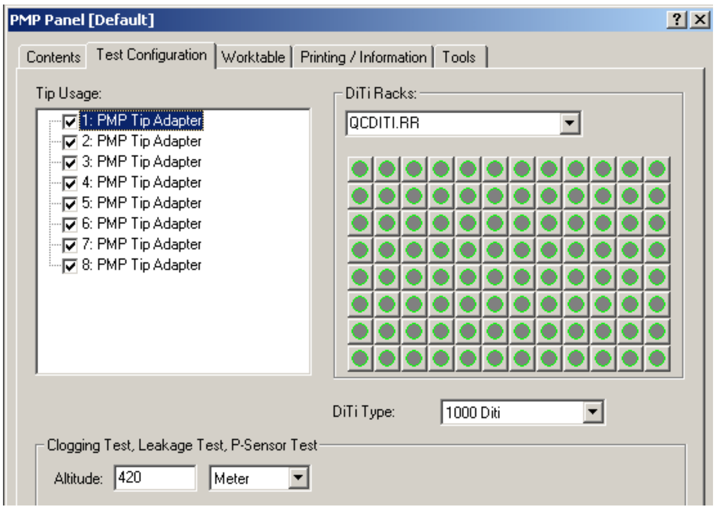
Information	References
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3

Purpose

Before running any of the PMP Option tests the DiTis used have to be defined and configured in the Test Configuration page. This means to:

- Select the tips you want to include in the test in the window **Tip Usage**.
- Select the appropriate **DiTi Type** from the corresponding list.
- Use the controls in the frame **DiTi Racks** to select the DiTis available for the test or to deselect those that are not available, respectively (see cross references).
- Enter for the location of the instrument the altitude above sea level in the frame **Clogging Test, Leakage Test, P-Sensor Test**.

Note: *DiTis with or without filter can be used for the tests*



Tip Usage:
☑ 1: PMP Tip Adapter
☑ 2: PMP Tip Adapter
☑ 3: PMP Tip Adapter
☑ 4: PMP Tip Adapter
☑ 5: PMP Tip Adapter
☑ 6: PMP Tip Adapter
☑ 7: PMP Tip Adapter
☑ 8: PMP Tip Adapter

DiTi Racks: QCDITI.RR

DiTi Type: 1000 Diti

Clogging Test, Leakage Test, P-Sensor Test
Altitude: 420 Meter

Fig. 10-27 PMP Option Tests, Test Configuration page

10.6.5 PMP Worktable Page

Cross References

List of cross references to information provided in other sections:

Information	References
Worktable Complete Editor	See chapter 14, 🗎 14-1

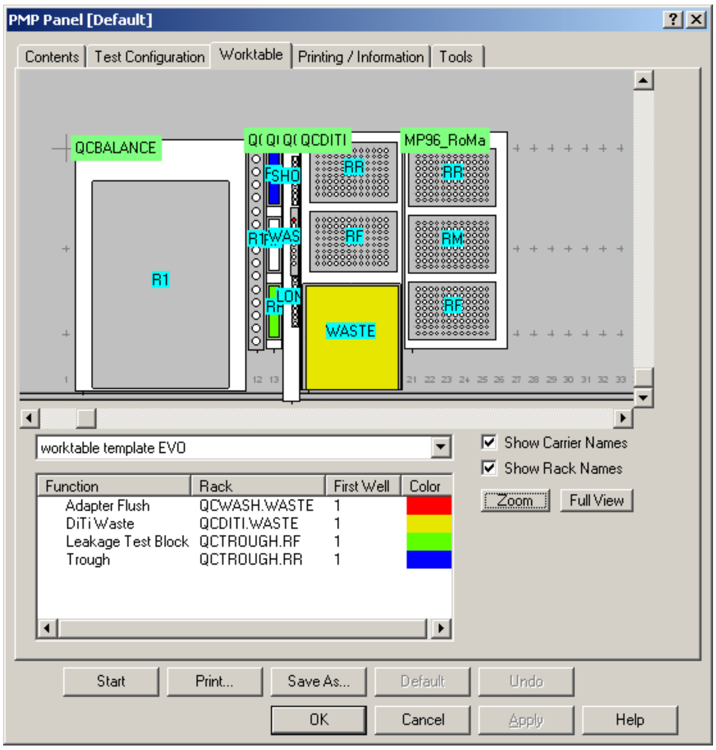
Worktable Prerequisites

To run the PMP Option Tests you have to make sure that your worktable is defined in the Instrument Software and physically prepared including the following items:

- Waste (for flushing the PMP tip adapters; not necessary for Air LiHa)
- Carrier with DiTi racks (DiTis with or without filter can be used)
- DiTi waste (for disposal of used DiTis)
- PMP Leakage Test Block (for sealing the tips during certain tests)
- Trough (filled with tap water, for liquid detection)

Note: *There is no default worktable map for PMP Option tests available in the list box for worktable maps. However, you can adapt the predefined “Worktable template EVO” using the “Worktable Complete Editor” (see cross references). For the PMP Leakage Test Block and the trough you should select a trough rack (see example below).*

Example



worktable template EVO

☑ Show Carrier Names
☑ Show Rack Names

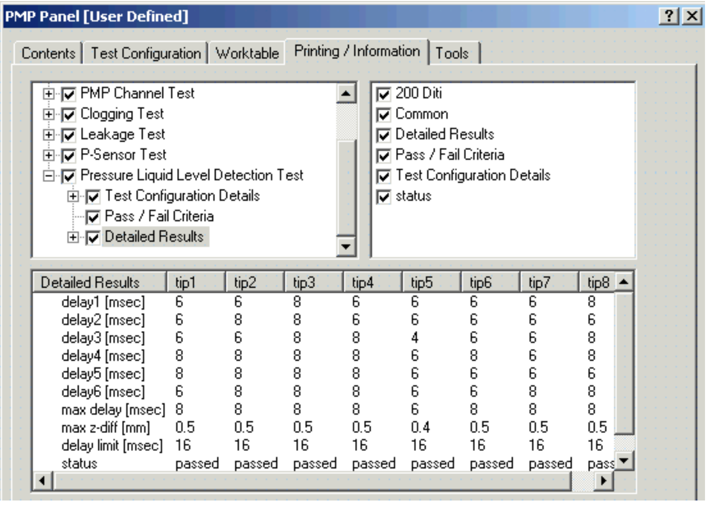
Function	Rack	First Well	Color
Adapter Flush	QCWASH.WASTE	1	🟥
DiTi Waste	QCDITI.WASTE	1	🟨
Leakage Test Block	QCTROUGH.RF	1	🟩
Trough	QCTROUGH.RR	1	🟦

Fig. 10-28 *Example of a worktable for PMP Option tests*

10.6.6 Printing / Information

Detailed Test Result

The details of the test results can be viewed on the **Printing / Information** page.



- ☑ PMP Channel Test
- ☑ Clogging Test
- ☑ Leakage Test
- ☑ P-Sensor Test
- ☑ Pressure Liquid Level Detection Test
  - ☑ Test Configuration Details
  - ☑ Pass / Fail Criteria
  - ☑ Detailed Results

- ☑ 200 Diti
- ☑ Common
- ☑ Detailed Results
- ☑ Pass / Fail Criteria
- ☑ Test Configuration Details
- ☑ status

Detailed Results	tip1	tip2	tip3	tip4	tip5	tip6	tip7	tip8
delay1 [msec]	6	6	8	6	6	6	6	8
delay2 [msec]	6	8	8	6	6	6	6	6
delay3 [msec]	6	6	8	8	4	6	6	8
delay4 [msec]	8	8	8	8	6	8	6	8
delay5 [msec]	8	8	8	8	6	6	6	6
delay6 [msec]	6	8	8	8	6	6	8	8
max delay [msec]	8	8	8	8	6	8	8	8
max z-diff [mm]	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5
delay limit [msec]	16	16	16	16	16	16	16	16
status	passed	passed	passed	passed	passed	passed	passed	pass

Fig. 10-29 *Printing / Information page showing test results*

Test Result Details Printed

The details of the test results can be printed via the **Printing / Information** page.

The print report shows for some of the test results the measuring points **p1** to **p9**. The following figure and description explains these measuring points:

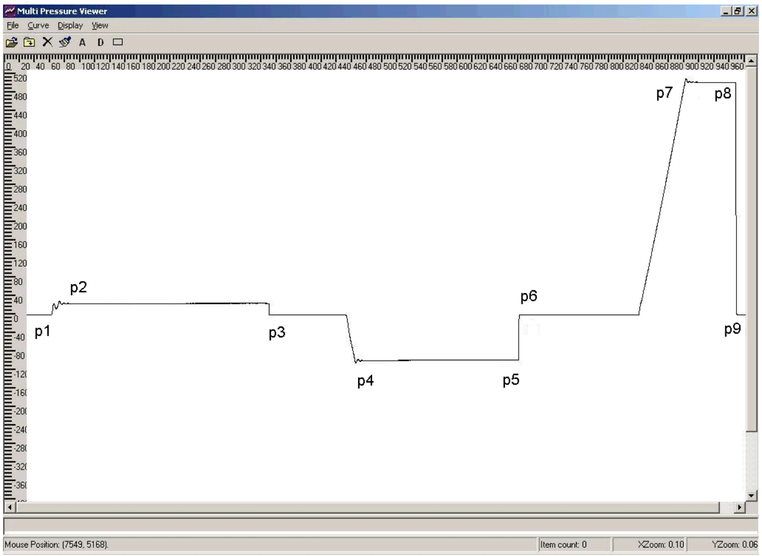


Fig. 10-30 *Reference pressure curve*

The reference pressure curve above was achieved performing the following procedure using a proper working adapter / tip combination:

1. The pressure reference level is measured at **p1** (ambient pressure).
2. The tip is sealed by pushing it onto a rubber slab (PMP Leakage Test Block).
3. The dilutor is moved a few steps to get about 4.5 mbar.
4. The achieved pressure is measured at **p2**.

5. After about 5 seconds, the tip is lifted to release the pressure.
6. Zero level is measured at **p3**.
7. The tip is sealed again and the dilutor is moved (in positive direction) to get about -35 mbar.
8. Pressure is measured at **p4** and after 5 seconds at **p5**.
9. The tip is lifted and zero pressure is measured again at **p6**.
10. After sealing again, the dilutor is moved (in negative direction) to get about 180 mbar.
11. Pressure is measured at **p7** and after 5 seconds at **p8**.
12. After lifting the tip zero level is measured again at **p9**.

10.6.7 Tools Page

Purpose

The **Tools** page shows the measured ambient pressure of the available PMP tip adapters and shows possible pressure errors. In addition it contains the controls for resetting pressure errors and for flushing the liquid system (not for Air LiHa).

Brief Description

With the **Tools** page you can check quickly whether all PMP-channels are working correctly.

- If they are in order, the blue bars showing the channel pressures should be approx. in the middle of the displayed range, more or less on an equal level.
- Channels showing a pressure error (blue bar near the upper or lower end) are marked red. Such an error indication will remain (even if the cause has been eliminated) until you press the **Reset Pressure Error** button.

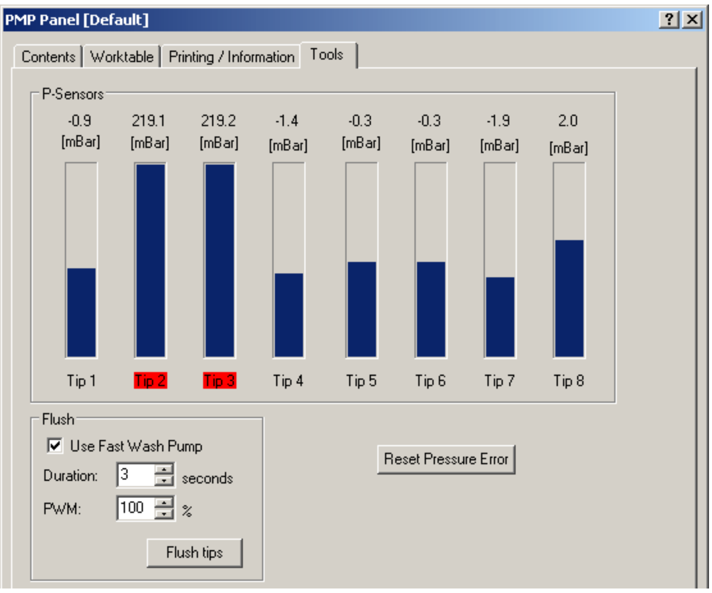
LiHa

In addition, the **Tools** page allows you to flush the entire liquid system of the liquid handling arm (LiHa) manually, to ensure a proper test function and to eliminate air bubbles.

Note: *When you start the first test after opening the PMP panel, the system will be flushed automatically for 10 sec.*

Air LiHa

The Air LiHa does not use system liquid and therefore flushing is neither possible nor necessary.



☑ Use Fast Wash Pump

Duration: 3 seconds

PWM: 100 %

Fig. 10-31 PMP panel, Tools page

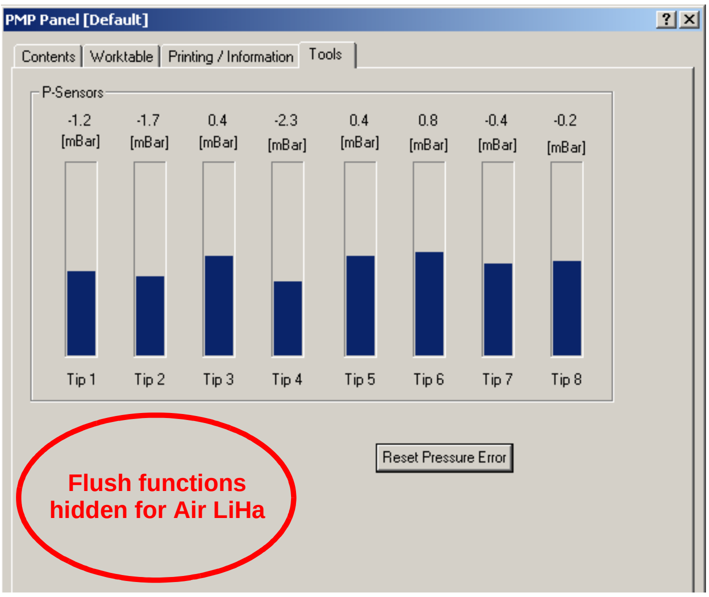


Fig. 10-32 PMP panel, Air LiHa, Tools page

Tab. 10-9 Controls on the Tools page

Element	Description
Tip 1 to 10	• Indicators (one per active LiHa channel) showing the current pressure in [mbar]. • Channels with a pressure error marked red (see figure).

Tab. 10-9 Controls on the Tools page

Element	Description
Use Fast Wash Pump (not available for Air LiHa)	• Select this check box if you want to use the FaWa for filling and flushing. If you select this check box, the PWM spin box is available. • Clear if you want to use only the dilutors. In this case the PWM spin box is not available.
Duration (not available for Air LiHa)	Lets you set the flush duration.
PWM (not available for Air LiHa)	(PWM = pulse width modulation). This spin box is only available if the **Use Fast Wash Pump** check box is selected. By varying the percentage you can vary the current of the FaWa motor and indirectly set the speed and force. 100% correspond to the maximum motor speed and force.
Flush tips (not available for Air LiHa)	If you click this button, the LiHa will move over the wash station and the tips will be flushed.
Reset Pressure Error	Click this button after you have taken any corrective action in case of a pressure error, to see whether the problem is eliminated. • If it is, the indicated pressure returns to normal • It it is not, the prompt described below appears.

Pressure Error

In case of a pressure error (corresponding channels marked red) try the following to eliminate the problem:

- Check electrical connection of tip adapter.
- Clean the tip adapter
- Check whether the pressure channel of the tip adapter is clogged. Replace the sealing ring if necessary. See Fig. 10-23 , 🗎 10-27 and instrument’s Operating Manual (1.2 “Reference Documents”, 🗎 1-3)
- Replace tip adapter.
- After any corrective action, click the **Reset Pressure Error** button on the **Tools** page to see whether the problem is solved.

Reset Pressure Error

Failed to reset pressure error. Please check the manual for further help.

If this message appears, the problem persists. Try the above measures or contact your nearest service organization for assistance.

Fig. 10-33 Pressure error persists

Further Information

Refer to the instrument's Operating Manual for information about:

- Cleaning or replacing the tip adapter
- Dissembling, assembling and adjusting the DiTi kit.

10.6.8 USB Test

Cross References

List of cross references to information provided in other sections:

Information	References
Test result details	See section 10.6.6 "Printing / Information", 🗎 10-33

Purpose

The **USB Test** is used to verify the connection between the PMP CU and the PC (USB cable, USB hub).

Procedure

1. On the **Contents** page, select the **USB Test** check box.
2. Change to the **Printing / Information** page and fill out the **Comments** field as necessary.
3. Click **Start** to begin.

   *At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the test was successful. In the Printing / Information page you will find the details of the test results* (see cross references)

If the Test Fails

If the test fails perform the following procedures and checks:
(→ Cross References)

- Check the USB cable and replace if necessary.
- Check the USB hub and replace if necessary.
- Check the PMP CU and replace if necessary.
- Check the USB port on the PC and select another USB port if necessary.
- **Repeat** the **USB Test** after the above checks and procedures.
- **Repeat all PMP tests** if the PMP CU was replaced.
- Call your nearest service representative if necessary.

10.6.9 PMP Channel Test

Cross References

List of cross references to information provided in other sections:

Information	References
PMP Worktable page	See section 10.6.5, 🗎 10-32
PMP Test Configuration page	See section 10.6.4, 🗎 10-31
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3
Tools page, Flush tips	See section 10.6.7, 🗎 10-34
Test result details	See section 10.6.6 “Printing / Information”, 🗎 10-33

Purpose

The **PMP Channel Test** is used to verify the correct wiring and tubing setup after installation or repair (each sensor does only ‘see’ the corresponding dilutor or plunger drive). The test involves dilutor (or plunger drive), p-sensor, wiring and tubing of the tested channel.

Procedure

1. On the **Contents** page, select the **PMP Channel Test** check box.
2. If necessary, change to the PMP **Worktable** page, and load a suitable worktable map. Make sure that the physical worktable layout corresponds exactly to the worktable map (see cross references).
3. Change to the **Printing / Information** page and fill out the **Comments** field as necessary.
4. Change to the PMP **Test Configuration** page and make the necessary entries (see cross references).
5. Click **Start** to begin.

   *At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the test was successful. In the Printing / Information page you will find the details of the test results* (see cross references)

If the Test Fails

If the test fails perform the following procedures and checks:
(→ Cross References)

- Flush the system once more thoroughly to eliminate any air bubbles (no flush possible / necessary on Air LiHa).
- Check the coax cables on those channels that failed, and replace them if necessary.
- Check if the tubes are connected correctly and not mixed up between different channels (Air LiHa does not have tubes).
- Check if the dilutors (or plunger drives) are addressed correctly in the right sequence.
- Check if the address setting on the DC-Servo boards is correct. If incorrect, the Z-axis of the wrong channel would move.
- **Repeat** the **PMP Channel Test** after the above procedures and checks.
- **Repeat all PMP tests** if any hardware was replaced or disassembled and reassembled.
- Call your nearest service representative if necessary.

10.6.10 Clogging Test

Cross References

List of cross references to information provided in other sections:

Information	References
PMP Worktable page	See section 10.6.5, 🗎 10-32
PMP Test Configuration page	See section 10.6.4, 🗎 10-31
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3
Tools page, Flush tips	See section 10.6.7, 🗎 10-34
Test result details	See section 10.6.6 “Printing / Information”, 🗎 10-33
DiTi Kit disassemble, reassemble, adjustment	See instrument’s “Operating Manual”

Purpose

The **Clogging Test** is used to verify if the pressure channel is not clogged.

Procedure

1. On the **Contents** page, select the **Clogging Test** check box.
2. If necessary, change to the PMP **Worktable** page, and load a suitable worktable map. Make sure that the physical worktable layout corresponds exactly to the worktable map (see cross references).
3. Change to the **Printing / Information** page and fill out the **Comments** field as necessary.
4. Change to the PMP **Test Configuration** page and make the necessary entries (see cross references).
5. Click **Start** to begin.

   At the end of the test a ***Test Passed*** *or* ***Test Failed*** *message notifies you whether or not the test was successful. In the Printing / Information page you will find the details of the test results* (see cross references)
6.

If the Test Fails

If the test fails perform the following procedures and checks:
(→ Cross References)

- Remove the DiTi Kit of the concerned channel and clean thoroughly with care from water, grease, etc.
- Check on the concerned channel if the tube is pushed back into the DiTi cone at the end of the tip adapter (e.g., caused by a crash). Readjust the tube protruding the DiTi cone using the appropriate tool (→ Cross References). (rem: Air LiHa does not have tubes).
- **Repeat** the **Clogging Test** after the above procedures and checks.
- **Repeat all PMP tests** if any hardware was replaced or disassembled and reassembled.
- Call your nearest service representative if necessary.

10.6.11 Leakage Test

Cross References

List of cross references to information provided in other sections:

Information	References
PMP Worktable page	See section 10.6.5, 🗎 10-32
PMP Test Configuration page	See section 10.6.4, 🗎 10-31
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3
Tools page, Flush tips	See section 10.6.7, 🗎 10-34
Test result details	See section 10.6.6 “Printing / Information”, 🗎 10-33
DiTi Kit disassemble, reassemble, adjustment	See instrument’s “Operating Manual”

Purpose

The **Leakage Test** is used to verify if the pressure channel of the PMP tip adapter is not leaking.

Note: *To test leakage, relatively high pressure must be applied. This may unclog a previously clogged pressure channel.*
Measure:

- *Do clogging test before leakage test*

Procedure

1. On the **Contents** page, select the **Leakage Test** check box.
2. If necessary, change to the PMP **Worktable** page, and load a suitable worktable map. Make sure that the physical worktable layout corresponds exactly to the worktable map (see cross references).
3. Change to the **Printing / Information** page and fill out the **Comments** field as necessary.
4. Change to the PMP **Test Configuration** page and make the necessary entries (see cross references).
5. Click **Start** to begin.

   *At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the test was successful. In the Printing / Information page you will find the details of the test results* (see cross references)

If the Test Fails

If the test fails perform the following procedures and checks:
(→ Cross References)

- Flush the system once more thoroughly to eliminate any air bubbles (no flush possible / necessary on Air LiHa).
- Check the sealings of the DiTi kit for damages and replace if necessary.
- Check if all parts of the DiTi kits are screwed together tightly.
- Check if the tubing sits tight in the DiTi kit.
  (rem: Air LiHa does not have tubes)
- Replace DiTi kit and/or insulation block if necessary
- **Repeat** the **Leakage Test** after the above procedures and checks.

- **Repeat all PMP tests** if any hardware was replaced or disassembled and reassembled.Call your nearest service representative if necessary.

10.6.12 P-Sensor Test

Cross References

List of cross references to information provided in other sections:

Information	References
PMP Worktable page	See section 10.6.5, 🗎 10-32
PMP Test Configuration page	See section 10.6.4, 🗎 10-31
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3
Tools page, Flush tips	See section 10.6.7, 🗎 10-34
Test result details	See section 10.6.6 “Printing / Information”, 🗎 10-33
DiTi Kit disassemble, reassemble, adjustment	See instrument’s “Operating Manual”

Purpose

The **P-Sensor Test** is used to verify if the accuracy of the sensor is OK.

Procedure

1. On the **Contents** page, select the **P-Sensor Test** check box.
2. If necessary, change to the PMP **Worktable** page, and load a suitable worktable map. Make sure that the physical worktable layout corresponds exactly to the worktable map (see cross references).
3. Change to the **Printing / Information** page and fill out the **Comments** field as necessary.
4. Change to the PMP **Test Configuration** page and make the necessary entries (see cross references).
5. Click **Start** to begin.

   *At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the test was successful. In the Printing / Information page you will find the details of the test results* (see cross references)

If the Test Fails

If the test fails perform the following procedures and checks:
(→ Cross References)

- Flush the system once more thoroughly to eliminate any air bubbles (no flush possible / necessary on Air LiHa).
- Replace insulation block if necessary (e.g., after a crash the sensor might be damaged by overpressure)
- **Repeat** the **P-Sensor Test** after the above procedures and checks.
- **Repeat all PMP tests** if any hardware was replaced or disassembled and reassembled.
- Call your nearest service representative if necessary.

10.6.13 Filter Test

Cross References

List of cross references to information provided in other sections:

Information	References
Test result details	See section 10.6.6 “Printing / Information”, 🗎 10-33
Disposable Tip Cone (DiTi cone) Air LiHa	See instrument’s “Operating Manual”
Air LiHa Inline filter	See instrument’s “Operating Manual”

Purpose

The Filter Test is **only** available **for Air LiHa tip adapters**.
The **Filter Test** is used to verify if the Inline filter in the DiTi cone of the Air LiHa tip adapter is present and faultless.

Procedure

1. Remove / eject the DiTis from the tip adapters.
2. On the **Contents** page, select the **Filter Test** check box.
3. Change to the **Printing / Information** page and fill out the **Comments** field as necessary.
4. Click **Start** to begin.

   *At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the test was successful. In the Printing / Information page you will find the details of the test results (→ Cross References)*

If the Test Fails

If the test fails perform the following procedures and checks:
(→ Cross References)

- **Repeat** the **Filter Test** a few times (2 - 3 x)
- **Replace the Inline filter** if the repeated tests fail
- Call your nearest service representative if necessary.

10.6.14 Pressure Liquid Level Detection Test

Cross References

List of cross references to information provided in other sections:

Information	References
PMP Worktable page	See section 10.6.5, 🗎 10-32
PMP Test Configuration page	See section 10.6.4, 🗎 10-31
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3
Tools page, Flush tips	See section 10.6.7, 🗎 10-34
Test result details	See section 10.6.6 “Printing / Information”, 🗎 10-33
DiTi Kit disassemble, reassemble, adjustment	See instrument’s “Operating Manual”

Purpose

The **Pressure Liquid Level Detection Test** is used to verify if the pLLD is working.

Procedure

1. On the **Contents** page, select the **Pressure Liquid Level Detection Test** check box.
2. If necessary, change to the PMP **Worktable** page, and load a suitable worktable map. Make sure that the physical worktable layout corresponds exactly to the worktable map (see cross references).
3. Change to the **Printing / Information** page and fill out the **Comments** field as necessary.
4. Change to the PMP **Test Configuration** page and make the necessary entries (see cross references).
5. Click **Start** to begin.

   *At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the test was successful. In the Printing / Information page you will find the details of the test results* (see cross references)

If the Test Fails

If the test fails perform the following procedures and checks:
(→ Cross References)

- Flush the system once more thoroughly to eliminate any air bubbles (no flush possible / necessary on Air LiHa).
- Fill the trough with tap water (system liquid might be non conductive or too much conductive).
- Go to the Liquid System panel and run the **Liquid Level Detection** test (a wrong cLLD can lead to a failed pLLD test). If this test fails follow the instructions for the failed (capacitive) Liquid Level Detection test.
- **Repeat** the **Pressure Liquid Level Detection Test** after the above procedures and checks.
- **Redo** the **PMP Channel Test**, **Clogging Test** and **Leakage Test** and eliminate all possible problems and errors. **Repeat** the **Pressure Liquid Level Detection Test.**
- Call your nearest service representative if necessary.

10.7 Te-Fill

10.7.1 Overview

What is Te-Fill

The Te-Fill option allows to dispense or aspirate liquids into/from containers on the worktable. The option is used when the liquid volumes to be handled are greater than the dispense volume (syringe volume) of the diluter.

The pipetting tips can be connected to the bidirectional pump of the Te-Fill option instead of the diluters. The switching over from the diluters to the pump and the determination of the pump direction are performed by a number of valves.

Te-Fill

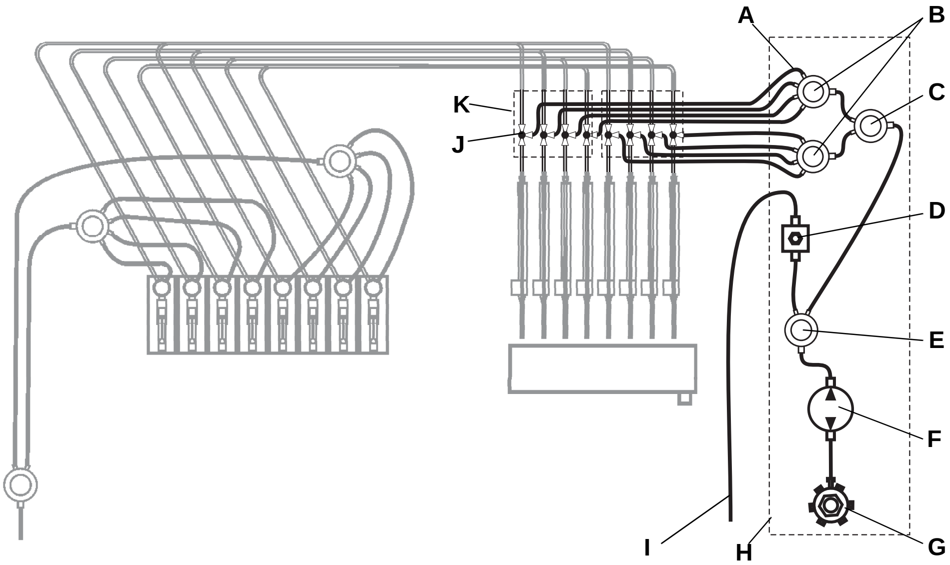


Fig. 10-34 Te-Fill diagram (example for 8 channels)

A	*Dispensing tubing*	*G*	*6-position selector valve (option)*
B	*Distributor 1 to 4*	*H*	*Pump box*
C	*Distributor 1 to 2*	*I*	*Waste tubing*
D	*Pressure relief valve*	*J*	*3/2-way valve*
E	*Distributor 1 to 2*	*K*	*Valve block*
F	*Bidirectional pump*		

Note: *The grey elements in the figure belong to the standard liquid system of the instrument.*

Function of the Components

The components of the Te-Fill option have the following functions:

- Valve block
  - The valve block (K) integrates four 3/2-way valves, the solenoids and the valve connections to form a unit. Up to two valve blocks (8 channels) can be installed on the LiHa of an instrument.
- 3/2-way valves
  - In the normal (non-actuated) position of the 3/2-way valve (J) the pipetting tubing is connected to the diluters of the standard liquid system. In this position pipetting is performed by means of the diluters and the Te-Fill option cannot be used for liquid handling.
  - When the Te-Fill option is active, the 3/2-way valve changes over to connect the pipetting tubing leading to the tips to the bidirectional pump via the distributors.
  - The 3/2-way valve of each channel can be controlled individually.
- Pump box
  - The distributors, the bidirectional pump, the pressure relief valve and the optional 6-position selector valve are mounted in the pump box. The pump box is located in the space left to the diluters.
- Distributors

  - For the Te-Fill option with 4 channels (one valve block only), one of the 1 to 4 distributors (B) is omitted and the outlet of the 1 to 2 distributor (C) is closed with a plug.
- Bidirectional pump
  - This is a membrane pump with actively switched valves to enable the pump to work in both directions, i.e. it can be used for dispense and aspirate jobs in a process.
- Pressure relief valve
  - If overpressure in the system occurs, the pressure relief valve directs the liquid to the waste container via the waste tubing.
- 6-position selector valve (option)
  - If more than one liquid needs to be handled, the Te-Fill option can be equipped with a 6-position selector valve. Up to 6 different liquids can be selected. The valve connects the corresponding container with the bidirectional pump.
  - Only one liquid can be handled at a time, i.e. if different liquids need to be dispensed into the same container, this must be carried out sequentially.

10.7.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3
Selecting and picking up DiTis	See section 10.3.2, 🗎 10-3

Permissions, Procedures

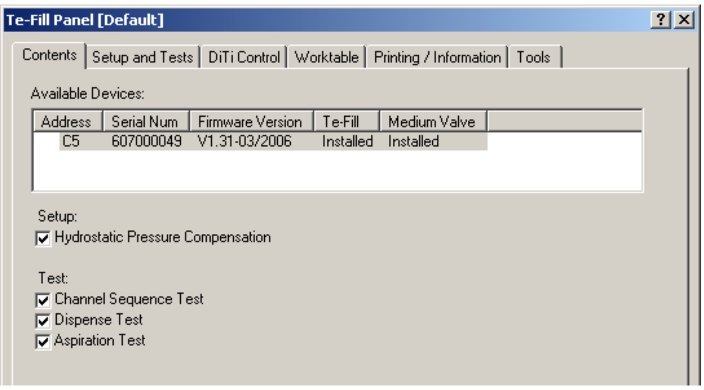
Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Function	Type	User	FSE
Hydrostatic Pressure Compensation	Setup		X
Channel Sequence Test	Test	X	X
Dispense Test	Test	X	X
Aspiration Test	Test	X	X
Setup	Page		X
DiTi Control	Page	X	X
Worktable	Page	X	X
Printing / Information	Page	X	X
Tools	Page	X	X

Starting the Panel

1 Start the panel with **Liquid System > Te-Fill**. The **Te-Fill** panel with activated **Contents** page appears. After starting the **Te-Fill** panel no setup or test check boxes are activated.

Note: Te-Fill "Installed" *is displayed in the* ***Available Devices*** *window if the Te-Fill channels are defined in the channel page of the LiHa panel (see 10.7.7 "LiHa Configuration", 🖹 10-51). The 6-position selector valve (see Fig. 10-34, 🖹 10-44) will be automatically recognized when installed and will be displayed as* ***Medium Valve "Installed"*** *in the* ***Available Devices*** *window.*



Available Devices:

Address	Serial Num	Firmware Version	Te-Fill	Medium Valve
C5	607000049	V1.31-03/2006	Installed	Installed

Setup:
☑ Hydrostatic Pressure Compensation

Test:
☑ Channel Sequence Test
☑ Dispense Test
☑ Aspiration Test

Fig. 10-35 *Te-Fill panel, Contents page*

Pages

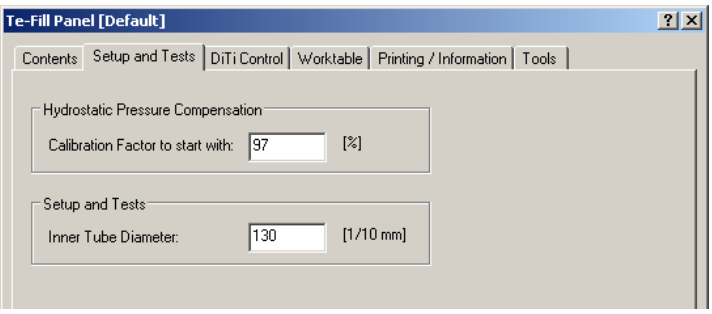
Tab. 10-10 *Pages of the Te-Fill panel*

Pages	Function
Contents	General overview, device and procedure selection
Setup and Tests	Definition of setup parameters
DiTi Control	Selection of DiTi rack and DiTi type
Worktable	Selection of an appropriate worktable layout
Printing / Information	Print selection for the QC-report
Tools	For manually testing Te-Fill functions

10.7.3 Setup Page

Purpose

The **Setup** page lets you define a start value for the **Hydrostatic Pressure Compensation Calibration Factor** and a value for the **Inner Tube Diameter** of the tubes you are using for the setup and all the tests.



Hydrostatic Pressure Compensation

Calibration Factor to start with: 97 [%]

Setup and Tests

Inner Tube Diameter: 130 [1/10 mm]

Fig. 10-36 *Te-Fill panel, Setup page*

Controls

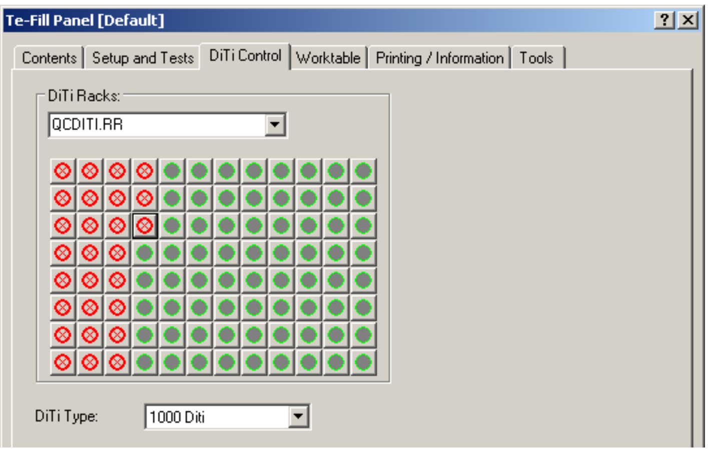
Tab. 10-11 *Controls on the Setup page*

Element	Description
Hydrostatic Pressure Compensation	You can either use the value displayed in the field **Calibration factor to start with** or enter a new value. The field normally shows the factory-set default value (100%) or the calibration factor from the last calibration. The value resulting from a calibration must be between 80% and 120%.
Setup & Tests	You can either use the value displayed in the field **Inner Tube Diameter** or enter a new value. The field normally shows the factory-set default value (inner diameter of a 16x100 mm tube).

10.7.4 DiTi Control Page

Purpose

If using DiTis instead of standard tips, the **DiTi Control** page lets you select the DiTi rack, the available DiTis and the type of DiTis for the Te-Fill tests.



DiTi Racks: QCDITI.RR

DiTi Type: 1000 Diti

Fig. 10-37 Te-Fill panel, DiTi Control page

Controls

The following table contains a brief description of the controls on the **DiTi Control** page.

***Note:** For detailed information, for example on how DiTis are selected and picked up from a DiTi rack (see cross references).*

Tab. 10-12 Controls on DiTi Control page

Element	Description
DiTi Racks	The frame contains two controls: • List box: Selection of a DiTi rack or DiTi box. • Graphical representation: Lets you select (green) / deselect (red) the DiTis on the rack you have selected from the list.
DiTi Type	Definition of the DiTis used for the test

10.7.5 Worktable Page

Cross References

List of cross references to information provided in other sections:

Information	References
Worktable templates	See section 5.2.7, 🗎 5-20
Worktable Complete Editor	See chapter 14, 🗎 14-1

Worktable Prerequisites

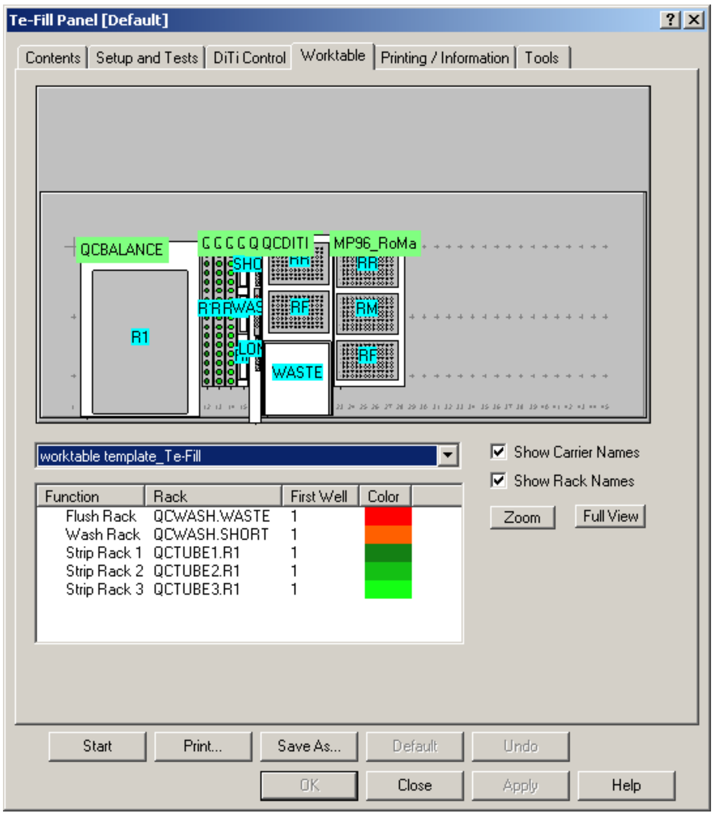
To run the Te-Fill setup and tests you need a suitable worktable map and you must ensure that the instrument’s physical worktable corresponds to the worktable map. The labware items you need are:

- Three strip racks with sixteen 100 ml tubes.

- One wash station (for flushing the tips)
- Carrier with DiTi racks (only if using DiTis)
- DiTi waste (for disposal of used DiTis)

There is a worktable template for Te-Fill that you can use for the Te-Fill setup and tests (see cross references). If necessary, you can use the “Worktable Complete Editor” (see cross references) to adapt this template according to your needs and store it under a different name.

Worktable Template for Te-Fill



worktable template_Te-Fill

☑ Show Carrier Names
☑ Show Rack Names

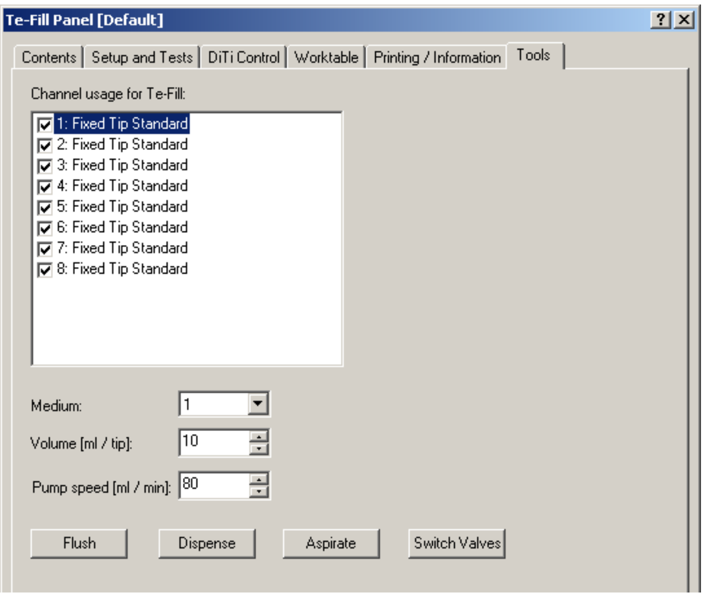
Function	Rack	First Well	Color
Flush Rack	QCWASH.WASTE	1	🟥
Wash Rack	QCWASH.SHORT	1	🟧
Strip Rack 1	QCTUBE1.R1	1	🟩
Strip Rack 2	QCTUBE2.R1	1	🟩
Strip Rack 3	QCTUBE3.R1	1	🟩

Fig. 10-38 *Te-Fill panel, Worktable page*

10.7.6 Tools page

Purpose

The **Tools** page allows you to manually activate various Te-Fill functions.



Channel usage for Te-Fill:
☑ 1: Fixed Tip Standard
☑ 2: Fixed Tip Standard
☑ 3: Fixed Tip Standard
☑ 4: Fixed Tip Standard
☑ 5: Fixed Tip Standard
☑ 6: Fixed Tip Standard
☑ 7: Fixed Tip Standard
☑ 8: Fixed Tip Standard

Medium: 1
Volume [ml / tip]: 10
Pump speed [ml / min]: 80

Fig. 10-39 *Te-Fill panel, Tools page*

Controls

Tab. 10-13 *Controls on the Tools page*

Element	Description
Channel Usage for Te-Fill	This list field shows for each channel the tip type defined in the LiHa configuration (see 10.7.7, 🗎 10-51). Each channel can be selected by a checkbox
Medium	Lets you specify the valve connector on the optional 6-position selector valve to which the container with the medium (source liquid) is connected to. If the valve is not installed the selection is disabled.
Volume [ml / tip]	Lets you define the volume in [ml] that is pumped to each selected channel when clicking one of the buttons; Flush, Dispense, or Aspirate (max. value = 1200 = 1.2 l)
Pump speed [ml / min.]	Lets you define the flow rate in [ml / min.] of the Te-Fill pump (value range: 8 - 80 ml / min.)
Flush	Button to start a flush cycle through the selected channels with the Te-Fill parameters defined as described above (LiHa moves to wash station)
Switch valves	Button to switch on the selected channels the 3/2-way valves to Te-Fill and back to Diluter and to switch at the same time the 6-position selector valve, if installed, to the position defined in this panel (rem: Diluter is the default valve setting for the 3/2-way valves)

__Tab. 10-13__ Controls on the Tools page

Element	Description
Dispense	Button to start a dispense cycle through the selected channels with the pump parameters defined in this panel
Aspirate	Button to start an aspirate cycle through the selected channels with the pump parameters defined in this panel

10.7.7 LiHa Configuration

Cross References

List of cross references to information provided in other sections:

Information	References
LiHa panel, channel page, setting up the tips	See section 8.6.5.2, 🗎 8-86

Defining the Te-Fill Channels

Before carrying out any of the following setups or tests you have to define the Te-Fill channels in the channel page of the LiHa panel.
Refer to cross references above.

10.7.8 Setup for Hydrostatic Pressure Compensation

Cross References

List of cross references to information provided in other sections:

Information	References
Liquid level detection	See section 10.9.6, 🗎 10-77

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure measures the liquid quantities pumped into a number of tubes, determines the liquid distribution (accuracy) and calculates the **Calibration Factor** for the hydrostatic pressure compensation. The resulting calibration factor is written to the LiHa with Te-Fill option.

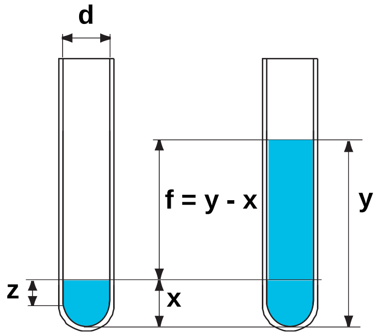
Principle

The procedure consists of the following steps:

- All 48 tubes are pre-filled with 1 ml, so that the liquid level of each tube is within the cylindrical part (level x, see following figure Fig. 10-15 , 🗎 10-16).
- The exact liquid level x is determined by means of the liquid level detection feature, LLD (see cross references).

- Then, 10 ml of liquid are added to each tube and the resulting liquid level y is again determined with LLD.
- From the difference f = y - x and the inner tube diameter, the software determines the real filling volume of each tube.

After the above sequence has been carried out for all tubes, the software determines the liquid distribution (accuracy) and the CV % (CV = coefficient of variation). The newly calculated calibration factor for the hydrostatic pressure compensation is written to the device. If the CV exceeds 3.2% (0.8 x 4%), a warning message is displayed.



d	*Inner tube diameter*
x	*Prefilled liquid, 1 ml*
y	*Liquid level at end of test*
z	*Cylindrical part of prefilled liquid*
f	*Filling height, f = y - x*

Fig. 10-40 *Pump calibration*

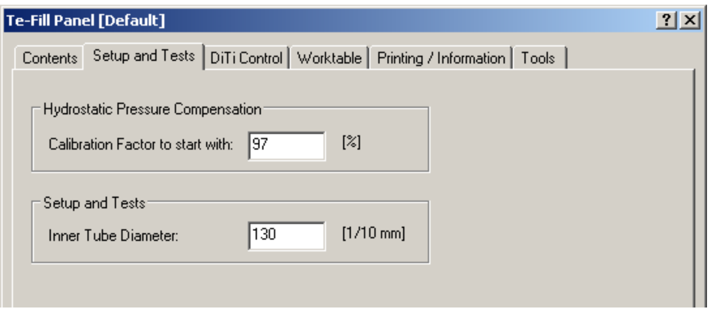
Before You Start

- Check / define the Te-Fill channels on the LiHa (see section 10.7.7 “LiHa Configuration”, 🗎 10-51).
- Connect the medium (source) to the pump or to the connector # 1of the optional 6-position selector valve.
- Load the strip racks with 3 x 16 = 48 (empty) tubes (16x100 mm).
- Make sure that the correct worktable map is loaded and that the physical arrangement of labware on the worktable corresponds to the worktable map.
- It is recommended that you fill and flush the liquid system (use the Tools page).

Procedure

To calibrate the pump for hydrostatic pressure compensation:

1 On the **Contents** page, select the **Hydrostatic Pressure Compensation** check box and change to the **Setup** page.



Hydrostatic Pressure Compensation
Calibration Factor to start with: 97 [%]

Setup and Tests
Inner Tube Diameter: 130 [1/10 mm]

Fig. 10-41 *Te-Fill panel, Setup page*

2 On the **Setup** page, check the value in the field **Calibration Factor to start with**(1). Use the shown value or key in a new value.

---

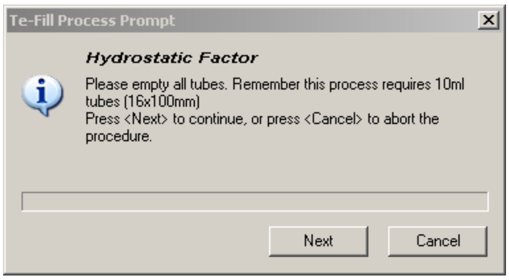
1) The value corresponds either to the factory-set default or to the pump calibration factor determined in a previous calibration.

3 Check the value in the field **Inner Tube Diameter**. Use this default value (130) or, if necessary, measure physically the inner diameter of the tubes you are using and key in the measured value.

4 Also make sure that the liquid system is pre-filled, that the sample tubes are empty and that the correct worktable map is used.

5 Click **Start** to begin.

The following prompt will be displayed:



Hydrostatic Factor

Please empty all tubes. Remember this process requires 10ml tubes (16x100mm)
Press <Next> to continue, or press <Cancel> to abort the procedure.

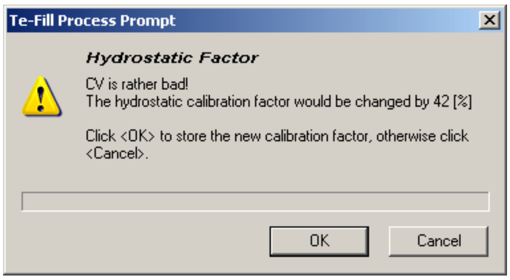
Fig. 10-42 *Empty tubes*

6 Check that all tubes have a size of 16x100 mm and are empty.

7 Click Next to continue.

At the end of the calibration the calibration factor is written to the LiHa.

Warning Messages



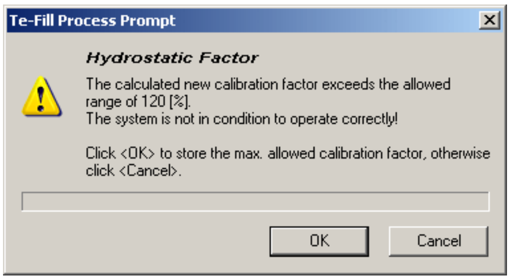
Hydrostatic Factor

CV is rather bad!
The hydrostatic calibration factor would be changed by 42 [%]

Click <OK> to store the new calibration factor, otherwise click <Cancel>.

CV is bad!

Fig. 10-43 *Bad CV*



Hydrostatic Factor

The calculated new calibration factor exceeds the allowed range of 120 [%].
The system is not in condition to operate correctly!

Click <OK> to store the max. allowed calibration factor, otherwise click <Cancel>.

Calibration factor exceeds limits !

Fig. 10-44 *Calibration factor out of limits*

In the case of warning message “CV is rather bad!” you can accept and continue if none of the CVs is above 4% (refer to the Printing / Information page for the details).

If one of the CVs is above 4% or the calibration factor exceeds the allowed range you should examine the Te-Fill system carefully to fix the problem:

- Is the medium container filled and correctly connected?
- Did you flush the system before starting the calibration?
- Are the 3/2-way valves working correctly

- Have you used the correct tubes (16x100 mm) ?
- Inner tube diameter equals the value in the setup page ?
- Are there any kinked, jammed or clogged tubings?
- Are there clogged or damaged tips?
- Is everything tight and no air in the system?
- Are you using standard tubing?

After you have fixed the problem you should repeat the calibration.

10.7.9 Channel Sequence Test

Purpose

This test checks if all channels are correctly addressable, which means that the tubing and the 3/2-way valves are correctly connected.

Principle

The procedure dispenses in a number of empty tubes 1 ml of liquid and measures the exact liquid levels. On top of the these liquid levels the system dispenses on a channel by channel basis once more 1 ml of liquid. After dispensing on one channel it measures again the liquid levels in all tubes. The result must show a level increase only in the tube where the system had to dispense into.

Before You Start

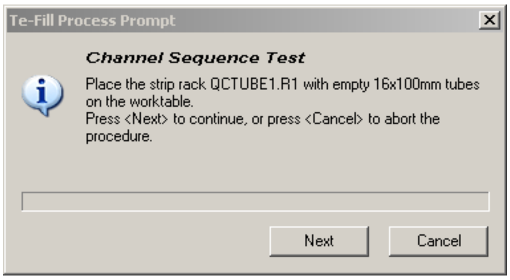
- Check / define the Te-Fill channels on the LiHa
  (see section 10.7.7 “LiHa Configuration”, 🗎 10-51).
- Connect the medium (source) to the pump or to the connector # 1of the optional 6-position selector valve.
- Load the strip racks with 3 x 16 = 48 **empty tubes** (16x100 mm).
- Make sure that the correct worktable map is loaded and that the physical arrangement of labware on the worktable corresponds to the worktable map. The channel sequence test uses strip rack 1 (most left as shown on the worktable page).
- It is recommended that you fill and flush the liquid system (use the Tools page).

Procedure

To perform the test:

1. On the **Contents** page, select the check box **Channel Sequence Test** and click **Start** to begin.

   The following prompt will be displayed:



Channel Sequence Test

Place the strip rack QCTUBE1.R1 with empty 16x100mm tubes on the worktable.
Press <Next> to continue, or press <Cancel> to abort the procedure.

2. Place the strip rack with empty tubes on the worktable.
3. Click **Next** to continue

Fig. 10-45 *Placing strip rack*

Pass / Fail Criteria

The test is passed if:

- The liquid level increase is measured after a dispense only in the channel that was addressed for dispensing.

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Examine the QC-report. For the channels that were dispensing wrongly check the following:
  - Correct connection and function of the 3/2-way valve
  - Correct connection of the tubing
  - Are there any kinked, jammed or clogged tubings?
  - Are there clogged or damaged tips?
  - Replace any faulty parts.
  - Repeat the **Channel Sequence Test**

10.7.10 Dispense Test

Purpose

This procedure measures the liquid quantities pumped into a number of tubes and determines the liquid distribution (accuracy) and the CV %. The results are compared with the expected values.

Principle

In principle, the procedure does the same as that for the pump calibration, except that nothing is written to the LiHa. The results are compared against the pass / fail criteria (see QC-report).

Before You Start

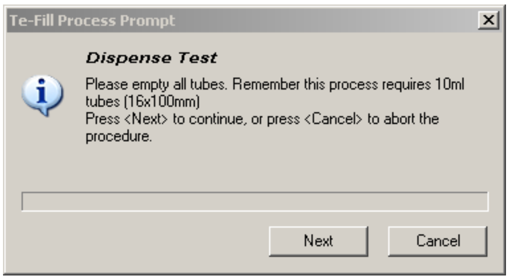
- Check / define the Te-Fill channels on the LiHa (see section 10.7.7 "LiHa Configuration", 🗎 10-51).
- Connect the medium (source) to the pump or to the connector # 1of the optional 6-position selector valve.
- Load the strip racks with 3 x 16 = 48 empty tubes (16x100 mm).
- Make sure that the correct worktable map is loaded and that the physical arrangement of labware on the worktable corresponds to the worktable map.
- It is recommended that you fill and flush the liquid system (use the Tools page).

Procedure

To perform the test:

1 On the **Contents** page, select the check box **Dispense Test** and click **Start** to begin.

The following prompt will be displayed:



Dispense Test

Please empty all tubes. Remember this process requires 10ml tubes (16x100mm)
Press <Next> to continue, or press <Cancel> to abort the procedure.

Fig. 10-46 *Empty tubes*

2 Check that all tubes have a size of 16x100 mm and are empty.

3 Click Next to continue.

At the end of the test a pass/fail message appears notifying you whether or not the test was successful. You can view the results on the Printing / Information page and on the QC-report.

Pass / Fail Criteria

The test is passed if:

- Overall accuracy (mean deviation from average): ± 5% over all channels
- CV %: ≤ 4%

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Examine the QC-report. Are there any individual channels that are outside the tolerance limits. If there are “bad” channels check the following:
  - Are there any kinked, jammed or clogged tubings?
  - Are there clogged or damaged tips?
  - Have you used the correct tubes (16x100 mm)?
  - Is the inner diameter of the tubes equal to the value in the setup panel?
  - Is everything tight and no air in the system?
- If the CV % is within the limits, but the accuracy is outside the tolerance limits:
  - Repeat the setup for **Hydrostatic Pressure Compensation**.
  - Check the valves and the tubings for damage.
  - Replace any faulty parts.
  - Flush the system well and repeat the **Dispense Test.**

10.7.11 Aspiration Test

Purpose

This procedure measures the liquid quantities aspirated from a number of tubes. The results are compared with the expected values.

Principle

The system aspirates from pre-filled tubes 5 ml of liquid and then compares the volume differences in the tubes against the pass/ fail criteria.

Before You Start

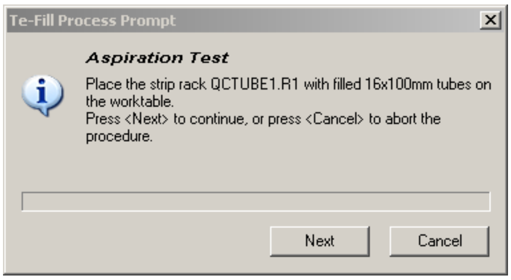
- Check / define the Te-Fill channels on the LiHa (see section 10.7.7 “LiHa Configuration”, 🗎 10-51)
- Connect the medium (source) to the pump or to the connector # 1of the optional 6-position selector valve.
- Load the strip racks with 3 x 16 = 48 tubes (16x100 mm) filled at least halfway up with liquid.
- Make sure that the correct worktable map is loaded and that the physical arrangement of labware on the worktable corresponds to the worktable map.
- It is recommended that you fill and flush the liquid system (use the Tools page).

Procedure

To perform the test:

1. On the **Contents** page, select the check box **Aspiration Test** and click **Start** to begin.

   The following prompt will be displayed:



Aspiration Test

Place the strip rack QCTUBE1.R1 with filled 16x100mm tubes on the worktable.
Press <Next> to continue, or press <Cancel> to abort the procedure.

Fig. 10-47 *Fill tubes*

2 Check that all tubes have a size of 16x100 mm and are filled approx. halfway up with liquid.

3 Click Next to continue.

At the end of the test a pass/fail message appears notifying you whether or not the test was successful. You can view the results on the Printing / Information page and on the QC-report.

Pass / Fail Criteria

The test is passed if:
- Volume after aspiration: - 5 ml
- Tolerance: ± 1.5 ml

If the Test Fails

Try the following (call the nearest customer service department if necessary):
- Examine the QC-report. Are there any individual channels that are outside the tolerance limits. If there are “bad” channels check the following:
  - Are there any kinked, jammed or clogged tubings?
  - Are there clogged or damaged tips?
  - Have you used the correct tubes (length 100 mm, inner diameter 13 mm)?
  - Is everything tight and no air in the system?
- If the accuracy is outside the tolerance limits:
  - Repeat the setup for **Hydrostatic Pressure Compensation.**
  - Check the valves and the tubings for damage.
  - Replace any faulty parts.
  - Repeat the **Aspiration Test**

10.7.12 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

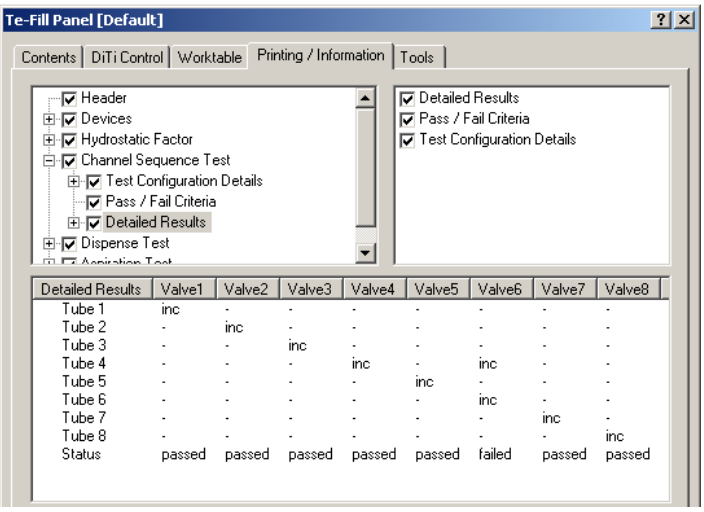
Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

Display

Example of the **Printing / Information** page display:



- ☑ Header
- ☑ Devices
- ☑ Hydrostatic Factor
- ☑ Channel Sequence Test
  - ☑ Test Configuration Details
  - ☑ Pass / Fail Criteria
  - ☑ Detailed Results
- ☑ Dispense Test
- ☑ Aspiration Test

- ☑ Detailed Results
- ☑ Pass / Fail Criteria
- ☑ Test Configuration Details

Detailed Results	Valve1	Valve2	Valve3	Valve4	Valve5	Valve6	Valve7	Valve8
Tube 1	inc	-	-	-	-	-	-	-
Tube 2	-	inc	-	-	-	-	-	-
Tube 3	-	-	inc	-	-	-	-	-
Tube 4	-	-	-	inc	-	inc	-	-
Tube 5	-	-	-	-	inc	-	-	-
Tube 6	-	-	-	-	-	inc	-	-
Tube 7	-	-	-	-	-	-	inc	-
Tube 8	-	-	-	-	-	-	-	inc
Status	passed	passed	passed	passed	passed	failed	passed	passed

Fig. 10-48 *Results of the channel sequence test*

10.8 Waste Pump

10.8.1 Overview

Waste Pump

The Waste Pump is used to drain the wash station regularly and to pump the waste liquid into a waste liquid container (WL). The waste pump (WP) is located in the compartment beneath the worktable on the left side of the instrument. The waste liquid bottles are located on a drawer in the cabinet under the instrument.

The following figure shows the arrangement of the wash station, the waste pump and the waste liquid bottles within the liquid system.

Note: *Most of the parts of the liquid system that are not dealt with in connection with the Waste Pump panel are not labelled in the following figure.*

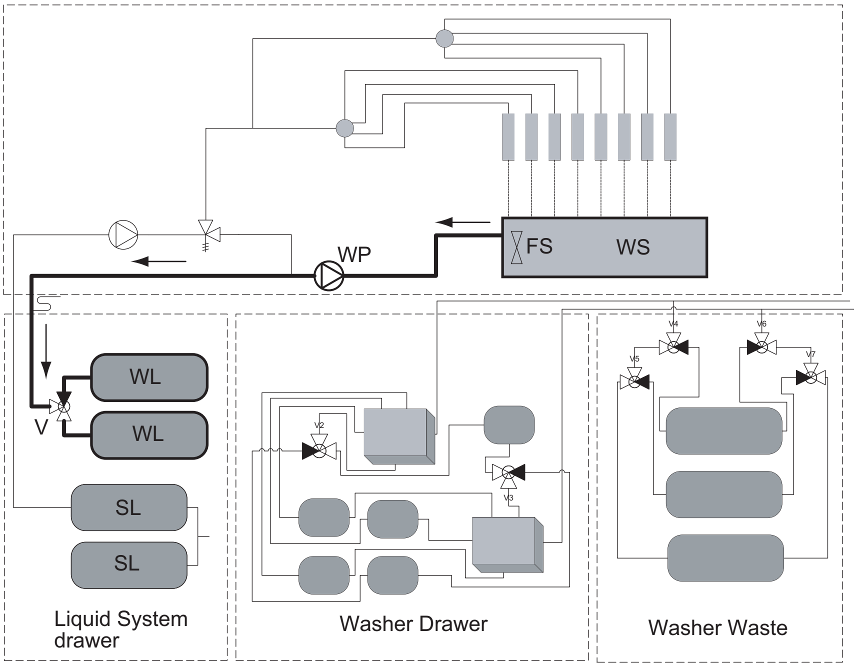


Fig. 10-49 *Arrangement of waste pump, wash station and waste liquid bottles*

WS	*Wash station*	***V***	*3-way valve*
FS	*Floating level sensor*	***WL***	*Waste liquid containers*
WP	*Waste pump*	***SL***	*System liquid containers*

Wash Station

As the following figure shows, the wash station is integrated in a combined wash / DiTi waste station. DiTis are disposed of through the funnel into a DiTi waste container, which is also located on the drawer in the cabinet.

The wash station is equipped with a floating level sensor that signals the software when the wash station is nearly full or empty.

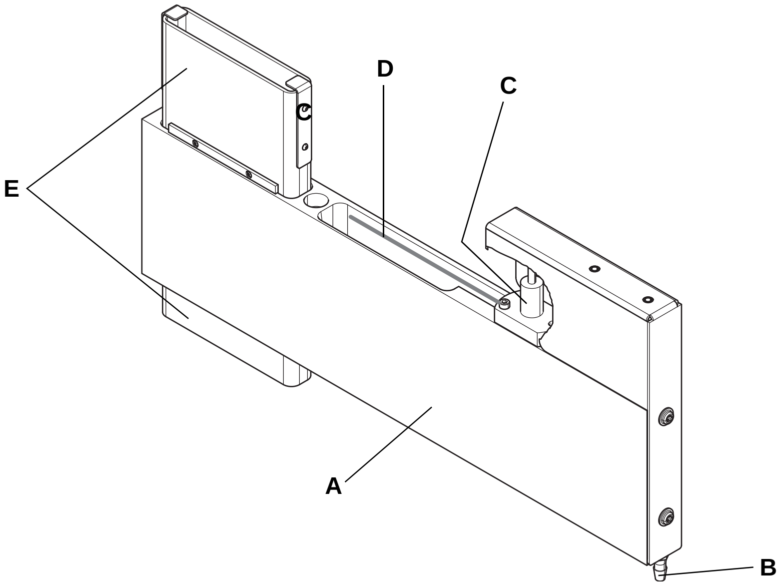


Fig. 10-50 Combined wash / DiTi waste station

A	*Wash / DiTi waste station*	*D*	*“Wash station full” line*
B	*Tube connector*	*E*	*Funnel for disposing of used DiTis*
C	*Floating level sensor*		

10.8.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

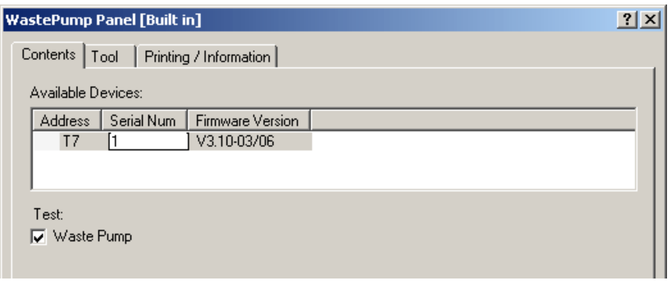
Tab. 10-14 Liquid System functions and User Permissions

Function	Type	User	FSE
Waste Pump	Test	X	X
QC-report	Report	X	X

Starting the Waste Pump Panel

1 Start the panel with **Liquid System > Waste Pump**.

*The **Waste Pump** panel with activated **Contents** page appears. After starting the **Waste Pump** panel, no check box is selected.*



Available Devices:

Address	Serial Num	Firmware Version
T7	1	V3.10-03/06

Test:
☑ Waste Pump

__Fig. 10-51__ Waste pump panel, Contents page

Pages

The Waste Pump panel consists of the following pages:

__Tab. 10-15__ Pages of the Waste Pump panel

Page	Description
Contents	General overview, procedure / test selection.
Tool page	For filling and flushing the liquid system
Printing / Information	Print selection for the QC-report.

10.8.3 Tool Page

The Tools page allows you to test the function of the waste pump and that of the floating liquid sensor in the wash station informally.

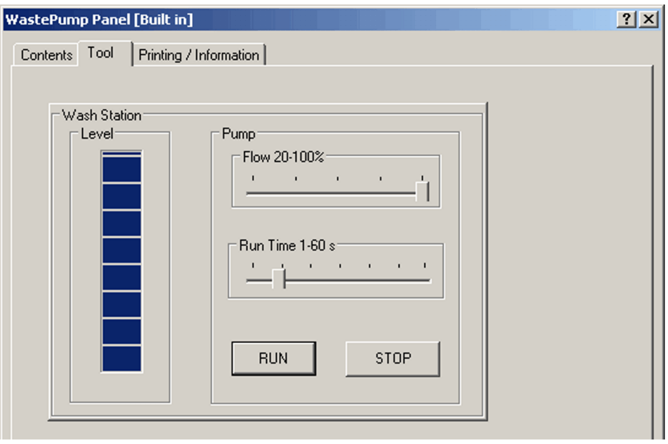


__Fig. 10-52__ Waste pump panel, Tool page

Tab. 10-16 *Controls on Test Configuration page*

Element	Description
Level	Indicates whether the wash station is full or empty. In our example the **Level** bar indicates that the liquid level has reached or overstepped its upper limit.
Pump	The frame **Pump** contains the elements for controlling the pump:
- Flow	• This slider lets you set the pump speed
- Run Time (1 - 60 s)	• With this slider you can set the time after which the pump is automatically switched off.
- Start	• Starts the pump. The pump stops when the preset run time has expired or when the **Stop** button is clicked.
- Stop	• Stops the pump when clicked.

10.8.4 Waste Pump Test

Purpose

This test allows you to check whether the waste pump and the floating sensor in the wash station work properly.

Procedure

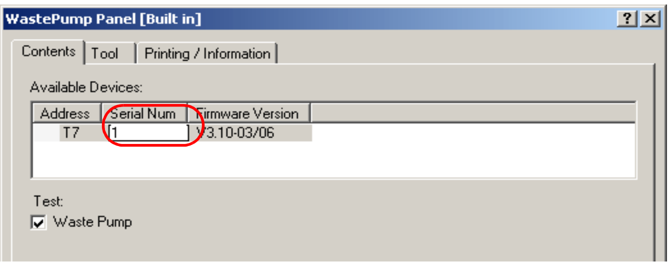
To perform the test:

1 On the **Contents** page, select the **Waste Pump Test** check box and click on **Start** near the bottom of the panel.

You will be guided through the test by a series of process prompts (not shown here). Always follow the instructions provided on the prompts.

2 If no valid serial number has been entered before, you are first prompted to enter the serial number of the waste pump. The serial number can be entered directly on the **Contents** page in the field **Serial Num**.

- You can find the serial number on the test sheet that is delivered with each pump.
- Click on **OK** on the process prompt when done.



Available Devices:

Address	Serial Num	Firmware Version
T7	1	V3.10-03/06

Test:
☑ Waste Pump

Fig. 10-53 *Entry of serial number on Contents page*

Note: *After you have entered a valid number, it will be stored in EEPROM.*

The next process prompt informs you that the waste pump starts draining the wash station. Please wait.

3 In a next step you are prompted to disconnect the tubing (A) that leads from the wash station to the waste container # 1 (C).

The waste liquid bottles are located on the liquid system drawer in the cabinet below the instrument.

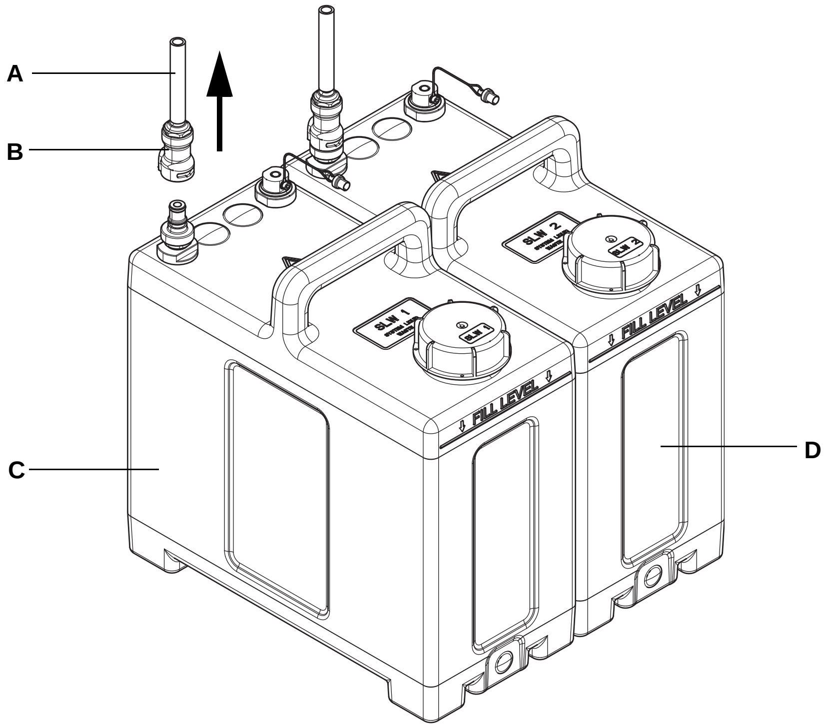


Fig. 10-54 *Waste liquid containers on drawer in cabinet*

A	*Waste tube from wash station*	***C***	*System waste liquid bottle # 1*
B	*Bayonet coupling*	***D***	*System waste liquid bottle # 2*

4 Close the drawer after you have disconnected the tube and click on **OK** to continue.

5 Next, you are prompted to fill the wash station with water up to the “full” mark (see arrow in the figure on the left).

6 Click on **OK** when done.

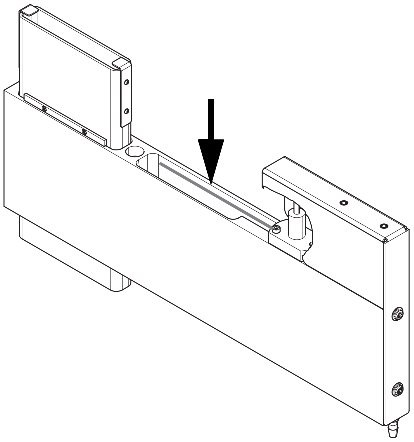


Fig. 10-55 *Filling the wash station*

7 After you have done this, you are instructed to reconnect the waste tube to the waste liquid bottles. Confirm with **OK** when done.

The waste pump starts draining the wash station. After 5 seconds the level sensor signals empty and the pump runs for another 10 seconds to completely drain the wash station.

8 Visually observe whether the wash station is emptied correctly.

When the test is finished you are notified whether or not is was successful.

Pass / Fail Criteria

The test is passed if all steps described above were executed correctly.

If the Test Fails

Try the following (contact your nearest representative if necessary):

- Check all tubings and their connections. Are there any leaking or otherwise damaged tubings? Replace damaged tubings or have them replaced.
- Make sure that the level sensor and the waste pump are properly connected to the distribution board (located near the waste pump in the compartment below the worktable).
- Use the **Tool** page to perform an informal test of the waste pump and the level sensor.
- Replace the level sensor or the waste pump if necessary (or have them replaced).

10.8.4.1 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

10.9 Liquid System Function

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3

10.9.1 Liquid System Panel

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 10-17 *Liquid System functions and User Permissions*

Function	Type	User	FSE
FaWa Test[a]	Test	X	X
Prefill for Liquid Level Detection	Preparation	X	X
Liquid Level Detection	Test	X	X
Gravimetric Pipetting Precision	Test	X	X
Colorimetric Pipetting Precision[a]	Test	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

a) This function is not available and deactivated for the Air LiHa

Before You Start

Pay attention to the following:

ATTENTION

Before starting the panel you must open the **Channel** page on the **LiHa** panel and check (and, if necessary correct) the tip configuration.

- You cannot rectify the settings after you have started the panel.
- If you notice errors in the tip configuration only after you have started the panel, it will be necessary to quit it, rectify the settings on the **Channel** page and then restart the panel.

WARNING

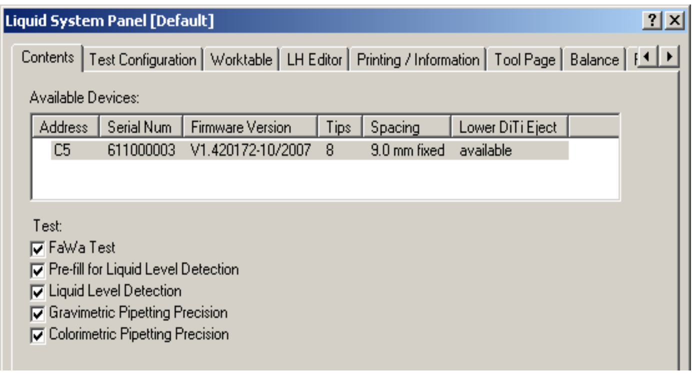
To avoid worktable contamination and splashes of liquid on the worktable, make sure you use only uncontaminated and undamaged DiTis for the tests described in this section.

Starting the Liquid System Panel

After you have checked the tip configuration on the LiHa **Channel** page, you can perform the **Liquid System** test functions as follows:

1 Start the panel with **Liquid System > Liquid System.**

*The **Liquid System** panel with activated **Contents** page appears. After starting the panel no check box is selected and not all tabs are visible.*



Available Devices:

Address	Serial Num	Firmware Version	Tips	Spacing	Lower DiTi Eject
C5	611000003	V1.420172-10/2007	8	9.0 mm fixed	available

Test:

☑ FaWa Test
☑ Pre-fill for Liquid Level Detection
☑ Liquid Level Detection
☑ Gravimetric Pipetting Precision
☑ Colorimetric Pipetting Precision

Fig. 10-56 *Liquid System panel, Contents page*

Pages

The **Liquid System** panel consists of the following pages:

Tab. 10-18 *Pages of the Liquid System panel*

Page	Description
Contents	General overview, procedure / test selection.
Test Configuration	For setting the test parameters
Worktable	Selection of an appropriate worktable map
LH Editor	Advanced test configuration for experienced users.
Printing / Information	Print selection for the QC-report.
Tool page	For filling and flushing the liquid system
Balance	Setup and test of the balance used for the **Gravimetric Test**.
Reader	Setup of a reader used for the **Colorimetric Test**

10.9.2 LH Editor

Cross References

List of cross references to information provided in other sections:

Information	References
FaWa test	See section 10.9.5, 🗎 10-72

Purpose

In addition to the settings of the **Test Configuration** page, the **LH Editor** allows advanced users to set further parameters for the test and prefill functions of the Liquid handling panel (FaWa test, Liquid Level Detection test, Gravimetric test, Colorimetric Test). However, using the **LH Editor** is only recommended for advanced users who wish to alter the standard settings according to special needs.

ATTENTION

Use the LH Editor only if you are an advanced user who has attended a corresponding training course and who knows exactly what consequences any changes of the standard test parameters may have.

Overview

The LH Editor page provides a tree view with the parameter groups shown in the following figure:

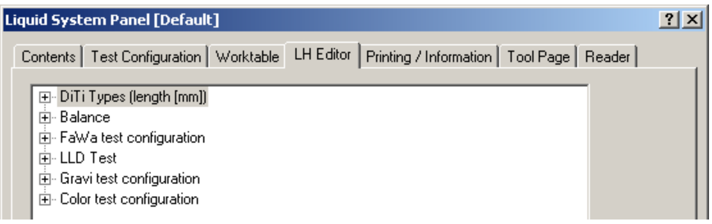


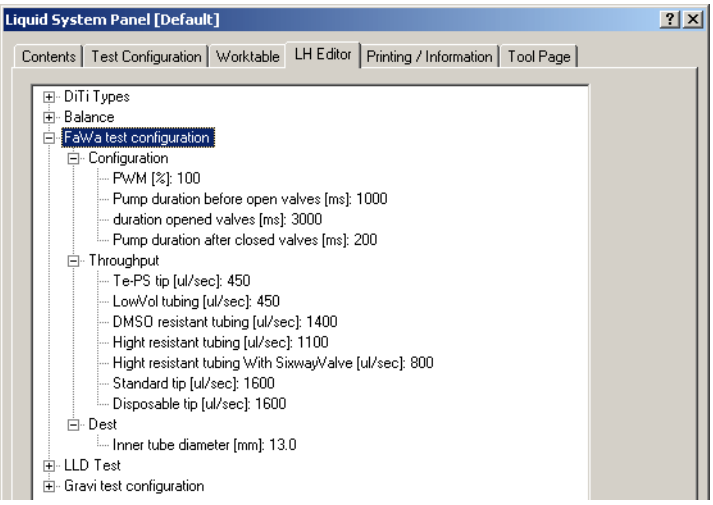
Fig. 10-57 *LH Editor*

Tab. 10-19 *Overview of LH parameters*

Parameter	Description
DiTi Type	Lists the supported DiTi types and lets you specify the DiTi lengths for special purposes.
Balance	Lets you set the test and communication parameters of the balance used for the Gravimetric test.
FaWa test configuration	Lets you set the FaWa test parameters.
LLD Test	As above for the Liquid Level Detection Test
Gravi test configuration	As above for the Gravimetric Test
Color test configuration	As above for the Colorimetric Test

Example

The following example shows how the LH Editor looks when you expand the nodes for the FaWa test. For more information, refer to the FaWa test (see cross references).



DiTi Types
Balance
FaWa test configuration
  Configuration
    PWM [%]: 100
    Pump duration before open valves [ms]: 1000
    duration opened valves [ms]: 3000
    Pump duration after closed valves [ms]: 200
  Throughput
    Te-PS tip [ul/sec]: 450
    LowVol tubing [ul/sec]: 450
    DMSO resistant tubing [ul/sec]: 1400
    Hight resistant tubing [ul/sec]: 1100
    Hight resistant tubing With SixwayValve [ul/sec]: 800
    Standard tip [ul/sec]: 1600
    Disposable tip [ul/sec]: 1600
  Dest
    Inner tube diameter [mm]: 13.0
LLD Test
Gravi test configuration

__Fig. 10-58__ LH Editor with expanded FaWa test parameters

Changing Parameters

You can change the values of the parameters by clicking directly in the parameter (in-line edit).

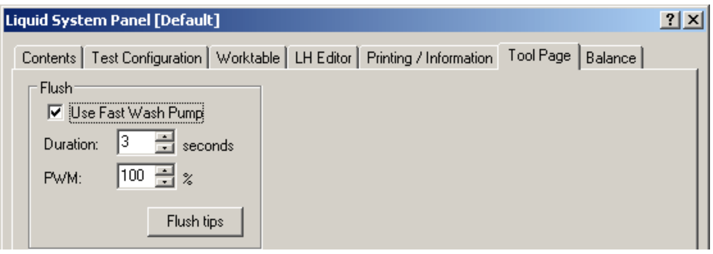
- If you alter one or more predefined (default) values **that are relevant for a particular test**, the test is no longer a “standard” test, but becomes a “user defined test”. The expression “user defined” is displayed on the title bar of the panel in this case.
- If, on the other hand, you alter parameters that do not directly affect the test results (e.g., the balance communication parameters), the indication “user defined” does not appear.

Note: *As long you as you run a standard test, there is no need to change any of the parameters of the **LH Editor.** The parameters a user can set for running standard tests can be set on the **Test Configuration** page.*

10.9.3 Tool Page

Purpose

The **Tool** page allows you to fill and flush the entire liquid system of the liquid handling arm (LiHa). Normally, it is used before a test is performed to ensure a proper test function and to eliminate air bubbles.



☑ Use Fast Wash Pump
Duration: 3 seconds
PWM: 100 %

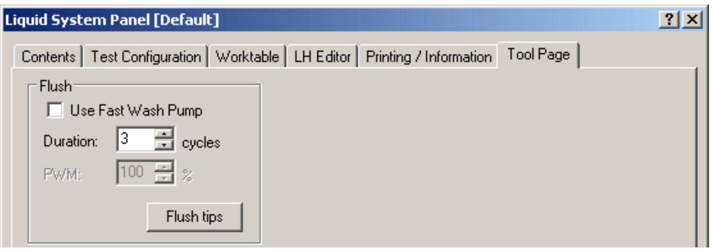


__Fig. 10-59__ Liquid System panel, Tool page

__Tab. 10-20__ Controls on the Tool page

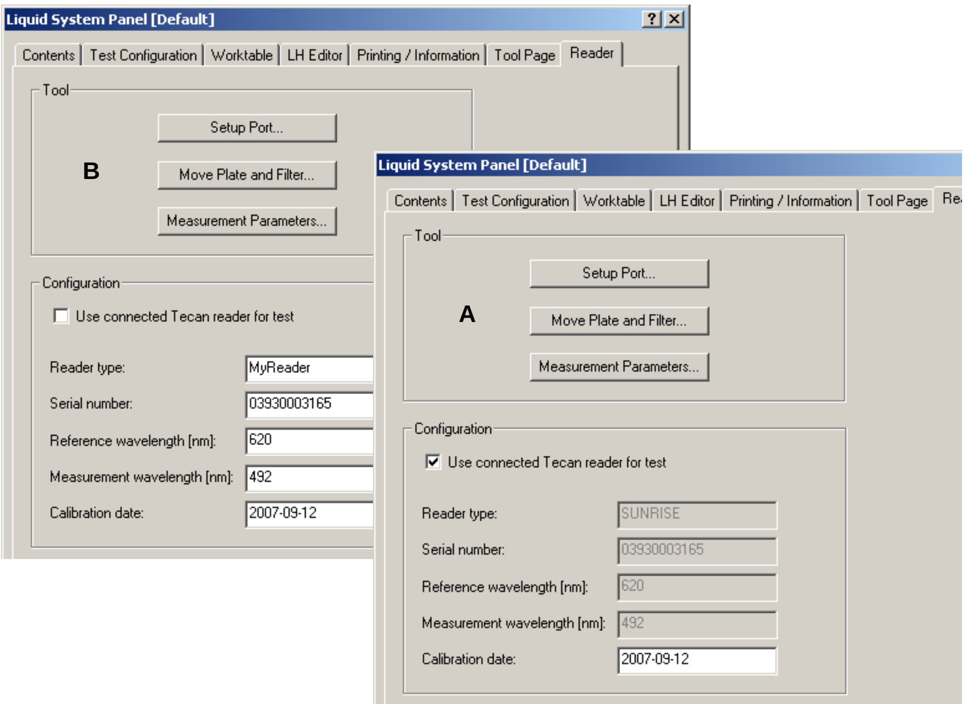
Element	Description
Use Fast Wash Pump	• Select this check box if you want to use the FaWa for filling and flushing. I f you select this check box, the PWM spin box is available. • Clear if you want to use only the diluters. In this case the PWM spin box is not available.
Duration	Lets you set the wash duration.
PWM	(PWM = pulse width modulation). This spin box is only available if the Use Fast Wash Pump check box is selected. By varying the percentage you can vary the current of the FaWa motor and indirectly set the speed and force. 100% correspond to the maximum motor speed and force.
Flush tips	If you click this button, the LiHa will move over the wash station and the tips will be flushed.

10.9.4 Reader Page

Purpose

The **Reader** page allows you to automatically or manually configure a reader. You can setup or check configuration data like: type, serial number, filter wavelengths, calibration date, connection **Port** and **Measurement Parameters**.

Reader Page



B:
☐ Use connected Tecan reader for test
Reader type: MyReader
Serial number: 03930003165
Reference wavelength [nm]: 620
Measurement wavelength [nm]: 492
Calibration date: 2007-09-12

A:
☑ Use connected Tecan reader for test
Reader type: SUNRISE
Serial number: 03930003165
Reference wavelength [nm]: 620
Measurement wavelength [nm]: 492
Calibration date: 2007-09-12

*Fig. **10-60** Reader page, External reader*

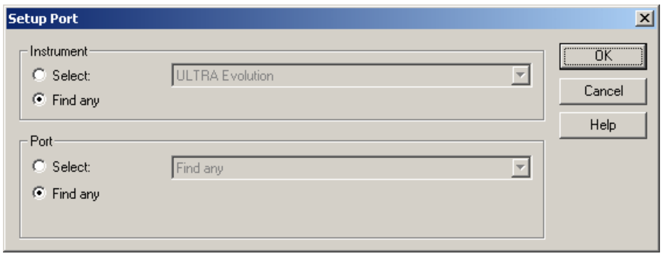
A *Tecan reader* ***B*** *External reader*

Reader Page Controls

Tool	Controls to access reader specific settings
- **Setup Port**	Allows to setup the connection of the reader to the superior instrument (see Fig. 10-61, 🗎 10-71)
- **Move Plate and Filter...**	- Allows to move the microplate drawer in and out of the reader - Allows to move the measuring filters in and out
- **Measurement Parameters...**	Allows to change the parameter setting of the reader (see Fig. 10-62, 🗎 10-71)
Configuration	Display and input section for reader data
- **Use connected Tecan reader for test**	Select this check box if you want to use a **Tecan reader** that is connected to the instrument
- **Reader type**	• **Tecan reader** (connected): reader type filled in automatically when the reader is recognized by the system. • **External reader** (not connected): reader type to be filled in manually.

-	**Serial number**	• **Tecan reader** (connected): serial number of the reader filled in automatically . • **External reader** (not connected): serial number of the reader to be filled in manually.
-	**Reference wavelength [nm]**	• **Tecan reader** (connected): wavelength of the reference filter filled in automatically. • **External reader** (not connected):wavelength of the reference filter to be filled in manually.
-	**Measurement wavelength [nm]**	• **Tecan reader** (connected): wavelength of the measuring filter filled in automatically. • **External reader** (not connected): wavelength of the measuring filter to be filled in manually.
-	**Calibration date**	Last calibration date of the reader to be filled in manually.

Port Setting Dialog

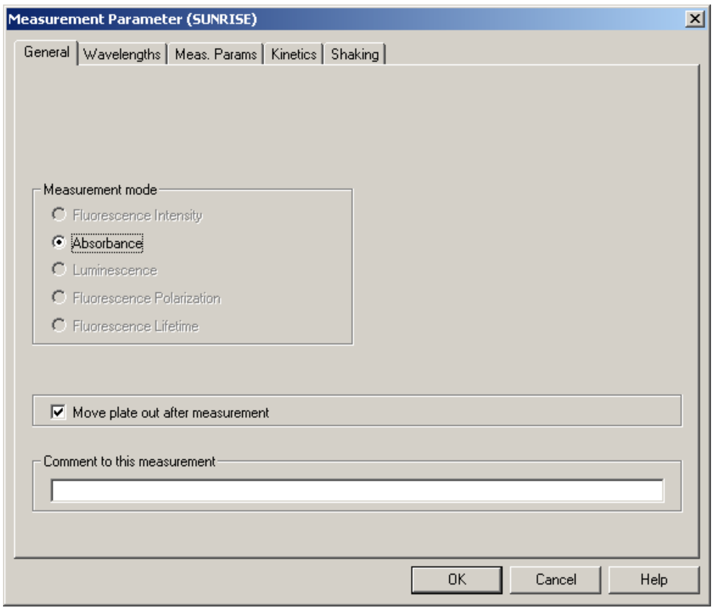


Instrument
○ Select: ULTRA Evolution
● Find any

Port
○ Select: Find any
● Find any

Fig. 10-61 *Port setting dialog*

Measurement Parameter Page



Measurement mode
○ Fluorescence Intensity
● Absorbance
○ Luminescence
○ Fluorescence Polarization
○ Fluorescence Lifetime

☑ Move plate out after measurement

Comment to this measurement

Fig. 10-62 *Measurement Parameters page*

Panels of the Measurement Parameter page

The panels are dependent of the Tecan reader that is connected to the system.

The data of the Tecan reader is displayed in the various panels or can be completed or changed accordingly (see Tecan reader documentation).

10.9.5 FaWa Test

10.9.5.1 Introduction

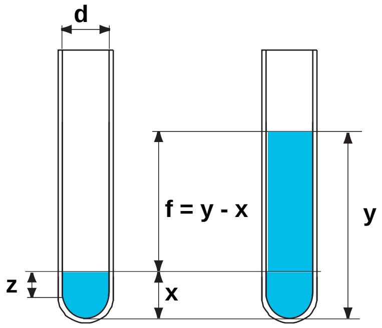
About the FaWa

The Fast Wash Pump (FaWa) is used to pump large amounts of liquid at high speed through the system, normally to rinse the tips. The Monitored Pump Option (MPO) consists of FaWa and Licos.

Purpose

The **FaWa Test** function checks the throughput of liquid in the entire liquid system, including the aspiration and pipetting tubings, the diluters, valves and the tips).

Test Principle



d	*Inner tube diameter*
x	*Prefilled liquid, approx. 600 µl*
y	*Liquid level at end of test*
z	*Cylindrical part of prefilled liquid*
f	*Filling height, f = y - x*

Fig. 10-63 *Principle of liquid level check*

The **FaWa** test uses one tube for each LiHa channel that is included in the test (can be selected by user). The tubes must be placed in an appropriate tube rack.

8 Plus 1 Access LiHa

Note: *When testing the FaWa with an* ***8 Plus 1 Access LiHa*** *a trough is used instead of tubes in a tube rack and all channels are dispensing into that same trough. About 50% of the trough must be filled with tap water before starting a test. Liquid level detection is done only with tip # 1 and refers to the total dispensed liquid of all channels.*

At the beginning of the test, all tubes must be empty. For the standard test, tubes with an inner diameter of 13 mm and a height of 100 mm are used.

- After the test has been started, the tubes are prefilled, so that the liquid level (x) is within the cylindrical part of the tube. Then, an **LLD** (Liquid Level Detection) test is performed to determine the exact level (x).
- Next, the FaWa pumps liquid into the tubes for a predefined time of 3 seconds and fills the tubes up to the level (y). Please note:
  - The resulting filling height (f = y - x) depends on various factors: Type of aspiration tubing, type of pipetting tubing, tip type, the inner diameter of the tube used for the test, etc. Note that the filling height (f = y - x) is not necessarily the same for all channels.
  - The tip types, the aspiration and pipetting tubings corresponds to those which were defined earlier on the LiHa **Channel** page.

- After the tubes have been filled, a second **LLD** is performed and the determined liquid levels are compared with the expected levels.
- The test is passed if the resulting filling heights (f = y - x) correspond to the expected values.

Inner Tube Diameter

The test will only produce reliable results if the inner diameter of the physical tube corresponds exactly to the one set on the **LH Editor** page. It is recommended that the tube diameters should be measured with a caliper and that the value on the **LH Editor** page is adapted if necessary.

10.9.5.2 FaWa Test Procedure

Cross References

List of cross references to information provided in other sections:

Information	References
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3
Advanced test configuration	See section 10.9.5.3, 🗎 10-76

Preparation

To prepare the FaWa test:

1 Put the required number of empty tubes into a tube rack and place the tube rack on the worktable. Make sure you use the correct tubes (Default type: inner diameter = 13 mm, height = 100 mm).

8 Plus 1 Access LiHa

Note: *When doing the FaWa test with an **8 Plus 1 Access LiHa** place a trough instead of the tubes with tube rack on the worktable and fill about 50% of it with tap water.*

ATTENTION

The test results will be unreliable if the physical tube diameter does not exactly correspond with the one set on the **LH Editor** page.

- Use a caliper to check the inner diameter of your tubes.
- Make sure that all tubes have the same inner diameter.
- Make sure your tubes are cylindrical, i.e. that the inner diameter remains the same in the cylindrical part of the tube.
- If necessary, go the **LH Editor page** and adapt the value of the inner tube diameter as described in “Advanced Test Configuration” (see cross references).

2 Ensure that the tip configuration and the tubing types correspond with the settings on the LiHa **Channel** page. Should they not be correct, you must quit the **Liquid System** panel, make the necessary changes on the LiHa **Channel** page and then restart the **Liquid System** panel.

3 Use the **Tool** page and perform the **Flush tips** function. Empty the tubes when done.

Test Procedure

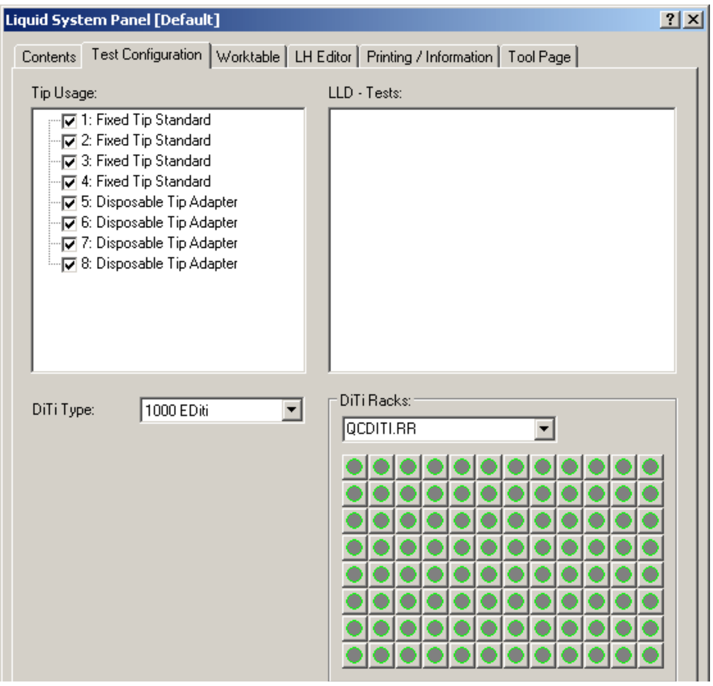
To perform the **FaWa** test:

1 On the **Contents** page, select the check box **FaWa Test**.

2 Open the **Worktable** page and check whether the worktable map corresponds to the physical worktable. Make sure that the worktable map contains the correct wash station (Standard or Combo). Correct as necessary.

3 Change to the **Printing / Information** page and fill out the **Comments** field as necessary.

4 Change to the **Test Configuration** page.



Tip Usage:
- ☑ 1: Fixed Tip Standard
- ☑ 2: Fixed Tip Standard
- ☑ 3: Fixed Tip Standard
- ☑ 4: Fixed Tip Standard
- ☑ 5: Disposable Tip Adapter
- ☑ 6: Disposable Tip Adapter
- ☑ 7: Disposable Tip Adapter
- ☑ 8: Disposable Tip Adapter

DiTi Type: 1000 EDiti

DiTi Racks: QCDITI.RR

Fig. 10-64 *FaWa, test configuration*

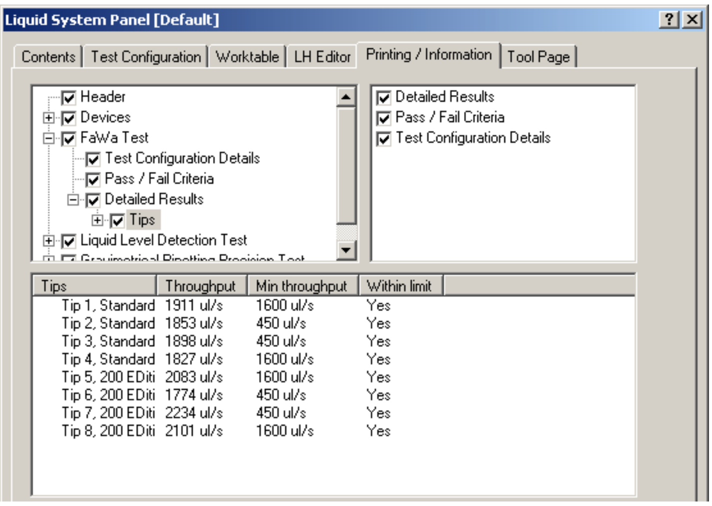
5 Configure the test according to your needs (see figure).

- **Tip Usage**: Select the tips you want to include in the test.
  Note: *When using the* ***8 Plus 1 Access LiHa*** *you can only select tip # 1 or all tips*
- If there are DiTis, select the type from the list **DiTi Type**.
- In the frame **DiTi Racks**, use the list box to select the DiTi racks or DiTi boxes.
- Form the associated graphical representation below the list box, select / deselect individual DiTis as necessary.
- Remember that you must deselect the DiTis from racks that do not contain the DiTi type you need for your test.

6 When everything is in order, start the test by clicking **Start** .

The test takes only a few seconds to execute. At the end of the test a ***Test Passed*** *or* ***Test Failed*** *message notifies you whether or not the test was successful.*
Note: *When using the* ***8 Plus 1 Access LiHa*** *you will be prompted to confirm that all channels were dispensing equally before the* ***Test Passed*** *or* ***Test Failed*** *notification is displayed.*

7 View the results on the **Printing / Information** page.



Liquid System Panel [Default]

Contents | Test Configuration | Worktable | LH Editor | Printing / Information | Tool Page

☑ Header
☑ Devices
☑ FaWa Test
  ☑ Test Configuration Details
  ☑ Pass / Fail Criteria
  ☑ Detailed Results
    ☑ Tips
☑ Liquid Level Detection Test

☑ Detailed Results
☑ Pass / Fail Criteria
☑ Test Configuration Details

Tips	Throughput	Min throughput	Within limit
Tip 1, Standard	1911 ul/s	1600 ul/s	Yes
Tip 2, Standard	1853 ul/s	450 ul/s	Yes
Tip 3, Standard	1898 ul/s	450 ul/s	Yes
Tip 4, Standard	1827 ul/s	1600 ul/s	Yes
Tip 5, 200 EDiti	2083 ul/s	1600 ul/s	Yes
Tip 6, 200 EDiti	1774 ul/s	450 ul/s	Yes
Tip 7, 200 EDiti	2234 ul/s	450 ul/s	Yes
Tip 8, 200 EDiti	2101 ul/s	1600 ul/s	Yes

*Fig. **10-65** FaWa test, Printing / Information page*

Pass / Fail Criteria

The test is passed if the minimum liquid throughput on each selected channel reaches or exceeds the value shown on the **Printing / Information** page, in column **Min. Throughput** and in the following figure.

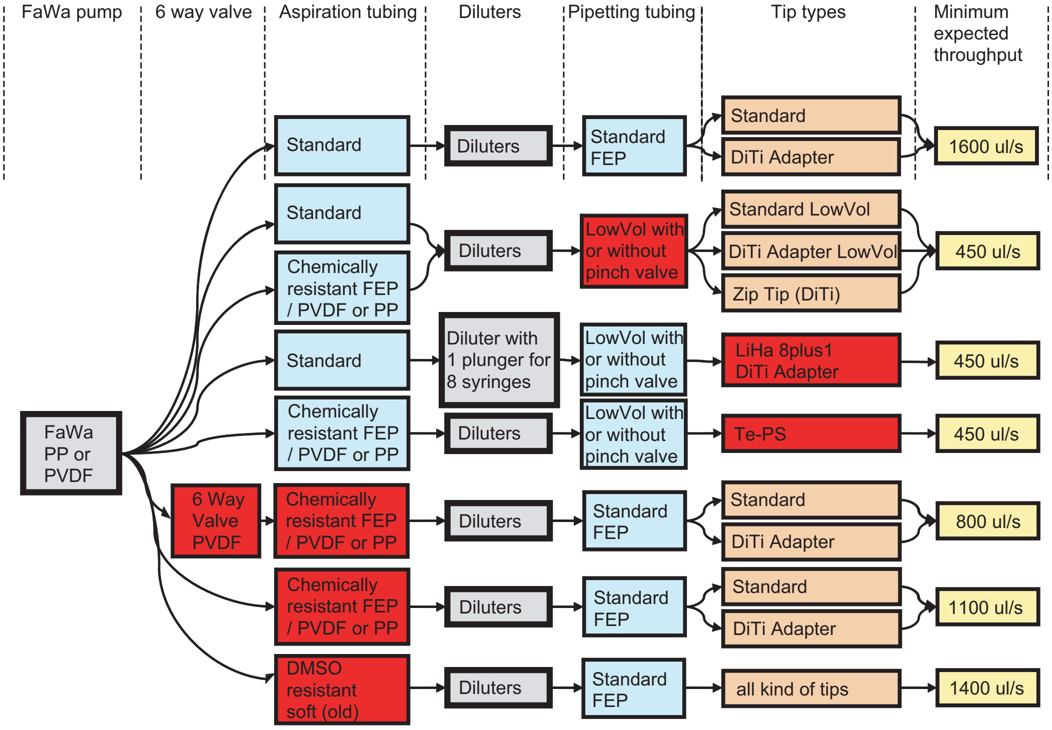


*Fig. **10-66** FaWa test, pass/fail criteria*

As the above diagram shows, the attainable minimum throughput per channel depends on several factors:

- the FaWa pump itself

- the type of aspiration tubing
- the diluter volume
- the type of pipetting tubing
- the tip types

The elements through which the FaWa pump presses the liquid have an influence on the overall flow resistance and therefore on the resulting liquid level and volume in the tube.

If the Test Fails

If the test fails try the following:

- Make sure that the settings on the LiHa **Channel** page are correct. If they are not, quit the **Liquid System** panel, rectify the settings, then repeat the test.
- Check whether you have used the correct tubes (tube diameter and height). If necessary repeat the test with the correct tubes.
- Check whether any tubings are kinked or clogged.
- Check whether any tips are clogged or otherwise damaged.
- Repeat the test when you have found the cause of the malfunction.
- Call your nearest service organization if necessary.

10.9.5.3 Advanced Test Configuration

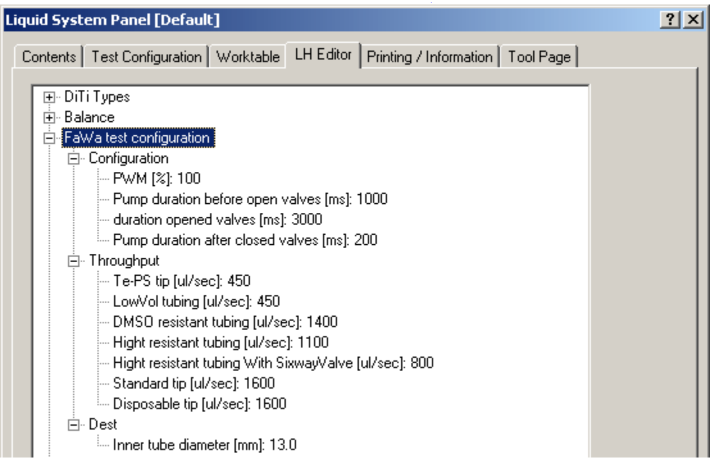
Purpose

As has been mentioned before, advanced users can use the **LH Editor** to adapt the configuration parameters to meet special requirements.

Parameters

Some of the parameters are shown in the following figure(s). Most of them are self-explanatory. The **LH Editor** also shows the default values.

***Note:** You should always consult the “real screen” on your computer and not the figures in this manual to find the values of parameters.*



Configuration
- PWM [%]: 100
- Pump duration before open valves [ms]: 1000
- duration opened valves [ms]: 3000
- Pump duration after closed valves [ms]: 200

Throughput
- Te-PS tip [ul/sec]: 450
- LowVol tubing [ul/sec]: 450
- DMSO resistant tubing [ul/sec]: 1400
- Hight resistant tubing [ul/sec]: 1100
- Hight resistant tubing With SixwayValve [ul/sec]: 800
- Standard tip [ul/sec]: 1600
- Disposable tip [ul/sec]: 1600

Dest
- Inner tube diameter [mm]: 13.0

***Fig. 10-67** LH Editor, FaWa parameters*

User Defined Parameters

If you change default parameters **which have an influence on the test results**, your test becomes a “user-defined” test. In this case, the text **User Defined** appears on the title bar of the panel.

10.9.6 Liquid Level Detection Test

10.9.6.1 Introduction

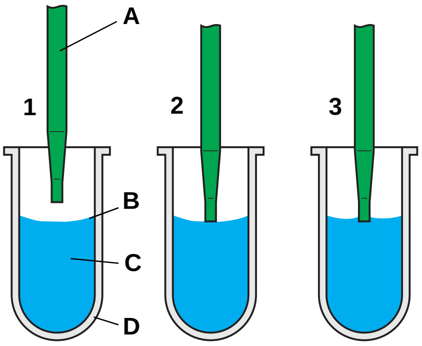
Purpose

The **Liquid Level Detection** function checks whether the liquid detection feature works properly. It is often also used to check whether this feature is capable of detecting a certain (usually small) volume of a specific liquid.

Principle of Liquid Detection

The integrated liquid level detection (ILID) measures the capacitance between the tip and the instrument worktable; i.e. the corresponding carrier. As soon as the tip touches the liquid surface, the change in capacitance serves to trigger a detection signal.

The conductivity of the liquid and the labware type have influence on the detectability.



1	The tip moves downwards to detect liquid.
2	The tip is at detection level.
3	The tip has contact to the liquid surface after detection.

A	*Tip*
B	*Liquid level*
C	*Sample*
D	*Tube*

Fig. 10-68 *Liquid level detection*

The liquid level detection evaluates both the liquid detection signal (when the tip moves into the sample liquid) and the exit signal (when the tip retracts).

Each channel has an individual liquid detection.

Note:

- *The evaluation of the test results is described below.*
- *For a detailed description of the liquid level detection as used by various applications refer to the corresponding operating and / or application software manual.*

How Test Results Are Evaluated

The test results are obtained according to the following:

- For tips that are expected to find liquid (prefill volume > 0 or destination is a trough):
  - **Liquid det error** is incremented if no liquid is detected.
  - **z-in-dev**: Max. difference of detected levels over number of cycles.
  - **Clot Error** is incremented if no exit signal occurs within **Clot Error Limit**.
- For tips that are not expected to find liquid (no prefill and destination is not a trough):
  - **Liquid det error** is incremented if liquid is detected.
  - **Clot Error** is incremented if an exit signal occurs within **Clot Error Limit**.

10.9.6.2 Test Procedure

Cross References

List of cross references to information provided in other sections:

Information	References
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3
Evaluation of test results	See section 10.9.6.1, 🗎 10-77

Test Liquid

Use tap water for the test.

Preparation

To prepare the **LLD** test:

1 Put the required number of empty tubes into a tube rack and place the tube rack, along with carriers, troughs, etc. on the worktable.

Note: *For the* ***LLD*** *test it is not relevant whether you use tubes with an inner diameter of 10 mm or 13 mm.*

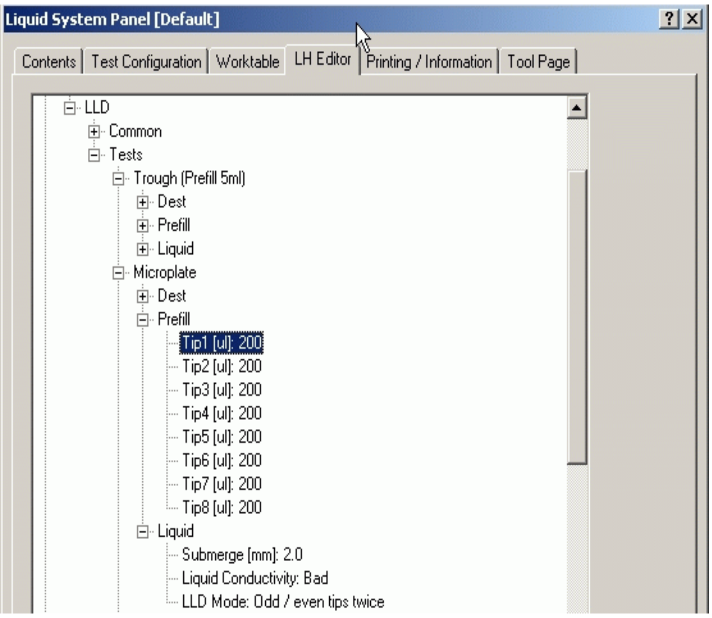
2 Ensure that the tip configuration corresponds to the settings on the LiHa **Channel** page. Should they not be correct, you must quit the **Liquid System** panel, make the necessary changes on the LiHa **Channel** page and then restart the **Liquid System** panel.

3 On the **Contents** page, select the following:

- If necessary (if the tubes are empty or do not contain the specified liquid quantities), select the **Prefill for Liquid Level Detection** check box.
- Check box **Liquid Level Detection**.

4 You must prefill the following wells for the following tips manually:

- **10 µl DiTis**. The volumes of these tips are too small for an automatic prefill of microplates or tubes, and the prefill would last too long. In this case, you must manually prefill the volume shown on the LH Editor page in section **Prefill** of the corresponding object. For an example see the following figure.



- LLD
  - Common
  - Tests
    - Trough (Prefill 5ml)
      - Dest
      - Prefill
      - Liquid
    - Microplate
      - Dest
      - Prefill
        - Tip1 [ul]: 200
        - Tip2 [ul]: 200
        - Tip3 [ul]: 200
        - Tip4 [ul]: 200
        - Tip5 [ul]: 200
        - Tip6 [ul]: 200
        - Tip7 [ul]: 200
        - Tip8 [ul]: 200
      - Liquid
        - Submerge [mm]: 2.0
        - Liquid Conductivity: Bad
        - LLD Mode: Odd / even tips twice

Fig. 10-69 *Prefill volume of microplate*

– **Troughs.** You can see the volume to prefill on the **Test Configuration** page, in the window **LLD - Tests** (see figure Fig. 10-70 , 🗎 10-80) or on the **LH Editor** page, in the Prefill section of the corresponding object. For a volume of 5 ml you must manually fill the trough up to a level of about 4 to 5 mm.

Note:

- *Before performing the **Prefill** function empty the troughs in order to avoid a liquid overflow.*
- *The **Prefill** function should be performed once at the beginning of the test.*
- *The standard test requires tap water for the **Prefill** function.*

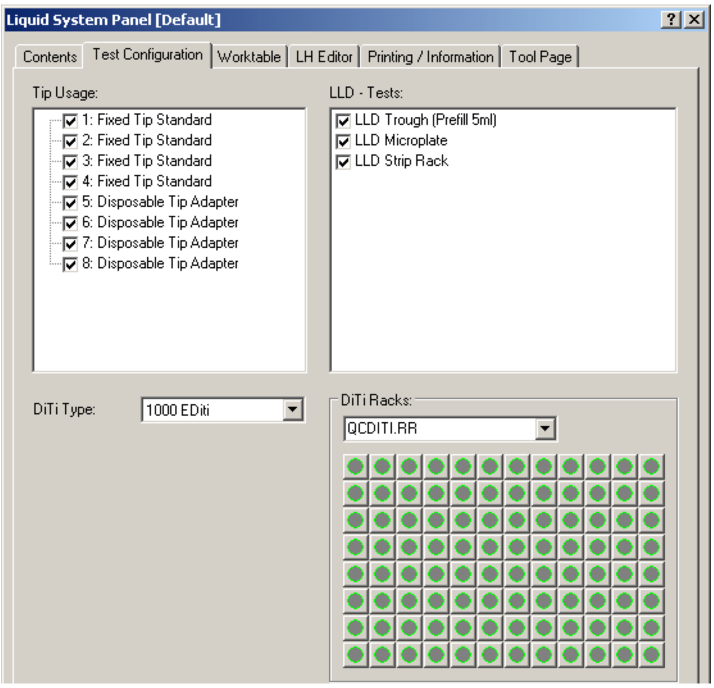
5 Open the **Worktable** page and check whether the worktable map corresponds to the physical worktable. Make sure that the worktable map contains the correct wash station (e.g., **Standard** or **Combo**). Correct as necessary.

Test Procedure

After you have made the test preparation as described above, continue as follows to perform the test:

1 Change to the **Printing / Information** page and fill out the **Comments** text box as necessary.

2 Change to the **Test Configuration** page.



Tip Usage:

- ☑ 1: Fixed Tip Standard
- ☑ 2: Fixed Tip Standard
- ☑ 3: Fixed Tip Standard
- ☑ 4: Fixed Tip Standard
- ☑ 5: Disposable Tip Adapter
- ☑ 6: Disposable Tip Adapter
- ☑ 7: Disposable Tip Adapter
- ☑ 8: Disposable Tip Adapter

LLD - Tests:

- ☑ LLD Trough (Prefill 5ml)
- ☑ LLD Microplate
- ☑ LLD Strip Rack

DiTi Type: 1000 EDiti

DiTi Racks: QCDITI.RR

Fig. 10-70 Liquid Level Detection, Test Configuration page

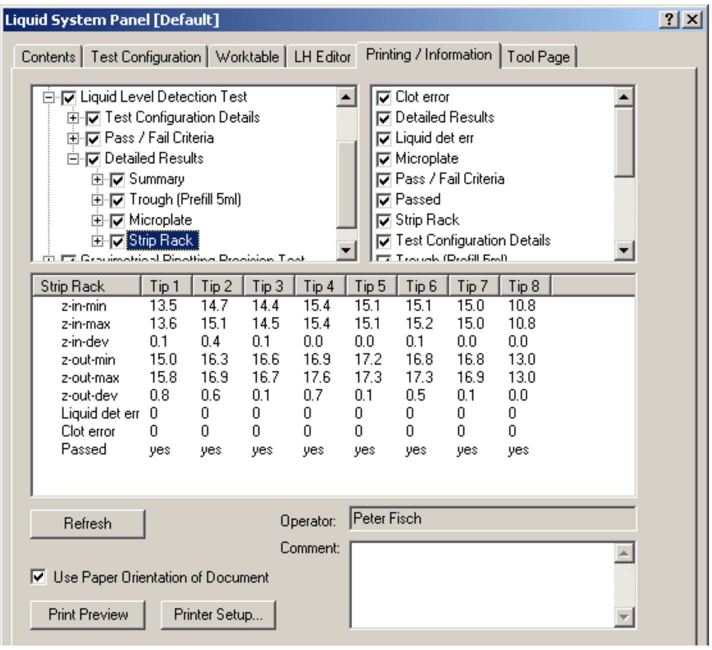
3 Configure the test according to your needs (see figure).

- – **Tip Usage**: Select the tips you want to include in the test.
- – **LLD Test**: Select the racks for which you want to perform the prefill and test procedures.
- – If there are DiTis, select the type from the list **DiTi Type**.
- – In the frame **DiTi Racks**, use the list box to select the DiTi racks or DiTi boxes.
- – From the graphical representation below the list box, select / deselect DiTis as necessary (see cross references).
- – Remember that you must deselect the DiTis from racks that do not contain the DiTi type you need for your test.

4 When everything is in order, start the test by clicking **Start** .

*At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the test was successful.*

5 View the results on the **Printing / Information** page.



- ☑ Liquid Level Detection Test
  - ☑ Test Configuration Details
  - ☑ Pass / Fail Criteria
  - ☑ Detailed Results
    - ☑ Summary
    - ☑ Trough (Prefill 5ml)
    - ☑ Microplate
    - ☑ Strip Rack

☑ Clot error
☑ Detailed Results
☑ Liquid det err
☑ Microplate
☑ Pass / Fail Criteria
☑ Passed
☑ Strip Rack
☑ Test Configuration Details

Strip Rack	Tip 1	Tip 2	Tip 3	Tip 4	Tip 5	Tip 6	Tip 7	Tip 8
z-in-min	13.5	14.7	14.4	15.4	15.1	15.1	15.0	10.8
z-in-max	13.6	15.1	14.5	15.4	15.1	15.2	15.0	10.8
z-in-dev	0.1	0.4	0.1	0.0	0.0	0.1	0.0	0.0
z-out-min	15.0	16.3	16.6	16.9	17.2	16.8	16.8	13.0
z-out-max	15.8	16.9	16.7	17.6	17.3	17.3	16.9	13.0
z-out-dev	0.8	0.6	0.1	0.7	0.1	0.5	0.1	0.0
Liquid det err	0	0	0	0	0	0	0	0
Clot error	0	0	0	0	0	0	0	0
Passed	yes	yes	yes	yes	yes	yes	yes	yes

Operator: Peter Fisch
Comment:
☑ Use Paper Orientation of Document

Fig. 10-71 LLD test, Printing Information page

Description of Test Results

The following table briefly describes the test results. Additional explanations are given after the table.

Tab. 10-21 Strip rack parameters

Strip rack	Description	Dimension
z-in-min	Lowest liquid level position found	[mm]
z-in-max	Highest liquid level position found	[mm]
z-in-dev	Difference (z-in-max - z-in-min)	[mm]
z-out-min	Lowest liquid level exit position found	[mm]
z-out-max	Highest liquid level exit position found	[mm]
z-out-dev	Difference (z-out-max - z-out-min)	[mm]
Liquid det err	Number of liquid detection errors	
Clot error	Number of clot errors	

How the Test Results are Evaluated

Refer to the description provided in the “Introduction” (see cross references).

Pass / Fail Criteria

The test is passed if the following is true:

- z-in-dev ≤ Error Limit [mm]
- Liquid det err = 0
- Clot error = 0

If the Test Fails

If the test fails try the following:

- Make sure that the settings on the LiHa **Channel** page are correct. If they are not, quit the **Liquid System** panel, rectify the settings, the repeat the test.
- Check whether any tips are clogged or otherwise damaged.
- Repeat the test when you have found the cause of the malfunction.
- Call your nearest service organization if necessary.

10.9.6.3 Advanced Test Configuration

Purpose

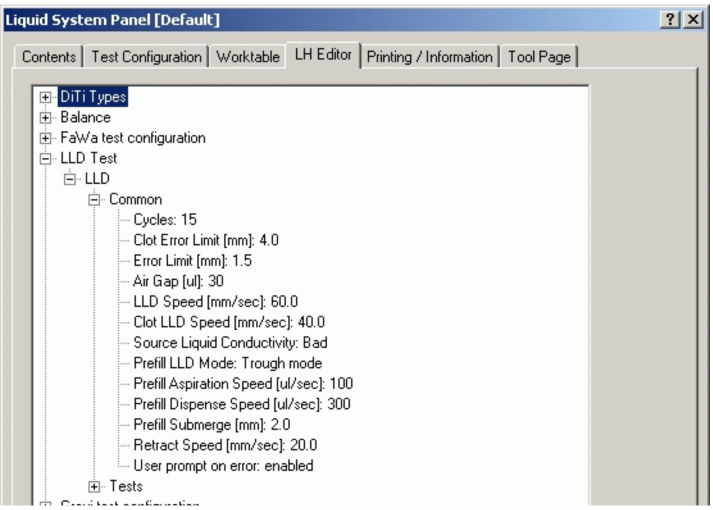
As has been mentioned before, advanced users can use the **LH Editor** to adapt the configuration parameters to meet special requirements.

Parameters

Some of the parameters are shown in the following figure(s). Most of them are self-explanatory. The **LH Editor** also shows the default values.

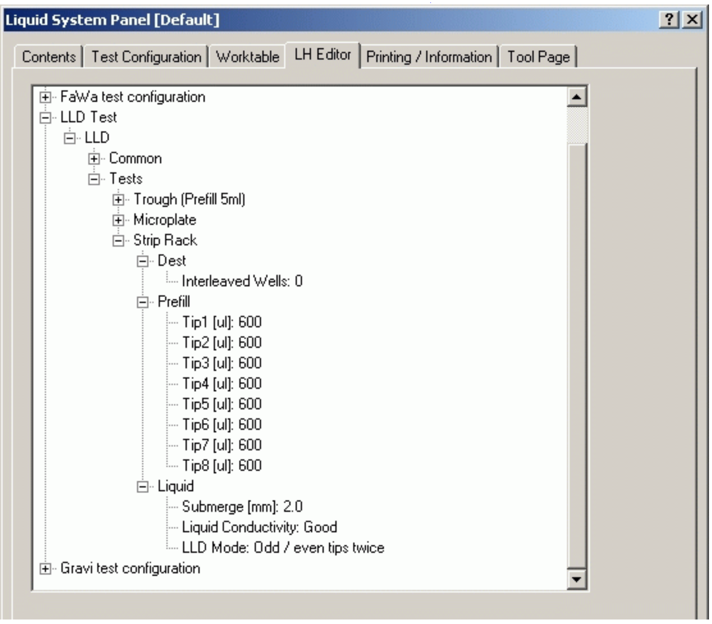
Note: *You should always consult the “real screen” on your computer and not the figures in this manual to find the values of parameters.*

The following figures show LH-Editor with the LLD parameters.



- DiTi Types
- Balance
- FaWa test configuration
- LLD Test
  - LLD
    - Common
      - Cycles: 15
      - Clot Error Limit [mm]: 4.0
      - Error Limit [mm]: 1.5
      - Air Gap [ul]: 30
      - LLD Speed [mm/sec]: 60.0
      - Clot LLD Speed [mm/sec]: 40.0
      - Source Liquid Conductivity: Bad
      - Prefill LLD Mode: Trough mode
      - Prefill Aspiration Speed [ul/sec]: 100
      - Prefill Dispense Speed [ul/sec]: 300
      - Prefill Submerge [mm]: 2.0
      - Retract Speed [mm/sec]: 20.0
      - User prompt on error: enabled
    - Tests

Fig. 10-72 *LH Editor, LLD common settings*



- FaWa test configuration
- LLD Test
  - LLD
    - Common
    - Tests
      - Trough (Prefill 5ml)
      - Microplate
      - Strip Rack
        - Dest
          - Interleaved Wells: 0
        - Prefill
          - Tip1 [ul]: 600
          - Tip2 [ul]: 600
          - Tip3 [ul]: 600
          - Tip4 [ul]: 600
          - Tip5 [ul]: 600
          - Tip6 [ul]: 600
          - Tip7 [ul]: 600
          - Tip8 [ul]: 600
        - Liquid
          - Submerge [mm]: 2.0
          - Liquid Conductivity: Good
          - LLD Mode: Odd / even tips twice
- Gravi test configuration

Fig. 10-73 *LH Editor, LLD test parameters*

User Defined Parameters

If you change default parameters **which have an influence on the test results**, your test becomes a “user-defined” test. In this case, the text **User Defined** appears on the title bar of the panel.

10.9.7 Gravimetric Test

10.9.7.1 Introduction

General

The **Gravimetric Test** function checks the precision and the accuracy of a liquid transfer by means of a precision balance placed on the worktable. The test can be performed with fixed or disposable tips.

- **Standard Gravimetric Test:** Users can select a test configuration from a list of standard test procedures where most test parameters are predefined . The standard gravimetric test is recommended for most users
  - During a standard test, a predefined amount (e.g., 10 µl or 100 µl) of liquid (e.g., water) is transferred into a container placed on the precision balance. The actual weight difference will be registered and transmitted to the result table that appears on the screen during the test.
  - The procedure will be repeated 12 times with each of the selected tips. The test duration depends on the number of selected tips and lasts about…
    - 1.5 hours with an 8-tip configuration
    - 45 minutes with a 4-tip configuration
    - 25 minutes with a 2-tip configuration
- **User-Defined Gravimetric Test:** Using the **LH Editor** (→ Cross References), advanced users and specialists can adapt most test parameters and perform a user-defined test. The definition of such a user-defined test is only recommended for users who have attended a special liquid handling course.

Accuracy, Precision

With the gravimetric test, these two terms have different meanings:

- **Precision** refers to the Coefficient of Variation (CV %) and provides a measure for the reproducibility of repeated tests. The less the results of subsequent tests “scatter”, i.e. differ from each other, the better the CV % value is. The more they vary from test to test, the higher the CV % value becomes.

$$CV\,[\%] = \frac{s \times 100\%}{x_m}$$

$$s = \sqrt{\frac{\sum (x_i - x_m)^2}{n-1}}$$

Where
x_i = measured values
x_m = mean value
n = number of samples
s = standard deviation
CV [%] = coefficient of variation

- **Accuracy** denotes the degree of conformity of a measure to a standard or true value (difference between the actual value and the expected value), divided by the expected value, multiplied by 100%).

$$a = \left(\frac{x_m - e}{e}\right) \times 100\%$$

Where
a = accuracy in %
x_m = mean value
e = expected value

***Note:** .The Gravimetric Test not only takes into consideration the variations of repeated tests per channel, but also variations over all measurements of all selected channels.*

10.9.7.2 Test Procedure

Cross References

List of cross references to information provided in other sections:

Information	References
LH Editor	See section 10.9.2, 🗎 10-66
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3
Balance installation and setup	See section 10.11, 🗎 10-126

Required Tools

An appropriate balance must be installed and set up (→ Cross References).

Test Liquid

Use tap water for the **Gravimeteric Test**.

Preparation

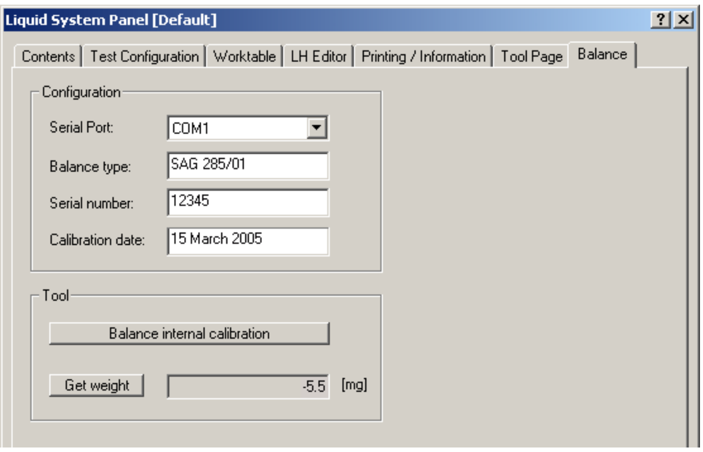
Prepare the **Gravimetric Test** as follows:

1. Install, connect and set up the balance according to the information provided in section “Balance” (see cross references).
2. Place carriers for DiTis, troughs and wash station on the worktable.
3. Ensure that the tip configuration corresponds to the settings on the LiHa **Channel** page. Should they not be correct, you must quit the **Liquid System** panel, make the necessary changes on the LiHa **Channel** page and then restart the **Liquid System** panel.

Test Procedure

To perform the **Gravimetric Test**:

1. On the **Contents** page, select the check box **Gravimetric Pipetting Precision Test**.
2. Open the **Worktable** page and check whether the worktable map corresponds to the physical worktable.
   - Make sure that the worktable map contains the correct wash station (e.g., **Standard** or **Combo**). Correct as necessary.
   - Also ensure that the worktable layout corresponds to the installed balance.
3. Use the **Tool** page and perform the **Flush tips** function several times. Make sure that the tubings are free of air bubbles and that the tips are not clogged or otherwise damaged. Take any corrective measures now as necessary.
4. Change to the **Balance** page.



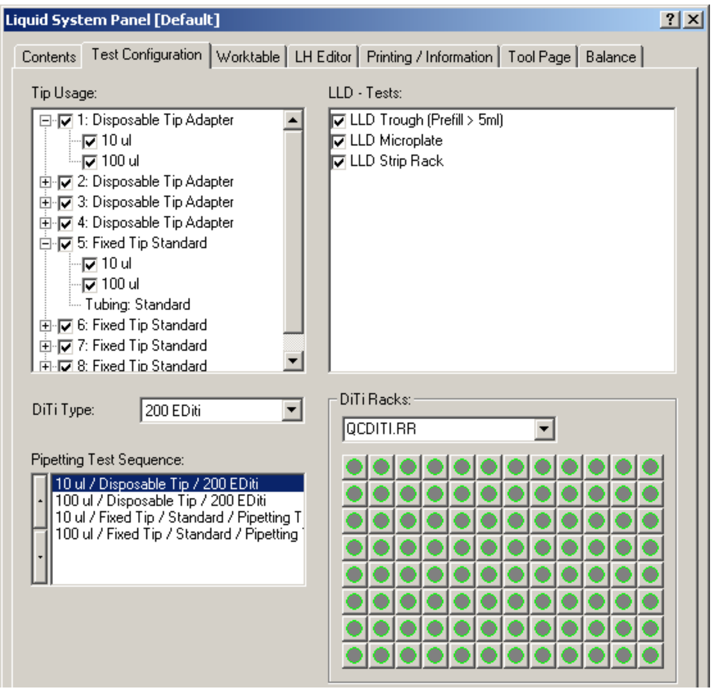
Serial Port: COM1
Balance type: SAG 285/01
Serial number: 12345
Calibration date: 15 March 2005
Get weight: -5.5 [mg]

Fig. 10-74 Balance page

5 Set the following parameters on the **Balance Page**:
  - **Serial Port**: Choose the COM port to which the balance is connected from the list.
  - **Calibration date**: Date when the balance was last externally calibrated by a Mettler FSE. Choose a date format that cannot be misinterpreted.

6 Change to the **Printing / Information** page and fill out the **Comments** field as necessary.

7 Change to the **Test Configuration** page.



Tip Usage:
- ☑ 1: Disposable Tip Adapter
  - ☑ 10 ul
  - ☑ 100 ul
- ☑ 2: Disposable Tip Adapter
- ☑ 3: Disposable Tip Adapter
- ☑ 4: Disposable Tip Adapter
- ☑ 5: Fixed Tip Standard
  - ☑ 10 ul
  - ☑ 100 ul
  - Tubing: Standard
- ☑ 6: Fixed Tip Standard
- ☑ 7: Fixed Tip Standard
- ☑ 8: Fixed Tip Standard

LLD - Tests:
- ☑ LLD Trough (Prefill > 5ml)
- ☑ LLD Microplate
- ☑ LLD Strip Rack

DiTi Type: 200 EDiti

DiTi Racks: QCDITI.RR

Pipetting Test Sequence:
10 ul / Disposable Tip / 200 EDiti
100 ul / Disposable Tip / 200 EDiti
10 ul / Fixed Tip / Standard / Pipetting T
100 ul / Fixed Tip / Standard / Pipetting

Fig. 10-75 Gravimetric test, Test Configuration page

8 Configure the test according to your needs (see figure).
  - **Tip Usage**: Select the tips and their pipetting volumes you want to include in the test.

- If there are DiTis, select the type from the list **DiTi Type**.
- In the frame **DiTi Racks**, use the list box to select the DiTi racks or DiTi boxes.
- From the associated graphical representation below the list box, select / deselect DiTis as necessary (see cross references).
- Remember that you must deselect the DiTis from racks that do not contain the DiTi type you need for your test.
- **Pipetting Test Sequence**: Change the sequence as necessary.
  - To change the position of an entry in the sequence, select the entry and move it up or down with the arrow buttons on the left.

9 When everything is in order, start the test by clicking **Start** .

*At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the test was successful.*

10 View the results on the **Printing / Information** page or print out the QC-Report.

Pass / Fail Criteria

In the field, all of the tips (not only a subset) must meet the CV pass criteria according to the following table (column “CV field”).

***Note:** For your information the table also shows the “CV manuf.” values:*

- ***CV manuf:** Values against which the pipetting precision is tested at the manufacturer’s site before the instrument is shipped. Note that these values are stricter for volumes $\geq 10\,\mu l$ than the corresponding field values.*
- ***CV field:** Values that must be attained at the customer’s to pass the test.*

***Tab. 10-22** Pipetting precision using standard liquid class parameters and deionized water*

Volume	CV manuf.[a)]	CV field[a)]	Tip Type	Syringe
1 µl	≤ 10%	≤ 10%	Low volume[b)]	500 µl
1 µl	≤ 10%	≤ 10%	DiTi 10 µl[b)]	500 µl
1 µl	≤ 10%	≤ 10%	Te-PS	250 µl
10 µl	≤ 3%	≤ 3.5%	Te-PS	250 µl
10 µl	≤ 3%	≤ 3.5%	Low volume	500 µl
10 µl	≤ 3%	≤ 3.5%	DiTi 10 µl	500 µl
10 µl	≤ 3%	≤ 3.5%	Standard[c)]	1000 µl
10 µl	≤ 3%	≤ 3.5%	DiTi 200 µl	1000 µl
100 µl	≤ 0.5%	≤ 0.75%	Standard[c)]	1000 µl
100 µl	≤ 0.5%	≤ 0.75%	DiTi 200 µl	1000 µl

a) CV calculated for every channel and across all eight tips, manufacturer’s limit and limit used at the customer’s site by the field service engineer respectively
b) using low volume option
c) Teflon coated outside

If the Test Fails

Try the following:

- Examine the QC-report.

- Try to find the cause of the problem with the help of the section 10.9.7.4 “Troubleshooting Test Failures”, 🗎 10-90.
- If the failure is due to individual channels, revalidate them according to the following section 10.9.7.3 “Revalidation of Individual Channels”, 🗎 10-88.

10.9.7.3 Revalidation of Individual Channels

When to Revalidate?

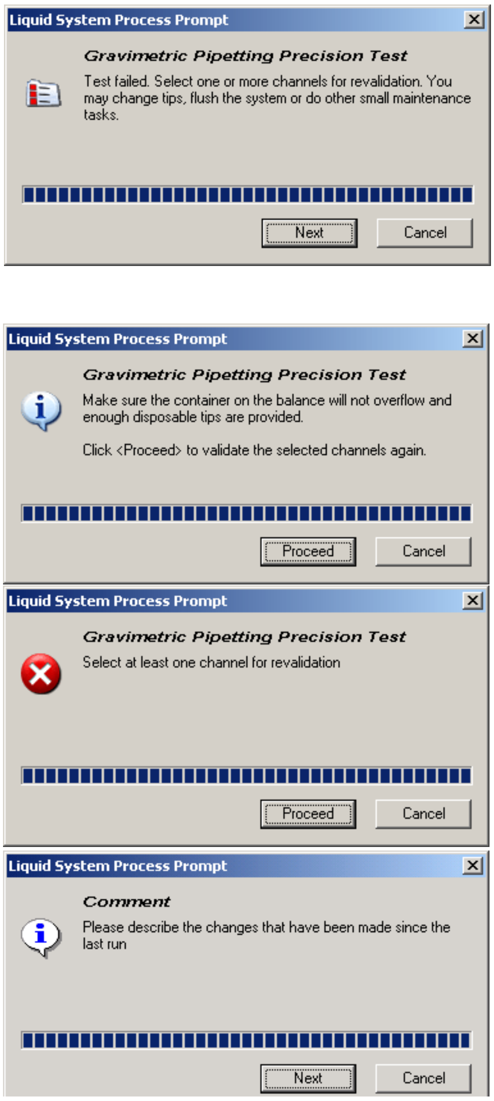
It is possible that the **Gravimetric Tes**t fails due to the following reasons:

- If the CV % values of some few channels are not within the tolerance limits.
- If the overall CV % of all channels is outside the tolerance limits.
- If individual channels did not dispense sufficient liquid (zero dispense).

Note: *The tolerance limits (pass/fail criteria) are shown in the QC-report.*

Revalidation Procedure

In such a case, the software prompts you to revalidate the offending channels. A series of process prompts guides you through the revalidation.



Gravimetric Pipetting Precision Test
Test failed. Select one or more channels for revalidation. You may change tips, flush the system or do other small maintenance tasks.

Gravimetric Pipetting Precision Test
Make sure the container on the balance will not overflow and enough disposable tips are provided.
Click <Proceed> to validate the selected channels again.

Gravimetric Pipetting Precision Test
Select at least one channel for revalidation

Comment
Please describe the changes that have been made since the last run

Fig. 10-76 *Gravimetric revalidation*

1. Use the **Test Configuration** page to select the channels you want to revalidate.

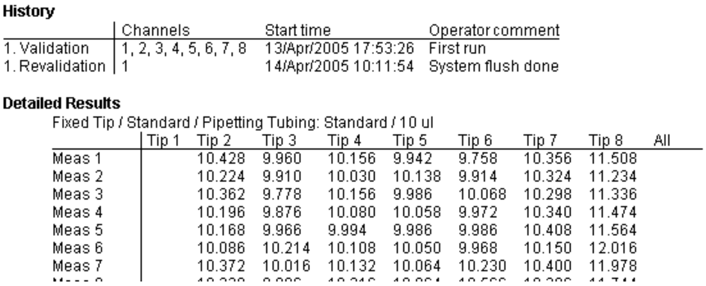
   You can only select /deselect channels that were selected for the Gravimetric test.
2. If necessary change defective tips and flush the tips.
3. Click on **Next** to continue.
4. Empty the liquid container on the balance to ensure it will not overflow during the revalidation.
5. Click on **Proceed** to continue.
6. Make sure you have selected at least one channel for revalidation, otherwise the procedure will not be performed
7. Click on **Proceed** to continue
8. Before starting the test you must fill out the **Comment** field on the **Printing / Information** page. Write a brief, but precise comment in the field.
9. Click on **Next** when done.

*The Gravimetric Test is now repeated for the selected channels. At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the revalidation was successful.*

10 View the results on the **Printing / Information** page or print out the QC-Report.

History in QC-Report

Please note that both the validations (gravimetric tests) and the revalidations are reported under **History** in the QC-report.



History

	Channels	Start time	Operator comment
1. Validation	1, 2, 3, 4, 5, 6, 7, 8	13/Apr/2005 17:53:26	First run
1. Revalidation	1	14/Apr/2005 10:11:54	System flush done

Detailed Results

Fixed Tip / Standard / Pipetting Tubing: Standard / 10 ul

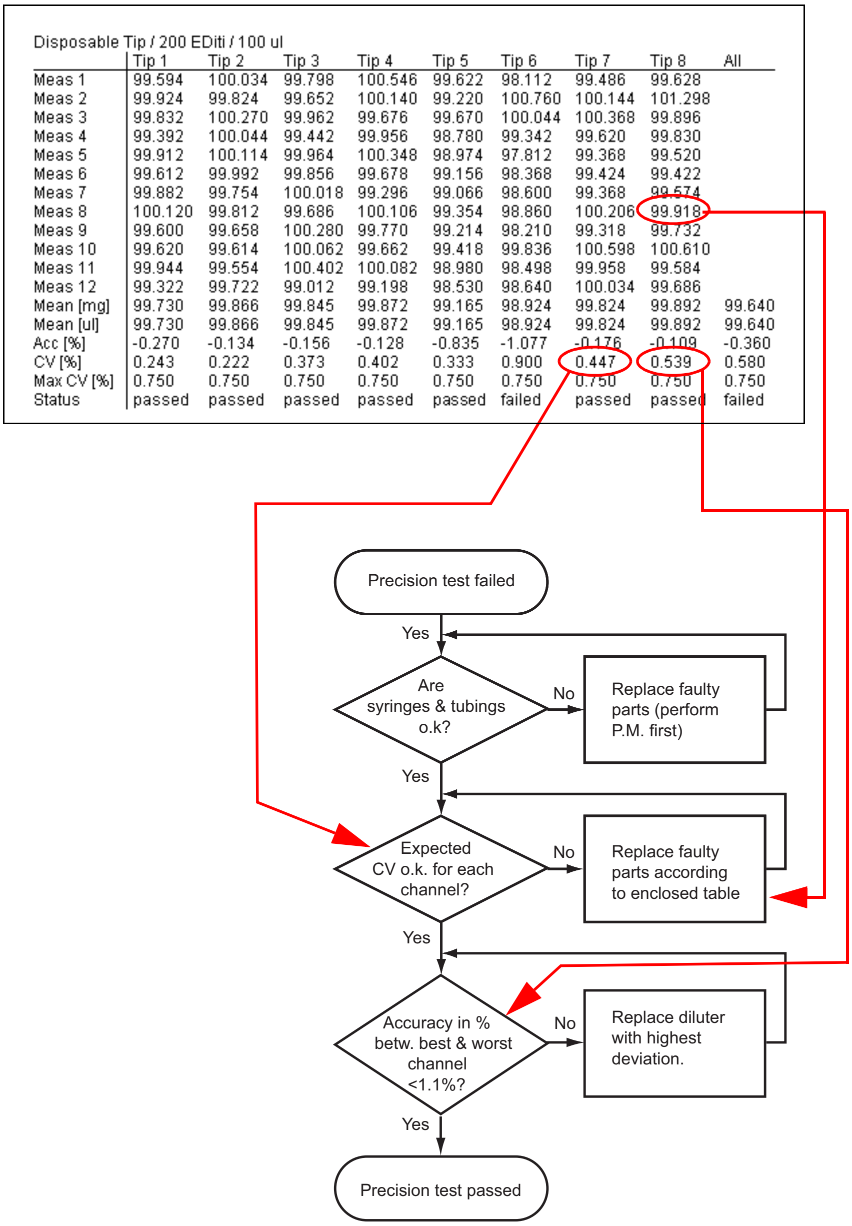
	Tip 1	Tip 2	Tip 3	Tip 4	Tip 5	Tip 6	Tip 7	Tip 8	All
Meas 1		10.428	9.960	10.156	9.942	9.758	10.356	11.508	
Meas 2		10.224	9.910	10.030	10.138	9.914	10.324	11.234	
Meas 3		10.362	9.778	10.156	9.986	10.068	10.298	11.336	
Meas 4		10.196	9.876	10.080	10.058	9.972	10.340	11.474	
Meas 5		10.168	9.966	9.994	9.986	9.986	10.408	11.564	
Meas 6		10.086	10.214	10.108	10.050	9.968	10.150	12.016	
Meas 7		10.372	10.016	10.132	10.064	10.230	10.400	11.978	

Fig. 10-77 *History gravimetric validations/revalidations in QC-report*

10.9.7.4 Troubleshooting Test Failures

If the Test Fails

Try to solve the problem according to the following diagram. The diagram shows an excerpt from the QC-report.



Disposable Tip / 200 EDiti / 100 ul

	Tip 1	Tip 2	Tip 3	Tip 4	Tip 5	Tip 6	Tip 7	Tip 8	All
Meas 1	99.594	100.034	99.798	100.546	99.622	98.112	99.486	99.628	
Meas 2	99.924	99.824	99.652	100.140	99.220	100.760	100.144	101.298	
Meas 3	99.832	100.270	99.962	99.676	99.670	100.044	100.368	99.896	
Meas 4	99.392	100.044	99.442	99.956	98.780	99.342	99.620	99.830	
Meas 5	99.912	100.114	99.964	100.348	98.974	97.812	99.368	99.520	
Meas 6	99.612	99.992	99.856	99.678	99.156	98.368	99.424	99.422	
Meas 7	99.882	99.754	100.018	99.296	99.066	98.600	99.368	99.574	
Meas 8	100.120	99.812	99.686	100.106	99.354	98.860	100.206	99.918	
Meas 9	99.600	99.658	100.280	99.770	99.214	98.210	99.318	99.732	
Meas 10	99.620	99.614	100.062	99.662	99.418	99.836	100.598	100.610	
Meas 11	99.944	99.554	100.402	100.082	98.980	98.498	99.958	99.584	
Meas 12	99.322	99.722	99.012	99.198	98.530	98.640	100.034	99.686	
Mean [mg]	99.730	99.866	99.845	99.872	99.165	98.924	99.824	99.892	99.640
Mean [ul]	99.730	99.866	99.845	99.872	99.165	98.924	99.824	99.892	99.640
Acc [%]	-0.270	-0.134	-0.156	-0.128	-0.835	-1.077	-0.176	-0.109	-0.360
CV [%]	0.243	0.222	0.373	0.402	0.333	0.900	0.447	0.539	0.580
Max CV [%]	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
Status	passed	passed	passed	passed	passed	failed	passed	passed	failed

Fig. 10-78 Troubleshooting after failed precision test

Tab. 10-23 Gravimetric Test Troubleshooting table

Problem	Reason		Possible cause	Remedy
Liquid transfer failure **Insufficient precision** **High inaccuracy**	Air bubbles in liquid system		Leaking tubing connection	Tighten tubing connection, replace tubing, flush system
			Leaking syringe	Tighten syringe, replace cap or syringe
			Dirty or damaged tip	Clean tip and coating, replace tip, flush system
	Incorrect aspiration or dispense position, Wrong inner diameter		Inaccurate source container position, submerge too small, tracking incorrect	Check, adjust
	Retraction speed too high			
Unacceptable foam formation			Dirty or damaged tip	Clean tip and coating, replace tip, flush system
	Foam in reagent trough due to manual mixing		Aspiration/dispensing speed too high	Check, adjust
Droplet formation			Dispensing speed too low Break-off too low	Check, adjust
No liquid detection			Incorrect container/rack definition	Check, add liquid, adjust
High carry over		-	Not enough wash volume	Check, adjust
		-	Retracting speed too high	
		-	Aspiration volume too large	
		-	DiTi cone contaminated	
		-	Too many cycles	
		-	Waste height too low	

10.9.7.5 Advanced Configuration

Purpose

As has been mentioned before, advanced users can use the **LH Editor** to adapt the configuration parameters to meet special requirements.

Parameters

Some of the parameters are shown in the following figure(s). Most of them are self-explanatory. The **LH Editor** also shows the default values.

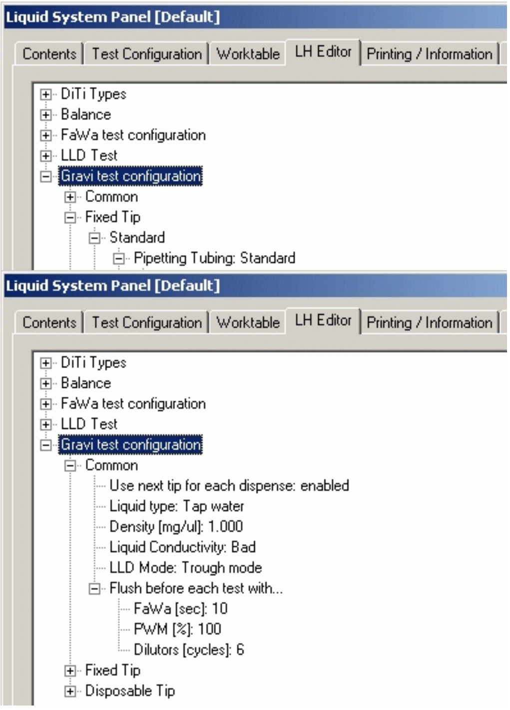
Note: *You should always consult the “real screen” on your computer and not the figures in this manual to find the values of parameters.*

User Defined Parameters

If you change default parameters **which have an influence on the test results**, your test becomes a “user-defined” test. In this case, the text **User Defined** appears on the title bar of the panel.

Overview

The following screens provide an overview of the parameters that can be checked or changed.



- DiTi Types
- Balance
- FaWa test configuration
- LLD Test
- Gravi test configuration
  - Common
  - Fixed Tip
    - Standard
      - Pipetting Tubing: Standard

- DiTi Types
- Balance
- FaWa test configuration
- LLD Test
- Gravi test configuration
  - Common
    - Use next tip for each dispense: enabled
    - Liquid type: Tap water
    - Density [mg/ul]: 1.000
    - Liquid Conductivity: Bad
    - LLD Mode: Trough mode
    - Flush before each test with...
      - FaWa [sec]: 10
      - PWM [%]: 100
      - Dilutors [cycles]: 6
  - Fixed Tip
  - Disposable Tip

Fig. 10-79 *Gravimetric test parameters*

Overview

You can set following test parameters:

- Common parameters
- Fixed tip parameters
- DiTi parameters

Common Parameters

The parameters shown on the left side are the same for all tip types:

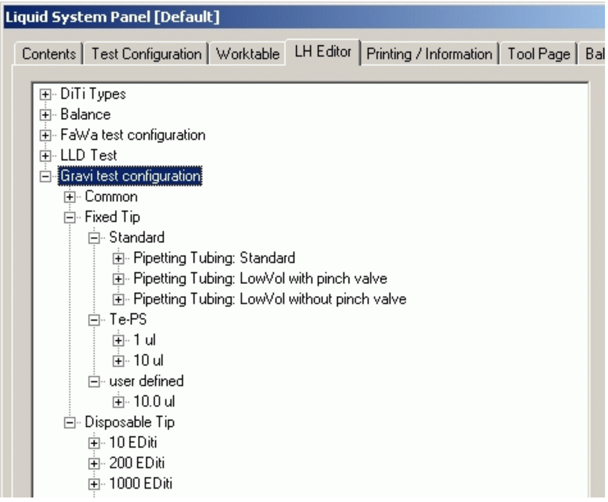
- Fixed tips
- Disposable tips

Note: *Pay attention to the item **Flush before each test with…** whose node is expanded in the above screen.*

- If a FaWa is installed, the liquid system is first flushed with the parameters shown on the screen. The parameters are ignored if no FaWa is available.
- Then the indicated number of dilutor cycles is carried out (independently of the presence or absence of the FaWa).

Overview of Tip Types

If you expand the **Fixed Tip** and **Disposable Tip** nodes further you can see more sub-types of fixed and disposable tips.



- DiTi Types
- Balance
- FaWa test configuration
- LLD Test
- Gravi test configuration
  - Common
  - Fixed Tip
    - Standard
      - Pipetting Tubing: Standard
      - Pipetting Tubing: LowVol with pinch valve
      - Pipetting Tubing: LowVol without pinch valve
    - Te-PS
      - 1 ul
      - 10 ul
    - user defined
      - 10.0 ul
  - Disposable Tip
    - 10 EDiti
    - 200 EDiti
    - 1000 EDiti

Fig. 10-80 *Overview of tip types*

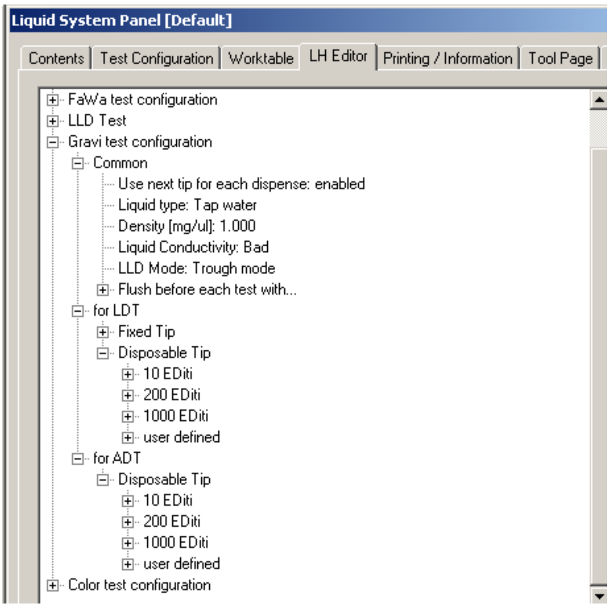
Tip Types for LiHa / Air LiHa:

LiHa
LDT (Liquid Displacement Technology):

- Fixed Tip
- Disposable Tip

Air LiHa
ADT (Air Displacement Technology):

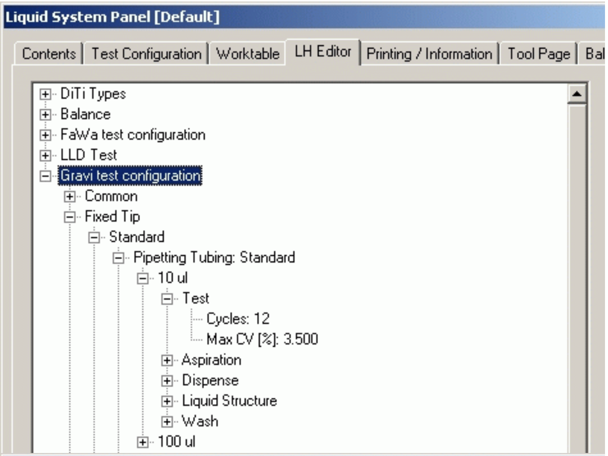
- Disposable Tip



- FaWa test configuration
- LLD Test
- Gravi test configuration
  - Common
    - Use next tip for each dispense: enabled
    - Liquid type: Tap water
    - Density [mg/ul]: 1.000
    - Liquid Conductivity: Bad
    - LLD Mode: Trough mode
    - Flush before each test with...
  - for LDT
    - Fixed Tip
    - Disposable Tip
      - 10 EDiti
      - 200 EDiti
      - 1000 EDiti
      - user defined
  - for ADT
    - Disposable Tip
      - 10 EDiti
      - 200 EDiti
      - 1000 EDiti
      - user defined
- Color test configuration

Fig. 10-81 *Overview of tip types for LiHa / Air LiHa*

Example The following screens show the parameters that can be set for fixed standard tips with standard pipetting tubings. The same parameters can also be set for other tip types.

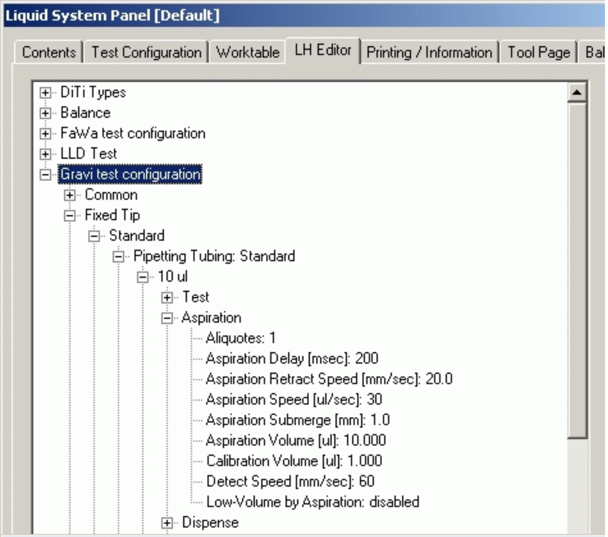


- DiTi Types
- Balance
- FaWa test configuration
- LLD Test
- Gravi test configuration
  - Common
  - Fixed Tip
    - Standard
      - Pipetting Tubing: Standard
        - 10 ul
          - Test
            - Cycles: 12
            - Max CV [%]: 3.500
          - Aspiration
          - Dispense
          - Liquid Structure
          - Wash
        - 100 ul

Test

Under **Test** you can set:

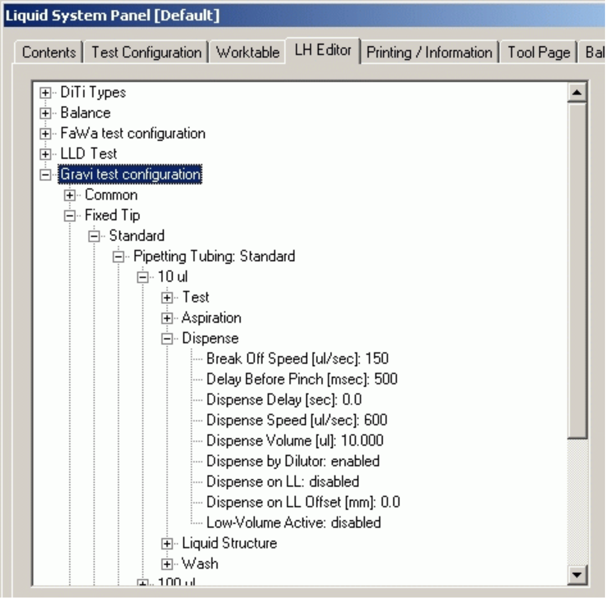
- The number of test cycles (standard = 12 cycles)
- and the maximum CV percentage (CV = coefficient of variation)



- DiTi Types
- Balance
- FaWa test configuration
- LLD Test
- Gravi test configuration
  - Common
  - Fixed Tip
    - Standard
      - Pipetting Tubing: Standard
        - 10 ul
          - Test
          - Aspiration
            - Aliquotes: 1
            - Aspiration Delay [msec]: 200
            - Aspiration Retract Speed [mm/sec]: 20.0
            - Aspiration Speed [ul/sec]: 30
            - Aspiration Submerge [mm]: 1.0
            - Aspiration Volume [ul]: 10.000
            - Calibration Volume [ul]: 1.000
            - Detect Speed [mm/sec]: 60
            - Low-Volume by Aspiration: disabled
          - Dispense

Aspiration

In this section you can set the aspiration parameters.



- DiTi Types
- Balance
- FaWa test configuration
- LLD Test
- Gravi test configuration
  - Common
  - Fixed Tip
    - Standard
      - Pipetting Tubing: Standard
        - 10 ul
          - Test
          - Aspiration
          - Dispense
            - Break Off Speed [ul/sec]: 150
            - Delay Before Pinch [msec]: 500
            - Dispense Delay [sec]: 0.0
            - Dispense Speed [ul/sec]: 600
            - Dispense Volume [ul]: 10.000
            - Dispense by Dilutor: enabled
            - Dispense on LL: disabled
            - Dispense on LL Offset [mm]: 0.0
            - Low-Volume Active: disabled
          - Liquid Structure
          - Wash
        - 100 ul

Dispense

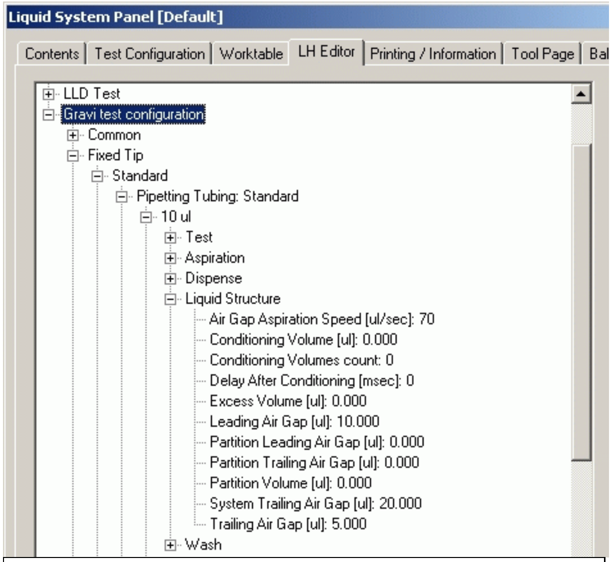
In this section you can set the dispense parameters.

Liquid Structure

These parameters define the liquid volumes and air gaps within the tip.

Also see next figure.

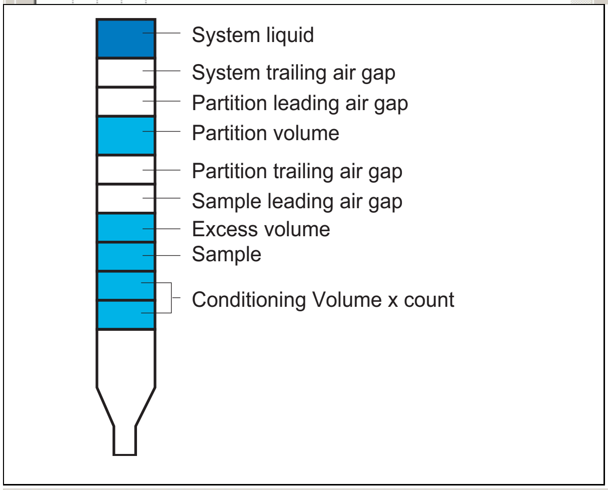
◆



```
⊞ LLD Test
⊟ Gravi test configuration
   ⊞ Common
   ⊟ Fixed Tip
      ⊟ Standard
         ⊟ Pipetting Tubing: Standard
            ⊟ 10 ul
               ⊞ Test
               ⊞ Aspiration
               ⊞ Dispense
               ⊟ Liquid Structure
                     Air Gap Aspiration Speed [ul/sec]: 70
                     Conditioning Volume [ul]: 0.000
                     Conditioning Volumes count: 0
                     Delay After Conditioning [msec]: 0
                     Excess Volume [ul]: 0.000
                     Leading Air Gap [ul]: 10.000
                     Partition Leading Air Gap [ul]: 0.000
                     Partition Trailing Air Gap [ul]: 0.000
                     Partition Volume [ul]: 0.000
                     System Trailing Air Gap [ul]: 20.000
                     Trailing Air Gap [ul]: 5.000
               ⊞ Wash
```

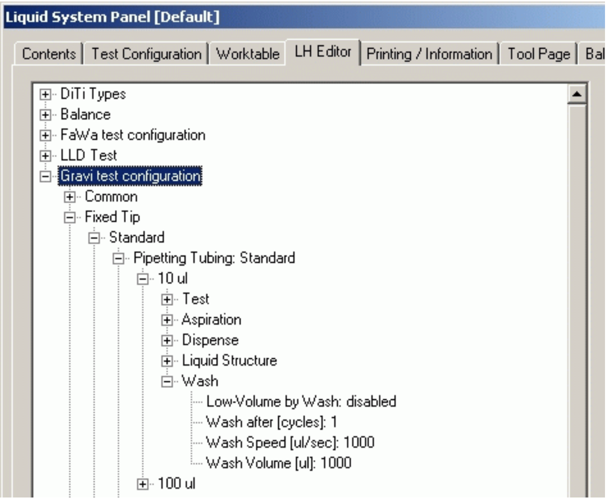
The figure on the lefts shows where these gaps and volumes are physically located within a tip.

- Air gaps appear white
- Liquid volumes appear colored.



Wash

In this section you can set the wash parameters.



```
⊞ DiTi Types
⊞ Balance
⊞ FaWa test configuration
⊞ LLD Test
⊟ Gravi test configuration
   ⊞ Common
   ⊟ Fixed Tip
      ⊟ Standard
         ⊟ Pipetting Tubing: Standard
            ⊟ 10 ul
               ⊞ Test
               ⊞ Aspiration
               ⊞ Dispense
               ⊞ Liquid Structure
               ⊟ Wash
                     Low-Volume by Wash: disabled
                     Wash after [cycles]: 1
                     Wash Speed [ul/sec]: 1000
                     Wash Volume [ul]: 1000
            ⊞ 100 ul
```

Fig. 10-82 *Parameters of standard fixed tips (standard pipetting tubing, 10 µl)*

10.9.8 Colorimetric Test

General

The Colorimetric Test cannot be used with channels # 2 to # 8 on an 8 Plus 1 Access LiHa on Freedom EVO 75, because pipetting on these channels cannot be controlled individually. For this reason a colorimetric test has to be used to check precision of pipetting with an 8 Plus 1 Access LiHa on Freedom EVO 75.

The **Colorimetric Test** function checks the precision of liquid transfers by pipetting a defined color solution into a 96 well microplate and measuring CV with an absorbance reader (e.g., Tecan Sunrise). The test is performed with disposable tips.

- **Standard Colorimetric Test:** For the standard colorimetric test most of the test parameters are predefined . For measuring the user can use a Tecan reader with fixed wavelenghts (gradient filters are not supported) or an external reader from a different supplier. The standard colorimetric test is recommended for most users.
- **User-Defined Colorimetric Test:** Using the **LH Editor** (→ Cross References), advanced users and specialists can adapt most test parameters and perform a user-defined test. The definition of such a user-defined test is only recommended for users who have attended a special liquid handling training.

Precision

With the colorimetric test, the term **Precision** has similar meaning like with the gravimetric test:

- **Precision** refers to the Coefficient of Variation (CV %) and provides a measure for the reproducibility of pipetting in multiple wells. The less the results of subsequent wells “scatter”, i.e. differ from each other, the better the CV % value is. The more they vary from well to well, the higher the CV % value becomes.

$$CV\,[\%] = \frac{s \times 100\%}{x_m}$$

$$s = \sqrt{\frac{\sum (x_i - x_m)^2}{n - 1}}$$

Where
x_i = measured values
x_m = mean value
n = number of samples
s = standard deviation
CV [%] = coefficient of variation

***Note:** .The Colorimetric Test takes into consideration the variations over all measurements of all selected channels.*

10.9.8.1 Test Procedure

Cross References

List of cross references to information provided in other sections:

Information	References
Worktable	See sections 5.2.7, 🗎 5-20
Operating Manual Sunrise Reader	See section 1.2, 🗎 1-3
Reader page	See section 10.9.4, 🗎 10-70
Select / deselect individual DiTis	See section 10.3.2, 🗎 10-3

Prerequisites

On the worktable:

- 2 Troughs (for 10 µl and 100 µl test) with Orange G color solution (or similar)
- 1 Trough with buffer addition
- DiTi rack with 200 µl DiTis
- Wash and DiTi waste station
- Carrier for the destination microplate

(see cross references)
For measuring:

- Absorbance reader (e.g., Tecan Sunrise)

(see cross references)

Preparation

Prepare the **Colorimetric Test** as follows:

1 Install and setup the absorbance reader according to the reader documentation.

- **Tecan Reader**:
  - Fill in the calibration date in the appropriate text field on the **Reader** page.
  - Go to the port setup dialog with the button **Port Setup** on the **Reader** page and check if the setting is correct.
    If you have more than one reader connected to the instrument select the reader you want to use with the color test.
    (see cross references)
  - Check the wavelengths shown on the **Reader** page. Default values are:
    Reference wavelength [nm]: 620
    Measurement wavelength [nm]: 492
    If the measuring filters in the reader have different wavelengths, set them accordingly in the **Measurement Parameters** page.
    (see cross references)

    Note: *If parameters have changed in the Measurement Parameters page (e.g., different filter wavelengths) and the entry was confirmed with* ***OK*** *the test gets* ***[user defined]*** *instead of* ***[default].***
    If the changes should be discarded, the dialog must be closed with ***Cancel****.*

- **External reader**:

- Fill in the reader data in the appropriate text fields on the **Reader** page: **Reader type**, **Serial number**, **Reference wavelength**, **Measurement wavelength** and **Calibration date**.
  (see cross references)
  Note: *If possible set the wavelength to the default values (see* ***Tecan Reader*** *above)*

2 Select on the Worktable page the layout **Liquid System Check EVO75 8 Plus 1 Access** and place carriers for DiTis and microplates, troughs and wash station on the worktable accordingly.

Note: *If the labware cannot be placed according to the mentioned layout at the customer site setup a customized worktable* (see cross references).

3 Ensure that the tip configuration corresponds to the settings on the LiHa **Channel** page. Should they not be correct, you must quit the **Liquid System** panel, make the necessary changes on the LiHa **Channel** page and then restart the **Liquid System** panel.

Test Procedure

To perform the **Colorimetric Test**:

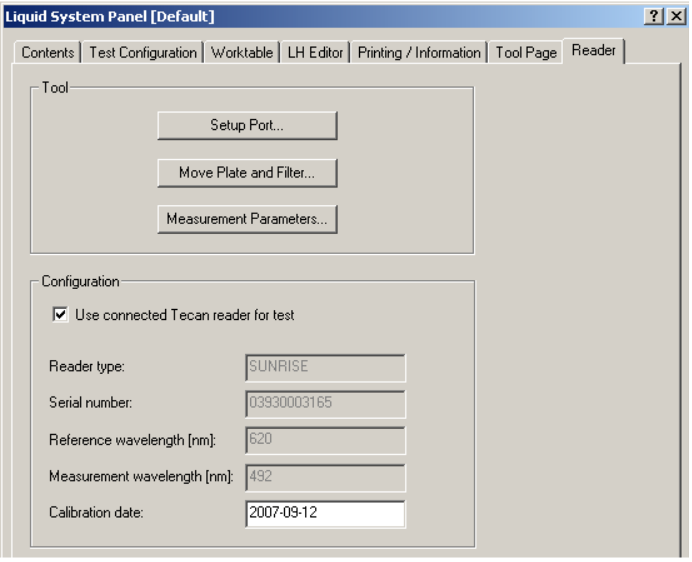
1 On the **Contents** page, select the check box **Colorimetric Pipetting Precision Test**.

2 Open the **Worktable** page and check whether the worktable map corresponds to the physical worktable.
(see cross references)

3 Change to the **Reader** page.

4 Set the following parameters on the **Reader** page (see cross references):

– **Tecan Reader:**
  - Select the check box **Use connected Tecan reader for test**.
  - **Calibration date**: Key in the date when the reader was last calibrated. Choose a date format that cannot be misinterpreted.
  - All other parameters are automatically read from the Tecan reader and displayed in the **Reader** page (see cross references).



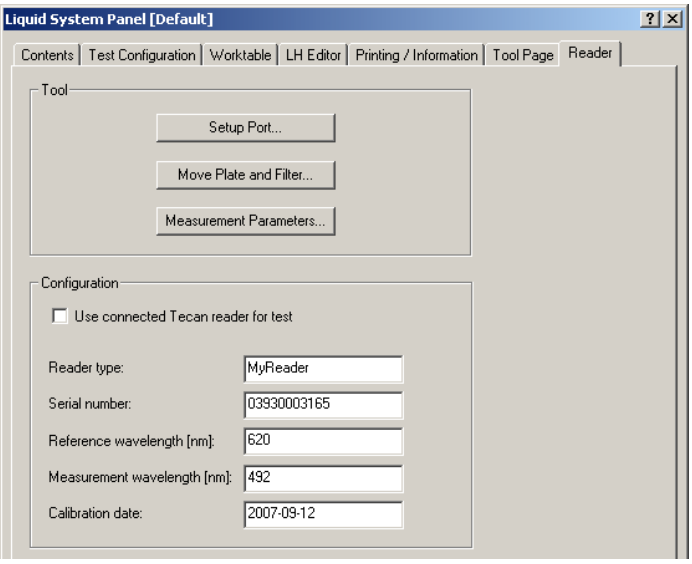
☑ Use connected Tecan reader for test

Reader type: SUNRISE
Serial number: 03930003165
Reference wavelength [nm]: 620
Measurement wavelength [nm]: 492
Calibration date: 2007-09-12

Fig. 10-83 *Reader page, Tecan reader*

– **External Reader**:

- Unmark the check box **Use connected Tecan reader for test.**
- **Reader type**: Key in the name and/or type of the external reader.
- **Serial number**: Key in the serial number (normally written on the type plate of the external reader).
- **Reference** and **Measurement wavelengths**: Key in the wavelengths as defined in the documentation of the external reader.
  ***Note:** If possible set the wavelength to the default values (see "Preparation", 🖹 10-97 above).*
- **Calibration date**. Key in the date when the external reader was last calibrated. Choose a date format that cannot be misinterpreted.



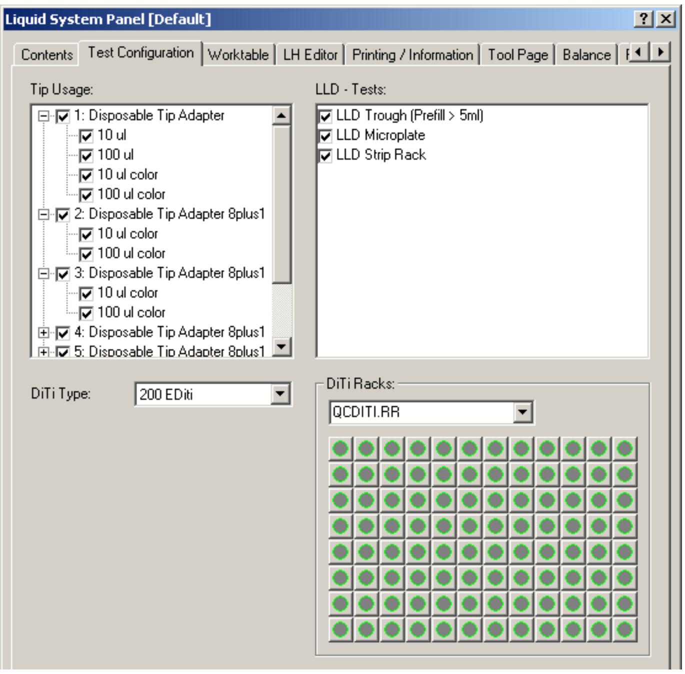
☐ Use connected Tecan reader for test

Reader type: MyReader
Serial number: 03930003165
Reference wavelength [nm]: 620
Measurement wavelength [nm]: 492
Calibration date: 2007-09-12

Fig. 10-84 *Reader page, External reader*

5 Change to the **Printing / Information** page and fill out the Comments field as necessary.

6 Change to the **Test Configuration** page.



Tip Usage:
- ☑ 1: Disposable Tip Adapter
  - ☑ 10 ul
  - ☑ 100 ul
  - ☑ 10 ul color
  - ☑ 100 ul color
- ☑ 2: Disposable Tip Adapter 8plus1
  - ☑ 10 ul color
  - ☑ 100 ul color
- ☑ 3: Disposable Tip Adapter 8plus1
  - ☑ 10 ul color
  - ☑ 100 ul color
- ☑ 4: Disposable Tip Adapter 8plus1
- ☑ 5: Disposable Tip Adapter 8plus1

LLD - Tests:
- ☑ LLD Trough (Prefill > 5ml)
- ☑ LLD Microplate
- ☑ LLD Strip Rack

DiTi Type: 200 EDiti

DiTi Racks: QCDITI.RR

Fig. 10-85 Test configuration page, colorimetric test

7 Configure the test according to your needs (see figure).
- **Tip Usage**: Select the tips and their pipetting volumes you want to include in the test.
- Select the **DiTi Type** from the list (standard: 200 µl).
- In the frame **DiTi Racks**, use the list box to select the DiTi racks or DiTi boxes and from the associated graphical representation below the list box, select / deselect DiTis as necessary (see cross references).
- Remember that you must deselect the DiTis from racks that do not contain the DiTi type you need for your test.

8 When everything is in order, start the test by clicking **Start**.

End of the Test

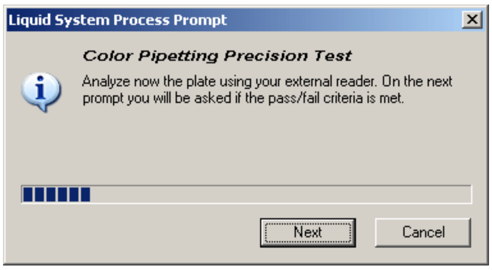
9 The end of the test differs depending on the reader used:

Tecan Reader used :

- At the end of the pipetting procedure:
  - you will be prompted to centrifuge the microplate (to remove possible air bubbles in the wells)
  - you will be guided afterwards with process prompts through the measurement with the **Tecan reader**.
  - the software finally calculates the results.
- A **Test Passed** or **Test Failed** message notifies you whether or not the test was successful.
- You can view the results on the **Printing / Information** page or print out the QC-Report.
- If the test failed see section “If the Test Fails”, 🗎 10-101.

External Reader used:

- At the end of the pipetting procedure:
  - you will be prompted to centrifuge the microplate (to remove possible air bubbles in the wells)



Color Pipetting Precision Test

Analyze now the plate using your external reader. On the next prompt you will be asked if the pass/fail criteria is met.

- A next prompt asks you to analyze the microplate with the external reader.

Fig. 10-86 *External reader, prompt 1*

10 Measure the microplate with the external reader and continue with **Next**.

*After confirming with **Next** you will be prompted to compare the calculated CVs in the report of the external reader with the **Pass / Fail Criteria** shown in the prompt.*

11 Click **OK** if the results meet the **Pass / Fail Criteria,** otherwise click **Cancel**.

12 A **Test Passed** or **Test Failed** message notifies you whether or not the test was successful.

Pass / Fail Criteria

The **Colorimetric Pipetting Precision Tes**t fails due to the following reasons:

- If the CV % value of a row of wells pipetted from the same channel are not within the tolerance limits.
- If the overall CV % of all wells is outside the tolerance limits.
- If individual channels did not dispense sufficient liquid (zero dispense).

Note: *The tolerance limits (pass/fail criteria) are also shown in the QC-report.*

If the Test Fails

Try the following:

- Examine the QC-report or the report of the external reader.
- Redo the centrifugation and measurement.
- Try to find the cause of the problem with the help of the section 10.9.7.4 “Troubleshooting Test Failures”, 🗎 10-90 in the Gravimetric Test description.

10.9.8.2 Advanced Configuration

Purpose

As has been mentioned before, advanced users can use the **LH Editor** to adapt the configuration parameters to meet special requirements.

Parameters

Some of the parameters are shown in the following figure(s). Most of them are self-explanatory. The **LH Editor** also shows the default values.

Note: *You should always consult the “real screen” on your computer and not the figures in this manual to find the values of parameters.*

User Defined Parameters

If you change default parameters **that have an influence on the test results**, your test becomes a “user-defined” test. In this case, the text **User Defined** appears on the title bar of the panel and on the QC report.

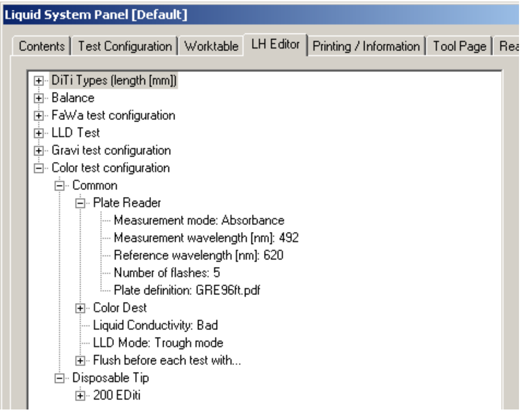
Overview Color Test Configuration

If you expand the node **Color test configuration** you will find the sub-nodes **Common** and **Disposable Tip** where you have access to the settings of:

- **Plate Reader**
- Test **Liquids**
- Test **Cycles**
- **Max CV**
- **DiTi** reuse
- **LH** parameters

Plate Reader Parameters

The following screen shows the parameters that can be set for the Plate Reader.



- DiTi Types (length [mm])
- Balance
- FaWa test configuration
- LLD Test
- Gravi test configuration
- Color test configuration
  - Common
    - Plate Reader
      - Measurement mode: Absorbance
      - Measurement wavelength [nm]: 492
      - Reference wavelength [nm]: 620
      - Number of flashes: 5
      - Plate definition: GRE96ft.pdf
    - Color Dest
    - Liquid Conductivity: Bad
    - LLD Mode: Trough mode
    - Flush before each test with...
  - Disposable Tip
    - 200 EDiti

Fig. 10-87 *LH Editor, reader parameters*

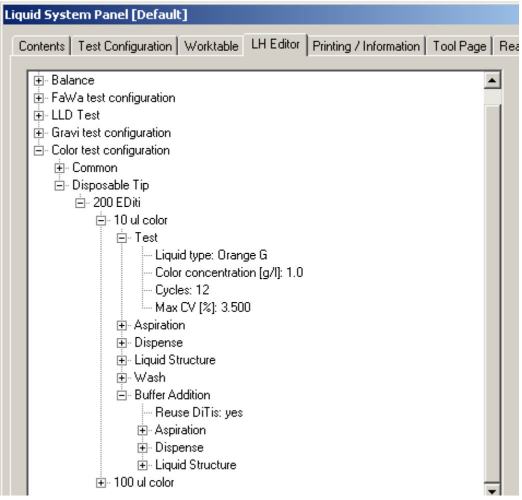
Plate Reader

Parameters:

- Measurement mode
(default: absorbance)
- Measurement wavelength
(default = 492 nm)
- Reference wavelength
(default = 620 nm)
- Number of Flashes
(default = 5)
- Plate definition
(default = GRE96 MP)

Test Parameters

The following screen shows the parameters that can be set for the Test.



- Balance
- FaWa test configuration
- LLD Test
- Gravi test configuration
- Color test configuration
  - Common
  - Disposable Tip
    - 200 EDiti
      - 10 ul color
        - Test
          - Liquid type: Orange G
          - Color concentration [g/l]: 1.0
          - Cycles: 12
          - Max CV [%]: 3.500
        - Aspiration
        - Dispense
        - Liquid Structure
        - Wash
        - Buffer Addition
          - Reuse DiTis: yes
          - Aspiration
          - Dispense
          - Liquid Structure
      - 100 ul color

Fig. 10-88 *LH Editor, test parameters*

Test

Parameters:

- Liquid type
(default = Orange G)
- Color Concentration
(default 10 µl test = 1.0 g/l)
(default 100 µl test = 0.1 g/l)
- Cycles
(default = 12)
- Max CV
(default 10 µl color = 3.5%)
(default 100 µl color = 1.75%)

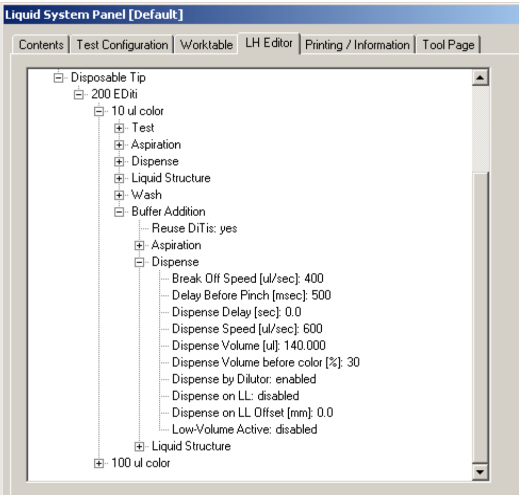
Buffer Addition

Parameters:

- Reuse DiTis
(default = yes)

Liquid Handling Parameters

The following screen shows the parameters that can be set for **Dispense**:



- Disposable Tip
  - 200 EDiti
    - 10 ul color
      - Test
      - Aspiration
      - Dispense
      - Liquid Structure
      - Wash
      - Buffer Addition
        - Reuse DiTis: yes
        - Aspiration
        - Dispense
          - Break Off Speed [ul/sec]: 400
          - Delay Before Pinch [msec]: 500
          - Dispense Delay [sec]: 0.0
          - Dispense Speed [ul/sec]: 600
          - Dispense Volume [ul]: 140.000
          - Dispense Volume before color [%]: 30
          - Dispense by Dilutor: enabled
          - Dispense on LL: disabled
          - Dispense on LL Offset [mm]: 0.0
          - Low-Volume Active: disabled
        - Liquid Structure
    - 100 ul color

Fig. 10-89 *LH Editor, dispense parameters for color test*

The color test parameter **Dispense Volume before color [%]** defines how much buffer is dispensed (in percentage of the whole dispense volume) before any color solution is dispensed.

Other parameters that can be set for liquid handling, like **Aspiration**, **Liquid structure**, etc. are described in the section of the Gravimetric Test 10.9.7.5 “Advanced Configuration”, 🗎 10-92.

10.10 Washer

10.10.1 Overview

Liquid System

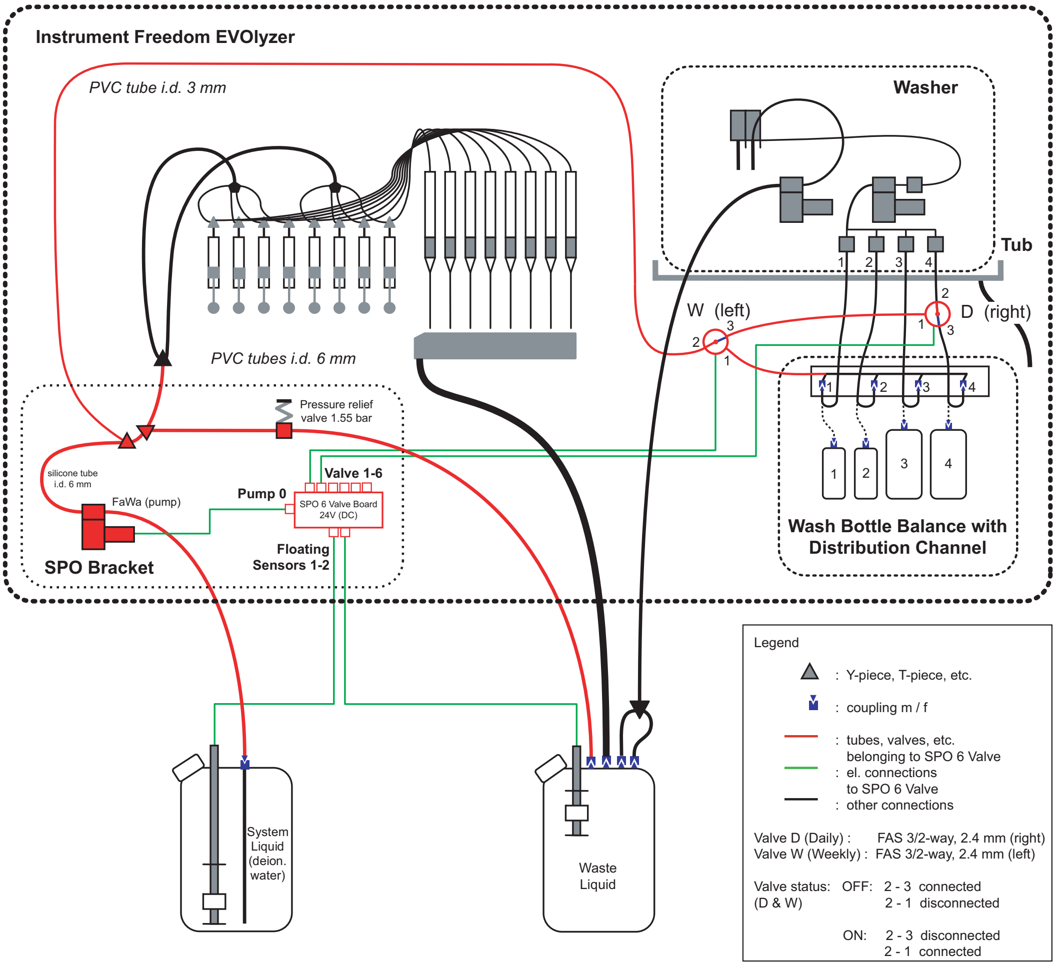


Fig. 10-90 *Liquid System overview*

10.10.2 Washer Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

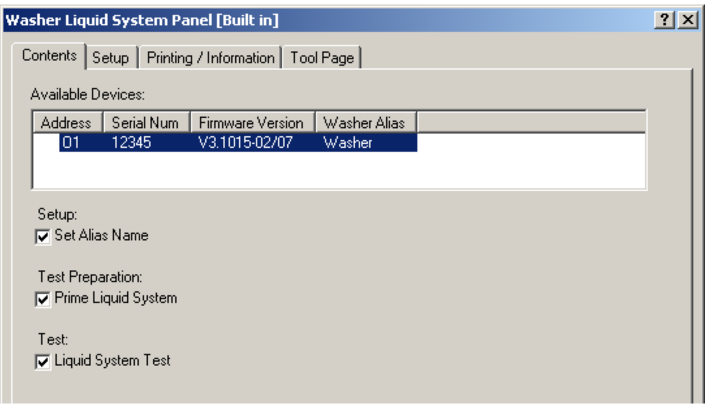
Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 10-24 *Washer functions and User Permissions*

Function	Type	User	FSE
Set Alias Name	Setup		X
Prime Liquid System	Prep.		X
Liquid System Test	Test		X
Printing / Information	Page	X	X
QC-report	Report	X	X

Starting the Panel

Start the panel with **System Liquid** > **Washer**. The **Washer** panel with activated **Contents** page appears. After starting the **Washer** panel no setup or test check boxes are activated.



Available Devices:

Address	Serial Num	Firmware Version	Washer Alias
01	12345	V3.1015-02/07	Washer

Setup:
☑ Set Alias Name

Test Preparation:
☑ Prime Liquid System

Test:
☑ Liquid System Test

Fig. 10-91 *Washer panel, Contents page*

Pages

The **Washer** panel consists of the following pages:

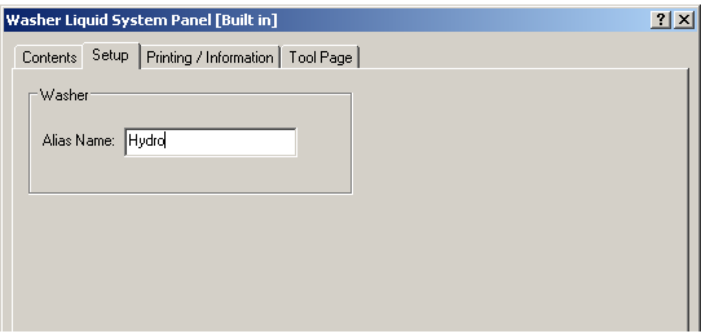
Tab. 10-25 *Pages of the Liquid System panel*

Page	Description
Contents	General overview, setup / test selection.
Setup	For defining an alias name for the washer
Printing / Information	Print selection for the QC-report.
Tool page	For manually activating valves, priming the washer, running the FAWA, priming and emptying the liquid system.

10.10.3 Setup Page

Purpose

The **Setup** page lets you define an **Alias Name** for the washer.



Alias Name: Hydro

Fig. 10-92 *Washer panel, Setup page*

10.10.4 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

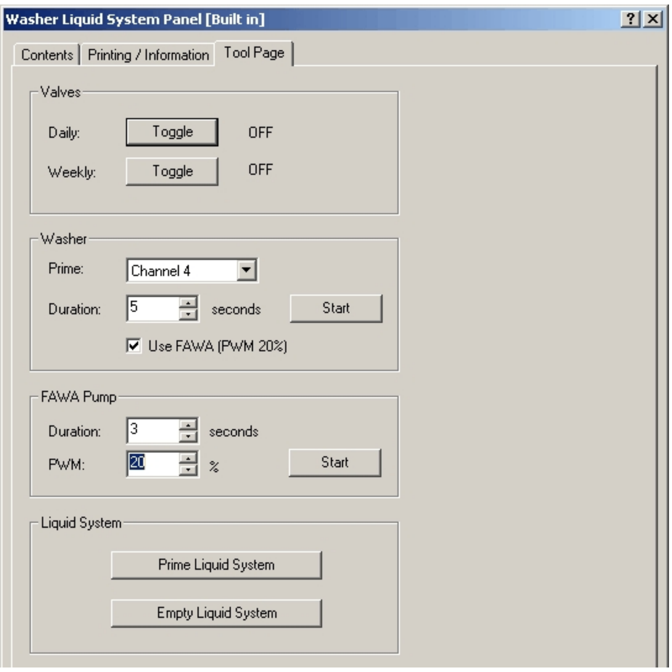
10.10.5 Tool Page

Purpose

The Tool Page provides controls for:

- Switching valves
- Priming the washer
- Running the FAWA
- Priming the whole liquid system of the washer

Tool Page



Washer Liquid System Panel [Built in]

Valves

Daily: OFF

Weekly: OFF

Washer

Prime: Channel 4

Duration: 5 seconds

☑ Use FAWA (PWM 20%)

FAWA Pump

Duration: 3 seconds

PWM: 20 %

Liquid System

Fig. 10-93 Washer panel, Tool page

Controls

Valves	Controls to manually switch the liquid system valves.
- **Daily valve toggle**	- Toggles the valve between On and OFF.
- **Weekly valve toggle**	- Toggles the valve between On and OFF.
Washer	Controls to manually prime a selected washer channel.
- **Prime**	- Combo box for selection of the channel to prime.
- **Duration**	- Spin box to select the priming duration in seconds.
- **Use FAWA (PWM 20%)**	- Check box to select the FAWA pump to support the priming with 20% of the FaWa pump capacity. **Note**: Must be selected except for troubleshooting.
- **Start button**	- Button to start the priming using the parameters above.
FAWA	Controls to manually run the FAWA pump
- **Duration**	- Spin box to select the pump duration in seconds.
- **PWM**	- Spin box to select the capacity as a percentage with which the FAWA pump shall run. **ATTENTION**: Settings above 36% may damage the silicone tubing of the FaWa!
- **Start button**	- Button to start the FAWA pump using the parameters above.
Liquid System	Controls to manually prime and empty the liquid system of the washer

- **Prime Liquid System** - Runs the priming procedure for the whole liquid system
- **Empty Liquid System** - Runs the emptying procedure for the whole liquid system

10.10.5.1 Prime Liquid System

Cross References

List of cross references to information provided in other sections:

Information	References
Liquid system overview	See section 10.10.1, 🗎 10-104

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

Priming the liquid system serves for filling the washer liquid system with system liquid and for eliminating air bubbles from the tubings. The system must be primed before running the **Liquid System Test**.

Prepare the Liquid System for priming

Before priming the liquid system, prepare the tubing and the system liquid as follows (see cross references):

- Fill up the system liquid container to 30% and place it on the floor.
- Connect the waste tubing (A) from the washer waste to two fittings of the waste container on the floor, using the provided Y-piece (B).
- Connect the waste (bypass) tubing (C) from the pressure relief valve of the FaWa to the waste container.
- Disconnect all washer tubings from the wash bottles and connect them to the corresponding distribution channel couplings (D; 1 - 4).

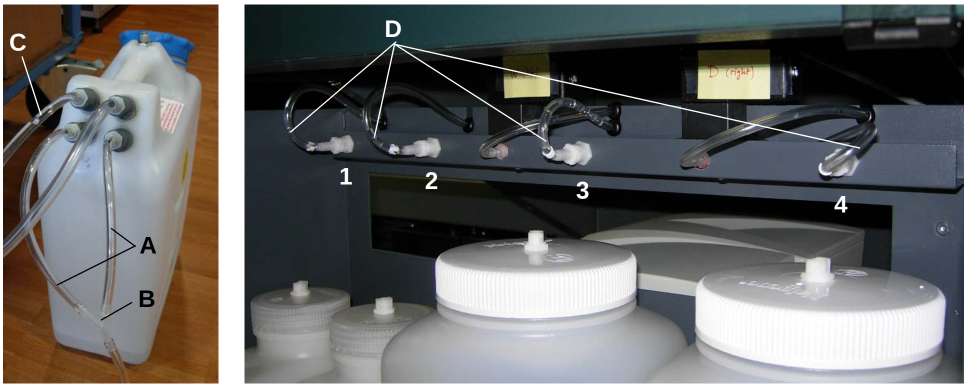
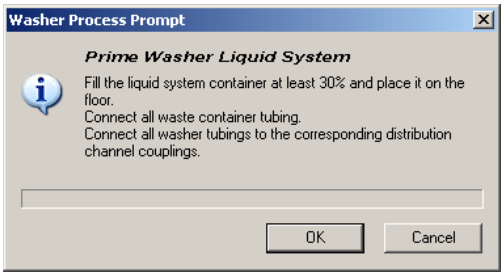


Fig. 10-94 Washer tubing for priming

Procedure

To prime the **Liquid System**:

1 On the **Contents** page select the check box **Prime Liquid System** and click **Start** or on the **Tool** page click the button **Prime Liquid System**.


Washer Process Prompt

Prime Washer Liquid System

Fill the liquid system container at least 30% and place it on the floor.
Connect all waste container tubing.
Connect all washer tubings to the corresponding distribution channel couplings.

Fig. 10-95 *Priming dialog*

2 In the dialog window click **OK** if the liquid system is prepared for priming (see "Prepare the Liquid System for priming", 🗎 10-108), otherwise click **Cancel** and prepare the liquid system for priming as described above.

Note: *Priming will take about 4 min.*

10.10.5.2 Empty Liquid System

Cross References

List of cross references to information provided in other sections:

Information	References
Liquid system overview	See section 10.10.1, 🗎 10-104

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

Emptying the liquid system serves for pumping all liquid out of the washer liquid system.

ATTENTION

Running the washer without liquid may damage the washer pump.

- Do not use the **Empty Liquid system** function extensively!

Prepare the Liquid System for emptying

Before emptying the liquid system, prepare the tubing as follows (see cross references):

- Empty the system liquid container and connect the liquid system tubing to the system liquid container.
- Connect the waste tubing (A) from the washer waste to two fittings of the waste container on the floor, using the provided Y-piece (B).
- Connect the waste (bypass) tubing (C) from the pressure relief valve of the FaWa to the waste container.
- Disconnect all washer tubings from the wash bottles and connect them to the corresponding distribution channel couplings (D; 1 - 4).

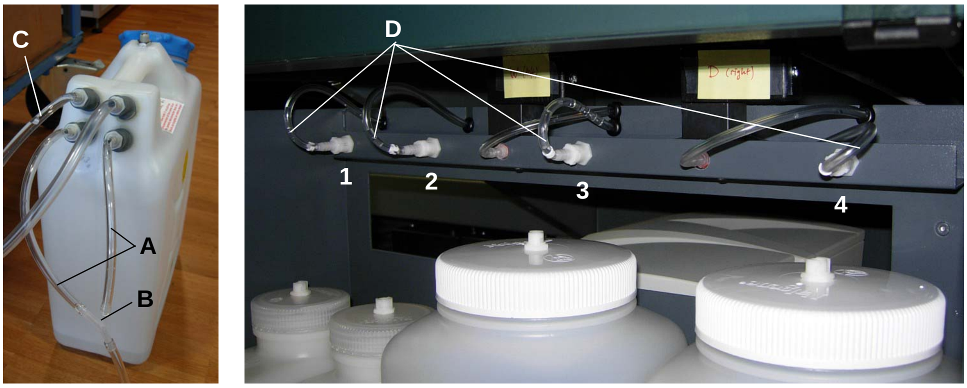
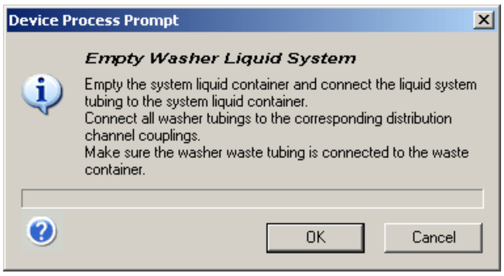


Fig. 10-96 *Washer tubing for emptying*

Procedure

To empty the **Liquid System**:

1 On the **Tool** page click the button **Empty Liquid System**.



Device Process Prompt

Empty Washer Liquid System

Empty the system liquid container and connect the liquid system tubing to the system liquid container.
Connect all washer tubings to the corresponding distribution channel couplings.
Make sure the washer waste tubing is connected to the waste container.

Fig. 10-97 *Emptying dialog*

2 In the dialog window click **OK** if the liquid system is prepared for emptying (see "Prepare the Liquid System for emptying", 🗎 10-109), otherwise click **Cancel** and prepare the liquid system for emptying as described above.

10.10.6 Set Alias Name

Cross References

List of cross references to information provided in other sections:

Information	References
Setup Page	See section 10.10.3, 🗎 10-106

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

In this setup, a new **Alias Name** will be given to the washer.

Note: *The alias name should only be changed if there is a special need for it.*

When to Setup an Alias Name

The washer has by default an alias name stored in its memory. When you start the washer panel for the first time with a new washer, you will see on the **Contents** page in the **Washer Alias** column of the **Available Devices** window this default

Alias Name. You can now use the same alias name in the application software. If you have to use another alias name for the washer in the application software, you have to change the name with this setup, so that the name stored in the washer memory equals the name used in the application software.

Washer Replacement

If the washer is defective and has to be replaced, you have to give to the new washer the same alias name as was set for the defective one. In case you cannot readout anymore the alias name from the memory of the defective washer, you will still find the **Alias Name** for the Hydroflex washer in the worktable setup in the application software (refer to 1.2 “Reference Documents”, 🗎 1-3).

Procedure

To perform the **Alias Name** setup procedure:

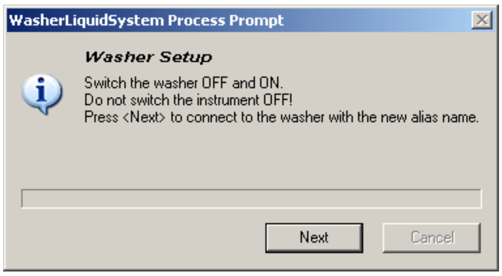
1 On the **Contents** page in the **Available Devices** window, select the washer for which you want to set a new alias name.

2 Select the **Set Alias Name** check box and change to the **Setup** page.

3 On the **Setup** page, type the new alias name for the washer into the **Alias Name** field.

(max. 20 characters, including hyphen and underscore, no blanks)

4 Go back to the **Contents** page and click **Start** to run the setup procedure.



Washer Setup

Switch the washer OFF and ON.
Do not switch the instrument OFF!
Press <Next> to connect to the washer with the new alias name.

***Fig. 10-98** Washer setup dialog*

5 When prompted, only switch the washer Off and ON. Do not switch off the instrument!

6 If you get an error message when the system is trying to connect to the washer:

- Switch the washer OFF and ON and close the **Washer** panel and / or disconnect and reconnect the USB connection of the washer.
- Reenter the **Washer** panel and check the new **Alias Name**.

After the setup, the new alias name is shown on the **Contents** page in the **Available Devices** window in the column **Washer Alias**.

10.10.7 Liquid System Test

Cross References

List of cross references to information provided in other sections:

Information	References
Prime Liquid System	See section 10.10.5.1, 🗎 10-108

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This test checks if there is any leakage or wrong connection in the tubing and the connectors on the valves. To check if the valves and the pumps of the washer and the FAWA are working correctly, the test uses the same program routines as are used in the application software for the daily maintenance and the weekly maintenance. This means that the maintenance sections of the **Liquid System Test** are verifying if those routines give the correct result. The terms ‘*daily*’ and ‘*weekly*’ used in these sections therefore refer to the daily and weekly maintenance included in the application software.

Structure

The procedure comprises the following test sections:

Tab. 10-26 *Liquid system test sections*

Test Section	Purpose	Principle	Pass Criteria
“Test for Tightness of Channel 4”, 🗎 10-115	Checks if the complete suction path (from the tubing connected to port 3 of valve D [daily] to the channel 4 inlet of the Hydroflex washer) is air tight -> no decrease in the wash result! Membrane cracks that will be self-sealing under pressure must be detected.	Priming on channel 4 from system container (valve W=ON, D=OFF). Folding the tubing at the valve inlet to increase the vacuum. Observe the Hydroflex washer inlet.	No air segments being aspirated.

***Tab. 10-26** Liquid system test sections*

Test Section	Purpose	Principle	Pass Criteria
"Test for Tightness of Flush", 🗎 10-116	For every LiHa flush the following paths must be pressure tight: • port 1 to port 2 and 3 of valve D, while it is OFF. • port 2 and 3 to port 1 of valve W while it is OFF -> no buffer dilution • valve connectors of valve W port 2 and 3, and valve D port 1 and the straight connector (connecting the thick wall tubing from the SPO with the thin wall tubing leading to port 2 of valve W) -> no spill.	Simulating LiHa flushing with 5 minutes intermittent FaWa activation against the overpressure valve and the paths to test, resulting in 1.55 bar test pressure. The leakage of a single drop will be made visible by appropriate tubing interconnections and a suitable detection preparation.	Not a single drop on the paper below the prefilled collecting tube. No spill below the tested valves and the straight connector.
"Test for Tightness of Connections", 🗎 10-119	For every washer liquid system maintenance the following paths must be pressure tight: • connectors of ports 2 and 3 of valve D, while it is OFF. -> no spill. • connector of port 1 of valve W, while it is ON. -> no spill. • distribution channel couplings and T-connectors. -> no spill.	Simulating maintenance pressure with 5 minutes intermittent FaWa activation against the overpressure valve and the specifically interconnected paths to test, resulting in 1.55 bar test pressure (during maintenance only, lower pressures will arise). Visual check of the corresponding parts afterwards.	No spill below the tested valve and distribution channel connectors and couplings.

Tab. 10-26 *Liquid system test sections*

Test Section	Purpose	Principle	Pass Criteria
"Test of Daily Maintenance", 🗎 10-120	Every end of day the washer must be completely rinsed with deionized water on channel 4. Therefore the following points must be guaranteed: • correct activation of the valve D. • acceptable flow restriction between port 2 and 3 of valve W, while it is OFF. • acceptable flow restriction between port 2 and 1 of valve D, while it is ON. • correct installation / flow restrictions of FaWa - Hydroflex connection tubing. • sufficient pump performance of the FaWa and the Hydroflex dispense pump.	Simulating the daily maintenance: - Activating valve D - Activating the FaWa with 20% of its capacity - Priming on channel 4 for 10 seconds - Controlling the over all performance by measuring the corresponding Hydroflex waste.	Pumped volume in graduated cylinder: >= 37 ml (valid for 8 and16 channel washers).
"Test of Weekly Maintenance", 🗎 10-122	Every end of week the washer must be cleaned with cleaning agent and rinsed with deionized water on all channels. Therefore the following points must be guaranteed: • correct activation of the valve W. • acceptable flow restriction between port 2 and 1 of valve W. • correct installation / flow restrictions of distribution channel & external washer tubing. • sufficient pump performance of the FaWa and the Hydroflex dispense pump.	Simulating the weekly maintenance: - Activating valve W - Activating the FaWa with 20% of its capacity - Priming on all channels for 10 seconds - Controlling the over all performance by measuring the corresponding Hydroflex waste channel per channel.	Pumped volume in graduated cylinder: >= 37 ml (valid for 8 and16 channel washers).

Tools

To carry out the **Liquid System Test** you need a long and a short service tube and a 100 ml graduated cylinder. The long and the short service tube are delivered with the instrument and are stored in a cavity behind the right access door of the Freedom EVOlyzer.

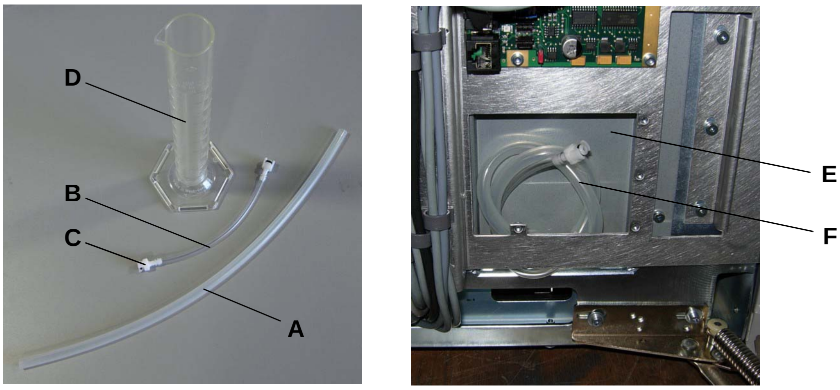


Fig. 10-99 Washer tools

A	*Long service tube*	*D*	*Graduated Cylinder 100 ml*
B	*Short service tube*	*E*	*Cavity behind right access door*
C	*Tube fitting of short service tube*	*F*	*Long and short service tubes, connected together to stay in place*

ATTENTION

Wrong test results of the **Liquid System Test** if the liquid system is not primed.

- Prime the liquid system before running the **Liquid System Test**.
  (see cross references)

Limitation

Note: *The* ***Liquid System Test*** *has to be run always completely, from clicking* ***Start*** *until the last process prompt showing the* ***Test Result*** *(passed or failed). It is not possible to individually run the* ***Tightness Tests***, ***Daily Maintenance Test*** *or* ***Weekly Maintenance Test.***

Procedure

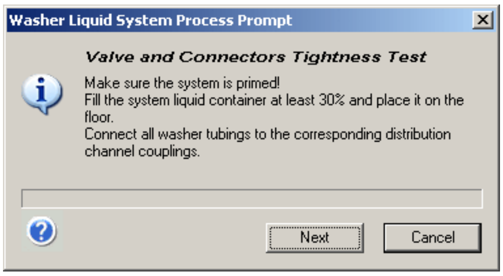
To perform the **Liquid System Test**:

1 On the **Contents** page, select the check box **Liquid System Test** and click **Start** to begin.

You will be guided through the test by the following process prompts:

Test for Tightness of Channel 4

For background information about this test section refer to:
Tab. 10-26 “Liquid system test sections”, 🗎 10-112.



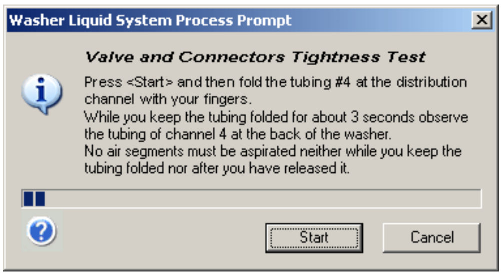
Valve and Connectors Tightness Test

Make sure the system is primed!
Fill the system liquid container at least 30% and place it on the floor.
Connect all washer tubings to the corresponding distribution channel couplings.

Fig. 10-100 Tightness test, dialog 1

2 Prepare the tubing and the system liquid for priming the liquid system
(see “Prepare the Liquid System for priming”, 🗎 10-108)

3 Click **Next**.



Washer Liquid System Process Prompt

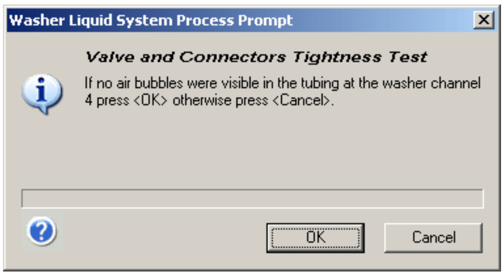
Valve and Connectors Tightness Test

Press <Start> and then fold the tubing #4 at the distribution channel with your fingers.
While you keep the tubing folded for about 3 seconds observe the tubing of channel 4 at the back of the washer.
No air segments must be aspirated neither while you keep the tubing folded nor after you have released it.

Fig. 10-101 *Tightness test, dialog 2*

4 Click **Start** and fold the tubing # 4 (A) with your fingers for about 3 sec. and then release it.
Visually check that there are no air segments at any time in the channel 4 tubing (B) connected on the back of the Hydroflex washer.
See Fig. 10-102, 🗎 10-116.

Fig. 10-102 *Membrane tightness test*



Washer Liquid System Process Prompt

Valve and Connectors Tightness Test

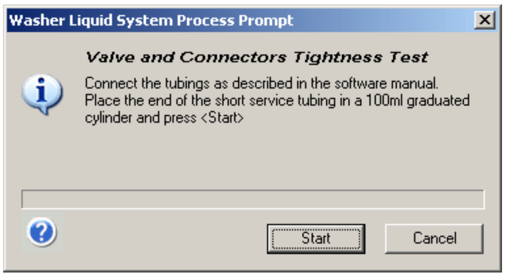
If no air bubbles were visible in the tubing at the washer channel 4 press <OK> otherwise press <Cancel>.

Fig. 10-103 *Tightness test, dialog 3*

5 Click **OK** if no air segments where visible in the tubing at the washer channel # 4. Otherwise click **Cancel** and refer to Tab. 10-27 “Remedies if the test failed”, 🗎 10-124. to fix the problem.

Test for Tightness of Flush

For background information about this test section refer to:
Tab. 10-26 “Liquid system test sections”, 🗎 10-112.



Washer Liquid System Process Prompt

Valve and Connectors Tightness Test

Connect the tubings as described in the software manual.
Place the end of the short service tubing in a 100ml graduated cylinder and press <Start>

Fig. 10-104 *Tightness test, dialog 4*

6 Connect the tubings as described in the following steps.

***Fig. 10-105** Tubings disconnected*

7 Disconnect the washer tubing # 1, # 2 and # 3 (A) from the distribution channel.

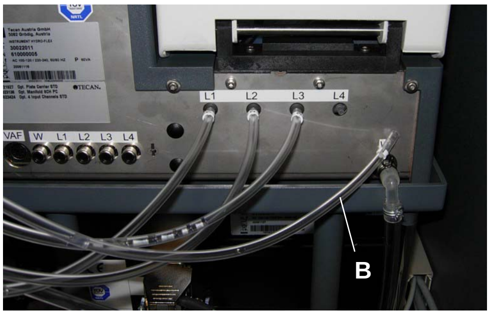


***Fig. 10-106** Tubing # 4 disconnected*

8 Disconnect tubing # 4 (B) from the washer.

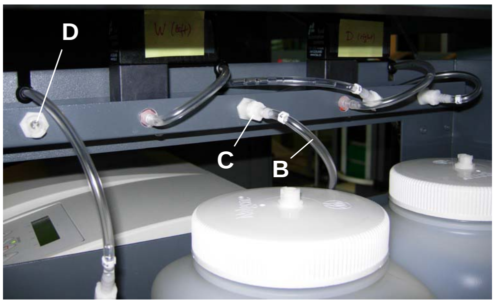


***Fig. 10-107** Tubing # 4 connected*

9 Get the short service tube out of the cavity behind the right access door of the instrument and separate it from the long (silicone) service tube (see Fig. 10-99 “Washer tools”, 🗎 10-115)

10 Connect tubing # 4 (B) from the washer to the distribution channel coupling # 3 (C) using one of the fittings of the short service tube.

11 Connect the short service tube with the remaining fitting to the distribution channel coupling # 2 (D).

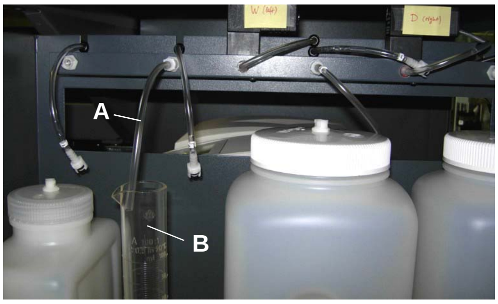
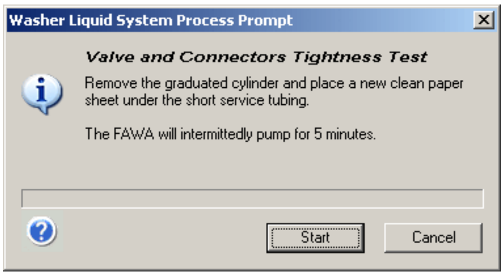


***Fig. 10-108** Short service tube*

12 Put the open end of the short service tube (A) into the 100ml graduated cylinder (B; see also Fig. 10-99 “Washer tools”, 🗎 10-115).

13 Click **Start** to continue.



Valve and Connectors Tightness Test

Remove the graduated cylinder and place a new clean paper sheet under the short service tubing.

The FAWA will intermittedly pump for 5 minutes.

Fig. 10-109 *Tightness test, dialog 5*

After the short service tube is filled with liquid a new dialog window is displayed.

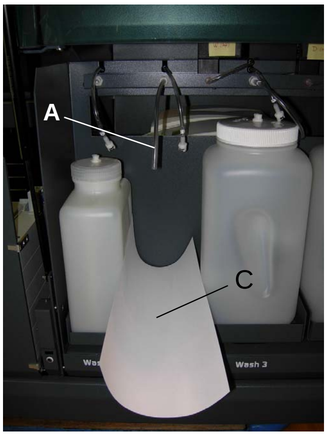
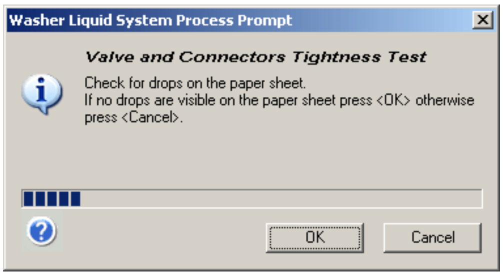


Fig. 10-110 *Paper below short service tube*

14 Remove the graduated cylinder and put a piece of clean paper (C) below the short service tube (A).

15 Click **Start** to continue.

Note: *This procedure takes about 5 min.*



Valve and Connectors Tightness Test

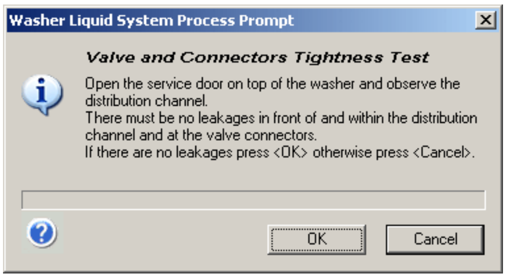
Check for drops on the paper sheet.
If no drops are visible on the paper sheet press <OK> otherwise press <Cancel>.

Fig. 10-111 *Tightness test, dialog 6*

16 If drops are on the paper click **Cancel** and refer to Tab. 10-27 “Remedies if the test failed”, 🗎 10-124. to fix the problem.

   – Repeat the complete test.

17 If there are no drops on the paper click **OK** to continue.



Valve and Connectors Tightness Test

Open the service door on top of the washer and observe the distribution channel.
There must be no leakages in front of and within the distribution channel and at the valve connectors.
If there are no leakages press <OK> otherwise press <Cancel>.

Fig. 10-112 *Tightness test, dialog 7*

A new dialog window is displayed.

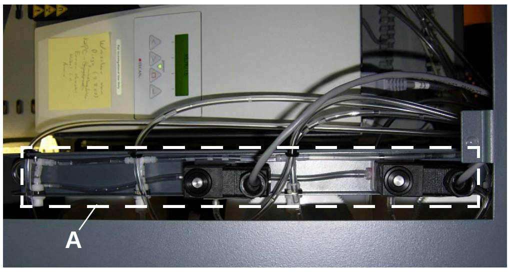


Fig. 10-113 Distribution channel

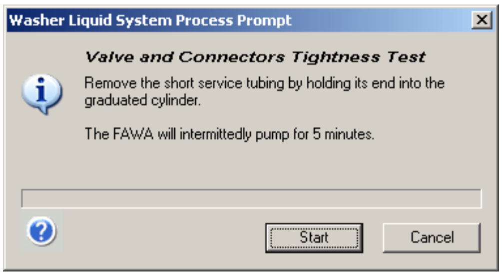
18 Observe the distribution channel (A). If there is any leakage in front of or within the distribution channel (especially around the valves) or at the valve connectors click **Cancel** and refer to Tab. 10-27 “Remedies if the test failed”, 🗎 10-124. to fix the problem.

– Repeat the complete test.

19 If there is no leakage click **OK** to continue.

Test for Tightness of Connections

For background information about this test section refer to: Tab. 10-26 “Liquid system test sections”, 🗎 10-112.


Washer Liquid System Process Prompt

Valve and Connectors Tightness Test

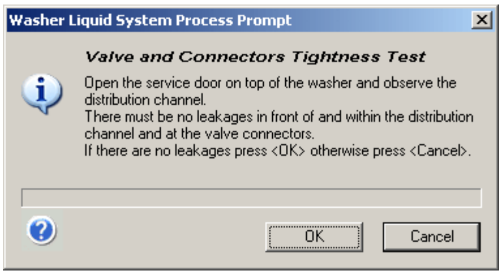
Remove the short service tubing by holding its end into the graduated cylinder.

The FAWA will intermittedly pump for 5 minutes.

Fig. 10-114 Tightness test, dialog 8

20 Place the short service tube into the graduated cylinder to prevent from spilling liquid when disconnecting. Disconnect the short service tube from the distribution channel coupling and click **Start**.

The FaWa will pump intermittent for 5 minutes.


Washer Liquid System Process Prompt

Valve and Connectors Tightness Test

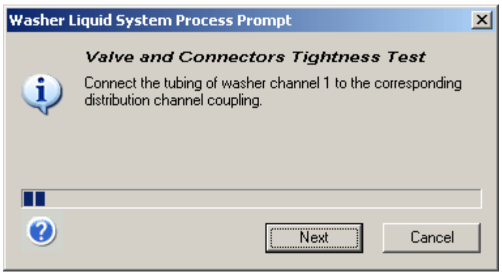
Open the service door on top of the washer and observe the distribution channel.
There must be no leakages in front of and within the distribution channel and at the valve connectors.
If there are no leakages press <OK> otherwise press <Cancel>.

Fig. 10-115 Tightness test, dialog 9

21 Observe the distribution channel and the valve connectors. If there is any leakage in front of or within the distribution channel (especially around the valves) or at the valve connectors click **Cancel** and refer to Tab. 10-27 “Remedies if the test failed”, 🗎 10-124. to fix the problem.

– Repeat the complete test.

22 If there is no leakage click **OK** to continue.


Washer Liquid System Process Prompt

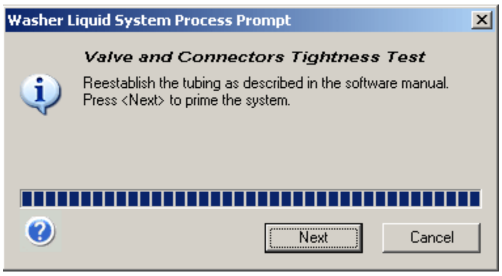
Valve and Connectors Tightness Test

Connect the tubing of washer channel 1 to the corresponding distribution channel coupling.

Fig. 10-116 Tightness test, dialog 10

23 Connect the tubing of the washer channel 1 to the corresponding distribution channel coupling.

24 Click **Next** to release the pressure with priming on channel 1.



Washer Liquid System Process Prompt

Valve and Connectors Tightness Test

Reestablish the tubing as described in the software manual.
Press <Next> to prime the system.

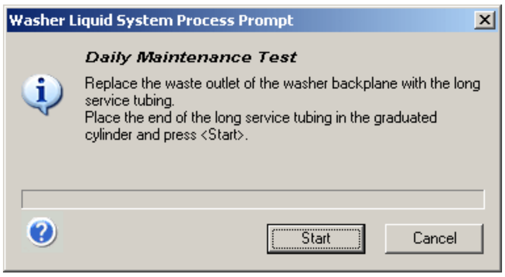
Fig. 10-117 *Tightness test, dialog 11*

25 Reestablish the tubing in reverse order to reach the initial situation for priming the liquid system (see "Prepare the Liquid System for priming", 🗎 10-108).

26 Click **Next** to prime the liquid system on channel 4 to make it air-free again.

Test of Daily Maintenance

For background information about this test section refer to: Tab. 10-26 "Liquid system test sections", 🗎 10-112.



Washer Liquid System Process Prompt

Daily Maintenance Test

Replace the waste outlet of the washer backplane with the long service tubing.
Place the end of the long service tubing in the graduated cylinder and press <Start>.

Fig. 10-118 *Daily maintenance test, dialog 1*

A new dialog window is displayed.

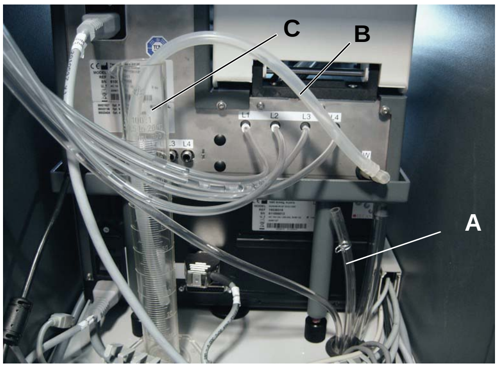


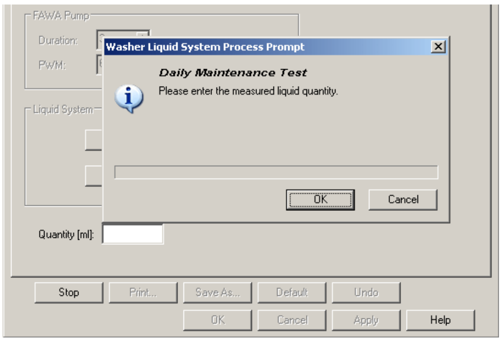
Fig. 10-119 *Waste tubing replaced*

27 Disconnect the waste tubing of the washer (A) and replace it with the long service tube (B).

28 Put the open end of the long service tube into the graduated cylinder (C).

29 Click **Start** to continue.

30 Measure the liquid pumped into the graduated cylinder and enter the value in the text field **Quantity [ml]** on the **Tool Page,** which is displayed behind the dialog window.

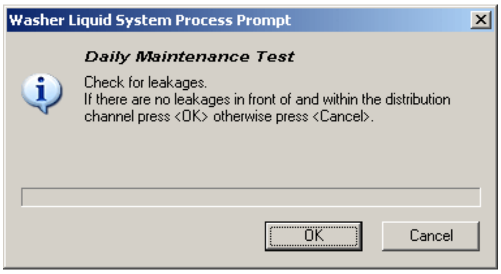

Washer Liquid System Process Prompt

Daily Maintenance Test

Please enter the measured liquid quantity.

Fig. 10-120 *Daily maintenance test, dialog 2*

31 Click **OK** to continue.


Washer Liquid System Process Prompt

Daily Maintenance Test

Check for leakages.
If there are no leakages in front of and within the distribution channel press <OK> otherwise press <Cancel>.

Fig. 10-121 *Daily maintenance test, dialog 3*

A new dialog window is displayed.

32 Observe the distribution channel (A). If there is any leakage in front of or within the distribution channel (especially around the valves) click **Cancel** and refer to Tab. 10-27 “Remedies if the test failed”, 🗎 10-124. to fix the problem.

– repeat the complete test.

33 If there is no leakage click **OK** to continue.

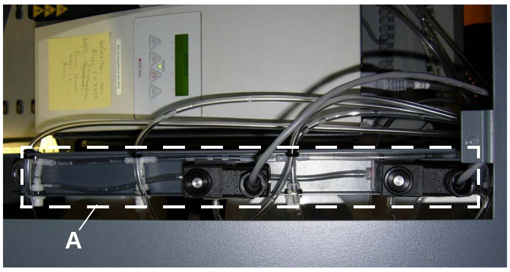
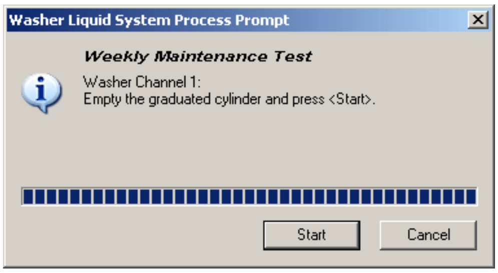


Fig. 10-122 *Distribution channel*

Test of Weekly Maintenance

For background information about this test section refer to: Tab. 10-26 “Liquid system test sections”, 🗎 10-112.

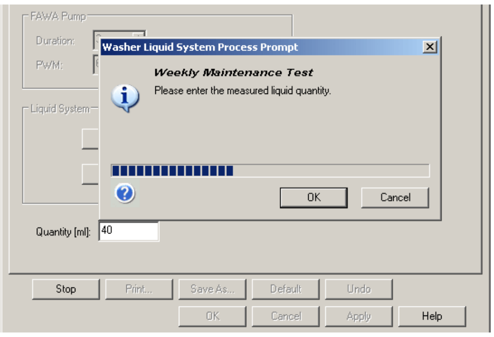


Weekly Maintenance Test

Washer Channel 1:
Empty the graduated cylinder and press <Start>.

Fig. 10-123 *Weekly maintenance test, dialog 1*

34 Empty the graduated cylinder and click **Start**.



Weekly Maintenance Test

Please enter the measured liquid quantity.

Quantity [ml]: 40

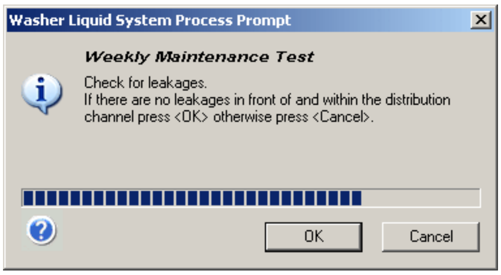
Fig. 10-124 *Weekly maintenance test, dialog 2*

35 Measure the liquid pumped into the graduated cylinder and enter the value in the text field **Quantity [ml]** on the **Tool Page,** which is displayed behind the dialog window.

36 Click **OK** to continue.

37 Repeat the last two steps for the washer channels # 2, # 3 and # 4.

You will be guided by process prompts.



Weekly Maintenance Test

Check for leakages.
If there are no leakages in front of and within the distribution channel press <OK> otherwise press <Cancel>.

Fig. 10-125 *Weekly maintenance test dialog 3*

A new dialog window is displayed.

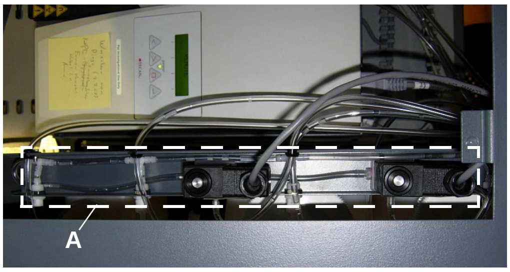
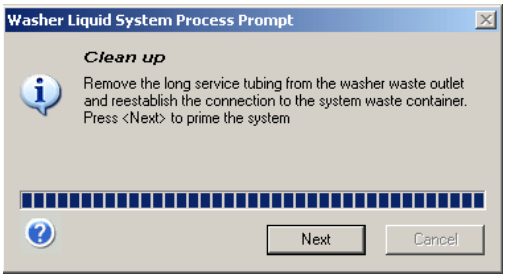


Fig. 10-126 *Distribution channel*

38 Observe the distribution channel (A). If there is any leakage in front of or within the distribution channel (especially around the valves) click **Cancel** and refer to Tab. 10-27 "Remedies if the test failed", 🗎 10-124. to fix the problem.

– Repeat the complete test.

39 If there is no leakage click **OK** to continue.



Clean up

Remove the long service tubing from the washer waste outlet and reestablish the connection to the system waste container. Press <Next> to prime the system

Fig. 10-127 *Clean up dialog*

A new dialog window is displayed.

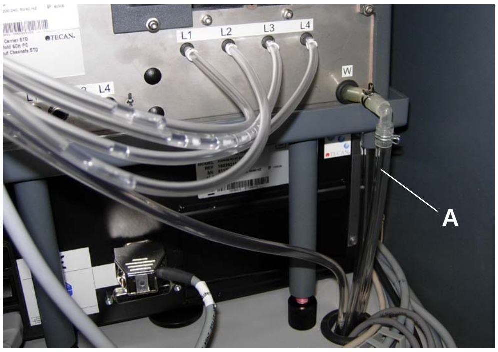
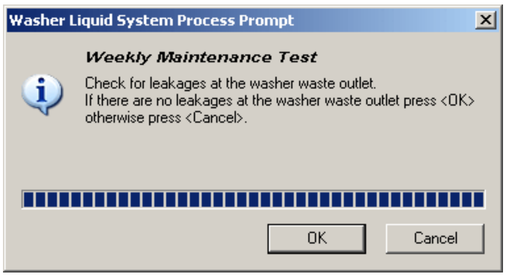


Fig. 10-128 *Waste tubing reinstalled*

40 Remove the long service tube from the waste outlet of the washer and reinstall the original waste tubing (A) connected to the waste container.

41 Click **Next** to prime the liquid system.



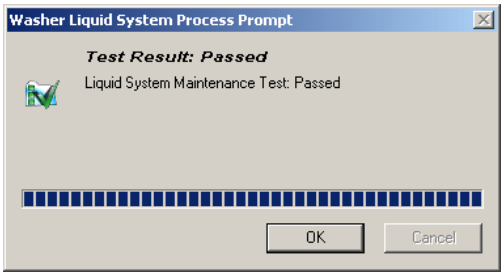
Weekly Maintenance Test

Check for leakages at the washer waste outlet.
If there are no leakages at the washer waste outlet press <OK> otherwise press <Cancel>.

Fig. 10-129 *Check washer waste outlet*

42 Check if there is any leakage at the washer waste outlet. If there are leakages, fix the problem and click **OK.**
Use the **Tool page** to check for correct washer waste connections (e.g., with function **Prime**)

43 If there are no leakages at the waste outlet click **OK** to continue.



Test Result: Passed

Liquid System Maintenance Test: Passed

Fig. 10-130 *Test result*

44 At the end of the test a **Test Passed** or **Test Failed** message notifies you whether or not the test was successful.

45 If the **Liquid System Test** is **Passed** and you are finished, interconnect the short and the long service tube with one of the fittings and store them in the cavity behind the right access door of the instrument (see Fig. 10-99 “Washer tools”, 🗎 10-115)

Pass / Fail Criteria

For the “**Test Passed**” criteria refer to Tab. 10-26 “Liquid system test sections”, 🗎 10-112

If the Test Fails

Try the following remedies according to the test sections that failed (call the nearest customer service department if necessary).

- After solving the problem, repeat the complete **Liquid System Test**.

Tab. 10-27 *Remedies if the test failed*

Test Section (reference)	Failure	Cause	Remedy
“Test for Tightness of Channel 4”, 🗎 10-115	Air segments aspirated	Air from tubing	Replace tubing
		Air from valve or valve connectors	Replace valve
“Test for Tightness of Flush”, 🗎 10-116	Drop(s) on the paper	Leaking valve	Repeat the test with adapted interconnections to determine the leaking valve. Replace the leaking valve
	Spill below the tested valve connectors and/or the straight connector	Leaking valve or connector	Replace the leaking valve or connector.
“Test for Tightness of Connections”, 🗎 10-119	Spill below valve connectors.	Leaking valve connectors.	Replace the corresponding valve (connectors must be factory glued)
	Spill below distribution channel coupling and T-connectors	Leaking distribution channel coupling and/or T-connector.	Replace the corresponding part.

Tab. 10-27 Remedies if the test failed

Test Section (reference)	Failure	Cause	Remedy
“Test of Daily Maintenance”, 🗎 10-120	Pumped volume in graduated cylinder: <= 37 ml		Use the **Tool page** and the overview figure to locate the cause by checking all points mentioned in Tab. 10-26, 🗎 10-112, in the column **Purpose** of the corresponding test section. Replace / fix the corresponding part.
“Test of Weekly Maintenance”, 🗎 10-122	Pumped volume in graduated cylinder: <= 37 ml		Use the **Tool page** and the overview figure to locate the cause by checking all points mentioned in Tab. 10-26, 🗎 10-112, in the column **Purpose** of the corresponding test section. Replace / fix the corresponding part.

10.11 Balance

10.11.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Gravimetric Test	See section 10.9.7, 🗎 10-84

Purpose

The purpose of this procedure is to set up and test the communication with the balance that is to be used for the **Gravimetric Test** (→ Cross References).

Supported Balance Types

The Instrument Software V8.0 supports the following balance types:

- Mettler-Toledo type WXS, delivered as of Q2 2008
- Mettler-Toledo type SAG285/01, delivered as of January 2004.
- Mettler-Toledo type AG 285 / AG 245, delivered until the end of 2003 (no longer available).

Tab. 10-28 *Readability and Weighing Ranges of WXS, SAG285/01 and AG 285*

	WXS 205DU		SAG 285/01			AG 285		
Readability	0.1 mg	0.01 mg	0.1 mg	0.01 mg	0.01 mg	0.1 mg	0.01 mg	0.01 mg
Maximum capacity	220 g	111 g	210 g	81 g	41 g	210 g	81 g	41 g
Weighing range	0 to 220 g		0 to 210			0 to 210 g		

Note: *Other balance types as mentioned in earlier editions of the Instrument Software Manual are no longer supported.*

Accessories for WXS

The following table lists the recommended accessories for the balance WXS. They are either needed for setting up the balance and for carrying out the Gravimetric Test or are otherwise useful.

Tab. 10-29 *Accessories for WXS*

Designation	Mettler Part No.	Needed for Test
Weighing pan (Ø 50 mm)	11121257	yes
Connection cable (1.5 m) weighing cell - control unit	11121440	yes
Transport case (optional)	11121160	no

Accessories for SAG285

The following table lists the recommended accessories for the balance SAG285. They are either needed for setting up the balance and for carrying out the Gravimetric Test or are otherwise useful.

Tab. 10-30 *Accessories for SAG285/01*

Designation	Mettler Part No.	Needed for Test
Weighing pan (Ø 50 mm)	238 472	yes
Connection cable LC-RS9	229 065	yes
Transport case (optional)	238 852	no

10.11.2 Preparatory Steps

Cross References

List of cross references to information provided in other sections:

Information	References
Reference documents	See section 1.2, 🗎 1-3

Before the **Balance** function can be performed, some preparatory steps are required. The procedures to be followed differ slightly depending on the balance model.

Information

You can find additional information in the documents listed below. Also see “Reference documents (see cross references).

- Balance WXS and SAG 285/01:
  - Operating Manual, Balance Kit.
  - Operating Manual of the balance itself (provided by Mettler Toledo).
- Balance AG 245/285
  - Operating Manual of the balance itself (provided by Mettler Toledo).

10.11.2.1 Preparation of WXS or SAG 285 / 01

Prepare and Connect

If your balance is a WXS or an SAG 285/01 (with separate Weighing Cell and Control Unit):

1. Prepare and install the Balance Kit for WXS or SAG 285/01 and the balance (Weighing Cell and Control Unit).
2. Connect the balance and the instrument:
   - WXS or SAG 285/01 Weighing Cell to the Control Unit.
   - WXS or SAG 285/01 Control Unit to the computer.
   - Connect the instrument to the computer on which the Setup and Service Software is installed
   - Note that the Setup and Service software supports only a connection via an RS-232 port. For the connection via a USB port, an appropriate RS-232 to USB adapter must be used. Details are provided in the Operating Manual, Balance Kit.
   - Set the balance parameters according to the Operating Manual, Balance Kit.
   - **Important**: The Autocalibration mode must be disabled.

ATTENTION

Make sure you set the balance parameters correctly.

Worktable

3 Within the **Liquid System** panel, go to the **Worktable** page.

- Select a suitable worktable map from the list.
- To execute the **Gravimetric Test** with the WXS or SAG 285/01 you need a worktable map for the appropriate balance type. As examples see the following figures.

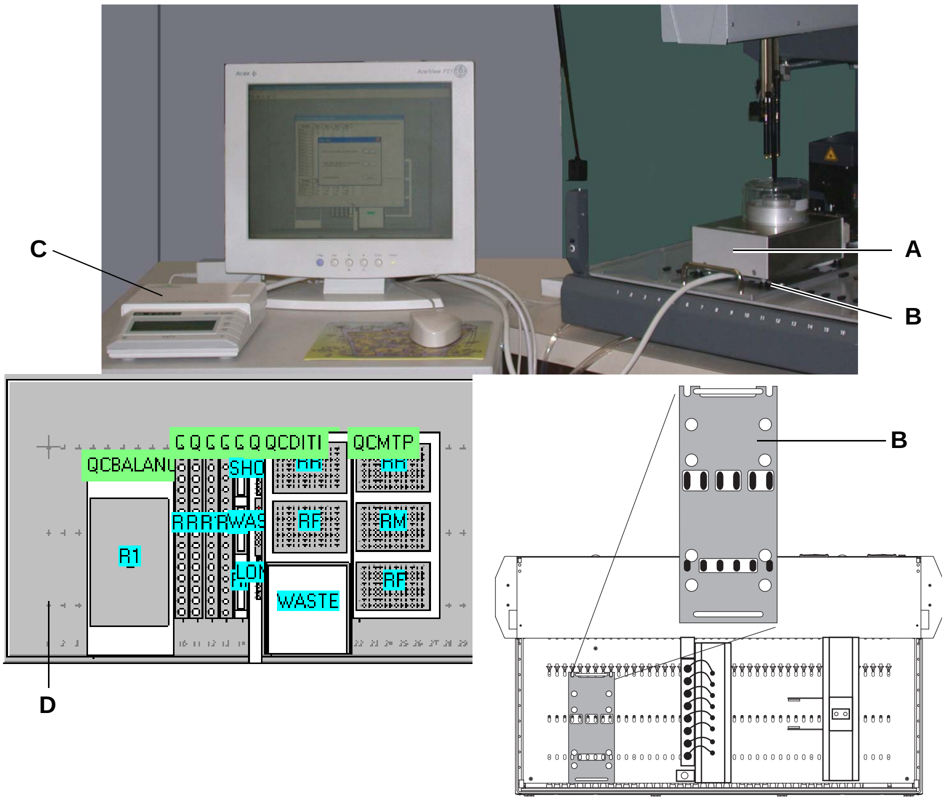


***Fig. 10-131** SAG 285/01, balance, adapter plate and worktable*

A	*SAG 285/01, Weighing Cell*	***C***	*SAG 285/01, Control Unit*
B	*Adapter plate WXS / SAG 285/01*	***D***	*Worktable map SAG 285/01 (example)*

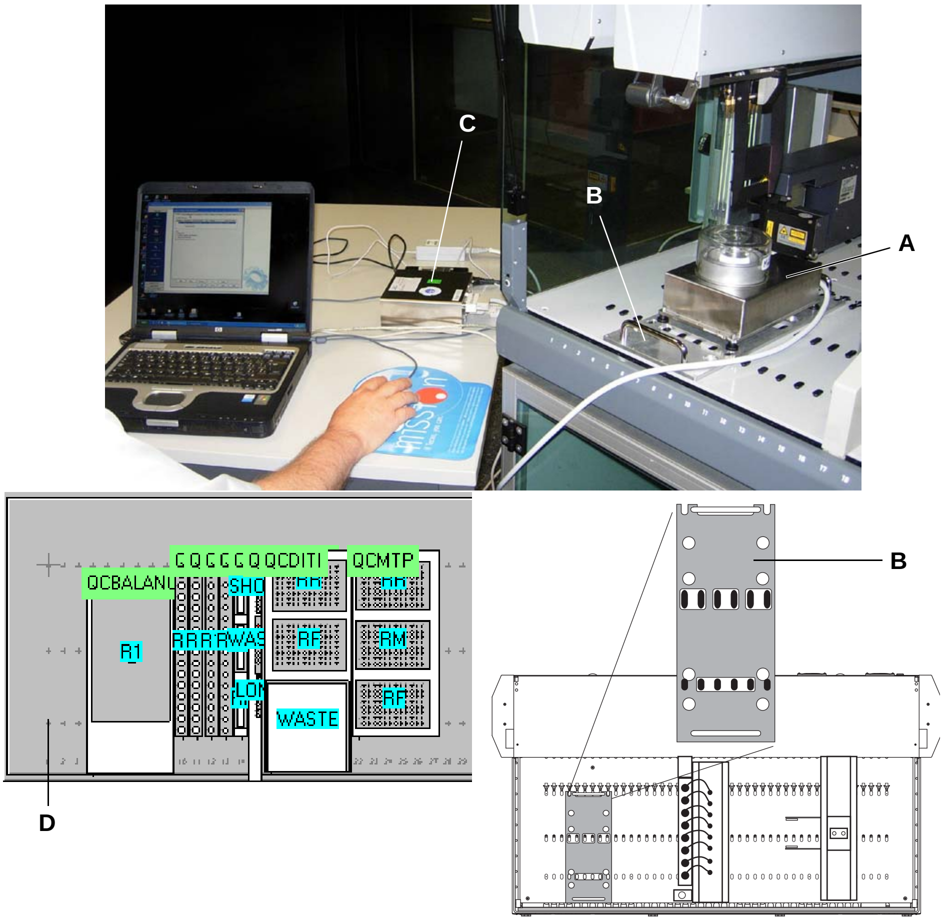


Fig. 10-132 *WXS balance, adapter plate and worktable*

A	*WXS, Weighing Cell*	***C***	*WXS, Control Unit*
B	*Adapter plate WXS / SAG 285/01*	***D***	*Worktable map WXS (example)*

4 Place the WXS / SAG 285/01 balance adapter plate on the worktable as shown in the previous figures.

Note: *The adapter plate for the WXS and SAG 285/01 occupies 6 grid positions on the worktable.*

5 Place the WXS or SAG 285/01 Weighing Cell on the adapter plate accordingly. Make sure the feet of the balance are properly seated in the corresponding positioning holes on the adapter plate.

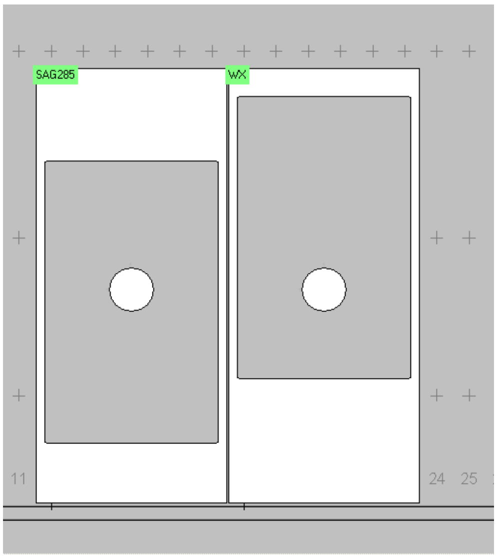


***Fig. 10-133** Weighing cell positions on the worktable*

***Note:** The WXS weighing cell is positioned in the rear holes and the SAG 285/01 weighing cell is positioned in the front holes of the adapter plate.*
In spite of this difference the absolute pipetting position for the gravimetric test is the same for both weighing cells (see figure on the left).

10.11.2.2 Preparation of Balances AG 285 and AG 245

Information

If your balance is an AG 285 or an AG 245 from Mettler Toledo AG, follow the instructions provided in the documents listed below. Also see “Reference documents” (see cross references).

- “Gravimetric Pipetting Precision Check”. This manual was part of the Balance Kit for the AG 285/245 balances. Please note:
  - In this manual, the information concerning the balance setup is still valid.
  - The procedure for the Gravimetric Test has changed, however, and is as described in this version of the Instrument Software Manual.
- Operating Manual of the balance itself (provided by the manufacturer).
- Also see Reference Documents (→ Cross References).

The most important steps to be carried out are summarized here. For details refer to the above manuals.

Prepare and Connect

1 Prepare and install the Balance Kit for the above models and the balance itself.

2 Connect the balance and the instrument:
  - Balance to the computer.
  - Connect the instrument on which the Setup and Service Software is installed to the computer.
  - Note that the Setup and Service software supports only a connection via an RS-232 port. For the connection via a USB port, an appropriate RS-232 to USB adapter must be used. Details are provided in the Operating Manual, Balance Kit (as far as the connection to an RS-232 or USB port is concerned, the information in the mentioned manual applies to the AG 285 / 245 balances too).
  - Set the balance parameters according to the manufacturer’s instructions.

ATTENTION

Make sure you set the balance parameters correctly.

Worktable

3 Within the **Liquid System** panel, go to the **Worktable** page.

- Select a suitable worktable map from the list.
- To execute the **Gravimetric Test** with the AG 285 you need a worktable map for this balance type. For an example see following figure.

Note: *The balances AG 245 and AG 285 of Mettler-Toledo AG look practically the same. However, their weighing ranges are different;*

- *AG 245:*
- *AG 285:*

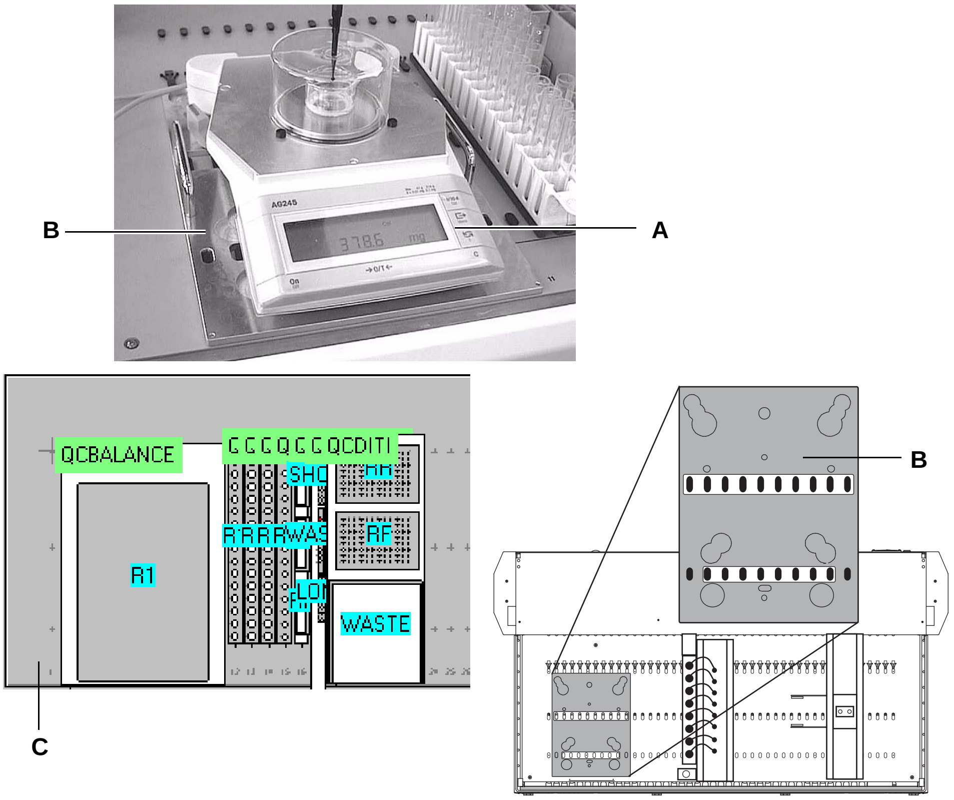


Fig. 10-134 *Example of AG 245 Balance, adapter plate and worktable*

A	*Balance AG 245 (weighing cell and display unit in same housing)*	***C***	*Worktable map AG 245 / 285 (example)*
B	*Adapter plate*		

4 Place the AG 245/285 balance adapter plate on the worktable as shown in the following figure.

Note: *The adapter plate for the AG 245/285 occupies 10 grid positions on the worktable.*

5 Place the AG 245/285 Balance on the adapter plate. Make sure the feet of the balance are properly seated in the corresponding positioning holes on the adapter plate.

10.11.3 Setup Procedure

Cross References

List of cross references to information provided in other sections:

Information	References
Gravimetric Test	See section 10.9.7, 🗎 10-84

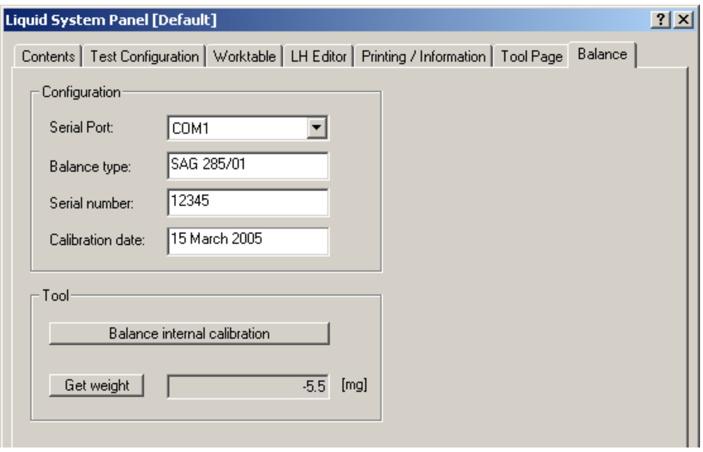
Purpose

With this function, the balance is configured.

Procedure

To set up the balance:

1 Start the **Liquid System** panel with **Liquid System** > **Liquid System**.
2 On the Contents page, select the check box **Gravimetric Test**.
3 Go to the **Balance** page.



Serial Port: COM1
Balance type: SAG 285/01
Serial number: 12345
Calibration date: 15 March 2005
-5.5 [mg]

Fig. 10-135 Balance page

4 Set the following parameters on the **Balance Page.**
   - **Serial Port**: From the list, choose the **COM** port to which the balance is physically connected.
   - **Calibration date**: Date when the balance was last externally calibrated by a Mettler FSE. Choose a date format that cannot be misinterpreted.

5 Test the communication with the balance.
   - Tare the balance
   - Put a reference weight of about 50 grams on the weighing pan.
   - Click on the button **Get weight** and compare the values shown on the display of the balance and the one shown on the balance page.

Calibration, Internal

To calibrate the balance with internal weight, proceed as follows:

6 Prepare the balance for calibration

- Make sure the environment is vibration-free
- Install the draft shield (protects from air drafts)
- Install the weighing pan that you use for weighing afterwards
- No vessel on the weighing pan

7 Click the button **Balance internal calibration** on the **Balance page**.

The calibration may take 1 to 2 minutes. It makes exact measurements without and with an internal weight.

Note: *The* ***Balance internal calibration*** *button is meant primarily for the Mettler balance WXS, because this balance has no control panel. But the button works also with the other supported balances.*

10.11.3.1 Advanced Configuration

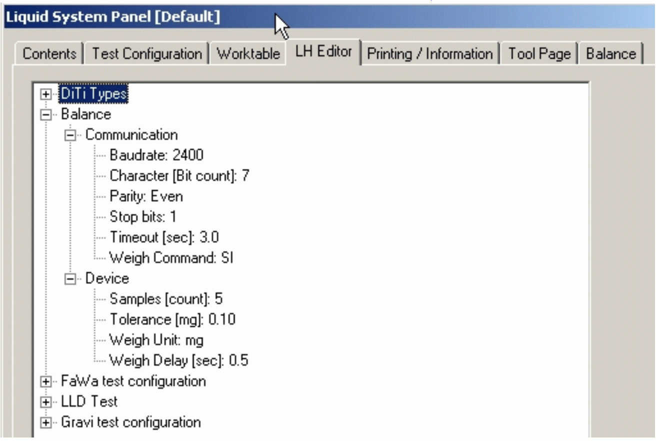
Purpose

As has been mentioned before, advanced users can use the **LH Editor** to adapt the configuration parameters to meet special requirements.

Parameters

Some of the parameters are shown in the following figure(s). Most of them are self-explanatory. The **LH Editor** also shows the default values.

Note: *You should always consult the “real screen” on your computer and not the figures in this manual to find the values of parameters.*



- DiTi Types
- Balance
  - Communication
    - Baudrate: 2400
    - Character [Bit count]: 7
    - Parity: Even
    - Stop bits: 1
    - Timeout [sec]: 3.0
    - Weigh Command: SI
  - Device
    - Samples [count]: 5
    - Tolerance [mg]: 0.10
    - Weigh Unit: mg
    - Weigh Delay [sec]: 0.5
- FaWa test configuration
- LLD Test
- Gravi test configuration

Fig. 10-136 *LH Editor, LLD test parameters*

ATTENTION

Ensure that the communication parameters correspond exactly to those set on the side of the balance, otherwise the communication will not work.

11 Options 1

11.1 Options Menu

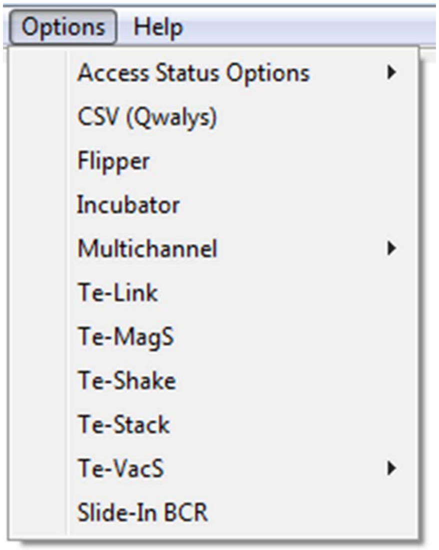


Fig. 11-1 Options menu

The **Options** menu contains the commands listed below.

Menu Item	Function	See section
Incubator	Setup and test of the heated incubator	11.2, 🗎 11-3
Incubatin Device	Setup of plates an dheating tests for the incubation Device	11.3, 🗎 11-24
Te-Thermix	As above for Te-Thermix	11.5, 🗎 11-49
Te-MagS	As above for Te-MagS	11.6, 🗎 11-58
Te-Shake	As above for Te-Shake	11.7, 🗎 11-70
Access Status Options	Setup and test of status and alarm devices	12.2, 🗎 12-3
CSV (Qwalys 3)	As above for CSV (only if this function has been selected during installation)	12.3, 🗎 12-76
Flipper	As above for the Flipper (only if Cellerity has been selected during installation)	12.4, 🗎 12-82

Menu Item	Function	See section
Te-Link	As above for Te-Link	12.5, 🗎 12-92
Te-VacS	As above for Te-VacS	12.6, 🗎 12-100
Te-Stack	As above for Te-Stack	12.8, 🗎 12-116
Multichannel	Setup and test of Te-MO, Aquarius, Autoloader	13, 🗎 13-1

11.2 Incubator

11.2.1 Introduction

Purpose

This panel lets you set up, calibrate and validate heated incubators (MIO). It also allows you to test the shutters and, if installed, the optional shaker.

Incubator Types

There are two different types of incubators available:

- Room temperature incubators
- Heated incubators

Room Temperature Incubator

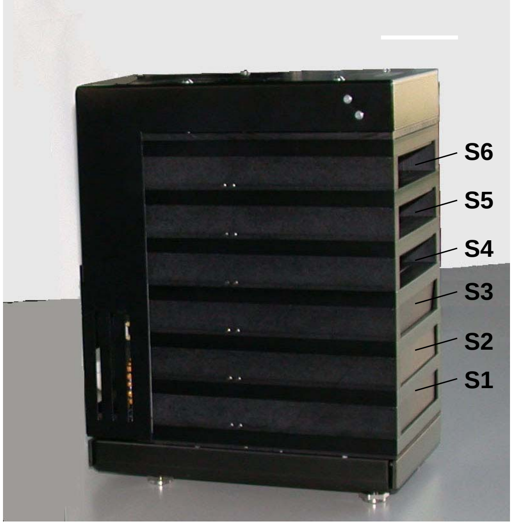
The general purpose of room temperature incubators (so-called RT-incubators) is to keep the plates with the samples to be examined at room temperature, while protecting them from exposure to light.

RT-Incubators may be set up and tested as follows:

- EVOlyzer: Use the command **Options > Access Status Options > Supervisor 2**.

11.2.1.1 Heated Incubator

Heated incubators can be used on all instrument types and communicate with the computer via the CAN bus. They are used to heat up the plates to target temperatures of 37 °C, 46 °C or 60 °C. They are equipped with shutters that protect the plates from exposure to light. Heated incubators can be equipped with an optional shaker, which allows the liquids in the samples to be mixed.



Heated incubator without shaker, with 6 slots (S1 to S6), calibrated to either 37 °C, 46 °C or 60 °C

- Shutters S1 to S3 closed
- Shutters S4 to S6 open

Fig. 11-2 Heated incubator

Heated incubator with shaker, calibrated to either 37 °C, 46 °C or 60 °C

Fig. 11-3 *Heated incubator with shaker*

Other forms of heated incubators:

- Heated incubator with 4 slots (for 37, 46 and 60 °C)

11.2.1.2 MIO1 and MIO2

The heated incubators are also called MIO (Monitored Incubator Option) and are differentiated between MIO1 and MIO2. The newer MIO2 replaces the MIO1 and shows the following new features:

- New electronics and firmware.
- Firmware download possible.
- Setting the serial number possible.
- Connection of two MIO2 via interconnection cable
  (setup of a current limitation possible for this case).
- Backward compatibility allows to setup a MIO2 as MIO1 (for frozen solutions where a MIO1 is requested).

11.2.2 TEMPO Tool

Brief Description

The TEMPO tool serves for calibrating and validating the heating plates of the incubator. It consists of the following main parts:

- A base unit to which the temperature sensor plates are connected and that serves as an interface to the instrument.
- One or more temperature sensor plates that can be inserted into the corresponding slots of the incubator.

Note: *There are two types of TEMPO tools:*

- *Multislot TEMPO to which up to six temperature sensor plates can be connected simultaneously. The advantage of the multislot TEMPO tool is that the heating plates of all slots can be calibrated and validated in one run.*
- *Single-slot TEMPO to which one temperature sensor plate can be connected. If only a single-slot TEMPO is available the heating plates of the slots must be calibrated/validated one by one, which takes considerably more time.*

Note: *For the field, TEMPO tools are available for the following temperatures:*

- MIO1: 37 °C and 46 °C (no 60 °C TEMPO).
- MIO2: 37 °C, 46 °C and 60 °C

The following figure shows a multislot TEMPO tool with the temperature sensor plates inserted into the slots of a 6-slot heated incubator.

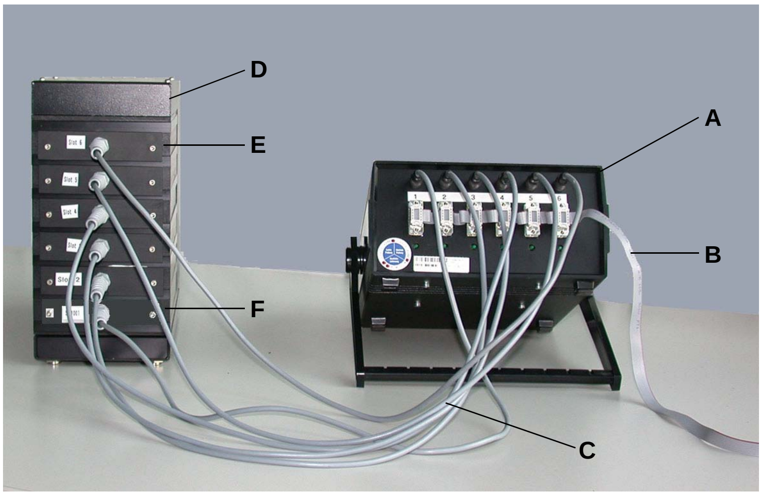


Fig. 11-4 *Multislot TEMPO tool*

A	*TEMPO base unit*	***D***	*Heated incubator (6 slots)*
B	*Connection to instrument*	***E***	*Temperature sensor plate (slot 6)*
C	*Connection cables of sensor plates*	***F***	*Temperature sensor plate (slot 1)*

Temperature Sensor Plate

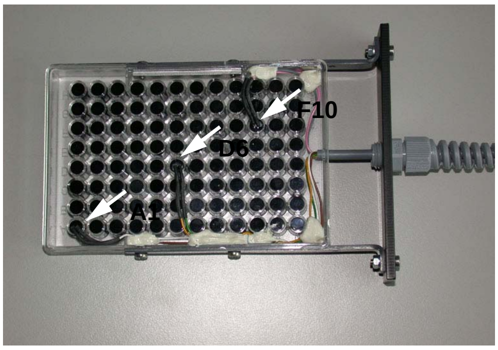


Fig. 11-5 *Temperature sensor plate (bottom view)*

The temperature sensor plate is a plug-in unit in the form of a 96-well microplate that can be inserted into the corresponding slot of the heated incubator. It is equipped with three temperature sensors that measure the plate temperature in three positions, namely A1, D6 and F10.

Calibration of the TEMPO Tool

Before you can use the TEMPO tool to calibrate and validate the incubator, the TEMPO itself must be calibrated properly. This calibration must be carried out at the factory at least once per year.

ATTENTION

Miscalibration/validation of the incubator possible if the TEMPO tool is not calibrated correctly.

- Ensure you have the TEMPO recalibrated once per year.
- Contact the customer service department when a recalibration is due so that the TEMPO can be returned for calibration.

Note: *If you calibrate or validate the incubator after the time for the recalibration of the TEMPO has expired (i.e. after more than a year), a warning message is printed on the QC-report.*

Install TEMPO

To Install the TEMPO tool:

1. Remove any objects (microplates) from the slots of the incubator.
2. Insert the sensor plates of the TEMPO tool in the appropriate slots of the incubator, i.e. sensor plate # 1 into slot 1 (bottom), sensor plate # 2 into slot 2 (above slot 1), etc. See previous Fig. 11-4, 🗎 11-5.

ATTENTION

Miscalibration/validation of the incubator possible if the sensor plates are not inserted properly.

- Ensure you insert the sensor plates correctly.
- The well bottoms (see Fig. 11-5, 🗎 11-5) must point downwards.
- The sensor plates must be inserted completely, i.e. their front plates must close the slots completely so that no heat can escape during the calibration or validation.

3. Connect the TEMPO tool to the CAN-bus according to the following description.

Connect TEMPO

Before the TEMPO tool can be used it must be connected to the CAN-bus. One possibility is to connect it to one of the CAN-bus connectors on the right side of the Optibo board.

Note: *The Optibo board is located behind the left access door of the instrument.*

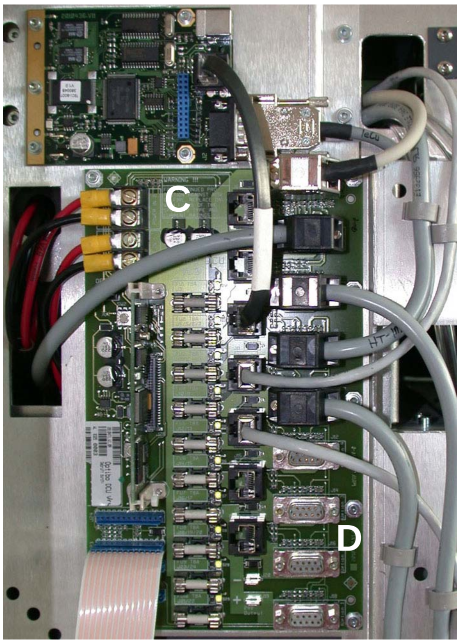


Fig. 11-6 *Optibo board*

Freedom EVO instruments are equipped with an Optibo board (C) as shown on the left. The connectors (D) to which a TEMPO can be connected are arranged as shown in the figure.

If none of the possible connectors is free you can disconnect the cable of a device that is not used while you are performing the test and/or calibration procedures with the TEMPO.

11.2.3 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
Setting the serial number	See section 7.1.3, 🗎 7-7
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Management System (see Cross References).

Tab. 11-1 *Incubator, Functions and User Permissions*

Function	Type	User	FSE	Prod a)
Set Defaults in EEPROM	Setup		X	X
Set Heating Plate Sensor Resistors b)	Setup			X
Current Limitation (MIO2 only)	Setup		X	X
Heating Calibration	Setup		X	X

Tab. 11-1 Incubator, Functions and User Permissions

Function	Type	User	FSE	Prod[a]
Heating Plate Connection Test (MIO2 only)	Test	X	X	X
Heating Validation	Test	X	X	X
Shutter Test	Test	X	X	X
Shaker Test	Test	X	X	X
Tool	Tool	X	X	X
Printing / Information	Page	X	X	X
QC-report	Report	X	X	X

a) Prod = Production department
b) Requires SnS_Production rights

Files, Directories

The Incubator panel creates the following files:

- **Result Files:** Test results are stored in *.any files.

Directory:	<data_path>\Results
File name:	Incubator_<serial_number>_<date>_<time>.any

- Test Configuration Files

Directory:	user defined
File name:	<name>.any

Log Files

Every time a calibration, validation or Heating Plate Connection Test is started, a log file is created for each of the slot, into which the values of the heating curves are written.

Saved in directory	<data_path>\Log
File names	IncubatorCalibration_Slot<slot_number>.xls IncubatorValidation_Slot<slot_number>.xls HeatingPlateConnectionTest.xls
Examples	IncubatorCalibration_Slot_3.xls IncubatorValidation_Slot_3.xls

You can open these files with Microsoft Excel or another appropriate spreadsheet program. The log files may be helpful for troubleshooting, for example if a serious failure occurs and you cannot repair it yourself. Call your nearest service organization in such a case and send them the corresponding log file(s).

***Note:** For detailed information on how to convert the data in the xls-file to a graphical representation similar to the one shown in the following figure, consult the documentation of your spreadsheet program.*

The following figure shows an example of the graphical representation of the data of one slot. There are six different curves for each slot. To archive a log file, you must save it under new names, because it will be overwritten at the next heating calibration or validation.

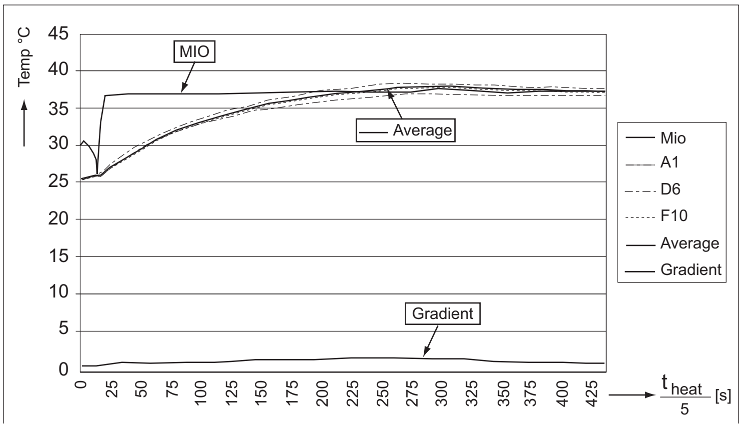


Fig. 11-7 *Example of the heating curves of one slot*

Explanation:

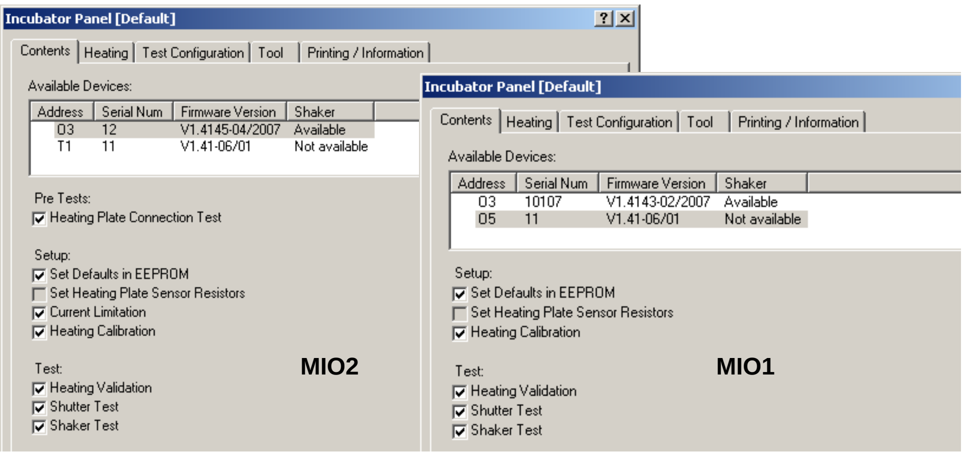
Vertical axis	Temperature in [°C]
Horizontal axis	Heating time in time units. 1 time unit = 5 [s]. To obtain the time, multiply the indicated time units by 5 [s], (e.g., 301 units correspond to 1505 [s] = 25 [min] 5 [s])
MIO	Temperature measured by the internal sensor located on the heating plate of a slot.
A1, D6 and F10	Temperatures measured by sensors A1, D6 and F10 on the TEMPO sensor plate.
Average	Average temperature T_{Av} $T_{Av} = \frac{T_{A1} + T_{D6} + T_{F10}}{3}$
Gradient	Difference between the highest and lowest temperatures T_{A1}, T_{D6} and T_{F10}.

Starting the Panel

To set up, calibrate, validate or test the heated incubator:

1 Start the panel with **Options > Incubator**. The **Incubator** panel with activated **Contents** page appears (see following figure).

*After starting the **Incubator** panel, no setup or test check box is selected and not all tabs are visible.*



Available Devices:

Address	Serial Num	Firmware Version	Shaker
03	12	V1.4145-04/2007	Available
T1	11	V1.41-06/01	Not available

Pre Tests:
☑ Heating Plate Connection Test

Setup:
☑ Set Defaults in EEPROM
☐ Set Heating Plate Sensor Resistors
☑ Current Limitation
☑ Heating Calibration

Test:
☑ Heating Validation
☑ Shutter Test
☑ Shaker Test

Available Devices:

Address	Serial Num	Firmware Version	Shaker
03	10107	V1.4143-02/2007	Available
05	11	V1.41-06/01	Not available

Setup:
☑ Set Defaults in EEPROM
☐ Set Heating Plate Sensor Resistors
☑ Heating Calibration

Test:
☑ Heating Validation
☑ Shutter Test
☑ Shaker Test

Fig. 11-8 *Incubator panel - Contents pages for MIO2 and MIO1*

2 If, after the start of the panel a message appears notifying you that a heating plate may be defective. Contact the customer service in this case.

*Before you can perform any setup or test procedure you must enter the **Serial Number** in the corresponding field in the window **Available Devices** (if not done beforehand, you will be prompted to do so when you try to start the first procedure). The serial number is printed on a label at the bottom of the incubator. For detailed information (→ Cross References).*

Pages

The **Incubator** panel is subdivided into the following pages:

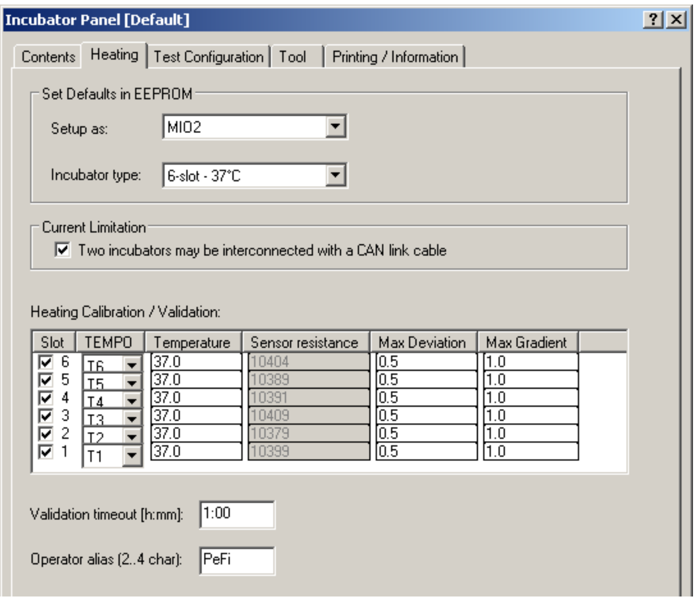
Tab. 11-2 *Pages in Safety panel*

Page	Function
Contents	General overview, device and procedure selection.
Heating	Setup of incubation parameters, calibration and validation parameters and conditions
Test Configuration	Definition of test conditions
Tool	For informal shutter and shaker tests
Printing / Information	Print selection for the QC-report

11.2.4 Heating Page

Purpose

The Heating page contains all the controls for specifying the type and other characteristics of the incubator and for setting the conditions for calibrating or validating the device.



Set Defaults in EEPROM

Setup as: MIO2

Incubator type: 6-slot - 37°C

Current Limitation

☑ Two incubators may be interconnected with a CAN link cable

Heating Calibration / Validation:

Slot	TEMPO	Temperature	Sensor resistance	Max Deviation	Max Gradient
☑ 6	T6	37.0	10404	0.5	1.0
☑ 5	T5	37.0	10389	0.5	1.0
☑ 4	T4	37.0	10391	0.5	1.0
☑ 3	T3	37.0	10409	0.5	1.0
☑ 2	T2	37.0	10379	0.5	1.0
☑ 1	T1	37.0	10399	0.5	1.0

Validation timeout [h:mm]: 1:00

Operator alias (2..4 char): PeFi

Fig. 11-9 Incubator panel - Heating page

Controls

The Heating page contains the following controls:

Setup as	List box from which the appropriate incubator model can be selected: For MIO2: – MIO1 (frozen solutions) – MIO2 For MIO1: – MIO1
Incubator Type	List box from which the appropriate incubator type can be selected (e.g., 6-slot - 46°C, 6-slot - 60°C, 4-slot - 46°C, etc.)
Current Limitation	Check box to switch on or off the current limitation by the **Current Limitation Setup** procedure (MIO2 only).
Heating Calibration / Validation	This window can be used to set up the parameters for heating calibration and validation.
- **Slot 1 to 6**	Check boxes to select the slots whose heating is to be calibrated or validated. Note: Slot 1 is at the bottom, slot 2 above slot 1, slot 3 above 2, etc.
- **TEMPO**	List boxes to select the TEMPO sensor plate to be used for calibrating / validating the incubator.

- **Temperature**	Target temperatures for the individual slots. If values are entered that differ from the indicated default values, the **Test Configuration** changes to “User defined”.
- **Sensor resistance**	Resistance in [Ohm] of the temperature sensors on the incubator’s heating plates. Please note: • The values are determined at 37 °C and written to EEPROM by the production department before the incubator is shipped. They cannot be set in the field. • The resistance values can be found on a label at the back of the incubator.
- **Max. Deviation**	Maximum permissible deviation from the average temperature T_{av} according to the following formula. $T_{av} = \frac{T_{A1} + T_{D6} + T_{F10}}{3}$ If the actual deviation exceeds the max. deviation the test will fail.
- **Max. Gradient**	Maximum permissible difference between the lowest and highest temperatures measured on the sensor plate. Also see “Gradient” below.
Validation timeout	Time within which the validation of the incubator must be concluded (otherwise the test will fail).
Operator alias	Allows you to enter a short name for identification. Note that a short form of the operator name, as shown on the **Printing / Information** page, is generated automatically and appears in the text box. Example: • Name on **Printing / Information** page: John Smith • Generated operator alias: JoSm You may alter the suggested short name if you want.

Gradient

The gradient can be determined from the temperatures measured by the three sensors arranged on the TEMPO sensor plate. The gradient corresponds to the difference between the highest and lowest temperatures measured.

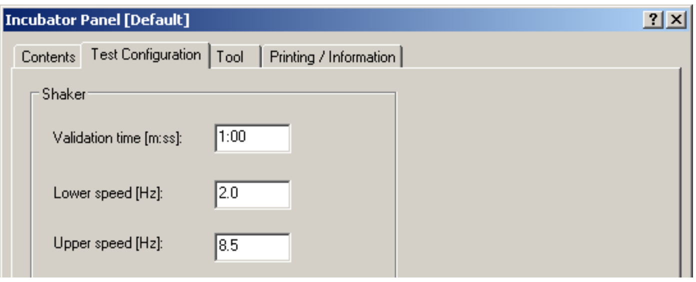
$$G = T_{max} - T_{min}$$

where:
- G = Gradient
- T_{max} = Maximum temperature measured
- T_{min} = Minimum temperature measured

11.2.5 Test Configuration Page

Purpose

This page lets you set the test conditions for the Shaker Test.



Validation time [m:ss]: 1:00

Lower speed [Hz]: 2.0

Upper speed [Hz]: 8.5

Fig. 11-10 *Incubator panel - Test Configuration page*

Controls

The **Test Configuration** page contains the following controls:

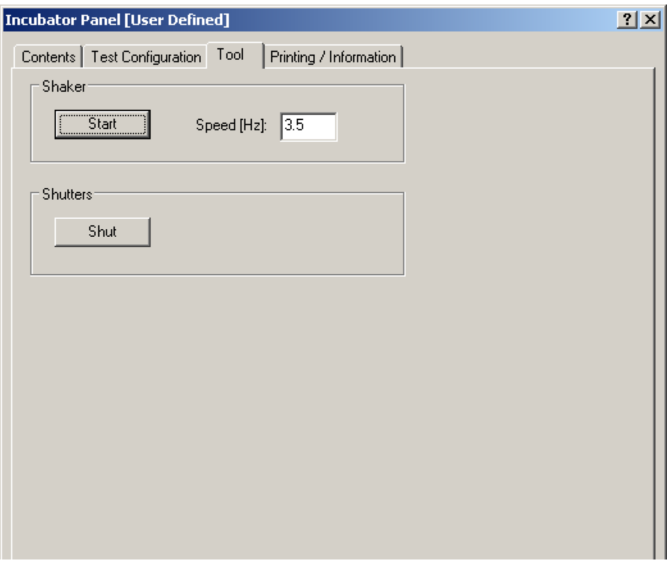
Shaker	Frame containing the controls for the shaker test
- **Validation time [min:sec]**	Text box in which the validation time can be entered. In the field the time can be set in minutes and seconds.
- **Lower speed [Hz]**	Text box for the lower shaker speed. Possible range: 1.0 to 8.5 [Hz]. Default = 2.0 [Hz].
Upper speed [Hz]	As above for the upper speed. Default = 8.5 [Hz].

Note: *This page is only available if the incubator is equipped with the (optional) shaker.*

11.2.6 Tool Page

Purpose

The **Tool** page can be used for an informal shaker or shutter test.



Speed [Hz]: 3.5

Fig. 11-11 *Incubator panel - Tool page*

Controls

The **Tool** page contains the following controls:

Shaker	Contains the controls for the shaker test. Note that these controls are only enabled if the incubator is equipped with a shaker.
- **Start / Stop**	Toggle button with which the shaker can be started and stopped. The caption of the button changes from **Start** to **Stop** and vice versa.
- **Speed [Hz]**	Text box in which the speed in [Hz] can be entered. Possible range: 1.0 to 8.5 [Hz]
Shutters	
- **Shut**	If you click this button all open shutters of the incubator are closed.

11.2.7 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

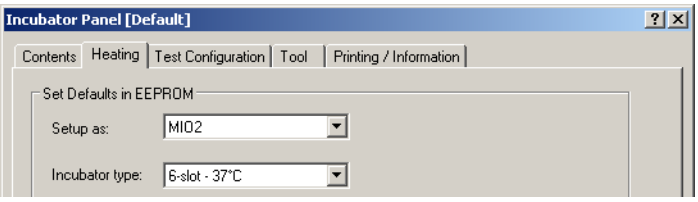
This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

***Note:** Usually, the entry of the parameters is only necessary when the incubator is taken into service for the first time.*

Procedure

To specify the incubator parameters:

1 On the Contents page, select the check box **Set Defaults in EEROM** and change to the **Heating** page.



Set Defaults in EEPROM

Setup as: MIO2

Incubator type: 6-slot - 37°C

***Fig. 11-12** Incubator parameters*

2 Select from the **Setup as** list the incubator model.

***Note:** For frozen solutions where a MIO1 is requested but you want to use a MIO2, select MIO1 (frozen solutions) in the **Setup as** list.*

3 Select the appropriate **Incubator type** from the list (number of slots and temperature).

4 Click **Start**.

The default values are written to EEPROM.

11.2.8 Set Current Limitation

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

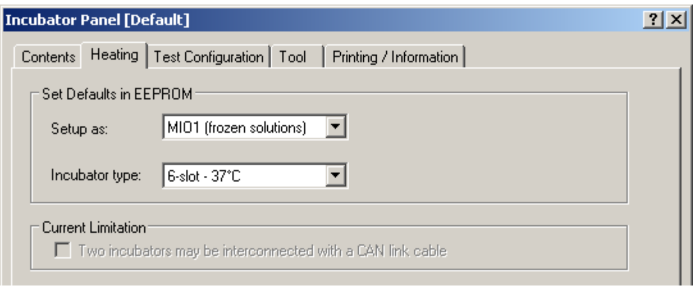
This procedure switches the **Current Limitation** on or off. If the current limitation is switched on, two incubators may be interconnected with a CAN link cable, whereas only one of them is connected to the Optibo.

ATTENTION

Fuse blown on the Optibo if two incubators are connected.

- Ensure that the current limitation is switched on when connecting two incubators on the same CAN connector of the Optibo.

***Note:** The **Current Limitation** is not available if the incubator is setup as MIO1:*



Setup as: MIO1 (frozen solutions)

Incubator type: 6-slot - 37°C

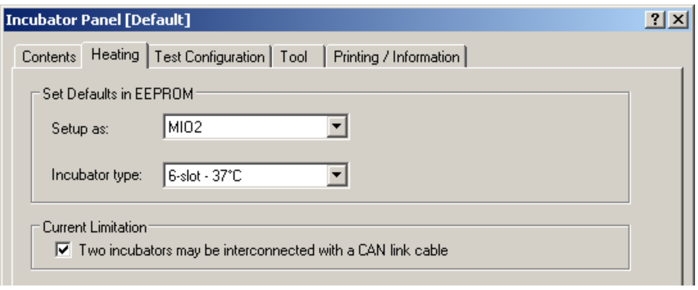
☐ Two incubators may be interconnected with a CAN link cable

***Fig. 11-13** Incubator setup as MIO1*

Procedure

To set the **Current Limitation** for MIO2 incubators:

1 On the **Contents** page, select the check box **Current Limitation** and change to the **Heating** page.



Set Defaults in EEPROM

Setup as: MIO2

Incubator type: 6-slot - 37°C

Current Limitation

☑ Two incubators may be interconnected with a CAN link cable

Fig. 11-14 *Current Limitation check box*

2 Select the **Current Limitation** check box (Two incubators may be interconnected with a CAN link cable) if you want to switch the current limitation on. Deselect the check box if you want to switch the current limitation off.

3 Go back to the **Contents** page and click **Start**.

The Current Limitation setting will be written to the EEPROM.

11.2.9 Heating Calibration

Cross References

List of cross references to information provided in other sections:

Information	References
TEMPO tool	See section 11.2.2, 🗎 11-4

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Note: *Only MIO2 60 °C incubators can be calibrated in the field.*

Purpose

This procedure allows you to calibrate the heated incubator to ensure that it works properly at the expected temperatures.

Tool

To carry out the calibration procedure you need a TEMPO tool. Ideally, you should use a TEMPO tool to which as many temperature sensor plates can be connected as the incubator has slots.

ATTENTION

Calibration errors possible if the TEMPO tool itself is not calibrated correctly.

- Ensure you have the TEMPO recalibrated once per year.
- Contact your the customer service when a recalibration is due so that the TEMPO can be returned for recalibration.

***Note:** The following procedure describes the steps to be followed in the field. It is assumed that the incubator is already installed on the instrument.*

Calibration Procedure

To calibrate the heated incubator:

1 Install the TEMPO tool as described in (→ Cross References).

2 Select the following on the **Contents** page:

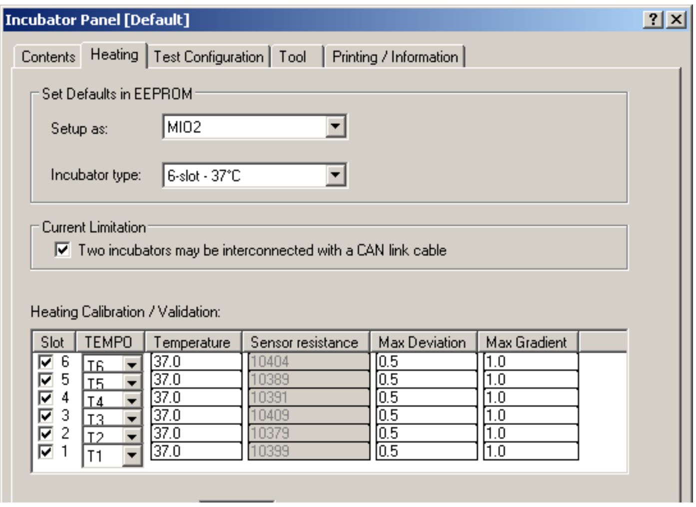
- To perform the calibration select the **Heating Calibration** check box.
- If you want to validate the heated incubator after the calibration, then select the check box **Heating Validation** as well.

Validating the heated incubator immediately after calibrating has the advantage that the incubator does not need to be heated up again (it is already heated up from the calibration).

3 Change to the **Heating** page (see following figure).

4 Make the following selections for each slot in the window **Calibration / Validation** as necessary or accept the suggested settings:

- Select the **Slot** check boxes of those slots you want to calibrate (and possibly validate).
- Select the **TEMPO** sensor plates (T1 to T6) you want to use for the individual slots (only necessary if you use a single slot TEMPO or if you do not have enough sensor plates at your disposal).
- **Temperature**: Usually you can accept the suggested values. If you set a target temperature that differs from the default temperature as set with **Incubator Type**:
  - The difference to the temperatures of the neighboring slots may not exceed 8 °C.
  - The temperature of the slot below must be equal or lower.



Set Defaults in EEPROM

Setup as: MIO2

Incubator type: 6-slot - 37°C

Current Limitation

☑ Two incubators may be interconnected with a CAN link cable

Heating Calibration / Validation:

Slot	TEMPO	Temperature	Sensor resistance	Max Deviation	Max Gradient
☑ 6	T6	37.0	10404	0.5	1.0
☑ 5	T5	37.0	10389	0.5	1.0
☑ 4	T4	37.0	10391	0.5	1.0
☑ 3	T3	37.0	10409	0.5	1.0
☑ 2	T2	37.0	10379	0.5	1.0
☑ 1	T1	37.0	10399	0.5	1.0

***Fig. 11-15** Heating page*

5 If you want to perform a **Heating Validation** afterwards, set the **Max. Deviation**, **Max. Gradient**, **Validation Timeout** and the **Operator alias** or accept the suggested values. For details see procedure **Heating Validation** (see Cross References).

6 Click **Start** to begin.

The selected slots of the incubator are heated up until the target temperature is reached and is stable (internal time-out = 75 minutes). The correction values found are written to EEPROM. The calibration results can be viewed on the ***Printing / Information*** *page.*

11.2.10 Heating Plate Connection Test

Purpose

This procedure checks if all heating plates are connected correctly to the electronics by heating up all three heating areas of each heating plate sequentially and measuring the temperature increase in A/D converter steps.

Note: *It is recommended to do this test before any other setup or test, to make sure that the heating plates basically are working correctly. For this reason the* ***Heating Plate Connection Test*** *is placed on the* ***Contents*** *page on top of the list of procedures.*

ATTENTION

Wrong measuring results and test “failed” if the heating plates were not at room temperature.

- Make sure that the heating plates are on room temperature before starting the ***Heating Plate Connection Test***.

Procedure

To test the heating plate connections:

1. Select **Heating Plate Connection Test** on the **Contents** page.
2. Click **Start** to run the test.

Note: *There are no test configurations available / necessary.*

Pass/Fail Criteria

The test is passed if the following is true:

- All three heating areas of each heating plate show after heating up a temperature increase equal or higher than a defined value (in A/D converter steps). For details refer to:
  - QC report (see 11.2.14 “Printing / Information”, 🗎 11-24)
  - log file HeatingPlateConnectionTest.xls (see “Log Files”, 🗎 11-8)

If the Test Fails

Try the following:

- Replace the incubator

11.2.11 Heating Validation

Cross References

List of cross references to information provided in other sections:

Information	References
TEMPO tool	See section 11.2.2, 🗎 11-4

Purpose

This procedure allows you to validate the heated incubator to check whether it works properly at the expected temperatures.

Note: *Only MIO2 60 °C incubators can be calibrated in the field.*

Tool

To carry out the validation procedure you need a TEMPO tool. Ideally, you should use a TEMPO tool to which as many temperature sensor plates can be connected as the incubator has slots.

ATTENTION

Validation errors possible if the TEMPO tool itself is not calibrated correctly.

- Ensure you have the TEMPO recalibrated once per year.
- Contact the customer service when a recalibration is due so that the TEMPO can be returned for recalibration.

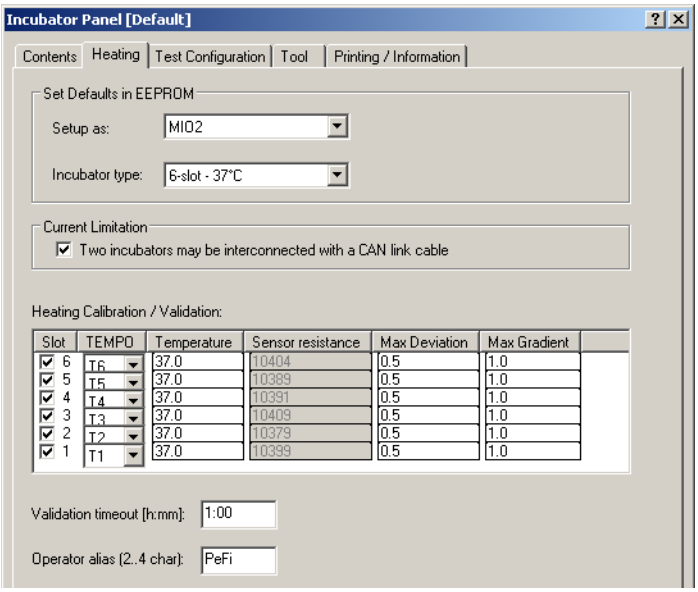
Note: *The following procedure describes the steps to be followed in the field. It is assumed that the incubator is already installed on the instrument.*

Validation Procedure

Note: *The heated incubator may be calibrated immediately before it is validated. In this case it is already heated up and can be validated more quickly.*

To validate the heated incubator:

1. If not done yet, install the TEMPO tool (see Cross References).
2. If not done yet, select the check box **Heating Validation** on the **Contents** page.
3. Change to the **Heating** page (see following figure). Check and, if necessary, alter the following parameters:
   - Make the following selections for each slot in the window **Calibration / Validation** as necessary or accept the suggested settings:
     - Select the **Slot** check boxes of those slots you want to validate. **Note**: The validation date in the incubator is only set if all slots are validated in one run.
     - Select the **TEMPO** sensor plates (T1 to T6) you want to use for the individual slots (only necessary if you use a single slot TEMPO or if you do not have enough sensor plates at your disposal).
     - **Temperature**: Usually you can accept the suggest values.
     - **Max. Deviation** and **Max Gradient**. Usually you can accept the suggested values. Alter them only in special cases. **Note**: If you set values that differ from the suggested default values, the **Test Configuration** changes to “User defined”.



Set Defaults in EEPROM

Setup as: MIO2

Incubator type: 6-slot - 37°C

Current Limitation

☑ Two incubators may be interconnected with a CAN link cable

Heating Calibration / Validation:

Slot	TEMPO	Temperature	Sensor resistance	Max Deviation	Max Gradient
☑ 6	T6	37.0	10404	0.5	1.0
☑ 5	T5	37.0	10389	0.5	1.0
☑ 4	T4	37.0	10391	0.5	1.0
☑ 3	T3	37.0	10409	0.5	1.0
☑ 2	T2	37.0	10379	0.5	1.0
☑ 1	T1	37.0	10399	0.5	1.0

Validation timeout [h:mm]: 1:00

Operator alias (2..4 char): PeFi

Fig. 11-16 *Heating page*

- Accept the suggested **Validation timeout time** or set an appropriate value (only recommended in special cases). Note: If you set a value that differs from the suggested default value, the indicated type changes to “User defined”.
- Enter your short name in the text box **Operator alias** or accept the suggested short name.

4 Click **Start** to begin.

If necessary the slots are heated up (or the heating is turned off to let them cool down) until the target temperature is reached and remains stable. Once the temperature is stable or the timeout has expired, the deviation and the gradient are checked against their tolerance limits.

Test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the following is true for all validated slots:

- Final validation criteria:
  - **Deviation** from target temperature ≤ **Max. Deviation**
  - **Gradient** ≤ **Max. Gradient** (Gradient = difference between highest and lowest temperatures in slot as measured by sensors A_1, D_6 and F_{10}).
  - Note: The final validation takes place at the end of the validation time. The respective criteria must be fulfilled for 2 minutes.
- Early validation criteria. The software may consider the test as passed before the general validation criteria are met. It is also passed if the following conditions are fulfilled:
  - $T_{min} \leq T_{ex} \leq T_{max}$ (T_{ex} = Average temperature extrapolated to **Validation Timeout**).
  - **Deviation** ≤ 80% of **Max. Deviation.**
  - **Gradient** ≤ 80% of **Max. Gradient**.

Example of an Early Validation

The following diagram illustrates how an early validation works at 37 °C.

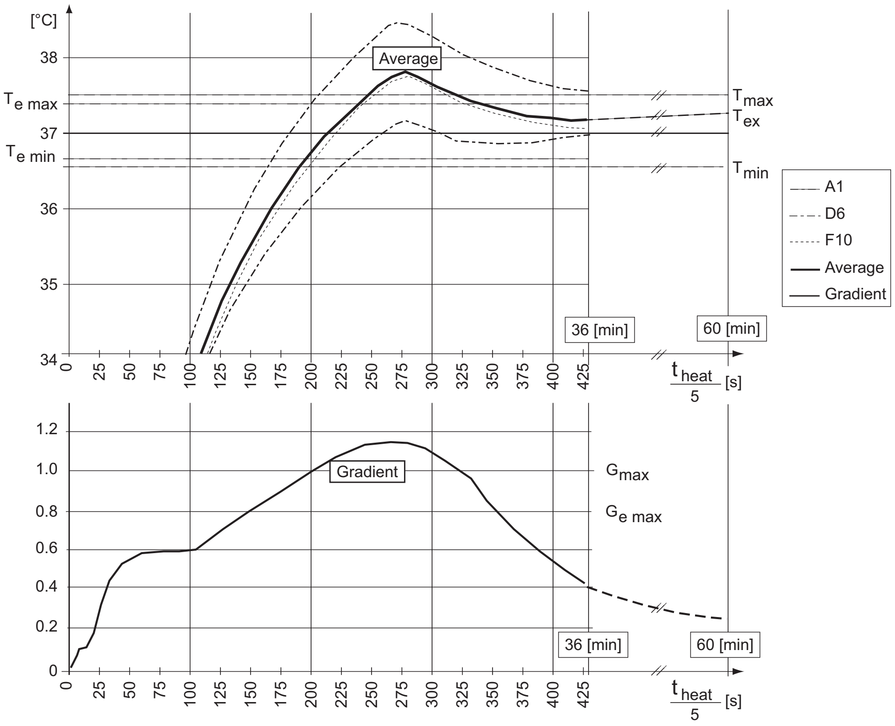


Fig. 11-17 *Heating validation, pass/fail criteria*

Tab. 11-3 *Example of an early validation of an incubator*

Calculation of temperature and gradient	Explanation
T_T = 37 °C	Target temperature
$T_{av} = (T_{A1} + T_{D6} + T_{F10}) / 3$	Average temperature
T_{ex}	Extrapolated average temperature
T_{Dev} = 0.5 °C	Maximum permissible deviation from T_T
$T_{max} = T_T + T_{Dev}$ = 37°C + 0.5°C = 37.5°C	Maximum permissible temperature.
$T_{min} = T_T - T_{Dev}$ = 37°C - 0.5°C = 36.5°C	Minimum permissible temperature
G_{max} = 1 °C	Maximum permissible gradient
$T_{e\ max}$ = 37°C + 0.8 x 0.5°C = 37.4°C	Maximum temperature for early validation
$T_{e\ min}$ = 37°C - 0.8 x 0.5°C = 36.6°C	Minimum temperature for early validation
$G_{e\ max} = 0.8 \times G_{max}$ = 0.8 x 1°C = 0.8°C	Maximum gradient for early validation
a) $T_{e\ min} \le T_{av} \le T_{e\ max}$	Pass / fail criteria. The validation is passed if the criteria a) and b) and c) are fulfilled.
b) $G \le G_{e\ max}$	
c) T_T - 0.5°C $\le T_{ex} \le T_T$ + 0.5°C	

Explanation

In the example according to Fig. 11-17 , 🗎 11-21 the incubator could be used before the **Max. Timeout** (in our case 60 minutes) has elapsed, because the following conditions are already fulfilled after 36 minutes:

- Gradient $G \leq G_{e\ max}$, where $G_{e\ max} = 0.8 \times G_{max}$
- Average temperature T_{av}: $T_{e\ min} \leq T_{av} \leq T_{e\ max}$, where $T_{e\ min} = 0.8 \times T_{min}$ and $T_{e\ max} = 0.8 \times T_{max}$.
- The extrapolated average temperature T_{ex} (= value the average temperature is likely to have after **Max. Timeout**, in our case after 60 minutes) is still between T_{min} and T_{max}. Note that T_{ex} is not a measured value, but is calculated considering the value and inclination of the T_{av} curve when the criteria for early validation are fulfilled (in our case after 36 minutes).

***Note:** The time after which the incubator is ready is shown in the QC-report under **Detailed Results**, in column **Ready**.*

If the Test Fails

Try the following:

- Repeat the calibration procedure (or have it repeated by an authorized person).
- Repeat the validation procedure.
- If the test fails only for one or two slots:
  - Repeat the calibration/validation.
  - Replace the whole incubator.

11.2.12 Shutter Test

Purpose

This procedure lets you check whether the shutters of the incubator can be opened and closed properly.

Procedure

To test the correct function of the shutters:

1. On the Contents page, select the **Shutter Test** check box and click **OK** to start the test.

   You will be guided through the test by a series of process prompts.

2. Follow the instructions provided on the prompts:
   - Open all shutters by pushing them inwards. Ensure that there are no objects in the slots that could prevent the shutters from being closed. Click **OK** on the prompt when done.
   - Confirm that the shutters are open. Click **OK** if in order.
   - All shutters should now close automatically.
   - Visually check whether all of them close properly. Confirm with **OK** if in order.

3. Next you are prompted to repeat the previous step 2. Again follow the instructions provided on the prompts.

   *After you have confirmed that the shutters work correctly a **Shutter Test Passed** message appears*

Pass / Fail Criteria

The test is passed if the shutters can be opened and closed properly as described above.

If the Test Fails

Contact the customer service department.

11.2.13 Shaker Test

Purpose

This procedure allows you to check the correct function of the shaker.

Note: *This procedure cannot be started if the incubator is not equipped with a shaker.*

Test Principle

During the test, the incubator is moved back and forth at two predefined speeds (10 [s] at the lower speed, then 10 [s] at the upper speed, then again 10 [s] at the lower speed, etc.) until the defined validation time has expired.

Note:

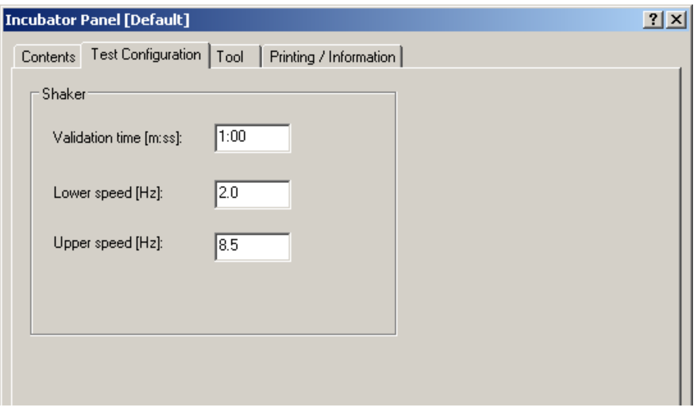
- *If the firmware version MIO 1.40 or later is used, the shaker movement is automatically checked by means of a sensor.*
- *If an earlier firmware version is used, the shaker movement is not checked automatically.*

Procedure

To test the shaker:

1 Remove all objects (microplates) from the incubator slots. All slots must be empty for the test.

2 On the **Contents** page, select the **Shaker Test** check box and change to the **Test Configuration** page.



Validation time [m:ss]: 1:00

Lower speed [Hz]: 2.0

Upper speed [Hz]: 8.5

Fig. 11-18 *Heated Incubator - Test Configuration page*

3 Set the following parameters or accept the suggested default values:
- – **Validation time** in minutes and seconds.
- – **Lower speed**. Possible range: 1.0 to 8.5 [Hz]. Default = 2.0 [Hz].
- – **Upper speed**. Possible range: 1.0 to 8.5 [Hz]. Default = 8.5 [Hz].

4 Click **OK** to start the test.

You will be guided through the test by a series of process prompts.

5 Follow the instructions provided on the prompts:
- – First remove all objects from the incubator’s slots and open all shutters.
- – Click **Next** when done. The shaker is started.
- – Observe the shaker during the test. The shutters must remain closed and must not clatter. Moreover, the incubator must sound normal for the whole test (no noise that reminds of loose parts should be audible).
- – When the test is over answer the questions on the prompts that appear:

- Did the shutters remain firmly closed for the whole test? Confirm with **OK** if in order (**Cancel** otherwise).
- Did the incubator sound “normal” during the test (no noise that reminded of loose parts)?. Confirm with **OK** if in order (**Cancel** otherwise).

Pass / Fail Criteria

Note: *Firmware version:*

- *If the firmware version MIO 1.40 or later is used a pass/fail message is created automatically as the shaker movement is checked by means of a sensor.*
- *If an earlier version of the firmware is used, the shaker movement is not checked automatically. You must judge visually whether the incubator is shaken properly.*

The test is passed if the following was true for the whole test:

- The incubator was shaken properly (at the upper and lower speed).
- The shutters remained closed and did not clatter.
- No “abnormal” or strange sounds were audible that reminded of loose parts.

If the Test Fails

Contact the customer service department.

11.2.14 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

11.3 Incubation Device

11.3.1 Introduction

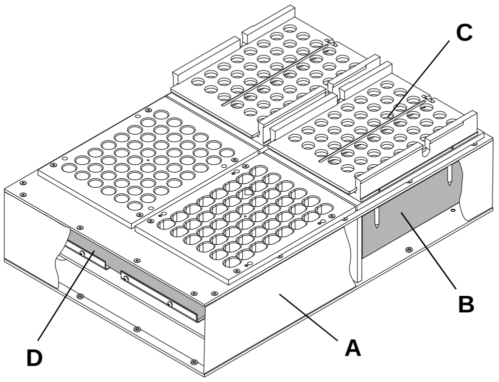
Cross References

List of cross references to information provided in other sections:

Information	References
Program Installation	See section 4.2, 🗎 4-2

Description

The name Incubation Device designates a sub-assembly consisting of a heating block and a printed control circuit that can be incorporated in OEM products. These subsystems are used in sample preparation for NAT (nucleic acid testing) and combine the features of a magnetic separator (similar to Te-MagS) and a heated incubator.



A	*Subsystem*
B	*Heating block*
C	*Carrier cover*
D	*Control circuit*

Fig. 11-19 *Incubation device incorporated in 1ml subsystem (Abbott)*

Note:

- *The Incubation Device panel can only be activated if the “Incubation Device” check box was selected during the program installation (→ Cross References).*
- *One 1ml or 15ml subsystem contains two independent Incubation Devices and magnetic separators.*
- *This section deals only with the Incubation Device part of the aforementioned subsystens, i.e. with the heating block and the associated control circuit.*

Heating Block

The heating blocks (B) are located in the rear part of the subsystem below the carriers. Their function corresponds to that of the Te-MagS and Te-Shake heating blocks. The procedures for calibration, burn-in and validation are practically the same as those for Te-MagS and Te-Shake.

Control Circuit

The control circuits (D) are located near the front of the subsystem. The type is the same as that for Te-MagS (2-PR-MAGS CC-V1.1A-A).

Note: *In order that the software can distinguish an Incubation Device from a Te-MagS a special plug must be inserted in the 9-pole connector of the control circuit. See corresponding Service Manual for details.*

Incubation Device Files

The Incubation Device function can create the following files:

- **Result Files:** Test results are stored in *.any files.

Directory:	<data_path>\Results
File name:	IncubationDevice_<serial_number>_<date>_<time>.any

- **Log Files:** Every time a heating block is used (e.g. a calibrate heating block by TEMPO110, burn-in of heating or heating validation with TEMPO110 procedure is started), a log file is created into which the values for the heating curves are written. You can open it in Microsoft Excel or in another appropriate spreadsheet program.

Directory:	<data_path>\Log
File name:	IncubationDeviceTemperatures.xls

***Note:** To archive the curve, save the log file under a new name, since the file will be overwritten after starting a further procedure with **Start**.*

- **Plate Files:** The file for Tecan plates is copied to disk and installed with the installation of the software. For customized plates, an own file is generated when the plates are created and the “Apply” button is clicked.

Directory:	<data_path>\Modules
File names:	IncubationDeviceTecanPlates.any for Tecan plates IncubationDeviceCustomPlates.any for customized plates

***Note:** Before installing a new version of the software, save the IncubationDeviceCustomPlates.any file to a different directory. Thus you can reload it later to the <data_path>\Config directory and use it again.*

11.3.2 Incubation Device Panel

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User administration system	See section 6.5, 🗎 6-3

Note:

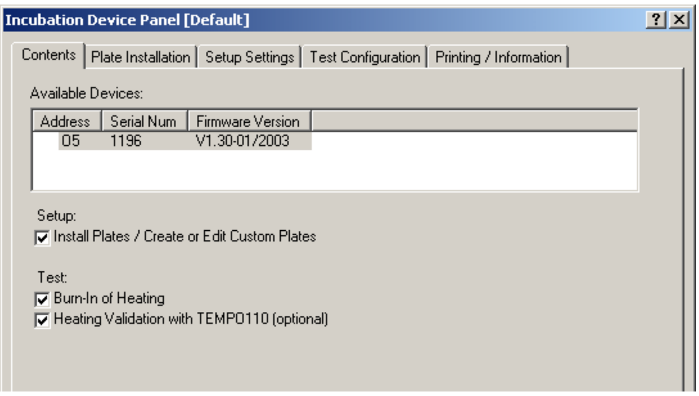
Tab. 11-4 Incubation Device Functions and User Permissions

Function	Type	User	FSE
Install Plates/Create or Edit Custom Plates	Setup	X	X
- Install Tecan and customized plates	Setup	X	X
- Remove Tecan and customized plates	Setup	X	X
- Delete customized plates	Setup		X
- Calibrate heating block with manufacturer parameters	Setup	X	X
- Calibrate heating block with TEMPO110	Setup		X
- Create customized plates	Setup		X
Burn-In of Heating	Test	X	X
Heating Validation with TEMPO110	Test	X	X
Printing / Information page	Page	X	X
QC-report	Report	X	X

Starting the Panel

1 Start the panel with **Options > Incubation Device**. The **Incubation Device** panel with activated **Contents** page appears. After starting the **Incubation Device** panel, no setup or test check box is selected and not all tabs are visible.

Contents Page



Available Devices:

Address	Serial Num	Firmware Version
05	1196	V1.30-01/2003

Setup:
☑ Install Plates / Create or Edit Custom Plates

Test:
☑ Burn-In of Heating
☑ Heating Validation with TEMPO110 (optional)

Fig. 11-20 Incubation Device panel - Contents page

Pages

Tab. 11-5 Pages of Incubation Device panel

Pages	Function
Contents	General overview, procedure selection.

Tab. 11-5 Pages of Incubation Device panel

Pages	Function
Plate Installation	Plate installation and heating block calibration data.
Setup Settings	Plate configuration data and mechanical setup.
Test Configuration	Configuration of the test procedures to be performed.
Printing	Print selection for the QC-report

11.3.3 Unknown Plate Found

Cross References

List of cross references to information provided in other sections:

Information	References
Unknown plate	See section 11.4.3, 🗎 11-36

11.3.4 Setup: Install Plates / Create or Edit Custom Plates

Cross References

List of cross references to information provided in other sections:

Actions	References
Install Tecan or customized plates [a]	See section 11.4.4, 🗎 11-37
Remove Tecan or customized plates [a]	See section 11.4.5, 🗎 11-40
Delete customized plates	See section 11.4.6, 🗎 11-40
Calibrate heating block with manufacturer parameters [a]	See section 11.4.4, 🗎 11-37
Calibrate heating block with TEMPO110	See section 11.4.7, 🗎 11-41
Create customized plates	See section 11.3.5, 🗎 11-28

a) These procedures do not require the field service engineer password.

Purpose

The **Install Plates/Create or Edit Custom Plates** procedure lets you carry out the actions listed in the cross-reference table above.

11.3.5 Create Customized Plates

Cross References

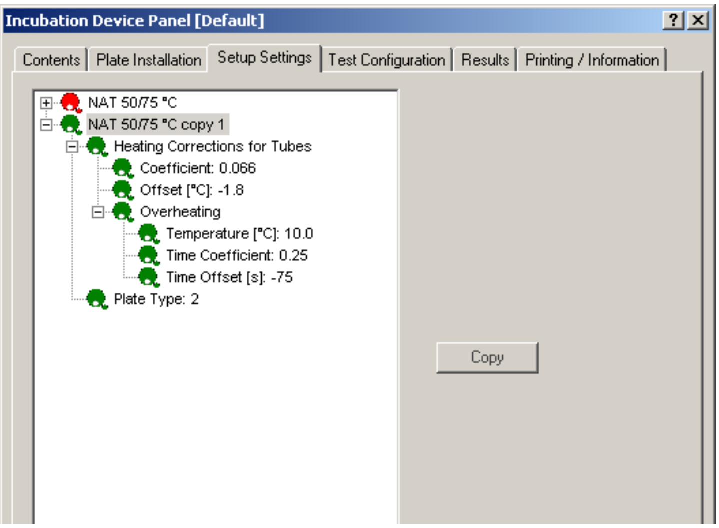
List of cross references to information provided in other sections:

Information	References
Heating corrections	See section 11.4.8, 🗎 11-43
Evaluation of overheating	See section 11.4.9, 🗎 11-44

Procedure

To create custom plates:

1 On the **Contents** page, select the **Install Plates/Create or Edit Custom Plates** check box and change to the **Setup Settings** page.



- NAT 50/75 °C
- NAT 50/75 °C copy 1
  - Heating Corrections for Tubes
    - Coefficient: 0.066
    - Offset [°C]: -1.8
    - Overheating
      - Temperature [°C]: 10.0
      - Time Coefficient: 0.25
      - Time Offset [s]: -75
  - Plate Type: 2

Fig. 11-21 *Incubation Device - Setup Settings*

2 Select an existing plate (reference plate).

3 Click **Copy**. A new plate appears in the list. It is marked in green, and its name is: **<original_name> copy <number>**.

4 Select the copied plate, and click it again to rename it.

5 If required, select the **Plate Type** entry to change its type number.

Heating Corrections

See (→ Cross References).

Evaluation of Overheating

See (→ Cross References).

11.3.6 Burn-In/Validation of Heating

Cross References

List of cross references to information provided in other sections:

Information	References
Burn-in of heating	See section 11.4.10, 🗎 11-45
Heating validation with TEMPO110	See Section 11.4.11, 🗎 11-46

Note: *Since the procedures to be followed also apply to other devices they are described in separate sections (→ Cross References).*

11.3.7 Printing / Information0x03120204

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2, 🗎 5-13

11.4 Heating Blocks

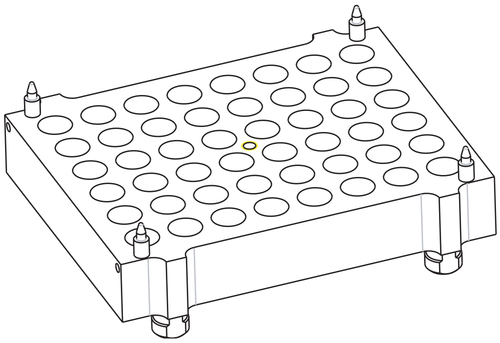
11.4.1 Heating Blocks and Plates

Heating Blocks

Purpose

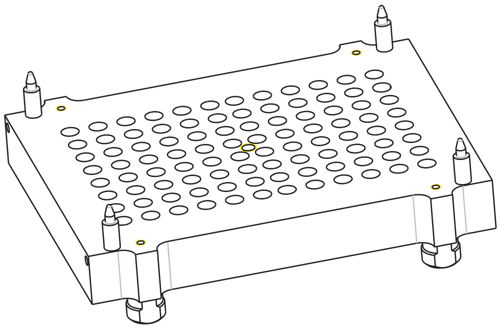
In clinical diagnostics and pharmaceutical research it is often necessary to heat up samples or to keep them at a constant temperature before they can be analyzed. This is accomplished by special heating blocks that are part of devices used for sample preparation.

Heating Block Types



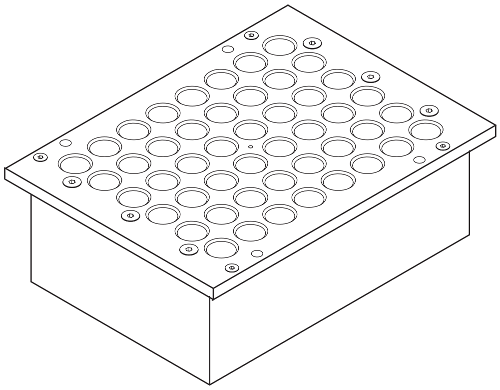
Heating block Eppendorf

- 48 holes
- Used for: Te-MagS, Te-Shake



Heating block PCR (polymerase chain reaction)

- 96 holes
- Used for :Te-MagS, Te-Shake



Heating block for Incubation Device

- 48 holes
- Used for Incubation Device (e.g., incorporated in 1ml or 15 ml subsystem (Abbott))

Fig. 11-22 *Heating blocks*

Tecan and Customized Plates

What Is a Plate?

From the point of view of the software, a plate is a set of data items describing a heating block and, (if present) its magnet block. Depending on the selected panel page, a context-specific view of this data set with the relevant data items is displayed in a tree structure (example see following figure):

- The root entry for a plate contains the name of the plate.
- Each plate is determined by its type and several parameters (leaves), which can be combined within one or more data sets (nodes and sub-nodes).
- The tree can be expanded or collapsed.
- There are two different types of plate:
  - Tecan plates (marked red) show the data defined by Tecan. Apart from the plate type and calibration parameters all items are read-only.
  - Customized plates (marked green) are copies of Tecan plates or of other customized plates. All parameters of customized plates can be modified.

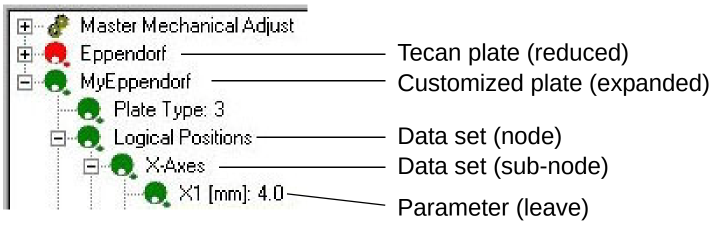


Fig. 11-23 Plates tree view

Plates in Tecan Options

The following table shows which Tecan options are (or can be) equipped with such heating plates:

Tab. 11-6 Plates in Tecan options

Device name	Used for	Heating block type	Heating optional	Details see
Te-MagS	Magnetic bead separation	PCR[a], Eppendorf	no	11.6, 🗎 11-58
Te-Shake	Orbital shaker	PCR[a], Eppendorf	yes	11.7, 🗎 11-70

a) PCR = Polymerase Chain Reaction

Procedures

The plates used in the above options have similar properties and the procedures for installing, creating, editing and deleting customized plates are almost identical. Likewise, the procedures to be followed for burning-in/validation, calibration and heating corrections of the heating blocks are also practically the same. For this reason, the respective procedures are described separately in this section. They are listed in the following table.

Tab. 11-7 Procedures applicable to all heating plates

Topics	Procedure	Details see
Installation/removal of plates	Unknown plate found	11.4.3, 🗎 11-36
	Install Tecan or customized plates	11.4.4, 🗎 11-37
	Remove Tecan or customized plates	11.4.5, 🗎 11-40
	Delete customized plates	11.4.6, 🗎 11-40
Heating calibration/ burn-in/validation/ correction	Heating block calibration with TEMPO110	11.4.7, 🗎 11-41
	Heating corrections	11.4.8, 🗎 11-43
	Burn-in of heating	11.4.10, 🗎 11-45
	Heating validation with TEMPO110	11.4.11, 🗎 11-46

***Note:** In the following procedures the screens of the Te-MagS are shown. Note that the corresponding screens that appear when you run the procedures for a Te-Shake or an Incubation Device look slightly different:*

- *The title bar shows the name of the option for which the procedure is performed (Te-MagS, Te-Shake or Incubation Device).*
- *Plate names shown on the screens may be different (particularly those of customized plates).*

Required Tools

For the calibration of the heating plates with TEMPO (temperature option) a special temperature gauge, TEMPO110, is needed. For the installation see the above table.

11.4.2 TEMPO110

Description

What Is a TEMPO110?

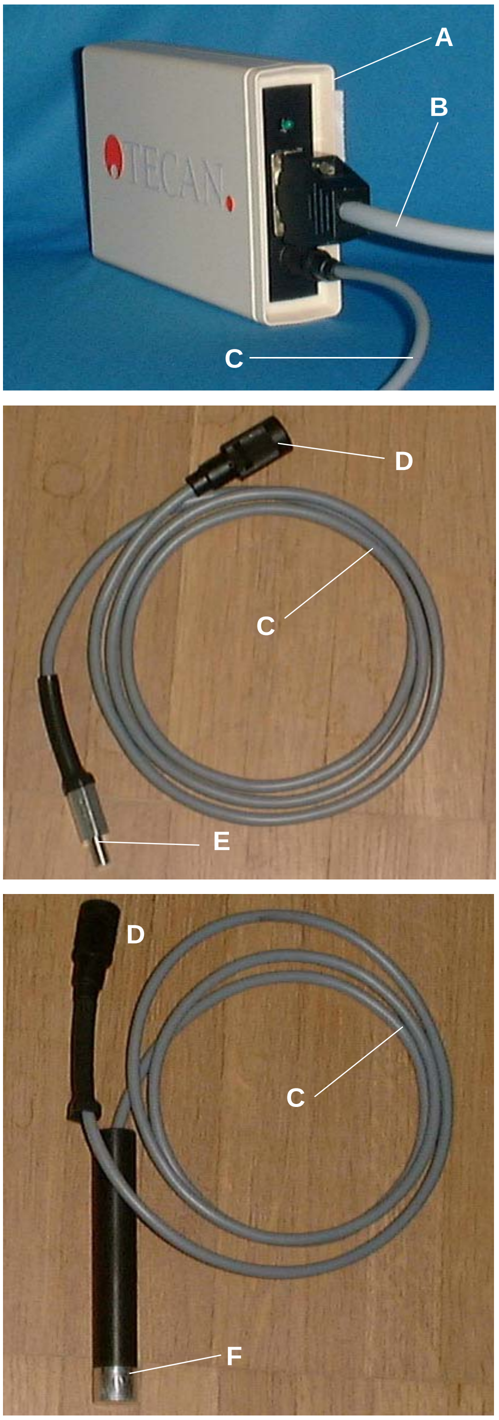
Tempo110 is a temperature gauge that serves for calibrating and checking the heating blocks incorporated in options like Te-MagS, Te-Shake and the Incubation Device.

A special temperature sensor that is connected to the Tempo110 is applied to the heating block and measures its temperature. Tempo110 converts the output signal of the sensor to a digital value that is transmitted over the CAN-bus cable to the instrument and the computer.

There are two types of temperature sensors as shown in the following figures.

***Note:** The Tempo110 has no display of its own. The temperature is displayed by the software on the screen of the computer.*

Parts of TEMPO110



A	*Tempo110, basic unit*
B	*CAN-bus cable*
C	*Sensor cable*

C	*Sensor cable*
D	*Connector to Tempo110*
E	*Sensor, can be screwed to Eppendorf and PCR heating block*

C	*Sensor cable*
D	*Connector to Tempo110*
F	*Sensor, can be inserted into heating block of Incubation Device*

Fig. 11-24 *Tempo110 and temperature sensors*

Connect TEMPO

Before the TEMPO tool can be used it must be connected to the CAN-bus. One possibility is to connect it to one of the CAN-bus connectors on the right side of the Optibo board.

Note: *The Optibo board is located behind the left access door of the instrument.*

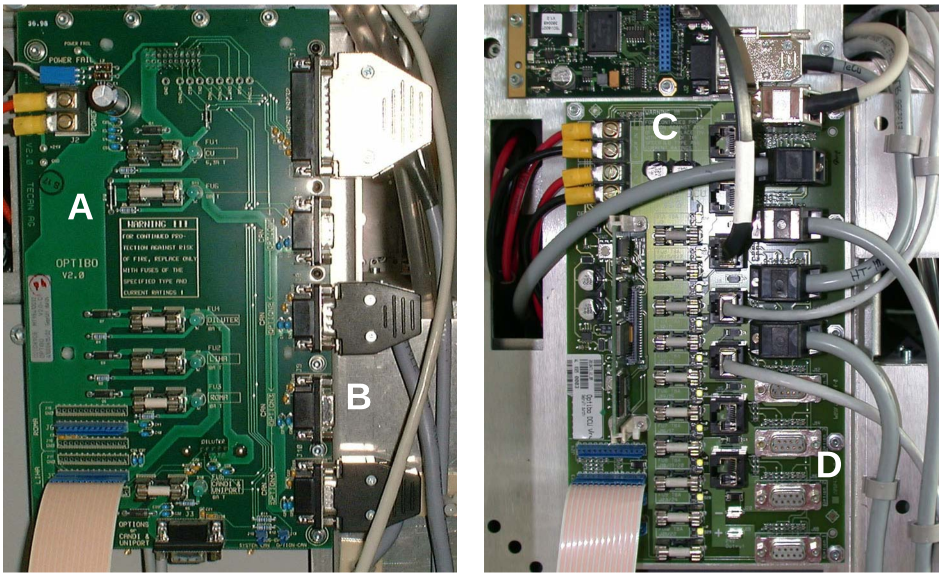


Fig. 11-25 *Optibo boards versions*

A	*Genesis Optibo*
B	*Connector on right side*
C	*Optibo DCU (Freedom EVO)*
D	*Connectors on right side*

The above figure shows two versions of the Optibo board.

- Genesis Classic and Freedom instruments are equipped with Optibo boards that are identical with or similar to the board (A) on the left side. The connectors (B) to which a TEMPO can be connected are arranged as shown on the left photo.
- Freedom EVO instruments are equipped with an Optibo board (C) as shown on the right side. The connectors (D) to which a TEMPO can be connected are arranged as shown on the right photo.

If none of the possible connectors is free you can disconnect the cable of a device that is not used while you are performing the test and/or calibration procedures with the TEMPO.

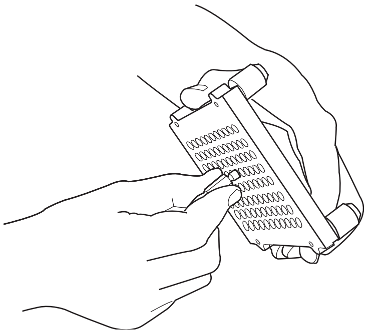
Installing the Temperature Sensor

The procedure to be followed depends on the type of heating plate.

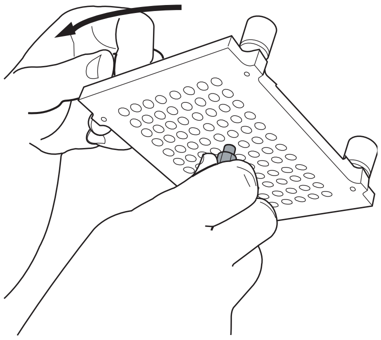
Te-MagS and Te-Shake

To install the temperature sensor:

1. Disconnect the heating block from the corresponding device, remove it and screw the sensor to the block as described below.
2. Reinstall and reconnect the heating block when done.



Recommendation: Hold the plate upside down and set the sensor to the threaded center hole of the plate.

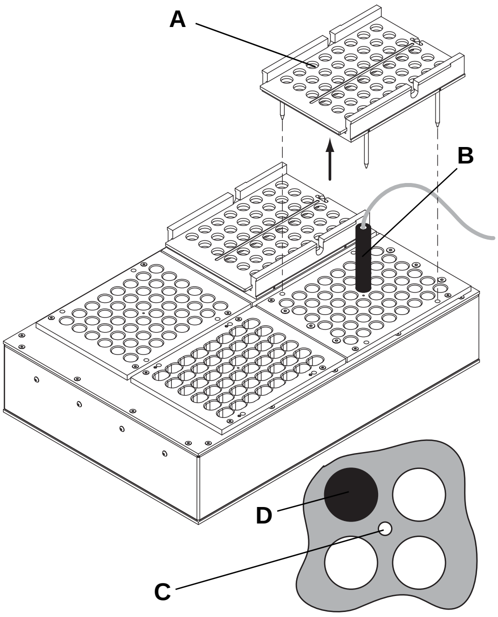


Hold the plate by one of its feet and screw it around the sensor down to the stop position.

Fig. 11-26 *Installation for Te-MagS and Te-Shake*

Incubation Device

Note: *The Incubation Device requires a different type of temperature sensor.*



A	*Carrier cover*
B	*Tempo110 sensor*
C	*Center hole*
D	*Insert sensor here*

1. Remove the carrier cover (A).
2. Connect the sensor to the Tempo110.
3. Insert the sensor into the left/rear hole (D) next to the center (C) of the carrier.
4. Carefully push the sensor down until it touches the surface of the heating block.

Fig. 11-27 *Installation for Incubation Device*

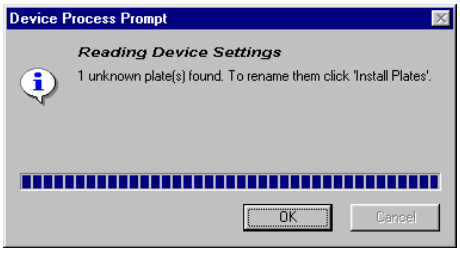
11.4.3 Unknown Plate Found

Unknown Plates

It is possible that the information about customized plates stored in EEPROM differs from the information stored in the computer's database. Plate information is compared when the panel is started. If during this comparison process no matching plates can be found in the database, the respective plates are labeled **unknown**, and you are prompted to rename them.

Procedure

1. If an unknown plate (not existing in the database) is found during startup, the **Unknown plate found** message appears.

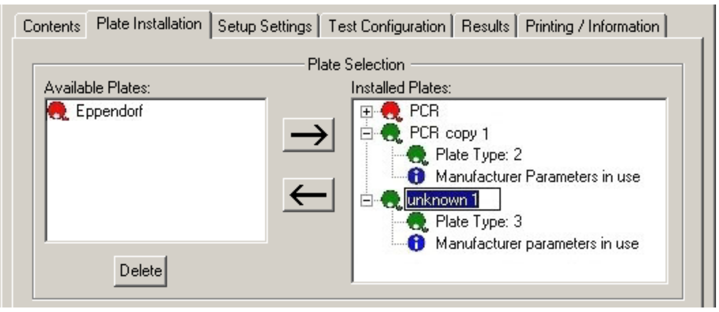


Reading Device Settings

1 unknown plate(s) found. To rename them click 'Install Plates'.

Fig. 11-28 *Unknown plate found*

2. Confirm with **OK**.
3. On the **Plate Installation** page of the respective option, slowly click twice on the plate name **unknown**.
4. Rename the plate (in-place-edit).
5. Click **Apply** to store the plate in the database.



Available Plates:
- Eppendorf

Installed Plates:
- PCR
- PCR copy 1
  - Plate Type: 2
  - Manufacturer Parameters in use
- unknown 1
  - Plate Type: 3
  - Manufacturer parameters in use

Fig. 11-29 *Renaming a plate*

11.4.4 Install Tecan or Customized Plates

Cross References

List of cross references to information provided in other sections:

Information	References
Heating calibration with TEMPO 110	See section 11.4.7, 🗎 11-41

Purpose

This procedure sends all plate-specific parameters from the computer’s plate database down to the device. However, they are only sent after **Start** has been clicked. Up to 25 plates can be installed in the device.

Further Information

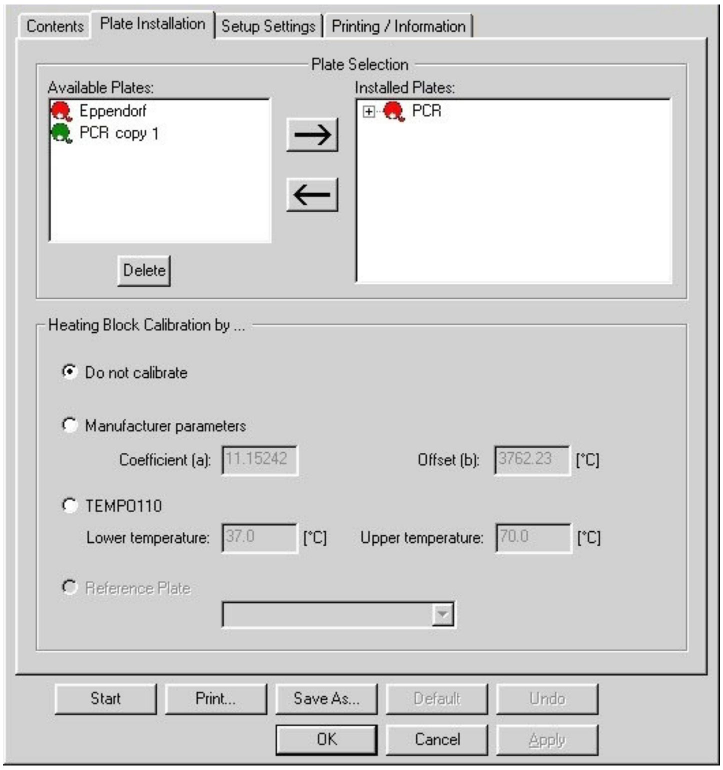
The physically available plates are shown in the Operating Manual. A customized plate is a logical plate that has been modified. Consult the data on the **Plate Installation** and **Setup Settings** pages of the corresponding device panel to find the modifications of the selected plate and its settings.

Procedure

To install a plate:

1 On the **Contents** page, select the **Install Plates/Create or Edit Custom Plates** check box and change to the **Plate Installation** page (see following figure).

Plates that are not installed (configured) yet are listed the ***Available Plates*** *section. Tecan plates are marked with a red, customized plates with a green Tecan symbol. See following figure.*



Available Plates: Eppendorf, PCR copy 1

Installed Plates: PCR

● Do not calibrate

○ Manufacturer parameters

Coefficient (a): 11.15242 Offset (b): 3762.23 [°C]

○ TEMPO110

Lower temperature: 37.0 [°C] Upper temperature: 70.0 [°C]

○ Reference Plate

Fig. 11-30 *Plate Installation page*

2 Select the plate to be installed from the **Available Plates** section and move it to the **Installed Plates** section with the arrow → button. The plate is now listed in the **Installed Plates** section.

3 Select the plate you have moved to the **Installed Plates** section.

Depending on the plate type, the following ***Heating Block Calibration*** *options are possible:*

Manufacturer parameters	Calibration using the manufacturer parameters, continue with the paragraph “Manufacturer parameters”
TEMPO110	Calibration with TEMPO110 (enabled, if TEMPO110 is connected to the CAN bus, → Cross References).
Reference Plate	Calibration using the parameters of a calibrated Tecan plate, continue with “Reference Plate”.
Do not calibrate	No calibration (only enabled if a calibration was performed, continue with paragraph “To “Continue”).

Reference Plate

4 Select the **Reference Plate** option to take over the calibration data of the corresponding Tecan plate.

5 From the drop down list, select a Tecan plate with the appropriate calibration. Continue with paragraph “To Continue”.

Manufacturer Parameter

6 Select the **Manufacturer parameters** option.

7 If necessary (Te-MagS and Te-Shake) remove the heating block from the device to calibrate.

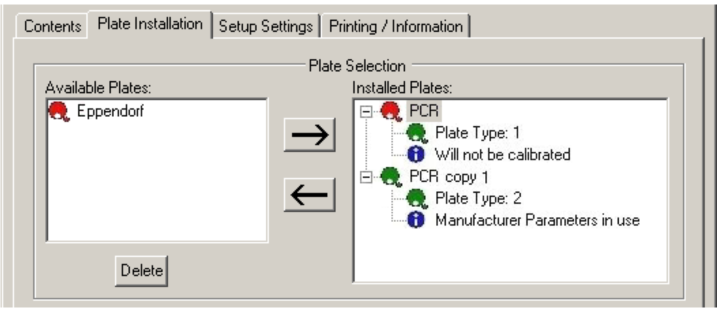
8 Read the coefficients a and b printed on a label at the bottom of the heating block. To calibrate the heating block, enter them into the **Coefficient (a)** and **Offset (b)** input fields under **Manufacturer parameters**. These parameters were determined when the heating block was calibrated at the manufacturer’s site.

9 If necessary (Te-MagS and Te-Shake) put the heating block back into the device and reconnect it.

To Continue

10 Confirm your entries with **Apply**.

*They are now written to the database and can no longer be canceled with **Undo**. The **Installed Plates** section shows now a summary of the **Heating block calibration** (arranged by section).*



Available Plates:
- Eppendorf

Installed Plates:
- PCR
  - Plate Type: 1
  - Will not be calibrated
- PCR copy 1
  - Plate Type: 2
  - Manufacturer Parameters in use

Fig. 11-31 *Plate installation page*

Note: *Please note the following.*

- *The **Plate Type n** entry is created automatically during plate setup, starting with the lowest free number.*
- *The **Plate Type** information must be entered correctly in the Gemini application software.*
- *Plates installed in an earlier session are marked with the **Will not be calibrated** remark.*
- *Newly installed plates carry a note informing how the calibration will be done or has been done (for example: **Manufacturer Parameters in use**).*

11 Install the new heating block with **Start**.

12 At the end of the procedure, confirm the **Setup: Done** message with **OK**.

*On the **Contents** page, the **Install Plates/Create or Edit Custom Plates** check mark turns gray to indicate that the plate setup has been successful.*

11.4.5 Remove Tecan or Customized Plates

Removing Plates

A plate is removed when it is listed in the **Available Plates** section of the **Plate Installation** page. The database remains unchanged, i.e. a removed plate can be reinstalled later.

Procedure

To remove a plate:

1. On the **Contents** page, select the **Install Plates/Create or Edit Custom Plates** check box and change to the **Plate Installation** page.
2. Select the plate to remove from the **Installed Plates** section and move it to the **Available Plates** section with the ← button. The plate is now listed in the **Available Plates** section.
3. Click **Start** to remove the plate from the device as well.
4. At the end of the procedure, click **OK** to confirm the **Setup: Done** message.

11.4.6 Delete Customized Plates

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Deleting Plates

Deleting a plate means removing it from the database. In order to delete an installed plate, it must first be removed.

Note: *Tecan plates cannot be deleted.*

Procedure

To delete a plate:

1. On the **Contents** page, select the **Install Plates/Create or Edit Custom Plates** check box and change to the **Plate Installation** page.
2. Select the plate to be deleted from the **Available Plates** section.
3. Click **Delete** to remove the plate from the list.
4. Confirm the deletion with **Apply**.
5. Click **Start** to delete the plate from the database.
6. At the end of the procedure, click **OK** to confirm the **Setup: Done** message.

11.4.7 Heating Block Calibration with TEMPO110

Cross References

List of cross references to information provided in other sections:

Information	References
Installation/connection of TEMPO110	See section 11.4.2, 🗎 11-33
Installation of temperature sensor	See section 11.4.2, 🗎 11-33

Purpose

Calibration with TEMPO110 lets you achieve a higher precision than you would obtain by using the manufacturer parameters. This calibration procedure must be carried out at customer's request (and at the customer's site).

Note:

- *Allow approx. 30 minutes for this calibration process.*
- *Make sure the heating block temperature is below the calibration temperature. Otherwise the calibration process cannot be started.*

Required Tool

To calibrate the heating block a special electronic temperature gauge, TEMPO110, is needed (→ Cross References).

Installation of TEMPO110

To install the TEMPO110:

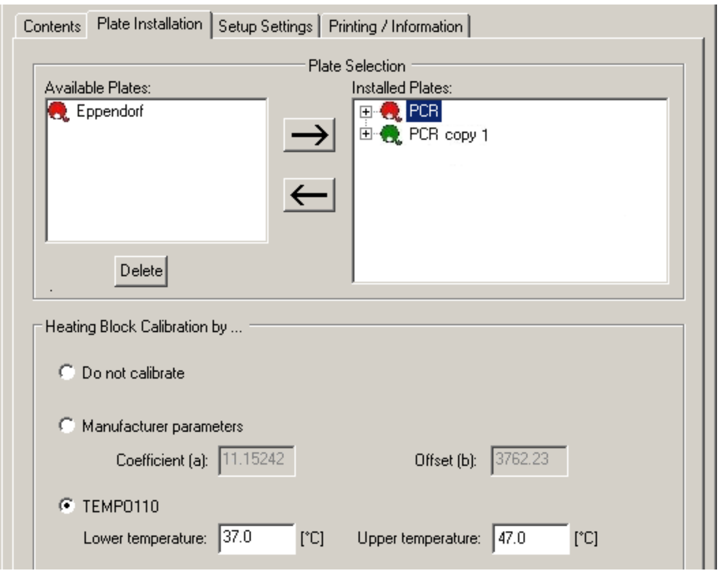
1. Switch the instrument off.
2. Connect the TEMPO110 to the CAN bus (→ Cross References).
3. Switch the instrument on.

The TEMPO110 is automatically registered when the instrument is switched on (or when the software is started up).

Procedure

To calibrate the heating block with a TEMPO110:

1. On the **Contents** page, select the **Install Plates/Create or Edit Custom Plates** check box and change to the **Plate Installation** page. The **TEMPO110** option is enabled.



Available Plates: Eppendorf

Installed Plates: PCR, PCR copy 1

○ Do not calibrate

○ Manufacturer parameters

Coefficient (a): 11.15242 Offset (b): 3762.23

● TEMPO110

Lower temperature: 37.0 [°C] Upper temperature: 47.0 [°C]

Fig. 11-32 Plate Installation page

2 Select the plate to be calibrated in the **Installed Plates** section.

3 Select the **TEMPO110** option if its is not enabled already. Its input fields are enabled for writing.

4 Enter the values for **Lower temperature** and **Upper temperature**.

- A minimum difference of 10 °C is recommended between the two temperatures. If the value for **Upper temperature** is lower than that for **Lower temperature**, the system will not accept the entries. Whenever possible, accept the default values.
- Recommendation: For the **Lower temperature** and **Upper temperature,** choose values outside the intended working temperature range.

5 Click **Start**.

6 In case of a Te-MagS proceed as follows: When the **Device will move to mount the sensor** message appears make sure the Te-MagS contains no rack for tubes or other obstacles hindering free movement of the drives and confirm with **Next**.

7 When prompted to do so fix the TEMPO110 sensor to the heating block and connect the block to the device.

The procedure to be followed depends on the device you are testing (→ Cross References).

8 Follow the instruction on the screen You are prompted to calibrate the lower and upper temperatures. The whole calibration procedure lasts about 30 minutes.

9 At the end of the procedure, confirm the **Setup: Done** message with **OK**.

10 Remove the TEMPO110 sensor when finished.

11.4.8 Heating Corrections

Purpose

A properly calibrated heating will heat the surface of the heating block up to the required target temperature. Due to heat losses to the surrounding colder air the liquid temperature in the tubes will be somewhat lower than the target temperature.

For this reason, you may determine a heating correction to obtain the correct liquid temperature.

Example of Heating Correction

To perform a heating correction:

1. Define two target temperatures (measuring points), e.g.
   - Target temperature:T_1 = 37 °C
   - Target temperature:T_2 = 65 °C
2. With your application software measure the temperatures in the liquid.
   - Temperature measured in the liquid at 37 °C = 39.9 °C
   - Temperature measured in the liquid at 65 °C = 63.3 °C
3. For both calibration points, determine the temperature difference (Δ1 and Δ2) from the measured liquid temperature:
   - Δ1 = Target temperature T1 – liquid temperature = -2.9 °C
   - Δ2 = Target temperature T2 – liquid temperature = 1.7 °C
4. Using these values, calculate the coefficient and offset as explained below.

$$Coefficient = \frac{\Delta 1 - \Delta 2}{T1 - T2} = \frac{-2.9°C - 1.7°C}{37°C - 65°C} = 0.164$$

$$Offset = \frac{\Delta 2 \times T1 - \Delta 1 \times T2}{T1 - T2} = \frac{1.7°C \times 37°C - (-2.9°C) \times 65°C}{37°C - 65°C} = -8.979°C$$

$$T_{Tube} = Coefficient \times T_{Target} + Offset$$

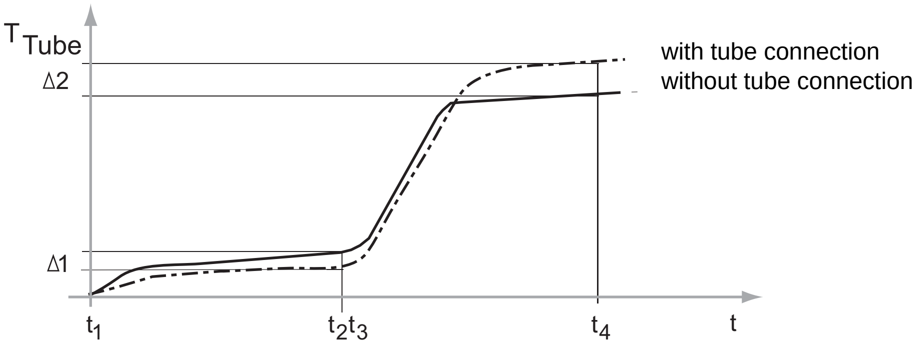
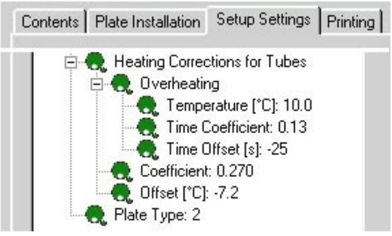


Fig. 11-33 Heating curve

t_1	*Set target temperature to T_1*	***t_2***	*Measure temperature in tube*
t_3	*Set target temperature to T2*	***t_4***	*Measure temperature in tube*



- Heating Corrections for Tubes
  - Overheating
    - Temperature [°C]: 10.0
    - Time Coefficient: 0.13
    - Time Offset [s]: -25
  - Coefficient: 0.270
  - Offset [°C]: -7.2
- Plate Type: 2

Fig. 11-34 *Heating corrections*

Entering the Corrections

To enter the calculated values:

5 On the **Setup Settings** page, enter the calculated values directly beside **Heating Corrections for Tubes \ Coefficient** and **Heating Corrections for Tubes \ Offset** (in-place edit) as follows:

- **Coefficient** in [°C per °C]; range: (–1.000 to 1.000)
- **Offset** in °C; in the range: (–12.5 to 12.5).

Note: *The correction is deactivated if* ***Coefficient*** *= 0 and* ***Offset*** *= 0*

11.4.9 Evaluation of Overheating

Purpose

The parameters entered during a heating correction influence the overheating at the beginning when the heating is switched on or when the target temperature is changed. During a short period of time some additional heating energy is supplied to shorten the heat up time.

Example

Proceed as follows:

1. Choose an overheating temperature, e.g. T_{OV} = <u>10 °C</u>
2. Choose a very long overheating time. With your application software, measure the time it takes until the liquid temperature has reached 95 % of the target temperature.

   The measured time is the overheat time, t_{OV}.
   - Target temperature $T_1 = 37$ °C → Overheat time $t_{OV1} = 40$ s
   - Target temperature $T_2 = 65$ °C → Overheat time $t_{OV2} = 73$ s
3. If the overheating time is too long or too short, repeat the previous steps with an adjusted overheating temperature T_{OV}.
4. If required, determine time durations for various temperatures (Note that the overheat temperatures must always remain the same).
5. Using these values, calculate the time coefficient and time offset according to the following formulae:

$$TimeCoefficient = \frac{t_{OV2} - t_{OV1}}{T2 - T1} = \frac{73s - 40s}{65^\circ C - 37^\circ C} = \underline{1.18\frac{s}{^\circ C}}$$

$$TimeOffset = t_{OV1} - TimeCoefficient \times T1 = 40s - 1.18\frac{s}{^\circ C} \times 37^\circ C = \underline{-3.6s}$$

Entering the Corrections

6 On the **Setup Settings** page, enter the calculated values directly under **Overheating** in the following input fields (in-place edit)
   - **Temperature** in [°C]
   - **Time Coefficient** in [s per °C]
   - **Time Offset** in [s]

7 Confirm the entered data with **Apply**. They are now written to the database and cannot be canceled anymore with **Undo**.

8 Install the new customized plate with **Start**.

9 At the end of the procedure, confirm the **Setup: Done** message with **OK**.

11.4.10 Burn-In of Heating

Cross References

List of cross references to information provided in other sections:

Information	References
Heating validation with TEMPO110	See section 11.4.11, 🗎 11-46

Purpose

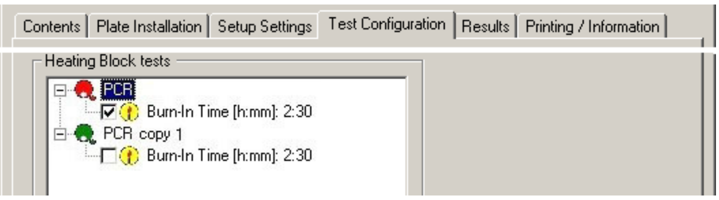
The **Burn-In of Heating** procedure is used to find early failures of the heating. During the **Burn-In Time** (default is 2:30 hours), the heating block is used extensively, i.e. for each cycle the heating is switched on for 25 minutes (max. heatup time) and stabilized at 65 °C (target temperature) for 5 minutes. Then, it is switched off for 10 minutes (switch off time) and the next cycle begins until the **Burn-In Time** is reached.

A heating validation with TEMPO110 (→ Cross References) should be performed after this procedure to make sure that the heating works properly.

Procedure

To perform the test:

1 On the **Contents** page, select the **Burn-In of Heating** check box and change to the **Test Configuration** page.



PCR
☑ Burn-In Time [h:mm]: 2:30
PCR copy 1
☐ Burn-In Time [h:mm]: 2:30

Fig. 11-35 *Heating block test*

2 Select the heating blocks to be tested. Tecan plates are checked by default. Custom plates, however, are not checked by default to avoid unnecessary heating up of the plates.

3 If necessary, change the corresponding **Burn-In Time** (in-place-edit).

4 Start the procedure with **Start**.

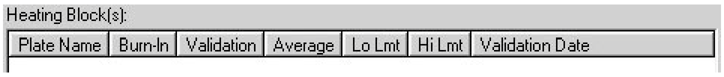
5 If the **Connect the required heating block to the device** message appears.

- Follow the instructions provided on the message box. When the heating block is connected, confirm with **Next**.
- At the end of the test, a **Burn-In of Heating: Passed** or **Failed** message appears.

6 Confirm with **OK**. The **Results** page is active.

Pass/Fail Criteria

The test is passed if the sensor temperature has been within the specifications during five minutes at the end of each cycle.



Heating Block(s):

Plate Name	Burn-In	Validation	Average	Lo Lmt	Hi Lmt	Validation Date

*Fig. **11-36** Heating Block(s) section on Results page*

Heating test specifications:

- at 40 °C max. tolerance = ± 1 °C Heating block temperature
- at 65 °C max. tolerance = ± 1.9 °C Heating block temperature
- at 80 °C max. tolerance = ± 2.5 °C Heating block temperature

For a summary of all test results (→ Cross References).
Measured temperatures are stored in the Log\<Device>Temperatures.xls file

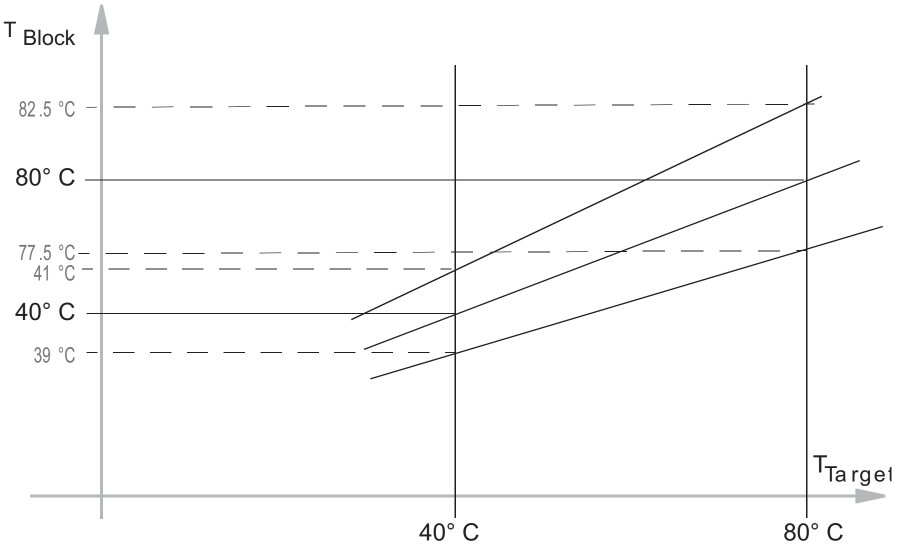


*Fig. **11-37** Heating accuracy*

11.4.11 Heating Validation with TEMPO110

Cross References

List of cross references to information provided in other sections:

Information	**References**
Installation/connection of TEMPO110	See section 11.4.2, 🗎 11-33
Installation of temperature sensor	See section 11.4.2, 🗎 11-33

***Note:** Perform this optional test at customer's request (and site).*

Principle

A **Heating Validation with TEMPO110** is performed at a specific validation temperature. The heating block must reach the validation temperature within x minutes and must remain stable for a given period of time (2 minutes):

The duration x depends on the heating block to validate:

- Te-MagS and Te-Shake: x = 25 minutes.
- Incubation device: x = 45 minutes.

Required Tool

To calibrate the heating block a special electronic temperature gauge, TEMPO110, is needed (→ Cross References).

Installation of TEMPO110

To install the TEMPO110:

1. Switch the instrument off.
2. Connect the TEMPO110 to the CAN bus (→ Cross References).
3. Switch the instrument on.

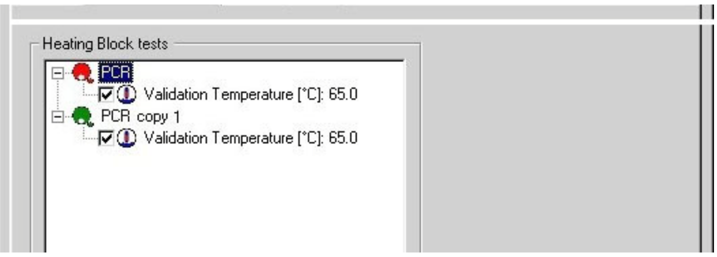
The TEMPO110 is automatically registered when the instrument is switched on (or when the software is started up).

***Note:** The test can only be started if the heating block temperature is below 35 °C.*

Procedure

To validate the heating with a TEMPO110:

1. On the **Contents** page, select the **Heating Validation with TEMPO110** check box and change to the **Test Configuration page.** See following figure.



Heating Block tests

PCR
☑ Validation Temperature [°C]: 65.0
PCR copy 1
☑ Validation Temperature [°C]: 65.0

***Fig. 11-38** ‘Test Configuration page*

2. Select the heating block to be validated.
3. If necessary, change the **Validation Temperature** (in-place-edit).
4. Enter your operator alias in the **Operator alias** input field.
5. Click **Start**.
6. In case of a Te-MagS proceed as follows: When the **Device will move to mount the sensor** message appears make sure the Te-MagS contains no rack for tubes or other obstacles hindering free movement of the drives and confirm with **Next.**
7. When prompted to do so fix the TEMPO110 sensor to the heating block and connect the block to the device.

   The procedure to be followed depends on the device you are testing (→ Cross References).
8. Confirm with **Next** when done.

*At the end of the test a **Heating Validation: Passed** or **Failed** message appears.*

9 Confirm with **OK**.

*The **Results** page is now active.*

Pass/Fail Criteria

The test is passed if the **Average** value is within the range **Lo Lmt** and **Hi Lmt** (at 65° this is ≤ ± 1.9 °C).

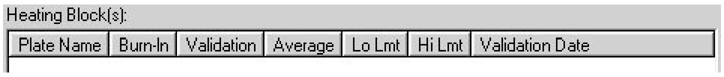


Fig. 11-39 *Heating Block(s) section on Results page*

If the test is passed a validation string with the date and the operator’s alias is written to the corresponding device.

- For a summary of the test results see the **Results** page of the corresponding device.
- Measured temperatures are stored in the corresponding <Device>Temperatures.xls file.

11.5 Te-Thermix

11.5.1 Overview

What Is a Te-Thermix?

The Te-Thermix is an advanced incubator for one microplate. When it is opened the drawer (B) is pushed out so that a microplate can be placed on it and drawn inside the device. The Te-Thermix is equipped with a heating block and a shaker that serves for mixing purposes. The target temperature can be set by the application software.

Note that the Te-Thermix is equipped with several sensors that monitor the device status (door open / closed, labware present / absent, etc.). There are also sensors for measuring the temperature and the shaker motor speed.

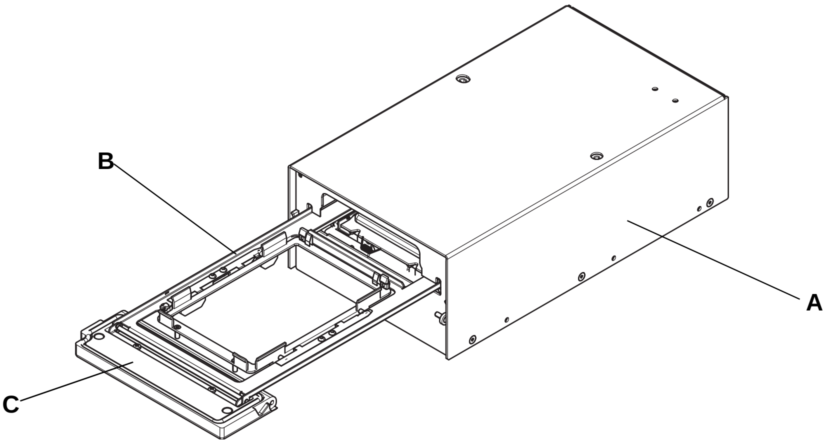


Fig. 11-40 *Te-Thermix*

A	*Te-Thermix*	***C***	*Front door*
B	*Drawer*		

Connection to CAN-Bus

The Te-Thermix communicates with the computer via the Options CAN-bus. The CAN-bus address can be set with a dip switch located on the rear side of the device. The following configurations are possible:

- Master: A Te-Thermix that is directly connected to the Options CAN-bus address, is a (virtual) master. It occupies one Options CAN-bus address that must be unique.
- Slave: To save Options CAN-bus addresses, it is possible to connect up to six additional (slave) devices to a master device via a local CAN-bus. In this configuration, only the (virtual) master occupies one Options CAN-bus address.
- For additional information about CAN-bus addressing and termination consult the Te-Thermix Service Manual.

Virtual Master

As has been explained before, a master Te-Thermix is one that is directly connected to the Options CAN-bus, while a slave is an additional device that can be accessed indirectly via a master.

However, as far as functionality is concerned, the functionality of a slave is the same as that of the master. For this reason, the master is referred to as “virtual” master in the QC-report.

Example

The following figure shows an example of a configuration with two master devices and one slave connected to Master 1.

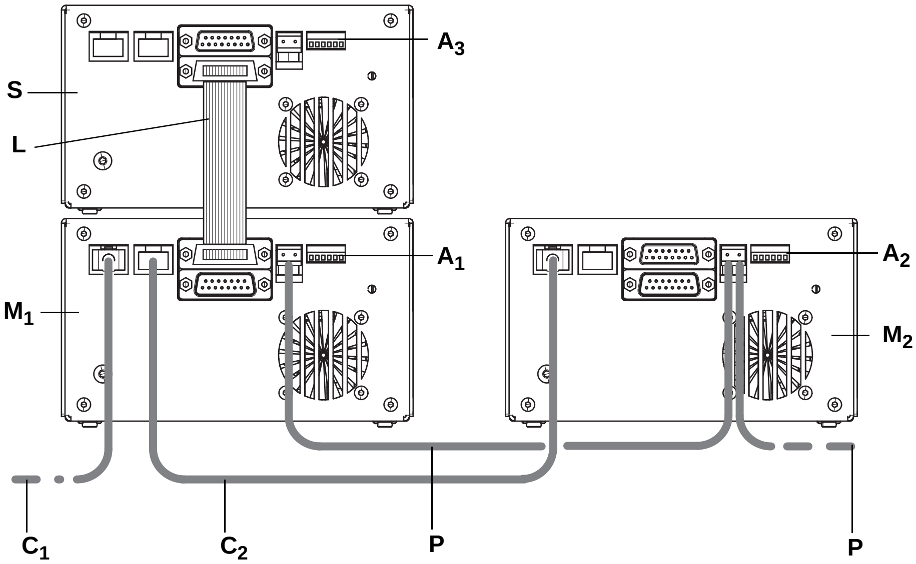


Fig. 11-41 *Example of a configuration*

A_1	*Address switch (virtual) master 1*	***M_1***	*(Virtual) master 1*
A_2	*Address switch (virtual) master 2*	***M_2***	*(Virtual) master 2*
A_3	*Address switch slave 1*	***L***	*Local CAN-bus and power supply, master 1 to slave*
C_1	*CAN-bus cable, Optibo to master 1*	***P***	*Power supply cable (from Optibo)*
C_2	*CAN-bus cable, master 1 to master 2*		

Note:

- *The setting of the slave's address switch (A_3) is irrelevant and is ignored. The Master Te-Thermix assigns the local CAN-bus addresses automatically when it is switched on.*
  - T00 is the internal CAN-bus address of the master.
  - T01 to T07 are the internal CAN-bus addresses of additional (slave) devices.
- *Slaves are supplied with electrical power via the cable (L), which also contains the local CAN-bus.*

Tools

You need a 96-well flat-bottom microplate for the **Drawer and Labware Detection Test** and the **Shaker Test**.

Serviceability

Note that the Te-Thermix contains no serviceable parts and can therefore not be repaired in the field. If one or more of the following tests fail, the device must be returned to the nearest representative for repair.

11.5.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

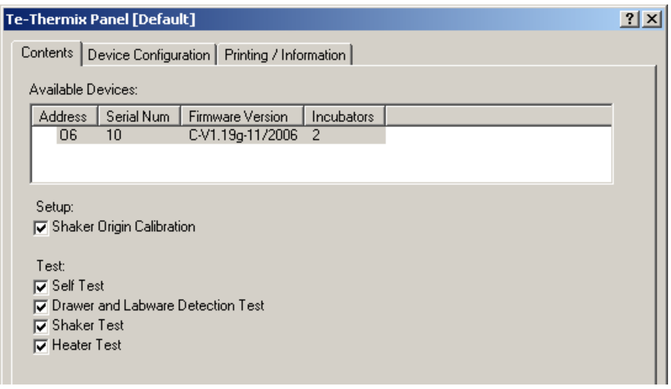
Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Note: *Some of the following setup and calibration procedures can be carried out by members of the SnS_Customer group as well.*

Function	Type	User	FSE
Shaker Origin Calibration	Setup		X
Self test	Test	X	X
Drawer and Labware Detection Test	Test	X	X
Shaker Test	Test	X	X
Heater Test	Test	X	X

Starting the Panel

1 Start the panel with **Options > Te-Thermix**. The **Te-Thermix** panel with activated **Contents** page appears. After starting the **Te-Thermix** panel no check boxes are activated.



Available Devices:

Address	Serial Num	Firmware Version	Incubators
06	10	C-V1.19g-11/2006	2

Setup:
☑ Shaker Origin Calibration

Test:
☑ Self Test
☑ Drawer and Labware Detection Test
☑ Shaker Test
☑ Heater Test

Fig. 11-42 *Te-Thermix panel - Contents page*

Pages

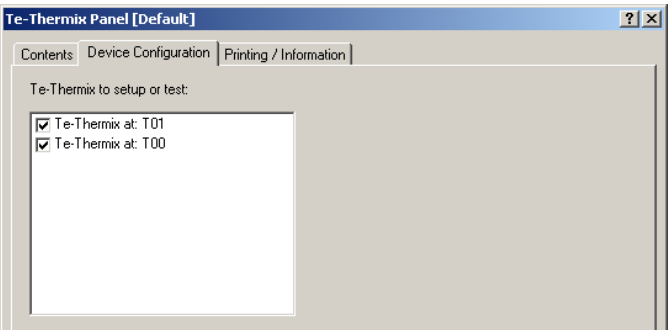
Tab. 11-8 Pages of the Te-Thermix panel

Pages	Function
Contents	General overview, selection of the (virtual) master devices, setup and test procedures. Note that only one master device can be selected at a time.
Device Configuration	Lets you select / deselect the devices interconnected with the master selected on the **Contents** page.
Printing / Information	Print selection for the QC-report

11.5.3 Device Configuration Page

Purpose

The **Device Configuration page** page lets you select the Te-Thermix devices interconnected with the (virtual) master device, selected on the **Contents** page.



Te-Thermix to setup or test:

☑ Te-Thermix at: T01
☑ Te-Thermix at: T00

Fig. 11-43 Te-Thermix panel, Device Configuration page

Controls

The window **Te-Thermix to setup or test** lists the devices interconnected with the (virtual) master:

- You can select / deselect the device(s) to setup or test by selecting or clearing the corresponding check boxes on the left.
- The local CAN-bus address T00 is always assigned to the master, T01 to T07 are assigned to the installed slaves.

***Note:** If no master device has been selected on the **Contents** page, the window **Te-Thermix to setup or test** remains empty.*

11.5.4 Setup: Shaker Origin Calibration

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Shaker Origin Calibration** sets the origin (zero point) for the shaking mechanism. It must be performed in the following cases:

- During installation of a Te-Thermix.
- If the Shaker Test failed (see 11.5.7, 🗎 11-55).

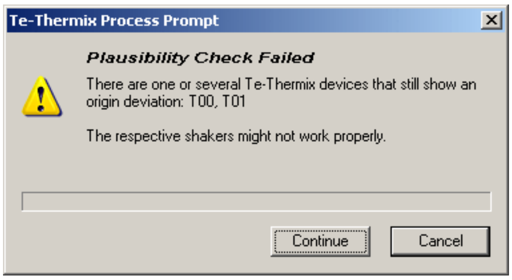
Procedure

Calibrate the shaker origin as follows:

1. On the contents page, select the **Shaker Origin Calibration** check box and change to the **Device Configuration** page.
2. On the **Device Configuration** page select the Te-Thermix device(s) to setup.
3. Click **Start** to begin the **Shaker Origin Calibration**.

Warning

If there is an origin deviation you will get a warning as shown:



Plausibility Check Failed

There are one or several Te-Thermix devices that still show an origin deviation: T00, T01

The respective shakers might not work properly.

Do the following:

- Run the **Shaker Test**.
- Retry the **Shaker Origin Calibration**.

Fig. 11-44 *Origin deviation warning*

11.5.5 Self Test

Purpose

The **Self Test** automatically checks the most important functions of the Te-Thermix.

Procedure

To perform the test:

1. On the **Contents** page, select the **Self Test** check box and change to the **Device Configuration** page.
2. On the **Device Configuration** page, select the devices to test from the list.
3. Click **Start** to begin.

   You will be guided through the test by a series of process prompts (not shown here). Always follow the instructions provided on the prompts.

   After the initialization the drawer is opened and the first process prompt appears.
4. If there is a microplate on the drawer, remove it and click **OK** to continue.

   The self test is now started. It may take several minutes to perform. At the end you are notified whether or not the test was successful.

Pass / Fail Criteria

The test is passed if all functions of the self test were carried out correctly.

If the Test Fails

Try the following: (call the nearest customer service department if necessary):

- Check the CAN-bus address settings and bus terminations of master devices.
- Check whether possible master to slave and slave to slave connection cables are properly connected.
- Check the power supply cables.
- If these measures do not help, the malfunctioning device must be replaced. Remember that the Te-Thermix cannot be repaired in the field.

11.5.6 Drawer and Labware Detection Test

Purpose

The **Drawer and Labware Detection Test** checks whether the drawer opens / closes properly and whether the presence / absence of a microplate placed on the drawer is detected.correctly.

Procedure

To perform the test:

1. On the **Contents** page, select the check box **Drawer and Labware Detection Test** and change to the **Device Configuration** page.
2. On the **Device Configuration** page, select the devices to test from the list.
3. Click **Start** to begin.

   You will be guided through the test by a series of process prompts (not shown here). Always follow the instructions provided on the prompts.

   When the test is started, the drawer is opened and the first process prompt appears.
4. Check whether the drawer is completely open and click **OK** if this is the case (click **Cancel** otherwise).
5. Next, you are prompted to place a microplate on the drawer. Ensure that it is seated correctly on the drawer and click on **Next** when done.
6. In the following step, you must check whether the door is completely closed. Click on **OK** if this is the case.
7. After a while the door is opened anew and the drawer is pushed out. Remove the microplate and click on **Next** when done.

   The door is closed again and a message appears informing you whether or not the test was successful.

Pass / Fail Criteria

The test is passed if the door opened and closed properly and the presence / absence of the microplate could be detected correctly.

If the Test Fails

Try the following: (call the nearest customer service department if necessary):

- Check whether an appropriate microplate was used.
- Repeat the **Self Test.**
- If these measures do not help, the malfunctioning device must be replaced. Remember that the Te-Thermix cannot be repaired in the field.

11.5.7 Shaker Test

Purpose

The **Shaker Test** checks the proper function of the built-in shaker.

Procedure

To perform the test:

1. On the **Contents** page, select the **Shaker Test** check box and change to the **Device Configuration** page.
2. On the **Device Configuration** page, select the devices to test from the list.
3. Click **Start** to begin.

   You will be guided through the test by a series of process prompts (not shown here). Always follow the instructions provided on the prompts.

   When the test is started, the drawer is opened and the first process prompt appears.
4. Fill a 96-well flat bottom microplate with approx. 250 µl of water per well.
   - Make sure you choose the correct microplate type.
   - You can fill the wells with tap water or distilled water.
5. Place the microplate on the drawer. Ensure that it is seated correctly on the drawer and click on **Next** when done.

   The door is closed and the test is started. The shaker functions are tested at two different shaker speeds. During the test the process prompts inform you about the test progress. The following test steps are carried out in sequence:
   - Acceleration to low speed, subsequent test and validation.
   - Acceleration to high speed, subsequent test and validation.

   At the end of the test, a message appears informing you whether or not the test was successful.

Pass / Fail Criteria

The test is passed if all shaker functions could be carried out correctly.

If the Test Fails

Try the following: (call the nearest customer service department if necessary):

- Check whether an appropriate microplate was used.
- Run the **Shaker Origin Calibration** setup**.**
- Repeat the **Self Test** and the **Drawer and Labware Detection Test**.
- If these measures do not help, the malfunctioning device must be replaced. Remember that the Te-Thermix cannot be repaired in the field.

Log File

A log file containing the shaker frequencies, amplitudes and phase shifts in the X-and Y-axes as a function of time is stored as follows: <dataDir>\Log\Thermix_Shaker_Test.xls.

Note: *The log file is overwritten at the next execution of the test.*

11.5.8 Heater Test

Purpose

The **Heater Test** checks the proper function of the built-in heating block.

Procedure

To perform the test:

1. On the **Contents** page, select the **Heater Test** check box and change to the **Device Configuration** page.
2. On the **Device Configuration** page, select the devices to test from the list.
3. Click **Start** to begin.

   You will be guided through the test by a series of process prompts (not shown here). Always follow the instructions provided on the prompts.

   At the beginning, the drawer is opened and the first process prompt appears.
4. Remove any microplate that may be on the drawer, then click **Next** to continue.

   The door is closed and the test is started. The following steps are carried out in sequence:
   - The heating block is heated up until the target temperature is reached.
   This may take some time.
   - In a second step the temperature curve is validated, i.e. compared against the pass / fail criteria.

   At the end of the test, a message appears informing you whether or not the test was successful.

Pass / Fail Criteria

The test is passed if the validation of heating curve corresponds to the pass / fail criteria (see QC-report).

If the Test Fails

Try the following: (call the nearest customer service department if necessary):

- Check bus addresses and master / slave connections.
- Repeat the **Self Test** and the **Drawer and Labware Detection Test**.
- If these measures do not help, the malfunctioning device must be replaced. Remember that the Te-Thermix cannot be repaired in the field.

Log File

A log file containing the heating curves as a function of time is stored as follows:
<dataDir>\Log\Thermix_Heater_Test.xls.

Note: *The log file is overwritten at the next execution of the test.*

11.5.9 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

11.6 Te-MagS

11.6.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	**References**
Tecan or Customized Plates	See section 11.4.1, 🗎 11-30
Reference documents	See section 1.2, 🗎 1-3

Description

The Te-MagS (Magnetic bead separator) serves for magnetic separation processes on Freedom EVO, Genesis Freedom and Classic instruments. It is used in combination with commercially available magnetic beads to isolate biomolecules or whole cells by means of magnetic forces.

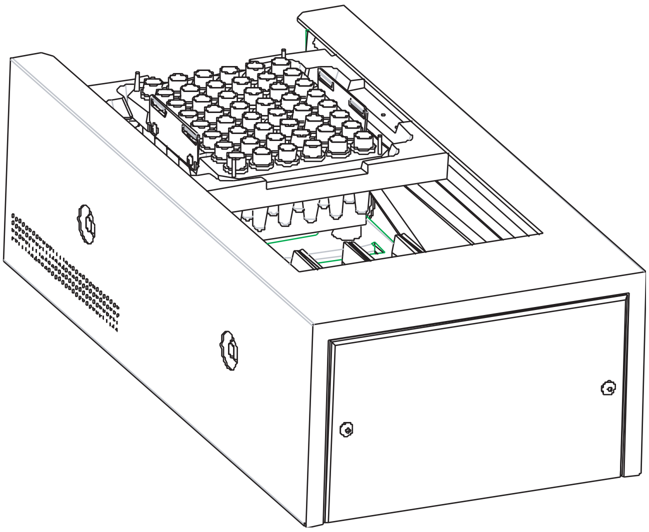


Fig. 11-45 Te-MagS

Further Information

Find further information about the Te-MagS:

- Tecan and customized plates
- Te-MagS Operating Manual
- Te-MagS Service Instructions
- Gemini Software Manual

Te-MagS Files

The Te-MagS function can create the following files:

- **Result Files:** Test results are stored in *.any files.

Directory:	<data_path>\Results
File name:	TeMags_<serial_number>_<date>_<time>.any

- **Log Files:** Every time a heating block is used (e.g. a **Calibrate heating block by TEMPO110**, **Burn-In of Heating** or **Heating Validation with TEMPO110** procedure is started), a log file is created into which the values for the heating curves are written. You can open it in Microsoft Excel or in another appropriate spreadsheet program.

Directory:	<data_path>\Log
File name:	TeMagsTemperatures.xls

***Note:** To archive the curve, save the log file under a new name, since the file will be overwritten after starting a further procedure with **Start**.*

- **Plate Files:** The file for Tecan plates is copied to disk and installed with the installation of the software. For customized plates, an own file is generated when the plates are created and the **Apply** button is clicked.

Directory:	<install_path>\Modules (for TeMagsTecanPlates.any) <data_path>\Config. (for Te-MagsCustomPlates.any)
File names:	TeMagsTecanPlates.any for Tecan plates TeMagsCustomPlates.any for customized plates

11.6.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

***Note:** Some of the following setup and calibration procedures can be carried out by members of the SnS_Customer group as well.*

***Tab. 11-9** Te-MagS Functions and User Permissions*

Function	Type	User	FSE
Set Defaults in EEPROM	Setup		X
Set Master Y-Offset	Setup		X
Y-Autorange	Setup		X
Install Plates/Create or Edit Custom Plates	Setup	X	X

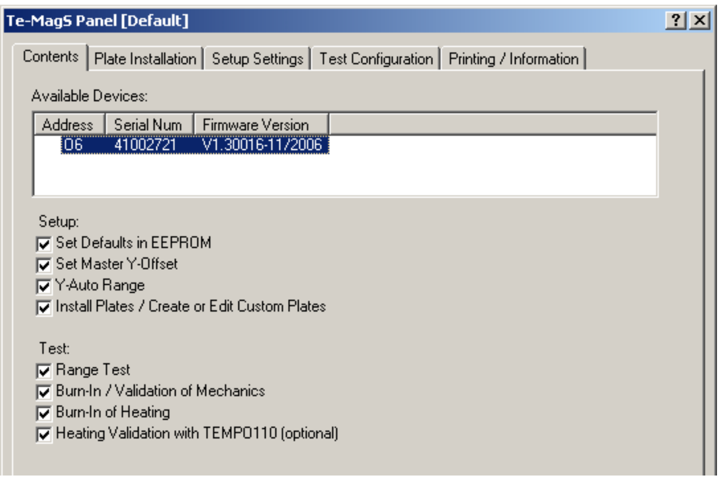
Tab. 11-9 Te-MagS Functions and User Permissions

Function	Type	User	FSE
- Install Tecan and customized plates	Setup	X	X
- Remove Tecan and customized plates	Setup	X	X
- Delete customized plates	Setup		X
- Calibrate heating block with manufacturer parameters	Setup	X	X
- Calibrate heating block with TEMPO110	Setup		X
- Create customized plates	Setup		X
Range Test	Test	X	X
Burn-In/Validation of Mechanics	Test	X	X
Burn-In of Heating	Test	X	X
Heating Validation with TEMPO110	Test	X	X
Printing	Page	X	X
QC-report	Report	X	X

Starting the Panel

1 Start the panel with **Options > Te-MagS**. The **Te-MagS** panel with activated **Contents** page appears. After starting the **Te-MagS** panel, no setup or test check box is selected and not all tabs are visible.

Contents Page



Available Devices:

Address	Serial Num	Firmware Version
06	41002721	V1.30016-11/2006

Setup:
☑ Set Defaults in EEPROM
☑ Set Master Y-Offset
☑ Y-Auto Range
☑ Install Plates / Create or Edit Custom Plates

Test:
☑ Range Test
☑ Burn-In / Validation of Mechanics
☑ Burn-In of Heating
☑ Heating Validation with TEMPO110 (optional)

Fig. 11-46 Contents page

Pages

Tab. 11-10 Pages of Te-MagS panel

Pages	Function
Contents	General overview, procedure selection.
Plate Installation	Plate installation and heating block calibration data.
Setup Settings	Plate configuration data and mechanical setup.
Test Configuration	Configuration of the test procedures to be performed.
Printing	Print selection for the QC-report

11.6.3 Unknown Plate Found

Cross References

List of cross references to information provided in other sections:

Information	References
Unknown plate	See section 11.4.3, 🗎 11-36

The message **Unknown plate found** appears when the data of a custom plate differs from the values stored in the database. In such a case you have to rename the plate and store the data in the database (→ Cross References).

11.6.4 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To set the Tecan defaults:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box. No further parameters need to be defined.
2. Download the default values have them re-read by clicking **Start**.

Confirm the **Test** message with **OK**.

11.6.5 Setup: Set Master Y-Offset

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure sets the Y-Offset, so you do not have to teach the logical Y-offset for each individual plate (provided in the Mags*Plates.any file). Consequently, it must be performed only once.

ATTENTION

Before starting this procedure make sure the Te-MagS contains no rack for tubes, TEMPO110 sensor or other obstacles hindering free movement of the drives.

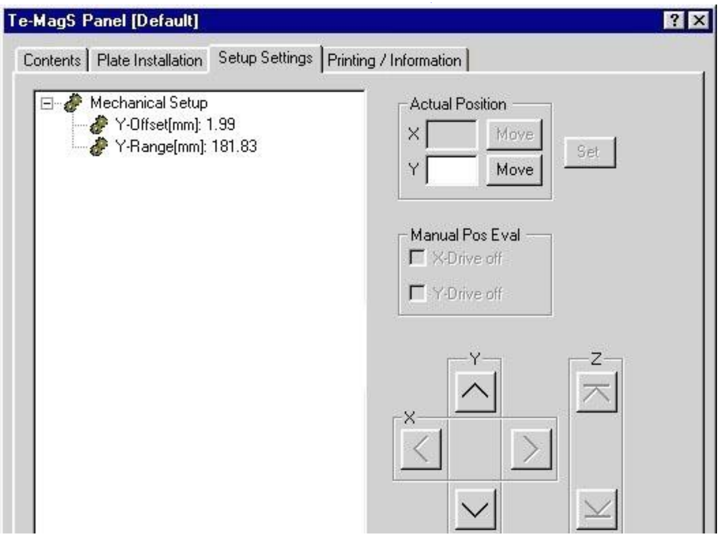
ATTENTION

If you double-click the values for Y-offset, Y-Range and X-Axes the rack for the tubes will be moved to the given positions!

Procedure

To set the master Y-Offset:

1. On the **Contents** page, select the **Set Master Y-Offset** check box and change to the **Setup Settings** page (see following figure).
2. Expand the **Mechanical Setup** entry and double-click **Y-Offset**. The rack for the tubes moves to the indicated position.
3. Check the position: It must correspond to the tip position.



Mechanical Setup
Y-Offset[mm]: 1.99
Y-Range[mm]: 181.83

Fig. 11-47 *Setup Settings page*

4 If the position is not correct, align it by moving the rack for tubes in the Y-axis:

- with single steps: click the **Y** movement buttons.
- with given Y position: enter a value in the **Y** input field in the **Actual Position** section and click **Move**.

*In both cases, the values are directly written down to the Te-MagS and the value for **Y-Range** is adapted automatically.*

5 Save the new values in the EEPROM with **Start**.

6 At the end of the procedure, confirm the **Setup: Done** message with **OK**.

11.6.6 Setup: Y-Autorange

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Y-Autorange** procedure moves the Y-drive to its two extreme positions to find the available range. The values found are then written to the EEPROM.

ATTENTION

Before starting this procedure make sure the Te-MagS contains no rack for tubes, TEMPO110 sensor or other obstacles hindering free movement of the drives.

Procedure

To determine the Y-autorange:

1. On the **Contents** page, select the **Y-Autorange** check box. No further parameters have to be defined.
2. Click **Start**. The **Y-Drive will move to its extremes** message appears.
3. Confirm with **Next**.
4. At the end of the procedure, confirm the **Test** message with **OK**.

11.6.7 Setup: Install Plates/Create or Edit Custom Plates

Cross References

List of cross references to information provided in other sections:

Actions	References
Install Tecan or customized plates a)	See section 11.4.4, 🗎 11-37
Remove Tecan or customized plates a)	See section 11.4.5, 🗎 11-40
Delete customized plates	See section 11.4.6, 🗎 11-40
Calibrate heating block with manufacturer parameters a)	See section 11.4.4, 🗎 11-37
Calibrate heating block with TEMPO110	See section 11.4.7, 🗎 11-41
Create customized plates	See section 11.6.8, 🗎 11-65

a) *These procedures do not require the field service engineer password.*

Purpose

The **Install Plates/Create or Edit Custom Plates** procedure lets you carry out the actions listed in the cross-reference table above.

11.6.8 Create Customized Plates

Cross References

List of cross references to information provided in other sections:

Information	References
Heating corrections	See section 11.4.8, 🗎 11-43
Evaluation of overheating	See section 11.4.9, 🗎 11-44

Customized Plates

A customized plate is a copy of an existing plate that has a non-blank name and differs in at least one parameter from its original. Its data set is stored in an appropriate *.any file.

Procedure

To create custom plates:

1 On the **Contents** page, select the **Install Plates/Create or Edit Custom Plates** check box and change to the **Setup Settings** page.

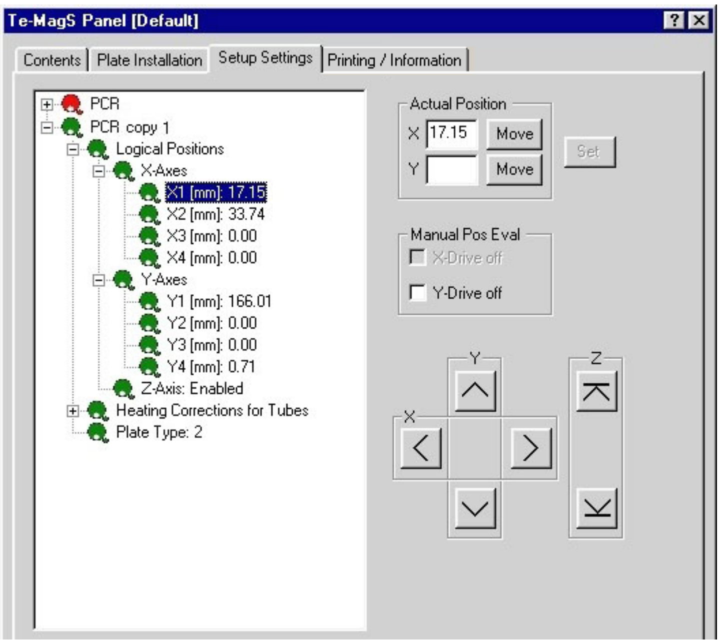


Fig. 11-48 Setup Settings page

2 Select an existing plate (reference plate).

3 Click **Copy**. A new plate appears in the list. It is marked in green, and its name is: **<original_name> copy <number>**.

4 Select the copied plate, and click it again to rename it.

5 If required, select the **Plate Type** entry to change its type number.

There are four logical positions per plate, used by the application software (4 X positions and 4 Y positions). Only X1, X2, Y1 and Y4 are used for Gemini:

X1	Magnet is on the right side of the tub
X2	Magnet is on the left side of the tube
Y1	Magnet position
Y4	Heating position

Teaching the X Positions

To teach the X-positions:

1. Under **Logical Positions > X-Axes** click the logical **X** position you want to change. The caption of the **Set** button changes to a value according to the selected logical X-position (e.g., **Set X1** or **Set X2**).
2. Move the slide in X-direction until the required position is reached:
   - with single steps: click the **X** movement buttons.
   - with given **X** position: enter a value in the **X** input field in the **Actual Position** section and click **Move**.
3. Click **Set Xn** to accept the corresponding coordinate of the system as the logical position.
4. Repeat steps 1 through 3 for the other X positions.

Teaching the Y Positions

To teach the Y-positions:

1. Under **Logical Positions > Y-Axes** click the logical **Y** position you want to change. The caption of the **Set** button changes to a value according to the selected logical X-position (e.g., **Set Y1** or **Set Y4**).
2. If you want to set the logical Y position manually, select the **Y-Drive off** check box. Otherwise continue with step 5.
3. Move the slide manually in Y-direction until the required position is reached.
4. Clear the **Y-Drive off** check box. The Y-slide moves to the initialization position, then back to the given Y-position. Continue with step 6.
5. Move the slide in Y-direction until the required position is reached:
   - with single steps: click the **Y** movement buttons.
   - with given X position: enter a value in the **Y** input field in the **Actual Position** section and click **Move**.
6. Click **Set Yn** to accept the corresponding coordinate by the system as logical position.
7. Repeat steps 1 through 6 for the other Y positions.

Teaching the Z-Axis

To teach the Z-axis:

1. Double-click the **Z-Axis** entry to toggle between **Z-Axis: Enabled** and **Z-Axis: Disabled**.
2. Disable **Z-Axis** if you are working with long tubes and do not want the Z-drive to go up for incubation within your application (Gemini).

Heating Corrections

See (→ Cross References).

Evaluation of Overheating

See (→ Cross References).

11.6.9 Range Test

Cross References

List of cross references to information provided in other sections:

Information	References
Summary of all test results	See section 11.6.12, 🗎 11-69

Purpose

The **Range Test** procedure finds out quickly if the device can be initialized in every extreme position and if the whole range can be reached. The device is initialized after every move.

ATTENTION

Before starting this procedure make sure the Te-MagS contains no rack for tubes, TEMPO110 sensor or other obstacles hindering free movement of the drives.

Procedure

To perform a range test:

1 On the **Contents** page, select the **Range Test** check box. No further parameters have to be defined.
2 Click **Start**.
3 If the **Install the heating- and the magnet blocks and remove the TEMPO110 sensor** message appears, confirm with **Next**.
4 At the end of the test, a **Range Test: Passed** or **Failed** message appears.
5 Confirm with **OK**.

For a summary of all test results (→ Cross References).

If the Test Fails

If the test fails, perform the **Y-Autorange** procedure . There is a mechanical problem if the test fails again. Call your nearest service organization.

11.6.10 Burn-In/Validation of Mechanics

Cross References

List of cross references to information provided in other sections:

Information	References
Summary of all test results	See section 11.6.12, 🗎 11-69

Purpose

The **Burn-In of Mechanics** procedure is used to find early failures of the mechanics. During 1000 cycles (default) the axes under test are moved and validated continuously. The **Burn-In of Mechanics** procedure is always performed before the Te-MagS leaves the factory. Therefore, it is not necessary to repeat it at the customer's site.

The **Validation of Mechanics** procedure is used to check whether the mechanics works satisfactorily. All axes are moved at random for a defined number of cycles (default is 200). After 20 cycles, an initialization is performed and the deviation is evaluated. The two tests differ from each other only in the number of test cycles.

ATTENTION

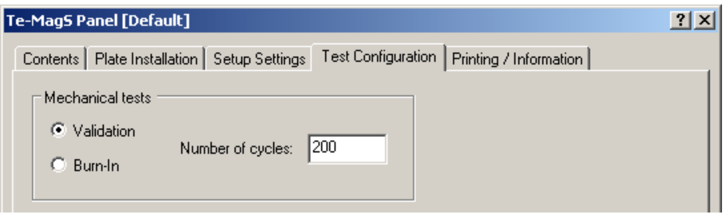
Before starting the procedure:

- The tubes must be removed, and the heating block must be installed.
- The test must be performed with the magnet and heating block installed, as their weights might influence the result.

Procedure

To perform the procedure:

1 On the **Contents** page, select the **Burn-In/Validation of Mechanics** check box and change to the **Test Configuration** page.



● Validation
○ Burn-In
Number of cycles: 200

Fig. 11-49 Test Configuration page

2 Select **Validation**. The **Number of cycles** is automatically set to the default value of 200 cycles.

3 If necessary, change the number of cycles in the **Number of cycles** input field.

4 Start the procedure with **Start**.

5 If the **Install the heating- and the magnet blocks and remove the TEMPO110 sensor** message appears do the following:
   - Follow the instructions on the screen.
   - Confirm with **Next**.

   *At the end of the test, a **Burn Test/Validation of Mechanics: Passed** or **Failed** message appears.*

6 Confirm with **OK**.

For a summary of all test results (→ Cross References).

If the Test Fails

If the test fails, perform the **Y-Autorange** procedure. There is a mechanical problem if the test fails again. Call your nearest service organization.

11.6.11 Burn-In/Validation of Heating

Cross References

List of cross references to information provided in other sections:

Information	**References**
Summary of all test results	See section 11.6.12, 🗎 11-69
Burn-in of heating	See section 11.4.10, 🗎 11-45
Heating validation with TEMPO110	See Section 11.4.11, 🗎 11-46

Note: *Since the procedures to be followed also apply to other devices they are described in separate sections (→ Cross References).*

11.6.12 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	**References**
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

11.7 Te-Shake

11.7.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Tecan or customized plates	See section 11.4.1, 🗎 11-30

Description

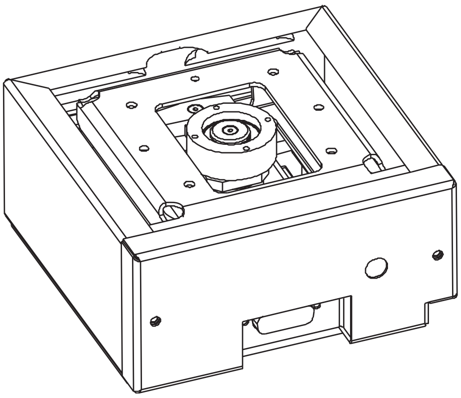


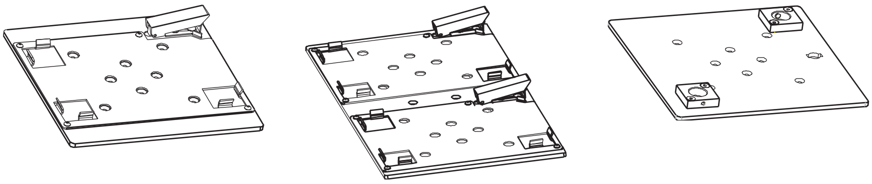
Fig. 11-50 Te-Shake

The Te-Shake is an orbital shaker for microplates or microplate-like racks. It performs mixing functions on Freedom EVO, Genesis Freedom and Classic instruments. Optionally, a heating block with which samples can be heated during the mixing process may be placed on the Te-Shake. The shaker plate (see following figure) is mounted to an eccentric. In this way, the rotation of the rotor produces the orbital movement of the shaker plate.

Te-Shake Variants

The Te-Shake is supplied as a base unit. Shaker plates are available depending on the requirements:

- Shaker plate for one microplate
- Shaker plate for two microplates
- Shaker plate for heating



Shaker plate
for one microplate

Shaker plate
for two microplates

Shaker plate
for heating

Fig. 11-51 Shaker plates

Further Information

Find further information about the Te-Shake:

- Tecan or customized plates (→ Cross References)

- Te-Shake Operating Manual
- Te-Shake Service Manual
- Gemini Software Manual
- EVOware Software Manual

Te-Shake Files

The Te-Shake function can create the following files:

- **Result Files:** Test results are stored in *.any files.

Directory:	<data_path>\Results
File name:	TeShake_<serial_number>_<date>_<time>.any

- **Log Files:** Every time a heating block is used (e.g. a **Calibrate heating block by TEMPO110**, **Burn-In of Heating** or **Heating Validation with TEMPO110** procedure is started), a log file is created into which the values for the heating curves are written. You can open it in Microsoft Excel or in another appropriate spreadsheet program.

Directory	<data_path>\Log
File name	TeShakeTemperatures.xls

***Note:** To archive the curve, save the log file under a new name, since the file will be overwritten after starting a further procedure with **Start**.*

- **Plate Files:** The file for Tecan plates is copied to disk and installed with the installation of the software. For customized plates, an own file is generated when the plates are created and the **Apply** button is clicked.

Directory:	<install_path>\Modules (for TeShakeTecanPlates.any) <data_path>\Config (for TeShakeCustomPlates.any)
File names:	TeShakeTecanPlates.any for Tecan plates TeShakeCustomPlates.any for customized plates

11.7.2 Te-Shake Panel

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Note: *Some of the following setup and calibration procedures can be carried out by members of the SnS_Customer group as well.*

Tab. 11-11 *Te-Shake Functions and User Permissions*

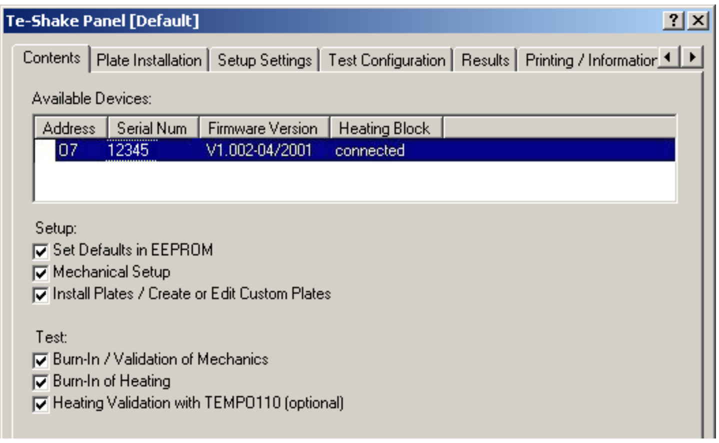
Function	Type	User	FSE
Set Defaults in EEPROM	Setup		X
Mechanical Setup	Setup		X
Install Plates/Create or Edit Custom Plates [a]	Setup	X	X
- Install Tecan and customized plates	Setup	X	X
- Remove Tecan and customized plates	Setup	X	X
- Delete customized plates	Setup		X
- Calibrate heating block with manufacturer parameters	Setup	X	X
- Calibrate heating block with TEMPO110	Setup		X
- Create customized plates	Setup		X
Burn-In/Validation of Mechanics	Test	X	X
Burn-In of Heating [a]	Test	X	X
Heating Validation with TEMPO110 [a]	Test	X	X
Printing / Information	Page	X	X
Diagnostics	Page	X	X
QC-report	Report	X	X

a) Procedure can only be carried out if a heating plate is installed

Starting the Panel

To setup or test the Te-Shake:

1 Start the panel with **Options > Te-Shake**. The **Te-Shake** panel with activated **Contents** page appears. After starting the **Te-Shake** panel, no setup or test check box is selected and not all tabs are visible.



Available Devices:

Address	Serial Num	Firmware Version	Heating Block
07	12345	V1.002-04/2001	connected

Setup:
☑ Set Defaults in EEPROM
☑ Mechanical Setup
☑ Install Plates / Create or Edit Custom Plates

Test:
☑ Burn-In / Validation of Mechanics
☑ Burn-In of Heating
☑ Heating Validation with TEMP0110 (optional)

***Fig. 11-52** Te-Shake Panel - Contents page*

Pages

The **Te-Shake** panel is subdivided into the following pages:

Page	Function
Contents	General overview, procedure selection.
Plate Installation	Plate installation and heating block calibration data.
Setup Settings	Plate configuration data and mechanical setup.
Test Configuration	Configuration of the test procedures to be performed.
Results	Test results summary.
Printing / Information	Print selection for the QC-report.
Move Tool	Informal rotation test.
Diagnostics	Diagnostic data.

11.7.3 Unknown Plate Found

Cross References

List of cross references to information provided in other sections:

Information	References
Unknown plate	See section 11.4.3, 🗎 11-36

The message **Unknown plate found** appears when the data of a custom plate differs from the values stored in the database. In such a case you have to rename the plate and store the data in the database (⟶ Cross References).

11.7.4 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To set the Tecan defaults:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box. No further parameters need to be defined.
2. Download the default values have them re-read by clicking **Start**.

Confirm the **Test** message with **OK**.

11.7.5 Setup: Mechanical Setup

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

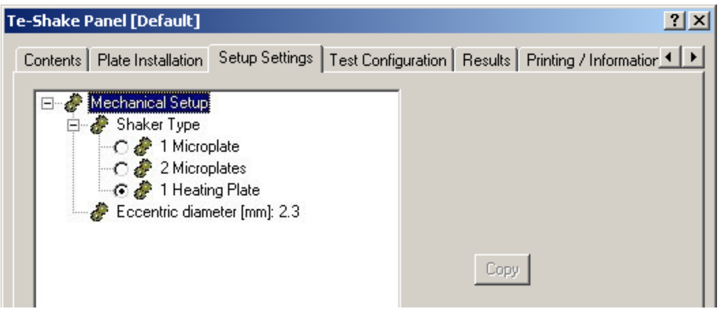
The **Mechanical Setup** procedure lets you define the shaker plate type and the diameter of the eccentric. It must be performed in the following cases:

- When the device is put into operation for the first time
- If a different shaker plate is installed
- If the counterweight is changed

Procedure

To set the configuration:

1. On the **Contents** page, select the **Mechanical Setup** check box and change to the **Setup Settings** page.



Mechanical Setup
- Shaker Type
  - ○ 1 Microplate
  - ○ 2 Microplates
  - ● 1 Heating Plate
- Eccentric diameter [mm]: 2.3

Fig. 11-53 *Mechanical setup*

2 Expand the **Mechanical Setup** node and select the correct shaker from the **Shaker Type** options.

*If you select or clear (by selecting another option) the **1 Heating Plate** option button, a message appears that notifies you that you are going to change the Te-Shake type. Confirm with **OK**. After processing steps 3 and 4, finish the Te-Shake function with **Close** and restart it with **Options > Te-Shake**.*

3 If necessary, correct the **Eccentric diameter** parameter.

4 Confirm your entries with **Start**.

11.7.6 Setup: Install Plates/Create or Edit Custom Plates

Note: *This procedure can only be performed if a shaker plate with heating is installed.*

Actions	**References**
Install Tecan or customized plates [a]	See section 11.4.4, 🗎 11-37
Remove Tecan or customized plates [a]	See section 11.4.5, 🗎 11-40
Delete customized plates	See section 11.4.6, 🗎 11-40
Calibrate heating block using manufacturer parameters [a]	See section 11.4.4, 🗎 11-37
Calibrate heating block using TEMPO110	See section 11.4.7, 🗎 11-41
Create customized plates	See section 11.7.7, 🗎 11-75

a) These procedures do not require the field service engineer password.

Purpose

The **Install Plates/Create or Edit Custom Plates** procedure lets you carry out the actions listed in the cross-reference table above.

11.7.7 Create Customized Plates

Cross References

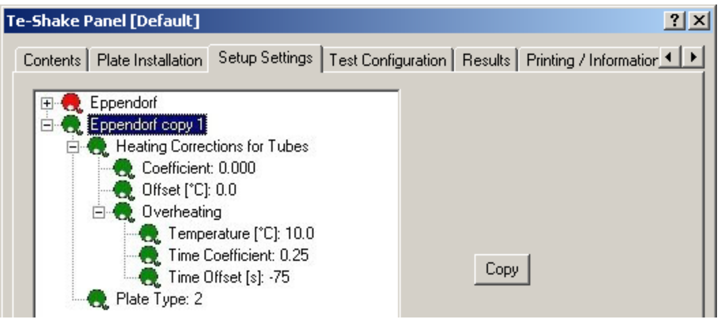
List of cross references to information provided in other sections:

Information	References
Calculate temperature correction	See section 11.4.8, 🗎 11-43
Evaluation of Overheating	See section 11.4.9, 🗎 11-44

Customized Plates

A customized plate is a copy of an existing plate that has a non-blank name and differs in at least one parameter from its original. Its data set is stored in an appropriate *.any file.

1 On the **Contents** page, select the **Install Plates/Create or Edit Custom Plates** check box and change to the **Setup Settings** page.



- Eppendorf
- Eppendorf copy 1
  - Heating Corrections for Tubes
    - Coefficient: 0.000
    - Offset [°C]: 0.0
    - Overheating
      - Temperature [°C]: 10.0
      - Time Coefficient: 0.25
      - Time Offset [s]: -75
  - Plate Type: 2

Fig. 11-54 *Setup Setting page*

2 Select an existing plate (reference plate).

3 Click **Copy**. A new plate appears in the list. It is marked green, and its name is: **<original_name> copy<number>**.

4 Select the copied plate, and click it again to rename it.

Heating Corrections

See (→ Cross References).

Evaluation of Overheating

See (→ Cross References).

11.7.8 Burn-In/Validation of Mechanics

Cross References

List of cross references to information provided in other sections:

Information	References
Summary of all test results	See section 11.7.11, 🗎 11-79

Purpose

The **Burn-In of Mechanics** procedure serves to find early failures of the mechanics. During 4 hours (default), the shaker plate is rotated at different speeds and in various directions. The **Burn-In of Mechanics** procedure is always performed before the Te-Shake leaves the factory. It is therefore not necessary to repeat it at the customer’s site.

The **Validation of Mechanics** procedure serves to check whether the mechanics work properly. The shaker plate is rotated for a defined test time (default time: 60 seconds). The two tests differ only in the test time.

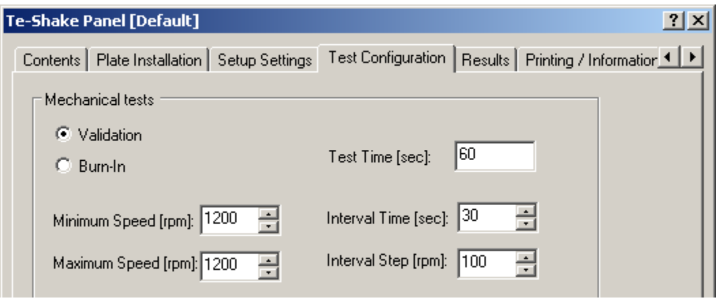
Test Principle

The test begins at the defined **Minimum Speed**, with the shaker rotating clockwise for a given **Interval Time**. Then, the rotation direction is reversed and the shaker is rotated counterclockwise for the same time. After each cycle, the speed is increased by **Interval Step** and the procedure is repeated until the **Maximum Speed** is reached. Then, it continues at **Minimum Speed**. When the **Test Time** has elapsed, the test is stopped, regardless of the other parameters.

Procedure

To perform the procedure:

1 On the **Contents** page, select the **Burn-In/Validation of Mechanics** check box and change to the **Test Configuration** page.



Mechanical tests

● Validation
○ Burn-In

Test Time [sec]: 60

Minimum Speed [rpm]: 1200

Maximum Speed [rpm]: 1200

Interval Time [sec]: 30

Interval Step [rpm]: 100

Fig. 11-55 Te-Shake Panel - Test Configuration page

The **Test Configuration** page contains the following controls:

Validation	Option button to select validation of mechanics (default).
Burn-In	Option button to select burn-in of mechanics.
Test Time	Input field for overall test time.
Minimum Speed	Input field for minimum speed (in revolutions per minute).
Interval Time	Input field for interval time (in seconds) at one speed in one direction in the range (5 to 60).
Interval Step	Input field for interval step (in revolutions per minute)

2 Select **Validation**. The default **Test Time** is set automatically.

3 If necessary, change the test parameters.

4 Start the procedure with **Start**.

*At the end of the test, a **Burn-In Test/Validation of Mechanics: Passed** or **Failed** message appears.*

5 Confirm with **OK**. The **Results** page is active.

Pass/Fail Criteria

The test is passed, if the following conditions are fulfilled:

Mechanical Burn-In / Validation:

Status: Passed

Move Errors: 0

Initialization Errors: 0

Heating Block Connected: Yes

Fig. 11-56 *Mechanical Burn-In/Validation section on Results page*

Maximum number of Move Errors (drive overload errors):	0
Maximum number of Initialization Errors:	0

If the Test Fails There is a mechanical problem if the test fails. Call your nearest service organization.
For a summary of all test results (→ Cross References).

11.7.9 Burn-In/Validation of Heating

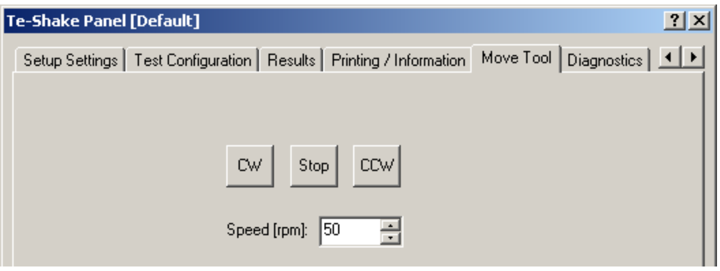
Cross References List of cross references to information provided in other sections:

Information	References
Summary of all test results	See section 11.7.11, 🗎 11-79
Burn-in of heating	See section 11.4.10, 🗎 11-45
Heating validation with TEMPO110	See Section 11.4.11, 🗎 11-46

Note: *Since the procedures to be followed also apply to other devices they are described in separate sections (→ Cross References).*

11.7.10 Move Tool

Purpose The **Move Tool** lets you rotate the shaker clockwise and counterclockwise at various speeds.



Speed [rpm]: 50

Fig. 11-57 *Te-Shake Panel - Move Tool page*

Controls The **Move Tool** page contains the following controls:

CW	Starts the rotation of the shaker in clockwise direction.

Stop	Stops the rotation.
CCW	Starts the rotation of the shaker in counterclockwise direction
Speed [rpm]	Input field for rotating speed (in revolutions per minute).

Procedure

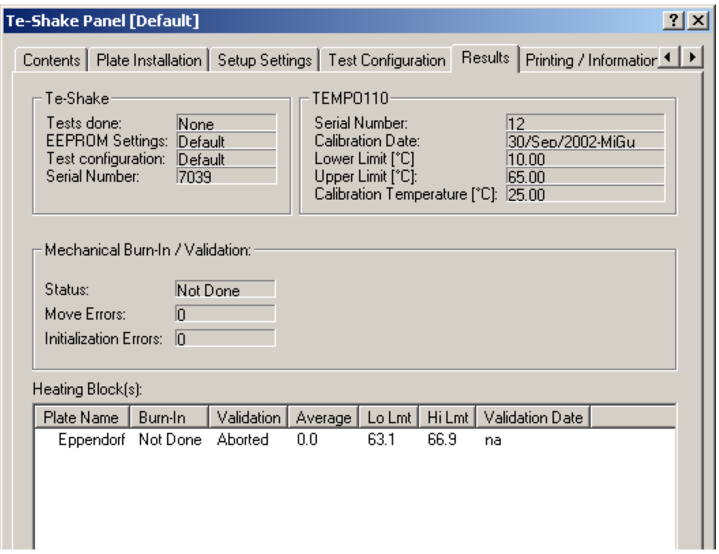
To rotate the shaker plate:

1. Change to the **Move Tool** page.
2. Use the command buttons to move the shaker plate as needed.

11.7.11 Results Page

Purpose

After executing a test, the results are summarized on the **Results** page:



Te-Shake
Tests done: None
EEPROM Settings: Default
Test configuration: Default
Serial Number: 7039

TEMPO110
Serial Number: 12
Calibration Date: 30/Sep/2002-MiGu
Lower Limit [°C] 10.00
Upper Limit [°C]: 65.00
Calibration Temperature [°C]: 25.00

Mechanical Burn-In / Validation:
Status: Not Done
Move Errors: 0
Initialization Errors: 0

Heating Block(s):

Plate Name	Burn-In	Validation	Average	Lo Lmt	Hi Lmt	Validation Date
Eppendorf	Not Done	Aborted	0.0	63.1	66.9	na

Fig. 11-58 *Te-Shake Panel - Results page*

Data

The **Results** page displays the following data:

Te-Shake

- **Tests done**	**None**, **All** or **Not all**
- **EEPROM Settings**	**User Defined** or **Default**
- **Test configuration**	**User Defined,** if there were deviations to the default values, otherwise **Default.**
- **Serial Number**	Serial number of Te-Shake

TEMPO110

- **Serial Number**	Serial number of TEMPO110
- **Calibration Date**	Date of last calibration and short name of person who calibrated TEMPO110

- **Lower Limit [°C]** - **Upper Limit [°C]**	Lower/upper temperature limit: Range for which TEMPO110 has been designed and within which it should be used.
- **Calibration Temperature [°C]**	Temperature at which TEMPO110 was calibrated.
Range Test	Detailed results (see **Results** page)
Mechanical Burn-In/Validation	Detailed results (see **Results** page)
Heating Block(s)	Detailed results (see **Results** page)

Viewing/ Printing Results

To view or print test results:

1. Change to the **Results** page.
2. Print the test results with **Print** or preview the test report.

11.7.12 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

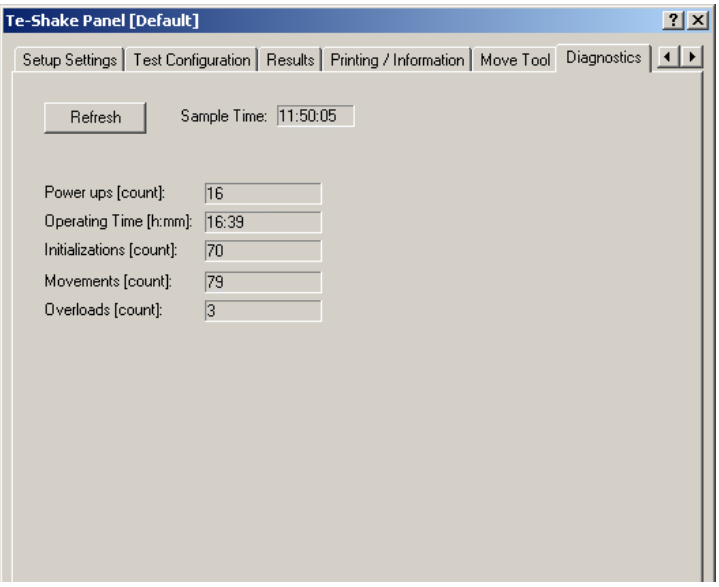
QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

11.7.13 Diagnostics Page

Purpose

The **Diagnostics** page provides useful diagnostic data for field service engineers.



Sample Time: 11:50:05

Power ups [count]: 16
Operating Time [h:mm]: 16:39
Initializations [count]: 70
Movements [count]: 79
Overloads [count]: 3

Fig. 11-59 *Te-Shake Diagnostics page*

Controls, Data

The **Diagnostics** page contains the following controls and displays the following data:

Refresh	Reloads the diagnostic data and refreshes the **Sample Time**.
Sample Time	Snapshot time (e.g., time when the diagnostic data were read)
Power ups	Number of times the instrument was switched on.
Operating Time	Total operating time in hours and minutes since first start.
Initializations	Total number of initializations.
Movements	Total number of rotation cycles.
Overloads	Total number of overload errors.

Viewing Diagnostics Data

To view diagnostics data:

1. Change to the **Diagnostics** page.
2. View/examine the data.

12 Options 2

12.1 Options Menu

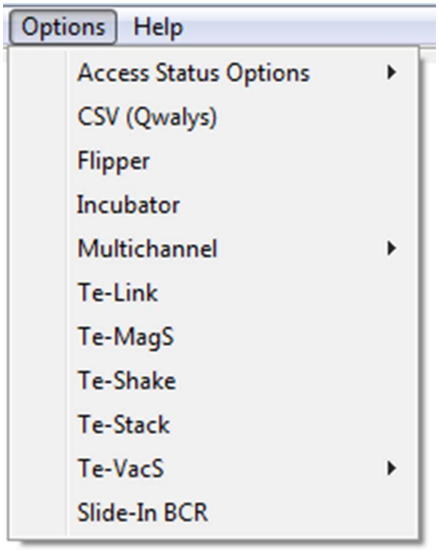


Fig. 12-1 Options menu

The **Options** menu contains the commands listed below.3

Tab. 12-1 Options Menu

Menu Item	Function	See section
Incubator	Setup and test of the heated incubator	11.2, 🗎 11-3
Te-Thermix	as above for Te-Thermix	11.5, 🗎 11-49
Te-MagS	As above for Te-MagS	11.6, 🗎 11-58
Te-Shake	As above for Te-Shake	11.7, 🗎 11-70
Te-Shake	As above for Te-Shake	11.7, 🗎 11-70
Access Status Options	Setup and test of status and alarm devices	12.2, 🗎 12-3
CSV (Qwalys 3)	As above for CSV (only if this function has been selected during installation)	12.3, 🗎 12-76
Flipper	As above for the Flipper (only if Cellerity has been selected during installation)	12.4, 🗎 12-82
Te-Link	As above for Te-Link	12.5, 🗎 12-92

Tab. 12-1 Options Menu

Menu Item	Function	See section
Te-VacS	As above for Te-VacS	12.6, 🗎 12-100
Te-Stack	As above for Te-Stack	12.8, 🗎 12-116
Slide-In BCR	As above for Slide-In BCR	12.9, 🗎 12-143
Multichannel	Setup and test of Te-MO, Aquarius, Autoloader	13, 🗎 13-1

12.2 Access / Status Functions

12.2.1 Introduction

Purpose

The **Access and Status** functions are subdivided into a number of panels used for setting up and testing various safety and status devices (e.g., door locks, status indicators, sensors, acoustic alarm devices, etc.). The panels that can be invoked depend on the instrument type and configuration.

Access/Status Sub-Menu

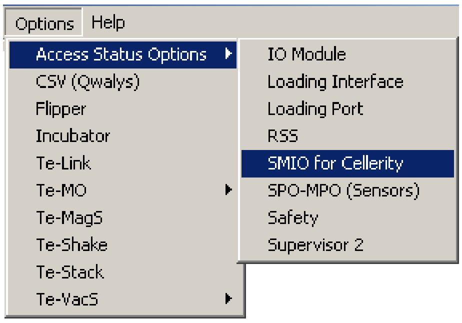


Fig. 12-2 Access / Status sub-menu

The **Access / Status** sub-menu lets you call up the panels described below.

Tab. 12-2 Access / Status functions

Panel	Function	Used for	Details see
I/O Module	Tests the functions of the I/O Module (optional extension to Te-CU board).	Freedom EVO	12.2.2, 🗎 12-4
Loading Interface	Test of position sensors and indicator lamps	EVOlyzer, instruments 30045716, 30045717 and 30045718	12.2.3, 🗎 12-11
Loading Port	Test of door lock, LEDs and plate sensors	Instruments 30045716, 30045717 and 30045718	12.2.4, 🗎 12-16

Tab. 12-2 Access / Status functions

Panel	Function	Used for	Details see
SMIO for Cellerity	Test of door locks, waste container sensor and solid waste sensor for Cellerity	Cellerity	12.2.5, 🗎 12-24
SPO-MPO (Sensors)	Calibration and test of system liquid and waste liquid bottle sensors (Licos & trolley sensors)	Freedom EVO, EVOlyzer, instruments 30045716, 30045717 and 30045718	12.2.7, 🗎 12-39
Safety	Setup and test of door locks, status and alarm devices connected to the SMIO board.	Freedom EVO, Aquarius, Auto-Loader, instruments 30045716, 30045717 and 30045718, 30030281	12.2.8, 🗎 12-47
SMIO 30030281	Adjust DiTi waste bag sensor. Test system liquid sensor, waste liquid sensor and DiTi waste bag sensor for 30030281.	30030281	12.2.5, 🗎 12-24

12.2.2 I/O Module

Purpose

This panel provides the functions for testing the I/O Option board.

12.2.2.1 Introduction

Brief Description

The I/O Option board is an add-on board that can be plugged onto the Te-CU board (located in the compartment behind the left access door of the instrument). The board has 4 input lines, 4 output lines and an RS-485 interface.

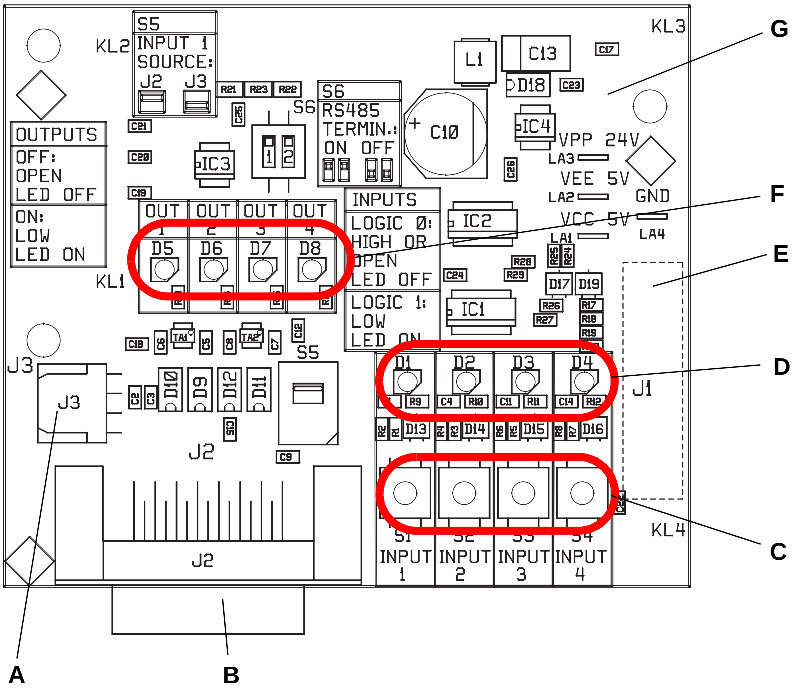


Fig. 12-3 I/O Te-CU board

A	*Connector (digital input 1)*
B	*Connector (15 pins) for RS-485 Interface*
C	*Input simulation switches (S1 to S4)*
D	*Input status LEDs (D1 to D4)*
E	*Interconnection to Te-CU*
F	*Output status LEDs (D5 to D8)*
G	*I/O Te-CU*

The above figure shows the layout of the board:

- **Input lines:** Over the inputs lines 1 to 4 the Te-CU into which the I/O board is plugged, can receive signals from an external data source. The status LEDs D1 to D4 light up when a logic 1 signal is applied to the corresponding input. The switches S1 to S4 allow a simple test of the inputs: When one of them is pressed the corresponding LED lights up.
- **Output lines:** Over the output lines, an external device can receive signals from the Te-CU. The 4 LEDs D5 to D8 show the states of the outputs OUT 1 to OUT 4: If an output has the state logic 1 the corresponding LED is on.
- **RS-485 Interface:** The board is also equipped with an RS-485 interface. This interface enables the Te-CU board to communicate with external devices via the connector (J2). The transmission protocol used is the Tecan-specific OEM-Protocol.

Required Tools

None.

12.2.2.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

The test(s) described in this section can be carried out by users belonging at least to the SnS_Customer group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 12-3 *I/O Module, Functions and User Permissions*

Function	Type	User	FSE
Input Test	Test	X	X
Output Test	Test	X	X
RS-485 Operation Test	Test	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Files, Directories

The I/O Option function creates the following files:

- **Result Files:** Test results are stored in *.any files.

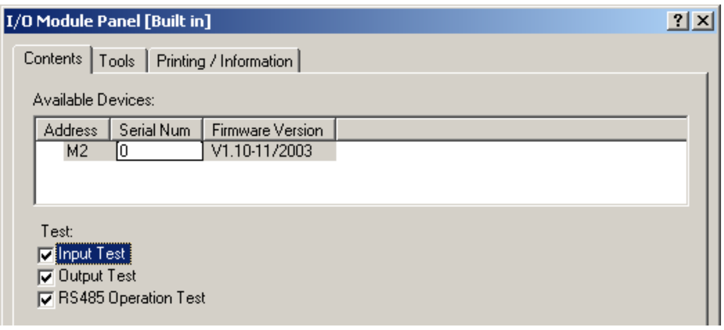
Directory:	<data_path>\Results
File name:	IOModule_<serial_number>_<date>_<time>.any

Starting the Panel

To set up or test the I/O Option board:

1 Start the panel with **Options > Access Status > IO Module**. The **I/O Module** panel with activated **Contents** page appears (see following figure).

*After starting the **I/O Module** panel, no setup or test check box is selected.*



Available Devices:

Address	Serial Num	Firmware Version
M2	0	V1.10-11/2003

Test:
☑ Input Test
☑ Output Test
☑ RS485 Operation Test

Fig. 12-4 *I/O Module panel - Contents page*

Pages

The **I/O Module** panel is subdivided into the following pages:

Tab. 12-4 Pages in I/O Module panel

Page	Function
Contents	General overview, device and procedure selection.
Tools	Contains the controls for an informal test of the board
Printing / Information	Print selection for the QC-report

12.2.2.3 Tools Page

Purpose

The Tools page contains the controls that allow you to test the I/O board informally.

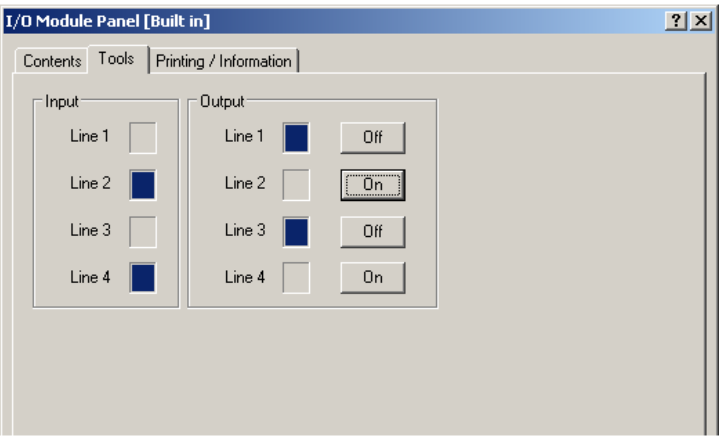


Fig. 12-5 I/O Module panel - Tools page

Controls

The **Setup** page contains the following controls:

Inputs	The frame **Inputs** contains 4 indicator fields **Line 1** to **Line 4**.
- **Indicator fields**	A field turns blue when a logic 1 signal is applied to the corresponding input (or when the button of the associated switch is pressed). Note that the associated LED on the board is also turned on in this case.
Outputs	The frame **Outputs** contains the controls for testing the outputs **Line 1** to **Line 4**.
- **Indicator fields**	A field turns blue if a logic 1 signal is applied to the corresponding output line (gray if the signal changes to logic 0).
- **Command buttons**	These are toggle buttons that change the corresponding output from logic 0 to logic 1 or vice versa when clicked. Note that the caption of a button changes accordingly from **On** to **Off** and vice versa. When an output line is in the logic 1 state the corresponding LED is turned on and the indicator field appears blue.

12.2.2.4 Input Test

Purpose

This procedure serves for checking the inputs of the I/O board.

Prerequisite

The I/O board must be installed on the Te-CU board and the instrument must be switched on.

Procedure

To test the input lines:

1. On the **Contents** page, select the **Input Test** check box.
2. Click **Start** to begin.

   You will be guided through the test by a series of process prompts (not shown here). Always follow the instructions provided on the prompts.
3. When prompted press the appropriate switch (S1 to S4) whose number is indicated on the prompt.
4. Do the same for the other switches when prompted to do so.

If the Test Fails

Try the following:

- Check the installation of both the Te-CU and the I/O boards.
- Ensure that all settings are correct.
- Replace the I/O board if necessary.
- If the problem persists contact the customer service department for assistance if necessary.

12.2.2.5 Output Test

Purpose

This procedure serves for checking the outputs of the I/O board.

Prerequisite

The I/O board must be installed on the Te-CU board and the instrument must be switched on.

Procedure

To test the output lines:

1. On the **Contents** page, select the **Output Test** check box.
2. Click **Start** to begin.

   You will be guided through the test by a series of process prompts (not shown here). Always follow the instructions provided on the prompts.
3. When prompted check whether the LED of the indicated output lights up. Confirm with **Yes** if this is the case.
4. Do the same for the other outputs when prompted to do so.

If the Test Fails

Try the following:

- Check the installation of both the Te-CU and the I/O boards.
- Ensure that all settings are correct.
- Replace the I/O board if necessary.
- If the problem persists contact the customer service department for assistance if necessary.

12.2.2.6 RS-485 Operating Test

Purpose

This procedure serves for testing whether the RS-485 interface located on the I/O board works properly.

Prerequisite

Make sure the following conditions are fulfilled:

- The I/O board must be installed on the Te-CU board and the instrument must be switched on.
- No commands must be executed during the test.

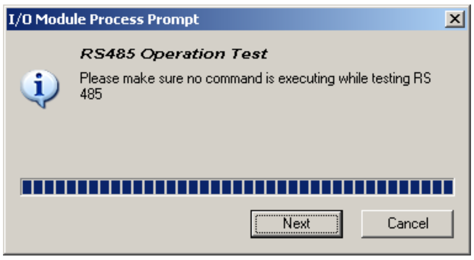
Procedure

To test the RS-485 interface:

1 On the **Contents** page, select the **RS-485** check box.

*Click **Start** to begin.*

You will be guided through the test by some process prompts. Always follow the instructions provided on the prompts.


I/O Module Process Prompt

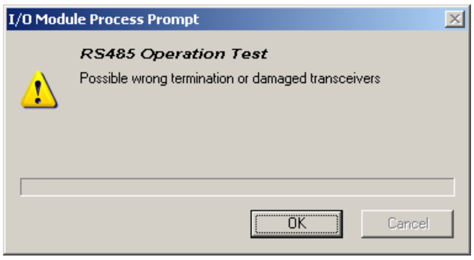
RS485 Operation Test

Please make sure no command is executing while testing RS 485

The first prompt reminds you to stop running command sequences.

2 If not done yet stop the execution of commands.

3 Click **Next** to start the test.


I/O Module Process Prompt

RS485 Operation Test

Possible wrong termination or damaged transceivers

Fig. 12-6 *Example of a failed test*

*If the RS-485 interface is in order and terminated properly the **I/O Board Test: Passed** message is displayed, otherwise the **I/O Board Test: Failed** (see figure on the left side).*

4 Confirm with **OK**.

If the Test Fails

Try the following:

- Check the installation of both the Te-CU and the I/O boards.
- Ensure that all board settings are correct. Pay special attention to the correct setting of the RS-485 termination switches. Consult the Operating Manual of the I/O board for the correct settings.
- Replace the I/O board if necessary.
- If the problem persists contact the customer service department for assistance if necessary.

12.2.2.7 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.2.3 Loading Interface

12.2.3.1 Overview

Purpose

This panel provides the functions needed to test the LEDs and position sensors of the Loading Interface that are installed on EVOlyzer instruments.

Brief Description

The Loading Interface is a system designed to facilitate the use of the instrument on which it is installed. It consists of the following main components:

- A number of magnetic position sensors (Hall sensors) are installed beneath the worktable, near the front row of positioning pins. These sensors are used to monitor the absence or presence of carriers at the various grid positions on the worktable.
- The carriers to be monitored are equipped with a permanent magnet that actuates the corresponding sensor. If a carrier occupies more than one grid position, the permanent magnet is located on its left side.
- A number of status LED indications are arranged along the front of the worktable. There is one red and one green LED in each grid position. These LEDs can be used by the application software to guide the user through certain processes and for various status and alarm indications.

Fig. 12-7 *Status LEDs on Worktable*

The maximum number of sensors and LEDs depends on the instrument size.

- Instrument size 100 cm: 30 grid positions, 25 sensors
- Instrument size 150 cm, 45 grid positions, 34 or 40 sensors
- Instrument size 200 cm, 69 grid positions, 58 or 64 sensors

Tools

Please note:

- The production department has a special “Sensor Control Tool” that allows testing eight position sensors at a time.
- It is not planned to use this tool at the customer’s site. The position sensors can be tested one by one with the aid of a suitable carrier that is equipped with a position magnet.

12.2.3.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

The test(s) described in this section can be carried out by users belonging at least to the SnS_Customer group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 12-5 Loading Interface, Functions and User Permissions

Function	Type	User	FSE
LED Test	Test	X	X
Sensor Test	Test	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Files, Directories

The Loading Interface function creates the following files:

- **Result Files:** Test results are stored in *.any files.

Directory: <data_path>\Results

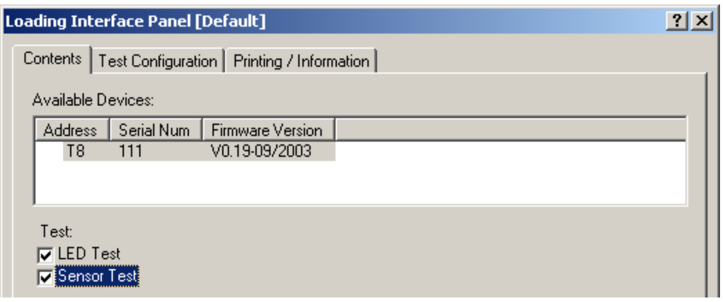
File name: LoadingInterface_<serial_number>_<date>_<time>.any

Starting the Panel

To set up or test the Loading Interface:

1 Start the panel with **Options > Access Status > Loading Interface**. The **Loading Interface** panel with activated **Contents** page appears (see following figure).

*After starting the **Loading Interface** panel, no setup or test check box is selected.*



Available Devices:

Address	Serial Num	Firmware Version
T8	111	V0.19-09/2003

Test:
☑ LED Test
☑ Sensor Test

Fig. 12-8 Loading Interface panel - Contents page

Pages

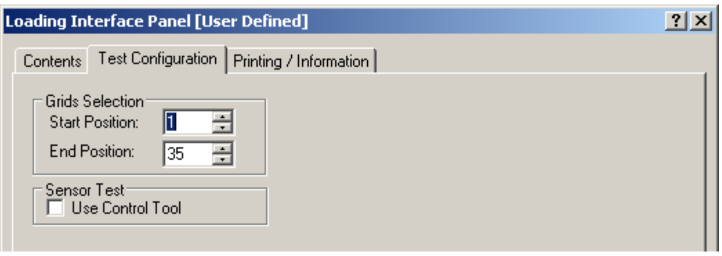
The **Loading Interface** panel is subdivided into the following pages:

Tab. 12-6 Pages in Safety panel

Page	Function
Contents	General overview, device and procedure selection.
Test Configuration	Definition of test conditions
Printing / Information	Print selection for the QC-report

12.2.3.3 Test Configuration Page

Purpose This page allows you to define the test conditions.



Loading Interface Panel [User Defined]

Start Position: 1

End Position: 35

☐ Use Control Tool

Fig. 12-9 Loading interface - Test Configuration page

Controls

The controls are arranged in two frames.

Grid Selection	Spin boxes for the range of LEDs and sensors to test
- **Start Position**	Grid position of leftmost LED/sensor in range
- **End Position**	Grid position of rightmost LED/sensor in range
Sensor Test	
- **Use Control Tool**	• This check box is used to inform the software that the test is carried out with the “Sensor Control Tool” that allows checking 8 sensors at a time. Usually only for the production department. • If no such tool is available the check box must be cleared. The sensors can be tested one by one with the aid of a carrier with position magnet (e.g., a tube rack).

12.2.3.4 LED Test

Purpose

The purpose of this procedure is to check whether all LEDs in a given range work properly.

Procedure

To carry out the test:

1. On the **Contents** page, select the **LED Test** check box and change to the **Test Configuration** page.
2. On the **Test Configuration** page, define the range of LEDs you want to test.

ATTENTION

Make sure ALL sensors in the defined range are visible and are not covered by objects of any kind.

3. Click **Start** to begin.

   You will be guided through the test procedure by a series of process prompts (not shown here). Strictly follow the instructions provided on the process prompts.
4. To test the LEDs:
   - The first prompt instructs you to ensure that all LEDs in the selected range are visible. Confirm with **Next** to continue if this is the case (abort with **Cancel** otherwise).
   - Next you are prompted to check if all red LEDs in the selected range are flashing. If this is the case click **Next** to continue.
   - In the next step, all green LEDs should be flashing. Click **Next** on the prompt if this is okay.
5. If there is another range of LEDs to test repeat the above steps 1 through 4 for that range.

If the Test Fails

Try the following:

- Check if you have defined the range of visible LEDs correctly. Repeat the test with the correct settings if necessary.
- If the problems persist the whole installation of the LEDs must be checked. Contact the customer service department for assistance if necessary.

12.2.3.5 Sensor Test

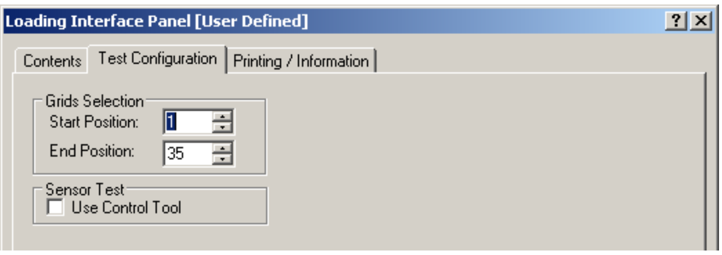
Purpose

The purpose of this procedure is to check whether all position sensors in a given range work properly.

Procedure

To test the position sensors:

1. Remove as many carriers, tube racks, etc. as possible from the worktable so that you can test the sensors over a large range.
2. On the **Contents** page, select the **Sensor Test** check box and change to the **Test Configuration** page.



Start Position: 1
End Position: 35
☐ Use Control Tool

Fig. 12-10 *Loading Interface - test configuration page*

3. Use the **Grids Selection** spin boxes to define the range of position sensors you want to test (**Start Position** and **End Position**). All grid positions in the defined range must be accessible.
4. Set the check box **Sensor Test** as follows:
   - Select the check box if the “Sensor Control Tool” is at your disposal (usually only for the production department).
   - Clear the check box otherwise. Use a carrier with position magnet for the test.
5. Click **Start** to begin.

   You will be guided through the test procedure by a series of process prompts (not shown here). Strictly follow the instructions provided on the process prompts.
6. To test the position sensors with the aid of a carrier:
   - Place the carrier in the indicated grid position on the worktable.
     - The position number is indicated on the prompt.
     - Before the carrier is placed on the worktable the associated red LED is on. As soon as the sensor detects the carrier the red LED goes out and the green one lights up.
   - Click **Next** if the sensor detects the carrier properly, otherwise abort with **Cancel**.
7. Repeat step 6 for all grid positions in the selected range.
8. If there is another range of sensors to be tested repeat the above steps 1 through 7 for that range.
9. When finished reinstall all carriers, racks, etc. you have removed before.

If the Test Fails

Try the following:

- Check whether your settings on the Test Configuration page are correct.
- Check whether the carrier or tool has the required position magnet(s) on the bottom side.
- Repeat the test with the correct settings and aids if necessary.
- If the problems persist, the carrier (or the “Control Tool”), as well as the whole installation of the position sensors must be checked. Contact the customer service department for assistance if necessary.

12.2.3.6 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.2.4 Loading Port (instruments 30045716, 30045717 and 30045718)

Cross References

List of cross references to information provided in other sections:

Information	References
Test of loading port on EVOlyzer instrument (Supervisor 2 panel)	See section 12.2.9, 🗎 12-60

Purpose

This panel lets you test the loading port installed on a Freedom EVO instrument that is equipped for instruments 30045716, 30045717 and 30045718.

Note: *The loading ports used on instruments 30045716, 30045717, 30045718 and Freedom EVOlyzer instruments are not identical. The loading port for Freedom EVOlyzer is tested with the “Supervisor 2” panel (see cross references).*

12.2.4.1 Introduction

Loading Port for instruments 30045716, 30045717 and 30045718

The following figure shows the loading port for instruments 30045716, 30045717 and 30045718.

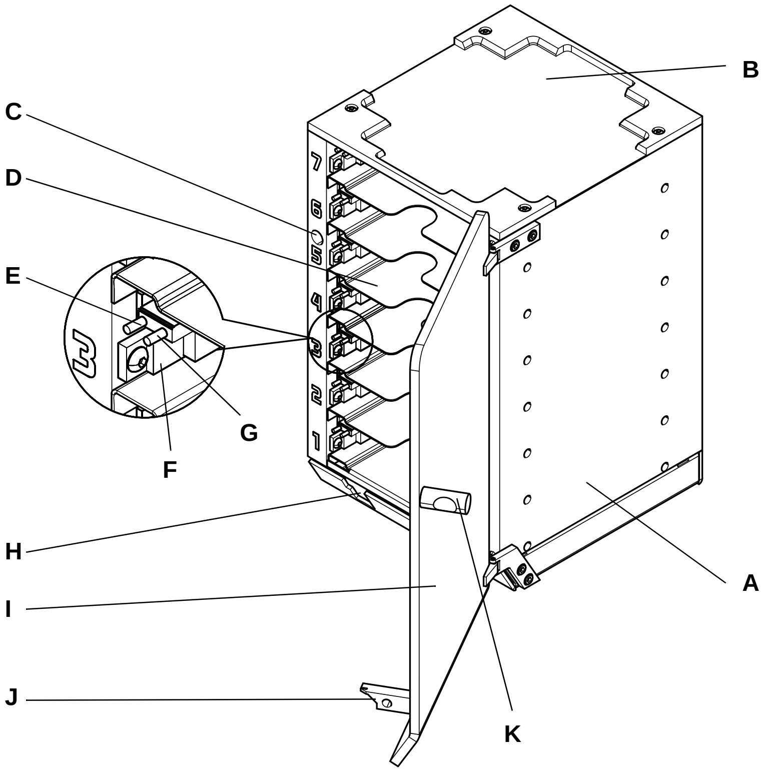


Fig. 12-11 *Loading port (instruments 30045716, 30045717 and 30045718)*

A	*Loading port*	***F***	*Slot sensor*
B	*External tray*	***G***	*Green LED*
C	*Magnet*	***I***	*Front door*
D	*Internal tray*	***J***	*Locking finger*
E	*Red LED*	***K***	*Door handle*

Features

The main features of the loading port for instruments 30045716, 30045717 and 30045718 are:

- Front door (I) with handle (K) and locking finger (J).
- Door lock. (H). The door lock can
- One external tray on the top for deep well plates or DiTi boxes.
- Seven internal trays for microplates (# 1 = bottom tray, # 7 = top tray). Each internal tray is equipped with one red LED (E), one green LED (G) and a reflexive optical sensor, the slot sensor (F), that detects the presence or absence of a microplate in the tray.
- The door lock and the LEDs are controlled by the application software via the firmware. The application software also reads the state of the reflexive optical sensor.
  - The door lock can be opened and closed.
  - Each individual LED can be switched permanently on or off or can be set flashing

– The state of each slot sensor can be determined at any time.

12.2.4.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

The test(s) described in this section can be carried out by users belonging at least to the SnS_Customer group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 12-7 RSS, Functions and User Permissions

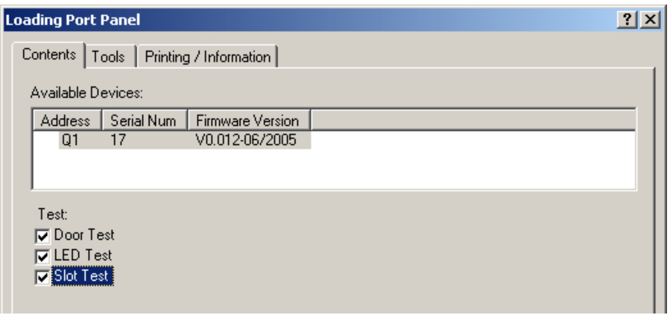
Function	Type	User	FSE
Door test	Test	X	X
LED test	Test	X	X
Slot test	Test	X	X
Tool	Tool		
Printing / Information	Page	X	X
QC-report	Report	X	X

Starting the Panel

To test the Loading Port:

1 Start the panel with **Options > Access Status Options > Loading Port**. The **Loading Port** panel with activated **Contents** page appears (see following figure).

*After starting the **Loading Port** panel, no test check box is selected.*



Available Devices:

Address	Serial Num	Firmware Version
Q1	17	V0.012-06/2005

Test:
☑ Door Test
☑ LED Test
☑ Slot Test

Fig. 12-12 Loading Port panel - Contents page

Pages

The **Loading Port** panel is subdivided into the following pages:

Tab. 12-8 Pages in Safety panel

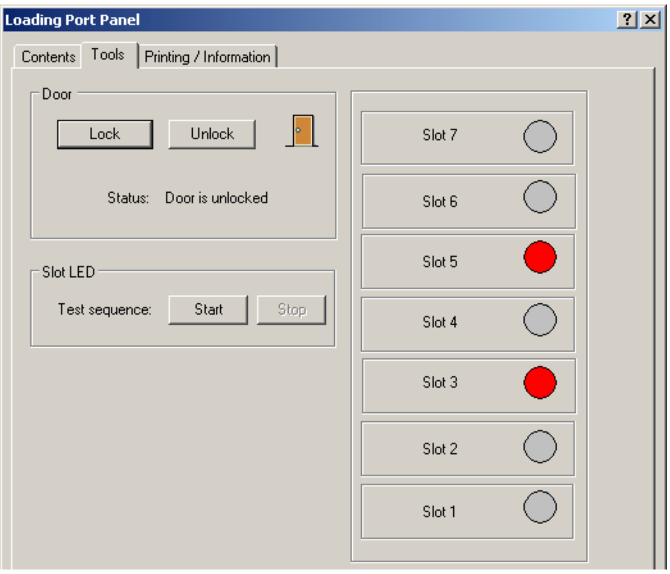
Page	Function
Contents	General overview, device and procedure selection.
Tools	Allows you to test the loading port functions informally.
Printing / Information	Print selection for the QC-report

12.2.4.3 Tools Page

Purpose

This page lets you test the door lock, the LEDs and the reflexive sensors informally.

Tools Page



Status: Door is unlocked

Fig. 12-13 Loading Port panel, Tools page

Controls

The following table briefly describes the controls on the **Tools** page.

Tab. 12-9 Controls on Tools page

Control		Description	
Door		Contains the controls for testing the door lock. The symbol on the right side shows the current status of the door.	
-	**Lock**	• Locks the door. Symbol if door is locked:	🔒
-	**Unlock**	• Unlocks the door. Symbol for unlocked door	🚪
		• Symbol if the door is open	🚪
Slot LED		Contains the controls for running the LED test	
-	**Start**	• Starts the LED test	
-	**Stop**	• Stops the LED test	

Tab. 12-9 Controls on Tools page (cont.)

Control	Description	
Elements on right side	Show the status reflexive sensors in the individual slot. The indicator on the right side lights up if the reflexive sensor has detected an object (e.g., a microplate) in the slot.	
- **Slot 1 to Slot 7**	Indicator ON: The slot contains an object (e.g., a microplate).	●
	Indicator OFF. Slot is empty.	○

12.2.4.4 Door Test

Purpose The purpose of this procedure is to test whether the states of the front door (open, closed, locked) are recognized and whether the door lock works properly.

Procedure To test the door:

1 On the **Contents** page, select the **Door Test** check box and click **Start** to begin.

You will be guided through the test by a series of precess prompts. Always follow the instructions provided on screen.

Loading Port Process Prompt

Loading Port Door Lock

Please open the front door

At the beginning the door should not be locked.

2 Open the front door.

3 Click **OK** when done.

Loading Port Process Prompt

Loading Port Door Lock

Please close the front door

4 Now close the door.

5 Click **Ok** when done.

The door will now be locked.

Loading Port Process Prompt

Loading Port Door Lock

Check if the front door is locked now.
Press 'OK' if successful, otherwise press 'Cancel'.

6 Check whether the door is locked.

7 Click **OK** if in order, **Cancel** otherwise.

Now the door will again be unlocked.

Loading Port Door Lock

Check if the front door is unlocked.
Press 'OK' if successful, otherwise press 'Cancel'.

8. Check whether the door is unlocked.
9. Click **OK** if in order, **Cancel** otherwise,

Fig. 12-14 *Door test*

Pass / Fail Criteria

The test is passed if the door can be opened, closed, locked and unlocked as described above.

If the Test Fails

Try the following:

- Check whether the Loading Port is connected properly.
- Check whether the door lock and the locking finger are in order.
- Replace any faulty parts or the whole Loading Port.
- Contact the customer service department if necessary.

12.2.4.5 LED Test

Purpose

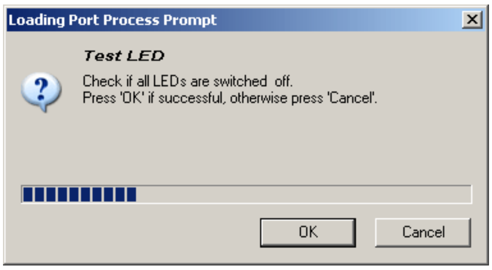
The purpose of this procedure is to test whether the LEDs on the front of the Loading port work properly.

Procedure

To perform the LED test:

1. On the **Contents** page, select the **LED Test** check box and click **Start** to begin.

   You will be guided through the test by a series of precess prompts. Always follow the instructions provided on screen.

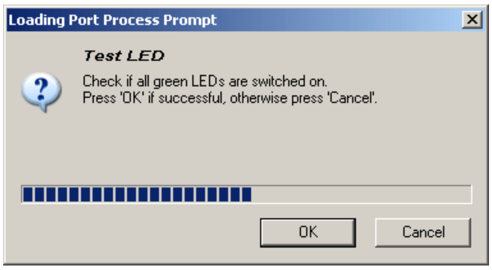


Test LED

Check if all LEDs are switched off.
Press 'OK' if successful, otherwise press 'Cancel'.

First, all LEDs are switched off.

1. Check whether all LEDs are off.
2. Click **OK** if in order, **Cancel** otherwise.



Test LED

Check if all green LEDs are switched on.
Press 'OK' if successful, otherwise press 'Cancel'.

Next, the green LEDs are switched on. The red LEDs remain switched off.

3. Check if all green LEDs are switched on and if the red ones remain switched off.
4. Click **OK** if in order, **Cancel** otherwise.

Test LED

Check if all red LEDs are switched on.
Press 'OK' if successful, otherwise press 'Cancel'.

Next, the green LEDs are switched off and the red ones are turned on.

5 Check if the red LEDs are turned on and if the green ones remain switched off.

6 Click **OK** if in order, **Cancel** otherwise.

Fig. 12-15 *LED test*

Pass / Fail Criteria

The test is passed if all LEDs can be switched on and off properly as described above.

If the Test Fails

Try the following:

- If none of the LEDs is switched on check the connection of the loading port.
- If one or more individual LEDs cannot be turned on or off:
  - Replace the printed circuit board on which the LEDs are located (or have it replaced by an FSE).
  - Replace the whole Loading Port.
- Contact the customer service department if necessary.

12.2.4.6 Slot Test

Purpose

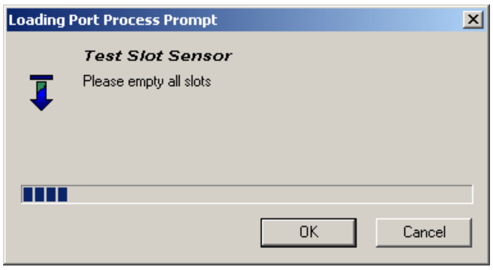
The purpose of this procedure is to test whether the slot sensors correctly detect the presence or absence of microplates in each individual slot of the Loading Port. The test starts with slot # 1 (bottom slot).

Procedure

To perform the **Slot Test**:

1 On the **Contents** page, select the **Slot Test** check box and click **Start** to begin.

You will be guided through the test by a series of process prompts. Always follow the instructions provided on screen.



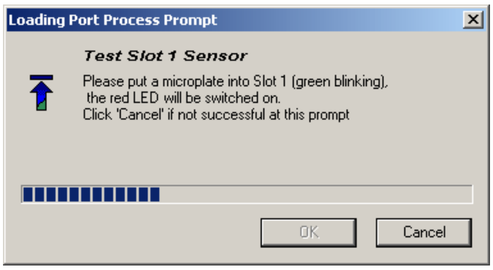
Test Slot Sensor

Please empty all slots

First you are prompted to empty all slots.

1 Remove any microplates from that might be in the slots.

2 Click **OK** when done.



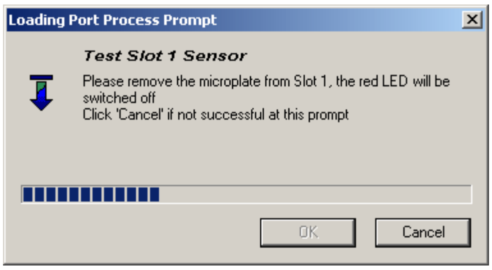
Test Slot 1 Sensor

Please put a microplate into Slot 1 (green blinking),
the red LED will be switched on.
Click 'Cancel' if not successful at this prompt

Next, you are prompted to put a microplate into the slot indicated on the prompt. Note that the green LED is flashing.

3 Insert the microplate into the respective slot. The red LED should be switched on.

4 Click on **Cancel** if not in order.



Test Slot 1 Sensor

Please remove the microplate from Slot 1, the red LED will be switched off
Click 'Cancel' if not successful at this prompt

Fig. 12-16 *Slot test*

Next you are prompted to remove the microplate from the slot.

5 Remove the microplate from the slot. The red LED should be turned off.

6 Click on **Cancel** if not in order.

After you have tested the respective slot, you are prompted to do the same for the next slot.

7 Repeat the above steps 3 to 6 for the remaining slots.

Pass / Fail Criteria

The test is passed if the presence or absence of a microplate is correctly detected in each individual slot.

If the Test Fails

Try the following:

- If the presence or absence of a microplate is not detected correctly:
  - Check whether the slot sensor is connected correctly to the printed circuit board on the left side.
  - Replace the corresponding slot sensor (or have it replaced by an FSE).
  - Replace the printed circuit board on the left side (or have it replaced by an FSE).
- If the LEDs do not light up as expected, repeat the LED test.
- Contact the customer service department if necessary.

12.2.4.7 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

***Note:** The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.2.5 SMIO 30030281

12.2.5.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Access Status Option	See section 12.2, 🗎 12-3
Program installation	See section 4.2, 🗎 4-2
Firmware Compatibility	See section 4.5, 🗎 4-21
Sensors used in SMIO 30030281	See section 12.2.5.2, 🗎 12-25

What Does SMIO Mean?

The term SMIO stands for Smart Input/Output. With EVO Instruments, SMIO boards (hardware) can be used as follows:

- For controlling the three sensors that are set up and checked with the **SMIO** panel, described in this section, namely:
  - “System liquid bottle empty” sensor
  - “Waste liquid bottle full” sensor
  - “DiTi waste bag full” sensor.
- For the Safety option (door locks, alarm lamp etc.). This option requires a different firmware and is dealt with in a different section (→ Cross References).

***Note:** The **SMIO** panel described in this section is part of the NAT (= nucleic acid testing) system, which is a closed configuration, i.e. one that consists of an instrument equipped with a defined and limited set of devices:*

- *The SMIO panel can only be activated if the **SMIO 30030281** check box was selected during the program installation (→ Cross References).*

Sensors

(→ Cross References).

SMIO Instrument2 Files

The SMIO function can create result files

Directory:	<data_path>\Results
File name:	Smio_30030281_<serial_number>_<date>_<time>.any

12.2.5.2 Sensors Used in SMIO 30030281

Overview

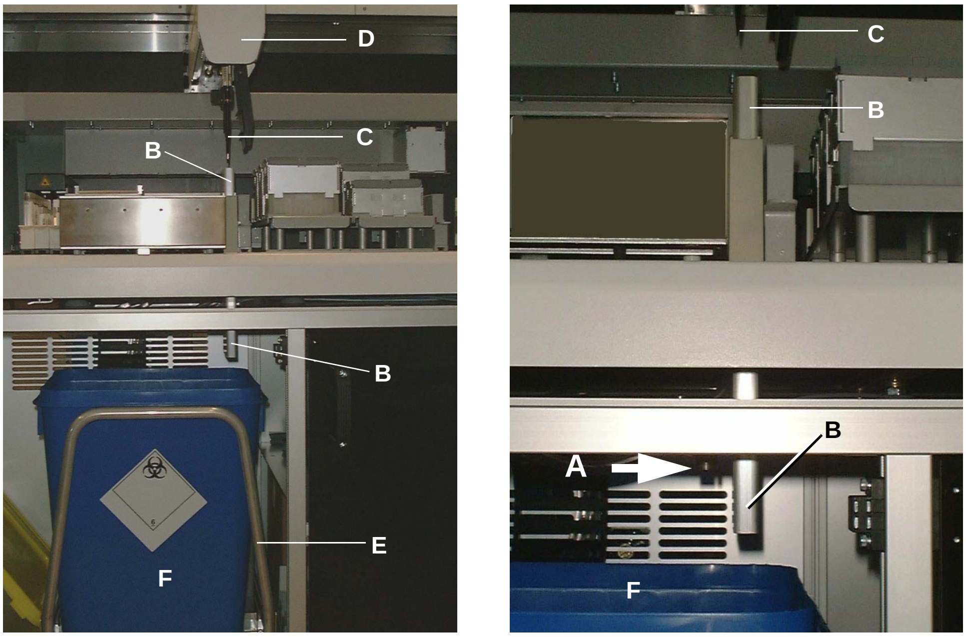


Fig. 12-17 DiTi waste sensor and container

A	*DiTi waste sensor*	*D*	*Liquid Handling Arm (LiHa)*
B	*DiTi waste shaft*	*E*	*DiTi waste tray*
C	*Disposable tips (DiTis)*	*F*	*DiTi waste container*

DiTi Waste Sensor

The DiTi waste sensor (A) is an ultrasonic sensor that is located above the DiTi waste container (F) in the cabinet below the worktable. Its purpose is to monitor the fill level of DiTs (C) that, after usage, were dropped through the shaft (B) into the DiTi waste container. The application software continually checks the state of the sensor. When the DiTi waste container is almost full the operator is prompted to replace the full DiTi waste container with an empty one.

The DiTi waste container (F) rests on the DiTi waste tray (E) that can be pulled out of the cabinet like a drawer.

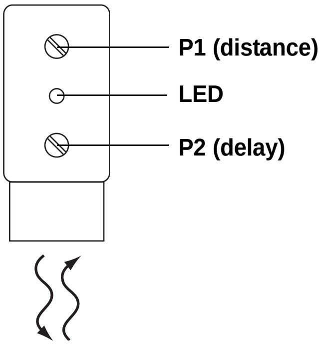


Fig. 12-18 DiTi waste sensor

The DiTi waste sensor is equipped with two potentiometers which are accessible from the front.

- Potentiometer P1 serves for adjusting the distance between the sensor and the upper level to the DiTis in the waste container.
- P2 lets you set the time delay.

System and Waste Bottle Sensors

These two capacitive sensors monitor the liquid levels in the system liquid and waste liquid bottles. These bottles are arranged on the DiTi waste tray behind the DiTi waste container (see following figure). As can be seen the sensors are fixed to the vertical column at the rear of the DiTi waste tray. This column also serves as a duct for the connection cables of the sensors.

The application software continually checks the two level sensors and notifies the operator when…

- there is only 1 liter of liquid or less left in the system liquid bottle.
- the waste liquid level oversteps the admissible upper limit (10.5 liters).

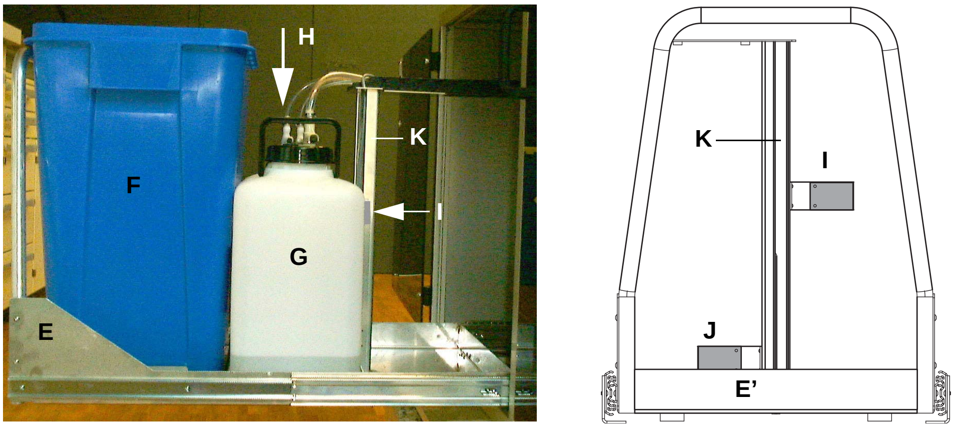


Fig. 12-19 *Location of system and waste liquid bottles, associated level sensors*

E	*Tray (pulled out of cabinet, side view) with DiTi waste container and bottles.*
E’	*Empty tray with level sensors (front view)*
F	*DiTi waste container*
G	*Waste liquid bottle*
H	*System liquid bottle (not visible)*
I	*Waste bottle sensor*
J	*System bottle sensor*
K	*Column at rear*

Location of the SMIO Board

The SMIO board is located behind the right access door of the instrument, near the power switch.

Required Tools

For the calibration of the DiTi waste sensor a flat reflecting plate is needed.

12.2.5.3 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	**References**
Using the panel	See section 5.2, 🗎 5-13

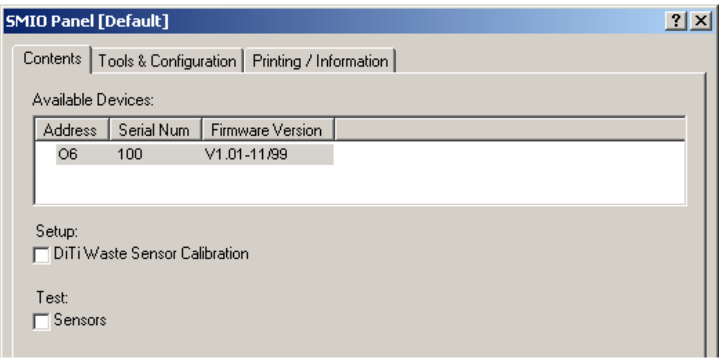
Permissions, Procedures

The following table shows the functions of the SMIO panel. Note that all functions can be invoked by both operators and field service engineers (no password required).

Function	Type	User	FSE
DiTi Waste Sensor Calibration	Setup	X	X
Sensors	Test	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Starting the Panel

1 Start the panel with **Options > Access Status Options > SMIO 30030281**. The **SMIO** panel with activated Contents page appears. After starting the **SMIO** panel no setup or test check box is activated.



Available Devices:

Address	Serial Num	Firmware Version
06	100	V1.01-11/99

Setup:
☐ DiTi Waste Sensor Calibration

Test:
☐ Sensors

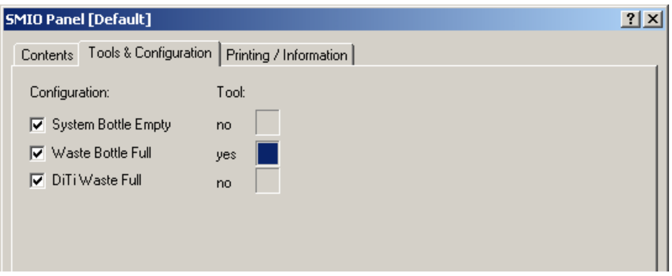
Fig. 12-20 SMIO panel - Setup page

Pages

Tab. 12-10 Pages of SMIO panel

Pages	Function
Contents	General overview, procedure selection.
Tools & Configuration	Configuration of the sensor test..
Printing / Information	Print selection for the QC-report

12.2.5.4 Tools & Configuration Page



Configuration:	Tool:	
☑ System Bottle Empty	no	☐
☑ Waste Bottle Full	yes	■
☑ DiTi Waste Full	no	☐

Fig. 12-21 SMIO panel - Tools and Configuration page

Purpose This page serves for configuring the sensor test. At the same time, it contains three indicator fields that show whether the associated sensor is in its “true” or “false” state (i.e. the state that corresponds to the text next to the check box).

Controls

Configuration	Three check boxes to select the sensors to check, one box per sensor.
Tool	Three square indication fields (one per sensor) that turn blue when the corresponding sensor changes to the state indicated next to the check box.

12.2.5.5 DiTi Waste Sensor Calibration

Cross References List of cross references to information provided in other sections:

Information	References
Position of sensor	See section 12.2.5.2, 🗎 12-25

Purpose This procedure is used to calibrate the ultrasonic sensor that monitors the fill level in the DiTi waste container.

Preparation To perform this setup procedure you need to open the left cabinet below the worktable and to remove the DiTi waste container.

Procedure To calibrate the sensor:

1 On the **Contents** page, select the **DiTi Waste Sensor Calibration** check box and click **Start**.

You will be guided through the procedure by a series of process prompts (not shown here). Always follow the instructions on the screen.

2 Hold a reflecting plate horizontally at about 300 mm below the ultrasonic sensor. Click **Next** on the prompt to continue.

The next prompt appears.

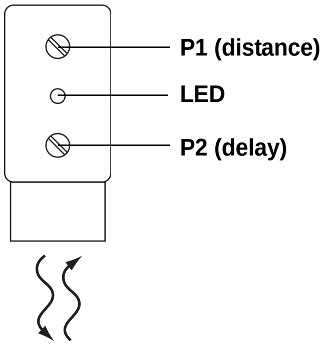


Fig. 12-22 *DiTi waste sensor*

3 Turn the potentiometers P1 and P2 at the front of the sensor counterclockwise to their stop positions. Click **Next** to continue when done.

The next prompt appears.

4 Now turn the distance potentiometer (P1) clockwise until the LED at the front of the sensor just lights up. **Click** next to continue.

*The **Setup: Done** prompt appears.*

5 Click **OK** to finish.

***Note:** If you intend to continue with the sensor tests leave the cabinet open, otherwise put back the DiTi waste container and close the cabinet.*

12.2.5.6 Sensor Test

Cross References

List of cross references to information provided in other sections:

Information	References
Tools & Configuration page	See section , 🗎 12-27
Location of sensors, bottles and DiTi waste container	See section 12.2.5.2, 🗎 12-25

Purpose

This procedure lets you test whether the three SMIO sensors work properly.

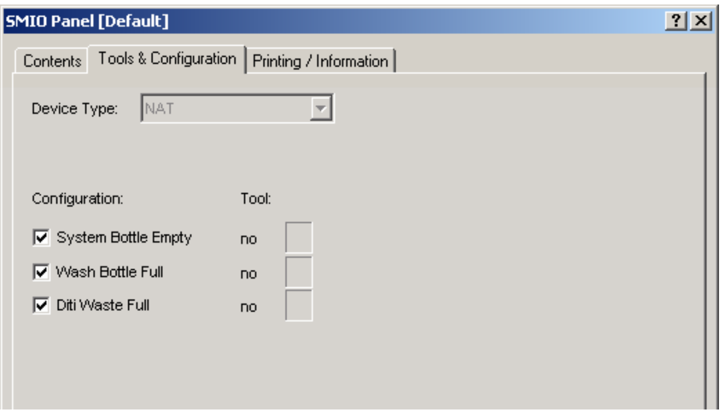
Preparation

If not done yet, open the left cabinet below the worktable and remove the DiTi waste container.

Procedure

To test the sensors:

1 On the Contents page, select the **Test** check box and change to the **Tools & Configuration** page (also → Cross References).



Device Type: NAT

Configuration: Tool:

☑ System Bottle Empty no
☑ Wash Bottle Full no
☑ Diti Waste Full no

Fig. 12-23 SMIO panel - Tools and Configuration page

2 Select the sensors you want to check.

3 Click **Start**.

4 Check the sensors as shown in the following paragraphs.

You will be guided through the tests by a series of prompts. Always follow the instructions provided on the screen.

System Liquid Sensor

To test the system liquid level sensor:

1 Open the door of the cabinet below the worktable and pull out the DiTi waste tray on which the bottles are located (→ Cross References).

2 When prompted to do so fill the system liquid bottle with one liter (or empty it accordingly) and put the bottle back. Click **Next** when done.

The software now checks the state of the sensor the next prompt appears.

3 Pour two more liters of liquid into the bottle and click **Next** when done.

Again the software checks the sensor. A message appears that shows whether the test was successful or not.

4 Confirm with **OK**.

Waste Liquid Sensor

To test the waste liquid level sensor:

1 If not done yet open the door of the cabinet below the worktable and pull out the DiTi waste tray on which the bottles are located (→ Cross References).

2 When prompted to do so fill the waste liquid bottle until it contains 8.5 liters. Click **Next** when done.

The software now checks the state of the sensor.

3 Pour two more liters of liquid into the bottle and click **Next** when done.

Again the software checks the state of the sensor. A message appears that shows whether the test was successful or not.

4 Confirm with **OK**.

DiTi Waste Sensor

To test the DiTi waste sensor:

1 When prompted to do so hold the reflecting plate horizontally at a distance of 360 [mm] below the DiTi waste sensor. Click **Next** on the prompt.

The software checks the state of the sensor. The next prompt appears.

2 As instructed, lift the plate until the distance to the sensor is reduced to 300 [mm]. Click **Next** when done.

Again the software checks the state of the sensor. A message appears that shows whether the test was successful or not.

3 Confirm with OK.

4 When finished re-place the DiTi waste container on the tray, push the tray back into the cabinet and close the cabinet door.

12.2.5.7 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

12.2.6 SMIO for Cellerity

12.2.6.1 Overview

About SMIO for Cellerity

SMIO (= Smart Input / Output) is an electronic board to which the safety elements listed below are connected (see following two figures). The board itself is located behind the right access door of the instrument. The elements connected to the SMIO board are shown in the following figures:

Door Locks

The Cellerity system is secured with four door locks:

- Door locks (A), (B) and (E) at the instrument front for securing the front sliding safety panels (C) and (D) and the entire system door.
- Door lock (F) that secures the AutoLoader front access door (the door lock is located at the inside and is not directly visible in the figure).

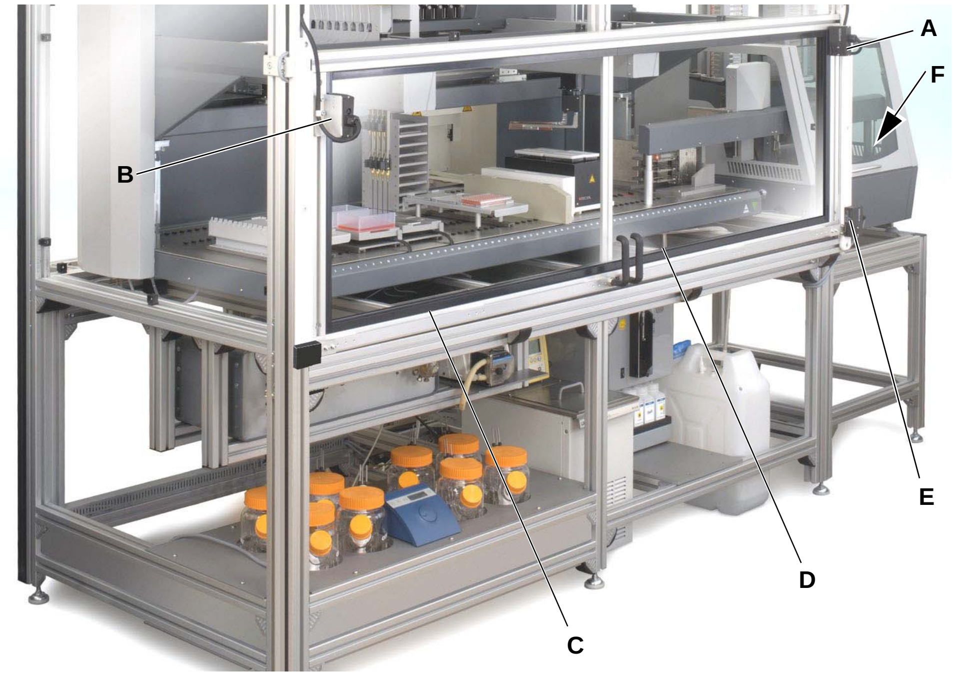


Fig. 12-24 *Cellerity door locks*

A	*Door lock for right sliding panel*	***D***	*Right front safety panel*
B	*Door lock for left sliding panel*	***E***	*Door lock for entire system door*
C	*Left front safety panel*	***F***	*AutoLoader door lock (behind door)*

Waste Liquid Sensors

See following Fig. 12-25 , 🗎 12-32. The waste liquid level sensors (J) and (K) are mounted to the back of the waste trolley (G).The system uses these capacitive sensors to monitor the waste liquid levels in the containers (H) and (I), thus preventing the containers from overflowing.

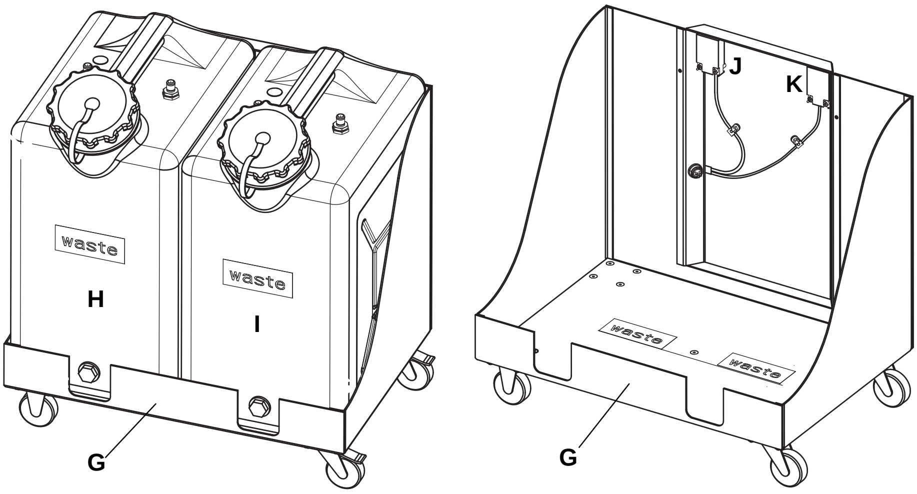


Fig. 12-25 *Trolley for waste liquid containers*

G	*Trolley for waste liquid containers*	***J***	*Left liquid level sensor*
H	*Left waste liquid container*	***K***	*Right liquid level sensor*
I	*Right waste level container*		

Solid Waste Slide

The solid waste sensor is a reflective optical sensor (L) located on the left side of the solid waste slide (M). The sensor monitors used flasks when they are disposed of into the solid waste container, located behind the instrument.

Fig. 12-26 *Solid waste slide*

L	*Solid waste sensor*	***M***	*Solid waste slide*

Further Information

For more detailed information about the Cellerity instrument and its components, please refer to the Cellerity Operating and Service Manuals.

12.2.6.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3

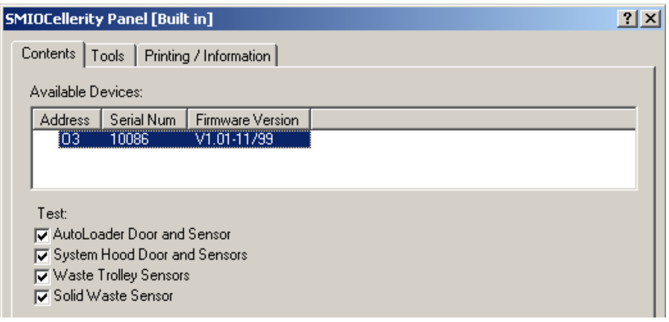
Permissions, Procedures

The test(s) described in this section can be carried out by users belonging at least to the SnS_Customer group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Function	Type	User	FSE
AutoLoader Door and Sensor	Test	X	X
System Hood Door and Sensors	Test	X	X
Waste Trolley Sensors	Test	X	X
Solid Waste Sensor	Page	X	X
Tools	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Starting the Panel

1 Start the panel with **Options > Access Status Options > SMIO for Cellerity**. The **SMIO for Cellerity** panel with activated **Contents** page appears. After starting the **SMIO for Cellerity** panel no test check boxes are activated.



Available Devices:

Address	Serial Num	Firmware Version
03	10086	V1.01-11/99

Test:
☑ AutoLoader Door and Sensor
☑ System Hood Door and Sensors
☑ Waste Trolley Sensors
☑ Solid Waste Sensor

Fig. 12-27 SMIO for Cellerity - Contents page

Pages

***Tab. 12-11** Pages of the SMIO for Cellerity panel*

Pages	Function
Contents	General overview, device and procedure selection
Tools	For an informal test of the SMIO functions.
Printing / Information	Print selection for the QC-report

12.2.6.3 Tools Page

Purpose The **Tools** page lets you test the door locks of the Cellerity system informally.

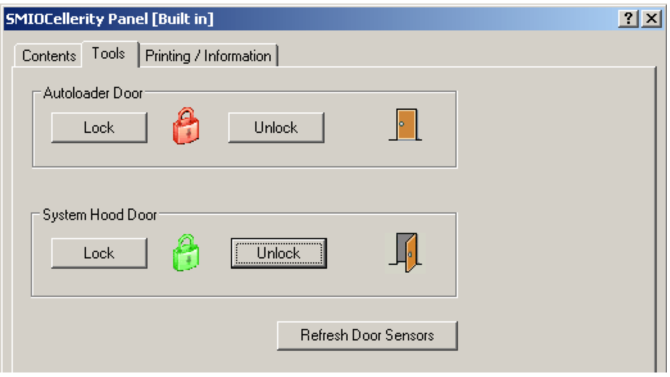


Fig. 12-28 *SMIO for Cellerity, Tools page*

Controls The Tools page is subdivided into two frames, each of which contains the following controls:

Controls in frames AutoLoader door and System hood door

- **Lock**	• Locks the corresponding door
- **Unlock**	• Unlocks the door(s)
- **Lock symbol**	• A red symbol indicates that the door is locked
	• A green symbol indicates that the door is unlocked
- **Door symbol**	• Indicates that the door is open
	• Indicates that the door is closed
Refresh Door Sensors	If you click this button, the status of each door locks is reread and the door lock symbols on the **Tools** page are updated.

12.2.6.4 AutoLoader Door and Sensor Test

Purpose

This procedure tests whether the AutoLoader door lock and sensor work properly.

Procedure

To perform the test:

1. On the **Contents** page, select the check box **AutoLoader Door and Sensor** and click **Start** to begin.

   You will be guided through the test by a series of process prompts (not shown here). Always follow the instructions on the prompts.
2. First, you have to close the AutoLoader front door. Confirm with **OK** on the prompt when done.

   The door will now be locked.
3. Next, check whether the door is locked. Confirm with **OK** if the door is locked, **Cancel** otherwise.

   The door is unlocked again.
4. Check whether the door is again unlocked. Confirm with **OK** if the door is again unlocked, **Cancel** otherwise.

Pass / Fail Criteria

The test is passed if the behavior of the AutoLoader door is as expected in all test steps.

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Check whether the door lock is installed properly and whether the locking bar mounted to the door can be inserted properly into the slot in the lock.
- Check whether the electrical connection of the lock is in order.
- Replace door lock if necessary.

12.2.6.5 System Hood Door and Sensors Test

Purpose

This procedure tests whether the three locks on the system hood work properly.

Procedure

To perform the test:

1. On the **Contents** page, select the check box **System Hood Door and Sensors** and click **Start** to begin.

   You will be guided through the test by a series of process prompts (not shown here). Always follow the instructions on the prompts.
2. First, you have to close all system hood doors (the system hood must be in its lower position and the two sliding panels must be closed). Confirm with **OK** on the prompt when done.

   The doors will now be locked.
3. Next, check whether the doors are locked. Confirm with **OK** if they are locked, **Cancel** otherwise.

   The doors are unlocked again.
4. Check whether the doors are again unlocked. Confirm with **OK** if they are again unlocked, **Cancel** otherwise.

Pass / Fail Criteria

The test is passed if the behavior of the system hood doors is as expected in all test steps.

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Check whether the door locks are installed properly and whether the locking bars mounted to the doors can be inserted properly into the slots of the corresponding locks.
- Check whether the electrical connections of the locks are in order.
- Replace faulty door locks.

12.2.6.6 Waste Trolley and Sensors Test

Purpose

This procedure tests whether the liquid level sensors, mounted to the back of the liquid container trolley, work properly.

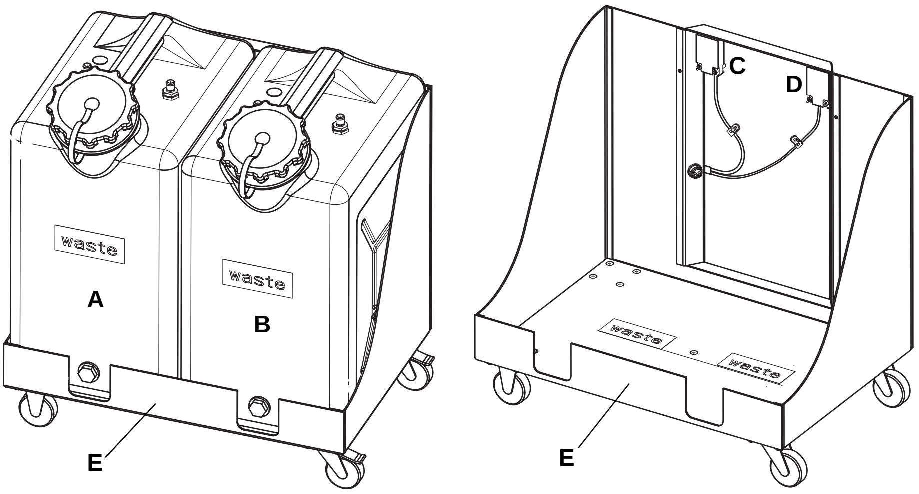


Fig. 12-29 *Trolley for waste liquid containers*

A	*Left waste liquid container*	***D***	*Right liquid level sensor*
B	*Right waste container*	***E***	*Trolley for waste liquid containers*
C	*Left liquid level sensor*		

Procedure

To perform the test (see also Fig. 12-29 , 🗎 12-36):

1. If there are waste liquid containers on the trolley, it is recommended that you remove them before beginning with the test.
2. On the **Contents** page, select the check box **Waste Trolley Sensors** and click **Start** to begin.

   You will be guided through the test by a series of process prompts (not shown here). Always follow the instructions on the prompts.
3. First, place empty liquid containers on the trolley:
   - One container in position (A), confirm with **OK** when done (**Cancel** to abort).
   - One container in position (B), confirm with **OK** when done.
4. Next, place full liquid containers on the trolley:
   - One container in position (A), confirm with **OK** when done (**Cancel** to abort).
   - One container in position (B), confirm with **OK** when done.

Pass / Fail Criteria

The test is passed if the empty and full containers were recognized correctly and if you did not abort the test.

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Check the electrical connection of the trolley to the instrument.
- Check the electrical connection of the sensors.
- Replace faulty liquid level sensor.

12.2.6.7 Solid Waste Sensor Test

Purpose

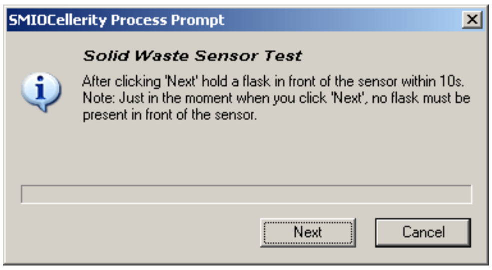
The **Solid Waste Sensor Test** is used to check the correct function of the solid waste sensor (see Fig. 12-30 , 🗎 12-37 below.

Procedure

To perform the test:

1 On the **Contents** page, select the check box **Solid Waste Sensor** and click **Start** to begin.

A process prompt appears, as shown below.



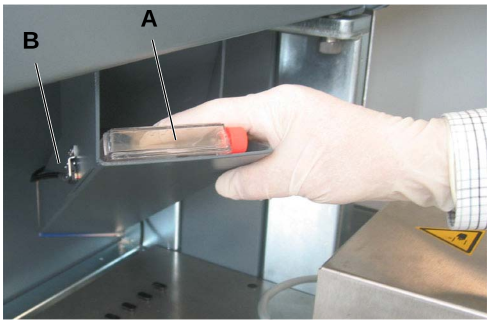
SMIOCellerity Process Prompt

Solid Waste Sensor Test

After clicking 'Next' hold a flask in front of the sensor within 10s.
Note: Just in the moment when you click 'Next', no flask must be present in front of the sensor.

2 Before continuing, make sure there is no flask in front of the solid waste sensor (see figure below).

3 Click **Next** on the prompt.



4 Within 10 seconds after clicking on **Next**, take a flask (A) and hold it in front of the solid waste sensor (B) as shown in the figure.

Pay attention to the position of the screw cap.

***Fig. 12-30** Solid waste sensor test*

Pass / Fail Criteria

The test is passed if the flask was recognized correctly during the test.

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Check the electrical connection of the solid waste sensor.
- Replace the sensor.

12.2.6.8 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

***Note:** The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.2.7 SPO-MPO (Sensors)

12.2.7.1 Overview

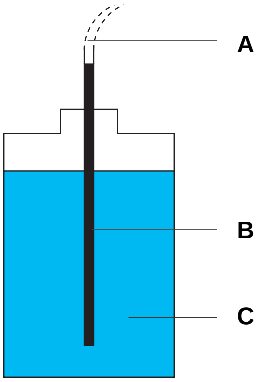
Purpose

The **SPO-MPO (Sensors)** panel provides the functions needed for setting up and testing the following liquid level sensors:

- **Licos:** System and waste liquid sensors. These can be located on the following printed circuit boards:
  - MPO-board (Freedom EVO, Genesis Freedom and Classic instruments)
  - SPO-board (EVOlyzer)
- **Floating sensors:** These sensors are located in the system and waste liquid bottles and are connected to the SPO-board (EVOlyzer)

Licos

The Licos system checks the liquid level in the system liquid bottle and/or the waste liquid bottle. A sensor tube that is inserted into the bottle is connected to a pressure sensor located on the SPO or MPO-board.



A	*Licos tubing*
B	*Licos sensor tube*
C	*System/waste liquid*

Depending on the liquid level, the air in the sensor tube and the tube that leads to the board is compressed more or less and the air pressure is increased or decreased accordingly. This air pressure serves as a measure for the liquid level in the bottle.

Fig. 12-31 *Licos tubing*

Floating Sensors

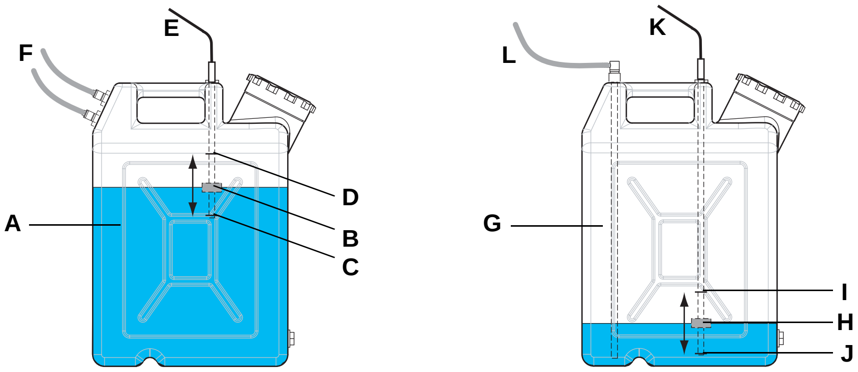


Fig. 12-32 *Bottles with floating sensors*

A	*Waste liquid bottle (20 liters)*	***G***	*System liquid bottle (20 liters)*
B	*Floating sensor*	***H***	*Floating sensor*
C	*Lower waste liquid level (warning)*	***I***	*Upper system liquid level (warning)*
D	*Upper waste liquid level (alarm)*	***J***	*Lower system liquid level (alarm)*
E	*Cable to SPO-board*	***K***	*Cable to SPO-board*
F	*Tube connections*	***L***	*Tube connection*

Both the waste liquid bottle (A) and the system liquid bottle (G) are equipped with a floating sensor (B and H, respectively) with an integrated permanent magnet. Depending on the liquid level, the sensor moves up and down along an immersion tube between an upper and a lower stop. Inside the immersion tube there are two reed contacts located near the stops. These reed contacts are actuated when the floating sensor reaches the upper or lower stop.

The states of each contact is evaluated by the application software that triggers the appropriate action when the liquid reaches a warning or alarm limit:

- The contacts near the stops (C) and (D) are used to notify the application software when the waste liquid level oversteps the warning level (C) or the alarm level (D).
- Likewise, the contacts near the stops (I) and (J) are used to notify the application software when the system liquid level falls below the warning level (I) or the alarm level (J).

Board Configuration

The Setup and Service software learns via the installed firmware which board is installed and how it is configured.

- MPO board: Contains Licos sensors.
- SPO board: This board is equipped with jumpers and an application switch that must be set properly depending on the connected sensor types (Licos and/or floating sensors).
- For detailed information about the board configuration and the connection of the liquid sensors consult the appropriate Service Manual (Freedom EVO or EVOlyzer).

12.2.7.2 Panel Description

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

***Tab. 12-12** SPO-MPO (Sensors), Functions and User Permissions*

Function	Type	User	FSE
Licos Setup	Setup		X
Licos Test	Test	X	X
Floating Sensor Test	Test	X	X
Tool	Tool		
Printing / Information	Page	X	X
QC-report	Report	X	X

Files, Directories

The SPO-MPO function creates the following files:

- **Result Files:** Test results are stored in *.any files.

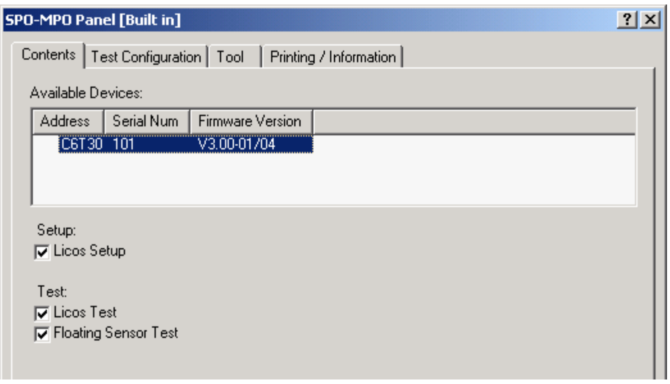
Directory:	<data_path>\Results
File name:	SPOMPO_<serial_number>_<date>_<time>.any

Starting the Panel

To set up or test the Licos or floating sensors:

1 Start the panel with **Options > Access Status > SPO-MPO (Sensors)**. The **SPO-MPO** panel with activated **Contents** page appears (see following figure).

*After starting the **SPO-MPO** panel, no setup or test check box is selected.*



Available Devices:

Address	Serial Num	Firmware Version
C6T30	101	V3.00-01/04

Setup:
☑ Licos Setup

Test:
☑ Licos Test
☑ Floating Sensor Test

Fig. 12-33 *SPO-MPO panel - Contents page*

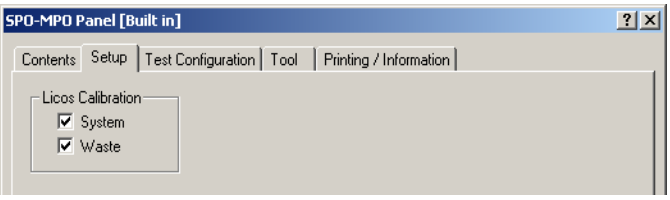
Tab. 12-13 *Pages in Safety panel*

Page	Function
Contents	General overview, device and procedure selection.
Setup	Selection of the Licos sensors to calibrate.
Test Configuration	Selection of the sensors to be tested
Tool	Indication of sensor states
Printing / Information	Print selection for the QC-report

12.2.7.3 Setup Page

Purpose

This page is used to define which Licos sensors are to be calibrated.



Licos Calibration
☑ System
☑ Waste

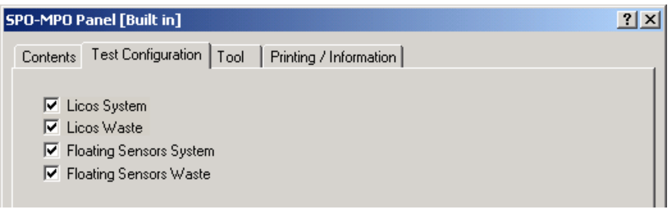
Fig. 12-34 *SPO-MPO panel - Setup page*

Controls The only controls are the check boxes for selecting he **System** and the **Waste** Licos sensors.

Note: *The check boxes cannot be selected If there are no Licos sensors installed (follows from hardware configuration / position of Application Switch on SPO board).*

12.2.7.4 Test Configuration Page

Purpose This page allows you to select the sensors to be tested.



☑ Licos System
☑ Licos Waste
☑ Floating Sensors System
☑ Floating Sensors Waste

Fig. 12-35 *SPO-MPO panel - test Configuration page*

Controls The page contains four check boxes that correspond to the four possible sensors.

Note:

- *Which of the check boxes are selectable depends on the hardware configuration (MPO or SPO board, board configuration).*
- *Sensors that are not selected will not be tested.*

12.2.7.5 Tool Page

Purpose The **Tool** page can be used to view the current state of the Licos and/or floating sensors.

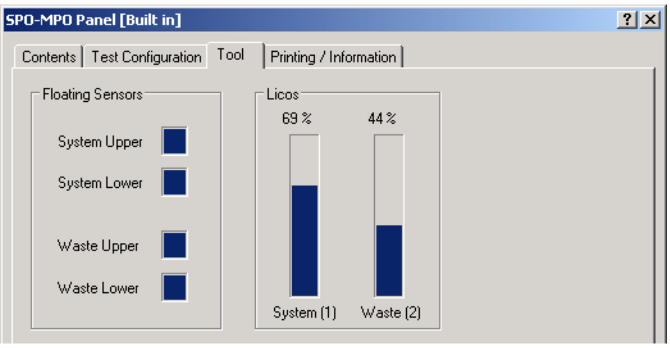
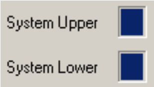
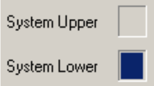
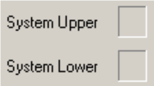
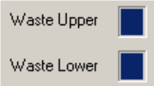
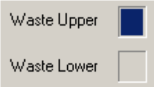
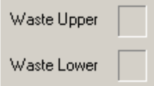


Fig. 12-36 *SPO-MPO panel - Tool page*

Controls The following table summarizes the various states of the indicating elements for the floating and Licos sensors. It is assumed that the reed contacts of the floating sensors work and are properly connected to the SPO board.

__Tab. 12-14__ Indicating elements on Tool page

Sensor Type	Sensor	Description
Floating sensor in system liquid bottle	 System Upper ■ System Lower ■	**System Upper** and **System Lower** on: System liquid level above upper (warning) sensor. There is still enough liquid in the bottle
	 System Upper ☐ System Lower ■	**System Upper** off, **System Lower** on: System liquid level below warning limit, bottle must be refilled soon.
	 System Upper ☐ System Lower ☐	**System Upper** and **System Lower** off: Liquid level below alarm limit. Bottle must be refilled.
Floating sensor in waste liquid bottle	 Waste Upper ■ Waste Lower ■	**Waste Upper** and **Waste Lower** on: Waste liquid level below warning limit. There is still enough room in the bottle for more liquid.
	 Waste Upper ■ Waste Lower ☐	**Waste Upper** on, **Waste Lower** off: Waste liquid level has overstepped warning limit. Bottle must be emptied soon.
	 Waste Upper ☐ Waste Lower ☐	**Waste Upper** and **Waste Lower** off: Waste liquid level has overstepped alarm limit. Bottle must be emptied.
Licos	System (1)	The vertical bar continuously indicates the current level of the system liquid.
	Waste (2)	As above for the waste liquid bottle

***Note:** Elements that are not physically installed appear gray.*

12.2.7.6 Licos Setup

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

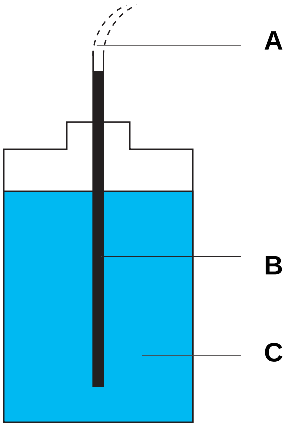
This procedure is used to calibrate the Licos system.

Installation

Before you start calibrating the Licos sensors you must connect the tubings to the sensor tubes.

ATTENTION

Connect the tubing to the sensor tube before inserting the latter into the appropriate bottle, otherwise the Licos system will not work.



A	*Licos tubing*
B	*Licos sensor tube*
C	*System/waste liquid*

Make sure the tubings are connected to the appropriate Licos sensor tube:

- tube no. 1 is connected to sensor 1 and
- tube no. 2 is connected to sensor 2

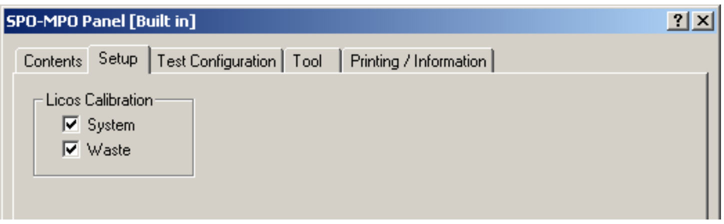
Fig. 12-37 *Licos MPO Tubing*

Procedure

To calibrate the Licos sensors:

1 If the sensor tubes are in the bottles, remove them.

2 On the **Contents** page, select the **Licos Setup** check box and change to the **Setup** page.


SPO-MPO Panel [Built in]

Licos Calibration
☑ System
☑ Waste

Fig. 12-38 *SPO-MPO panel - Setup page*

3 On the **Setup** page, select the check boxes that correspond to the installed bottles.

4 Click **Start**.

You will be guided through the setup procedure by a series of process prompts (not shown here). Strictly follow the instructions provided on the process prompts.

5 To calibrate the Licos (1) for the system liquid:

– Fill up the system bottle while keeping the Licos (1) sensor tube outside the bottle. **OK** to continue.

– Carefully insert the Licos (1) sensor tube into the system bottle and click **OK** to continue.

Note: *This liquid level will be set to 100% during the calibration that starts now.*

6 If a waste liquid bottle is installed you will be prompted to do the same for the Licos (2). Follow the instructions on the process prompts.

12.2.7.7 Licos Test

Purpose

This procedure is used to test the correct function of the Licos system.

Procedure

To test the Licos:

1. On the **Contents** page, select the check box **Licos Test** and change to the **Test Configuration** page.
2. On the **Test Configuration** page, select the check boxes of the Licos you want to test.

   You will be guided through the setup procedure by a series of process prompts (not shown here). Strictly follow the instructions provided on the process prompts.
3. To test the Licos (1) for the liquid system:
   - Remove the Licos (1) sensor tube from the bottle and click **OK** to continue.
   - If necessary, fill up the system liquid bottle to the 100% level and reinsert the Licos (1) sensor tube into the bottle. Click **OK** to continue.

Note: *The 100% level was determined during the calibration of the sensor.*

4. If a waste liquid bottle is installed you will be prompted to do the same for the Licos (2). Follow the instructions on the process prompts.

If the Test Fails

If the test fails try the following:

- Check the installation of the installation of the Licos and repeat the test.
- Repeat the Licos Setup or have it repeated by an authorized user.
- Contact the customer service department if necessary.

12.2.7.8 Floating Sensor Test

Purpose

This procedure is used to test the correct function of the floating sensors.

Procedure

To test the floating sensors:

1. On the Contents page, select the **Floating Sensor Test** check box and change to the **Test Configuration** page.
2. Use the **Test Configuration** page to select the sensors you want to check.
3. Click **Start**.

   You will be guided through the test procedure by a series of process prompts (not shown here). Strictly follow the instructions provided on the process prompts.

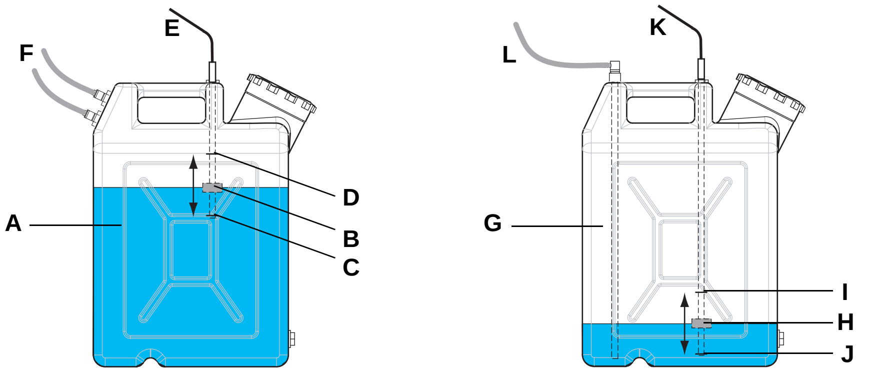


Fig. 12-39 *Bottles with floating sensors*

A	*Waste liquid bottle (20 liters)*	***G***	*System liquid bottle (20 liters)*
B	*Floating sensor*	***H***	*Floating sensor*
C	*Lower waste liquid level (warning)*	***I***	*Upper system liquid level (warning)*
D	*Upper waste liquid level (alarm)*	***J***	*Lower system liquid level (alarm)*
E	*Cable to SPO-board*	***K***	*Cable to SPO-board*
F	*Tube connections*	***L***	*Tube connection*

ATTENTION

In the following step you will be asked to empty or fill a bottle to a certain level. Before judging whether the corresponding sensor has reacted properly you must wait until the liquid level in the bottle is stable, otherwise you may obtain unreliable results.

4. To test the floating sensor in the system liquid bottle:
   - Empty system liquid bottle until the floating sensor is in its lower position (J, alarm limit). Click **OK** on the prompt when done.
   - Fill the system liquid bottle until the liquid level is approx. in the middle between the two positions (I) and (J). Wait until the liquid level in the bottle is stable. Click **OK** on the prompt when done.
   - Fill the system liquid bottle until the floating sensor is in its top position (I, warning). Wait until the liquid level in the bottle is stable. Click **OK** on the prompt when done.
5. To test the floating sensor in the waste liquid bottle you will be prompted to do the same for the liquid levels (C, warning limit) and (D, alarm limit). Strictly follow the instructions provided on the process prompts.

If the Test Fails

Try the following:

1. Check whether the sensors to be tested are selected properly on the **Test Configuration** page.
2. Check the installation of the sensors and their connections to the SPO-board.
3. Check whether the sensors can be moved smoothly up and down along the immersion tube inside the bottle.
4. Repeat the test.
5. Contact the customer service department if necessary.

12.2.7.9 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.2.8 Safety

12.2.8.1 Overview

Purpose

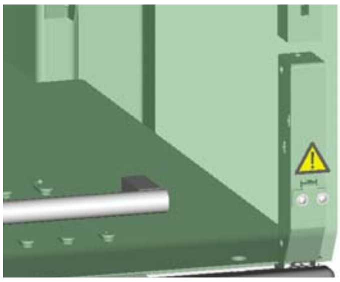
This panel lets you set up and test the safety and status devices connected to the SMIO board.

- **Freedom EVO, Genesis Classic, Genesis Freedom:** Door locks, status lamp, acoustic alarm devices, pause/resume buttons.
- **Aquarius/AutoLoader:** Door locks.

Freedom EVO Instruments

Safety and Status Devices

The following figures show where such safety and status devices are located on a Freedom EVO instrument.



- **Door locks:** During normal operation, they prevent the user from reaching into a zone in which movable parts like arm and pipetting devices are moving.

Fig. 12-40 Freedom EVO access and status devices

- **Status lamp (A):** This lamp is located above the work table. When switched on, it can assume different indication modes and colors:
  - Colors: Green or red
  - Indication: Continuous or flashing.
- **Acoustic alarm (B):** The lamp compartment also contains a buzzer. If this buzzer is enabled it is connected in parallel to the red lamp and emits a high-pitched continuous or intermittent sound when the red lamp is switched on.
- **Pause/resume button:** This button is located near the bottom right corner of the instrument, beside the power ON switch. The pause/resume button allows users to halt a running process temporarily so that the door locks are released and the front access door can be opened.

***Note:** Safety and alarm devices on Freedom EVO instruments:*

- *These instruments are always equipped with the above safety and status devices. During normal operation, these elements are controlled by the application software.*
- *In addition to the built-in elements, external indicator lamps, acoustic alarm devices and pause/resume buttons are available as options.*

External Pause/ Resume Button

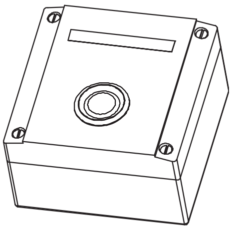


Fig. 12-41 Pause/resume button

***Note:** The external Pause/ Resume button is optional.*

Aquarius and AutoLoader

Both the Aquarius and the AutoLoader are always equipped with one door lock.

12.2.8.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

***Tab. 12-15** Access Status Option, Functions and User Permissions*

Function	Type	User	FSE
Device Configuration	Setup		X
Acoustic Alarm Setup	Setup		X
Door Lock Test	Test	X	X
Pause / Resume Button Test	Test	X	X
Alarm Device Test	Test	X	X
Tool	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Files, Directories

The Access Status function creates the following files:

- **Result Files:** Test results are stored in *.any files.

Directory:	<data_path>\Results
File name:	Safety<serial_number>_<date>_<time>.any

- Test Configuration Files

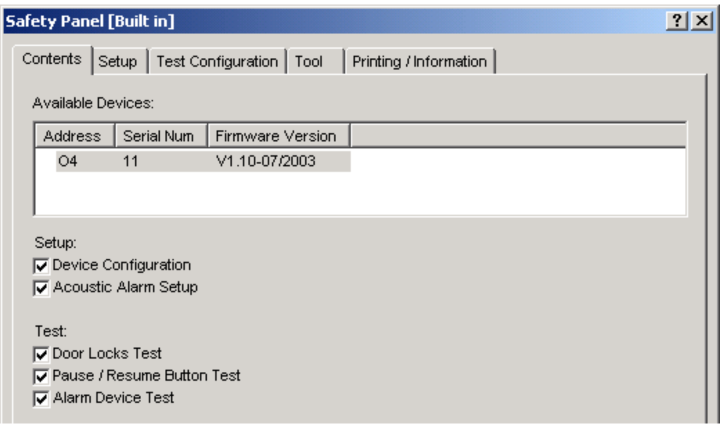
Directory:	user defined
File name:	<name>.any

Starting the Panel

To set up or test safety or alarm devices:

1 Start the panel with **Options > Access Status Options > Safety**. The **Safety** panel with activated **Contents** page appears (see following figure).

*After starting the **Safety** panel, no setup or test check box is selected.*



Available Devices:

Address	Serial Num	Firmware Version
04	11	V1.10-07/2003

Setup:
☑ Device Configuration
☑ Acoustic Alarm Setup

Test:
☑ Door Locks Test
☑ Pause / Resume Button Test
☑ Alarm Device Test

Fig. 12-42 *Safety panel - Contents page*

Pages

The **Safety** panel is subdivided into the following pages:

Note: *The following buttons are not available in 30030281 instrument version:*

- *“Acoustic Alarm Setup”*
- *“Pause/Resume Button Test”*
- *“Alarm Device Test”*

Tab. 12-16 *Pages in Safety panel*

Page	Function
Contents	General overview, device and procedure selection.
Setup	Selection of the devices to set up and/or test
Test Configuration	Selection of door locks and pause/resume buttons to test
Tool	Tool buttons for testing
Printing / Information	Print selection for the QC-report

12.2.8.3 Setup Page

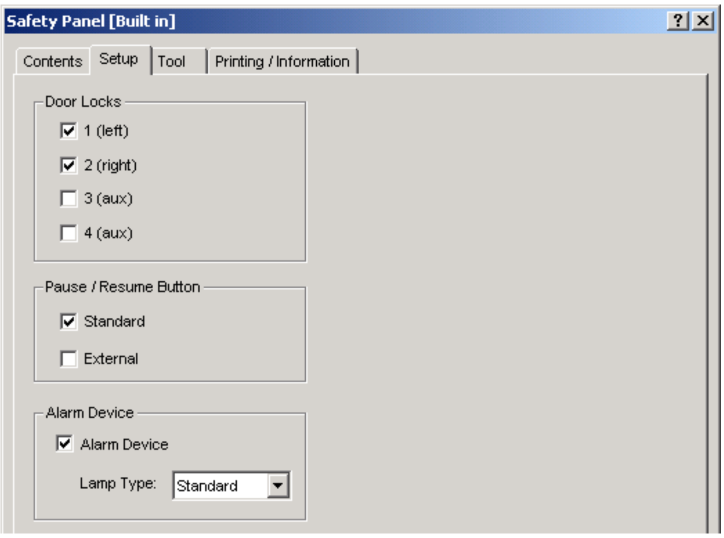
Purpose

This page is used to define which safety and status devices are physically installed on the instrument.

Note: *Devices that are not defined with the aid of this page cannot be set up and tested later.*

Note: *The following buttons are not available in 30030281 version:*

- *“Pause/Resume Button”*
- *“Alarm Device”*



Door Locks

☑ 1 (left)

☑ 2 (right)

☐ 3 (aux)

☐ 4 (aux)

Pause / Resume Button

☑ Standard

☐ External

Alarm Device

☑ Alarm Device

Lamp Type: Standard

Fig. 12-43 Safety panel - Setup page

Controls

The **Setup** page contains the following controls:

Door Locks

- **Door lock 1 (left)**	Check box to select the left main door lock.
- **Door lock 2 (right)**	Check box to select the right main door lock.
- **Door lock 3 (aux)**	Check box to select the third (auxiliary) door lock.
- **Door lock 4 (aux)**	Check box to select the fourth (auxiliary) door lock.

Pause / Resume button(s)

- **Standard**	Check box to select the (built-in) pause/resume button.
- **External**	Check box to select an external (optional) pause/resume button.

Alarm Device

- **Alarm Device**	Check box to select the alarm device.
- **Lamp Type**	Selection of a standard or external lamp

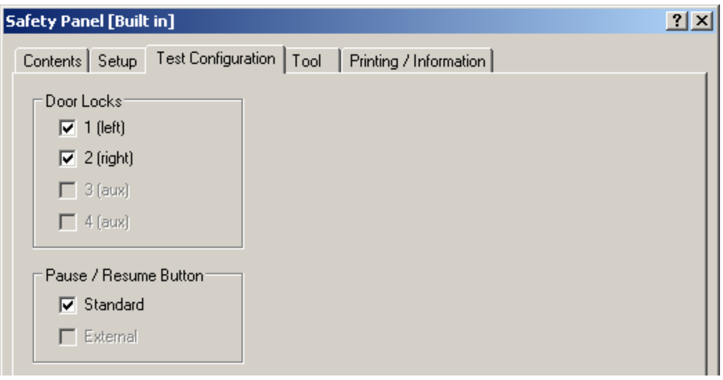
12.2.8.4 Test Configuration Page

Purpose

This page contains the check boxes that you let select the door locks and pause/resume buttons you want to check.

Note: *The following button is not available in 30030281 version:*

- *“Pause/Resume Button”*



Door Locks
☑ 1 (left)
☑ 2 (right)
☐ 3 (aux)
☐ 4 (aux)

Pause / Resume Button
☑ Standard
☐ External

Fig. 12-44 *Safety panel - Test Configuration page*

Controls

The check boxes are arranged in two frames:

- **Door Locks:** For the left and right door lock, two additional check boxes are reserved for future use.
- **Pause/Resume Button:** For a standard and a possible external pause/resume button. The following pause/resume buttons must be declared as “standard”
  - Built-in pause/resume button of Freedom EVO.
  - Optional pause/resume button of Genesis instruments.

Note: *You can only select the check boxes of those elements that have previously been selected on the* ***Setup*** *page.*

12.2.8.5 Tool Page

Purpose

The **Tool** page allows you to test the following safety and status elements informally and manually: Door locks, pause/resume button(s), status lamp/acoustic alarm.

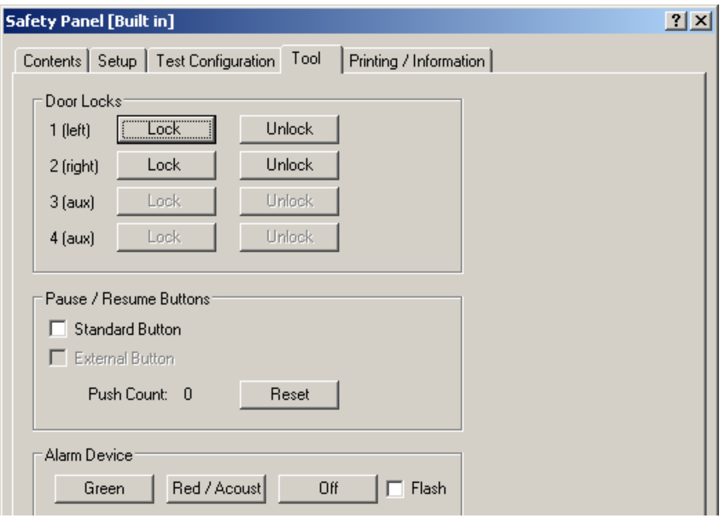


Fig. 12-45 *Safety panel - Tool page*

Controls

The controls are arranged in three frames.

Frame for Door Locks 1 to 4	Contains a set of command buttons for locking/releasing the door locks.
- **Lock**	Closes the door lock when clicked
- **Unlock**	Releases the door lock when clicked
Frame for Pause / Resume button(s)	
- **Standard Button**	Check box to select the standard pause/resume button (Freedom EVO: Built-in button, Genesis: Optional button)
- **External Button**	Check box to select an external (optional) button.
- **Push Count**	Indicates how many times the selected Pause/Resume button(s) were pressed. If both the standard and the external button are installed and selected simultaneously , **Push Count** indicates the total number of keystrokes.
- **Reset**	Command button that resets **Push Count** to zero.
Frame Alarm Device	Contains the controls for testing the alarm lamp and the acoustic alarm.
- **Green**	Switches on the green LEDs of the alarm lamp
- **Red/Acoust**	Switches on the red LEDs + acoustic alarm (if enabled)
- **Off**	Switches the alarm device off.
- **Flash**	When this button is pressed the lamp flashes and the acoustic alarm is in intermittent mode.

12.2.8.6 Device Configuration

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure is used to define which alarm and status devices are physically installed on the instrument.

Note: *Devices that are not defined cannot be set up and/or tested.*

Procedure

To define the devices:

1 On the **Contents** page, select the **Device Configuration** check box and change to the **Setup** page.

The Setup page lets you select the safety and status elements that are physically installed on the instrument or device you are setting up and testing.

ATTENTION

Make sure you select only elements that are physically installed.

2 Select the installed door locks:

- If you are setting up an Aquarius/AutoLoader the **Left** door lock corresponds to that of the Aquarius, the **Right** one to that of the AutoLoader

3 If available, select the **Pause/Resume** button(s).

- **Standard**: Select this check box:
  - Freedom EVO: For the built-in pause/resume button.
  - Genesis Freedom and Classic: For the optional pause/resume button.
- **External**: Select this check box if there is a second (optional) pause/ resume button installed on a Freedom EVO.

4 Set the **Alarm Device** controls:

- **Alarm Device:** Select this check box if there is an alarm device installed, such as an alarm lamp or an acoustic alarm device.
- **Lamp Type:** Choose the appropriate lamp type from the list as follows:
  - **Standard:** If an internal lamp is installed.
  - **External:** If there is an external lamp connected or no lamp at all.

ATTENTION

Make sure you select **External** if there is an external lamp or no lamp at all.

5 Check whether your settings are correct and click **Start.**

Your settings will be stored in EEPROM.

12.2.8.7 Acoustic Alarm

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure describes how to set the volume of the acoustic alarm device. Setting the volume is necessary if the acoustic signal is too loud or not loud enough.

Note: *The volume cannot be set directly via the Setup and Service software. The software only instructs you what to do. However, you must set the volume itself manually by turning the appropriate volume switch.*

Location of Parts

The volume switch (E) is located on the printed circuit board (D). The same printed circuit board also contains the LED-arrays for the status lamp (A) and the acoustic alarm device, the buzzer (F).

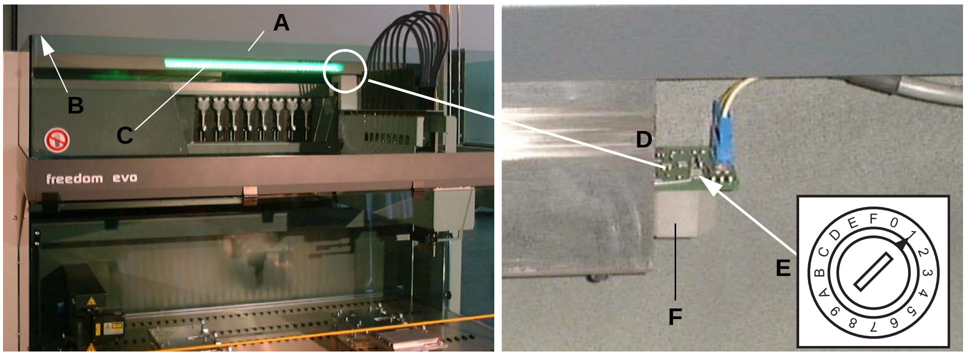
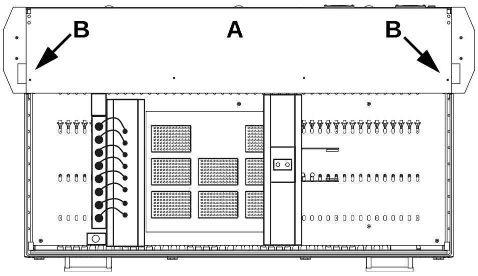


Fig. 12-46 *Location of the volume switch*

A	*Top cover*	***D***	*Printed circuit board*
B	*Fixing screws*	***E***	*Volume switch*
C	*Status lamp*	***F***	*Acoustic alarm (buzzer)*



To access the volume switch (E) you must loosen the screws (B) and lift the top cover (A).

Fig. 12-47 *Fixing screws for top cover*

Volume Switch

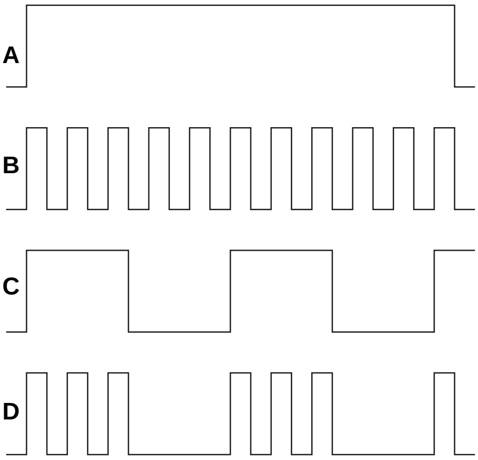
The volume switch (E) is a rotary switch with 16 positions, 0 to F. You can set four volume levels with intermittent or continuous sound.

***Tab. 12-17** Volume switch*

Switch position	Volume	Mode
0	high	Intermittent (frequency approx. 3 to 5 Hz)
1	medium	
2	low	
3	very low	
4	high	Continuous sound
5	medium	
6	low	
7	very low	
8 to F	Off	Disabled

Sound Diagrams

The following four diagrams illustrate how the alarm sounds in the various modes.



A	*Lamp and acoustic alarm in continuous mode*
B	*Lamp in continuous mode, acoustic alarm intermittent*
C	*Lamp flashing, acoustic alarm in continuous mode*
D	*Lamp flashing, acoustic alarm intermittent.*

***Fig. 12-48** Sound diagrams*

***Note:** On/off frequency of the acoustic alarm in intermittent mode:*

- *If the acoustic alarm is enabled (switch positions 0 to 7) it is switched on and off together with red status lamp.*
- *The on/off frequency is between 3 and 5 Hz and depends on the volume. The lower the volume is set, the higher the on/off frequency becomes.*
- *The on/off frequency of the alarm is higher than that of the flashing lamp.*

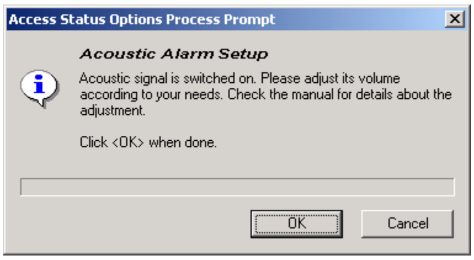
Setting the Volume

To set the volume level and the mode:

1. Loosen the fixing screws of the top cover of the instrument (see figures earlier in this section).
2. Lift the cover.

3 Check whether the volume switch is in one of the positions 0 to 7. If it is not, turn it into a position for a low volume with a small screwdriver:
   - Position 2 for a continuous sound
   - Position 6 for an intermittent sound.

4 On the **Contents** page, select the **Acoustic Alarm Setup** check box and click **Start**.



Acoustic Alarm Setup

Acoustic signal is switched on. Please adjust its volume according to your needs. Check the manual for details about the adjustment.

Click <OK> when done.

Fig. 12-49 *Acoustic Alarm setup*

The prompt shown on the left side appears and the alarm device is turned on.

5 Follow the instructions provided on the prompt.

6 Carefully turn the volume switch with a small screwdriver and set a volume and mode that suit the customer.

ATTENTION

Be careful not to slip off the slot of the switch with the screwdriver in order not to damage the printed circuit board.

7 Click **OK** when done.

This turns the acoustic signal off.

8 Close and refix the top cover when finished.

Switching the Alarm Off

To switch the acoustic alarm off:

1 Open the top cover as described above.
2 Set the switch to one of the positions 8 to F.
3 Close and refix the top cover when finished.

12.2.8.8 Door Locks Test

Purpose

This procedure allows you to test the door locks that are connected to the SMIO board.

Note: *With this procedure, only those door locks can be tested that were declared earlier as physically installed (procedure **Device Configuration**).*

Procedure

To test the door locks:

1 On the **Contents** page, select the **Door Locks Test** check box and change to the **Test Configuration** page.
2 If necessary, use the **Test Configuration** page to select the door lock(s) you want to test.
3 Click **Start** when done.

You will be guided through the test by a series of process prompts (not shown here). Strictly follow the instructions on the screen.

4 To test the door locks you will be typically prompted as shown below for the left door lock:

- **Please open the main door** → confirm with **OK**.
- **Please close the main door** → confirm with **OK**.
- **Check if the left side is locked now** → confirm with **OK**.
- **Check if it is unlocked now** → confirm with **OK**.

The instructions for testing the right door lock are the same.

5 At the end a **Passed** or **Failed** message appears. Click **OK** to confirm.

6 Change to the **Printing / Information** page to preview/print the QC-report.

If the Test Fails

Check the door locks and their installation.

12.2.8.9 Pause / Resume Button Test

Purpose

This procedure allows you to test the pause/resume button(s) connected to the SMIO board.

***Note:** With this procedure, only those pause/resume buttons can be tested that were declared earlier as physically installed (procedure **Device Configuration**).*

Procedure

To test the pause/resume buttons:

1. On the Contents page, select the **Pause / Resume Button Test** check box and change to the **Test Configuration** page.
2. If necessary, use the **Test Configuration** page to select the pause/resume button(s) you want to test.
3. Click **Start** when done.

   You will be guided through the test by a series of process prompts (not shown here). Strictly follow the instructions on the screen.
4. To test the Pause/Resume button(s) you will be typically prompted as follows:
   - **Press the ‘Pause/Resume Button’ twice** → the message closes if the button is pressed twice.
   - **Press the ‘External Pause/Resume Button’ twice** → the message closes if the button is pressed twice.
5. At the end a **Passed** or **Failed** message appears. Click **OK** to confirm.
6. Change to the **Printing / Information** page to preview/print the QC-report.

If the Test Fails

Check the pause/resume buttons and their installation.

12.2.8.10 Alarm Device Test

Cross References

List of cross references to information provided in other sections:

Information	References
Setting the acoustic alarm	See section 12.2.8.7, 🗎 12-55

Purpose

This procedure allows you to test the alarm devices (status lamps, acoustic alarm devices) that are connected to the SMIO board.

Procedure

To test the alarm devices:

1. On the **Contents** page, select the **Alarm Device Test** check box and click **Start** to begin.

   You will be guided through the test by a series of process prompts (not shown here). Strictly follow the instructions on the screen.
2. To test the alarm devices you will be typically prompted as follows:
   - **Check if the green lamp is on and the red one off** → confirm with **OK**.
   - **Check if the red lamp is on and the green one off** → confirm with **OK**.
   - **Check if the acoustic signal is on and its volume is according to your needs** → confirm with **OK**.
   - **Check if both lamps and the acoustic signal are off** → confirm with **OK**.

3 At the end a **Passed** or **Failed** message appears. Click **OK** to confirm.

Adjusting the Volume

If the acoustic alarm is too loud or not loud enough you must adjust the volume manually. For the detailed procedure (→ Cross References).

4 Change to the **Printing / Information** page to preview/print the QC-report.

If the Test Fails

Check the alarm devices and their installation.

12.2.8.11 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.2.9 Supervisor 2 Panel

12.2.9.1 Overview

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

This panel allows you to set up and test the following devices: Loading Port, Room Temperature Incubator and Weighing Scales. These are installed on Freedom EVOlyzer instruments.

Note: *The loading ports used on instruments 30045716, 30045717 and 30045718 and Freedom EVOlyzer instruments are not identical. The loading port for instruments 30045716, 30045717 and 30045718 is tested with the “Loading Port” panel (see cross references).*

Brief Device Description

The devices that are set up and tested with this panel are located on the right side of EVOlyzer instruments. The following figure shows one possible combination.

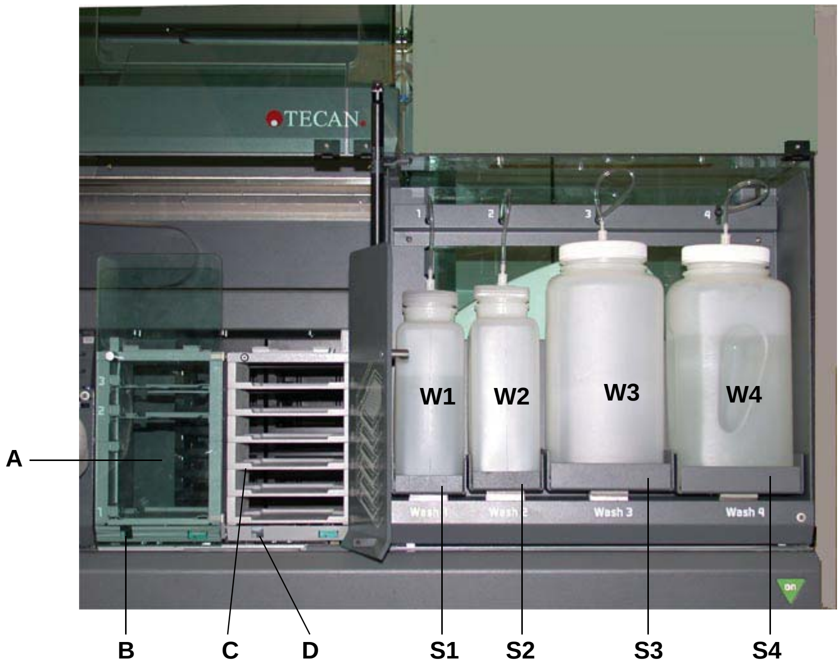


Fig. 12-50 *Loading Port, RT-Incubator and Weighing Scales*

A	*Loading Port*	***D***	*Door lock of RT-Incubator*
B	*Door lock of Loading Port*	***S1 to 4***	*Scales 1 to 4*
C	*Room Temperature Incubator*	***W1 to 4***	*Wash bottles 1 to 4*

The individual devices are:

- **Loading Port (A):** The Loading Port is a small cabinet with a front door, three internal compartments (slots) and a carrier at the top, over which the operator can exchange racks (microplates and DiTi boxes) with the instrument. The Loading Port is equipped with the following safety and status elements:
  - Door lock (B) with which the front door can be secured
  - The three compartments and the place at the top are equipped with reflexive optical sensors (B1 to B5) that detect the presence or absence of racks.
  - Note that the bottom compartment is higher than the other ones and is suitable for the exchange of ordinary, low microplates, as well as 1000 µl DiTi boxes and deep-well plates. It has two optical sensors so that the software can determine whether a rack placed in this compartment is a low or a high one.
- **Room Temperature Incubator (C) :** An RT-Incubator serves as a temporary store for microplates during sample preparation. The incubator has a front door that can be secured with a door lock (D) and six compartments (slots) through which microplates can be passed to and from the instrument. There is an additional external tray on the top that can hold a microplate.
  The front door of the RT-incubator is opaque and each compartment can be closed with a shutter at the back so that the microplates inside are not exposed to light during the incubation process.
  Depending on the instrument size it is possible to connect up to three RT-Incubators to the Supervisor 2 board. Each incubator is equipped with a temperature sensor. However, if more than one RT-Incubator is installed, only

the temperature sensor of RT-Incubator # 1 can be connected to the Supervisor 2 board (usually, this is the leftmost RT-Incubator).

- **Weighing Scales (S1 to S4):** The four weighing scales on the right side of the instrument continuously monitor the levels of wash liquid in the bottles (W1 to W4) that are placed on them. Scales 1 and 2 are for 2-liter bottles, scales 3 and 4 are for 4-liter bottles. These liquids are used by the Columbus plate washer, located behind the weighing scales.

Possible Configurations

The individual devices are connected to the Supervisor 2 board. The Setup and Service software learns via the firmware which of the above devices are installed. Depending on the instrument size the following configurations are possible:

- 1 Loading Port + 1 RT Incubator + 1 set of Weighing Scales
- No Loading Port, 2 RT Incubators + 1 set of Weighing Scales
- No Loading Port, 1 RT Incubator + 1 set of Weighing Scales
- 1 Loading Port + 2 RT Incubators + 1 set of Weighing Scales
- No Loading Port, 3 RT Incubators + + 1 set of Weighing Scale

Tools

To perform the setup procedures you need the following:

- One 10 mm hexagonal wrench
- One precision thermometer (accuracy ± 0.1 °C)

12.2.9.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 12-18 *Supervisor 2, Functions and User Permissions*

Function	Type	User	FSE
Set Serial Numbers of Devices a)	Setup		X
Calibrate RT-Sensor of RT-Incubator	Setup		X
Adjust Weighing Scales	Setup		X
Loading Port Test	Test	X	X
RT-Incubators Test	Test	X	X

Tab. 12-18 Supervisor 2, Functions and User Permissions

Function	Type	User	FSE
Weighing Scales Test	Test	X	X
Tools	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

a) This function is automatically selected if the serial number is < 1 or > 32767

Files, Directories

The Access Status function creates the following files:

- **Result Files:** Test results are stored in *.any files.

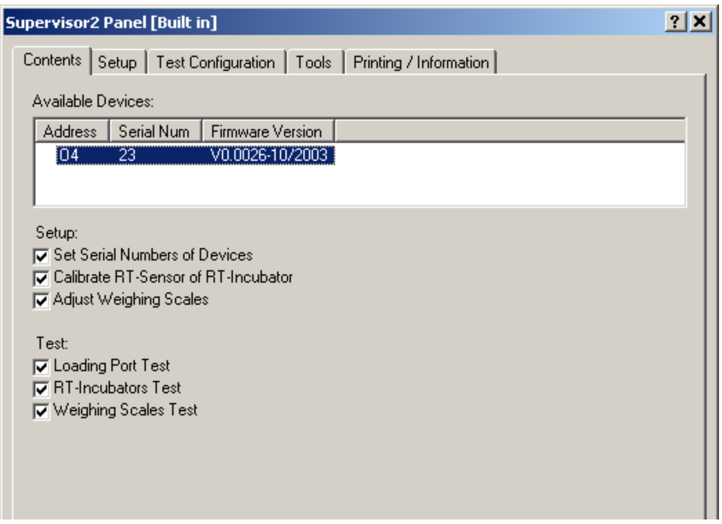
Directory:	<data_path>\Results
File name:	Supervisor2_<serial_number>_<date>_<time>.any

Starting the Panel

To set up or test the devices connected to the Supervisor 2 board:

1 Start the panel with **Options > Access Status > Supervisor 2**. The **Supervisor 2** panel with activated **Contents** page appears (see following figure).

*After starting the **Supervisor 2** panel, no setup or test check box is selected.*



Available Devices:

Address	Serial Num	Firmware Version
04	23	V0.0026-10/2003

Setup:
☑ Set Serial Numbers of Devices
☑ Calibrate RT-Sensor of RT-Incubator
☑ Adjust Weighing Scales

Test:
☑ Loading Port Test
☑ RT-Incubators Test
☑ Weighing Scales Test

Fig. 12-51 Safety panel - Contents page

Pages

The **Supervisor 2** panel is subdivided into the following pages:

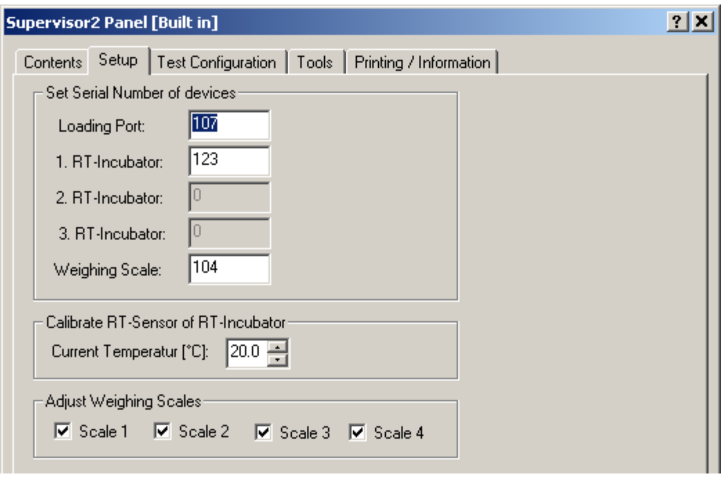
Tab. 12-19 Pages in Safety panel

Page	Function
Contents	General overview, device and procedure selection.
Setup	Input of serial numbers, nominal temperature for RT-sensor, selection of scales to adjust
Test Configuration	Selection of RT-Incubators and scales to test
Tools	Tools and indicators for testing the various devices connected to the Supervisor 2 board.
Printing / Information	Print selection for the QC-report

12.2.9.3 Setup Page

Purpose

This page lets you define the serial numbers of the connected devices, the current room temperature and the scales you wish to adjust.



Set Serial Number of devices
Loading Port: 107
1. RT-Incubator: 123
2. RT-Incubator: 0
3. RT-Incubator: 0
Weighing Scale: 104

Calibrate RT-Sensor of RT-Incubator
Current Temperatur [°C]: 20.0

Adjust Weighing Scales
☑ Scale 1 ☑ Scale 2 ☑ Scale 3 ☑ Scale 4

Fig. 12-52 Supervisor 2 panel - Setup page

Controls

The **Setup** page contains the following controls:

Set Serial Numbers of Devices	Contains the text boxes in which the serial number can be typed (also see note below).
- **Loading Port**	Serial number of the Loading Port
- **1. RT-Incubator**	Serial number of the 1st RT-Incubator
- **2. RT-Incubator**	Serial number of the 2nd RT-Incubator
- **3. RT-Incubator**	Serial number of the 3rd RT-Incubator
- **Weighing Scale**	Serial number of the Weighing Scales (one number for the entire set)

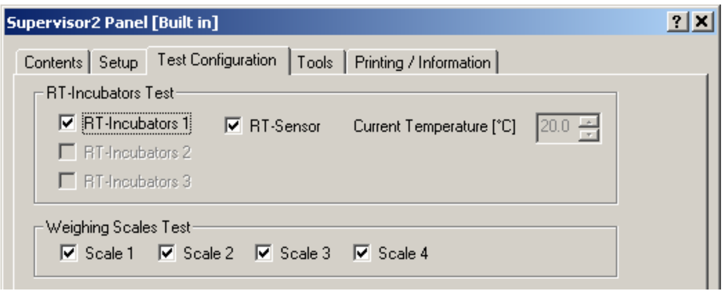
Calibrate RT-Sensor of RT-Incubator	Contains a spin box **Current Temperature [°C]** that allows you to set the exact current room temperature as the nominal value. The RT-sensor of the 1st RT-Incubator will be calibrated to this temperature during the setup procedure.
Weighing Scales	Four check boxes (**Scale 1** to **Scale 4**) to select the scale(s) you want to adjust.

Note: *No serial numbers can be entered for devices that are not connected to the Supervisor 2 board.*

12.2.9.4 Test Configuration Page

Purpose

This board lets you select the RT-Incubators and the Weighing Scales to be tested.



☑ RT-Incubators 1
☐ RT-Incubators 2
☐ RT-Incubators 3
☑ RT-Sensor
Current Temperature [°C] 20.0
☑ Scale 1 ☑ Scale 2 ☑ Scale 3 ☑ Scale 4

Fig. 12-53 *Supervisor 2 panel - Test Configuration panel*

Controls

The **Test Configuration** page contains the following controls:

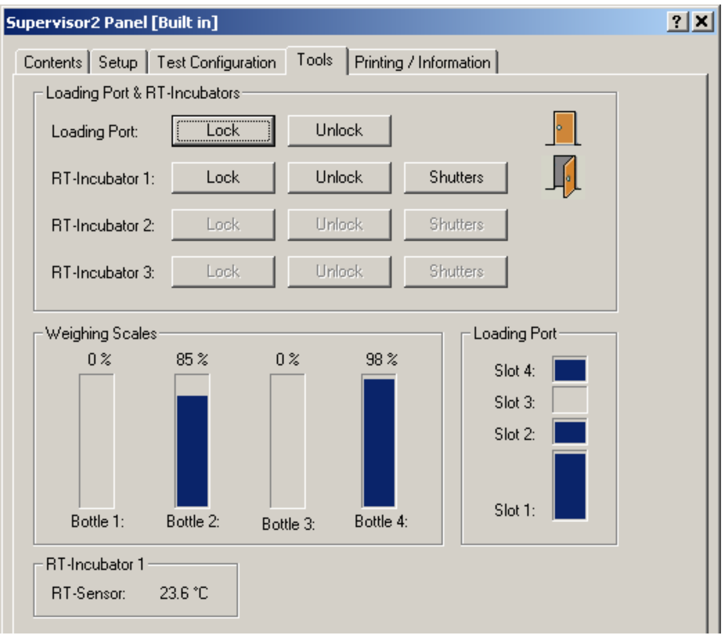
RT-Incubator Test	Controls to configure the RT-Incubator test
- **RT-Incubator 1**	Check box to select the 1st RT-Incubator
- RT-Sensor	Check box to select the RT-Sensor of the 1st RT-Incubator.
- Current Temperature	Text box in which the current room temperature must be typed during the test (to be measured with a precision thermometer (see note below).
- RT-Incubator 2	Check box to select the 2nd RT-Incubator. Can only be used if the incubator is installed and connected to the Supervisor 2 board (also see note below)
- RT-Incubator 3	As above for the 3rd RT-Incubator
Weihging Scales Test	Four check boxes (**Scale 1** to **Scale 4**) to select the scale(s) you want to test.

Note: *The RT-sensor is only tested for the 1st RT-Incubator (= the RT-Incubator whose sensor is connected to the Supervisor 2 board. In most cases, this is the leftmost RT-Incubator).*

12.2.9.5 Tools Page

Purpose

The **Tools** page allows you to test the installed devices and their elements informally and manually.



RT-Sensor: 23.6 °C

Fig. 12-54 *Supervisor 2 panel - Tools page*

Controls

The **Tools** page contains the following controls:

Loading Port & RT-Incubators	Controls to test the following elements: • Loading Port: Door locks • RT-Incubators: Door locks and shutters
- **Lock**	Locks the door of the device indicated on the left side when clicked.
- **Unlock**	Unlocks the door of the corresponding device.
- **Door symbols on right side**	Indicate whether the door of the corresponding device is opened, closed or locked.
- **Shutters**	Only for RT-Incubators. Closes the six shutters at the back of the corresponding RT-Incubator.
Weihging Scales	Four vertical bars that continuously show the current filling levels of **Bottle 1** to **Bottle 4**). The filling levels (as a percentage) are also indicated as text above the bars.
Loading Port	Four indicators that show the presence or absence of a rack in the corresponding place (**Slot 1** to **Slot 4**).
- **Slot 1**	This indicator shows whether the compartment contains: • No rack: Field is gray • Low rack (e.g., microplate): Indicator fills 50% of the field • High rack (deep-well plate or 1000 µl DiTi box): Indicator fills whole field.

- **Slot 2 to Slot 4**	• No rack: Field is gray • Rack present: Field is colored.
RT-Incubator 1	Shows the current temperature measured by the connected **RT-Sensor**.

12.2.9.6 Set Serial Numbers of Devices

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

Lets you enter and store the serial numbers of the installed devices: Loading Port, RT-Incubators and Weighing Scales. If the serial numbers are entered they will be printed in the QC-report.

Where Do I Find the Numbers?

The serial numbers are printed on stickers applied to the bottom of the devices (not visible when the device is installed). You should also find them in the shipping papers.

When Must the Numbers Be Set?

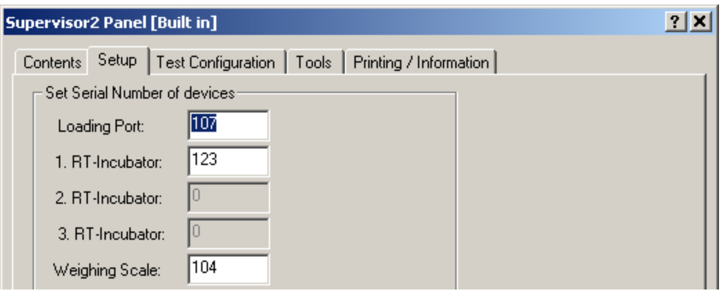
When a device is newly installed or when it is replaced with another one.

Procedure

To set the serial numbers:

1 On the **Contents** page, select the check box **Set Serial Numbers of Devices** and click **Start**.

*A process prompt instructing you to set the serial numbers appears together with the **Setup** page.*



Loading Port: 107
1. RT-Incubator: 123
2. RT-Incubator: 0
3. RT-Incubator: 0
Weighing Scale: 104

Fig. 12-55 Setup page - Set serial numbers

2 Type the correct serial numbers in the appropriate text fields (**Loading Port**, **RT-Incubator**, **Weighing Scale**).

Input fields for devices that are not installed cannot be edited.

3 Click **OK** when done.

The entered values are stored in EEPROM. They will appear in the QC-reports of the various tests.

12.2.9.7 Calibrate RT-Sensor of RT-Incubator

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure allows you to calibrate the RT-sensor of the RT-Incubator # 1. The sensor is located at the bottom of the RT-Incubator.

Tool

For this setup procedure you need a calibrated precision thermometer (accuracy ± 0.1 °C)

ATTENTION

To obtain reliable results carry out the calibration only if the following conditions are fulfilled:

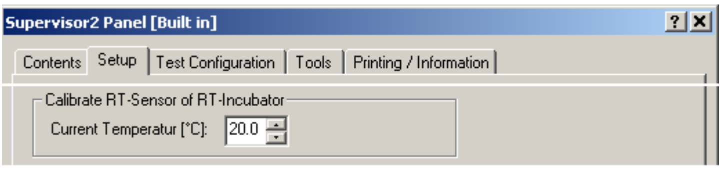
- The RT-Incubator must have been installed on the instrument long enough to adapt to the room temperature.
- The room temperature must have been stable for a sufficient period of time (approx. 1 hour).

Procedure

To calibrate the RT Sensor:

1. Use the precision thermometer to determine the exact room temperature.
2. On the **Contents** page, select the check box **Calibrate RT-Sensor of RT-Incubator** and click **Start**.

   *A process prompt together with the **Setup** page appears.*



Current Temperatur [°C]: 20.0

Fig. 12-56 Setup page - Calibrate temperature sensor

3. Enter the value indicated by the thermometer in the spin box **Current Temperature [°C]**. Use the up/down arrows of the spin box or type the value directly in the box.
4. Click **OK** when done.

   The sensor will be calibrated to the entered temperature. The temperature offset will be stored in EEPROM.

12.2.9.8 Adjust Weighing Scales

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure is used to adjust the four weighing scales so that the liquid levels in the wash liquid bottles can be determined with sufficient precision.

Tool and Other Material

To carry out the adjustment you need the following:

- Tool: 10 mm hexagon wrench.
- Other material: 1 empty bottle, 1 full 2-liter bottle and 1 full 4-liter bottle.

Procedure

Please, pay attention to the following:

ATTENTION

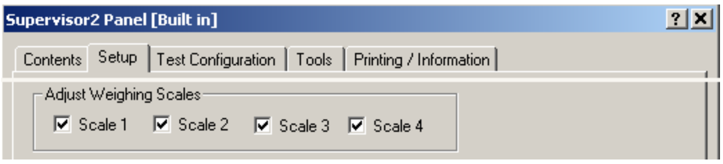
In order to obtain reliable results you should always put the bottle cap and the tube on top of the bottle during the following setup .

To adjust the weighing scales:

1 Remove the cover (A) below the scales:
   - Hold the cover at both ends as shown in the figure below.
   - Pull it towards you.

Fig. 12-57 *Removing the cover*

2 On the Contents page, select the **Adjust Weighing Scales** check box and change to the **Setup** page (see following figure).


Supervisor2 Panel [Built in]

Adjust Weighing Scales

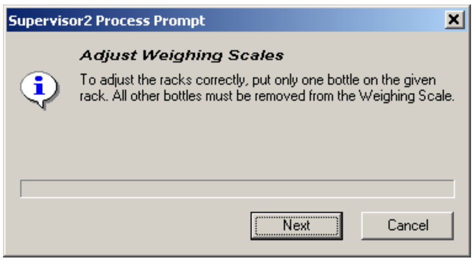
☑ Scale 1 ☑ Scale 2 ☑ Scale 3 ☑ Scale 4

Fig. 12-58 *Selecting the scales*

3 Select the scales you wish to adjust by selecting the corresponding check boxes (**Scale 1** to **Scale 4)**.

4 Click **Start** to begin.

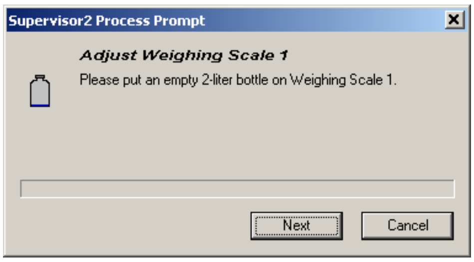
You will be guided through the setup procedure by a series of process prompts (not all of them are shown here). Strictly follow the instructions provided on the process prompts.


Supervisor2 Process Prompt

Adjust Weighing Scales

To adjust the racks correctly, put only one bottle on the given rack. All other bottles must be removed from the Weighing Scale.

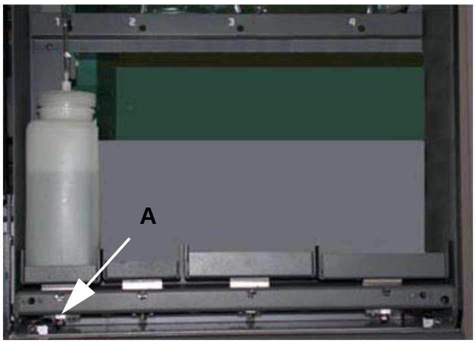
5 Use only one bottle and remove all other bottles from the scales. Click **Next** when done.


Supervisor2 Process Prompt

Adjust Weighing Scale 1

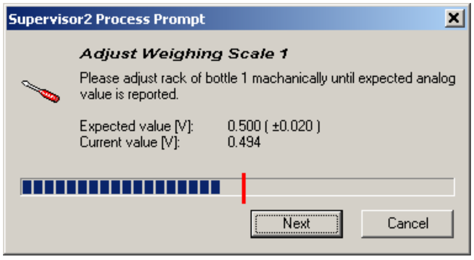
Please put an empty 2-liter bottle on Weighing Scale 1.

6 Place an empty 2-liter bottle on scale # 1. Make sure the cap and the tube are on top of the bottle. Click **Next** when done.



7 Use a 10 mm hexagon wrench to turn the adjusting screw (A). Carefully turn the screw until the **Expected value** on the prompt is within the indicated limits.

Ideally, the progress bar should be as close as possible to the red mark on the prompt.


Supervisor2 Process Prompt

Adjust Weighing Scale 1

Please adjust rack of bottle 1 machanically until expected analog value is reported.

Expected value [V]: 0.500 (±0.020)
Current value [V]: 0.494

8 Click **Next** when done and wait for the end of the calibration of the empty level (0%).

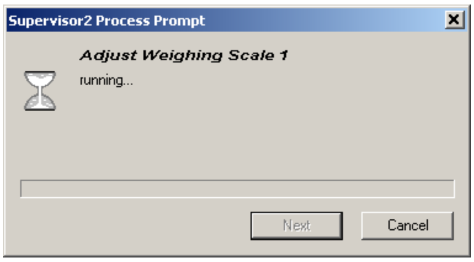


Fig. 12-59 Adjustment of scale 1

9 When prompted to do so, fill the bottle with 2 liters of liquid and put it back on the scale.

10 Click **Next** when done and wait for the end of the calibration of the full level.

11 Repeat the above steps 6 to 10 for the other scales.

12 Reinstall the cover below the scales when finished.

12.2.9.9 Loading Port Test

Purpose

This procedure lets you test the proper function of the door lock and the sensors of the Loading Port.

Procedure

To test the Loading Port:

1. On the **Contents** page, select the check box **Loading Port Test** and click **Start** to begin.

   You will be guided through the test procedure by a series of process prompts (not shown here). Strictly follow the instructions provided on the process prompts.
2. To test the door lock of the Loading Port:
   - Open the front door of the Loading Port. Click **OK** on the prompt when done.
   - Close the front door. Click **OK** when done.
   - Check whether the front door is locked. Click **OK** if this is the case (**Cancel** otherwise).
   - Now check whether the door is unlocked. Click **OK** if this is the case.
3. To test the sensors of the Loading Port:
   - Empty the Loading Port. Remove all racks and DiTi boxes. Click **OK** to continue.
   - Put a microplate into the bottom compartment (**Slot 1**). Click **OK** when done.
   - Remove the microplate and put a 1000 µl DiTi box into slot # 1. Click **OK** when done.
   - Continue in the same manner with the other slots.
4. At the end a **Passed** or **Failed** message appears. Click **OK** to confirm.
5. Change to the **Printing / Information** page to preview/print the QC-report.

If the Test Fails

Try the following:

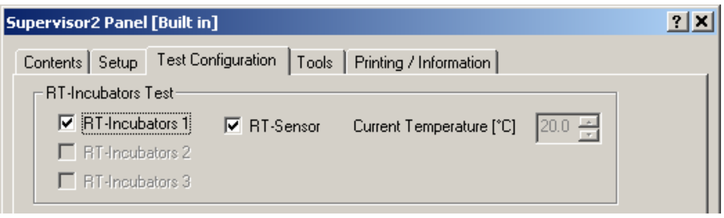
- Use the **Tool** page for an informal test.
- Examine the QC-report.

12.2.9.10 Room Temperature Incubators Test

Test This procedure tests the door lock and the shutters of the installed RT-Incubators.

Procedure To test the RT-Incubators:

1 On the **Contents** page, select the check box **RT-Incubators Test** and change to the **Test Configuration** page.



☑ RT-Incubators 1
☐ RT-Incubators 2
☐ RT-Incubators 3
☑ RT-Sensor
Current Temperature [°C] 20.0

Fig. 12-60 *Configure RT-Incubator test*

2 If there is more than one RT-Incubators select those you want to test.

3 If required select the **RT-Sensor Test** check box.

4 Click **Start** to begin.

You will be guided through the test procedure by a series of process prompts (not all of them are shown here). Strictly follow the instructions provided on the process prompts.

5 To test the door lock of the RT-Incubator:

- Open the front door of the RT-Incubator. Click **OK** on the prompt when done.
- Close the front door. Click **OK** when done.
- Check whether the front door is locked. Click **OK** if this is the case (**Cancel** otherwise).
- Now check whether the door is unlocked. Click **OK** if this is the case.

6 To test the shutters of the RT-Incubator:

- Open all shutters at the back of the RT-Incubator (push them inwards). Click **OK** when done.

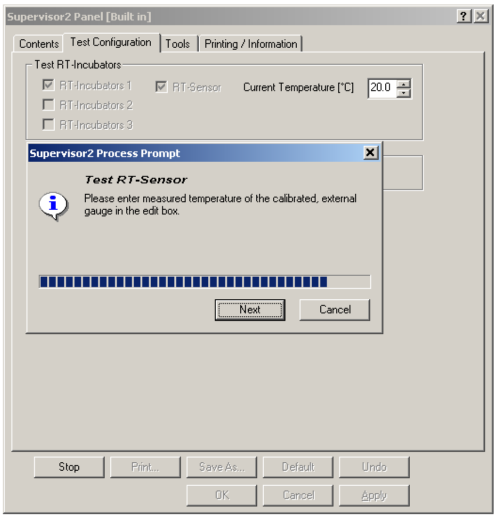
The shutters will be closed by the program.

- Check whether all shutters are closed. Click **OK** if this is the case (**Cancel** otherwise).

Note: *The following RT-Sensor test can only be performed if …*

- *the 1st RT-Incubator is connected to the Supervisor 2 board*
- *the check box **RT-Sensor** on the **Test Configuration** page is selected.*

7 To test the RT-Sensor:
- Determine the current room temperature with the precision thermometer.
- On the **Test Configuration** page that pops up, enter the determined temperature in the spin box **Current Temperature** (use the up/down arrows or type the value directly in the box).
- Click **OK** on the prompt when done.



☑ RT-Incubators 1
☐ RT-Incubators 2
☐ RT-Incubators 3
☑ RT-Sensor
Current Temperature [°C] 20.0

Test RT-Sensor

Please enter measured temperature of the calibrated, external gauge in the edit box.

***Fig. 12-61** testing the RT-Sensor*

8 If required repeat the above steps 5 to 6 for other RT-Incubators.

9 At the end a **Passed** or **Failed** message appears. Click **OK** to confirm.

10 Change to the **Printing / Information** page to preview/print the QC-report.

If the Test Fails

Try the following:
- Use the **Tools** page for an informal test.
- Examine the QC-report.
- If the RT-Sensor test fails recalibrate the sensor and repeat the test. Ask your nearest Tecan representative for assistance if necessary.
- If the shutters do not close properly contact the customer service department for assistance.

12.2.9.11 Weighing Scales Test

Purpose

This procedure lets you test the correct function of the weighing scales.

Preparation

To carry out the test efficiently you should have the following at your disposal:
- 1 empty and 1 full 2-liter bottle (filled with exactly 2 liters of wash liquid)
- 1 empty and 1 full 4-liter bottle (fill with exactly 4 liters of wash liquid)

Procedure

Please, pay attention to the following:

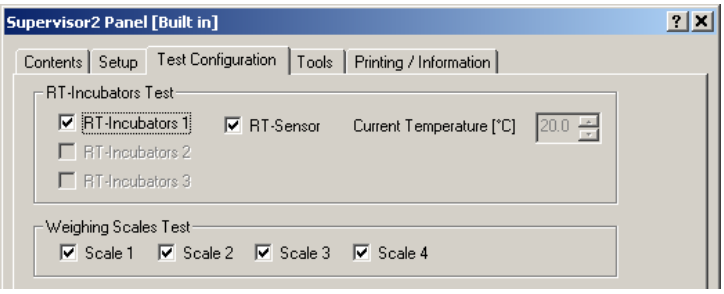
ATTENTION

In order to obtain reliable results you should always put the bottle cap and the tube on top of the bottle during the following tests.

To test the Weighing Scales:

1 Prepare the bottles as described above.

2 On the **Contents** page, select the Weighing Scales Test check box and change to the Test **Configuration** page.



RT-Incubators Test

☑ RT-Incubators 1 ☑ RT-Sensor Current Temperature [°C] 20.0
☐ RT-Incubators 2
☐ RT-Incubators 3

Weighing Scales Test

☑ Scale 1 ☑ Scale 2 ☑ Scale 3 ☑ Scale 4

Fig. 12-62 *Selection of the bottles to test*

3 On the **Test Configuration** page, select the bottles you want to test.

4 Click **Start** to begin.

You will be guided through the test procedure by a series of process prompts (not shown here). Strictly follow the instructions provided on the process prompts.

5 To test one scale you are prompted to do the following:

- To put an empty (2- or 4-liter bottle) on the scale indicated on the prompt. Do not forget to put the bottle cap and the tube on top of the bottle. Click **OK** on the prompt when done.
- Wait until the empty bottle is tested.
- Put a full bottle on the scale. Click **OK** on the prompt when done.
- Wait until the full bottle is tested.

6 Repeat step 5 for any other scale to be tested. Always follow the instructions provided on the prompts.

7 At the end a **Passed** or **Failed** message appears. Click **OK** to confirm.

8 Change to the **Printing / Information** page to preview/print the QC-report.

If the Test Fails

Try the following:

- Use the **Tools** page for an informal test.
- Examine the QC-report.
- Repeat the setup procedure **Adjust Weighing Scales**. If necessary ask a person with the necessary access rights for assistance.
- If the problem persists, the Hall sensors beneath the scales and their connection to the Supervisor 2 board, as well as the mechanics of the scales must be checked. Contact the customer service department if necessary.

12.2.9.12 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.3 Carrier Shaking Vials (CSV)

12.3.1 Overview

Purpose

The CSV-panel (Carrier Shaking Vials) allows you to set up and test the CSV-carriers (Qwalys 3 carrier, OEM-Product).

Brief Description

The name “Carrier Shaking Vials” denotes a special carrier on which rotating vials can be placed. Since the vials are inclined with respect to the Z-axis, the liquid they contain is slightly “shaken” by the rotary motion. The vials are driven by a stepper motor located in the housing at the front of the carrier. Note that every second vial (1, 3, 5…) turns counterclockwise, while the vials 2, 4, 6… rotate in clockwise direction (# 1 = rearmost position). The following figure shows two CSV-carriers on an instrument worktable.

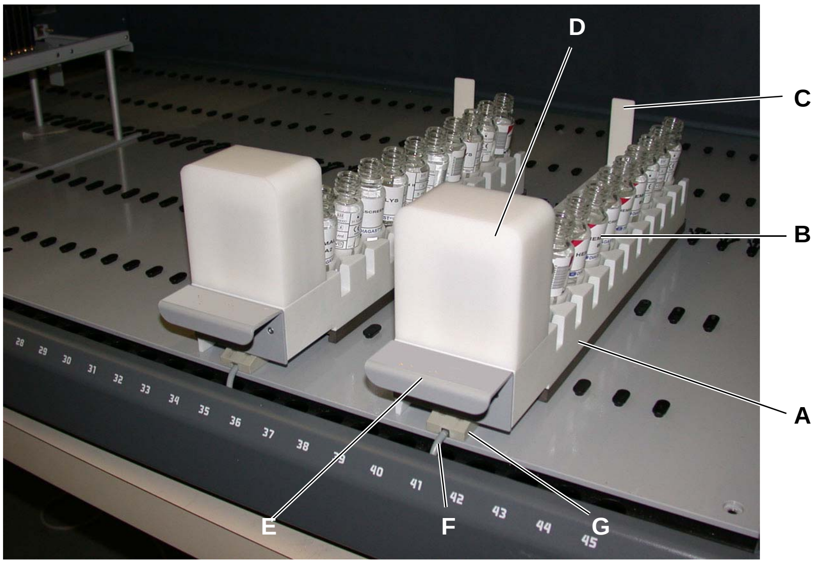


Fig. 12-63 *CSV-carriers on worktable*

A	*CSV-carrier*	*E*	*Handle*
B	*Rotating vials*	*F*	*Connection cable*
C	*Barcode flag*	*G*	*Conductor rail*
D	*Motor housing*		

Arrangement and Connection of the Carriers

The CSV-carriers are connected to the SMIO-board, located behind the left service door. Ensure that the carriers are arranged and connected as follows:

Tab. 12-20 *Arrangement and connection of CSV carriers*

Carrier	Connector on SMIO	Position on worktable	Comment
CSV1	J4	left	The carriers must be arranged from left to right. If there is only one carrier, connect it to J4; if there are 2 carriers use J4 and J5, etc.
CSV2	J5	middle	
CSV3	J6	right	

Note: *For further information, refer to the Service Manual of the corresponding instrument.*

12.3.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

The test(s) described in this section can be carried out by users belonging at least to the SnS_Customer group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 12-21 *CSV-panel, Functions and User Permissions*

Function	Type	User	FSE
Test	Test	X	X
Test	Test	X	X
Tool	Tool		
Printing / Information	Page	X	X
QC-report	Report	X	X

Files, Directories

The CSV function creates the following files:

- **Result Files:** Test results are stored in *.any files.

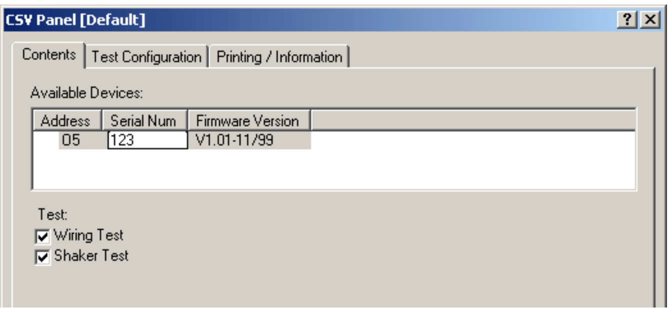
Directory:	<data_path>\Results
File name:	CSV_<serial_number>_<date>_<time>.any

Starting the Panel

To set up or test the devices connected to the RSS board:

1. Start the panel with **Options > Carrier Shaking Vials**. The CSV-panel with activated **Contents** page appears (see following figure).

   *After starting the **CSV** panel, no check boxes are selected and not all tabs are visible.*



Available Devices:

Address	Serial Num	Firmware Version
05	123	V1.01-11/99

Test:
☑ Wiring Test
☑ Shaker Test

__Fig. 12-64__ CSV panel, Contents page

__Tab. 12-22__ Pages in CSV panel

Page	Function
Contents	General overview, device and procedure selection.
Test Configuration	Selection of the CSV-carriers to test
Printing / Information	Print selection for the QC-report

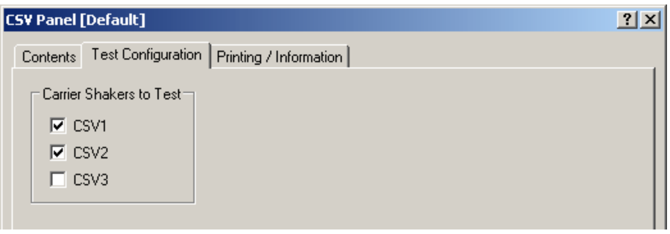
Serial Number

***Note:** Please note that the serial number in the window **Available Devices** refers to the SMIO-board and not to the CSV carrier.*

12.3.3 Test Configuration Page

Purpose

This page lets you select the carriers to test.



Carrier Shakers to Test
☑ CSV1
☑ CSV2
☐ CSV3

__Fig. 12-65__ CSV panel, Test Configuration page

Controls

The Test Configuration page contains the following controls:

Frame Carrier Shakers to test	Contains three check boxes according to the three carriers that can be connected to the SMIO-board
- **CSV1**	Selection of carrier connected to J4 of SMIO
- **CSV2**	Selection of carrier connected to J5 of SMIO
- **CSV3**	Selection of carrier connected to J6 of SMIO

12.3.4 Wiring Test

Cross References

List of cross references to information provided in other sections:

Information	References
Arrangement and connection of CSV-carriers	See section 12.3.1, 🗎 12-76
Test Configuration page	See section 12.3.3, 🗎 12-78

Purpose

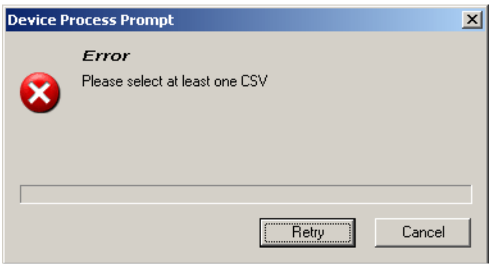
This test allows you to check whether the individual CSV-carriers are arranged and connected properly (see cross references).

Procedure

To perform the wiring test:

1. Place at least one vial on the carrier.
2. On the **Contents** page, select the **Wiring Test** check box and change to the **Test Configuration** page.
3. On the **Test Configuration** page, select the CSV-carriers you want to test.
   - – Make sure you select at least one carrier, otherwise the test will not be performed.
   - – Also ensure that you select only carriers that are physically connected to the SMIO board.
4. Click **Start** to begin.

   You will be guided through the test with a series of process prompts. Always follow the instructions on the screen.



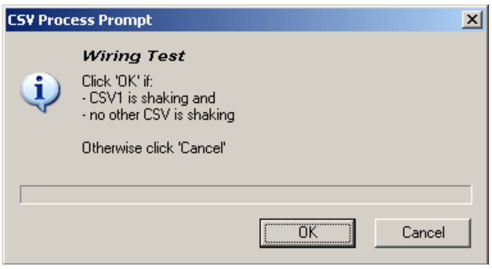
Error

Please select at least one CSV

Fig. 12-66 *No CSV selected*

This error message appears if you have not selected any CSV-carrier. Do one of the following:

- Select at least one carrier and click **Retry** to continue.
- Click **Cancel** otherwise.



Wiring Test

Click 'OK' if:
- CSV1 is shaking and
- no other CSV is shaking

Otherwise click 'Cancel'

Fig. 12-67 *Wiring test*

A process prompt like this appears if at least one CSV-carrier has been selected.

5. Visually check the following:
   - Is the carrier indicated on the prompt running?
   - Is it the only one that is running?
6. Depending on the result:
   - If you can answer both questions with “yes” click on **OK** to finish.
   - If one of the above conditions is not true, the test has failed. Click **Cancel** to abort.

Pass / Fail Criteria

The test is passed if all of the selected CSV-carriers are connected correctly.

If the Test Fails

Try the following:

- Check whether the carriers are connected correctly to the SMIO-board.
- Check the electrical contacts between the carriers and the conductor rails.
- Replace the whole carrier or have it replace by the customer service.
- Replace the SMIO-board or have it replaced by the customer service.

12.3.5 Shaker Test

Cross References

List of cross references to information provided in other sections:

Information	References
Arrangement and connection of CSV-carriers	See section 12.3.1, 🗎 12-76
Test Configuration page	See section 12.3.3, 🗎 12-78

Purpose

This test lets you check whether the vials on the selected CSV-carriers rotate properly when the drive motor is turned on.

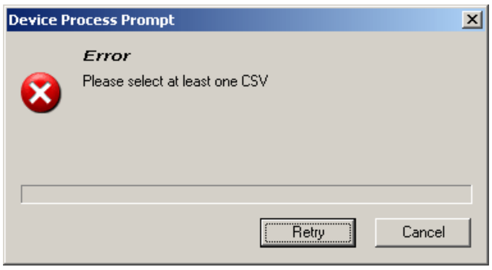
Procedure

To perform the **Shaker Test**:

1. Fill the CSV-carrier you want to test with vials. We recommend you to load all possible positions.
2. On the **Contents** page, select the **Shaker Test** check box and change to the **Test Configuration** page.
3. On the **Test Configuration** page, select the CSV-carriers you want to test.

   Make sure you select at least one carrier, otherwise the test will not be performed. Also ensure that you select only carriers that are physically connected to the SMIO board.
4. Click **Start** to begin.

   You will be guided through the test with a series of process prompts. Always follow the instructions on the screen.

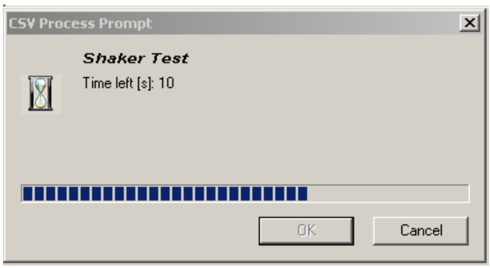


Error
Please select at least one CSV

Fig. 12-68 No CSV selected

This error message appears if you have not selected any CSV-carrier. Do one of the following:

- Select at least one carrier and click **Retry** to continue.
- Click **Cancel** otherwise.



Shaker Test
Time left [s]: 10

Fig. 12-69 Shaker test

The drive motor is turned on for about 30 seconds. A process prompt like this appears while the drive motor is running.

5 Visually check whether the vials rotate as long as the motor is turned on. Please note that the sense of rotation changes from vial to vial (1, 3, 5… rotate counterclockwise, 2, 4, 6… rotate clockwise), where # 1 is the rearmost vial.

6 Confirm with **OK** if in order (click **Cancel** otherwise).

Pass /Fail Criteria

The test is passed if all of the vials placed on the selected CSV-carriers rotate properly.

If the Test Fails

Try the following:

- Check whether the carriers are connected correctly to the SMIO-board.
- Check the electrical contacts between the carriers and the conductor rails.
- Replace the whole carrier or have it replaced by an FSE.
- Replace the SMIO-board or have it replaced by an FSE.

12.3.6 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

__Note:__ The __Operator__ field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the __Comment__ field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.4 Flipper

12.4.1 Overview

Cross References

List of cross references to information provided in other sections:

Information	References
AutoLoader	See section 13.7, 🗎 13-96

What Is a Flipper?

The Flipper is an optional assembly that is used on Cellerity instruments. Its main functions are the following (see also Fig. 12-70 , 🗎 12-83):

- It serves as a loading device for the flasks (A) fetched from the AutoLoader.
- The flipper module holds (A) the flasks (B) during pipetting when the LiHa dispenses or aspirates the nutrient fluid needed for the growth of cell cultures through a septum in the screw cap (G).
- It can also rock up and down round a horizontal axis, thus mixing its contents.
- When the flasks (B) are ready for incubation, the RoMa picks them up and transports them to the incubator at the rear side if the instrument.
- Finally, the flipper is equipped with a spring-loaded plate mechanism that serves to detach the cell culture from the inner wall of a flask when the culture is fully grown. When this mechanism is released, the knocking plate (C) knocks against the flask. The force of the impact is sufficient to detach the cell culture from the flask’s wall.

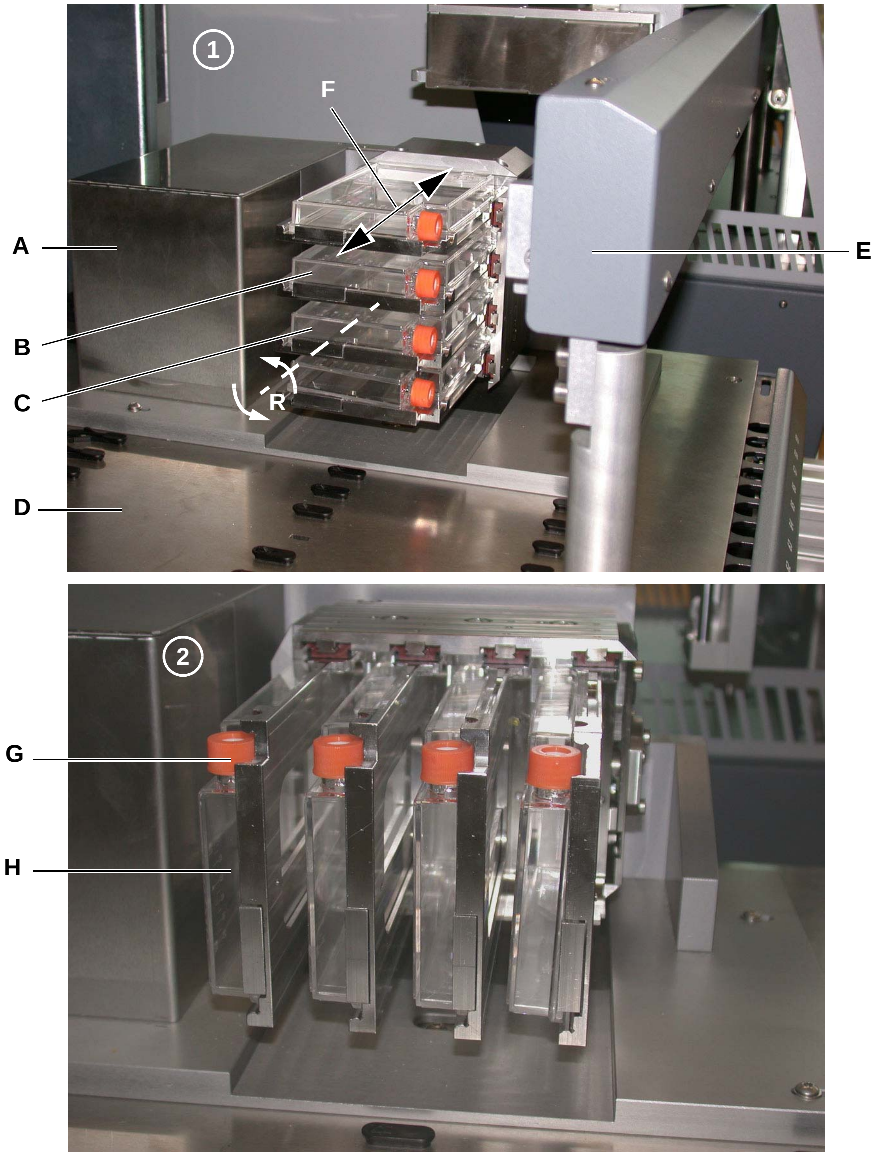


Fig. 12-70 *Flipper module*

A	*Flipper module*	***F***	*C-axis (open / close locking plate)*
B	*Flask IN loading/unloading position*	***G***	*Screw cap with septum*
C	*Knocking plate*	***H***	*Flask in upright pipetting position*
D	*Worktable*	***R***	*R-axis (rotation horizontal / vertical)*
E	*AutoLoader transfer rail*		

Positions

The flipper can be turned into the following positions:

- Loading / unloading position (picture 1).
  - In this position, the AutoLoader’s loading module puts the flasks onto the trays of the Flipper.
  - The same position also serves for unloading the flasks. As mentioned before, they are unloaded by the RoMa.

- Pipetting position (picture 2): The Flipper module is turned into an upright position (2) so that the LiHa can dispense liquid into the flask or aspirate liquid from it through the septum in the screw cap (G).
- Mixing position. For mixing the cell cultures and the liquid, the flasks are turned into the horizontal position and then rocked gently round the R-axis.

Movement Axes

The flipper knows two movement axes:

- R-axis: This rotational axis is parallel to the worktable front. It allows turning the flipper into the horizontal loading/unloading/mixing position and the vertical pipetting position.
- C-axis: This movement axis is parallel to worktable’s X-axis and used for opening closing the tray and for releasing the knocking mechanism. The movements in the C-axis are produced by a camshaft with four cams located in the housing on the right side of the flipper.
  - Depending on the positions of the cams, the flasks can be put on or removed from the trays or can be firmly gripped (e.g., for pipetting or mixing).
  - To detach the cell culture from the inner wall of the flasks, the flasks are first turned into the horizontal position (R-axis). Then the cams open the trays, thereby tensioning their retention springs. By turing the cams further the trays are released suddenly and knock against the flasks, thus detaching the cell cultures.
  - Note that the four cams have an angular displacement with respect to each other, so that the trays are tensioned and released one after the other.

12.4.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13

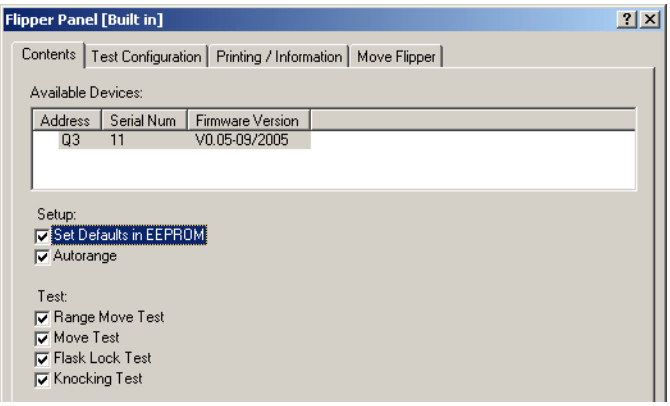
Permissions, Procedures

The following table shows the functions of the Flipper panel. Note that all functions can be invoked by both operators and field service engineers (no password required).

Function	Type	User	FSE
Set defaults in EEPROM	Setup		X
Autorange	Setup		X
Range Move Test	Test	X	X
Move Test	Test	X	X
Flask Lock Test	Test	X	X
Knocking Test	Test	X	X

Starting the Panel

1 Start the panel with **Options > Flipper**. The **Flipper** panel with activated **Contents** page appears. After starting the **Flipper** panel no setup or test check box is activated.



Available Devices:

Address	Serial Num	Firmware Version
Q3	11	V0.05-09/2005

Setup:
☑ Set Defaults in EEPROM
☑ Autorange

Test:
☑ Range Move Test
☑ Move Test
☑ Flask Lock Test
☑ Knocking Test

Fig. 12-71 SMIO panel - Contents page

Pages

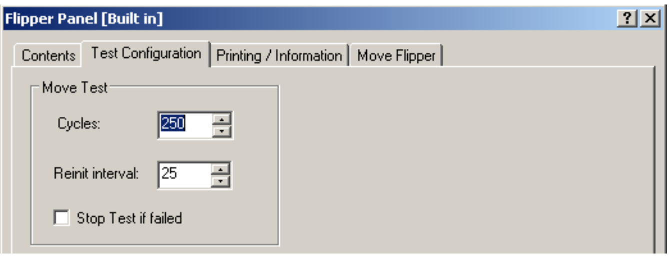
Tab. 12-23 Pages of the Flipper panel

Pages	Function
Contents	General overview, device and procedure selection
Test Configuration	Lets you set the test parameters
Printing / Information	Print selection for the QC-report
Move Flipper	For an informal test of the flipper functions.

12.4.3 Test Configuration Page

Purpose

The **Test Configuration** page lets you set the parameters for the **Move Test**.



Move Test
Cycles: 250
Reinit interval: 25
☐ Stop Test if failed

Fig. 12-72 Flipper panel, Test Configuration page

Controls

Move Test	Controls for the Move Test
- **Cycles**	- Number of test cycles
- **ReInit interval**	- Cycles after which the axes are reinitialized
- **Stop Test if failed**	- If selected, the test is stopped automatically when the pass criteria are no longer fulfilled.

12.4.4 Move Flipper Page

Purpose

The **Move Flipper** page lets you test the functions of the Flipper informally.

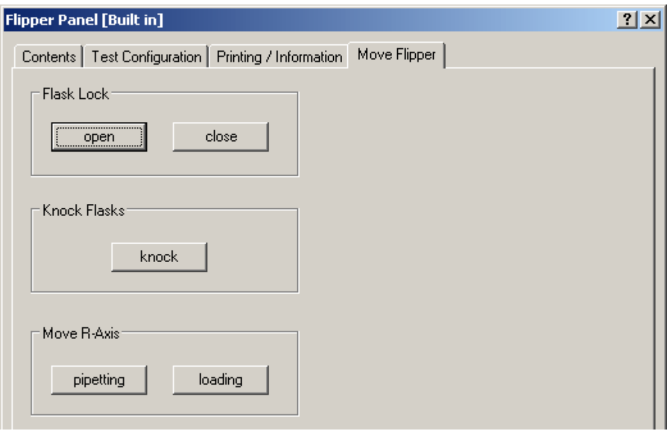


Fig. 12-73 *Flipper panel, Move Flipper page*

Controls

Flask Lock	Controls for testing the flask locking mechanism
- **open**	- Opens the lock
- **close**	- Closes the lock
Knock flasks	For testing the knocking mechanism
- **knock**	- If this button is clicked, the knocking plate is released and knocks against the flasks
Move R-Axis	For turning the flipper
- **pipetting**	- Turns the flipper into the (upright) pipetting position
- **loading**	- Turns the flipper into the (horizontal) loading position

12.4.5 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box.

   No further parameters need to be defined.
2. Download the default values to the Flipper and have them re-read by the software with **Start**.

12.4.6 Autorange

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Autorange** procedure turns the flipper round its R-axis to find the extreme positions, then calculates the available rotational range. The result is stored in EEPROM.

1. On the **Contents** page, select the **Autorange** check box. No further entries need to be made.
2. Click **Start** to begin.

   *At the end of the procedure, the **Setup: Done** message is displayed.*
3. Confirm with **OK**.

12.4.7 Range Move Test

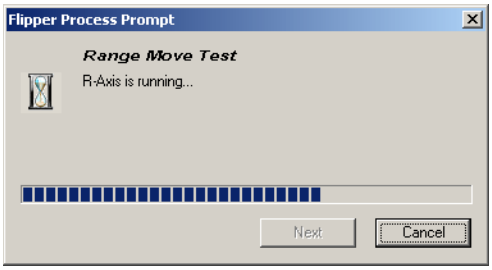
Purpose

This test checks whether the **Flipper** can be turned over the whole range of the R-axis.

Procedure

To perform the test:

1. On the **Contents** page, select the **Range Move Test** check box. No further entries are necessary.
2. Click **Start** to begin.



Range Move Test

R-Axis is running...

The **Range Move Test** process prompt appears. At the end of the test, you are notified whether or not the test was successful.

***Fig. 12-74** Range move test process prompt*

Pass / Fail Criteria

- The test is passed if the range within which the flipper can be rotated corresponds to the range determined by the **Autorange** procedure.
- The test is failed if the result does not correspond to the range determined in the Autorange test, i.e. if it is smaller or larger).

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Repeat the **Set Defaults in EEPROM** and the **Autorange** procedures (Or have them repeated by an authorized specialist), then perform the **Range Move Test** again.
- If this does not help, there might be a mechanical problem, or a problem with the electronic control of the flipper. Replace the flipper or have it replaced.

12.4.8 Move Test

Purpose

This test checks whether the flipper can be turned over the available range for a user-defined number of test cycles.

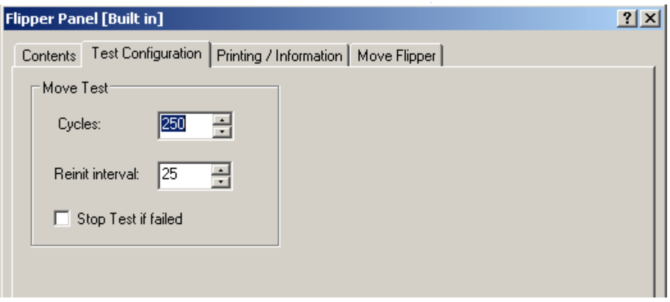
Test Principle

The user can set the number of test cycles for which the test should be performed, as well as the reinitialization interval, i.e. the number of cycles after which the flipper is reinitialized before the test continues. In addition, the user chooses whether the test should be aborted immediately if one test cycle fails.

Procedure

To perform the Move test:

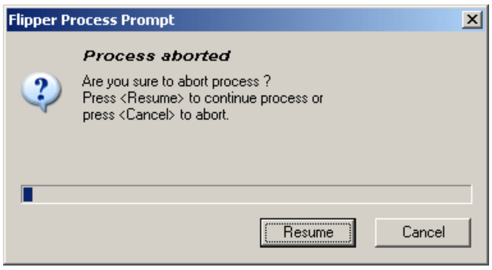
1. On the **Contents** page, select the **Move Test** check box and change to the **Test Configuration** page.



Cycles: 250
Reinit interval: 25
☐ Stop Test if failed

Fig. 12-75 *Flipper panel, Test Configuration page*

2. Set the following on the **Contents** page or accept the suggested default values:
   - **Cycles**: Total number of test cycles:
   - **Reinit interval**: Number of test cycles after which the flipper is reinitialized.
   - **Select** the check box **Stop Test if failed** if you want to abort the test immediately if a test cycle fails.
3. Click **Start** at the bottom of the panel to begin.



Process aborted

Are you sure to abort process ?
Press <Resume> to continue process or
press <Cancel> to abort.

Fig. 12-76 *Process aborted*

4 If this prompt appears (only if you have selected the check box **Stop Test if failed** on the **Test Configuration** page):
   - To continue click **Resume**.
   - To abort the test click **Cancel**.

At the end of the test you are notified whether or not the test was successful.

Pass / Fail Criteria

- The test is passed if the range within which the flipper can be rotated corresponds to the range determined by the **Autorange** procedure in all test cycles.
- The test is failed if at least one of the test cycles fails.

If the Test Fails

Try the following (call the nearest customer service department if necessary):

- Repeat the **Set Defaults in EEPROM** and the **Autorange** procedures (Or have them repeated by an authorized specialist), then run the **Move Test** again.
- If this does not help, there might be a mechanical problem, or a problem with the electronic control of the flipper. Replace the flipper or have it replaced.

12.4.9 Flask Lock Test

Purpose

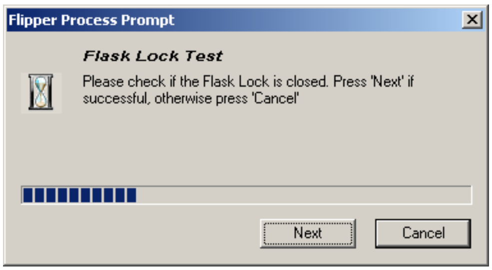
This test lets you check whether the flasks are firmly locked in the flipper.

Procedure

To perform the test:

1 On the **Contents** page, select the **Flask Lock Test** check box and click **Start** to begin.

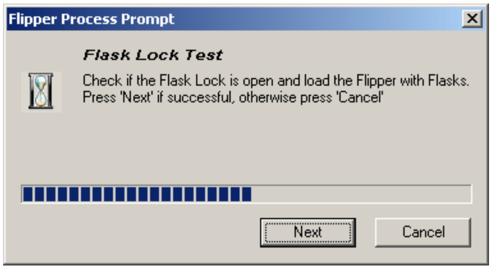
You will be guided through the test by a series of process prompts. Always follow the instructions provided on the prompts.



Flask Lock Test

Please check if the Flask Lock is closed. Press 'Next' if successful, otherwise press 'Cancel'

1 First check whether the flask locks are closed. Click on **Next** if OK (**Cancel** if not OK).

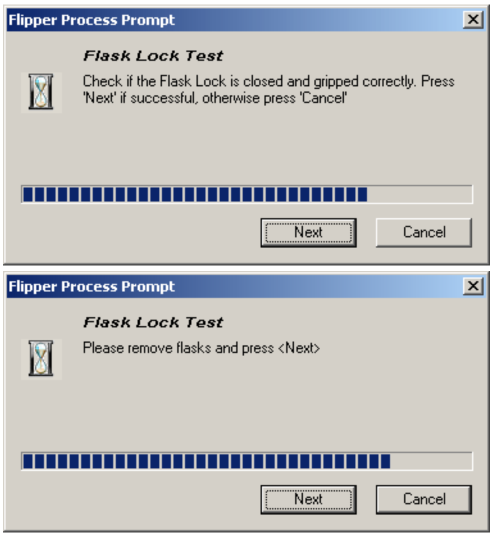


Flask Lock Test

Check if the Flask Lock is open and load the Flipper with Flasks. Press 'Next' if successful, otherwise press 'Cancel'

2 Now check whether the flask locks are open. Click on **Next** if OK (**Cancel** if not OK).

3 Load the flipper with flasks.
   - Click on **Next** when done.
   - Click **Cancel** if the flasks cannot be loaded.



Flask Lock Test

Check if the Flask Lock is closed and gripped correctly. Press 'Next' if successful, otherwise press 'Cancel'

Flask Lock Test

Please remove flasks and press <Next>

Fig. 12-77 *Flask lock test*

4 Check whether the locks are closed and whether all flasks are firmly gripped by the mechanism.

5 Click on **Next** if OK, otherwise click **Cancel**.

6 Remove the flasks:

- Click **Next** when done.
- Click **Cancel** if you cannot remove the flasks.

At the end of the test you are notified whether or not the test was successful.

Pass / Fail Criteria

- The test is passed if the locking mechanism worked as expected in all tests and you did not answer any question with **Cancel**.

If the Test Fails

- If the test fails, there might be a mechanical problem or a problem with the electronic control of the flipper. Replace the flipper or have it replaced by an authorized service specialist.
- After the installation of the replacement flipper you should repeat the setup and test procedures described in this section.

12.4.10 Knocking Test

Purpose

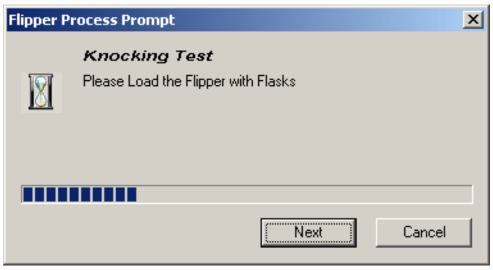
This test lets you check whether the knocking mechanism (used to detach the cell cultures from the wall of a flask) works properly.

Procedure

To perform the test:

1 On the **Contents** page, select the **Knocking Test** check box and click **Start** to begin.

You will be guided through the test by a series of process prompts. Always follow the instructions provided on the prompts.

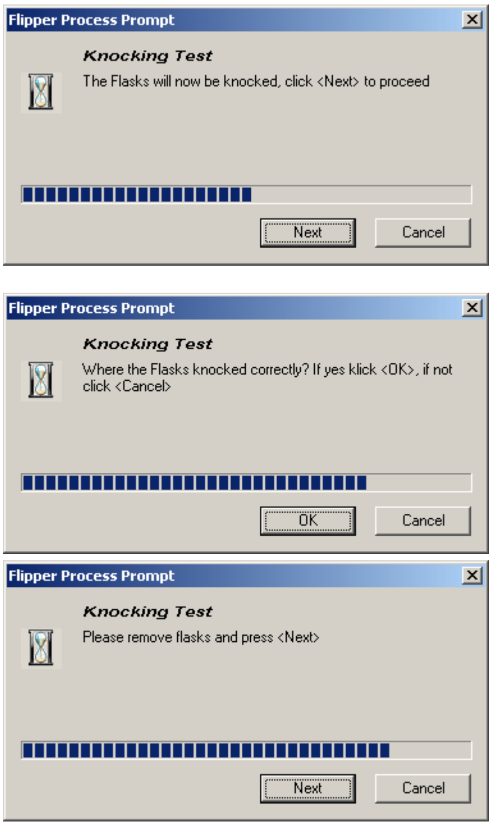


Knocking Test

Please Load the Flipper with Flasks

When the test begins all the locks should be open.

1 When prompted to do so, load the flasks and click **Next** when done (click **Cancel** if you cannot load the flasks).



Knocking Test

The Flasks will now be knocked, click <Next> to proceed

Knocking Test

Where the Flasks knocked correctly? If yes klick <OK>, if not click <Cancel>

Knocking Test

Please remove flasks and press <Next>

Fig. 12-78 *Knocking test*

2 Click **Next** to continue and observe the behavior:
   - The knocking plates should be tensioned and released one by one in equal time intervals.
   - You should see the plate movements and hear the knocks.

3 Confirm with **OK** if the behavior is as described above, otherwise click **Cancel**.

4 Remove the flasks and click **Next** when done.

At the end of the test you are notified whether or not the test was successful.

Pass / Fail Criteria

- The test is passed if the knocking mechanism worked as expected in all tests and you did not answer any question with **Cancel**.

If the Test Fails

- If the test fails, there might be a mechanical problem, or a problem with the electronic control of the flipper. Replace the flipper or have it replaced by an authorized service specialist.
- After the installation of the replacement flipper you should repeat the setup and test procedures described in this section.

12.5 Te-Link

12.5.1 Overview

What Is a Te-Link?

The Te-Link is an optional device that allows the transport of racks, such as microplates from one instrument to another. Racks to be moved to a neighboring instrument are placed on the carrier of the Te-Link and then moved to the neighboring instrument for further processing. This can be done in different ways:

- A RoMa places the rack on the Te-Link on one instrument, another RoMa picks it up when it arrives at the destination.
- However, it is also possible to pipet directly from/into the rack on one side and to load and unload the rack on the opposite end of the Te-Link.

Master Instrument

The instrument to which the Te-Link is electrically connected and by which it is controlled is the master instrument. In practice, all movements and loading/ unloading cycles are controlled and coordinated by the application software of the master instrument.

Main Parts

The following figure shows the main parts and the movement axis of the Te-Link.

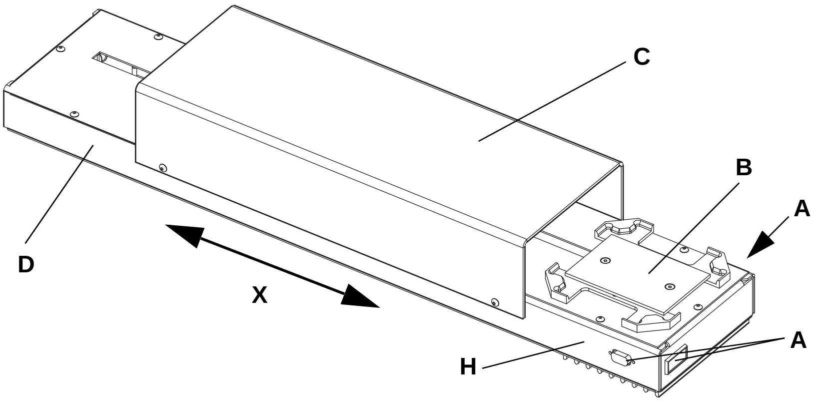


Fig. 12-79 *Te-Link*

A	*Places for connectors*	***D***	*Chassis*
B	*Carrier*	***H***	*Home position*
C	*Protective cover*	***X***	*X-axis (movement of carrier)*

Movement Axis

The Te-Link has only one movement axis, referred to as the X-axis by the software and in single commands.

Note: *Do not confuse the X-axis of the instrument and that of the Te-Link.*

- ***Instrument:*** *The X-axis of the instrument refers to left/right movements (parallel to the instrument front) of arm devices.*
- ***Te-Link:*** *Depending on the arrangement of the linked instruments the X-axis can be parallel to an instrument's X-axis (parallel to the front) or to the Y-axis (at an angle of 90° to the front of the instrument).*
  As far as the Te-Link is concerned, we do not distinguish between "left" and "right". Instead, we distinguish between movements towards or away from the home position.

Home Position

When the Te-Link is initialized the carrier is brought into the “home position” on the side of the cable connections. The previous figure shows the carrier the Te-Link with the carrier in its home position. The instrument where the home position is located is the “Master Instrument”.

Linking Two Instruments

The following figure shows some possible arrangements of instruments that are connected via a Te-Link.

Fig. 12-80 *Some possible arrangements of linked instruments*

Special Tools

No special tools are required for setting up and testing the Te-Link.

12.5.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	**References**
Using the panel	See section 5.2, 🗎 5-13

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

***Tab. 12-24** Te-MO Wash Unit Functions and User Permissions*

Function	**Type**	**User**	**FSE**
Set Defaults in EEPROM	Setup		X
Autorange	Setup		X
Range Move Test	Test	X	X
Random Move Test	Test	X	X
Move Page	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Files, Directories

The Te-Link function creates the following files:

- **Result Files:** Test results are stored in *.any files.

  Directory: <data_path>\Results

  File name: Te-Link_<serial_number>_<date>_<time>.any

- Test Configuration Files

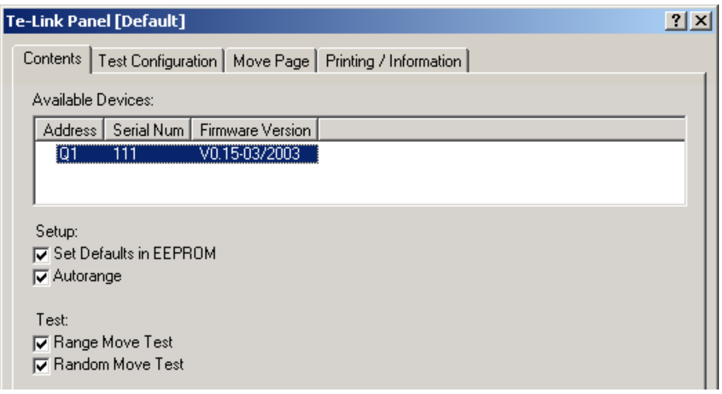
  Directory: user defined

  File name: <name>.any

Starting the Panel

To set up or test the Te-Link:

1 Start the panel with **Options > Te-Link**. The **Te-Link** panel with activated **Contents** page appears. After starting the **Te-Link** panel, no setup or test check box is selected and not all tabs are visible.



Available Devices:

Address	Serial Num	Firmware Version
01	111	V0.15-03/2003

Setup:
☑ Set Defaults in EEPROM
☑ Autorange

Test:
☑ Range Move Test
☑ Random Move Test

__Fig. 12-81__ Te-Link panel, Contents page

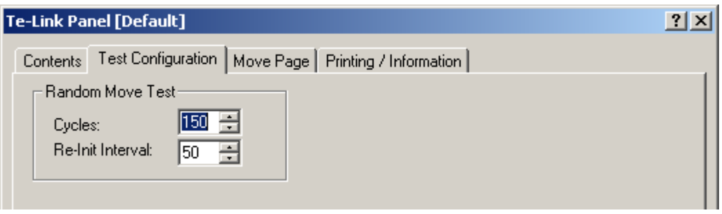
Pages The **Te-Link** panel is subdivided into the following pages:

__Tab. 12-25__ Pages of Te-Link Panel

Pages	Function
Contents	General overview, procedure selection
Test Configuration	Lets you set the test parameters
Move Page	For moving the carrier in the X-axis
Printing / Information	Print selection of QC-report

12.5.3 Test Configuration Page

Purpose The **Test Configuration** page lets you set the parameters for the **Random Move Test**.



Cycles: 150
Re-Init Interval: 50

__Fig. 12-82__ Te-Link - Test Configuration page

Controls

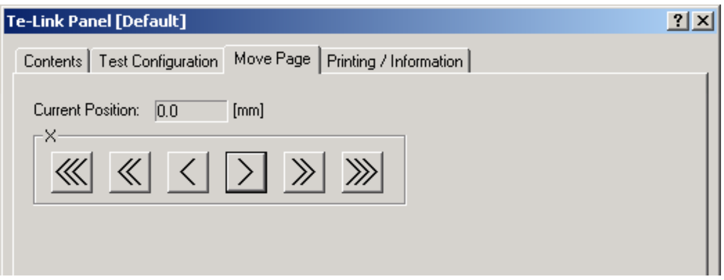
Random Move test	Controls for the Random Move Test
- **Cycles**	- Number of test cycles
- **Re-Init Interval**	- Cycles after which the axis is reinitialized

12.5.4 Move Page

Purpose

The **Move Page** allows you to move the carrier of the Te-Link stepwise or continuously in both directions of the Te-Link's X-axis.

***Note:** The **Move Page** is not used by any setup or test procedures as described in this manual. It serves as an additional tool that can be used to move the carrier "by hand".*



Current Position: 0.0 [mm]

***Fig. 12-83** Te-Link - Move Page*

Controls

The **Move Page** contains the following controls

< >	Single step (1/10 mm) movement buttons towards (<) and away (>) from the home position.
« »	Ten steps (1 mm) movement buttons towards (<) and away (>) from the home position.
⋘ ⋙	Continuous movement buttons (if button is kept pressed) towards (<) and away (>) from the home position.
Current position	Shows the current position of the shuttle, i.e. the distance from the home position in [mm].

***Note:** The arrows on the movement buttons indicate the direction in which the carrier will be moved*

- *Towards (<) or away (>) from the home position.*
- *If you place the mouse pointer over a movement button, a text appears that explains what you can do with the button (so-called "tool tip")*

Keyboard Control

It is also possible to move the carrier with the keyboard. You can use the corresponding keys of the numeric keypad or the keys in the key blocks left of the numeric keypad.

***Tab. 12-26** Moving the carrier with the keyboard*

Key (left of numeric keypad)	Key in numeric pad (NumLock on)	Movement axis	Part moved
→	6 →	X+ (away from home)	Carrier
←	4 ←	X- (towards home)	Carrier

Steps

The carrier is moved as follows:

- Every time you hit one of the above keys the carrier is moved by one step (0.1 mm).
- If you keep the key pressed it is moved continuously at a speed of about two steps per second.
- You can press a key continuously and at the same time press the Ctrl key. In this case, the carrier is accelerated until it reaches a maximum speed.

12.5.5 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box.

   No further parameters need to be defined.
2. Download the default values with **Start**.

12.5.6 Autorange

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this procedure is to determine the scaling adjust factor of the X-axis.

Principle

The procedure moves the carrier in the X-axis to its extreme positions, counts the actual number of steps and determines the scaling adjust factor.

Procedure

1. On the **Contents** page, select the **Autorange** check box

   No further parameters need to be entered.
2. Click **Start** to begin.

12.5.7 Range Move Test

Purpose

The purpose of this test is:

- To ensure that the movement range in the X-axis is not too large.
- To ensure that the carrier is moved at the maximum speed over the whole range.
- To detect possible losses of movement steps.

Principle

The movable parts of the Te-Link, the carrier, is moved several times to the extreme positions of the X-axis. Then, it is reinitialized.

Procedure

To perform the **Range Move Test**:

1 On the **Contents** page select the **Range Move Test**.

No further entries need to be made.

2 Click **Start** to begin.

*Test results can be viewed on the **Printing / Information** page.*

Pass/Fail Criteria

The test is passed if the values are within the given deviation limit (0.1 mm).

If the Test Fails

Repeat the **Autorange** setup procedure. If the test fails again, call your nearest service organization.

12.5.8 Random Move Test

Purpose

The purpose of this test is to verify whether the movable parts of the Te-Link, the carrier, can be moved at random, without losing steps, in the X-axis at various speeds and to various positions for a great number of times.

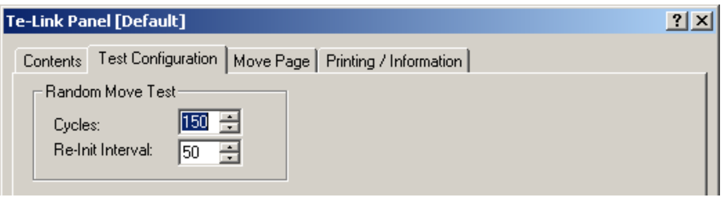
Principle

The carrier is initialized and then moved at random for a user-defined total number of **Cycles**. During the test the carrier is reinitialized periodically after **Re-Init Interval** cycles (can also be defined by the user).

Procedure

To perform the **Random Move Test**:

1 On the **Contents** page, select the **Random Move Test** check box and change to the **Test Configuration** page.



Cycles: 150

Re-Init Interval: 50

Fig. 12-84 *Test Configuration page*

2 In the frame **Range Move Test**, set the total number of test **Cycles** and the **Re-Init Interval**.

3 Click **Start** to begin.

Test results can be viewed on the **Printing / Inforamtion** page.

Pass/Fail Criteria

The test is passed if the values of all axes are within the given deviation limit (0.1 mm).

If the Test Fails

Repeat the **Autorange** setup procedure. If the test fails again, call your nearest service organization.

12.5.9 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

***Note:** The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.6 Te-VacS

12.6.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Te-VacS Operating + Service Manuals	See section 1.2, 🗎 1-3

Description

The Te-VacS is a solid phase extraction vacuum system used for vacuum separation.

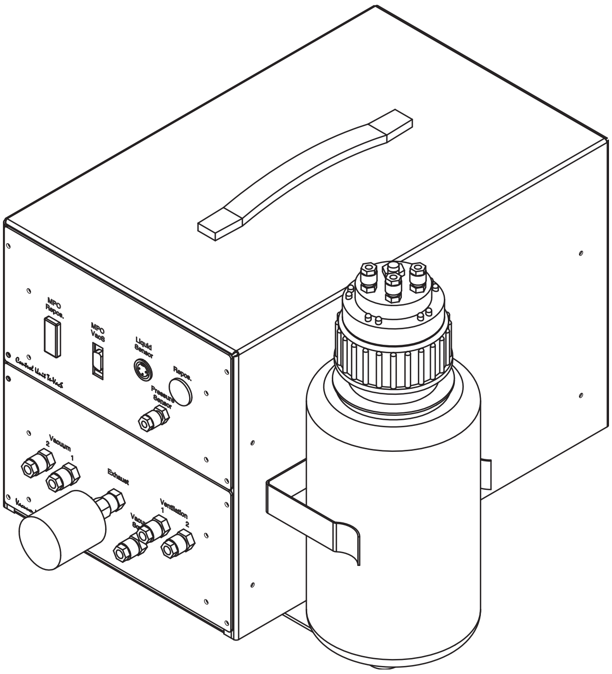


Fig. 12-85 *Te-VacS*

Te-VacS Types

In the field you may encounter the following three types of Te-VacS modules:

- New model of Te-VacS supplied as of April 2003. This new model can be used to replace the earlier versions, Te-VacS-B and Te-VacS-C.
- Te-VacS-B for biological molecules supplied until April 2003.
- Te-VacS-C for chemical compounds supplied until April 2003.

Note: *The new model of the Te-VacS is referred to as Te-VacS (without extension) in this section.*

Required Tools

To carry out the settings and tests the use of an external pressure gauge is recommended:

Tool	Supplier	
Pressure gauge: vacuum proof	Ahlborn GmbH	
Pressure range: 0 - 1 bar (0 - 100 kPa)	P.O.Box 1253	
Resolution: 0.003 bar (0.3 kPa)	D-83602 Holzkirchen	
	Germany	
	Telephone:	0049 (0)80 243 0070
	Telefax:	0049 (0)80 243 0071

For additional information about the Te-VacS (→ Cross References).

12.6.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

***Tab. 12-27** Te-VacS Functions and User Permissions*

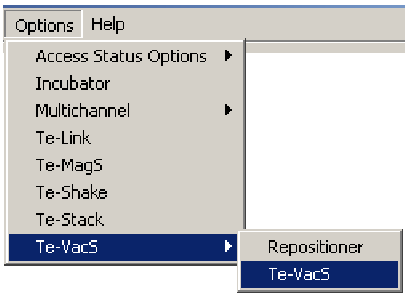
Function	Type	User	FSE
Set type	Setup		X
Set duty cycle timing	Setup	a)	a)
Liquid level sensor	Test	X	X
Pressure sensor calibration	Test	X	X
Extraction valve function and pump performance	Test	X	X
Ventilation valve function and leakage	Test	X	X
Test Advanced Configuration Data	Test		X
Results	Page	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

a) *The duty cycle timing can only be checked in the field, but the values cannot be altered by field service engineers and customers.*

Starting the Panel

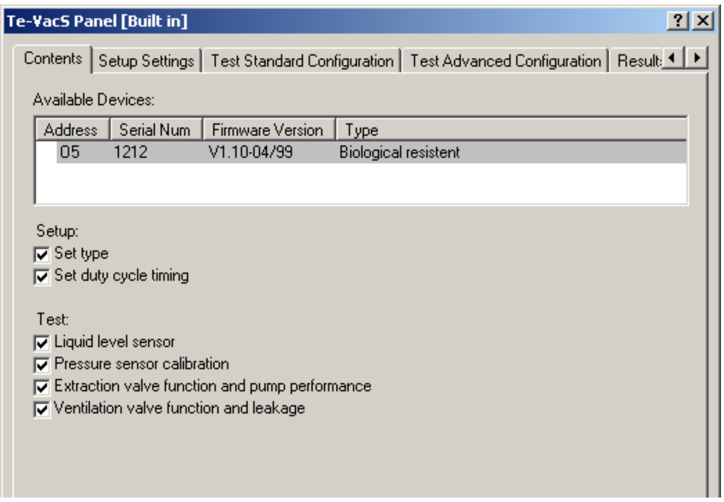
To setup or test the Te-VacS:

1 Start the panel with **Options > Te-VacS > Te-VacS**.



*The **Te-VacS** panel with activated **Contents** page appears. After starting the Te-VacS panel, no startup or test check box is selected and not all tabs are visible.*

Fig. 12-86 *Te-VacS sub-menu*



Available Devices:

Address	Serial Num	Firmware Version	Type
05	1212	V1.10-04/99	Biological resistent

Setup:
☑ Set type
☑ Set duty cycle timing

Test:
☑ Liquid level sensor
☑ Pressure sensor calibration
☑ Extraction valve function and pump performance
☑ Ventilation valve function and leakage

Fig. 12-87 *Te-VacS Panel - Contents page*

Pages

The **Te-VacS** panel is subdivided into the following pages:

Page	Description
Contents	General overview, procedure selection.
Setup Settings	Setup of the Te-VacS type.
Test Standard Configuration	Configuration of the available hardware.
Test Advanced Configuration	Advanced configuration data, data can only be viewed, but not changed.
Results	Test results summary.
Printing / Information	Print selection for the QC-report

12.6.3 Set Type and Duty Cycle Timing

Field Service Engineers/Operators

Access rights:

- The **Set type** procedure requires the field service engineer password.
- The **Set duty cycle timing** procedure allows field service engineers and customers to check the values, however, they cannot alter them.

Purpose

The **Setup Settings** procedure lets you define the Te-VacS type. The **Duty cycle timing** can only be checked in the field.

Procedure

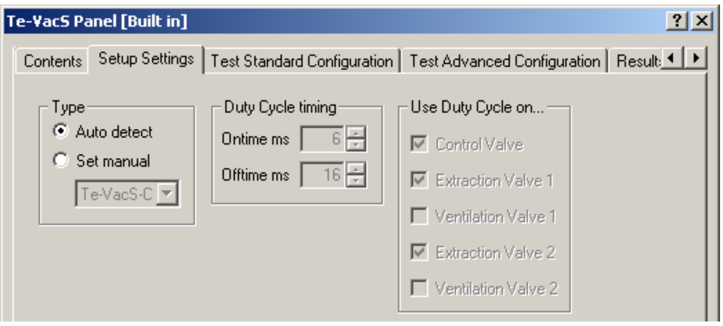
To set up a Te-VacS:

1. On the **Contents** page, select both the **Set type** and **Set duty cycle timing** check boxes.

ATTENTION

Make sure you select both the **Set Type** and **Set duty cycle timing** check boxes, otherwise the specified type and the duty cycle will not be transmitted to the instrument when **Start** is clicked.

2. Change to the **Setup Settings** page.



Type
● Auto detect
○ Set manual
Te-VacS-C

Duty Cycle timing
Ontime ms 6
Offtime ms 16

Use Duty Cycle on...
☑ Control Valve
☑ Extraction Valve 1
☐ Ventilation Valve 1
☑ Extraction Valve 2
☐ Ventilation Valve 2

__Fig. 12-88__ Te-VacS - Setup Settings page

The **Setup Settings** page displays the following data:

Duty Cycle timing	Due to their chemical properties, the valves for the Te-VacS-C use continuous current, whereas the valves for the Te-VacS-B are operated with a duty cycle. The fields show the On and Off times that define the duty cycle for the Te-VacS-B valves.
Use Duty Cycle on	Valves using this duty cycle.

3. Select the **Type** of detection. If the **Auto detect** option is selected, the Te-VacS type should be detected automatically by the software. If for some reason the autodetection does not work, select the **Set manual** option and select the appropriate type from the list as follows:
   - **Te-VacS** and **Te-VacS-C:** Select Te-VacS-C from the list.
   - **Te-VacS-B:** Select Te-VacS-B from the list.

4. Start the setups with **Start**. The **Please remove the Microplate from the vacuum block** message appears.
5. Follow the instruction and confirm with **Next**. The Te-VacS produces now a vacuum in the bottle.
6. Confirm the **The VacS will be set to type x** message with **OK**.
7. Confirm the **Duty cycle will be enabled for type x** message with **OK**.

The type is set in the EEPROM, which allows a correct control of the device.

In Case of Errors

If errors occur during the setup, follow the instructions given. Either click **Retry** to restart the setup or abort it with **Cancel**.

12.6.4 Liquid Level Sensor Test

Purpose

The **Liquid level sensor** test procedure checks whether the liquid level sensor works properly.

Procedure

To perform the test procedure:

1. On the **Contents** page, select the **Liquid level sensor** check box. No further parameters need to be defined.
2. Start the procedure with **Start**. The **Prepare Vacuum / Waste Bottle** message appears.
3. Follow the instruction and confirm with **Next**. The **Please turn the float switch on and off** message appears.
4. Move the float at the end of the liquid level sensor up and down. If the test passes, then you can confirm with **OK**, otherwise continue with **Cancel**. The **Please replace the lid** message appears.
5. Replace the bottle top and confirm with **Next**.

12.6.5 Pressure Sensor Calibration Test

Purpose

The **Pressure sensor calibration** procedure calibrates the pressure sensor (e.g., by equalizing the ambient air pressure) to check whether it works properly.

Procedure

To perform the test procedure:

1. On the **Contents** page, select the **Pressure sensor calibration** check box. No further parameters need to be defined.
2. Start the procedure with **Start**. The **Prepare Vacuum / Waste Bottle** message appears. Follow the instructions and confirm with **Next**.
3. The **Please remove the Microplate from the vacuum block** message appears. Follow the instruction and confirm with **Next.** The **Waiting for ambient pressure equalisation...** message is displayed.
4. If the test passes, the **Ambient pressure equalisation timeout** field is filled out in the **Results** page, otherwise a message is output.

12.6.6 Extraction Valve Function / Pump Performance Test

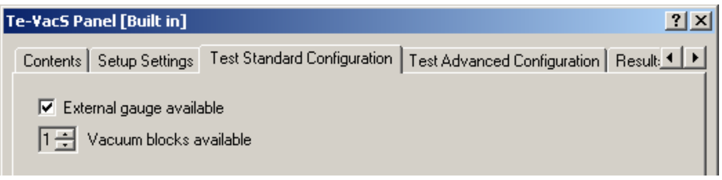
Purpose

The **Extraction valve function and pump performance** checks the flow rate pressure to find out whether the extraction valves are blocked by checking.

Procedure

To perform the test:

1. On the **Contents** page, select the **Extraction valve function and pump performance** check box and change to the **Test Standard Configuration** page.



☑ External gauge available

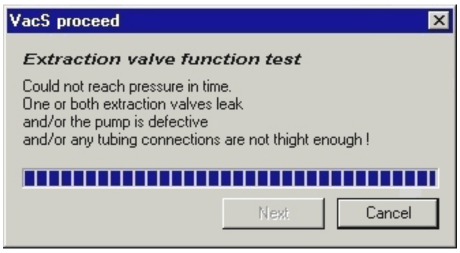
1 Vacuum blocks available

***Fig. 12-89** Test Standard Configuration page*

2. Clear the **External gauge available** check box if no external gauge is available.
3. Start the procedure with **Start**. The **Prepare Vacuum / Waste Bottle** message appears and asks you to **remove the lid**, **empty the bottle** and **replace the lid**.
4. Follow the instructions and confirm with **Next**. If the **External gauge available** check box is selected, the **Please attach the external gauge** message appears.
5. Follow the instruction and confirm with **Next**. The **Please remove the Microplate from the vacuum block** message appears.
6. Remove the microplate and confirm with **Next**.
7. Follow the instructions in the process prompts when the system is testing the extraction valves.
8. If the **External gauge available** check box is selected, the **Please detach the external gauge** message appears at the end of the test. Do so and confirm with **OK**.
9. If the test Passes, the fields in the **Extraction Valve** sections on the **Results** page are filled out.

Pass/Fail Criteria

If the test fails, the **Extraction valve function test message** appears:



Extraction valve function test

Could not reach pressure in time.
One or both extraction valves leak
and/or the pump is defective
and/or any tubing connections are not thight enough !

***Fig. 12-90** Extraction valve function test message*

1. Check the stated points and perform the test again.

12.6.7 Ventilation Valve Function and Leakage Test

Purpose

This procedure tests ventilation valves for leakages to find out whether they are blocked.

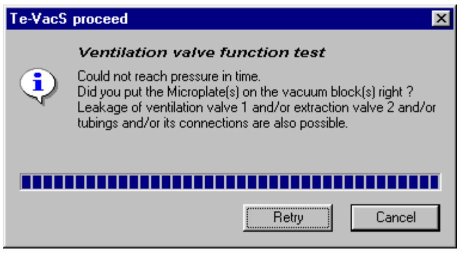
Procedure

To perform the test procedure:

1. On the **Contents** page, select the **Ventilation valve function and leakage** check box and change to the **Test Standard Configuration** page.
2. Specify the number of available vacuum blocks (one or two) with the **Vacuum blocks available** spin box.
3. Start the procedure with **Start**. The **Prepare Vacuum / Waste Bottle** message appears. Follow the instructions and confirm with **Next**.
4. The **Please put the vacuum block on the rear position and put a Microplate on the vacuum block** message appears. Follow the instruction and confirm with **Next**.
5. Follow the instructions in the process prompts when the system is testing the ventilation valves.
6. If the test passes, the fields in the **Ventilation Valve** sections on the **Results** page are filled out.

Pass/Fail Criteria

If the test fails, the **Ventilation valve function test** message appears:



Ventilation valve function test

Could not reach pressure in time.
Did you put the Microplate(s) on the vacuum block(s) right ?
Leakage of ventilation valve 1 and/or extraction valve 2 and/or tubings and/or its connections are also possible.

Fig. 12-91 *Ventilation valve function test message*

1. Check the stated points and perform the test again.

12.6.8 Advanced Configuration Data

Purpose

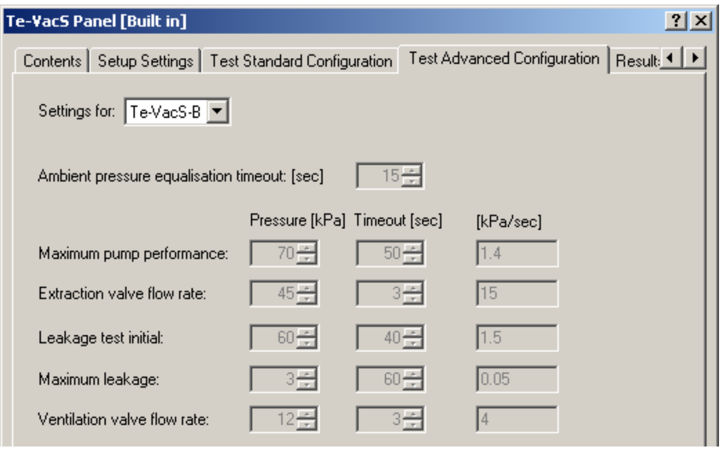
The **Test Advanced Configuration** page displays the values that must be reached by the tested valves.

Note: *The configuration data cannot be changed by both operators and field service engineers (higher password level required).*

Procedure

To display the advanced test configuration data:

1. Change to the **Test Advanced Configuration** page.



Settings for: Te-VacS-B

Ambient pressure equalisation timeout: [sec] 15

	Pressure [kPa]	Timeout [sec]	[kPa/sec]
Maximum pump performance:	70	50	1.4
Extraction valve flow rate:	45	3	15
Leakage test initial:	60	40	1.5
Maximum leakage:	3	60	0.05
Ventilation valve flow rate:	12	3	4

Fig. 12-92 Test Advanced Configuration page

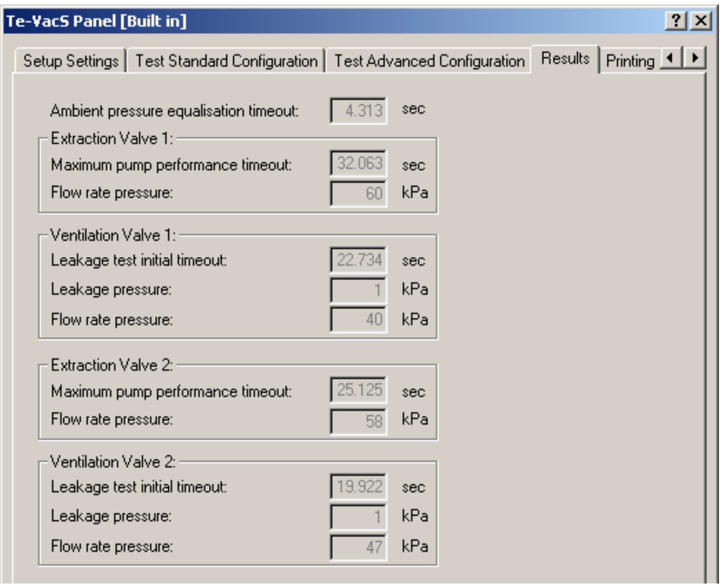
2 Select the Te-VacS type to be tested from the **Setting for** list as follows:

- **Te-VacS** and **Te-VacS-B:** Select Te-VacS-B from the list.
- **Te-VacS-C: Select Te-VacS-C** from the list.

You can make this selection without the field service engineer password. It allows you to read the default specifications all both Te-VacS types.

12.6.9 Results Page

Purpose The Results page summarizes test results.



Ambient pressure equalisation timeout: 4.313 sec

Extraction Valve 1:
Maximum pump performance timeout: 32.063 sec
Flow rate pressure: 60 kPa

Ventilation Valve 1:
Leakage test initial timeout: 22.734 sec
Leakage pressure: 1 kPa
Flow rate pressure: 40 kPa

Extraction Valve 2:
Maximum pump performance timeout: 25.125 sec
Flow rate pressure: 58 kPa

Ventilation Valve 2:
Leakage test initial timeout: 19.922 sec
Leakage pressure: 1 kPa
Flow rate pressure: 47 kPa

Fig. 12-93 Results page

Data The **Results** page shows the settings (left) and the following test results:

Ambient pressure equalization timeout	Test result for **Pressure sensor calibration** procedure.

Extraction Valve x	Test results for **Extraction valve function and pump performance** procedure.
Ventilation Valve x	Test results for Ventilation valve function and leakage procedure.

Viewing/ Printing Results

To view or print test results:

1. Change to the **Results** page.
2. Print the test results with **Print** or preview the test report.

12.6.10 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.7 Repositioner

Cross References

List of cross references to information provided in other sections:

Information	References
Te-VacS	See section 12.6, 🗎 12-100
Te-VacS Operating and Service Manual	See section 1.2, 🗎 1-3

12.7.1 Overview

What Is a Repositioner?

The Repositioner is an optional extension to the Te-VacS and is used in vacuum separation. It allows moving a 384-well target plate that rests on a movable carrier, the Positioner, into four positions under a 96-well SPE[1] Cartridge (e.g., TecPrep 96 microplate). In this way, the contents of four subsequent TecPrep 96 microplates can be extracted to one 384-well target plate (e.g., MALDI targets[2]).

Main Parts

The following figure shows the main parts of the Repositioner.

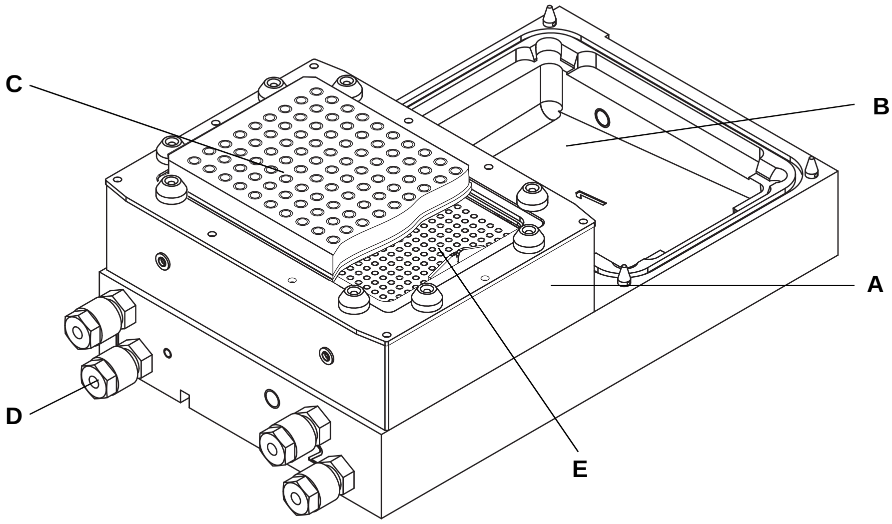


Fig. 12-94 *Repositioner*

A	*Vacuum block*	***C***	*96-well SPE cartridge*
B	*Compartment for additional Repositioner*	***D***	*Tube connectors*
		E	*384-well target plate (movable)*

Movement Axes

The Repositioner moves the 384-well target in the X-axis (left/right) or the Y-axis (front/rear) into 4 positions. In each of these positions, 96 of the 384 wells of the target plate are aligned with the centers of the 96 wells of the SPE cartridge, as shown in the following figure.

---

[1] *SPE = Solid Phase Extraction*

[2] *MALDI = Matrix Assisted Laser Desorption Ionization*

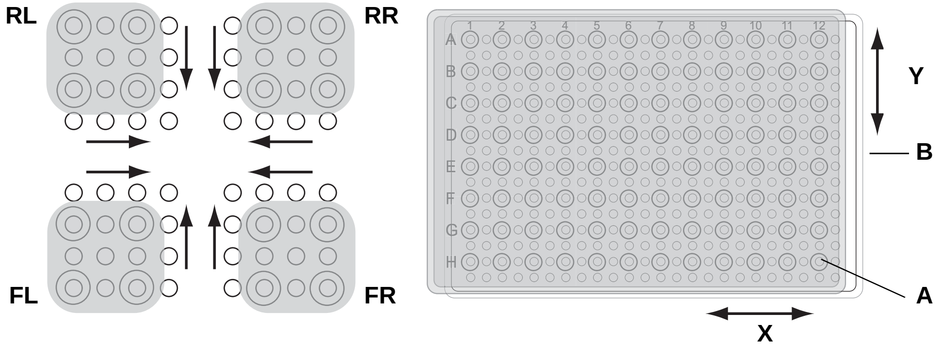


Fig. 12-95 *Repositioning the 384-well target*

A	*TecPrep 96 plate*	***RR***	*Rear-right position*
B	*384-well target (beneath A)*	***FL***	*Front-left position*
RL	*Rear-left position*	***FR***	*Front-right position*

12.7.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13

Permissions, Procedures

The Repositioner panel has only two test procedures. No password is needed for running these tests.

Tab. 12-28 *Repositioner Functions and User Permissions*

Function	Type	User	FSE
Move Test	Test	X	X
Extended Test	Test	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Files, Directories

The Repositioner function creates the following files:

- **Result Files:** Test results are stored in *.any files.

Directory:	<data_path>\Results
File name:	Repositioner_<serial_number>_<date>_<time>.any

- Test Configuration Files

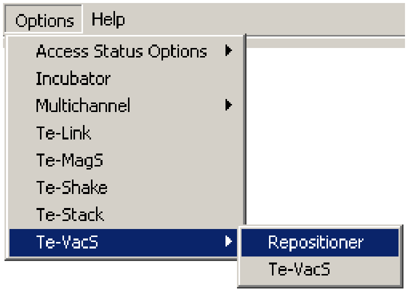
Directory: user defined

File name: <name>.any

Starting the Panel

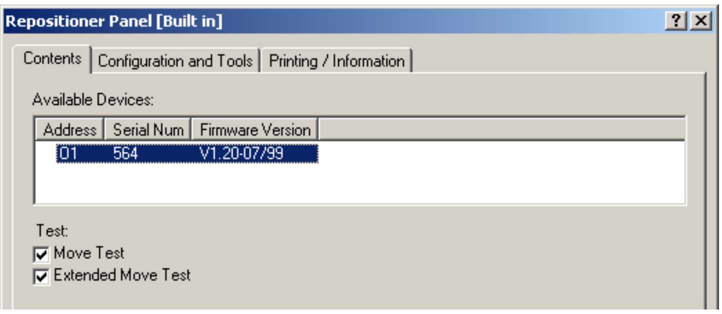
To test the Repositioner:

1 Start the panel with **Options > Te-VacS > Repositioner**.



*The **Repositioner** panel with activated **Contents** page appears. After starting the **Repositioner** panel, no check box is selected.*

Fig. 12-96 *Te-VacS sub-menu*



Available Devices:

Address	Serial Num	Firmware Version
01	564	V1.20-07/99

Test:
☑ Move Test
☑ Extended Move Test

Fig. 12-97 *Te-Link panel, Contents page*

Pages

The **Repositioner** panel is subdivided into the following pages:

Tab. 12-29 *Pages of Repositioner Panel*

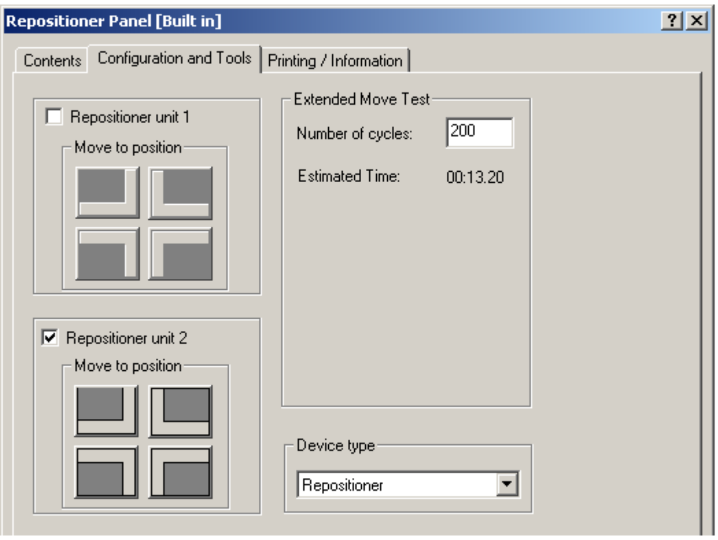
Pages	Function
Contents	General overview, procedure selection
Configuration and Tools	This page allows you to set the test parameters and to move the microplate
Printing / Information	Print selection of QC-report

12.7.3 Configuration and Tools Page

Purpose

The **Configuration and Tools** page allows you to move the 384 MALDI target plate in X- and Y-direction into 4 defined positions so that each well can be positioned in the center of one hole of the 96-well TecPrep plate. In addition, it contains the controls for setting up the **Extended Test**.

Note: *The* ***Configuration and Tools*** *page allows you to test two Repositioners.*



☐ Repositioner unit 1

☑ Repositioner unit 2

Number of cycles: 200

Estimated Time: 00:13.20

Device type: Repositioner

Fig. 12-98 Repositioner - Configuration and Tools page

Controls

Upper left frame	Contains the controls for testing the Repositioner unit 1
- **Repositioner unit 1**	Check box to select and activate the move buttons
- **Move to position**	Four command buttons that move the 384-well target plate into one of the following positions: - RL: Aligns rear left wells of target with wells of 96-plate - RR: Aligns rear right wells of target - FL: Aligns front left well of target - FR: Aligns front right wells of target
Lower left frame	As above for testing the Repositioner unit 2. For the description of the controls see above.
Extended Move Test	Frame containing the contains the controls for the **Extended Move Test**
- **Number of cycles**	Text box in which the required number of test cycles can be typed.
- **Estimated time**	Displays the total estimated test time
Device Type	List box that lets you select the device type. The type must be set to Repositioner before the first test can be started.

12.7.4 Move Test

Cross References

List of cross references to information provided in other sections:

Information	References
Configuration and Tools page	See section 12.7.3, 🗎 12-112

Purpose

With this test you can check whether you can move the repositioner carrier into the four possible positions.

Procedure

To perform the **Move Test**:

1. You can Insert 384-well target plates and TecPrep 96 microplates into the Repositioners you want to test.

   Not absolutely necessary for this test, but lets you judge better whether the target plate is positioned properly.
2. On the **Contents** page, select the **Move Test** check box and change to the **Configuration and Tools** page (→ Cross References).
3. If necessary, select the device type **Repositioner** from the respective list.

   You cannot start the test as long as the device type is not set to Repositioner.
4. Select the **Repositioner** units 1 and/or 2 as necessary.
5. Click **Start**.

   You will be guided trough the test by a series of process prompts. Always follow the instructions provided by the prompts.
6. When the process prompt appears do the following:
   - Click the movement button indicated on the prompt.
   - Visually check whether the TecPrep plate is moved to the correct position.
7. Click **OK** on the prompt if the TecPrep plate moves to the correct position, otherwise click **Cancel**.
8. If the previous test was successful, repeat steps 6 to 7 for the remaining positions according to the instructions provided on the process prompts

Pass/Fail Criteria

The test is passed if the TecPrep plate can be moved into all positions.

If the Test Fails

Check if the Repositioner is installed correctly. If the installation is correct contact the customer service department.

12.7.5 Extended Move Test

Cross References

List of cross references to information provided in other sections:

Information	References
Configuration and Tools page	See section 12.7.3, 🗎 12-112

Purpose

The test is actually a burn-in test and its purpose is to find early failures of mechanical parts.

Principle

The Selected Repositioner carriers are moved for a given number of cycles into the four possible positions according to the following pattern.

Tab. 12-30 *Sequence of Positions within one Test Cycle*

Step within one test cycle n	Carrier in unit 1 (if installed and selected) is moved to	Carrier in unit 2 (if installed and selected) is moved to
n_1	Front right position	Front right position
n_2	Front left position	Front right position
n_3	Rear left position	Rear left position
n_4	Rear right position	Rear right position

Note:

- *For this test it is not necessary insert 384-well target plates and TecPrep 96 microplates into the Repositioners to be tested.*
- *If two units are selected the corresponding carriers are moved into the given positions sequentially within one step (first carrier 1, then carrier 2).*

Procedure

To perform the **Extended Move Test**:

1. On the **Contents** page, select the **Extended Move Test** check box and change to the **Configuration and Tools** page (→ Cross References).
2. If necessary, select the device type **Repositioner** from the respective list.

   You cannot start the test as long as the device type is not set to Repositioner.
3. Select the **Repositioner** units 1 and/or 2 as necessary.
4. Set the required number of test cycles or accept the default value provided by the system.
5. Click **Start**.

   The carrier(s) start moving according to the described pattern. The total test time is indicated under ***Estimated Time****. Note that the value remains stable throughout the test.*
6. When the test is over, carefully check the Repositioners for loose, defective or broken parts.

Pass/Fail Criteria

The test is passed if the Repositioner works properly after the **Extended Move Test**.

If the Test Fails

Contact the customer service department.

12.7.6 Printing / information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.8 Te-Stack

This section describes the setup and test procedures for the Te-Stack.

12.8.1 Introduction

Description

The Te-Stack is a loading and unloading module for standard microplates or a loading module for DiTis. There are several configurations possible. The following figure shows a Te-Stack with transfer station and second stacks. Both are equipped with (optional) DiTi waste trays.

Fig. 12-99 *Te-Stack, new model with belt drive, delivered as of 2006*

A	*Te-Stack transfer rail*	***E***	*Position sensor*
B	*Waste trays*	***F***	*Transfer carrier*
C	*Second Te-Stacks (drawer pulled out)*	***G***	*Master Te-Stacks*

Te-Stack Versions

The Setup and Service software distinguishes between the following Te-Stack versions:

- (Stand-alone) Te-Stack without transfer station, for example in a Te-MO environment.
- Te-Stack with transfer station (with or without barcode scanner).
- Te-Stack with transfer station (with or without barcode scanner) and second Te-Stacks.

Te-Stack Models

Basically there are two models of the Te-Stack:

- The previous model, delivered from 2001 until 2006 used a spindle drive for the transfer station.
- The new model, delivered as of mid 2006, uses a belt drive for the transfer station.
- Note that the present version of the Setup and Service software supports both the old and the new model.
- For a detailed description, refer to the Operating Manual

Nomenclature

Note:

- *The Te-Stack that controls the transfer station and the barcode scanner is called Master Te-Stack.*
- *If there is a second Te-Stack arranged behind the first one, it can be pulled outward as shown in figure Fig. 12-99 , 🖹 12-116. Note that the position of the stacks is monitored with an optical sensor (so-called “Slide-in-position” sensor).*

Required Tools

A Greiner “96 well microplate U96” or a DiTi box must be used as the test plate. All setup and test procedures are specified for these labware items, i.e. they may not be performed with any other plate types.

ATTENTION

Make sure you use the correct firmware version.

- If you want to load plate settings and parameters that were defined in an earlier version than V4.50 of the Setup and Service software consult the nearest service organization.
- For the Setup and Service software, the firmware version 1.10 or higher is required.

Te-Stack Files

The Te-Stack function can create the following files:

- Result Files

Directory: <data_path>\Results

File name: TeStack_<serial_number>_<date>_<time>.any

- Test Configuration File

Directory: user defined

File name: <name>.any (enter the full file name with extension .any).

- Plate Files. If you save your user-specific plate data with **Back up to File**, an appropriate *.any file is created into which your plate settings are written. You can load this file with **Restore from File** to use the same settings for another Te-Stack.

Directory: <data_path>\Configor user defined

File names: <name>.any> (enter the full file name with extension .any)

Example: MyTeStackPlates.any

12.8.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

***Tab. 12-31** Te-Stack Functions and User Permissions*

Function	Type	User	FSE
Set Defaults in EEPROM	Setup		X
Set sensor configuration	Setup		X
Determine Range	Setup		X
Teach Transfer Station logical positions[a)]	Setup		X
Teach Te-Stack positions	Setup		X
Adjust carrier position sensor window [a)]	Setup		X
Adjust barcode scanner window[a)]	Setup		X
Plate setup	Test	X	X
Range test	Test	X	X
Mechanical Burn-In/Validation	Test	X	X
Te-Stack functional test	Test	X	X
Transfer Station functional test[a)]	Test	X	X
System test [a)]	Test	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

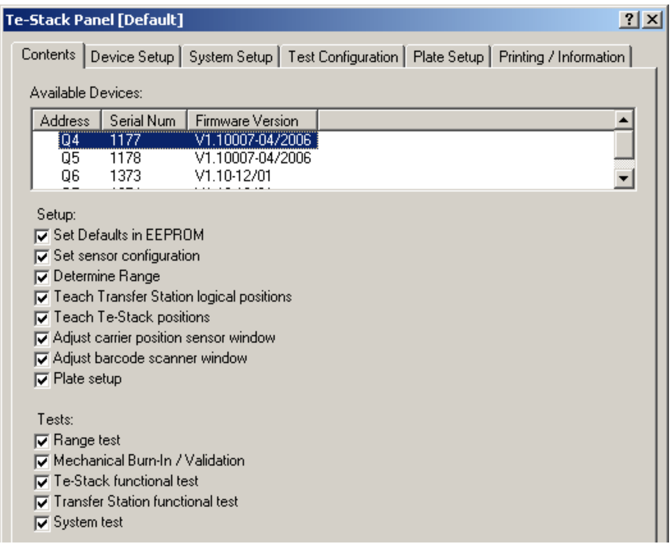
a) *These procedures can only be enabled (and therefore executed) if there is a Transfer station installed and the Te-Stack is selected from the Available Devices list.*

Starting the Panel

To set up or test the Te-Stack:

1 Start the panel with **Options > Te-Stack**. The **Te-Stack Panel** with activated **Contents** page appears. After starting the Te-Stack panel, no startup or test check box is selected and not all tabs are visible.

Note: *If there is a second Te-Stack installed, we recommend performing the setup procedures for the Master Te-Stack first.*



Available Devices:

Address	Serial Num	Firmware Version
Q4	1177	V1.10007-04/2006
Q5	1178	V1.10007-04/2006
Q6	1373	V1.10-12/01

Setup:
☑ Set Defaults in EEPROM
☑ Set sensor configuration
☑ Determine Range
☑ Teach Transfer Station logical positions
☑ Teach Te-Stack positions
☑ Adjust carrier position sensor window
☑ Adjust barcode scanner window
☑ Plate setup

Tests:
☑ Range test
☑ Mechanical Burn-In / Validation
☑ Te-Stack functional test
☑ Transfer Station functional test
☑ System test

Fig. 12-100 *Te-Stack Panel - Contents page*

Pages

The **Te-Stack** panel is subdivided into the following pages:

Page	Description
Contents	General overview, procedure selection.
Device Setup	Sensor configuration and Te-Stack positions.
System Setup	Transfer station carrier positions and second Te-Stack selection
Plate Setup	Creation of user-defined plates
Test Configuration	Configuration of the test procedures.
Printing / Information	Print selection for the QC-report

12.8.3 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To set the predefined defaults:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box. No further parameters need to be defined.
2. Download the default values to the Te-Stacks and have them re-read by the software with **Start**.

12.8.4 Set Sensor Configuration

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

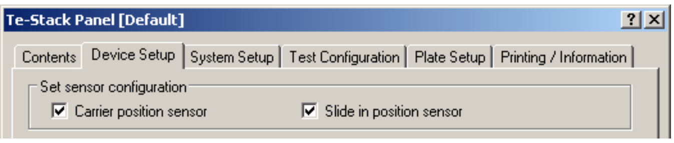
Purpose

The **Set Sensor Configuration** procedure informs the software if there is a carrier position sensor or a slide in position sensor installed.

Procedure

To set the sensor configuration:

1. On the **Contents** page, select the **Set Sensor Configuration** check box and change to the **Device Setup** page.



Set sensor configuration
☑ Carrier position sensor
☑ Slide in position sensor

Fig. 12-101 *Te-Stacks Panel - Set sensor configuration*

2. Select the **Carrier Position Sensor** and/or the **Slide-in-Position Sensor** if the movable transfer station is located in the rear position.

   The Te-Stack does not verify whether the selected sensors are physically installed.
3. Confirm your entry with **Start**.

   A message appears that notifies you that the sensor configuration will be written to the Te-Stack.
4. Confirm with **Next**.
5. At the end of the procedure, the **Setup: Done** message is displayed. Confirm with **OK**.

12.8.5 Determine Range

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

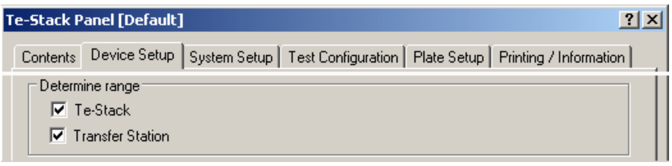
Purpose

The **Determine Range** procedure moves the gripper and/or the transfer station carrier (if installed and Master Te-Stack is selected) at slow speed to the extreme positions to determine the available range(s). The values found are written to the corresponding Te-Stack.

Procedure

To determine the maximum range:

1 On the **Contents** page, select the **Determine Range** check box and change to the **Device Setup** page.



Determine range
☑ Te-Stack
☑ Transfer Station

Fig. 12-102 Te-Stack, determine range

2 Select the **Te-Stack** or **Transfer Station** check box to determine which range to set.

3 Start the procedure with **Start**.

4 At the end of the procedure, the **Setup: Done** message is displayed. Confirm with **OK**.

12.8.6 Teach Transfer Station Logical Positions

Purpose

This procedure is used to adjust the positions of the Te-Stack(s) on the transfer station, for example the logical positions Pos1 and, if a second Te-Stack is installed, Pos2.

Principle

To do this, the transfer station carrier is moved below the corresponding Te-Stack. Then its position is adjusted, so that a test plate or DiTi box is exactly between the grippers. The values found, together with logical positions Pos0, Pos8 (for belt drive) and Pos9, are then written to the Te-Stacks. This procedure must be executed if the transfer station is displaced on the worktable.

The following two figures and the associated tables show the logical positions for the Te-Stack with spindle drive (old) and the model with belt drive (new).

Logical Positions with Spindle Drive (Old Model)

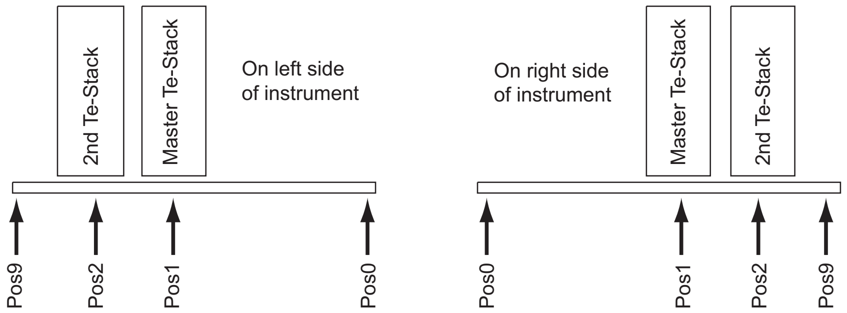


Fig. 12-103 *Logical positions of transfer station with spindle drive (old)*

Tab. 12-32 *Transfer Station Logical Positions (spindle drive)*

Position	Te-Stacks on left side	Te-Stacks on right side
Pos0	Range	Initialization position
Pos1	Below Master Te-Stack	Below Master Te-Stack
Pos2	Below second Te-Stack	Below second Te-Stack
Pos8	Not used	Not used
Pos9	Initialization position	Range

Logical Positions with Belt Drive (New Model)

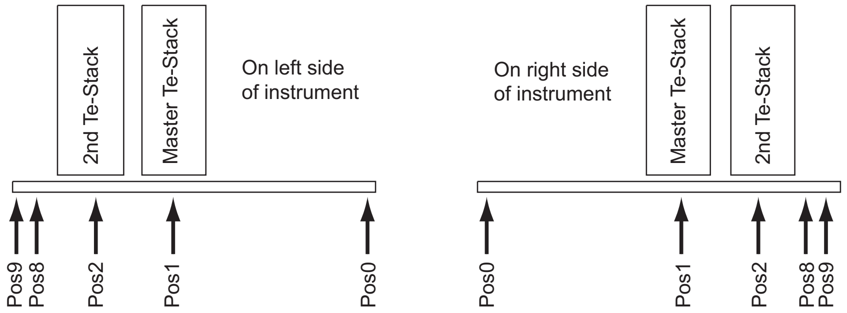


Fig. 12-104 *Logical positions of transfer station with spindle drive*

Tab. 12-33 *Transfer Station Logical Positions*

Position	Te-Stacks on left side	Te-Stacks on right side
Pos0	Initialization position	Initialization position
Pos1	Below Master Te-Stack	Below Master Te-Stack
Pos2	Below second Te-Stack	Below second Te-Stack
Pos8	Range - 10 mm	Range - 10 mm
Pos9	Range	Range

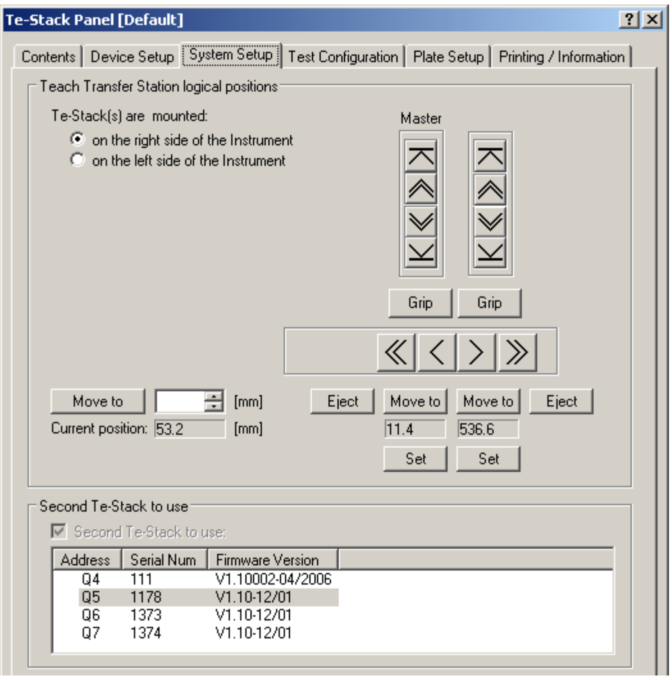
***Note:** The **Teach Transfer Station logical positions** procedure can only be executed:*

- *If a transfer station is installed.*
- *If the Master Te-Stack is selected on the **Contents** page.*

Procedure

To teach the transfer station logical positions:

1 On the **Contents** page, select the **Teach Transfer Station logical positions** check box and change to the **System Setup** page (see following figure).



Teach Transfer Station logical positions

Te-Stack(s) are mounted:
● on the right side of the Instrument
○ on the left side of the Instrument

Move to [ ] [mm]
Current position: 53.2 [mm]

11.4
536.6

Second Te-Stack to use

☑ Second Te-Stack to use:

Address	Serial Num	Firmware Version
Q4	111	V1.10002-04/2006
Q5	1178	V1.10-12/01
Q6	1373	V1.10-12/01
Q7	1374	V1.10-12/01

***Fig. 12-105** System Setup page*

The **System Setup** page contains the following controls:

Te-Stack(s) are mounted	Option buttons to select the side on which the Te-Stacks are located on the instrument.
Move to	Moves the transfer station carrier to the position specified in the spin box beside the **Move to** button.
Input field (beside **Move to** button)	Spin box that lets you set the position of transfer station carrier
⤒	Moves the gripper up to **Init** Position.
⇓ ⇑	Moves the gripper down/up by 10 mm (100 steps).
⤓	Moves the gripper down to **Carrier Position**
< >	Move the transfer station carrier left/right by 0.1 mm (1 step).

« »	Moves the transfer station carrier left/right by 1 mm (10 steps).
Set	Sets the **Actual Position** as the newly taught logical position.
Move To	Moves the transfer station carrier to the displayed position.
Eject	Moves carrier in x-axis to Pos8 and ejects plate or DiTi box using the waste tray
Grip / Release	Toggle button that grips / releases the microplate or DiTi box. When the button is clicked the caption changes from **Grip** to **Release** or vice versa.
Second Te-Stack to use	Check box to select the second Te-Stack

2. Select the **on the right side** or **on the left side** option button to determine the location on the instrument.
3. If a second Te-Stack is installed, the **Second Te-Stack to use** check box and the address of the second Te-Stack are selected. The movement buttons for the gripper are enabled.
4. Use the movement buttons to find the corresponding logical position(s).
5. Set the determined position with **Set**.
6. Save the logical positions with **Start**.

   A message appears that informs you that the determined positions will be written to the Te-Stack.
7. Continue with **Ok**.

   The values are written to the Te-Stack and the ***Setup: Done*** *message is displayed.*
8. Confirm with **OK**.

12.8.7 Teach Te-Stack Positions

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Teach Te-Stack Positions** procedure adjusts the gripper positions according to the figure below. The determined values are written to the Te-Stacks.

Before You Start

Some preparations are necessary before starting the procedure.

ATTENTION

Before starting the **Teach Te-Stack Positions** procedure make sure the transfer station carrier or another slide is below the Te-Stack.

If this is not the case the procedure to follow depends on whether you want to perform the procedure for the first or second Te-Stack.

First Te-Stack

1. On the **Contents** page, select the **Teach Transfer Station logical positions** check box and change to the **Device Setup** page.
2. Move the transfer station carrier with **Move to** to the corresponding Te-Stack.
3. Change back to the **Contents** page and clear the **Teach Transfer Station logical positions** check box.

Second Te-Stack (not Master)

1. First, go to the **Contents** page and select the second Te-Stack in the **Available Devices** section.
2. Then proceed as described above.
3. Select the second Te-Stack again when finished.

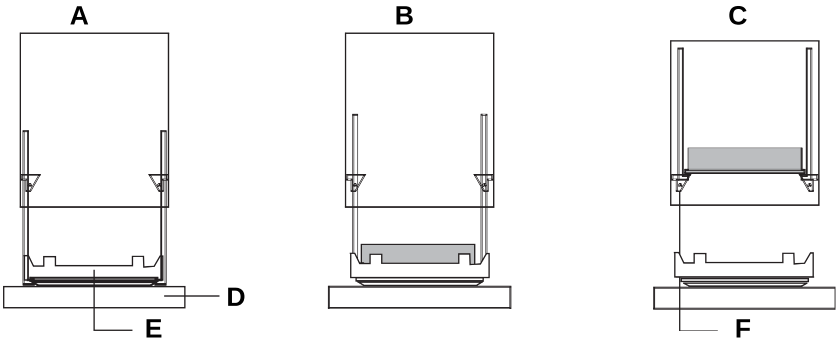


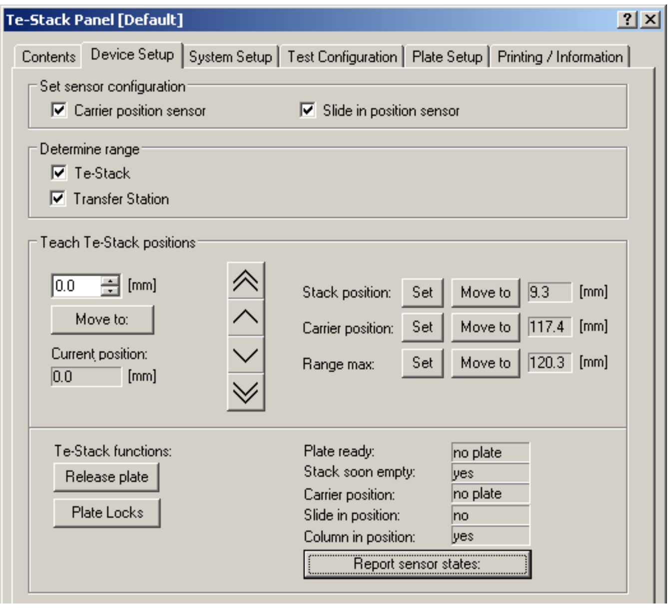
Fig. 12-106 Te-Stack positions

A	*Max. range*	*D*	*Base*
B	*Carrier position*	*E*	*Transfer station or other side*
C	*Stack position*	*F*	*Plate locks*

Procedure

To teach the Te-Stack positions:

1. On the **Contents** page, select the **Teach Te-Stack positions** check box and change to the **Device Setup** page.



☑ Carrier position sensor
☑ Slide in position sensor
☑ Te-Stack
☑ Transfer Station
0.0 [mm]
Current position: 0.0 [mm]
Stack position: 9.3 [mm]
Carrier position: 117.4 [mm]
Range max: 120.3 [mm]
Plate ready: no plate
Stack soon empty: yes
Carrier position: no plate
Slide in position: no
Column in position: yes

Fig. 12-107 *Device Setup page*

The **Teach Te-Stack Positions** frame of the **Device Setup** page contains the following controls:

Input field (above **Move To** button)	Spin box that lets you set the gripper position.
Move To	Moves the gripper to the entered position.
︿ ﹀	Moves the gripper up/down by 0.1 mm (1 step).
︽ ︾	Moves the gripper up/down by 1 mm (10 steps).
Set	The three **Set** buttons beside **Range max**, **Stack position** and **Carrier position** are used to set the current gripper position to the corresponding value displayed on the right side.
Move To	The three **Move To** buttons beside **Range max**: **Stack position** and **Carrier position** are used to move the gripper to the corresponding position displayed on the right side.
Grip Plate / Release Plate	Toggle button that lets you grip or release the plate or DiTi box. When you click this button its caption changes from **Grip plate** to **Release plate** and vice versa.
Plate Locks	Opens the plate locks and closes them again.
Report Sensor states	Reports the sensor states (see below).

2 Move the gripper down to the Transfer Station or other slide so that it exactly touches the base.

3 Set the position with **Set** next to **Range max**.

4 Put a test plate or DiTi box onto the transfer station carrier or other slide and move the gripper down so that it can exactly grip the plate or DiTi box. Use the **Grip plate** button to test.

5 Set the position with **Set** next to **Carrier position**.

6 Put the test plate or DiTi box into the Te-Stack column and move the gripper up so that it can exactly grip the plate or DiTi box. Use **Grip plate** to test.

7 Set the position with **Set** next to **Stack position**.

8 Save the positions with **Start**.

A message informs you that the values for the Te-Stack range, stack position and carrier position will be written to Te-Stacks.

9 Continue with **Next**.

*The values are written to the Te-Stack and the **Setup: Done** message is displayed.*

10 Confirm with **OK**.

Sensor States

You can view the current states of the installed sensors by clicking the **Report sensor states** command button.

Plate ready	**Plate found**, if there is at least one plate in the column, otherwise **no plate**.
Stack soon empty	**Yes**, if the column is not filled up to the sensor position.
Carrier Position	**Plate found**, if the transfer station carrier contains a plate and is below the Te-Stack, otherwise **no plate**.
Slide in Position	**Yes**, if the rear Te-Stack(s) have been pushed back into the operating position (catch must have snapped in)**.**
Column in Position	**Yes**, if the column is installed.

12.8.8 Adjust Carrier Position Sensor Window

Cross References

List of cross references to information provided in other sections:

Information	References
Set Sensor Configuration	See section 12.8.4, 🗎 12-120

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Adjust carrier position sensor window** procedure determines the reading window for the carrier position sensor. To do so the transfer station carrier moves a test plate or DiTi box along the X-axis and the carrier position sensor finds out the range within which it can detect the plate or DiTi box.

ATTENTION

Please note:

- The **Adjust carrier position sensor window** procedure can only be executed if a transfer station is installed.
- Before starting the **Adjust Carrier Position Sensor Window** procedure make sure that the carrier position sensor is configured (→ Cross References).

Procedure

To adjust the carrier position sensor window:

1. Select the **Adjust carrier position sensor window** check box. No further parameters have to be defined.
2. Start the procedure with **Start**.

   A message appears that instructs you to put the test plate or DiTi box onto the carrier of the transfer station.
3. Follow the instructions and continue with **Next**.

   *At the end of the procedure, the **Setup: Done** message is displayed.*
4. Confirm with **OK**.

12.8.9 Adjust Barcode Scanner Window

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Adjust barcode scanner window** procedure determines the scanning window for the barcode scanner.

Principle

While the transfer station carrier moves a test plate or DiTi box along the X-axis, the barcode scanner finds out the range within which it can read the barcode of the test plate or DiTi box.

ATTENTION

The **Adjust barcode scanner window** procedure can only be executed:

- If there is a barcode scanner installed.
- If there is a Transfer Station installed.
- If the Master Te-Stack is selected on the **Contents** page.

Procedure

To adjust the barcode scanner window:

1. On the **Contents** page, select the **Adjust barcode scanner window** check box. No further parameters need to be defined.
2. Start the procedure with **Start**. The **Please put Test Plate / DiTi box onto Carrier of Transfer Station** message appears.
3. Put a test plate or DiTi box with a barcode label onto the transfer station carrier slide and continue with **Next**.
4. At the end of the procedure, the **Setup: Done** message is displayed. Confirm with **OK**.

12.8.10 Plate Setup

Purpose

The **Plate Setup** procedure lets you define plates according to your needs. This must be done, for instance, if you use a special DiTi carrier that is higher than the test plate or if you want to dispense at slower speed.

Up to 25 plate types may be defined for a Te-Stack and can be saved in a file.

Note: *The parameters of the test plate are hard coded in the software and cannot be defined.*

Plate Data

Various data can be defined for a plate:

- **Plate name**
- **Height of the plate**
- **Release position**: Distance from plate locks by which the plate stack must be lifted, so that the plate locks can be opened without lifting the stack further. Default is 3 mm.
- **Relock position**: Distance from the bottom of the lowered plate stack in which the plate locks can be closed again. In this position, the second plate from the bottom is held by the locks and cannot fall down, while the bottommost plate can be released.

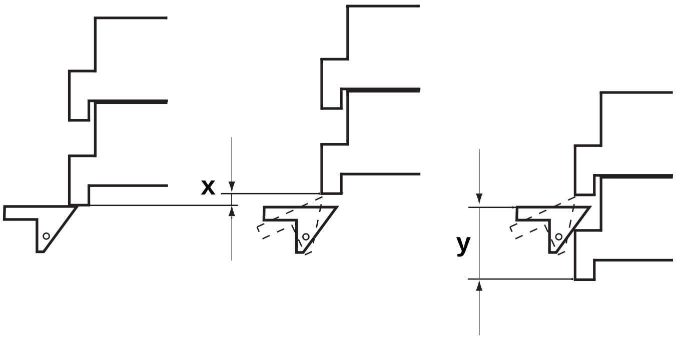


Fig. 12-108 *Release and relock positions*

x	*Release position*	***y***	*Relock position*

- **Structure**: Height of the sub-structure (if existing), so that the plate is gripped further above.
- **Speed Reduction**: Flag to reduce the dispense speed. 1 means that the plate is dispensed at slower speed, 0 means normal speed (default).

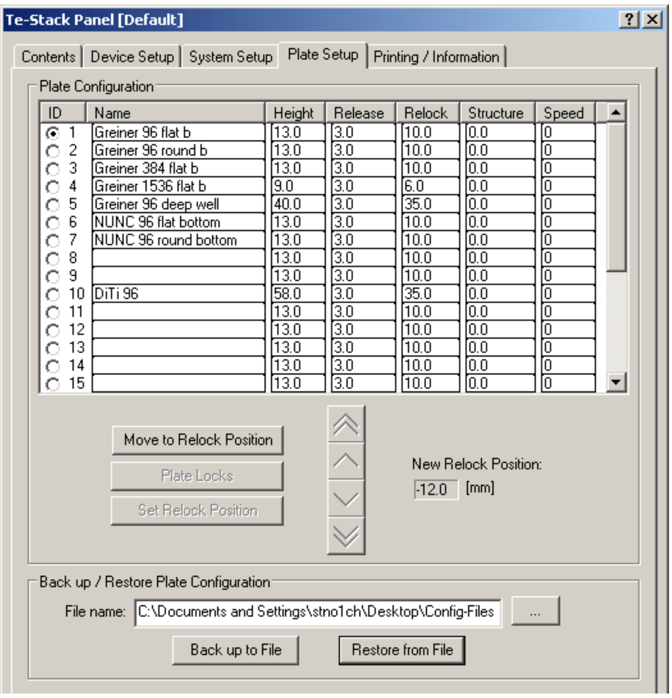
Note: *For the **Plate Setup** procedure the following is recommended:*

- *If there is a second Te-Stack, perform it for the Master Te-Stack and load the plate settings afterwards from the file.*
- *Otherwise make sure the other slide is below the Te-Stack.*

Procedure

To define plates:

1 On the **Contents** page, select the **Plate Setup** check box and change to the **Plate Setup** page.



ID	Name	Height	Release	Relock	Structure	Speed
● 1	Greiner 96 flat b	13.0	3.0	10.0	0.0	0
○ 2	Greiner 96 round b	13.0	3.0	10.0	0.0	0
○ 3	Greiner 384 flat b	13.0	3.0	10.0	0.0	0
○ 4	Greiner 1536 flat b	9.0	3.0	6.0	0.0	0
○ 5	Greiner 96 deep well	40.0	3.0	35.0	0.0	0
○ 6	NUNC 96 flat bottom	13.0	3.0	10.0	0.0	0
○ 7	NUNC 96 round bottom	13.0	3.0	10.0	0.0	0
○ 8		13.0	3.0	10.0	0.0	0
○ 9		13.0	3.0	10.0	0.0	0
○ 10	DiTi 96	58.0	3.0	35.0	0.0	0
○ 11		13.0	3.0	10.0	0.0	0
○ 12		13.0	3.0	10.0	0.0	0
○ 13		13.0	3.0	10.0	0.0	0
○ 14		13.0	3.0	10.0	0.0	0
○ 15		13.0	3.0	10.0	0.0	0

New Relock Position: -12.0 [mm]

File name: C:\Documents and Settings\stno1ch\Desktop\Config-Files

Fig. 12-109 Te-Stack Panel - Plate Setup page

The **Plate Setup** page contains the following controls:

ID	Option button to select the plate ID to be defined.
Name	Name of the plate. Important! Choose a unique name. See the ATTENTION note below.
Height	Height of the plate in mm.
Release	Release Position in mm, default: 3.0.
Relock	Relock Position in mm
Structure	Height of the sub structure in mm.
Speed	Flag for speed reduction, 0: normal speed (default)/1: slow speed
Move to Relock Position	Moves the plate to Relock Position and opens the plate locks.
Plate Locks	Closes the plate locks and opens them again.
Set Relock Position	Sets the Relock Position to the given distance.
∧ ∨	Moves the gripper up/down by 0.1 mm (1 step).

︽ ︾	Moves the gripper up/down by 1 mm (10 steps).
File name	File name the plate data are stored in.
…	Browser button. Opens the standard **Windows Open** dialog so that the directory and file names can be specified.
Back up to File	Saves the plate data into the specified file.
Restore from File	Loads the plate data from the specified file.

ATTENTION

- Plate names must be unique, i.e. two different plates must never be given the same name. If you disregard this attention note, plates might not be found anymore when you rename them later.
- Plate locks should not be opened for more than 15 minutes at a time.

2. Depending on your requirements do one of the following:
   - If you want to use already defined plate settings, use the browser button [**…**] to search and load your data with **Restore from File**.
   - If you want to define new plate data, select the corresponding plate **ID** option button and edit the necessary input fields. Positive values must be entered in all fields.
3. Save your settings with **Start**.

   *The data are written to the Te-Stack and the **Setup: Done** message is displayed.*
4. Confirm with **OK**.
5. If you want to use your user-specific plate settings for other Te-Stacks, for example for the second Te-Stack, use the browser button [**…**] to specify the file name and save your data with **Back up to File**.

Determining the Relock Position

To determine the relock position:

1. Put a corresponding plate or DiTi box onto the transfer station carrier or other slide and put one into the column.
2. Click **Move to Relock Position**. The gripper takes the plate from the transfer station carrier or other slide, stacks it into the column and moves it then to the relock position defined in the table. The plate locks will be opened.
3. With the movement buttons align the plate or DiTi box according to the following figure. Use **Plate Locks** to close and open the plate locks.

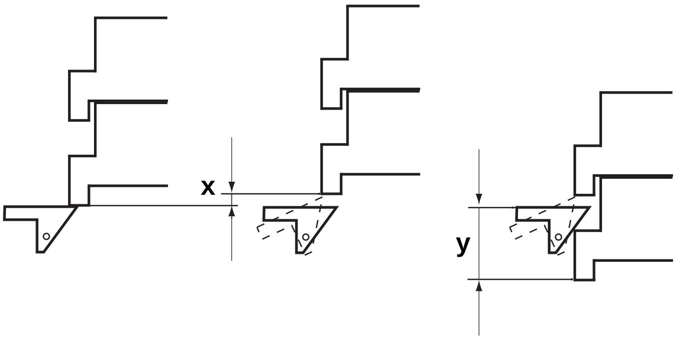


Fig. 12-110 Release and relock positions

x	*Release position*	*y*	*Relock position*

4 Set the position with **Set Relock Position.** The plate locks close and the gripper dispenses the plate to the transfer station carrier or other slide. If the Relock Position is false, the plate within the Column falls also down.

5 Save your settings with **Start**.

12.8.11 Range Test

Cross References

List of cross references to information provided in other sections:

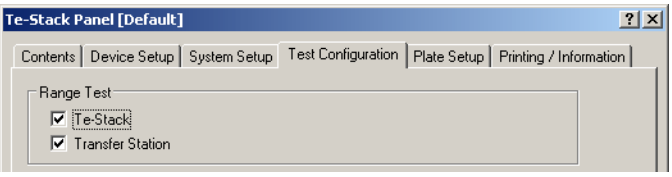
Information	References
Printing / Information page	See section 12.8.16, 🗎 12-142
Determine Range	See section 12.8.5, 🗎 12-121

Purpose

The **Range Test** procedure finds out quickly if the gripper or transfer station carrier (if installed and Master Te-Stack is selected) can reach the whole range. The device is initialized once and the number of lost increments is evaluated.

To perform a range test:

1 On the **Contents** page, select the **Range Test** check box and change to the **Test Configuration** page.



Range Test
☑ Te-Stack
☑ Transfer Station

Fig. 12-111 Test Configuration page

2 Select the **Te-Stack** and/or **Transfer Station** axes to be tested.

3 Start the procedure with **Start**.

*The **Range Test** process prompt appears. At the end of the test, a **Range Test: Passed** or **Failed** message appears.*

4 Confirm with **OK**.

Pass/Fail Criteria

The test is passed, if the following conditions are fulfilled:

Number of Move Errors:	0
Number of Lost Increment Errors:	0
Number of Lost Increments:	46 for the Te-Stack 4 the for transfer station

The test results can be previewed on the **Printing / Information** page (→ Cross References).

If the Test Fails

If the test fails, perform the **Determine Range** procedure for the corresponding device (→ Cross References). There is a mechanical problem if the test fails again. Call your nearest service organization and mail the corresponding result file or fax the QC-report.

12.8.12 Mechanical Burn-In/Validation

Cross References

List of cross references to information provided in other sections:

Information	References
Printing / Information page	See section 12.8.16, 🗎 12-142
Determine Range procedure	See section 12.8.5, 🗎 12-121

Burn-In

The **Mechanical Burn-In** procedure serves to find early failures of the mechanics. During the test, the devices are continuously moved and validated 2000 times (lasts about 8 hours). Note that this procedure is always performed before the Te-Stacks leaves the factory. Therefore, it is not necessary to run the procedure at the customer's site.

Validation

The **Mechanical Validation** procedure checks whether or not the mechanics work properly. The selected devices are moved at random for the defined number of moves (default is 250, lasts about 10 minutes). The two tests differ only in the number of moves performed. After 25 moves, an initialization is performed and the number of lost increments is evaluated. The gripper and the plate locks are tested during the first move after the initialization, for example during the 1st, 26th, 51st … moves.

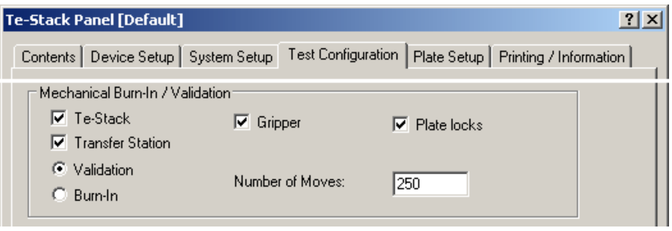
ATTENTION

Before starting the procedure remove all plates from the column.

Procedure

To validate the mechanics:

1 On the **Contents** page, select the **Mechanical Burn-In/Validation** check box and change to the **Test Configuration** page.



☑ Te-Stack
☑ Transfer Station
● Validation
○ Burn-In
☑ Gripper
☑ Plate locks
Number of Moves: 250

Fig. 12-112 Test Configuration page

2. Select the **Validation** option. The default number of 250 cycles is automatically set.
3. If necessary, change the number of moves to be performed in the **Number of Moves** input field. Valid range is 1 to 1000.
4. Clear the check boxes of devices you do not want to test.
5. Start the procedure with **Start**. The **Please empty Column and Carrier of Transfer Station** message appears.
6. Remove all plates or DiTi boxes from the column, empty the transfer station carrier and continue with **Next**.

   *At the end of the test, a **Mechanical Burn-In/Validation: Passed** or **Failed** message appears.*
7. Confirm with **OK**.

Pass/Fail Criteria

The test is passed, if the following conditions are fulfilled:

Number of Move Errors:	0
Number of Initialization Errors:	0
Number of Lost Increment Errors:	0
Number of Lost Increments:	46 for the Te-Stack 4 the for transfer station

The test results can be viewed on the **Printing / Information** page (→ Cross References).

If the Test Fails

If the test fails, perform the **Determine Range** procedure for the corresponding device (→ Cross References). There is a mechanical problem if the test fails again. Call your nearest service organization and mail the corresponding result file or fax the QC-report.

12.8.13 Te-Stack Functional Test

Cross References

List of cross references to information provided in other sections:

Information	**References**
Printing / Information page	See section 12.8.16, 🗎 12-142
Determine Range procedure	See section 12.8.5, 🗎 12-121
Check Transfer station logical positions	See section 12.8.6, 🗎 12-121
Check Te-Stack positions	See section 12.8.7, 🗎 12-124

Purpose

The **Te-Stack functional test** checks whether the Te-Stack works correctly.

Principle

The gripper picks up the given number of test plates or DiTi boxes from the carrier transfer station or from an other slide and stacks them into the column. Afterwards it dispenses all of them again.

Before You Start

Some preparations are necessary before you can start the test.

ATTENTION

Before starting the **Te-Stack functional test** procedure:

- If you perform the test for the second Te-Stack (not Master), make sure that the transfer station carrier is below the Te-Stacks. If this is not the case, proceed as follows:
  - On the **Contents** page, select the Master Te-Stack in the **Available Devices** section and the **Teach Transfer Station logical positions** check box.
  - Change to the **System Setup** page and move the transfer station slide with **Move To** to the corresponding Te-Stack.
  - Return to the **Contents** page and select the second Te-Stack again.
- If no transfer station is installed, make sure another slide is below the Te-Stacks.

Procedure

To test the Te-Stack functionality:

1 On the **Contents** page, select the **Te-Stack functional test** check box and change to the **Test Configuration** page.

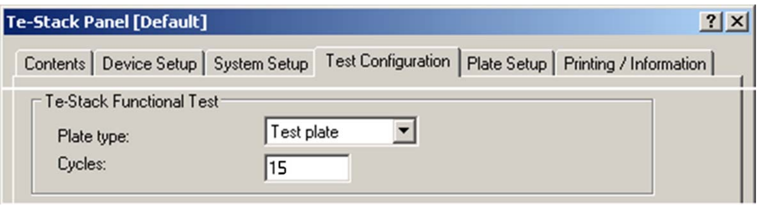


Plate type: Test plate
Cycles: 15

Fig. 12-113 Test Configuration page

2. Enter the following:
   - **Cycles**: Number of plates to be tested (default: 15).
   - **Plate Type**: Choose the correct type (Test plate or DiTi box) from the list.
3. Start the procedure with **Start**.

   *The **Please put Test Plate / DiTi box on …** message appears.*
4. Put a test plate or DiTi box on the transfer station carrier or another slide and confirm with **Next.**

   *The gripper takes the test plate or DiTi box and stacks it into the column. The next **Please put Test Plate / DiTi box on …** message appears.*
5. Repeat steps 3 and 4 for the all indicated plates.

   *When all plates are stacked into the column, the gripper takes the bottom plate and dispenses it. The **Please remove Test Plate / DiTi box …** message appears.*
6. Remove the test plate or DiTi box from the transfer station carrier or other slide and confirm with **Next**.

   *The gripper dispenses the next test plate or DiTi box and a further **Please put Test Plate / DiTi box from …** message appears.*
7. Repeat step 6 for all indicated plates.

   *At the end of the test, a **Te-Stack Functional Test: Passed** or **Failed** message appears.*
8. Confirm with **OK**.

Pass/Fail Criteria

The test is passed, if the following conditions are fulfilled:

Number of Move Errors:	0
Number of Te-Stack Specified Errors:	0

The test results can be previewed on the **Printing / Information** page (→ Cross References).

If the Test Fails

Also see cross references at the beginning of this section.

- If **Number of Move Errors** ≥ 1
  - Perform the **Determine Range** procedure for the Te-Stack.
  - Check the Transfer Station logical positions.
  - Check the Te-Stack positions.
- If **Number of Te-Stack Specified Errors** ≥ 1
  - Check the Te-Stack positions and check the correct function of the sensors with **Report Sensor states**.

12.8.14 Transfer Station Functional Test

Cross References

List of cross references to information provided in other sections:

Information	References
Determine Range procedure	See section 12.8.5, 🗎 12-121
Adjust Carrier Position Sensor Window	See section 12.8.8, 🗎 12-128
Adjust Barcode Scanner Window	See section 12.8.9, 🗎 12-129
Printing / Information page	See section 12.8.16, 🗎 12-142

Purpose

The **Transfer Station functional test** checks the proper function of the barcode scanner or the carrier position sensor.

Principle

During the test, the transfer station carrier moves a test plate along the X-axis for the given number of cycles (default is 100). The barcode scanner (if installed) reads the barcode or the carrier position sensor detects the plate or DiTi box. For the barcode scanner test, a reference reading is performed and the codes read are compared with this reference.

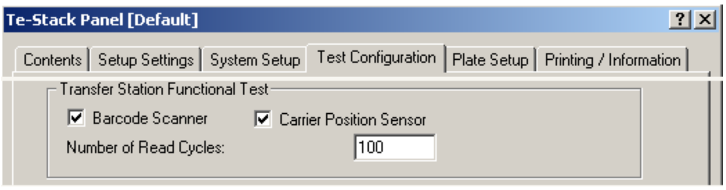
Note: *The **Transfer Station functional test** procedure can only be executed:*

- *If there is a transfer station installed.*
- *If the Master Te-Stack is selected on the **Contents** page*

Procedure

To test the transfer station functionality:

1 On the **Contents** page, select the **Transfer Station functional test** check box and change to the **Test Configuration** page.



Transfer Station Functional Test
☑ Barcode Scanner ☑ Carrier Position Sensor
Number of Read Cycles: 100

Fig. 12-114 *Test Configuration page*

2 Select the **Barcode scanner** (if installed) and/or the **Carrier position sensor** check box.

3 Enter the number of cycles to be performed into the **Number of Read Cycles** input field (default: 100).

4 Start the procedure with **Start**.

*The **Please put Test Plate / DiTi box on the Carrier of Transfer Station** process prompt appears.*

5 Put a test plate or DiTi box on the transfer station carrier and continue with **Next**.

*At the end of the test, a **Transfer Station Functional Test: Passed** or **Failed** message appears.*

6 Confirm with **OK**.

Pass/Fail Criteria

The test is passed, if the following conditions are fulfilled:

Number of undetected plates	0
Number of unread barcodes	0
Number of barcodes reading errors	0
Number of Move Errors:	0

The test results can be previewed on the **Printing / Information** page (→ Cross References).

If the Test Fails:

Also see cross references at the beginning of this section.

- If **Number of Plates not detected** ≥ 1
  - Make sure the carrier position sensor is clean.
  - Perform the **Adjust Carrier Position Sensor Window** procedure.
- If **Number of Barcodes not read** ≥ 1
  - Make sure the barcode scanner is clean.
  - Check the correct positioning of the barcode labels.
  - Perform the **Adjust Barcode Scanner Window** procedure.
- If **Number of Barcodes wrong read** ≥ 1
  - Check the barcode labels.
  - Perform the Adjust **Barcode Scanner Window** procedure.
- If **Number of Move Errors** ≥ 1
  - Perform the **Determine Range** procedure for the transfer station.
  - Check the transfer station logical positions.

12.8.15 System Test

Cross References

List of cross references to information provided in other sections:

Information	References
Determine Range procedure	See section 12.8.5, 🗎 12-121
Adjust Carrier Position Sensor Window	See section 12.8.8, 🗎 12-128
Adjust Barcode Scanner Window	See section 12.8.9, 🗎 12-129
Te-Stack Functional Test	See section 12.8.13, 🗎 12-136
Transfer Station Functional Test	See section 12.8.14, 🗎 12-138
Printing / Information page	See section 12.8.16, 🗎 12-142

Purpose

The **System Test** combines the **Te-Stack functional test** and **Transfer Station Functional Test** procedures and checks the whole system (→ Cross References).

Principle

The specified number of test plates are transferred from the Master Te-Stack to the second Te-Stack and back again for a given number of cycles (default is 10). In addition, the proper function of the barcode scanner or the carrier position sensor are tested. For the barcode scanner test, a reference reading cycle is performed and the actually read codes are compared.

ATTENTION

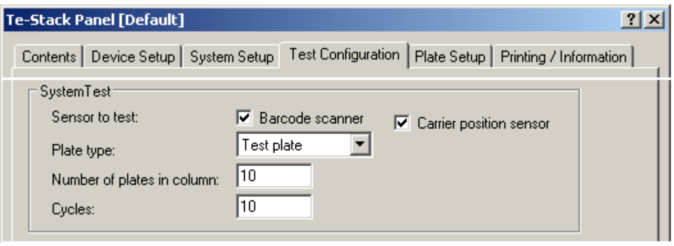
The System Test procedure can only be executed:

- If there is a Transfer Station installed
- If there is a second Te-Stack installed
- If the Master Te-Stack is selected on the **Contents** page

Procedure

To test the whole system:

1 On the **Contents** page, select the **System Test** check box and change to the **Test Configuration** page.



SystemTest

Sensor to test: ☑ Barcode scanner ☑ Carrier position sensor

Plate type: Test plate

Number of plates in column: 10

Cycles: 10

Fig. 12-115 *Test Configuration page*

2 Select the **Barcode scanner** (if installed) or the **Carrier position sensor** check box to define the scanner/sensor to be tested.

3 Select the correct plate type (Test plate or DiTi box) from the list **Plate type**.

4 Enter the number of plates to be transferred into the **Number of plates in column** input field.

5 Enter the number of test cycles to be performed into the **Cycles** input field (default: 10).

6 Change to the **System Setup** page, mark the **Second Te-Stack to use** check box and select the address of the second Te-Stack.

7 Start the procedure with **Start**.

A message appears that instructs you to fill the column of the Master Te-Stack with the indicated number of plates and to empty the carrier of the Transfer Station.

8 Follow the instructions and make sure no plate is on the transfer station carrier. Click **Next** to continue.

*At the end of the test, a **System Test: Passed** or **Failed** message appears.*

9 Confirm with **OK**.

Pass/Fail Criteria

The test is passed, if the following conditions are fulfilled:

Number of Move Errors:	0
Number of Plates not detected:	0
Number of Barcodes not read:	0
Number of Barcodes wrong read	0
Number of Te-Stack specified errors	0

The test results can be previewed on the **Printing / Information** page (→ Cross References).

If the Test Fails

Try the following:

- If **Number of Move Errors** ≥ 1
  - Perform the **Determine Range** procedure.
  - Check the **Transfer Station logical positions**.
  - Check the **Te-Stack positions**.
- If **Number of Plates not detected** ≥ 1
  - Make sure the carrier position sensor is clean.
  - Perform the **Adjust carrier position sensor window** procedure.
- If **Number of Barcodes not read** ≥ 1
  - Make sure the barcode scanner is clean.
  - Check the correct positioning of the barcode labels.
  - Perform the Adjust Barcode Scanner Window procedure.
- If **Number of Barcodes wrong read** ≥ 1
  - Check the barcode labels.
  - Perform the Adjust Barcode Scanner Window procedure.
- If **Number of Te-Stack Specified Errors** ≥ 1
  - Check the Transfer Station logical positions.
  - Check the Te-Stack positions and check the correct functioning of the sensors with **Report Sensor states**.

12.8.16 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

12.9 Slide-In BCR

12.9.1 Overview

What Is a Slide-In BCR?

The barcode reader is a part of the pipetting station. The barcode reader scans the barcodes of the samples in the sample area and locks the carrier. The Slide-In BCR is the corresponding panel.

To avoid reflections, the barcode reader is aimed in a 10-degree angle in the X-Y plane at the barcodes.

Its reading area is confined by the front right pillar of the Sample Area Cover.

The angle is adjustable. The laser beam bar has to point at the two marks on the front-right pillar of the Sample Area Cover.

Main Parts

The following figure shows the main parts of the pipetting station and the sample area.

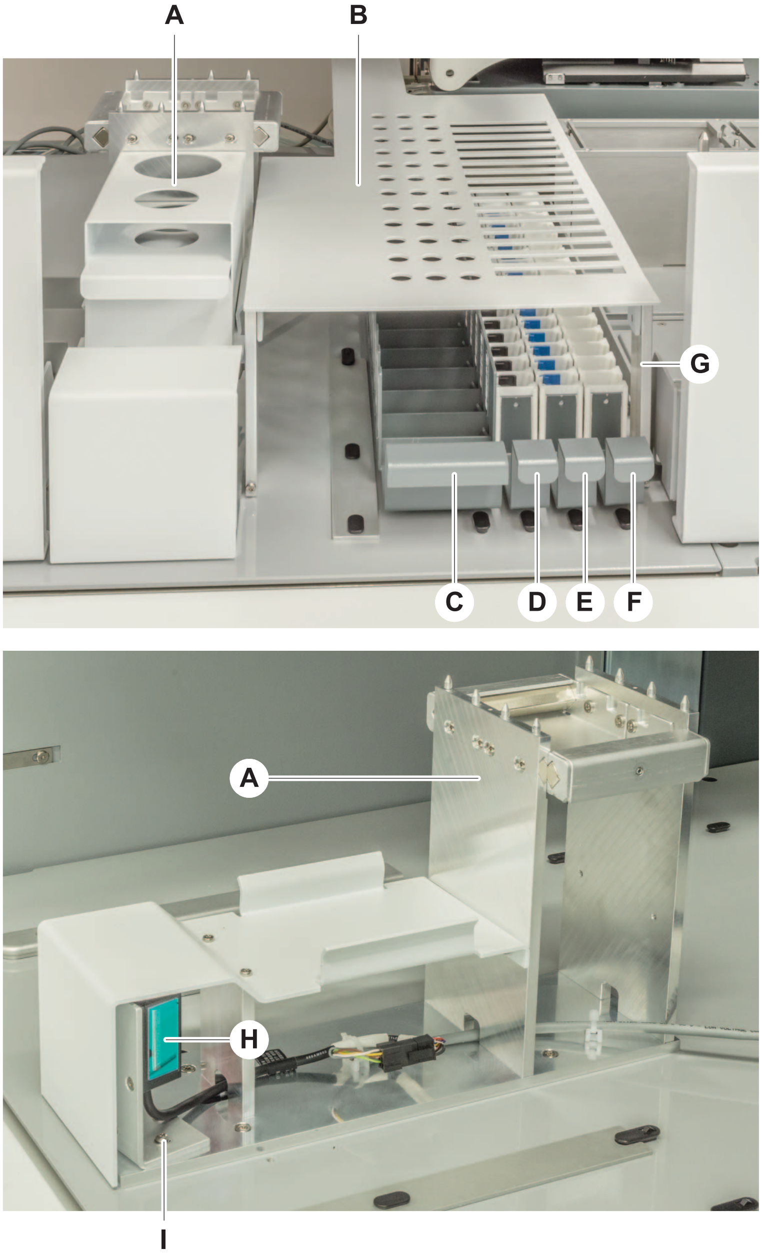


*Fig. **12-116*** *Pipetting station*

A	*Pipetting station*
B	*Sample Area Cover*
C	*Reagent rack*
D	*Sample rack*
E	*Control rack*
F	*Calibrator rack*
G	*Front right pillar*
H	*Barcode reader*
I	*Adjusting screws*

12.9.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 12-34 Slide-In BCR Functions and User Permissions

Function	Type	User	FSE
Set barcode reader configuration	Setup		X
Adjust barcode reader mechanically	Setup		X
Adjust scan view angle automatically	Setup		X
Verify barcode reader configuration	Test		X
Barcode reading test	Test		X
Carrier locking test	Test		X
Barcode reader and carrier locking functions	Tool		X
Printing / Information	Page		X
QC-report	Report		X

Files, Directories

The Slide-In BCR function creates the following files:

- **Result Files:** Test results are stored in *.any files.

  Directory: <data_path>\Results

  File name: Slide-In BCR_<serial_number>_<date>_<time>.any

- Test Configuration Files

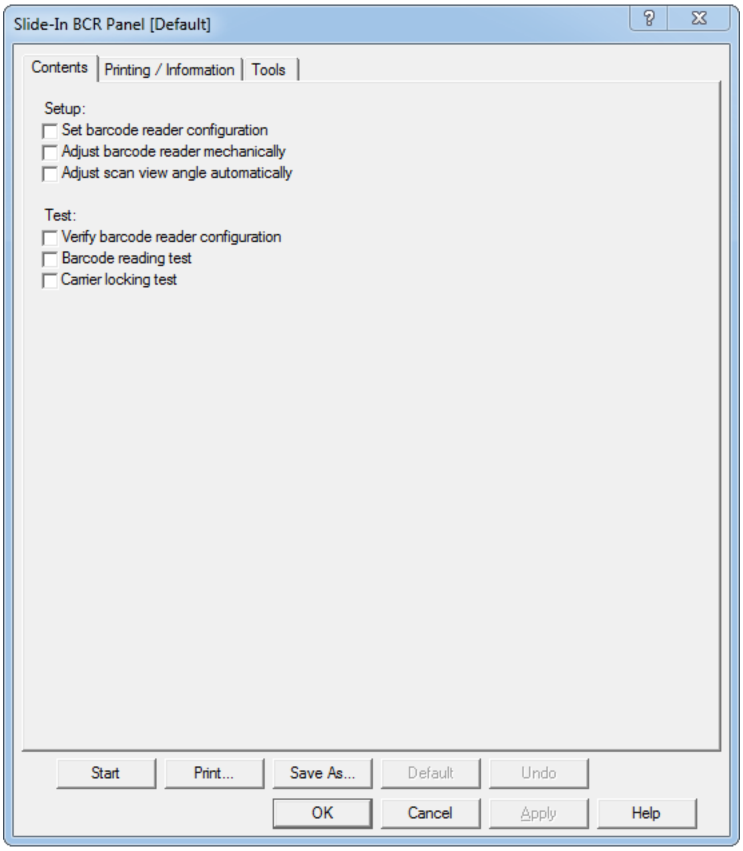
  Directory: user defined

  File name: <name>.any

Starting the Panel

To set up or test the Slide-In BCR:

1 Start the panel with **Options > Slide-In BCR**. The **Slide-In BCR** panel with activated **Contents** page appears. After starting the **Slide-In BCR** panel, no setup or test check box is selected and not all tabs are visible.



Setup:

☐ Set barcode reader configuration
☐ Adjust barcode reader mechanically
☐ Adjust scan view angle automatically

Test:

☐ Verify barcode reader configuration
☐ Barcode reading test
☐ Carrier locking test

Fig. 12-117 *Slide-In BCR panel, Contents page*

Pages

The **Slide-In BCR** panel is subdivided into the following pages:

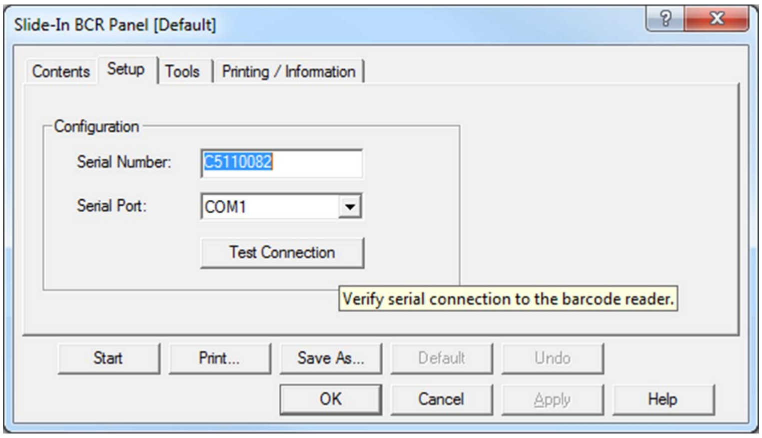
Tab. 12-35 *Pages of Slide-In BCR Panel*

Pages	Function
Contents	General overview, procedure selection
Setup	Lets you set the parameters for the Slide-In BCR
Test Configuration	Lets you set the test parameters
Tools	For testing the laser and reading barcodes
Printing / Information	Print selection of QC-report

12.9.3 Setup Page

Purpose

The **Setup** page lets you set the parameters for the **Slide-In BCR**.



Serial Number: C5110082

Serial Port: COM1

Verify serial connection to the barcode reader.

Fig. 12-118 *Slide-In BCR - Setup page*

Controls

Serial Number:	Insert the barcode scanner’s serial number
Serial Port:	Select the port that the barcode reader is connected to

Click **Test Connection** to ensure that the correct serial port is selected. If the correct serial port is selected the button label changes to **Connection OK**, otherwise the button label changes to **Connection Error**.

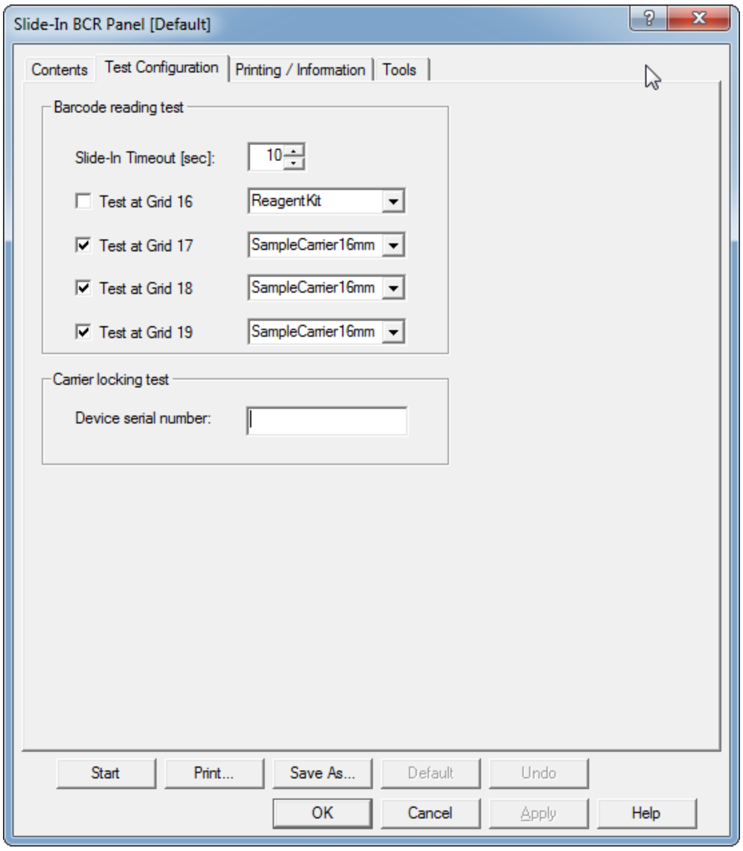
12.9.4 Test Configuration Page

The **Test Configuration Page** enables you to make a grid selection and select the employed carrier.

Furthermore, you can configure the Slide-In Timeout.

Slide-In Timeout

The Slide-In Timeout specifies the accepted duration from reading the first expected spacer barcode to sliding in the carrier completely.
If the duration exceeds the specified Slide-In Timeout, the barcode reader test will fail at this grid position and the test will continue at the next selected grid position.



Slide-In Timeout [sec]: 10

☐ Test at Grid 16 ReagentKit

☑ Test at Grid 17 SampleCarrier16mm

☑ Test at Grid 18 SampleCarrier16mm

☑ Test at Grid 19 SampleCarrier16mm

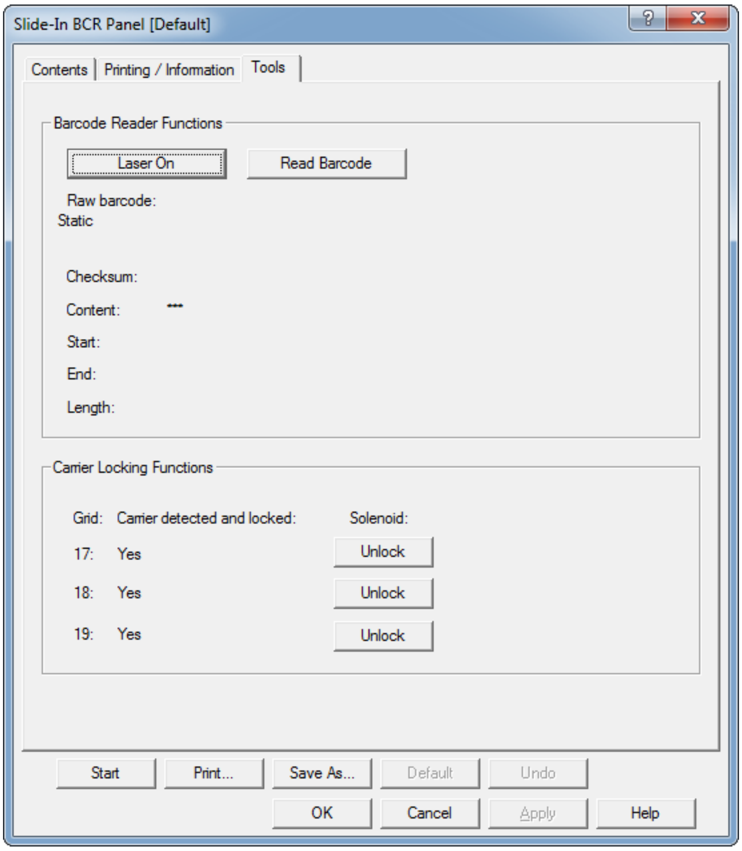
Device serial number:

Fig. 12-119 *Slide-In BCR - Test Configuration Page*

12.9.5 Tools Page

The **Tools Page** enables you to switch the barcode reader on and off, by clicking **Laser On** or **Laser Off**. Furthermore, you can click **Read Barcode** to read barcodes and show the data in the tools page.

Also the **Tools Page** enables you to switch on/off the solenoids (of Grid 17–19) to lock/unlock the carriers.



Raw barcode:
Static

Checksum:
Content: ***
Start:
End:
Length:

Grid:	Carrier detected and locked:	Solenoid:
17:	Yes	Unlock
18:	Yes	Unlock
19:	Yes	Unlock

Fig. 12-120 *Slide-In BCR - Tools Page*

12.9.6 Set barcode reader configuration

To setup the Slide-In BCR proceed as follows:

1. Select **Set barcode reader configuration**.
2. Click **Start**.

The barcode reader will be configured.

3. Click **OK** to confirm.

12.9.7 Adjust barcode reader mechanically

To adjust the barcode reader position in the X-Y plane mechanically proceed as follows:

1. Select **Adjust barcode reader mechanically**.
2. Click **Start**.
3. Follow the instructions.
   Loosen the barcode reader’s adjusting screws and adjust the barcode reader.
4. Click **OK** to confirm.

12.9.8 Adjust scan view angle automatically

To adjust the barcode reader's z-angle proceed as follows:

1 Select **Adjust scan view angle automatically**.

2 Click **Start**.

3 Follow the instructions.
Therefore, position the Test Tool Barcode Slide-In Assembly (30098940) as shown below.

Fig. 12-121 *Slide-In BCR - Test Tool Barcode Slide-In Assembly*

4 Click **OK** to confirm.

5 Remove the Test Tool Barcode Slide-In Assembly.

12.9.9 Verify Barcode Reader Configuration

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this test is:

- To ensure that the barcode reader’s configuration settings are matching the predefined device configuration.

Procedure

To perform the test proceed as follows:

1. Select **Verify barcode reader configuration**.

   No further entries need to be made.

2. Click **Start** to begin.

   *Test results can be viewed on the **Printing / Information** page.*

12.9.10 Barcode Reading Test

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

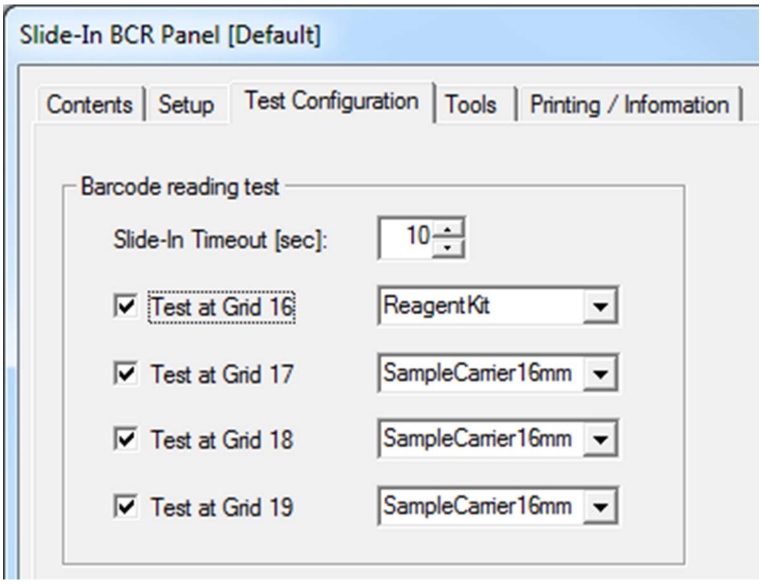
The purpose of this test is:

- To ensure that all barcodes on a carrier can be read.

Procedure

To perform the test proceed as follows:

1. In the **Setup** tab select **Barcode reading test**.
2. In the **Test Configuration** tab select **Test at Grid 16**.
3. In the corresponding list select **ReagentKit**.
4. Select **Test at Grid 17**, **Test at Grid 18**, and **Test at Grid 19**.
5. In each corresponding list select **SampleCarrier16mm**.



Slide-In Timeout [sec]: 10

☑ Test at Grid 16 ReagentKit

☑ Test at Grid 17 SampleCarrier16mm

☑ Test at Grid 18 SampleCarrier16mm

☑ Test at Grid 19 SampleCarrier16mm

Fig. 12-122 *Slide-In BCR - Test Configuration*

6. Click **Start** to begin.
7. Follow the instructions.

   *Test results can be viewed on the **Printing / Information** page.*

12.9.11 Carrier Locking Test

ATTENTION

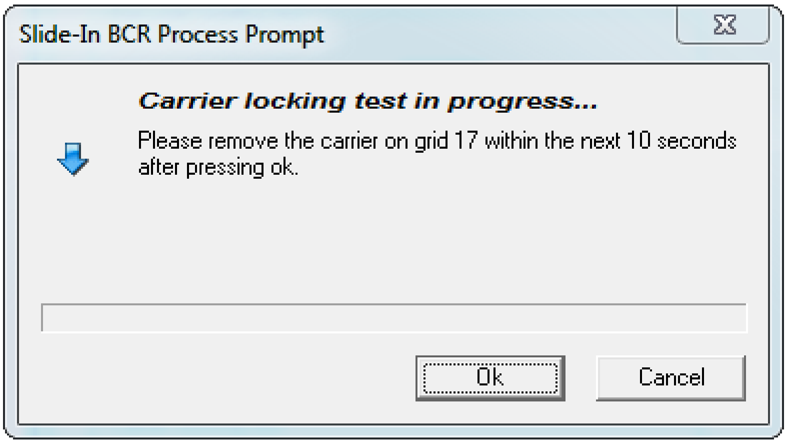
This procedure is for field service engineers only and can be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this test is to ensure that a carrier can be locked/unlocked and can be detected on grid 17, 18 and 19.

1 Start with grid 17.

The system prompts to remove the carrier within the next 10 seconds
The system switches on the solenoid for max. 10 seconds



Carrier locking test in progress...

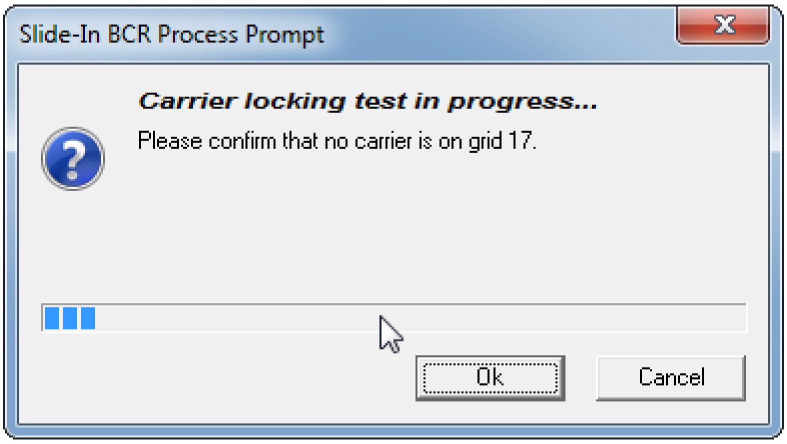
Please remove the carrier on grid 17 within the next 10 seconds after pressing ok.

Fig. 12-123 *Prompt remove carrier*

2 Remove the carrier.

3 Confirm the removal of the carrier.

The system switches the solenoid off
The system reads the input sensor (carrier is not detected)



Carrier locking test in progress...

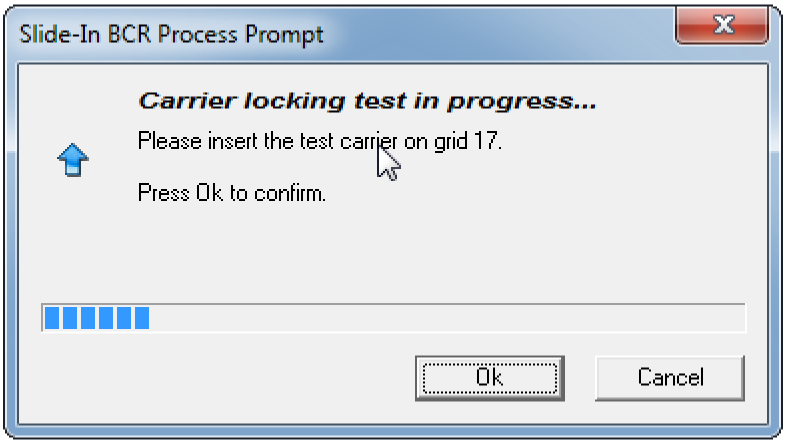
Please confirm that no carrier is on grid 17.

Fig. 12-124 *Prompt carrier removed*

4 Insert the carrier in the corresponding grid.

5 Confirm the insertion of the carrier.

The system reads the input sensor (carrier is detected and locked)



Carrier locking test in progress...

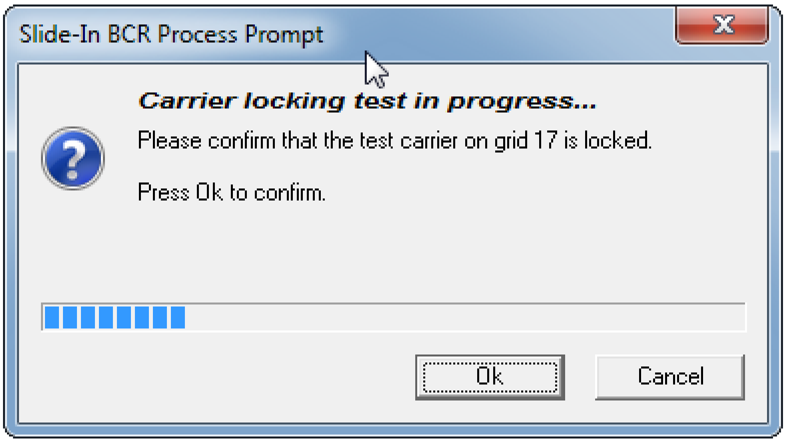
Please insert the test carrier on grid 17.

Press Ok to confirm.

Fig. 12-125 *Prompt carrier inserted*

6 Confirm the locking of the carrier.

The system switches the solenoid on
The system reads the input sensor (carrier is not detected)
The system switches the solenoid off
The system prompts to remove the carrier within the next 10 seconds
The system switches on the solenoid for max. 10 seconds



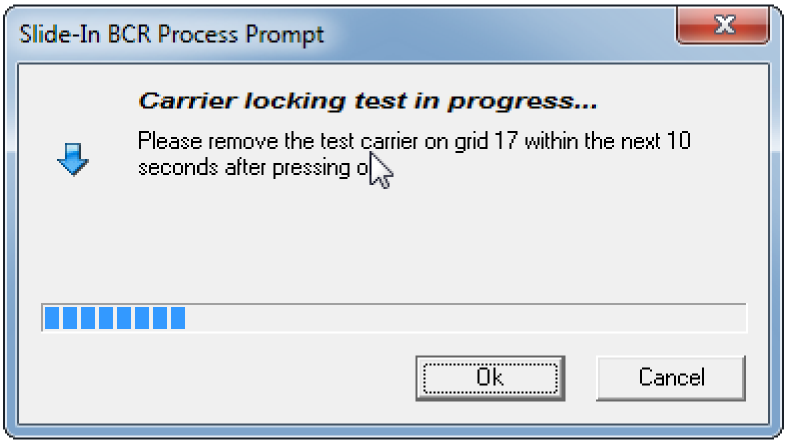
Carrier locking test in progress...

Please confirm that the test carrier on grid 17 is locked.

Press Ok to confirm.

Fig. 12-126 *Prompt carrier locked*

7 Remove the carrier.



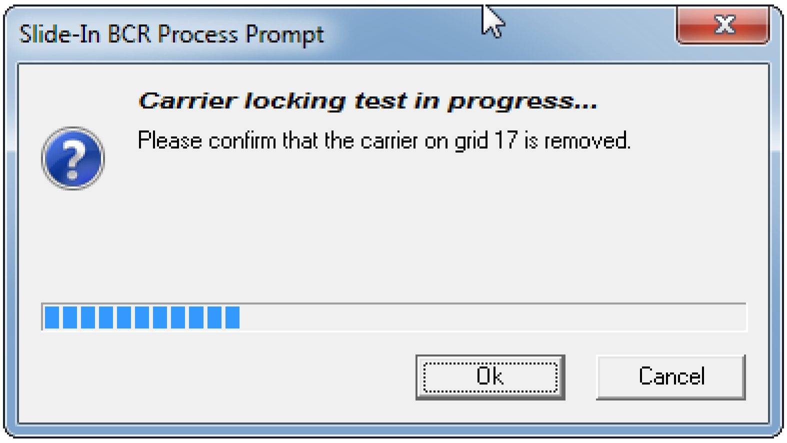
Carrier locking test in progress...

Please remove the test carrier on grid 17 within the next 10 seconds after pressing o

Fig. 12-127 *Prompt remove carrier*

8 Confirm the removal of the carrier.

The system reads the input sensor (carrier is not detected)
The system switches the solenoid off



Carrier locking test in progress...

Please confirm that the carrier on grid 17 is removed.

Fig. 12-128 *Prompt carrier removed*

9 Repeat the steps 2–8 for grid18 and 19.

12.9.12 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

13 Multichannel Functions

13.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Te-MO and Aquarius Operating and Service Manuals	See section 1.2, 🗎 1-3

Purpose of This Chapter

This chapter describes in detail how to setup and/or test in the field:

- Te-MO/Aquarius
- Wash and Refill systems for Te-MO/Aquarius
- Wash systems for the multichannel arms
- Autoloader

Te-MO, Aquarius and AutoLoader

Note: *Differences between Te-MO and Aquarius*

- *Te-MO (multipipetting option) is an option that can be installed on Freedom EVO instruments, as well as on Genesis Classic and Genesis Freedom instruments.*
- *Aquarius is an autonomous multipipetting instrument that incorporates the Te-MO Base Unit (as well as Te-MO wash and refill Te-MO units where applicable).*
- *The AutoLoader is an optional extension that can be linked to a destination device, such as Aquarius or Cellerity. It can handle and store various type of labware (e.g., microplates and DiTi boxes needed by the Aquarius or flasks for Cellerity) in up to six stacker columns that are arranged on a carousel.*

Note: *Setup and test procedures are identical for Te-MO and Aquarius. Unless otherwise noticed, the information provided in this chapter applies to both Te-MO and Aquarius.*

- *For the sake of simplicity, only the designation Te-MO will be used in those parts of this chapter that refer to the setup and test of the Base Unit, the Wash Unit and the Refill system.*
- *The name Aquarius appears in the part that describes the setup and test of the AutoLoader.*

Note: *The illustrations (photos, drawings) in this section show parts of the Te-MO. The corresponding Aquarius parts may look slightly different.*

Wash Systems

Te-MO 384 includes a wash system. For Te-MO 96, MCA96 and MCA384 the wash system is optional. The wash systems include an appropriate wash block on the worktable and a wash tower containing a control unit and a wash unit. Setups and tests for the multichannel arms MCA96 and MCA384 are done through the **MCA Wash** panel. Setups and tests for Te-MO 96 and Te-MO 384 are done through the **Te-MO Wash Unit** panel.

Options Menu

The **Multichannel** functions are called up via the **Options** menu.

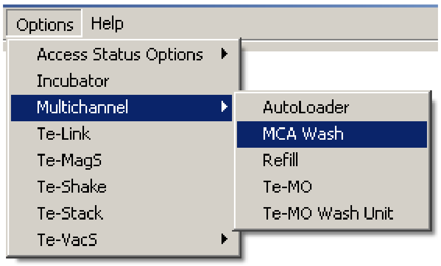


Fig. 13-1 Multichannel menu

Multichannel Panels

The multichannel functions can be invoked through five separate panels:

- **AutoLoader:** Setup and test procedures for Autoloader (optional extension for devices like Aquarius and Cellerity).
- **MCA Wash**: Setup and test procedures for the MCA96 and MCA384 wash systems.
- **Refill**: Setup and test procedures for the (optional) Te-MO Refill center.
- **Te-MO:** Setup and test procedures for the Te-MO/Aquarius base unit.
- **Te-MO Wash Unit:** Setup and test procedures for the Te-MO wash units. Note that there are two types of wash units:
  - 96 wash unit (optional for Te-MO 96).
  - 384 wash unit (always used with Te-MO 384).

For Your Safety

During the execution of certain setup and test procedures the tips attached to the pipetting head can move downwards. To avoid injuries be especially careful during such tests and do not reach into the region in which the head moves.

WARNING

Be careful when performing adjustments and tests during which the pipetting head moves downwards. To avoid injuries do not reach into the zone under the pipetting head.

13.2 Brief Description of Te-MO

The Te-MO (multichannel pipetting option) is a pipetting module designed for high-speed, high-precision liquid pipetting operations. Its main field of application is pharmaceutical research where large qualities of samples need to be examined in a short time.

The Te-MO uses standard microplates with 96, 384 or 1536 wells. It is possible to equip Freedom EVO, Genesis Freedom and Genesis Classic instruments with a Te-MO. Only one Te-MO can be installed on an instrument.

Main Parts of Te-MO

The main parts of a Te-MO are:

- The multipipetting head with 96 or 384 channels (see below).
- Three slides below the head, each one with 3 or 5 carrier positions on which microplates, wash blocks, etc. can be placed. The slides are mounted on so-called pallets and can be moved in the Y-axis.

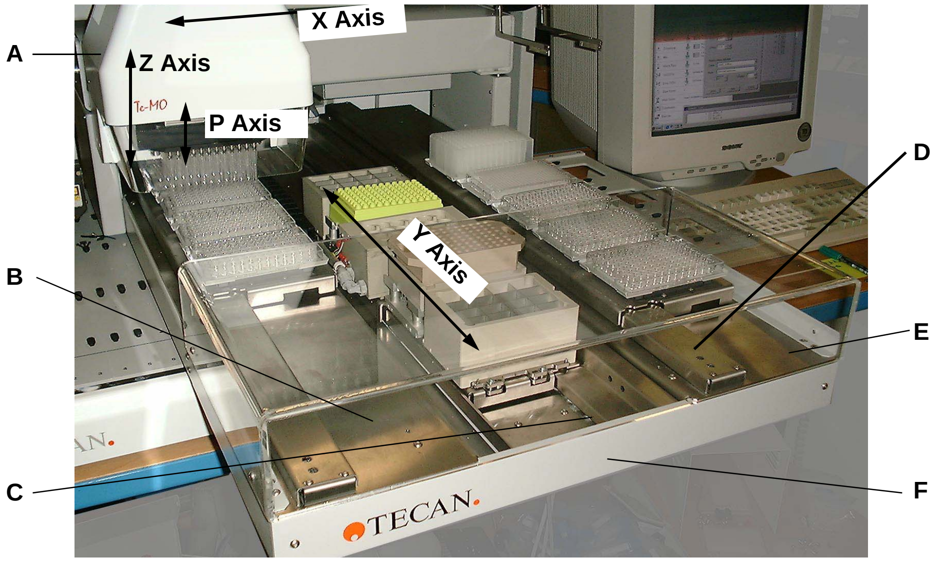


Fig. 13-2 *Te-MO 3 x 5 Overview*

A	Pipetting head	***D***	Y3 slide
B	Y1 slide	***E***	Plexiglass protective cover
C	Y2 slide (service slide)	***F***	Chassis

The slides are equipped with carriers. Each carrier can hold a rack (e.g., a microplate).

Slide Y2 is the so-called service slide. It serves for holding wash blocks, reagent blocks or transfer racks for DiTi boxes and tip blocks.

A Te-MO can be used together with other system devices or modules, such as LiHa, RoMa, PnP, Te-Stack, etc.

Note: *Remember that Aquarius is an autonomous instrument that has no arm devices.*

Movement Axes

Tab. 13-1 *Te-MO Movement Axes*

Axis	Moving direction	Parts moved
X	Left/right	Pipetting head, tip blocks, fixed tips, DiTis
Y1, Y2, Y3	Front/rear	Slides
Z	Up/down	Pipetting head, tip block, fixed tips, DiTis
p	Up/down within pipetting head	Plungers

13.2.1 Te-MO 96-Channel Pipetting Head

Description

Fig. 13-3 *Te-MO 96 pipetting head*

This pipetting head is equipped with 96 plungers and can aspirate and dispense liquid simultaneously through 96 channels. It is possible to attach a tip block with 96 tips or 96 DiTis to the head.

The Te-MO 96-channel pipetting head can aspirate and dispense liquid from 96, 384 or 1536-well microplates. Since there is always an air gap between the plunger and the liquid to aspirate/dispense, the plungers do not come into contact with the liquid so that the head cannot be contaminated by aspirated samples.

Te-MO 96 Pipetting Ranges

Tab. 13-2 *Pipetting ranges and coefficients of variation (96-Head)*

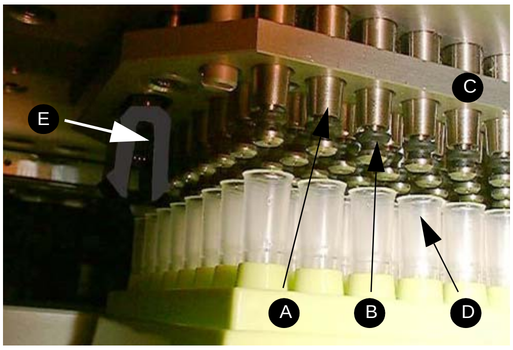
Parameter	**Range / value**	**CV**
Pipetting range	1 to 200 µl	
Precision[a] in liquid dispense mode	at 1 µl dispense volume at 5 µl dispense volume at 10µl dispense volume	< 6% < 4% < 3%

a) Values can only be achieved if maintenance is performed regularly according to schedule and if the instructions are strictly followed.

Tips

Depending on the application, DiTis or tip blocks are used:

- DiTis are used to reduce the risk of carry over (residues of liquid) from one sample to the next to a minimum.
- Tip blocks are employed in less critical cases.



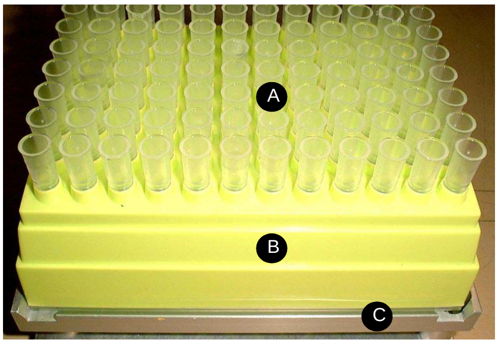
A	*Tip cone*
B	*Tip cone ring*
C	*Ejection plate*
D	*DiTis*
E	*Locking mechanism*

Fig. 13-4 *Attaching DiTis to head*

The figure above shows how a set of DiTis is attached to the pipetting head. When the cones are pushed into the DiTis the cone rings press against the walls of the DiTis and hold them firmly so that they can be lifted out of the DiTi box. At the same time, the tip cone rings serve as sealing rings.

To release the DiTis the ejection plate (C) is moved downwards and pushes the DiTis off the cones back into the DiTi box.

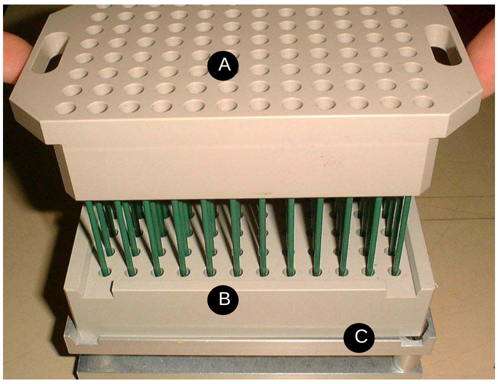
Tip blocks are attached to the pipetting head in a similar manner. Since a tip block is much heavier than a set of DiTis, the locking mechanism (E) secures the tip block and prevents it from falling down.



A	*DiTis*
B	*DiTi box*
C	*DiTi transfer rack*

Fig. 13-5 *DiTi transfer rack*

DiTis are delivered in a DiTi box. The whole DiTi box (with removed cover) is placed on the DiTi transfer rack on the service slide Y2. After each aspiration or dispense cycle the DiTis are put back into the box and are disposed of together with the box.



A	*Tip block*
B	*Tip block support*
C	*Tip block transfer rack*

Fig. 13-6 *Tip block transfer rack*

Tip blocks are picked up from a tip block support that is located on the tip block transfer rack on the service slide Y2.

13.2.2 Te-MO 384-Channel Pipetting Head

Description

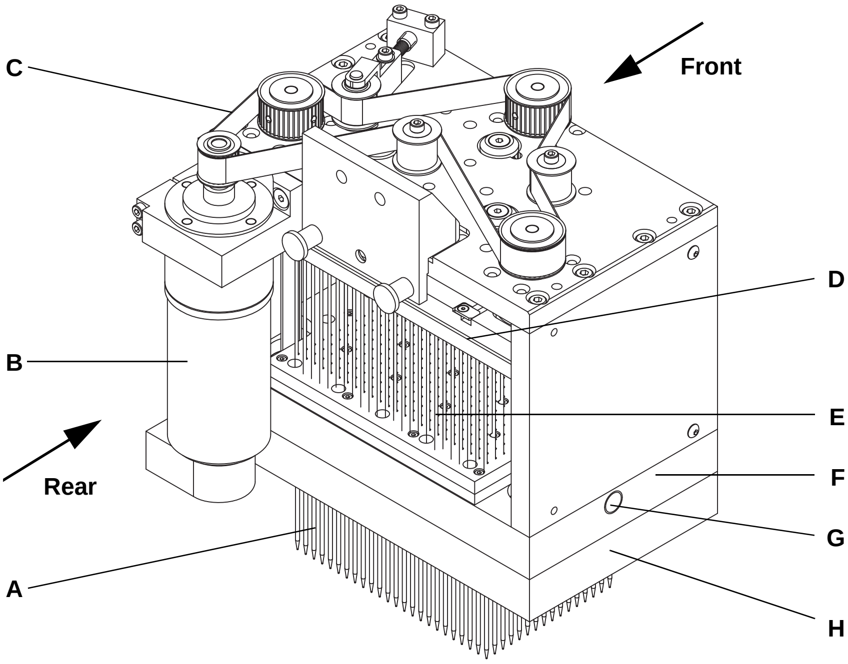


Fig. 13-7 *Te-MO 384 Head*

A	*Tips*	***E***	*Plungers*
B	*Drive motor*	***F***	*Wash chamber plate*
C	*Drive belt*	***G***	*System liquid inlet*
D	*Upper and lower stroke plate*	***H***	*Tip plate*

The Te-MO 384-channel pipetting head is equipped with 384 fixed tips (A). Note that DiTis and tip blocks cannot be used together with this type of pipetting head.

The plungers (E) are fixed to the stroke plate (D) and can be moved up and down to aspirate and dispense liquid.

Unlike the Te-MO 96-channel pipetting head, the 384-channel head can not only aspirate liquid through the bottom holes of the tips. It also contains a wash chamber that is enclosed by the plates (F) and (H). This chamber can be filled with liquid through the inlet (G) and emptied either through an outlet on the opposite side or through the tips. If the chamber is filled when the plungers (E) are in their top positions, the liquid can enter the tips from their top ends and flush them from the inside.

Te-MO 384 Pipetting Ranges

Tab. 13-3 Pipetting Ranges and Coefficients of Variation (384-Head)

Parameter	Te-MO 384 Head	
Pipetting range	0.5 - 50 µl	
Precision	500 nl a) 1 µl a) 2 µl b)	CV ≤ 4% CV ≤ 3% CV ≤ 5%

a) Tip touch (wet plate)
b) Free dispense

13.2.3 Carriers

Carrier Positions

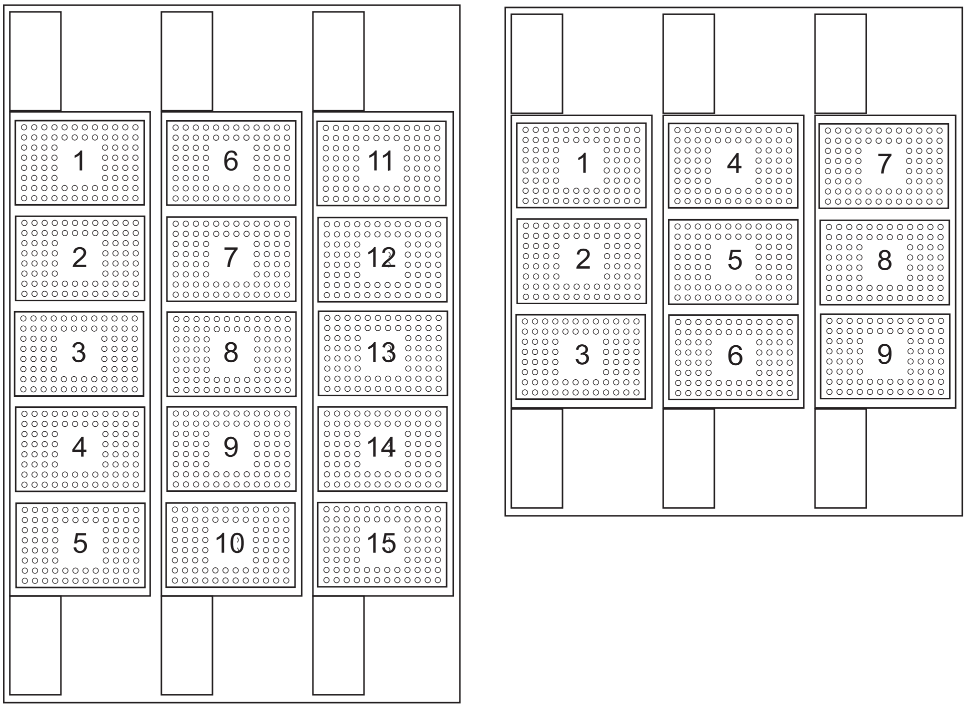
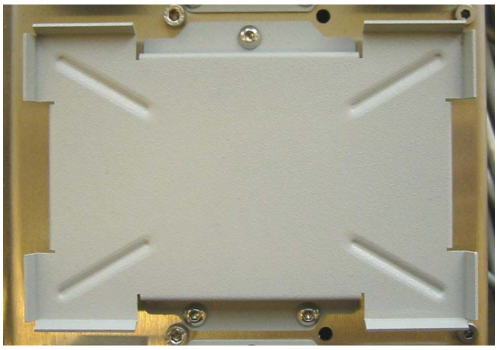


Fig. 13-8 Te-MO carrier positions

The above figure shows how the carrier positions on the slides are numbered:

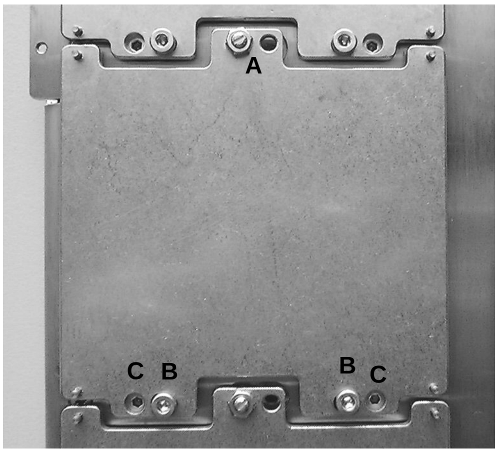
- for slides with 5 carrier positions
- for slides with 3 carrier positions.

Carrier Types



Standard carrier

Used for microplates and deep well plates.



Adjustable carrier

Carrier used for the service slide (Y2). This carrier can be rotated and adjusted horizontally to align the wash block, troughs, etc. with the tips of the pipetting head.

A	Lock nut
B	Screws for rotational adjustment
C	Screws for horizontal adjustment

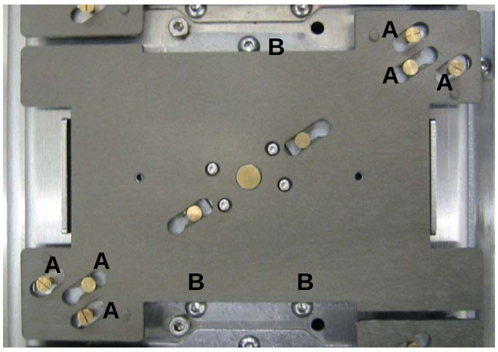


Fig. 13-9 *Carrier types*

Active positioning carrier (APC)

APCs are used for microplates and deep well plates, and are designed for 1536-well plates. An active gripper mechanism positions and holds the plates in an accurate, reproducible position. A special mechanism allows adjusting the carrier in all axes.

A	Positioning pins
B	Fixing screws

13.2.4 Required Tools

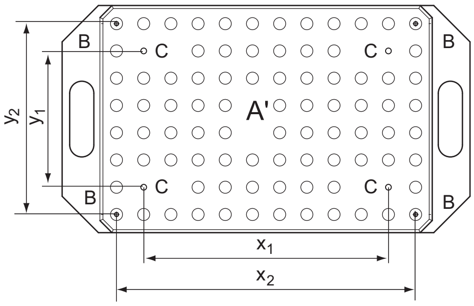
Cross References

List of cross references to information provided in other sections:

Information	References
Te-MO and Aquarius Operating and Service Manuals	See section 1.2, 🗎 1-3

Te-MO 96 Teach Block and Teach Pins

For aligning the 96-channel pipetting head and carrier positions in the x, y and z axes. Must be used together with the reference plate (Y1/Y3) or the reference block (Y2). Depending on the setup or test to be performed, the teach block must be equipped with the appropriate teach pins. See below.

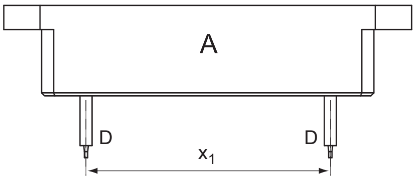


A'	*Teach block, bottom view*
B	*Outer mounting holes*
C	*Inner mounting holes*
x_1	*81 mm*
X_2	*99 mm*
y_1	*45 mm*
y_2	*63 mm*

Fig. 13-10 *Te-MO 96 teach block, bottom view*

The teach block has outer (B) and inner (C) mounting holes for fixing the teach pins (D, E, or F).

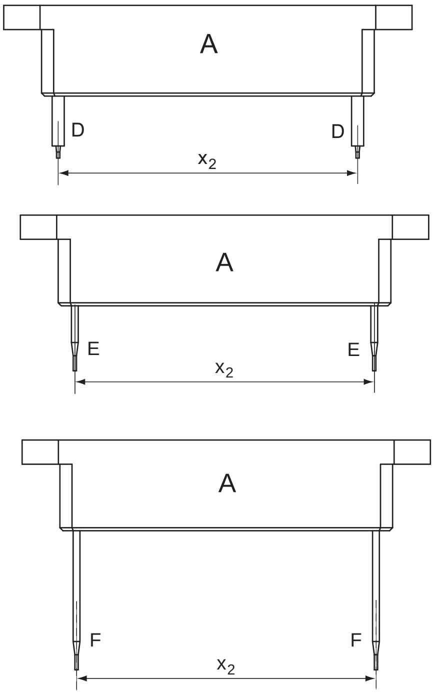
- The inner mounting holes are used for the mechanical adjustment of the APC carrier. In this case the teach pins for DiTi and APC (D) must be used (see following figure).



Teach block (A) equipped with teach pins for the mechanical prealignment of APC carriers. Mounted to inner holes.

Fig. 13-11 *Teach pins for mechanical prealignment of APC carrier*

- For the software setup and test procedures described in this section, the appropriate teach pins must be inserted in the outer mounting holes . The choice of the pins depends on the tips the customer uses for running his/her applications (see following figure).



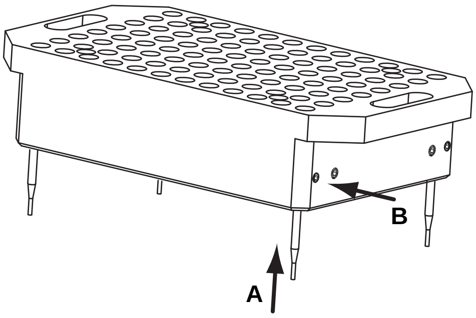
Teach block (A) equipped with teach pins for DiTi and APC (D). Mounted to outer holes.

Teach block (A) equipped with high-precision teach pins (E). Mounted to outer holes.

Teach block (A) equipped with normal teach pins (F).Mounted to outer holes.

Fig. 13-12 *Teach block equipped for software setups and tests*

Fixing the Pins to the Teach Block

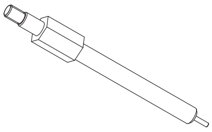


To fix the teach pins to the block:

1. Insert them in the appropriate holes at the bottom (arrow A). Push them inwards until the stop.
2. Tighten the associated set screws on the left and right sides of the block (arrow B).

Fig. 13-13 *Fixing the teach pins*

Te-MO 384 Teach Pin



Teach Pin: To align the 384-channel pipetting head and carrier positions, four such pins can be screwed to the head. Must be used together with the reference plate (Y1/Y3) or the reference block (Y2).

Fig. 13-14 *384-teach pin*

Reference Block and Plate

Note: *The reference block and reference plate are also used for setting up the AutoLoader.*

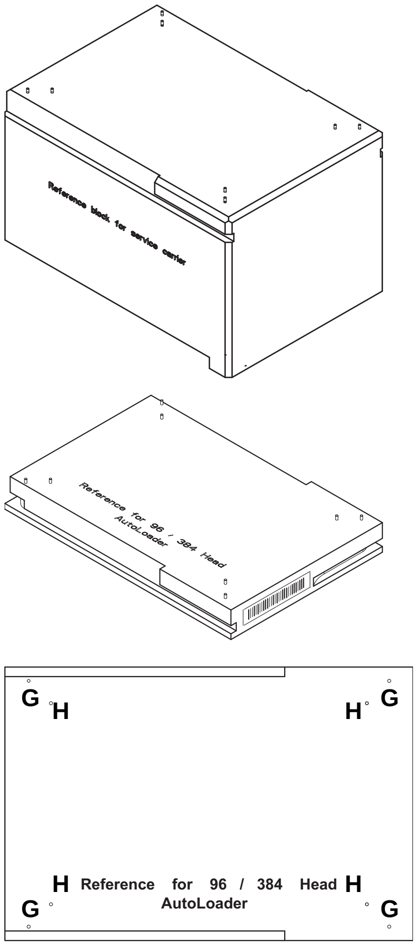


__Fig. 13-15__ Reference plates

Reference Block Y2: For aligning Te-MO 96 and 384 channel pipetting heads with the rack positions on the service slide Y2. This block must be used with a teach block (Te-MO-96) or with teach pins screwed to the pipetting head (Te-MO 384).

Reference plate for 96/384 head: This reference rack is used to align 96 and 384 channel pipetting heads with rack positions on slides Y1/Y3. It must be used together with a teach block or with teach pins screwed to the pipetting head.

Both the Y2 reference block and the reference plate for the 96/384 head (shown on the left side) are equipped with eight positioning pins protruding from the top surface.

- The outer pins (G) are needed if a 384-channel pipetting head is installed.
- The inner pins (H) are used if the head is a 96-channel pipetting head. Note that their x and y-distances correspond with the distances of the outer pins mounted to the 96-teach block.

13.3 Te-MO Base

Purpose

The **Te-MO Base** panel provides the functions for setting up and testing the multipipetting heads, slides, rack positions and the correct handling of tip blocks or DiTi boxes. Some of the setup and test procedures refer to a specific head type (e.g., Te-MO 96 head) and cannot be activated when another head is installed.

13.3.1 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

***Tab. 13-4** Te-MO Functions and User Permissions*

Function	Type	User	FSE
Reset Firmware, all data will be lost	Setup		X
Determine Device Configuration	Setup		X
Set Defaults in EEPROM	Setup		X
Set Te-MO Settings	Setup		X
Autorange	Setup		X
Setup Carrier Positions	Setup		X
Teach Carrier positions	Setup		X
Autodetection of APC / Set up Exchange position	Setup		X
Adjust Get and Drop Tip Block	Setup		X
Adjust Get and Drop DiTi	Setup		X
Mechanical Adjustment of Te-Stack Positions	Setup		X
Carrier Positions Plausibility Test	Test	X	X
Range Move Test	Test	X	X
Random Move Test	Test	X	X
Random Move Test for Plunger	Test	X	X
APC Functional Test	Test	X	X

Tab. 13-4 *Te-MO Functions and User Permissions*

Function	Type	User	FSE
Get and Drop Tip Block / DiTi Functional Test	Test	X	X
Pulse Generator Functional Test [a]	Test		
Move Tool	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

a) This test can no longer be activated

Files

The Te-MO panel creates the following files

- Result Files: Test results are stored in *.any files.:

Directors	<data_path>\Results
File name	TeMO_<serial_number>_<date>_<time>.any

Starting the Panel

To setup or test the Te-MO:

1. Start the panel with **Options > Multichannel > Te-MO**.

   First, the Te-MO device settings are read. If a Te-MO 96 is installed a message appears that warns you not to use this panel for a Te-MO 96 that is used by an earlier version of the Gemini Software (V 4.0 or earlier).

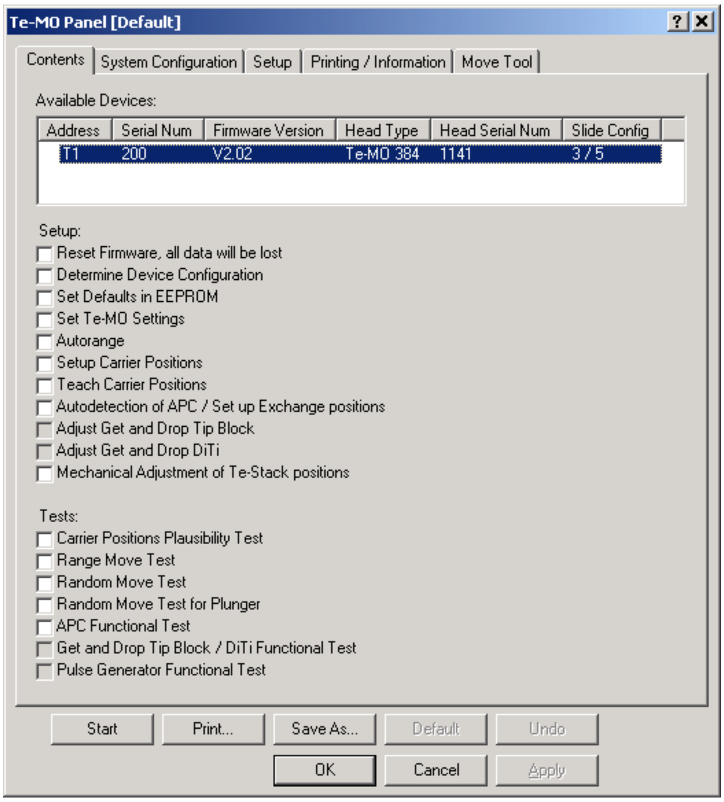
2. Do one of the following:
   - If the Te-MO is used by a Gemini Software V4.0 or earlier click **Cancel** on the message window to close the panel and use the Gemini Software for setup and test.
   - Otherwise continue with **Next**.

   The ***Te-MO*** *panel with activated* ***Contents*** *page appears. After starting the Te-MO panel, no startup or test check box is selected and not all tabs are visible.*

Note:

- *The procedure* ***Reset Firmware*** *is only needed if you replace the Te-MO firmware V1.03 with version V2.01 or higher (details see later in this section).*
- *You must perform the* ***Determine Device Configuration*** *and* ***Set Defaults in EEPROM*** *procedures before any further setup procedures are possible (no other setups or tests are enabled).*

Pages



Available Devices:

Address	Serial Num	Firmware Version	Head Type	Head Serial Num	Slide Config
T1	200	V2.02	Te-MO 384	1141	3 / 5

Setup:

- ☐ Reset Firmware, all data will be lost
- ☐ Determine Device Configuration
- ☐ Set Defaults in EEPROM
- ☐ Set Te-MO Settings
- ☐ Autorange
- ☐ Setup Carrier Positions
- ☐ Teach Carrier Positions
- ☐ Autodetection of APC / Set up Exchange positions
- ☐ Adjust Get and Drop Tip Block
- ☐ Adjust Get and Drop DiTi
- ☐ Mechanical Adjustment of Te-Stack positions

Tests:

- ☐ Carrier Positions Plausibility Test
- ☐ Range Move Test
- ☐ Random Move Test
- ☐ Random Move Test for Plunger
- ☐ APC Functional Test
- ☐ Get and Drop Tip Block / DiTi Functional Test
- ☐ Pulse Generator Functional Test

Fig. 13-16 *Contents page for Te-MO 384*

The **Te-MO** panel is subdivided into the following pages:

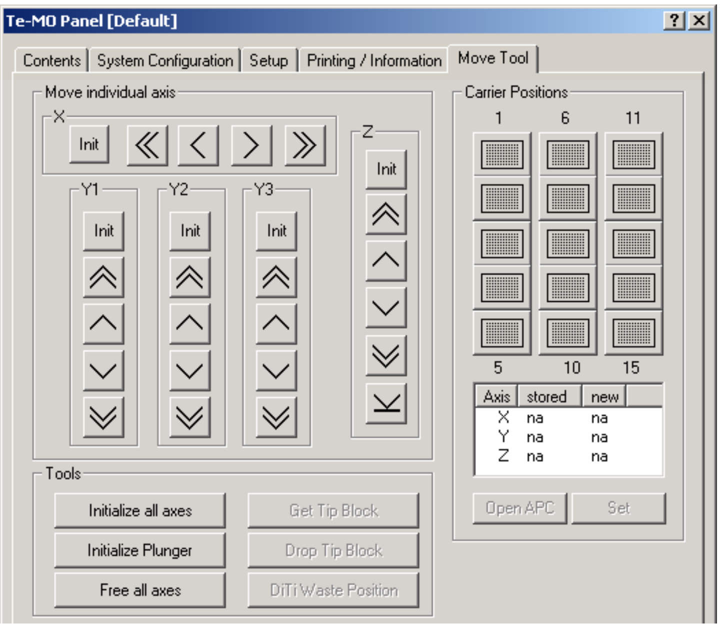
Tab. 13-5 *Pages of Te-MagS Panel*

Pages	Function
Contents	General overview, procedure selection
System Configuration	Lets you define the system configuration
Setup	Lets you define the setup parameters
Test Configuration	Lets you set the test parameters
Printing / Information	Print selection of QC-report
Move Tool	Used to move head and slides for adjustments and tests.

13.3.2 Move Tool Page

Function

The **Te-MO Move Tool** page lets you move the moveable parts of the Te-MO in all possible axes. In addition, it contains the necessary controls for selecting carrier positions, picking up/putting back tip blocks and DiTis and for initializing the various axes.



Axis	stored	new
X	na	na
Y	na	na
Z	na	na

Fig. 13-17 Te-MO Move Tool

***Note:** The **Move Tool** page opens automatically when you call up a setup procedure in which it is needed.*

Controls

The **Move Tool** page contains the following controls:

Move individual axis	Movement buttons for the axes: X (head), Y (slides), Z (tips)
< > ∧ ∨	Single step (1/10 mm) movement buttons
« » ︽ ︾	Ten steps (1 mm) movement buttons
⊻	50 steps (5 mm) movement button (only for downward movement in Z-axis)
Init	Moves devices to initial positions: X-axis (head) rightmost, Y-axis (slides) rearmost, Z-axis (tips) topmost.
Carrier Positions	Set of buttons to move slides and head until the head is above the selected carrier.
- **List box below carrier buttons**	Shows the currently stored and the new deviations from the nominal values in each axis after a setup.
- **Open/close APC**	“Toggle” button to move the currently selected carrier to the “exchange position” of the respective slide (= position where APCs are opened/closed). - If the APC is open the caption reads **Close**. - If the APC is closed the caption is **Open**
- **Set**	Overwrites previously stored value of carrier position with the newly taught position.

Tools	Set of buttons for various purposes
- **Initialize all axes**	Initializes the X, Y, and Z-axes
- **Initialize Plunger**	Initializes the plungers: - 96-channel pipetting head: aspirates, then initializes plungers 3 times. After initialization, plungers are in top position. - 384-channel pipetting head: dispenses and lowers the plungers to the bottom position.
- **Free all axes/ Return to last position**	Toggle button whose caption changes between **Free all axes** and **Return to last position**. - **Free all axes**: Moves slides into the front positions (so that they can be loaded/unloaded). Pipetting head is moved to the leftmost/ topmost position. - **Return to last position**: Slides and pipetting head are moved into the previous position head stays in topmost positions.
- **Get Tip Block** **Get DiTi**	96-channel head only: Picks up a tip block or a set of DiTis from the current position. The caption of this button depends on the tip type selected on the **Setup** page.
- **Drop Tip Block** **Drop DiTi**	96-channel head only: Releases a previously picked up tip block or set of DiTis. The caption of this button depends on the tip type selected on the **Setup** page.
- **DiTi Waste Position/** **Y2 backwards**	Toggle button whose caption changes between DiTi Waste Position and Y2 Backwards. Allows you towards the DiTi waste position or away from it. - **DiTi Waste Position**: Moves the Y2-slide forward into he DiTi waste position - **Y2 backwards**: Moves Y2 slide away from DiTi waste

Keyboard Control

It is also possible to use the keyboard for the movements in the various axes.

Tab. 13-6 Moving the Te-MO with the keyboard

Key in numeric pad (Num Lock active)	Movement axes	Parts moved
6 →	X+ (right)	Whole pipetting head
4 ←	X- (left)	
2 ↓	Y2+ (front	Service (middle) slide
8 ↑	Y2- (rear)	
PgDn 3	Y3+ (front)	Right slide
PgUp 9	Y3- (rear)	

Tab. 13-6 Moving the Te-MO with the keyboard

Key in numeric pad (Num Lock active)	Movement axes	Parts moved
7 Home	Y1- (rear)	Left slide
1 End	Y1+ (front	
+	Z+ (down)	Head
-	Z- (up)	

Steps

The parts of the Te-MO are moved as follows:

- Every time you hit one of the above keys the part is moved by one step (0.1 mm).
- If you keep the key pressed it is moved continuously at a speed of approx. two steps per second.

Note:

- *Acceleration is not possible with Te-MO.*
- *Num Lock must be active (if there is a Num Lock indicator lamp it must be switched ON)*

WARNING

Be careful when performing adjustments and tests during which the pipetting head moves downwards. To avoid injuries do not reach into the zone under the pipetting head.

ATTENTION

When using the **Move Tool** page be careful about the following:

- Avoid collisions. Plungers and tip blocks may be damaged when they collide with parts placed on the slides.
- Release tip blocks or DiTis only if there is a tip block transfer rack below the pipetting head. Avoid dropping the tip block or the DiTis when there is no such rack below the head.
- To prevent liquid splashing on the worktable always move a trough or wash station below the pipetting head before performing setup and test procedures in which previously aspirated liquid may be dispensed.

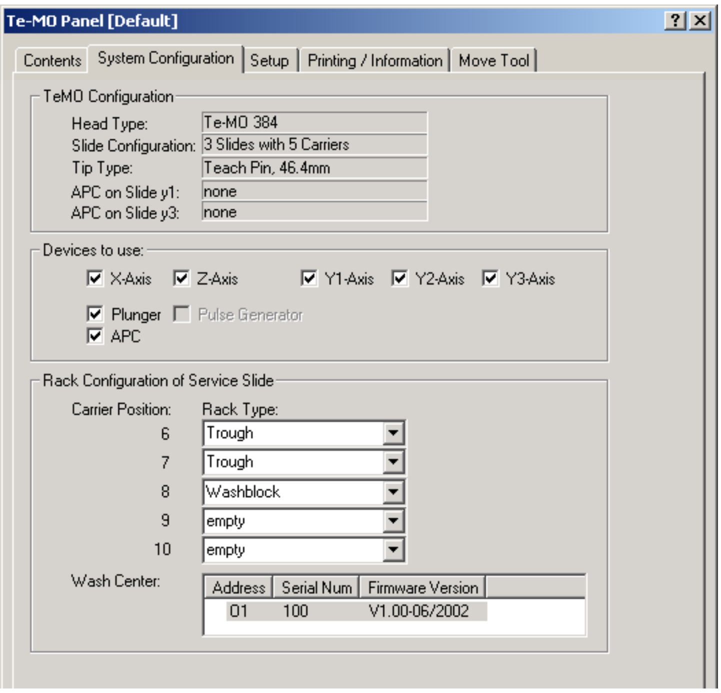
13.3.3 System Configuration Page

Purpose

The purpose of this page is to…

- verify important Te-MO configuration data.
- select axes and devices to be set up or tested
- define the positions of troughs, wash unit, transfer racks, etc.
- Select wash center to be used (only Te-MO 384).

Note: *The program notifies you automatically when you have to check or change parameters on this page.*



TeMO Configuration

Head Type: Te-MO 384
Slide Configuration: 3 Slides with 5 Carriers
Tip Type: Teach Pin, 46.4mm
APC on Slide y1: none
APC on Slide y3: none

Devices to use:

☑ X-Axis ☑ Z-Axis ☑ Y1-Axis ☑ Y2-Axis ☑ Y3-Axis
☑ Plunger ☐ Pulse Generator
☑ APC

Rack Configuration of Service Slide

Carrier Position:	Rack Type:
6	Trough
7	Trough
8	Washblock
9	empty
10	empty

Wash Center:

Address	Serial Num	Firmware Version
01	100	V1.00-06/2002

Fig. 13-18 *Te-MO System Configuration page*

Controls

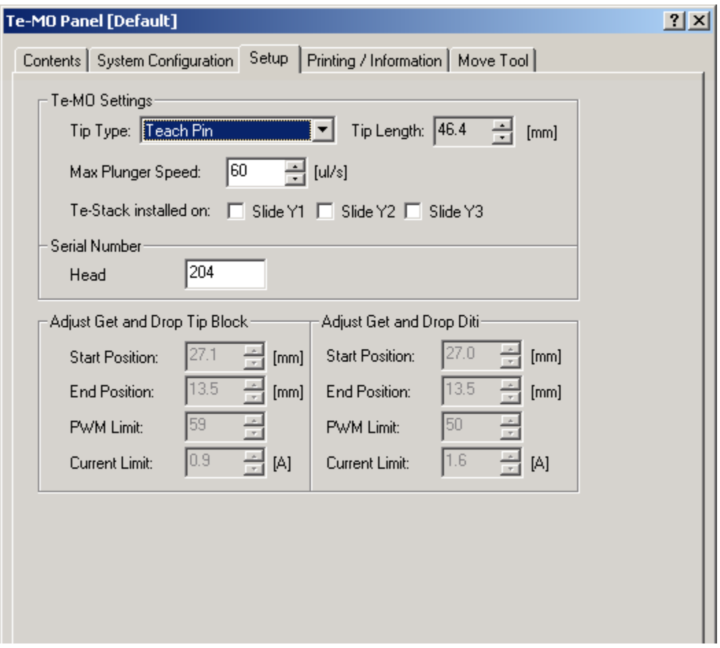
The **System Configuration** page contains the following controls:

Te-MO Configuration	This section shows configuration data that were read from the EEPROM or were set earlier on the **Setup** page. The values in this section cannot be changed on this page.
- **Head Type**	Te-MO 96 or Te-MO 384
- **Slide Configuration**	Number of slides and carriers per slide
- **Tip type**	Shows the tip block or DiTi type (Te-MO 96) or the tip type and length (Te-MO 384).
- **APC on Slide Y1**	Shows positions of APCs on slide Y1 (left slide)
- **APC on Slide Y3**	As above for slide Y3 (right slide)
Devices to use	Set of check boxes to select the devices to be set up or tested by means of procedures like **Autorange, Range Move Test, Random Move Test**.
Rack Configuration of Service Slide	Set of drop down lists from which you can select the devices (troughs, wash block, transfer racks) located on the carriers of the service slide Y2 (middle slide)
Wash Center	Only for Te-MO 384. Shows the address, serial number and firmware version of the 384 wash unit.

13.3.4 Setup Page

Purpose

The Setup page is used to set important parameters that the software must know during certain setup procedures (details see below).



Te-MO Settings

Tip Type: Teach Pin

Tip Length: 46.4 [mm]

Max Plunger Speed: 60 [ul/s]

Te-Stack installed on: ☐ Slide Y1 ☐ Slide Y2 ☐ Slide Y3

Serial Number

Head 204

Adjust Get and Drop Tip Block

Start Position: 27.1 [mm]

End Position: 13.5 [mm]

PWM Limit: 59

Current Limit: 0.9 [A]

Adjust Get and Drop Diti

Start Position: 27.0 [mm]

End Position: 13.5 [mm]

PWM Limit: 50

Current Limit: 1.6 [A]

Fig. 13-19 *Te-MO Setup page*

Note: *The* ***Setup*** *page automatically appears after the start of the setup procedures listed below. This allows you to check and adapt the parameters needed for the respective setup if necessary. The procedures are:*

- *Set Te-MO Settings*
- *Set up Carrier Positions*
- *Teach Carrier Positions*
- *Adjust Get and Drop Tip Block*
- *Adjust Get and Drop DiTi*

Controls

The **Setup** page contains the following controls:

Te-MO Settings	This frame contains the following controls:
- **Tip Type**	Depending on the installed head (96 or 384), you can select the current tip type (e.g., tip block or DiTis for Te-MO 96).
- **Tip Length**	Spin box for setting the tip length. See following note.
- **Max. Plunger Speed**	Spin box for setting the maximum speed in [µl/s] at which liquid is aspirated/dispensed
- **Te-Stack installed on**	These 3 check boxes are used if a Te-Stack is installed. They allow you to select the Te-MO slides that are accessible to the Te-Stack.
Serial Number	This frame contains the following control:

- **Head**	Text box in which the serial number of the pipetting head can be typed.
Adjust Get and Drop Tip Block	Frame in which the parameters needed for adjusting the picking up and dropping the tip block (Te-MO 96) can be set
- **Start Position [mm]**	Start position in [mm] above the bottom of the carrier from which the head starts picking up the tip block.
- **End Position [mm]**	End position in [mm] above the bottom of the carrier at which the head stops picking up/dropping the tip block.
- **PWM**	(PWM = pulse width modulation). Pulse width of the motor current that determines the force with which the pipetting head presses into the tip block.
- **Current Limit [A]**	Upper current limit. If the current limit is reached, the head stops pressing into the tip block.
Adjust Get and Drop DiTi	Frame containing the same parameters as above. They are needed for adjusting the picking up and dropping of DiTis (Te-MO 96). Note that the current limit cannot be set by the user.

13.3.5 Mechanical Adjustment of Carriers

Cross References

List of cross references to information provided in other sections:

Information	References
Te-MO and Aquarius Service Manuals	See section 1.2, 🗎 1-3
Autorange	See section 13.3.11, 🗎 13-28
Carrier Positions	See section 13.3.12, 🗎 13-28
Teach Carrier Positions	See section 13.3.13, 🗎 13-34
Autodetection of APC/Set up Exchange Positions	See section 13.3.14, 🗎 13-36

Purpose

When performing a setup procedure for carriers (e.g., **Set up Carrier Positions**, or **Teach Carrier Positions**) it may be necessary to readjust some or all of the carriers mechanically. The procedure to be followed depends on the carrier type.

Additional Information

Find additional information about the mechanical adjustment of carriers in the corresponding Te-MO or Aquarius Service Manuals. (→ Cross References).

Before You Start

Note: *Perform the* ***Autorange*** *procedure before carrying out this adjustment (→ Cross References).*

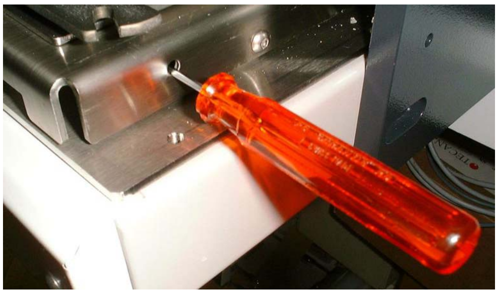
13.3.5.1 Adjustment of APC (Slides Y1 and Y3)

Required Tools

To adjust an APC, you need a screwdriver, and a "Reference for 96/384 Head". Depending on the type of pipetting head you need…

- either a Te-MO 96 teach block, equipped with DiTi/APC teach pins that are inserted in the inner mounting holes.
- or the Te-MO 384 teach pins that must be screwed to the pipetting head.

Principle



An APC rests on a ball-and-socket joint and can be turned in all axes. To level out an APC the fixing screw for the joint can be loosened and tightened when the adjustment is done.

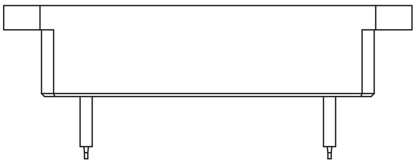
Fig. 13-20 *Mechanical adjustment of APC*

Mechanical Prealignment

In a first step, you must ensure that the APC is parallel to the pipetting head. Proceed as follows:

1 Mount the appropriate teach pins:

- – Te-MO 384: Screw them to the bottom plate of the pipetting head.
- – Te-MO 96: Insert the pins for DiTi/APC in the **inner** holes at the bottom of the teach block and tighten the associated set screws. Make sure they are mounted correctly. See following figure.



Teach pins in inner position (only during leveling out)

Fig. 13-21 *Pin position during leveling out*

2 Use the Move Tool to move the teach pins downwards until it touches the surface of the APC.

3 Mechanically adjust the APC:

- – The teach pins should touch the surface.
- – Also ensure that the sides of the are parallel to the teach pins.

Fine Alignment

After you have mechanically prealigned the APC continue as follows:

4 Ensure that the teach pins are mounted as follows:

- – Te-MO 384: As above.
- – Te-MO 96: Remove the teach pins from the inner holes and insert them in the **outer** holes at the bottom of the teach block. Fix them with the associated set screws on the left and right sides of the teach block.

5 Follow the instructions provided in **Setup Carrier Positions** and **Teach Carrier Positions** (→ Cross References) to fine align the APC.

6 If necessary, adjust the APC mechanically as described earlier in this section.

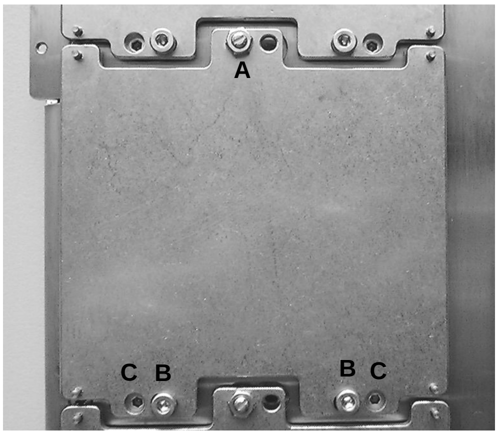
7 Retighten the fixing screw of the APC when finished.

13.3.5.2 Adjustment of Adjustable Carrier (Slide Y2)

Required Tools

Screwdrivers and a Reference Block Y2. Depending on the type of pipetting head you also need a teach block (Te-MO 96) or the teach pins (Te-MO 384).

Principle



The adjustable carrier can be rotated and leveled out with the screws (A) , (B) and (C).

A	Fixing screw
B	Screws for rotational adjustment
C	Screws for horizontal adjustment

Fig. 13-22 *Adjustable carrier*

Procedure

1 Follow the instructions provided in **Setup Carrier Positions** and **Teach Carrier Positions** (→ Cross References).

2 If necessary, adjust the carrier as described above.

3 Retighten the screw when finished.

13.3.6 Mechanical Adjustment of DiTi Waste Catches

Note: *This adjustment is only possible for Te-MO 96 (no DiTis can be used with a Te-MO 384).*

Purpose

In this adjustment, the DiTi waste catches are mechanically adjusted so that DiTis can be disposed of properly after an aspiration/dispensation cycle.

Principle

See following figure. After a set of DiTis (B) has been used in an aspiration/ dispensation cycle they are stripped off the Te-MO 96 head and placed in the original DiTi box (C) on the frontmost carrier of the service slide Y2. Then, the service slide is moved forward until the DiTi box (C) is gripped and held by the DiTi waste catches (D). When the service slide Y2 is withdrawn the DiTi block is retained by the hooks at the end of the catches (D) and the whole block with the DiTis falls into a waste bag or container located underneath the Te-MO.

Note: *The following procedure describes the mechanical adjustment of the DiTi waste catches for Te-MO 3/5. The procedure for Te-MO 3/3 is similar.*

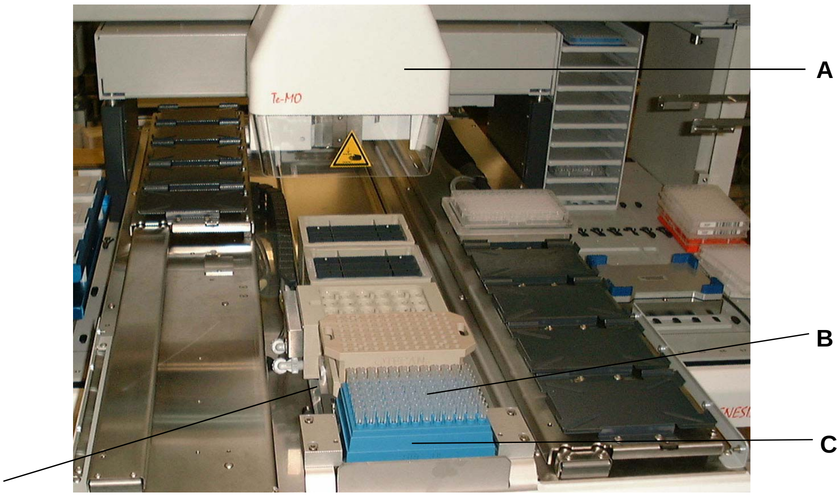


***Fig. 13-23** Example: DiTi Waste for Te-MO 3/5*

A	*Te-MO 96 pipetting head*	***C***	*DiTi box*
B	*DiTis*	***D***	*DiTi waste catch*

Procedure for Te-MO 3/5

To adjust the DiTi waste catches mechanically:

1 Place a (preferably empty!) DiTi box on the frontmost carrier of the service slide Y2.

2 On the **Move Tool** page, click on the **DiTi Waste Position** command button. This will move the service slide to the frontmost position.

*After you have clicked this button its caption changes to **Y2 backwards**.*

3 Visually check whether the DiTi waste catches (D) close correctly round the DiTi box (C).

The distance x between the rear edge of the DiTi box (C) and the hooks/ of the catches should be approx. 0.5 to 1 mm. See following figure.

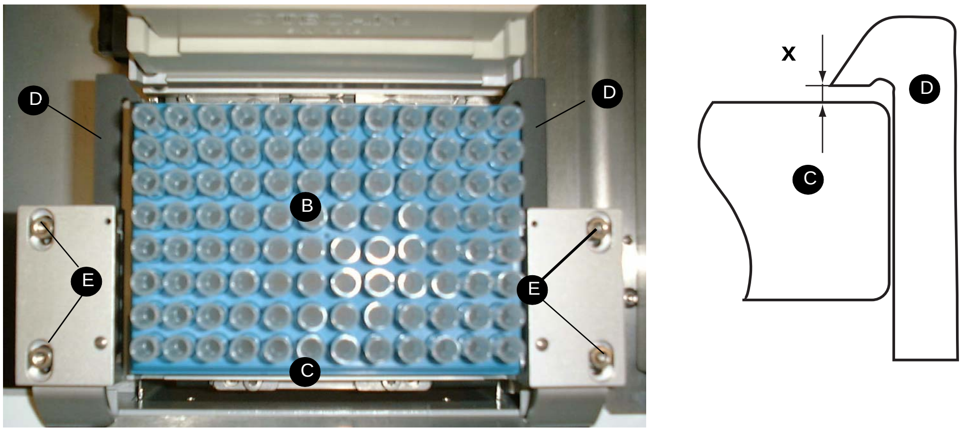


***Fig. 13-24** Adjusting the DiTi waste catches*

B	DiTis in DiTi box	***D***	DiTi waste catches
C	DiTi box	***E***	Adjusting screws

4. If necessary, adjust the positions of the DiTi waste catches (D) with the screws (E).
5. When you have done this click the **Y2 backwards** command button on the **Move Tool** page. The service slide Y2 moves backwards.

   *After you have clicked this button its caption changes back to **DiTi Waste Position**.*
6. Check whether the DiTi block is retained by the catches and falls into the DiTi waste bag or container below the Te-MO when the service slide Y2 is withdrawn.
7. Repeat the procedure as necessary.

Procedure for Te-MO 3/3 and Aquarius

The mechanical design of the DiTi waste disposal for the Te-MO 3/3 and the Aquarius differ from that for Te-MO 3/5. However, the principle of the adjustment is the same.

13.3.7 Reset Firmware

Cross References

List of cross references to information provided in other sections:

Information	References
Firmware download	See section 7.1.2, 🗎 7-4

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This setup procedure is needed if the Te-MO firmware V 1.03 is replaced with version V 2.01 or higher. The procedure resets all data in the Te-MO’s EEPROM to the firmware default values.

ATTENTION

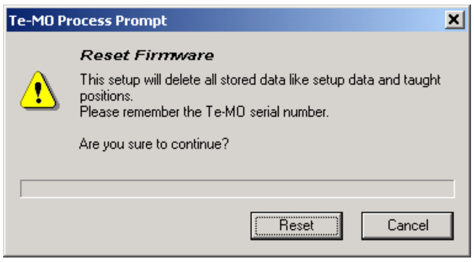
Do not carry out this procedure unnecessarily since all data will be lost. After the execution of this procedure it will be necessary to repeat all setup procedures for the Te-MO base unit.

Procedure

To reset the firmware:

1. Use the **Instrument > Basic Setup** panel and run the **Firmware Download** procedure to download the new firmware.
2. Write down the serial numbers of the Te-MO and the pipetting head.
3. On the **Contents** page select the **Reset Firmware** check box and click **Start**.

   The following warning message appears on the screen.



Te-MO Process Prompt

Reset Firmware

This setup will delete all stored data like setup data and taught positions.
Please remember the Te-MO serial number.

Are you sure to continue?

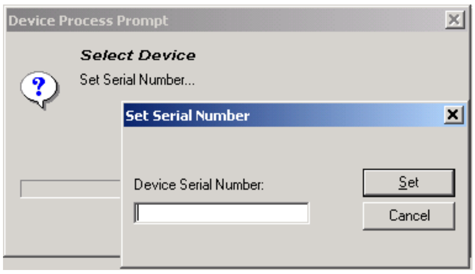
Fig. 13-25 Reset firmware

4 Read the message and click **Reset** if you want to reset the firmware; otherwise click **Cancel**.

If you have decided to reset the firmware two more process prompts appear on the e screen (not shown here) that instruct you to switch the instrument off and on again.

5 Follow the instructions on the screen. When instructed to do so…

- switch the instrument off
- and switch it on again.



Device Process Prompt

Select Device

Set Serial Number...

Set Serial Number

Device Serial Number:

Fig. 13-26 Reset firmware

After restarting the instrument the prompt shown on the left appears on the screen.

6 Follow the instructions:

- Type the serial number of the Te-MO you have noted down in the text box of the dialog box.
- Carefully check whether the serial number is correct
- Click **Set** if it is in order, otherwise click **Cancel**.

7 When finished confirm the **Setup: Done** prompt with **OK**.

Note: *Remember that you must now set up and test the whole Te-MO base according to the instructions given in this section.*

13.3.8 Determine Device Configuration

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose This function serves for determining the following:

- Head type: Whether the installed head is a Te-MO 96 or Te-MO 384 pipetting head
- Slide configuration (number of carriers per slide).

Procedure

To determine the device configuration:

1 On the **Contents** page, select the **Determine Device Configuration** check box and click **Start**.

The system does the following:

- Determines the head type.
- Performs an autorange check of slide Y1 (leftmost slide).
- Writes the results to the EEPROM.

13.3.9 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Note: *You must perform the* ***Determine Device Configuration*** *before you can run this setup procedure.*

Note: *If you run this setup with the Setup and Service software for the very first time, carrier positions that were taught earlier (e.g., with the Gemini software) will be reset.*

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To set the predefined defaults:

1 On the **Contents** page, select the **Set Defaults in EEPROM** check box. No further parameters need to be defined.

2 Click **Start** to download the default values to the Te-MO.

13.3.10 Set Te-MO Settings

Cross References

List of cross references to information provided in other sections:

Information	**References**
Setup page	See section 13.3.4, 🗎 13-19

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

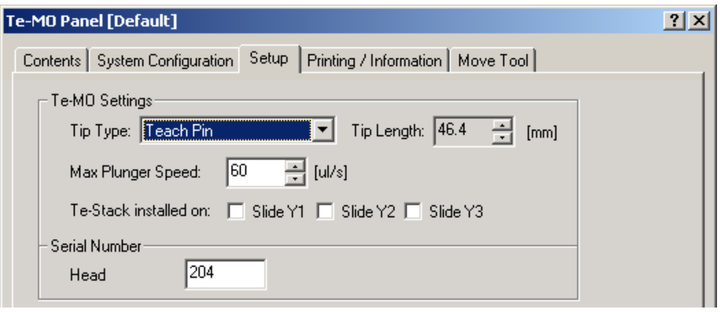
This setup procedure lets you define important Te-MO parameters, such as the tip configuration, plunger speed and the head serial number. If a Te-Stack is installed, you can also define the Te-MO slides that are served by the Te-Stack.

Procedure

To make the settings:

1 On the **Contents** page, select the **Set Te-MO Settings** and click **Start**.

The Setup page along with a process prompt appears.



Te-MO Settings
Tip Type: Teach Pin
Tip Length: 46.4 [mm]
Max Plunger Speed: 60 [ul/s]
Te-Stack installed on: ☐ Slide Y1 ☐ Slide Y2 ☐ Slide Y3
Serial Number
Head 204

Fig. 13-27 *Te-MO Settings on Setup page*

2 Select the currently used tip block or DiTis (Te-MO 96) or the tips (Te-MO 384) from the **Type** list.

   – If you choose a user-defined type you must specify its length and plunger capacity.

   – In case you select a Tecan standard tip type, the length and plunger capacity are set automatically.

3 Use the **Max. Plunger Speed** spin box to set the required aspiration/ dispensing speed according to the following table.

Tab. 13-7 *Maximum Plunger Speed*

Head Type	**Maximum Plunger Speed**
Te-MO 96	400 [µl/s]
Te-MO 384	60 [µl/s]

4. If a Te-Stack is installed select the **Te-Stack installed on** check boxes referring to those slides over which there is a stacker column.
5. If not already done, enter the serial number of the pipetting head in the text box **Head**.

Note:

- *You must set the head serial number anew after you have replaced a pipetting head.*
- *The serial number of the pipetting head is not identical with that of the entire Te-MO. You can find the head serial number on the label on the right side of the pipetting head.*

6. After you have made the necessary settings click **Next** on the prompt.

   Your settings are now stored in EEPROM.

13.3.11 Autorange

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The **Autorange** procedure is used to determine the following:

- Te-MO 3x5: Range in which the pipetting head can be moved in the X-axis.
- Te-MO 3x3: Scale adjusting factor of X-axis.
- Ranges in which the slides Y1, Y2 and Y3 can be moved in the Y-axis.

Note: *This setup does not include an autorange procedure of the plungers and the Z-axis.*

Procedure

To run the **Autorange** function:

1. Select the **Autorange** check box on the **Contents** page and change to the **System Configuration** page.
2. In the **Devices to use** frame, select the axes for which you want to perform the **Autorange** procedure.
3. Click **Start**. No further entries are needed.

The values found are written to the Te-MO.

13.3.12 Determine Carrier Positions

Cross References

List of cross references to information provided in other sections:

Information	References
Mechanical Adjustment of Carriers	See section 13.3.5, 🗎 13-20

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this setup procedure is to determine the scale adjust factors and displacements of the X, Y and Z axes. During the setup, mechanical adjustments might be necessary for those carrier positions that appear gray-shaded in the following figure.

- All carrier positions on the middle (service) slide must be checked and adjusted mechanically if necessary.
- If APCs are installed in the front or rear positions of the slides Y1 and Y3, they must be checked and (if necessary) adjusted mechanically.

ATTENTION

Carrier positions that were taught at an earlier time must be retaught since the system of coordinates of the axes will be changed during this setup.

Tools

You need the following tools for this procedure:

- Te-MO 384: Teach pins screwed to bottom plate of pipetting head.
- Te-MO 96: Teach block with the appropriate teach pins in the **outer** positions.
- Reference block and reference rack (Reference for 96/384 head).

Checked Carrier Positions

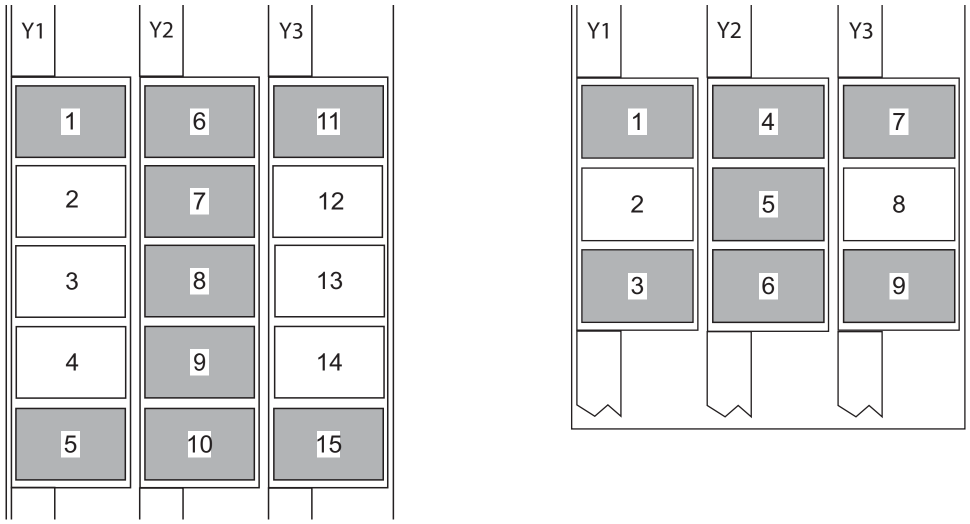


Fig. 13-28 *Carrier positions to be checked*

Sequence

The following table shows the sequence in which parameters are determined at the various rack positions.

Tab. 13-8 Test Sequence, Positions and Determined Values

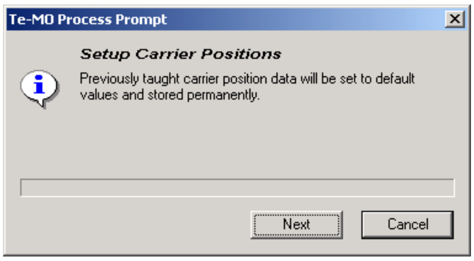
Seq.	Slide	Te-MO 3 x 5		Te-MO 3 x 3	
	Y1	5	X/Y-displacement, Z-range		
		4	---		
		3	---	3	X/Y-displacements, Z-range
		2	---	2	---
		1	Y-scale adjust factor	1	Y-scale adjust factor
	Y3	15	Y-displ.ment, X-scale adj. factor		
		14	---		
		13	---	9	Y-displacement, X-positions of carriers 7, 8 and 9
		12	---	8	---
		11	Y-scale adjust factor	7	Y-scale adjust factor
	Y2	10	Y-displacement, X & Z-position		
		6	Y-scale adjust factor, X & Z-position		
		7	X & Z-position	6	Y-displacement, X & Z-position
		8	X & Z-position	4	Y-scale adjust factor, X & Z-position
		9	X & Z-position	5	X & Z-position

Note: *The setup procedure for Te-MO 96 differs from that for Te-MO 384.*

Procedure for Te-MO 96

You will be guided through the test by a series of process prompts. Not all of them are shown here.

1 On the **Contents** page, select the **Setup Carrier Positions** check box and click **Start**. The Te-MO process prompt **Set Carrier Positions** appears.



Setup Carrier Positions

Previously taught carrier position data will be set to default values and stored permanently.

Fig. 13-29 *Set carrier positions process prompt*

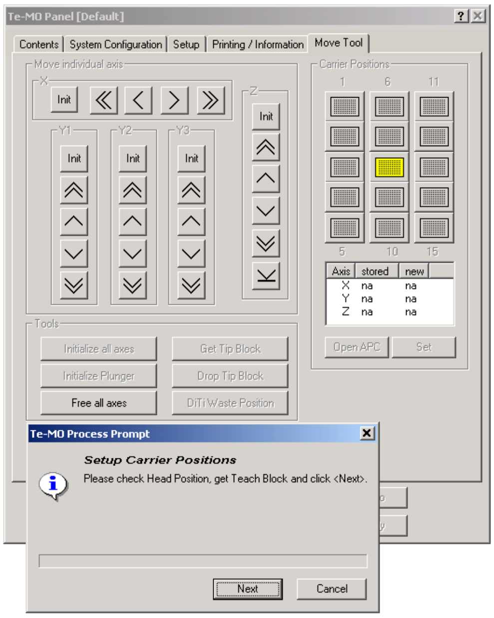
This process prompt notifies you that previously taught carrier positions will be overwritten by default values, which will be stored permanently. If necessary they have to be retaught later.

2 Click **Next** to continue or **Cancel** to abort the setup.

If you have chosen to continue the ***System Configuration*** *page appears, along with a process prompt that instructs you to check (and correct) the position of the tip block transfer rack on the service slide Y2.*

3 Follow the instructions. When done, click **Next** to continue.

A further process prompt, along with the ***Move Tool*** *appears:*



Setup Carrier Positions

Please check Head Position, get Teach Block and click <Next>.

Fig. 13-30 Set up carrier positions

4 Follow the instructions on the screen. Check the head position, then use the **Move Tool** to pick up the teach block. Continue with **Next**.

On a further prompt (that comes with the ***Setup*** *page) you are instructed to select the type of teach block.*

ATTENTION

Collisions and damage to pins or carriers possible if you select the wrong type.

- Ensure that the selected block corresponds to the installed block.
- Also ensure that the teach pins are in the outer positions of the teach block.

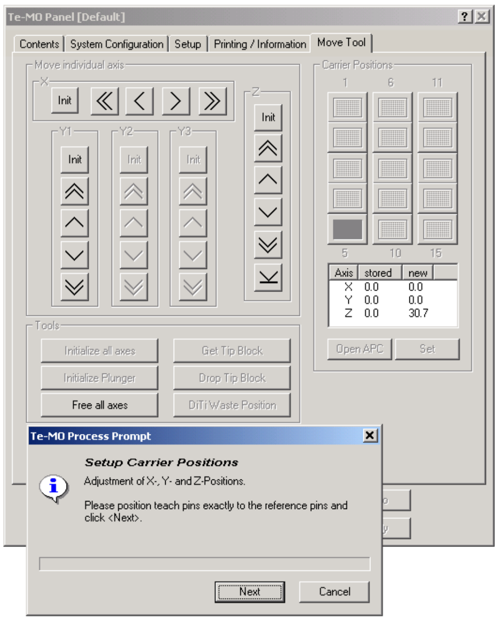
5 On the **Setup** page, select the teach block with the teach pins you are using:

- For normal precision: Teach block with normal (long) teach pins.
- For high precision: Teach block with high-precision teach pins.
- For DiTi/APC: Teach block with DiTi/APC teach pins.

6 Click on **Next** to continue when done.

*The **Te-MO Process Prompt** instructs you to place the reference rack on carrier position 5 (frontmost carrier of slide Y1).*

7 Click **Next** when done.



Axis	stored	new
X	0.0	0.0
Y	0.0	0.0
Z	0.0	30.7

Setup Carrier Positions

Adjustment of X-, Y- and Z-Positions.

Please position teach pins exactly to the reference pins and click <Next>.

Fig. 13-31 *Set up carrier positions*

8 Use the **Move Tool** to move the head and slide until the teach pins (A) are as close as possible above the protruding reference pins (C) on the reference rack (B). Also see following figure.

The teach pins (A) and the reference pins (C) on the reference rack (B) must be exactly aligned with one another as shown in the following figure.

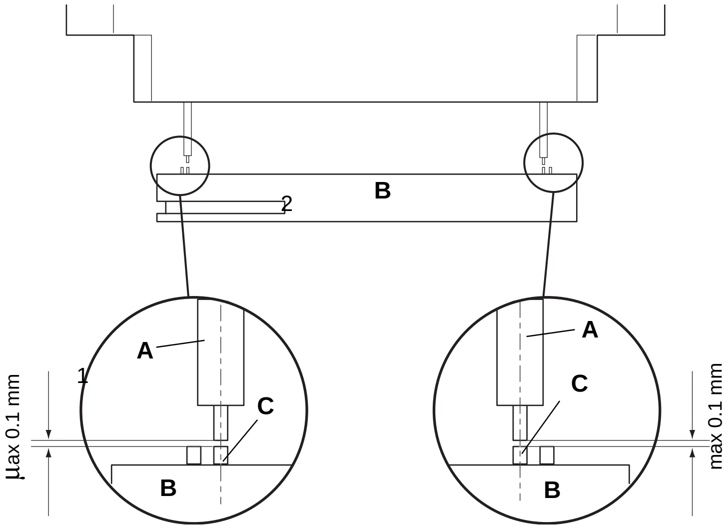


Fig. 13-32 *Aligning the Te-MO 96 pipetting head and reference rack*

A	Teach pin	***C***	Reference pin (on reference rack)
B	Reference rack		

9. If necessary, adjust the carrier mechanically until the four teach pins (A) are aligned precisely with the reference pins (C) on the reference rack in all axes. The procedure to be followed depends on the carrier type (→ Cross References).
10. After you have aligned the carrier click **Next** on the Te-MO process prompt to continue.
11. Follow the instructions on the screen to adjust the other carrier positions as described in the previous steps until you have adjusted all positions in the sequence described in the table earlier in this section.

    If you adjust the carriers on the service slide (Y2) you must use the reference block instead of the reference rack.
12. Confirm with **Done** when finished.

Procedure for Te-MO 384

The procedure for Te-MO 384 is similar to that for Te-MO 96. As with the procedure for Te-MO 96, you are guided through the procedure by a series of process prompts. Strictly follow the instructions on the screen:

1. On the **Contents** page, select the **Setup Carrier Positions** check box and click **Start**.

   A process prompt notifies you that previously taught carrier positions will be overwritten by default values, which will be stored permanently. If necessary they have to be retaught later.
2. Click **Next** to continue or **Cancel** to abort.
3. If you have chosen to continue, you are instructed to do the following:
   - to fix the teach pins to the pipetting head.
   - to check the type and length of the pins you are going to use. If necessary, use the **Setup** page to set the correct type and length of the teach pins.

ATTENTION

Collisions and damage to pins, tips or carriers possible if you select the wrong type.

- Ensure that the selected type corresponds to the installed types.

4. If your settings are in order, click **Next** to continue.

   *The **Te-MO Process** prompt instructs you to place the reference rack on carrier position 5 (frontmost carrier of slide Y1).*
5. Click **Next** when done.
6. Use the **Move Tool** to move the head and slide until the teach pins (A) are as close as possible above the protruding reference pins (C) on the reference rack (B).
7. If necessary, adjust the carrier mechanically until the four teach pins (A) are aligned precisely with the reference pins (C) in all axes. The procedure to be followed depends on the carrier type.
8. After you have aligned the carrier click **Next** on the Te-MO process prompt to continue.
9. Follow the instructions on the screen to adjust the other carrier positions as described in the previous steps until you have adjusted all positions in the sequence described in the table earlier in this section.

If you adjust the carriers on the service slide Y2 you must use the reference block instead of the reference rack.

10 Confirm with **Done** when finished.

13.3.13 Teach Carrier Positions

Cross References

List of cross references to information provided in other sections:

Information	References
Mechanical Adjustment of Carriers	See section 13.3.5, 🗎 13-20

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This setup procedure lets you “teach” each carrier position individually. You should use this procedure in the following cases:

- If the customer uses 1536-well microplates, it is advisable to “teach” the carrier positions in which these microplates will be used in practice.
- If it is possible that the mechanical adjustment of the carriers is not correct.

Tools

You need the following tools for this procedure:

- Te-MO 384: Teach pins screwed to bottom plate of pipetting head.
- Te-MO 96: Teach block with the appropriate teach pins in the **outer** positions.
- Reference block and reference rack (Reference for 96/384 head).

Procedure

You will be guided through the procedure by a number of process prompts. Not all of them are shown here. To adjust individual carrier positions:

1 Before starting the procedure do the following:

  – Te-MO 384: Screw the teach pins to the bottom plate of the head.
  – Te-MO 96: Use the **Move Tool** to pick up and attach the appropriate teach block.

2 On the **Contents** page, select the **Teach Carrier Positions** check box and click **Start**.

*On a further prompt (that comes with the **Setup** page) you are instructed to select the type of teach block.*

ATTENTION

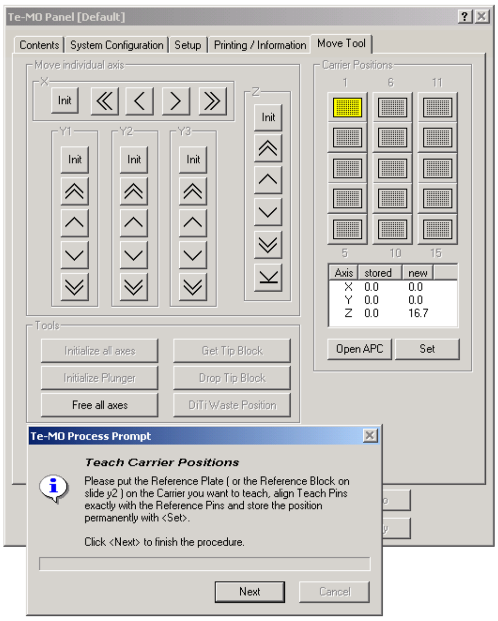
Collisions and damage to pins or carriers possible if you select the wrong type.

- Ensure that the selected block corresponds to the installed block.
- Also ensure that the teach pins are in the outer positions of the teach block.

3 On the **Setup** page, select the appropriate teach block or teach pins you are using:
   - – Te-MO 96:
     - For normal precision: Teach block with normal (long) teach pins.
     - For high precision: Teach block with high-precision teach pins.
     - For DiTi/APC: Teach block with DiTi/APC teach pins.
   - – Te-MO 384 pipetting head: Set the type and length of the teach pins.

4 Click on **Next** to continue when done.

5 Click **Next** to continue. The **Move Tool** and the **Te-MO Process Prompt** appear.



Axis	stored	new
X	0.0	0.0
Y	0.0	0.0
Z	0.0	16.7

Teach Carrier Positions

Please put the Reference Plate (or the Reference Block on slide y2) on the Carrier you want to teach, align Teach Pins exactly with the Reference Pins and store the position permanently with <Set>.

Click <Next> to finish the procedure.

Fig. 13-33 *Teach carrier positions*

6 Follow the instructions on the **Te-MO Process Prompt**:
   - – Place the required reference plate or block onto the carrier.
   - – Move the pipetting head over the carrier you want to teach.
   - – Use the command buttons on the **Move Tool** page to align the teach block/teach pins with the reference pins on the reference plate/block.
   - – If necessary adjust the carrier mechanically (→ Cross References).
   - – Click button **Set** when the adjustment of the respective carrier is done.
   - – Repeat the adjustment procedure for the other carriers as necessary.

If you adjust the carriers on the service slide Y2 you must use the reference block instead of the reference rack.

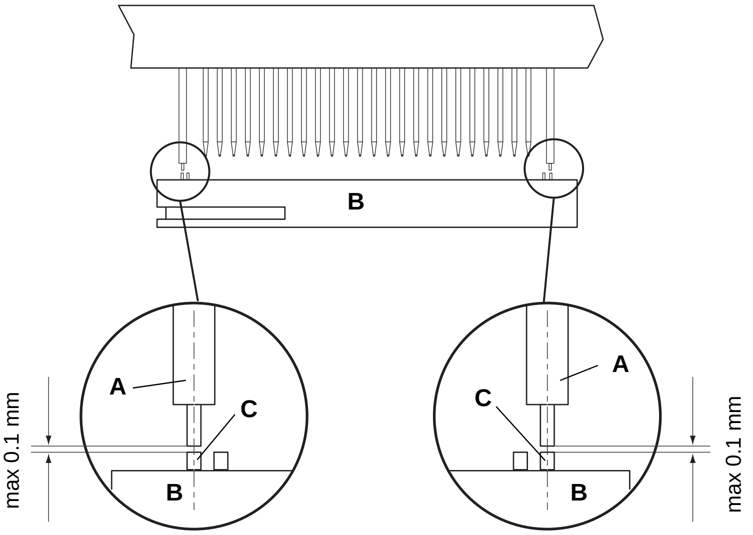


***Fig. 13-34** Aligning the Te-MO 384 pipetting head and reference rack*

A	Teach pin	***C***	Reference pin (on reference rack)
B	Reference rack		

7 Click **Next** on the **Te-MO Process Prompt** when done.

8 If a Te-MO 384 head is installed a further process prompt appears that instructs you to do the following:

- Remove the teach pins from the head.
- Set the correct pin length on the **Setup** page.

13.3.14 Autodetection of APC / Set up Exchange Position

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this setup procedure is to find the positions of APCs (active positioning carriers). APCs are detected by means of two built-in magnetic sensors on the base plate (one is arranged beneath slide Y1, the other beneath slide Y3).

Procedure

To carry out the APC autodetection:

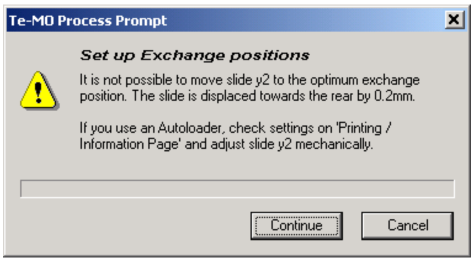
1 Select the **Autodetection of APC / Set up Exchange Position** check box on the **Contents** page, click **Start** and follow the instructions. No further entries are needed.

The Y1 and Y3 slides are now moved back and forth over their whole lengths so that possible APCs move past the magnetic sensors on the base plate. In *case an APC is detected an appropriate signal is received by the control electronics.*

The detected values are written to the Te-MO.

If a Warning Appears

It is possible that the following warning appears on the screen.



Set up Exchange positions

It is not possible to move slide y2 to the optimum exchange position. The slide is displaced towards the rear by 0.2mm.

If you use an Autoloader, check settings on 'Printing / Information Page' and adjust slide y2 mechanically.

Fig. 13-35 *Slide cannot be moved into exchange position*

Note: *This warning message is only relevant if you are setting up an Aquarius with connected AutoLoader.*

1. You can ignore the message (click **Continue**)…
   - if the device you are setting up is a Te-MO installed on a Freedom EVO or a Genesis instrument.
   - if you are setting up an Aquarius WITHOUT Autoloader.
2. If you are setting up an Aquarius WITH CONNECTED AutoLoader:
   - Due to mechanical displacement the indicated slide cannot be moved into the optimum slide position. The gripper module cannot properly pick up microplates or DiTi boxes from the exchange position or place them there.
   - Click **Cancel** and contact the nearest service organization for assistance and adequate measures.

13.3.15 Adjust Get and Drop Tip Block

Note: *This setup procedure applies only to Te-MO 96 pipetting heads.*

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this setup procedure is to ensure that tip blocks are picked up and released properly.

Procedure

To perform the adjustment:

1. On the **Contents** page, select **Adjust Get and Drop Tip Block** check box and change to the **System Configuration** page.
2. Use the **System Configuration** page to select the position of the tip block transfer rack.

3. Make sure a tip block transfer rack is available at the respective carrier position on slide Y2 and continue with **Start**.

   *The **Setup** page along with the **Te-MO Process Prompt** appears.*
4. Follow the instructions on the prompt and select the correct tip block type. Click **Next** to continue.

   *The **Move Tool** along with the **Te-MO Process Prompt** opens.*
5. Follow the instructions displayed on the **Process Prompt**. Use the following command buttons on the **Move Tool** page.
   - **Get Tip Block** to pick up the tip block.
   - **Drop Tip Block** to place it on the transfer rack.

   *If necessary, correct the parameters **Start Position, End Position, PWM** and **Current Limit** on the **Setup** page (see following table):*
   - Increase the **Start Position** if it is not above the tip block to pick up.
   - Decrease the **End Position** if the tip block is not picked up properly.
   - Increase the **Start Position** if the tip block is put back in a position that is too low.
   - Alter the pulse width (parameter **PWM**) as necessary.
6. Repeat the previous step until the tip block is picked up from and put back on the transfer rack properly.
7. Confirm with **Next** on the **Te-MO Process Prompt** when finished.

Tab. 13-9 *Parameters of Get/Drop Tip Block Setup*

Parameter	Setting	Description
Start Position [mm]	30.0	Lets you set the start position in [mm] from which the head starts picking up or dropping the tip block.
End Position [mm]	20.0	Lets you set the end position in [mm] at which the head stops picking up the tip block.
PWM	26	(PWM = pulse width modulation). Pulse width of the motor current that determines the force with which the pipetting head presses into the tip block. PWM is a value between 0 and 255. PWM = 60 → current = 60 /255 of maximum possible current.
Current Limit [A]	0.9	Lets you set the upper current limit. If the current limit is reached, the head stops pressing into the tip block.

13.3.16 Adjust Get and Drop DiTi

Note: *This setup procedure applies only to Te-MO 96 pipetting heads.*

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this setup procedure is to ensure that DiTis are picked up and released properly.

Procedure

The procedure is similar to that for tip blocks. To perform the adjustment:

1. On the **Contents** page, select the **Adjust Get and Drop DiTi** check box and change to the **System Configuration** page.
2. Use the **System Configuration** page to select the position of the DiTi transfer rack.
3. Make sure a DiTi transfer rack is available in the respective carrier position on slide Y2 and continue with **Start**.

   *The **Setup** page along with the **Te-MO Process Prompt** appears.*
4. Follow the instructions on the prompt and select the correct DiTi type. Click **Next** to continue.

   *The **Move Tool** along with the **Te-MO Process Prompt** opens.*
5. Follow the instructions displayed on the **Process Prompt**. Use the following command buttons on the **Move Tool** page.
   - **Get DiTi** to pick up the DiTis.
   - **Drop DiTi** to replace them on the DiTi box on the DiTi transfer rack.

   *If necessary, correct the parameters **Start Position, End Position** and **PWM** on the **Setup** page (see following table):*
   - Increase the **Start Position** if it is not above the DiTis to pick up.
   - Decrease the **End Position** if the DiTis are not picked up properly.
   - Increase the **Start Position** if the DiTis are put back in a position that is too low.
   - Alter the pulse width (parameter **PWM**) as necessary.
6. Repeat the previous step until the DiTis are picked up from and put back into the DiTi box properly.
7. Confirm with **Next** on the **Te-MO Process Prompt** when finished.

Tab. 13-10 *Parameters of Get/Drop DiTi Setup*

Parameter	Setting	Description
Start Position [mm]	30.0	Lets you set the start position in [mm] from which the head starts picking up or dropping the DiTis.
End Position [mm]	20.0	Lets you set the end position in [mm] in which the head stops picking up the DiTis.
PWM	38.0	(PWM = pulse width modulation). Pulse width of the motor current that determines the force with which the pipetting head presses into the DiTis. PWM is a value between 0 and 255. PWM = 38 → current = 38 /255 of maximum possible current.
Current Limit [A]	1.6	Cannot be altered.

13.3.17 Mechanical Adjustment of Te-Stack Positions

Cross References

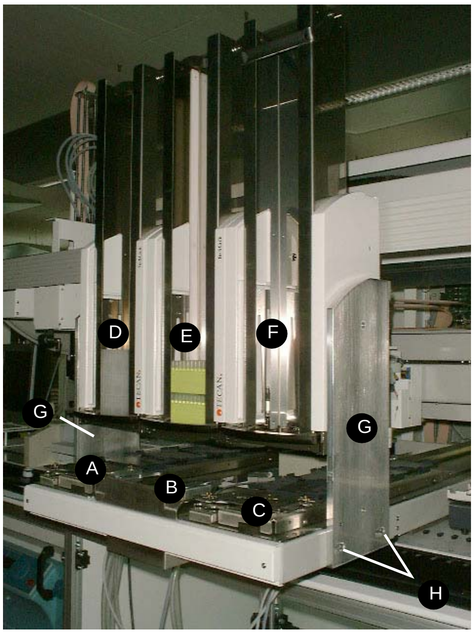
List of cross references to information provided in other sections:

Information	References
Te-Stack panel	See section 12.8, 🗎 12-116

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose



A	*Slide Y1*
B	*Slide Y2 (service slide)*
C	*Slide Y3*
D	*Te-Stack above slide Y1*
E	*Te-Stack above slide Y2*
F	*Te-Stack above slide Y3*
G	*Left/right support plates for Te-Stack*
H	*Fixing screws*

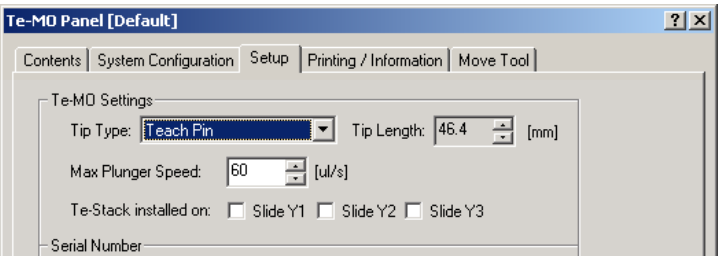
The adjustment described in this section is necessary if a Te-MO is combined with one or more Te-Stacks.

Fig. 13-36 *Te-MO and Te-Stack combined*

Procedure

To align the Te-MO with a Te-Stack:

1 On the **Contents** page, select the **Mechanical Adjustments of Te-Stack Positions** check box and change to the **Setup** page.



Te-MO Settings

Tip Type: Teach Pin

Tip Length: 46.4 [mm]

Max Plunger Speed: 60 [ul/s]

Te-Stack installed on: ☐ Slide Y1 ☐ Slide Y2 ☐ Slide Y3

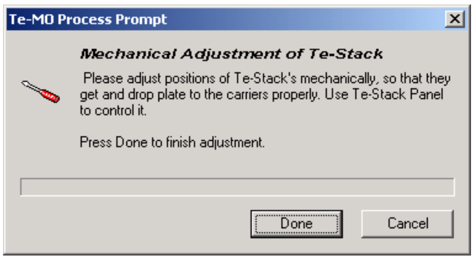
Serial Number

Fig. 13-37 *Te-MO Settings on Setup page*

2 Make sure the **Te-Stack installed on** check boxes are selected correctly. A check box must be selected where a Te-Stack is installed and must be cleared where no Te-Stack is available.

3 Click **Start**. All slides move into the Te-Stack positions.

*The process prompt **Mechanical Adjustment of Te-Stack** appears.*



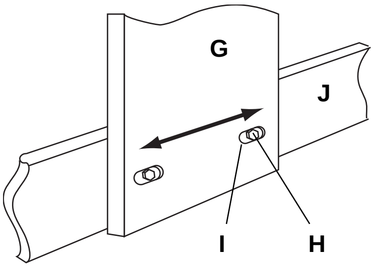
Te-MO Process Prompt

Mechanical Adjustment of Te-Stack

Please adjust positions of Te-Stack's mechanically, so that they get and drop plate to the carriers properly. Use Te-Stack Panel to control it.

Press Done to finish adjustment.

***Fig. 13-38** Te-MO process prompt for Te-Stack adjustment*



G	*Te-Stack support plate*
H	*Fixing screws (2 on each side)*
I	*Slotted hole*
J	*Te-MO frame*

***Fig. 13-39** Mechanical adjustment of Te-Stack position*

***Note:** The support plate (G) has two slotted holes (I) and two protruding bolts, which rest on the upper surface of the Te-MO frame (J). This makes it possible to move the Te-Stack horizontally without changing its vertical position.*

4 Loosen the fixing screws (H) with which the Te-Stack is fastened to the Te-MO frame. There are two fixing screw for each of the support plates (H).

5 Move the Te-Stack horizontally into the correct position.

6 Start the **Te-Stack** panel (→ Cross References) and test whether:

- Objects are picked up properly from the Te-MO slides
- Objects are put back correctly onto the Te-Stack slides.

7 Tighten the fixing screws (H) when the position is adjusted correctly.

8 Click **Done** on the **Te-MO Process Prompt** when finished.

13.3.18 Carrier Positions Plausibility Test

Cross References

List of cross references to information provided in other sections:

Information	References
Set up Carrier Positions	See section 13.3.12, 🗎 13-28
Teach Carrier Positions	See section 13.3.13, 🗎 13-34

Purpose

This test procedure checks whether the stored positions of the carriers are plausible, i.e. whether they are within the prescribed tolerance limits.

Note: *No parts are moved during this test.*

Procedure

To perform the test:

1 On the **Contents** page select the **Carrier Positions Plausibility Test** check box and click **Start**.

During the test, the previously taught positions (x, y and z coordinates) of all carriers are compared with their nominal positions.

- The **actual** positions were determined in the in **Setup Carrier Positions** and **Teach Carrier Positions** (→ Cross References).
- The **nominal** positions were determined (and prescribed) during the mechanical design.

Depending on the differences, carrier positions are classified as follows:

- **Setup done:** Actual positions close to nominal positions, no significant differences.
- **Taught:** (Some) actual positions deviate somewhat from their nominal values (they were obviously taught to make up for differences from nominal values).
- **User-defined:** Actual positions differ significantly from the respective nominal values. Possibility of mechanical problems.

Test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

This test has always the status **Passed.** Despite of that, the test results can be judged as satisfactory if all of the detailed results are as expected.

If Results Are Not as Expected

Depending on the examination of the results, try the following:

- If some of the detailed results are not as expected repeat the **Teach Carrier Positions** procedure (→ Cross References).
- If all of the detailed results are not as expected repeat the **Setup Carrier Positions** and, if necessary, the **Teach Carrier Positions** procedures (→ Cross References).

13.3.19 Range Move Test

Cross References

List of cross references to information provided in other sections:

Information	References
Autorange	See section 13.3.11, 🗎 13-28

Purpose

During this test, the movable parts (slides, head, plungers) as selected on the **System Configuration** page are moved several times into their extreme positions. Then, they are initialized. The purpose of this test is:

- To ensure that the ranges are not too large.
- To ensure that the parts are moved at the maximum speed over the whole range.
- To detect possible losses of movement steps.

ATTENTION

If you intend to move the plungers during this test, remove the tip block from the Te-MO 96 pipetting head before you start the test procedure. Otherwise the tip block will be dropped during the test and could be damaged.

Procedure

To perform the test:

1. On the **Contents** page select the **Range Move Test** check box and change to the **System Configuration** page.
2. In the **Device to use** frame, select the axes in which you want to move parts.
3. In the frame **Rack Configuration of Service Slide** set the **Rack Position** of the wash block.
4. Click **Start**.

Test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the following conditions are met:

- No collisions
- Number of lost steps within limits.

If the Test Fails

Repeat the **Autorange** procedure (→ Cross References).

13.3.20 Random Move Test

Cross References

List of cross references to information provided in other sections:

Information	References
Autorange	See section 13.3.11, 🗎 13-28
Autodetection of APC / Set up Exchange Positions	See section 13.3.14, 🗎 13-36

Purpose

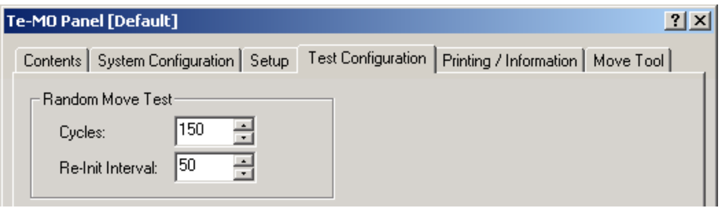
The **Random Move Test** procedure finds out if the mechanics of the pipetting head, the slides and the APCs work properly. All selected devices (except the plungers) are moved at random in their axes for a defined number of cycles. Then, the assemblies are reinitialized and the number of lost steps is evaluated for each axis.

Procedure

To perform the **Random Move Test**:

1. On the **Contents** page, select the **Random Move Test** check box and change to the **System Configuration** page.
2. In the **Device to use** frame, select the axes in which you want to move parts.

   The plungers are not moved in this test, regardless of whether the corresponding check box is selected or not.
3. Change to the **Test Configuration** page.



Random Move Test

Cycles: 150

Re-Init Interval: 50

Fig. 13-40 Test Configuration Page

4. Use the spin boxes in the frame **Random Move Test** to set the values for **Cycles** and **Re-Init Interval**:
   - **Cycles:** Total number of movements in each axis.
   - **Re-Init Interval:** Number of movements after which the respective device is reinitialized.
5. Click **Start**.

The results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the following conditions are met:

- No collisions
- Lost steps within limits
- APC works without errors

If the Test Fails

Try the following:

- Repeat **Autotange** procedure (→ Cross References).
- In case of APC-errors: Perform the procedures **Autorange** and **Autodetection of APC / Set up Exchange Positions** (→ Cross References)**.**

13.3.21 Random Move Test for Plunger

Cross References

List of cross references to information provided in other sections:

Information	References
Set Default in EEPROM	See section 13.3.9, 🗎 13-26

Purpose

This test checks the proper function of the plungers. The test is similar to the **Random Move Test**. The plungers are moved up and down at random for a defined number of cycles, then they are reinitialized.

ATTENTION

Note that the 384-channel pipetting head must not dry out. It must be flushed after 200 movements of the plungers, otherwise the sealing rings may be damaged.

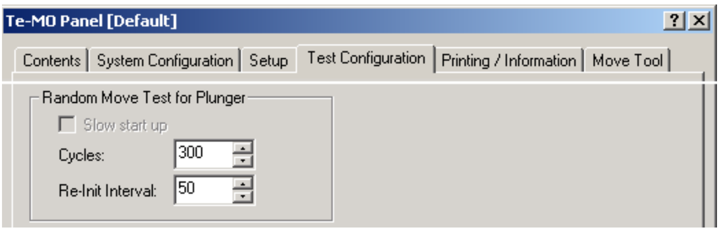
Before you begin, make sure there is enough liquid in the system liquid container and that the waste container is empty.

Procedure

To carry out the test:

1. On the **Contents** page, select the check box **Random Move Test for Plungers** and change to the **System Configuration** page.
2. In the frame **Rack Configuration of Service Slide** set the **Rack Position** of the wash block on the service slide Y2.

   *For this test, it is not necessary to check the **Plunger** check box in the frame **Device to use**.*
3. Change to the **Test Configuration** page.



Random Move Test for Plunger

☐ Slow start up

Cycles: 300

Re-Init Interval: 50

***Fig. 13-41** Test Configuration page*

4. Use the spin boxes in the frame **Random Move Test for Plunger** to set the values for **Cycles** and **Re-Init Interval**:
   - **Cycles:** Total number of movements.
   - **Re-Init Interval:** Number of movements after which the plungers are reinitialized. 384-channel heads are flushed at the end of the interval to prevent drying out and damage to the sealing rings.

   *The check box **Slow start-up** is intended for the production department only and cannot be selected by operators and FSEs.*
5. Click **Start**.

   *The **Move Tool** along with the **Te-MO Process Prompt** appears.*

6 Follow the instructions on the screen:
  - Te-MO 96: Remove DiTis, a tip or teach block that may be attached to the pipetting head. Then, position the head above the wash block.
  - Te-MO 384: Remove any teach pins from the pipetting head. Then position the head above the wash block.

7 Click **Next** to start the test.

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if no errors are detected.

If the Test Fails

Perform the procedure **Set Defaults in EEPROM** (→ Cross References).

13.3.22 APC Functional Test

Cross References

List of cross references to information provided in other sections:

Information	References
Mechanical adjustment of APC	See section 13.3.5, 🗎 13-20
Autorange	See section 13.3.11, 🗎 13-28
Autodetection of APC / Set up Exchange Positions	See section 13.3.14, 🗎 13-36

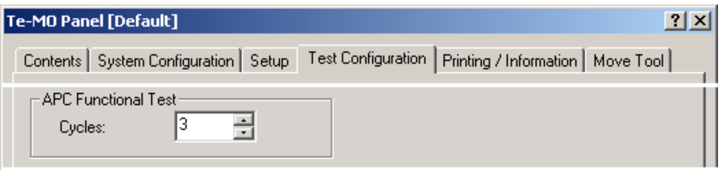
Purpose

The purpose of this test is to find out whether APCs grip/release objects like microplates properly.

Procedure

To carry out the test:

1 On the **Contents** page, select the **APC Functional Test** and change to the **Test Configuration** page.



Cycles: 3

Fig. 13-42 Test Configuration page

2 Use the **Cycles** spin box in the frame **APC Functional Test** to set the number of test cycles.

3 Click **Start**.

4 Follow the instructions that appear on the screen. You will be prompted to place a microplate on a specific APC, to check manually whether it is gripped and released properly. Confirm whether the microplate is gripped/released correctly when prompted to do so. You will have to repeat the test for each individual APC for the defined number of cycles.

5 Repeat the test procedure until all APCs are checked.

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if…

- each APC can be loaded and unloaded properly with microplates or the reference plate. The APCs must open enough when they are loaded or unloaded.
- no APC-errors are detected.

If the Test Fails

Try the following:

- If APC-errors are detected repeat the procedure **Autodetection of APC / Set up Exchange Positions** (→ Cross References).
- If one or more APCs do not open enough:
    - Perform the **Autorange** procedure (→ Cross References).
    - Adjust the APCs mechanically (→ Cross References).
    - Perform the procedure **Autodetection of APC / Set up Exchange Positions** (→ Cross References).

13.3.23 Get and Drop Tip Block / DiTi Functional Test

Cross References

List of cross references to information provided in other sections:

Information	References
Adjust Get and Drop tip block	See section 13.3.15, 🗎 13-37
Adjust Get and Drop DiTi	See section 13.3.16, 🗎 13-38

Note: *This test procedure applies only to Te-MO 96 pipetting heads.*

Purpose

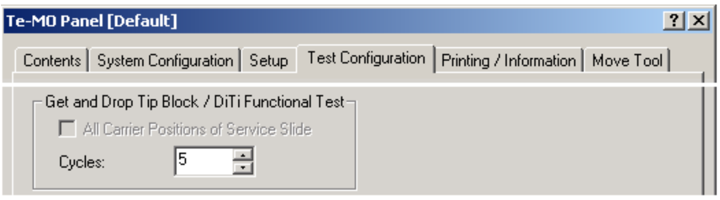
This test lets you check whether tip blocks or DiTis are picked up and released properly.

Procedure

To perform the test:

1 On the **Contents** page, select the **Get and Drop Tip Block / DiTi Functional Test** check box.

2 On the **Test Configuration** page, set the number of test cycles.



Get and Drop Tip Block / DiTi Functional Test

☐ All Carrier Positions of Service Slide

Cycles: 5

Fig. 13-43 *Cycles on Test Configuration page*

3 If necessary, change to the **System Configuration** page and set the position of the transfer rack for the tip block or for the DiTi box on the service slide Y2.

4 Click **Start** to begin.

*The **Setup** page along with a process prompt appears.*

5 Check whether the correct tip block or DiTi type is selected. Select the correct type if necessary.

6 Continue with **Next**.

The tip block or the DiTis are picked up and put back according to the defined number of cycles.

7 Visually check whether the tip block or the DiTis are picked up/released properly in each cycle

8 Confirm with **Next** on the **Te-MO Process Prompt** when finished.

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the tip block or the DiTis are picked up and released properly.

If the Test Fails

If the tip block or the DiTis are not picked up or released properly repeat the setup procedure according to **Adjust Get and Drop Tip Block** or **Adjust Get and Drop DiTi** (→ Cross References).

13.3.24 Pulse Generator Functional Test

Note: *This test can no longer be activated.*

13.3.25 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

13.4 Te-MO Wash Unit

The **Te-MO Wash Unit** panel serves for controlling the wash cycles of the pipetting tips. Note that there are two types of wash units:

- 96 wash unit
- 384 wash unit

13.4.1 96 Wash System

Note: *The 96 wash unit is used for the Te-MO-96.*

Overview

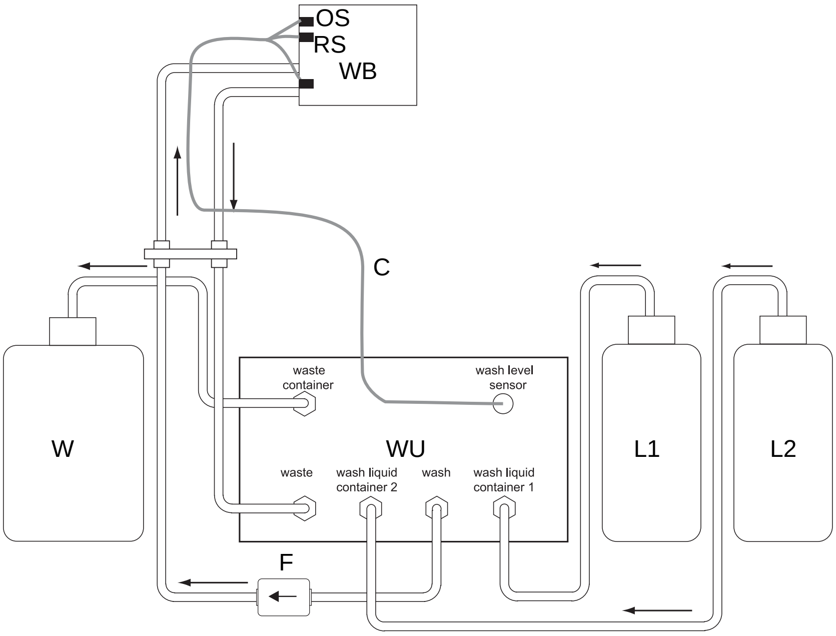


Fig. 13-44 *Te-MO 96 wash system*

WB	*Wash block 96*	***L1***	*Wash liquid container 1*
OS	*Overflow sensor*	***L2***	*Wash liquid container 2*
RS	*Ready sensor*	***W***	*Waste container*
WU	*Wash unit*	***C***	*Connection cable for level sensors*
→	*Liquid flow direction*	***F***	*Filter*

The heart of the system is the wash unit (WU) that is equipped with the valves and pumps that pump wash liquid from the wash bottles (L1) or (L2) through the wash liquid tubes into the wash block (WB), arranged on the service slide of the Te-MO.

The wash block (WB) is equipped with two level sensors. The “ready” sensor (RS) notifies the wash unit (WU) via the cable (C) when there is enough liquid in the block to wash the tips. The overflow sensor (OS) becomes active when there is too much liquid in the wash block. In such a case, the wash unit immediately stops the supply of further wash liquid. Liquid that flows from the wash block (WB) back to the wash unit (WU) is pumped into the waste container (W).

13.4.2 384 Wash System

Note: *The 384 wash unit is not an option, i.e. it is always used together with a 384-channel pipetting head.*

Overview

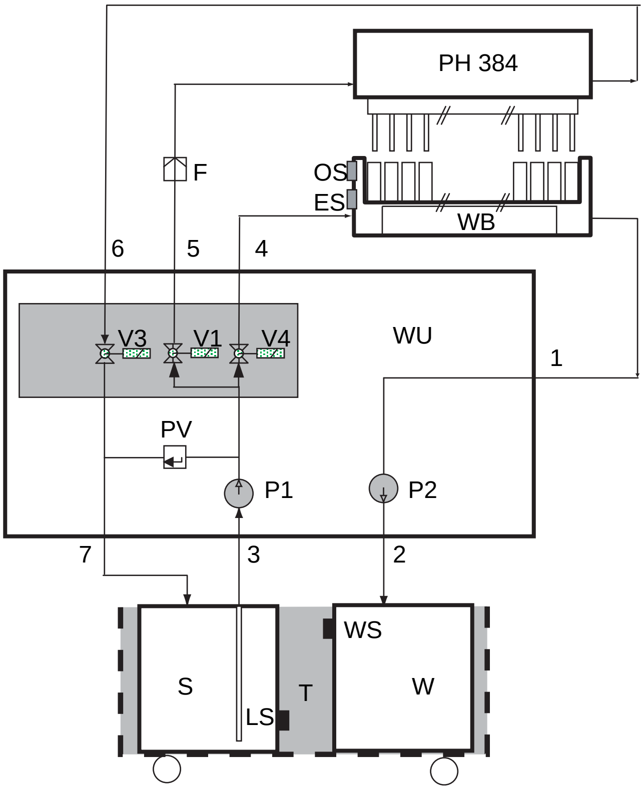


Fig. 13-45 *Te-MO 384 wash system (simplified)*

PH	Te-MO 384 pipetting head	***5***	Connector for left flush tube
WU	Te-MO 384 Wash unit	***6***	Connector for right flush tube
P1	Wash pump	***7***	Connector for system liquid backflow
P2	Waste pump	***F***	Filter
V1	Flush valve	***T***	Trolley for liquid containers
V3	Backflow valve	***S***	System liquid container
V4	Wash block valve	***W***	Waste container
PV	Pressure relief valve	***LS***	System liquid level sensor (on trolley)
1	Connector for waste tube	***WS***	Waste level sensor (on trolley
2	Connector for waste container	***WB***	Wash block 384
3	Connector for system liquid supply	***OS***	Overflow sensor
4	Connector for wash liquid	***ES***	Empty sensor

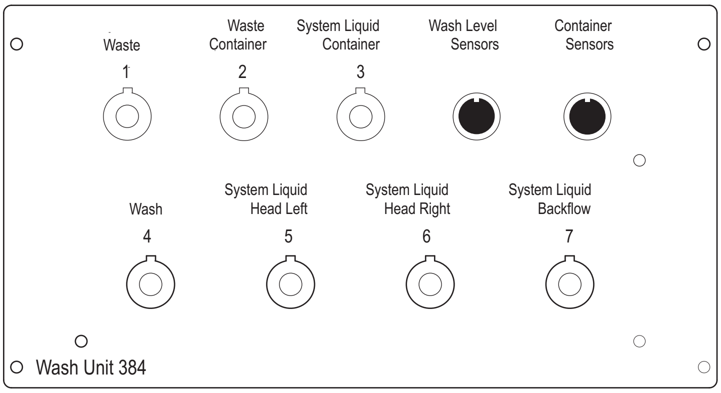


Fig. 13-46 *Wash unit 384 front panel*

The simplified block diagram (see earlier in this section) shows that the wash unit for the Te-MO 384-channel pipetting head controls two liquid circuits:

- **Liquid circuit for wash block.** The wash pump (P1) pumps system liquid from the system liquid container (S) through the valve (V4) into the wash block (WB). The overflow sensor (OS) notifies the system when the wash block is full. The waste pump (P2) is needed to discharge liquid that is no longer used into the waste container (W). From the status of the empty sensor (ES) the system knows when the wash unit contains no more liquid to discharge.
- **Liquid circuit for pipetting head.** A second liquid circuit serves for flushing the 384-pipetting head (PH). System liquid is directed though valve (V1) into the wash chamber of the pipetting head. From there, it can flow back in two ways:
  - If the plungers are in their top positions, liquid can flow through the tips into the wash block from where it can be pumped into the waste container (W). Valve (V3) is closed in this case.
  - If the plungers are in their bottom positions, no liquid can flow through the tips. However, it can flow back into the system liquid container through valve (V3), which must be open in this case.

Liquid Level Sensors

The liquid levels in the system liquid container (S) and waste container (W) are monitored by the liquid levels sensor (LS) and the waste level sensor (WS). Note that these sensors are mounted to the trolley (T) on which the liquid containers are located.

13.4.3 Wash Blocks

Note that different types of wash blocks must be used for the Te-MO 96 and the Te-MO 384 pipetting heads. The differences are due to the way in which the tips are washed:

- Te-MO 96: Tips are washed through aspiration and dispensation and external rinsing.
- Te-MO 384: Tips are washed by liquid that flows from the heads wash chamber through the tips and external rinsing.

13.4.4 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Files

The Wash unit can create the following files:

Results	**Directory**	<data_path>\Results
	File name	TeMOWashUnit_<serial_number>_<date>_<time>.any

Required Tools

To carry out the tests you need the following tools:

- One measuring cup 1000 [ml]
- Three service tubes. A service tube is equipped with a coupling at one end that can be plugged into the respective connectors on the front panel of the wash unit.

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

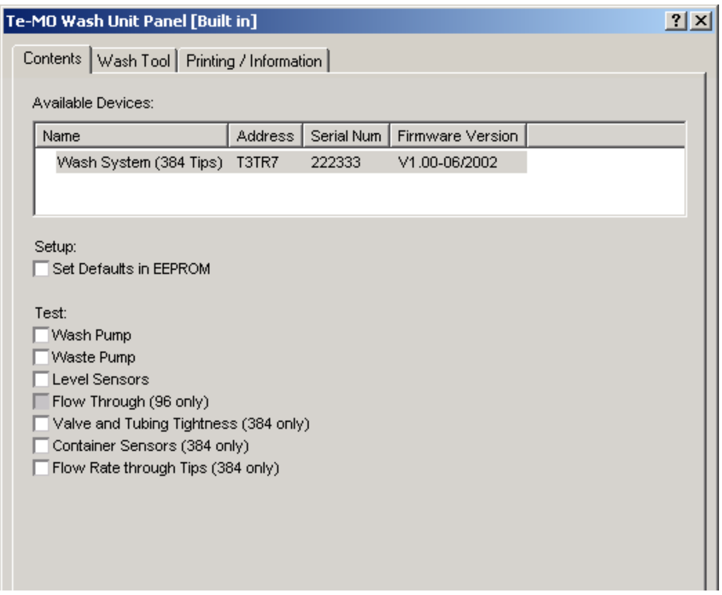
***Tab. 13-11** Wash Unit Functions and User Permissions*

Function	Type	User	FSE
Set Defaults in EEPROM	Setup		X
Wash Pump	Test	X	X
Waste Pump	Test	X	X
Level Sensor	Test	X	X
Valve and Tubing Tightness (384 only)	Test	X	X
Container Sensors (384 only)	Test	X	X
Flow Rate Through Tips (384 only)	Test	X	X
Wash Tool	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Starting the Panel

To setup or test the Wash Unit

1 Start the panel with **Options > Multichannel > Wash Unit**. The **Wash Unit** panel with activated **Contents** page appears. After starting the Te-MO function, no setup or test check box is selected and not all tabs are visible.



Name	Address	Serial Num	Firmware Version
Wash System (384 Tips)	T3TR7	222333	V1.00-06/2002

Setup:
☐ Set Defaults in EEPROM

Test:
☐ Wash Pump
☐ Waste Pump
☐ Level Sensors
☐ Flow Through (96 only)
☐ Valve and Tubing Tightness (384 only)
☐ Container Sensors (384 only)
☐ Flow Rate through Tips (384 only)

Fig. 13-47 *Wash Unit Panel, Contents page*

***Note: The Flow Through** test is for the production department and cannot be invoked by field service engineers. It is not described in this manual.*

Pages

The **Wash Unit** panel is subdivided into the following pages:

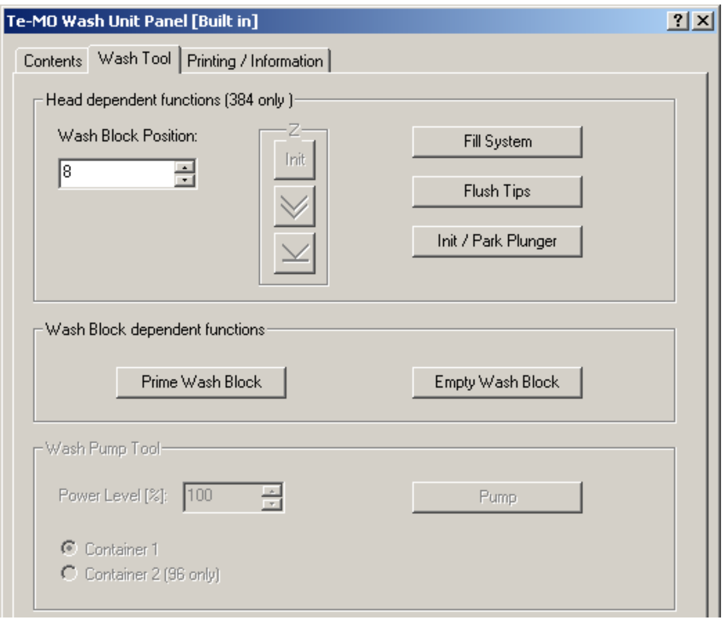
Tab. 13-12 *Pages of Te-MagS panel*

Pages	Function
Contents	General overview, procedure selection
Wash Tools	Utility functions
Test Configuration	Lets you set the test parameters
Printing / Information	Lets you configure a printed report

13.4.5 Wash Tool Page

Function

The **Wash Tool** page contains the controls for priming and testing the wash system.



Wash Block Position: 8

Power Level [%]: 100

● Container 1
○ Container 2 (96 only)

Fig. 13-48 Wash Tool page

Controls

The **Wash Tool** page contains the following controls:

Head dependent functions (384 only)	Controls for operations on 384 head.
Wash Block Position	Spin box to define the carrier position of the 384-wash block on slide Y2 (middle slide)
Init	Moves 384 tips to topmost position.
⇊	Moves tips 10 steps (1 mm) downwards.
⤓	Moves tips 50 steps (5 mm) downwards.
Fill System	Fills the wash chamber of the 384 head.
Flush Tips	Pumps liquid through wash chamber and tips
Init / Park Plungers	Moves plungers to bottom positions (closes tips; liquid in wash chamber cannot flow through the tips).
Wash Block dependent functions	Buttons for priming and emptying the wash block.
Prime Wash Block	Prepares the wash block for washing the tips.

Empty Wash Block	Starts the waste pump to empty the wash block: - Te-MO 96: pump stops after 10 [s] - Te-MO 384: pump stops when after 10 [s] or when empty sensor signals “wash block empty”.
Wash Pump Tool	Controls used for **Waste Pump Test**
Power Level	Spin box to set the pump power from 0 to 100%. Default value: 100%. Can be used to vary the pump speed.
Pump	To switch the pump on/off. Pump runs as long as the button is kept pressed and stops when it is released.
Container **Container 2 (96 only)**	Option buttons that let you select system liquid container. Container 2 can only be selected for Te-MO 96.

Safety Precautions

Be careful when using the **Move Tool** page. Keep in mind that the pipetting head does not detect whether there are any obstacles with which it might collide. Also be aware that the pipetting head moves downwards with considerable force.

WARNING

Be careful when performing adjustments and tests during which the pipetting head moves downwards. To avoid injuries do not reach into the zone under the pipetting head.

ATTENTION

When using the **Wash Tool** page be careful about the following:

- Avoid collisions. Plungers and tip blocks may be damaged when they collide with parts placed on the slides.
- To prevent liquid splashing on the worktable always move a trough or wash station below the pipetting head before performing setup and test procedures in which previously aspirated liquid may be dispensed.

13.4.6 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Purpose

This setup procedure sets the internal configuration data of the wash unit to the predefined defaults, which are hard-coded in the software. This has to be done once, if a new software version has been installed.

Procedure

To set the default values:

1 On the **Contents** page, select the **Set Defaults in EEPROM** check box. No further parameters need to be defined.

2 Download the default values to the wash unit.

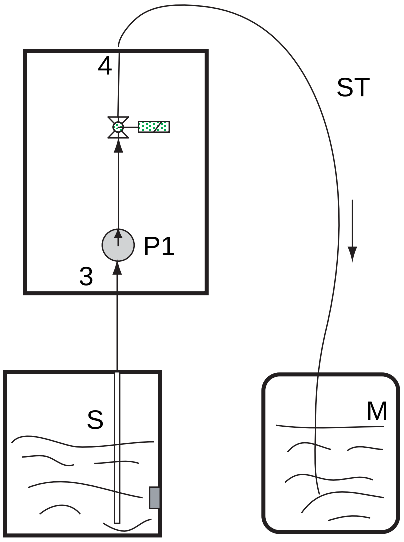
13.4.7 Test Wash Pump

Cross References

List of cross references to information provided in other sections:

Information	References
Te-MO 96 Wash System	See section 13.4.1, 🗎 13-49
Te-MO 384 Wash System	See section 13.4.2, 🗎 13-50

Principle



M	Measuring cup
ST	Service tube
P1	Wash pump
S	System liquid container
3	Connector “System liquid container
4	Connector “Wash”

Fig. 13-49 *Principle of wash pump test*

This test is used to check the performance of the wash pump (P1). You need a service tube and a measuring cup for this test. During the test, liquid will be pumped from the system liquid container (S) into the measuring cup (M) for a preset time. The test is passed if the volume in the measuring cup is between the limits according to the following table.

Limit Values

The following table shows the value ranges for Te-MO 96 and Te-MO 384.

Note: *The liquid volumes shown apply to the default pump duration. If the pump duration is changed on the **Test Configuration** page, the resulting volume changes accordingly.*

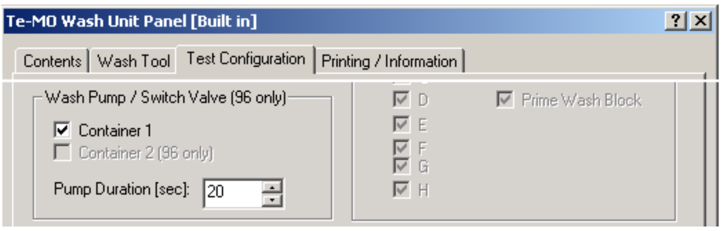
__Tab. 13-13__ Values for Wash Pump Test

Parameter	Te-MO 96	Te-MO 384
Flow rate range [ml/s]	24 to 28 [ml/s]	22.5 to 27.5 [ml/s]
Default pump duration	10 [sec]	20 [sec]
Expected volume after default pump duration	240 to 280 [ml]	450 to 550 [ml]

Procedure

To carry out the test:

1 On the **Contents** page, select the **Wash Pump** check box and change to the **Test Configuration** page.



☑ Container 1
☐ Container 2 (96 only)
Pump Duration [sec]: 20
☑ D
☑ E
☑ F
☑ G
☑ H
☑ Prime Wash Block

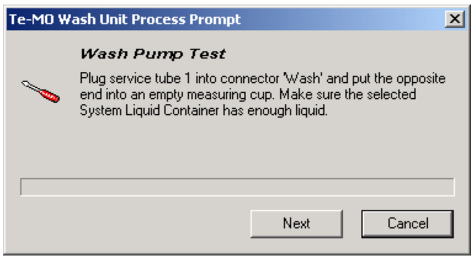
__Fig. 13-50__ Wash Unit, Test Configuration page

2 In the **Wash Pump/Switch Valve** frame on the **Test Configuration** page, set the required value for the **Pump Duration**.

3 In case a Te-96 pipetting head is installed, define the system liquid container from which you want to pump liquid into the measuring cup.

***Note:** Make sure there is enough system liquid in the selected container.*

4 Click **Start**. The **Wash Unit Process Prompt** appears.



Wash Pump Test

Plug service tube 1 into connector 'Wash' and put the opposite end into an empty measuring cup. Make sure the selected System Liquid Container has enough liquid.

__Fig. 13-51__ Wash pump test process prompt

5 Exactly follow the instructions provided on the **Process Prompt**. In this step, for instance, you are instructed to do the following:

- Plug the service tube into the connector **Wash** on the front panel of the wash unit and put the opposite end of the tube into the measuring cup.
- Make sure there is enough liquid in the selected system liquid container.

6 After you have done this, click **Next** to continue.

During the pre-set time, the wash pump pumps liquid from the selected system liquid container into the measuring cup.

*The **Process Prompt** continues to inform you on the current status and tells you what to do next. Carefully read and follow the instructions given.*

7. Check the quantity of liquid in the measuring cup when you are instructed to do so.
8. Continue with **OK** if the liquid quantity is between the limits indicated on the process prompt.

   *At the end of the test you will be prompted to reconnect the original tube to the **Wash** connector.*

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the pumped liquid quantity is between the minimum and maximum limits indicated on the process prompt.

If the Test Fails

Check if all tubes are connected correctly as indicated during the test. See drawings in descriptions of the corresponding wash system (→ Cross References).

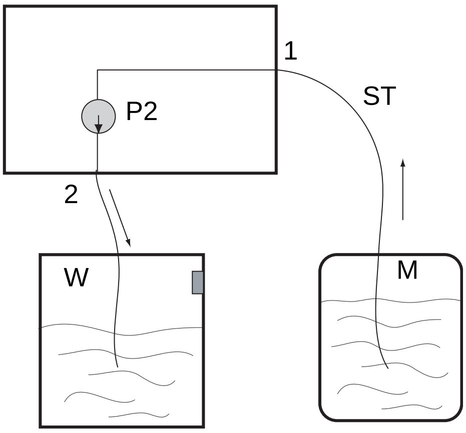
13.4.8 Test Waste Pump

Cross References

List of cross references to information provided in other sections:

Information	References
Te-MO 96 Wash System	See section 13.4.1, 🗎 13-49
Te-MO 384 Wash System	See section 13.4.2, 🗎 13-50

Principle



M	Measuring cup
ST	Service tube
P2	Waste pump
W	Waste container
1	“Waste” connector
2	“Waste container” connector

Fig. 13-52 *Principle of waste pump test*

This test is used to check the performance of the waste pump. You need a service tube and a measuring cup for this test. During the test, liquid will be pumped from the measuring cup (M) into the waste container (W) for a pre-set time. The test is passed when the remaining liquid in the cup does not exceed a given value.

Limit Values

The following table shows the value ranges for Te-MO 96 and Te-MO 384.

***Note:** The values for the **Max. remaining volume** apply to the default pump duration. If the pump duration is changed on the **Test Configuration** page, the resulting volumes change accordingly.*

***Tab. 13-14** Values for Waste Pump Test*

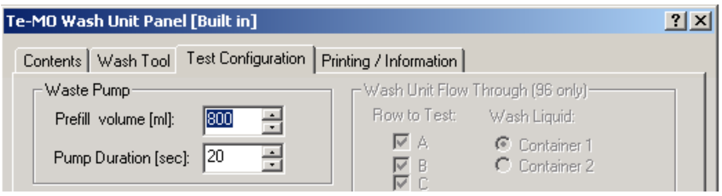
Parameter	Te-MO 96	Te-MO 384
Prefill volume	500 [ml]	800 [ml]
Minimum flow rate [ml/s]	30 [ml/s]	27.5 [ml/s]
Default pump duration	10 [sec]	20 [sec]
Max. remaining volume after default pump duration	500 – 300 [ml] = 200 [ml]	800 – 550 [ml] = 250 [ml]

***Note:** In the following procedure, the liquid quantities shown on the prompts apply to the Te-MO 384.*

Procedure

To carry out the test:

1 On the **Contents** page, select the **Waste Pump** check box and change to the **Test Configuration** page.



Prefill volume [ml]: 800
Pump Duration [sec]: 20

Row to Test: ☑ A ☑ B ☑ C
Wash Liquid: ● Container 1 ○ Container 2

***Fig. 13-53** Wash Unit, Test Configuration page*

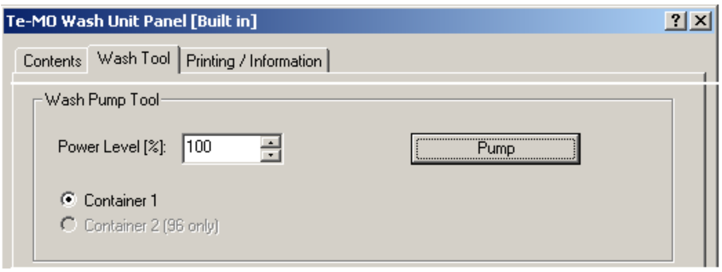
2 In the **Waste Pump** frame on the **Test Configuration** page, set the required values for the **Prefill volume** and the **Pump Duration**.

3 Click **Start**.

*The **Wash Unit Process Prompt** appears.*

4 Follow the instructions on the screen.

- Connect the tube.
- Prefill the measuring cup. Use the **Pump** button if necessary (see below).
- Click **OK** when done.



Power Level [%]: 100

● Container 1
○ Container 2 (96 only)

***Fig. 13-54** Waste pump test*

5 Connect the second service tube as indicated on the prompt.

6. After you have done this, click **Next** to continue.

   The waste pump starts pumping liquid from the measuring cup into the waste container for the preset time. The ***Process Prompt*** *continues to inform you on the current status and tells you what to do next.*

   Carefully read and follow the instructions given.

7. Check the quantity of remaining liquid in the measuring cup when you are instructed to do so. Also see previous table.

8. Continue with **OK** if the remaining liquid quantity does not exceed the quantity indicated on the process prompt.

   At the end of the test you will be prompted to reconnect the original tube to the ***Waste*** *connector.*

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the remaining liquid quantity does not exceed the quantity indicated on the process prompt.

If the Test Fails

Check if all tubes are connected correctly as indicated during the test. See drawings in descriptions of the corresponding wash system (→ Cross References).

13.4.9 Test Level Sensors

Cross References

List of cross references to information provided in other sections:

Information	References
Te-MO 96 Wash System	See section 13.4.1, 🗎 13-49
Te-MO 384 Wash System	See section 13.4.2, 🗎 13-50

Purpose

The purpose of this test is to check the level sensors of the wash block.

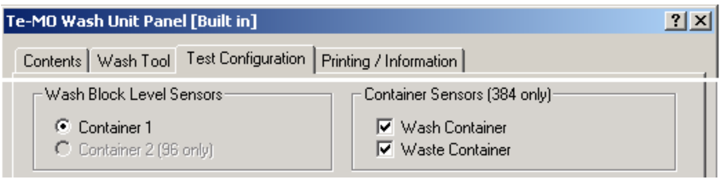
Note: *Due to the different mechanical designs of the wash blocks for Te-MO 96 and Te-MO 384 the test procedures for these wash blocks differ from each other.*

Te-MO 384 Wash Block

Procedure

To carry out the test:

1. On the **Contents** page, select the **Wash Block Level Sensors** check box and change to the **Test Configuration** page.



Te-MO Wash Unit Panel [Built in]

Wash Block Level Sensors
● Container 1
○ Container 2 (96 only)

Container Sensors (384 only)
☑ Wash Container
☑ Waste Container

Fig. 13-55 *Wash Unit, Test Configuration page*

*In the frame **Wash Block Level Sensors**, the option button labeled **Container 1** is selected by default.*

2 Click **Start**.

*The **Wash Unit Process Prompt** appears and informs you that the wash block will be emptied.*

3 Click **Next**.

The waste pump starts emptying the wash block. After the time indicated on the process prompt the waste pump is stopped. The next process prompt appears, informing you that the wash block will be filled up to test the level sensors.

4 Follow the instructions provided. Click **Next** to start the wash pump that will fill up the wash block.

5 Observe the liquid level in the wash block:

- If the pump is not stopped when the liquid level reaches the overflow sensor, click **Cancel** to stop the pump.
- If the supply of liquid is stopped automatically the next process prompt appears.

6 Again follow the instructions provided. Click **Next** to start emptying the wash block.

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the **Empty Sensor** assumes the status “empty” within the given time limit.

If the Test Fails

Check if all tubes are connected correctly as indicated during the test. See drawings in descriptions of the corresponding wash system (→ Cross References).

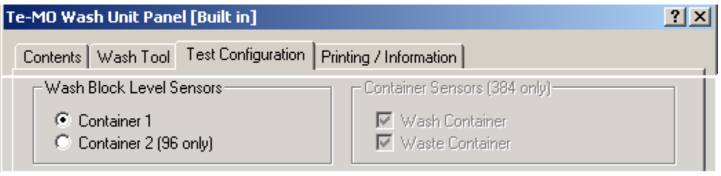
Te-MO 96 Wash Block

***Note:** The procedure for the Te-MO 96 wash block is somewhat more complicated. Reason: Unlike the Te-MO 384 wash block, the Te-MO 96 wash block cannot be emptied in one step.*

Procedure

To carry out the test:

1 On the **Contents** page, select the **Wash Block Level Sensors** check box and change to the **Test Configuration** page.


Te-MO Wash Unit Panel [Built in]

Wash Block Level Sensors
● Container 1
○ Container 2 (96 only)

Container Sensors (384 only)
☑ Wash Container
☑ Waste Container

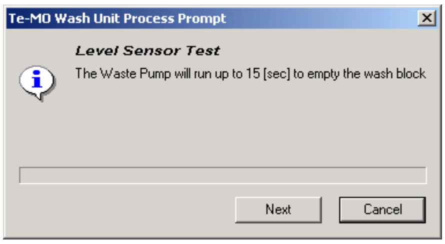
***Fig. 13-56** Wash Unit, Test Configuration page*

2 In the frame **Wash Block Level Sensors**, select the liquid container from which you want to pump liquid into the wash block.

3 Click **Start** to begin.

You will now be guided through the test by a series of process prompts.

4 Read the information provided and follow the instructions.

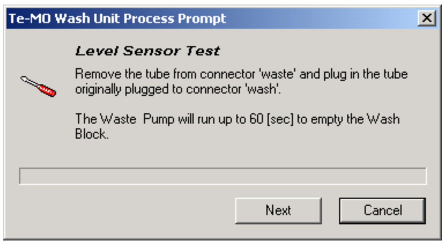

Te-MO Wash Unit Process Prompt

Level Sensor Test

The Waste Pump will run up to 15 [sec] to empty the wash block

First, the waste pump will drain waste liquid from the wash block. This is the liquid in the 24 waste liquid channels of the wash block.

5 Click **Next** to start the pump.

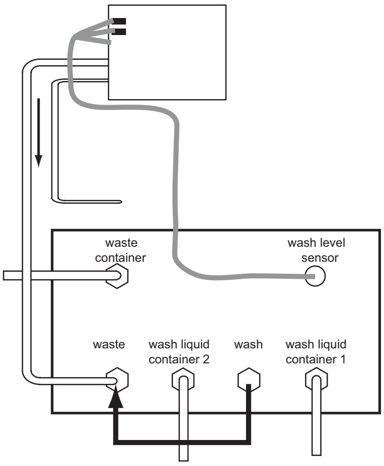

Te-MO Wash Unit Process Prompt

Level Sensor Test

Remove the tube from connector 'waste' and plug in the tube originally plugged to connector 'wash'.

The Waste Pump will run up to 60 [sec] to empty the Wash Block.

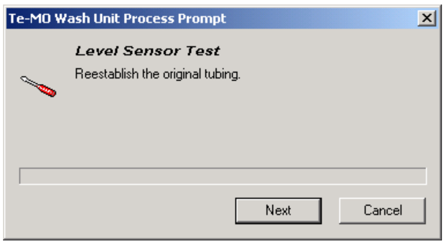
6 Now, disconnect the tube from the “Waste” connector at the front panel of the wash unit.



7 Remove the tube from the “Wash” connector and connect it to the “Waste” connector.

8 Click **Next** on the prompt.

The waste pump starts draining the liquid from the 96 wash channels of the wash block.

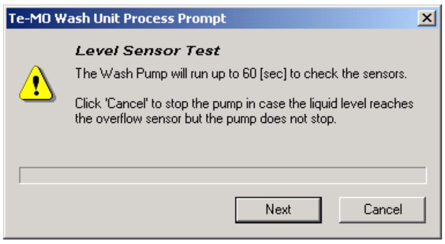

Te-MO Wash Unit Process Prompt

Level Sensor Test

Reestablish the original tubing.

9 Reconnect the wash and waste tubes to the original connectors.

10 Click **Next** when done.


Te-MO Wash Unit Process Prompt

Level Sensor Test

The Wash Pump will run up to 60 [sec] to check the sensors.

Click 'Cancel' to stop the pump in case the liquid level reaches the overflow sensor but the pump does not stop.

Fig. 13-57 *Level sensor test (Te-MO 96)*

11 Click **Next** to start the pump.

Wash liquid will be pumped into the wash block.

12 Observe the liquid level in the wash block. Check whether the pump stops automatically when the liquid has reached the overflow sensor.

13 Click **Next** if the pump stops correctly, **Cancel** otherwise.

A further prompt appears and informs you that the wash block will be emptied again.

ATTENTION

Before continuing, make sure that the “Overflow” sensor is dry. If necessary, use a lint-free cloth to dry it.

14 Click **Next** to start the waste pump.

*The test results can be viewed on the **Printing / Information** page.*

15 After you have finished the test, you should again dry the “Overflow” sensor with a lint-free cloth.

Pass/Fail Criteria

The test is passed if all actions (emptying wash blocks, etc.) are concluded within the time limits indicated on the process prompts.

If the Test Fails

Try the following:

1 Check if all tubes are connected correctly as indicated during the test. See drawings in descriptions of the corresponding wash system (→ Cross References).

2 Dry the “Overflow” sensor manually with a lint-free cloth.

3 Dry the “Empty” sensor manually with a lint-free cloth.

***Note:** It may be difficult to get the “Empty “ sensor dry.*

- *If available use compressed air.*
- *Wait long enough (several minutes) until the sensor is dry.*

4 Repeat the test when done.

13.4.10 Test Valve and Tubing Tightness (384 only)

Cross References

List of cross references to information provided in other sections:

Information	References
Te-MO 384 Wash System	See section 13.4.2, 🗎 13-50

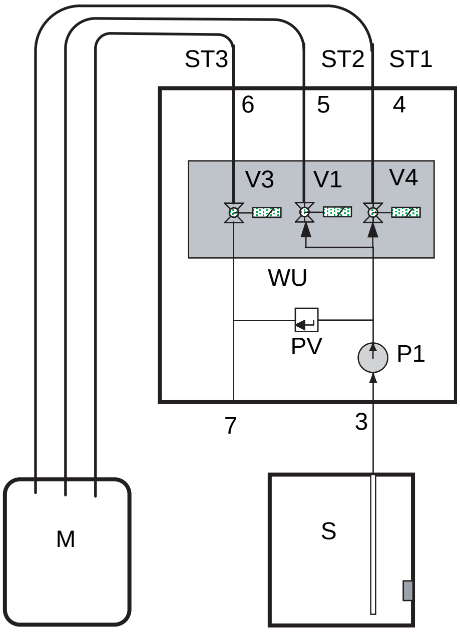
***Note:** This test applies to the Te-MO 384 head only and cannot be activated if a Te-MO 96 head is installed.*

Purpose

The purpose of this test is to check the following:

- Correct interconnection of tubings, pumps and valves.
- Proper function of the valves.
- Whether valves and tubings do not leak.

Principle

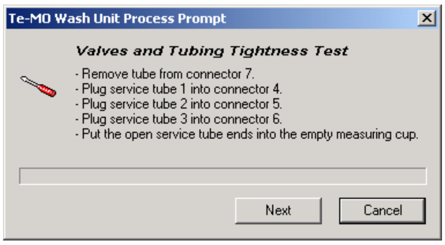


S	*System liquid container*
M	*Measuring cup*
ST1	*Service tube 1*
ST2	*Service tube 2*
ST3	*Service tube 3*
2-7	*Tube connectors on front panel of wash unit. Note: No tube is connected to # 7 during the test.*
V1,V3,V4	*Valves*
PV	*Pressure relief valve*
P1	*Wash pump*

Note: *You need three service tubes and a measuring cup for this test.*

Fig. 13-58 *Valve and tube tightness test*

Procedure



Valves and Tubing Tightness Test

- Remove tube from connector 7.
- Plug service tube 1 into connector 4.
- Plug service tube 2 into connector 5.
- Plug service tube 3 into connector 6.
- Put the open service tube ends into the empty measuring cup.

Fig. 13-59 *Preparatory steps*

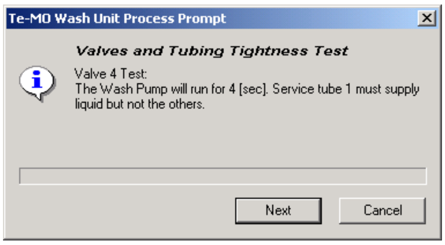
To perform the test:

1 On the **Contents** page select the **Valve and Tubing Tightness Test** check box and click **Start**.

*The **Wash Unit** process prompt appears.*

2 Follow the instructions on the screen to make the preparations for the test:

- Disconnect tube from connector # 7. This will close the connector so that no liquid can escape.
- Connect service tubes (ST 1), (ST 2) and (ST 3) to connectors (4), (5) and (6), respectively. Put the opposite ends of the service tubes into the measuring cup.
- Click **Next** to continue when ready.



Valves and Tubing Tightness Test

Valve 4 Test:
The Wash Pump will run for 4 [sec]. Service tube 1 must supply liquid but not the others.

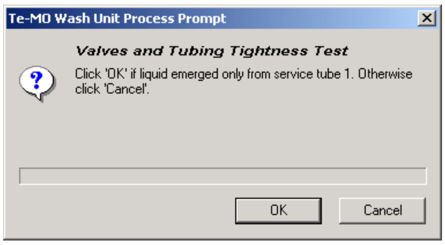
Fig. 13-60 *Starting the test of valve V 4*

The next process prompt appears

3 Click **Next** to continue:

Wash pump (P1) starts pumping liquid through valve (V4) for 4 seconds.

4 Observe the tube ends in the measuring cup. From which tube does liquid flow into the cup?



Valves and Tubing Tightness Test

Click 'OK' if liquid emerged only from service tube 1. Otherwise click 'Cancel'.

Fig. 13-61 *Liquid from correct tube?*

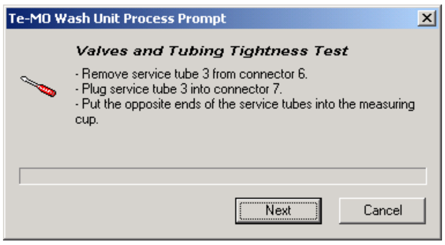
After 4 seconds, the next process prompt appears

5 Follow the instructions on the screen and check whether the following is true:
- Liquid flowed into the measuring cup through service tube (ST 1).
- No liquid was supplied by service tubes (ST 2) and (ST 3).

6 Click **OK** if the above is true, **Cancel** otherwise.

Similar tests follow for valves (V1) and (V3)/(PV = pressure relief valve). You will be guided through the tests by a series of process prompts.

7 Strictly follow the instructions on the screen.



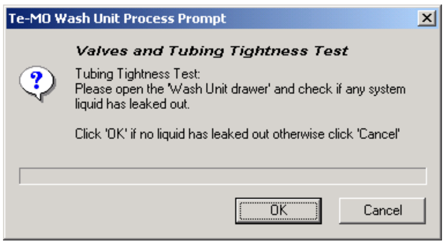
Valves and Tubing Tightness Test

- Remove service tube 3 from connector 6.
- Plug service tube 3 into connector 7.
- Put the opposite ends of the service tubes into the measuring cup.

Fig. 13-62 *Changing the connection*

After you have tested valves (V1) and (V3)/(PV), the system continues with “Valve 3/System Liquid Backflow Test”. Again, you will be guided through the test by a series of process prompts. The first of them is shown on the left.

8 Follow the instructions on the screen:
- Reconnect service tube # 3 as instructed and click **Next**.
- The following prompt informs you that the wash pump will run for the indicated time. Click **Next** to continue.
- Observe the service tubes. Liquid must flow out from service tube # 3, but not from the other service tubes. Click **OK** on the prompt if this is true, click **Cancel** otherwise.



Valves and Tubing Tightness Test

Tubing Tightness Test:
Please open the 'Wash Unit drawer' and check if any system liquid has leaked out.

Click 'OK' if no liquid has leaked out otherwise click 'Cancel'

Fig. 13-63 *Visual inspection for leaks*

If liquid emerged from service tube # 3 only, the prompt shown on the left appears.

9 Visually check tubings, valves and pumps for leaks. Does liquid escape from one of them. Do they feel wet when you touch them?

10 Confirm with **OK** if none of the valves and tubings leak; click **Cancel** otherwise.

11 After you have done this, the next process prompt instructs you to do the following:

- Remove the service tubes and reconnect the original tubes.
- Click **Next** to continue.

12 The last prompt informs you whether or not the test was successful. Click **OK** to confirm.

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if all questions have been answered correctly with **OK**.

If the Test Fails

Try the following:

- Check tubes and connections for leakages.
- If necessary, contact the nearest service organization for assistance.

13.4.11 Container Sensors (384 only)

Note: *This test applies to the Te-MO 384 head only and cannot be activated if a Te-MO 96 head is installed.*

Purpose

The purpose of this test is to check the correct function of the level sensors for the system liquid container and the waste container.

Location of the Sensors

The system liquid container and the waste container are located on a trolley as shown below. The level sensors themselves are mounted to the rear wall of the trolley.

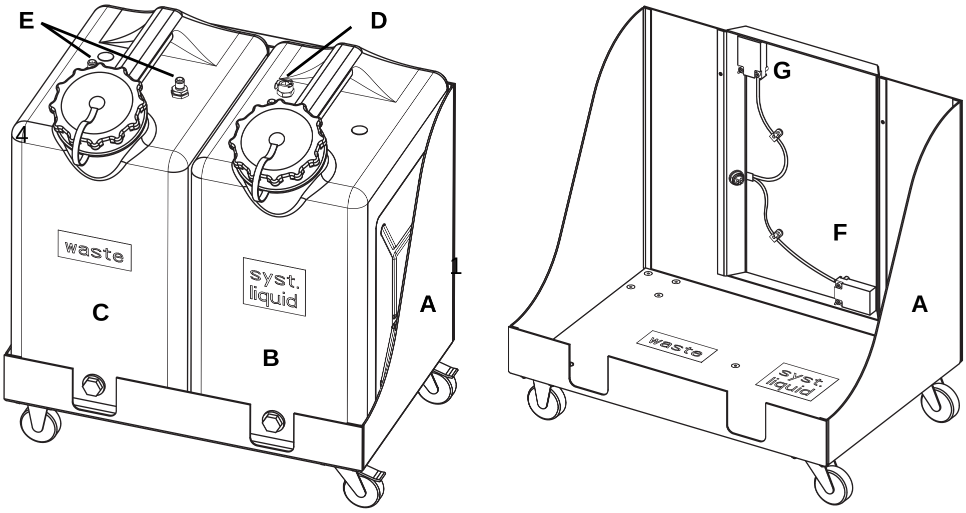


Fig. 13-64 *Trolley with level sensors and liquid containers*

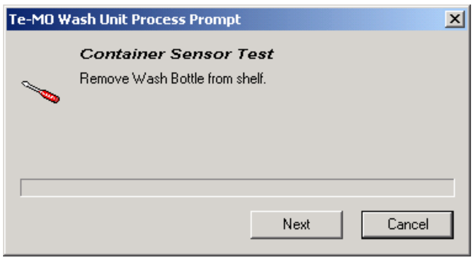
A	Trolley	***E***	*Waste tube connections*
B	*System liquid container*	***F***	*System liquid level sensor*
C	*Waste container*	***G***	*Waste level sensor*
D	*System liquid tube connection*		

Procedure

To test the sensors:

1 On the **Contents** page select the **Container Sensors (384 only)** check box and click **Start**.

*The **Wash Unit Process Prompt** appears. First, you will test the system liquid level sensor.*



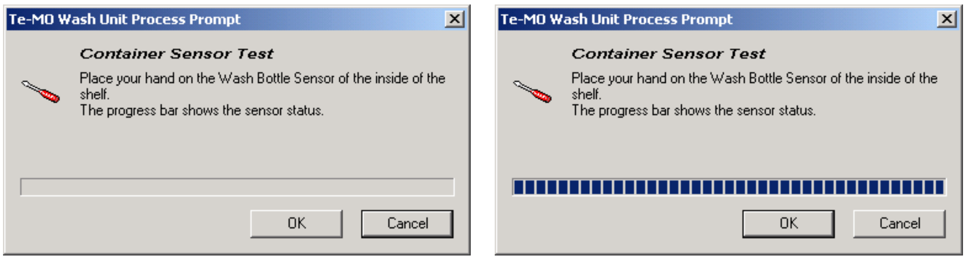
Container Sensor Test

Remove Wash Bottle from shelf.

Fig. 13-65 *Prompt to remove the wash bottle*

2 Follow the instructions on the process prompt. In a first step you are instructed to lift the system liquid bottle out of the trolley. Click **Next** when you have done so.

The next prompt appears.



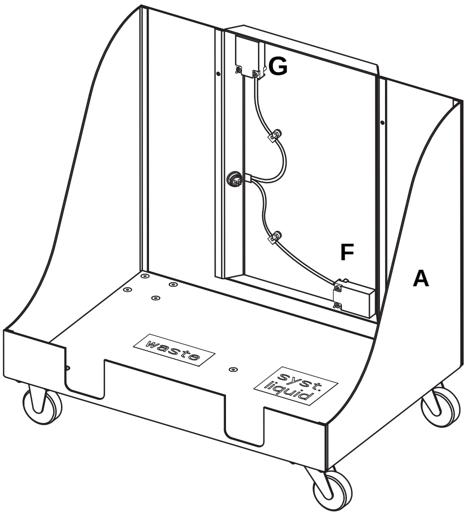
Container Sensor Test

Place your hand on the Wash Bottle Sensor of the inside of the shelf.
The progress bar shows the sensor status.

Container Sensor Test

Place your hand on the Wash Bottle Sensor of the inside of the shelf.
The progress bar shows the sensor status.

Fig. 13-66 *Prompt to touch the steel plate*



A *Trolley*
F *Liquid level sensor*
G *Waste level sensor*

3 Touch the system liquid level sensor (F) at the inside of the trolley.

4 Observe the process prompt. When you touch the sensor the blue progress bar must appear, as shown on the left.

Fig. 13-67 *Level sensors*

5 Remove your hand from the sensor. The blue progress bar must disappear.

6 Click **OK** on the prompt if the sensor works properly. Otherwise abort with **Cancel**.

If the test of the system liquid level sensor was successful, the system will prompt you to do the same for the waste level sensor.

7 Repeat steps 2 to 6 for the waste level sensor.

8 Put the containers back on the trolley when finished.

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the level sensors change their states as described above.

If the Test Fails

Try the following:

- Check whether the sensor cable is properly connected to the trolley.
- Replace the sensor(s) that do not react properly. Contact the nearest service organization for help if necessary.

13.4.12 Test Flow Rate Through Tips (384 only)

Cross References

List of cross references to information provided in other sections:

Information	References
Te-MO 384 Wash System	See section 13.4.2, 🗎 13-50

Note: *This test applies to the Te-MO 384 head only and cannot be activated if a Te-MO 96 head is installed.*

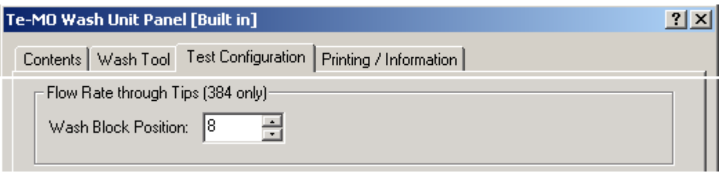
Purpose

The purpose of this test is to check whether the tips of the Te-MO 384 head can be flushed properly from the inside.

Procedure

To carry out the test:

1 On the **Contents** page, select the **Flow Rate Through Tips (384 only)** check box and change to the **Test Configuration** page.



Flow Rate through Tips (384 only)

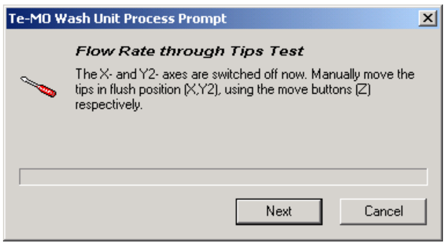
Wash Block Position: 8

Fig. 13-68 Wash unit, Test Configuration page

2 Check and, if necessary correct, the position of the wash block.

3 Click **Start** to begin. The **Wash Unit** process prompt appears and informs you that the pipetting head will be positioned over the wash block.

4 Click **Next** to continue. The next process prompt appears:



Flow Rate through Tips Test

The X- and Y2- axes are switched off now. Manually move the tips in flush position (X,Y2), using the move buttons (Z) respectively.

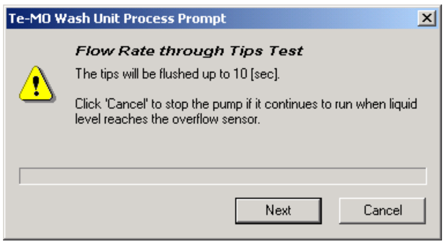
Fig. 13-69 Positioning the pipetting head

5 Read and follow the explanations and instructions provided on the process prompt.

You are informed that the drives in the X and Y2 (middle) axes are switched off.

6 Manually move the pipetting head and the Y2 slide until the head is positioned over the wash block.

7 Use the movement buttons in the **Z**-frame on the **Wash Tool** page to move the tips downwards, so that no liquid will be splashed over the worktable during the following test.



Flow Rate through Tips Test

The tips will be flushed up to 10 [sec].

Click 'Cancel' to stop the pump if it continues to run when liquid level reaches the overflow sensor.

Fig. 13-70 Flushing the tips

8 Click **Next** to continue.

The next process prompt appears.

9 Again follow the explanations and instructions on the screen:
  - The tips will be flushed up to 10 seconds.
  - Abort with **Cancel** in case the pump does not stop automatically when the liquid level reaches the overflow sensor of the wash block.
  - Otherwise click **Next** to continue. The next process prompt informs you that the plungers are moved into the park position and the wash block will be emptied.

10 Click **Next** to continue.

The last prompt informs you whether the test was successful.

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the wash block can be filled within the given time limit.

If the Test Fails

Contact the nearest service organization.

13.4.13 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

***Note:** The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

13.5 MCA Wash

The MCA Wash system is an option to be used with the multichannel arms MCA96 and MCA384. It controls the wash cycles for washing the pipetting tips of the multichannel heads.

13.5.1 MCA Wash System

Diagram

The figure shows a diagram of the MCA wash system and its components:

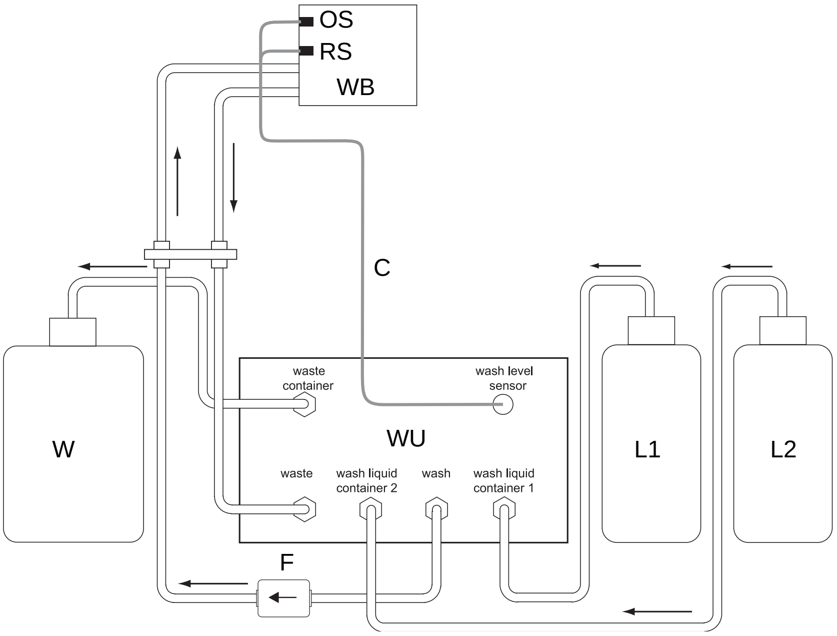


Fig. 13-71 *MCA wash system*

WB	*Wash block (MCA96 or MCA384)*
OS	*Overflow sensor*
RS	*Ready sensor (MCA96 wash block)*
WU	*Wash unit*
→	*Liquid flow direction*
L1	*Wash liquid container 1*
L2	*Wash liquid container 2*
W	*Waste container*
C	*Connection cable for:* *- overflow sensor (MCA96, MCA384)* *- ready sensor (MCA96 only)*
F	*Filter for wash liquid*

The heart of the system is the wash unit (WU), which is equipped with the valves and pumps that pump wash liquid from the wash bottles (L1) or (L2) through the wash liquid tubes into the wash block (WB).

The wash block (WB) is equipped with one or two level sensors. The “ready” sensor (RS, only on MCA96 wash block) notifies the wash unit (WU) via the cable (C) when there is enough liquid in the block to wash the tips. The overflow sensor (OS) becomes active when there is too much liquid in the wash block. In such a case, the wash unit immediately stops the supply of further wash liquid. Liquid that flows from the wash block (WB) back to the wash unit (WU) is pumped into the waste container (W).

Tips are washed through aspiration and dispensation and external rinsing.

13.5.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Files

The MCA Wash system can create the following files:

Results	**Directory**	<data_path>\Results (<data_path> see 5.3 “Data Files”, 🗎 5-29).
	File name	MCA_Wash_<serial_number>_<date>_<time>.any (see 7.7.2, 🗎 7-26)

Required Tools

To carry out the tests you need the following tools:

- One measuring cup 1000 [ml]
- Three service tubes. A service tube is equipped with a coupling at one end that can be plugged into the respective connectors on the front panel of the wash unit.

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

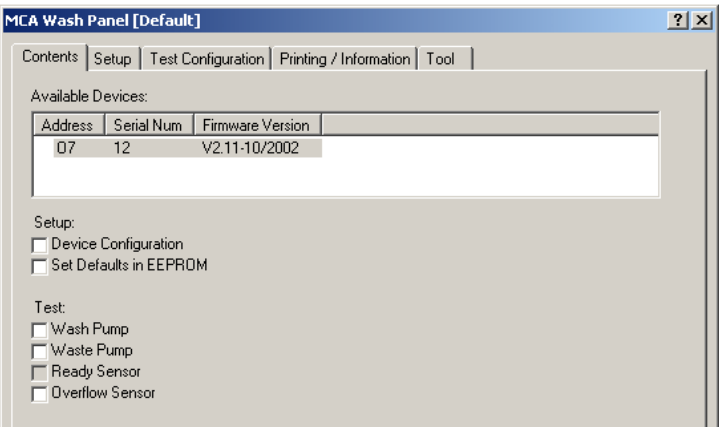
***Tab. 13-15** MCA Wash System Functions and User Permissions*

Function	Type	User	FSE
Device Configuration	Setup		X
Set Defaults in EEPROM	Setup		X
Wash Pump	Test	X	X
Waste Pump	Test	X	X
Ready Sensor (MCA96 only)	Test	X	X
Overflow Sensor	Test	X	X
Wash Tool	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Starting the Panel

To setup or test the MCA Wash system:

1 Start the panel with **Options > Multichannel > MCA Wash**. The **MCA Wash Panel** with activated **Contents** page appears. After starting the **MCA Wash Panel**, no setup or test check box is selected on the Contents page.



Available Devices:

Address	Serial Num	Firmware Version
07	12	V2.11-10/2002

Setup:
☐ Device Configuration
☐ Set Defaults in EEPROM

Test:
☐ Wash Pump
☐ Waste Pump
☐ Ready Sensor
☐ Overflow Sensor

Fig. 13-72 *MCA Wash Panel, Contents page*

Note: *If the wash block is for the MCA384 and the setting in the* ***Setup*** *page is accordingly, the* ***Ready Sensor*** *Test check box is deactivated.*

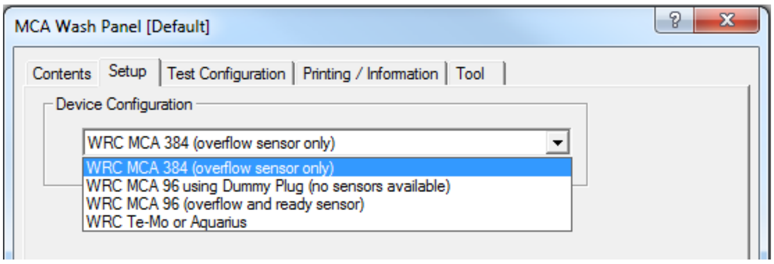
Pages The **MCA Wash Panel** is subdivided into the following pages:

Tab. 13-16 *Pages of MCA Wash Panel*

Pages	Function
Contents	General overview, procedure selection
Setup	Selection of the device configuration
Test Configuration	Selection of the wash liquid container
Printing / Information	Lets you configure a printed report
Tools	Utility functions

13.5.3 Setup Page

Function The **Setup** page contains a combo box for selecting the **Device Configuration**.



Device Configuration
WRC MCA 384 (overflow sensor only)
WRC MCA 384 (overflow sensor only)
WRC MCA 96 using Dummy Plug (no sensors available)
WRC MCA 96 (overflow and ready sensor)
WRC Te-Mo or Aquarius

Fig. 13-73 *Setup page*

Device Configuration The following device configurations can be selected:

Tab. 13-17 Device configurations

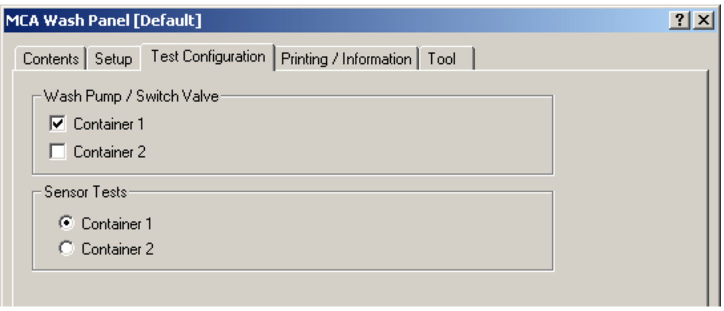
Selection	Hardware Configuration
WRC MCA 384 (overflow sensor only)	MCA384 or MCA96 wash block, MCA tower
WRC MCA 96 using Dummy Plug (no sensors available)	MCA96 wash block, WRC tower (Dummy Plug to bypass sensors, for example for non-conductive wash liquid)
WRC MCA 96 (overflow and ready sensor)	MCA96 wash block, WRC tower
WRC Te-Mo or Aquarius	Select this if you have a Te-MO or Aquarius and need only the Te-MO Wash Unit Panel (see 13.4, 🗎 13-49)

***Note:** If you select **WRC Tower with Te-MO or Aquarius** the setting will be effective after leaving the Instrument software. When you reenter the Instrument software the **MCA Wash** panel can no more be used to test the wash unit as the MCA Wash unit is no more displayed in the **Available Device** list on the **Contents** page. Subsequently you must use the **Te-MO Wash Unit** panel.*

13.5.4 Test Configuration Page

Function

The **Test Configuration** page contains the controls for the wash pump switch valve and the sensor selection for the container sensor test.



Wash Pump / Switch Valve
☑ Container 1
☐ Container 2

Sensor Tests
● Container 1
○ Container 2

Fig. 13-74 Test Configuration page

Controls

The **Tool** page contains the following controls:

Wash Pump / Switch Valve	Allows to switch wash liquid supply. If both containers are selected, the Wash Pump test is done with each of them
Container 1	Switches to container 1 for wash liquid supply.
Container 2	Switches to container 2 for wash liquid supply.
Sensor Tests	Allows to select liquid supply for wash block sensor test
Container 1	Selects container 1 for liquid supply.
Container 2	Selects container 2 for liquid supply.

13.5.5 Tools Page

Function

The **Tool** page contains the controls for priming and emptying the wash block and testing the waste pump.

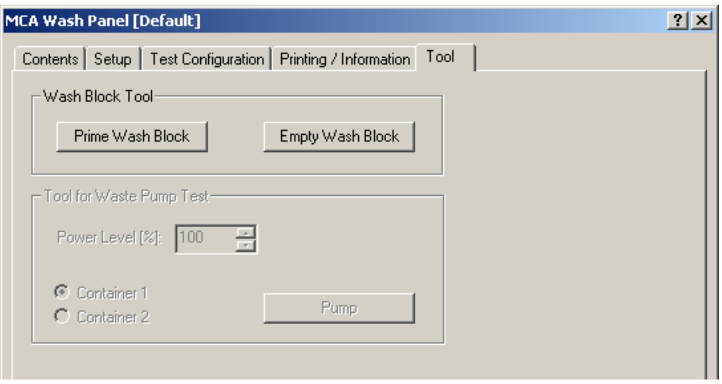


__Fig. 13-75__ Tool page

Controls

The **Tool** page contains the following controls:

Wash Block Tool	Buttons for priming and emptying the wash block.
Prime Wash Block	Prepares the wash block for washing the tips.
Empty Wash Block	Starts the waste pump to empty the wash block: • MCA384: pump stops after 10 [s] • MCA96: pump stops after 10 [s] or when the ready sensor signals “not ready” (no liquid).
Tool for Waste Pump Test	Controls used for **Waste Pump Test**
Power Level	Spin box to set the pump power from 0 to 100%. Default value: 100%. Can be used to vary the pump speed.
Pump	To switch the pump on/off. Pump runs as long as the button is kept pressed and stops when it is released.
Container 1 **Container 2**	Option buttons that let you select a wash liquid container.

13.5.6 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

***Note:** The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

13.5.7 Set Device Configuration

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure allows to select the device configuration according to the hardware used.

Procedure

To select the device configuration:

1. On the **Contents** page, select the **Device Configuration** check box and go to the **Setup** page.
2. On the **Setup** page select the device configuration in the combo box according to your hardware configuration (refer to Tab. 13-17 “Device configurations”, 🗎 13-74)
3. Click **Start** on the **Contents** page to store the device configuration.

13.5.8 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To set the default values:

1. On the **Contents** page, select the **Set Defaults in EEPROM** check box. No further parameters need to be defined.
2. Click **Start** to download the default values to the wash unit.

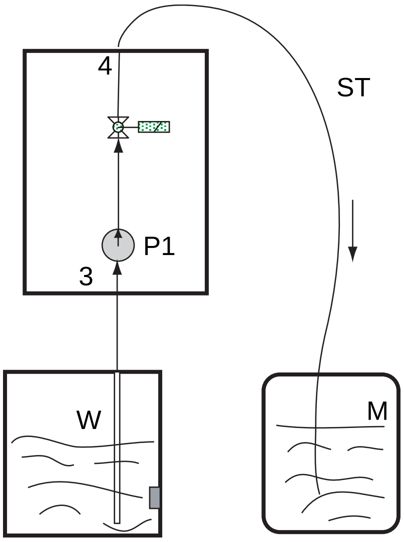
13.5.9 Test Wash Pump

Cross References

List of cross references to information provided in other sections:

Information	References
MCA Wash System	See section 13.5.1, 🗎 13-70

Principle



M	Measuring cup
ST	Service tube
P1	Wash pump
W	Wash liquid container
3	Connector “Wash liquid container
4	Connector “Wash”

Fig. 13-76 *Principle of wash pump test*

This test is used to check the performance of the wash pump (P1). You need a service tube and a measuring cup for this test. During the test, liquid will be pumped from the wash liquid container (W) into the measuring cup (M) for a preset time. The test is passed if the volume in the measuring cup is between the limits according to the following table.

Limit Values

The following table shows the value ranges for MCA96 and MCA384.

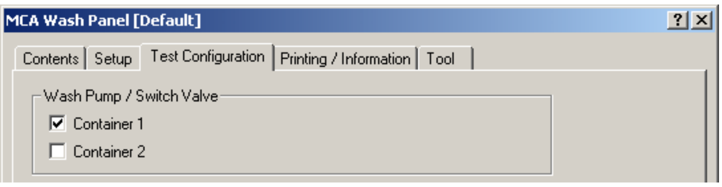
Tab. 13-18 *Values for Wash Pump Test*

Parameter	MCA96 and MCA384
Flow rate range [ml/s]	18 to 28 [ml/s]
Default pump duration	10 [sec]
Expected volume after default pump duration	180 to 280 [ml]

Procedure

To carry out the test:

1 On the **Contents** page, select the **Wash Pump** check box and change to the **Test Configuration** page.



Wash Pump / Switch Valve
☑ Container 1
☐ Container 2

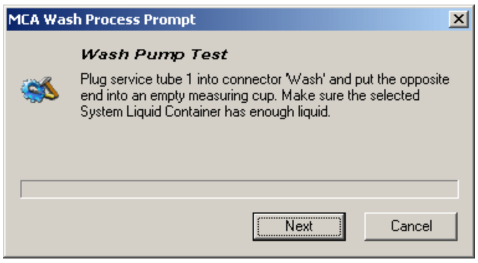
Fig. 13-77 *MCA Wash Panel, Test Configuration page*

2 In the **Wash Pump/Switch Valve** frame on the **Test Configuration** page select the wash liquid container from which you want to pump liquid into the measuring cup.

Note: *Make sure there is enough wash liquid in the selected container.*

Note: *If you select in the **Wash Pump/Switch Valve** frame container 1 **and** container 2, the wash pump test will run twice:*
First a test cycle with container 1. Then a second test cycle with container 2 after switching the valve.
This procedure also tests the correct switching of the valve.

3 Click **Start**. The following **MCA Wash Process Prompt** appears.



Wash Pump Test

Plug service tube 1 into connector 'Wash' and put the opposite end into an empty measuring cup. Make sure the selected System Liquid Container has enough liquid.

Fig. 13-78 *Wash pump test process prompt*

4 Exactly follow the instructions provided on the **Process Prompt**. In this step, for instance, you are instructed to do the following:

- Plug the service tube into the connector **Wash** on the front panel of the wash unit and put the opposite end of the tube into the measuring cup.
- Make sure there is enough liquid in the selected wash liquid container.

5 After you have done this, click **Next** to continue.

The wash pump pumps for 10 sec. liquid from the selected system liquid container into the measuring cup.

*The **Process Prompt** continues to inform you on the current status and tells you what to do next. Carefully read and follow the instructions given.*

6 Check the quantity of liquid in the measuring cup when you are instructed to do so.

7 Continue with **OK** if the liquid quantity is between the limits indicated on the process prompt.

*At the end of the test you will be prompted to reconnect the original tube to the **Wash** connector.*

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the pumped liquid quantity is between the minimum and maximum limits indicated on the process prompt.

If the Test Fails

- Check if all tubes are connected correctly as indicated during the test. See drawing in the description of the MCA wash system (→ Cross References).
- Make sure the system is primed correctly before you start.

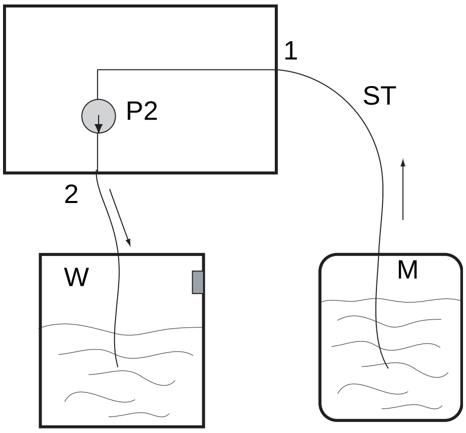
13.5.10 Test Waste Pump

Cross References

List of cross references to information provided in other sections:

Information	References
MCA Wash System	See section 13.5.1, 🗎 13-70

Principle



M	Measuring cup
ST	Service tube
P2	Waste pump
W	Waste container
1	“Waste” connector
2	“Waste container” connector

Fig. 13-79 *Principle of waste pump test*

This test is used to check the performance of the waste pump. You need a service tube and a measuring cup for this test. During the test, liquid will be pumped from the measuring cup (M) into the waste container (W) for a pre-set time. The test is passed when the remaining liquid in the cup does not exceed a given value.

Limit Values

The following table shows the value ranges for MCA96 and MCA384.

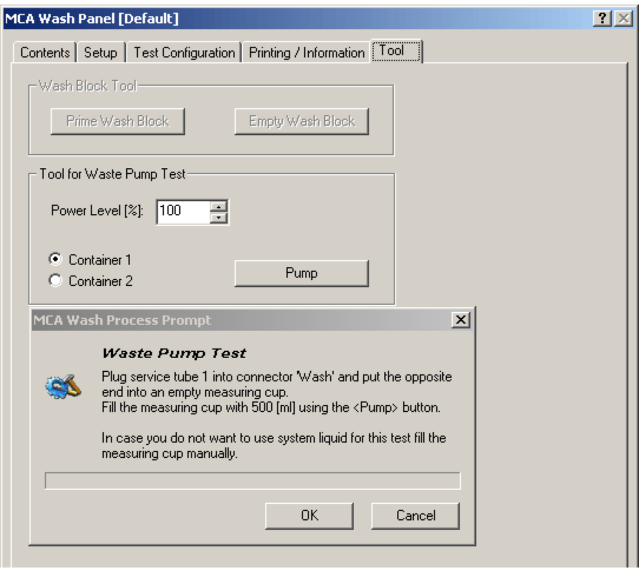
Tab. 13-19 *Values for Waste Pump Test*

Parameter	MCA96 and MCA384
Prefill volume	500 [ml]
Minimum flow rate [ml/s]	30 [ml/s]
Default pump duration	10 [sec]
Max. remaining volume after default pump duration	500 – 300 [ml] = 200 [ml]

Procedure

To carry out the test:

1. On the **Contents** page, select the **Waste Pump** check box.
2. Click **Start**. The following **MCA Wash Process Prompt** appears.



Power Level [%]: 100

● Container 1
○ Container 2

Waste Pump Test

Plug service tube 1 into connector 'Wash' and put the opposite end into an empty measuring cup.
Fill the measuring cup with 500 [ml] using the <Pump> button.

In case you do not want to use system liquid for this test fill the measuring cup manually.

***Fig. 13-80** Waste pump test*

3. Follow the instructions on the process prompt.
   - Connect the tube.
   - Prefill the measuring cup. Use the **Pump** button if necessary (see below).
   - Click **OK** when done.
4. Connect the second service tube as indicated on the next prompt.
5. After you have done this, click **Next** to continue.

   *The waste pump starts pumping liquid from the measuring cup into the waste container for 10 sec. The **Process Prompt** continues to inform you on the current status and tells you what to do next.*

   Carefully read and follow the instructions given.
6. Check the quantity of remaining liquid in the measuring cup when you are instructed to do so. Also see previous table.
7. Continue with **OK** if the remaining liquid quantity does not exceed the quantity indicated on the process prompt.

   *At the end of the test you will be prompted to reconnect the original tube to the **Waste** connector.*

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the remaining liquid quantity does not exceed the quantity indicated on the process prompt.

If the Test Fails

Check if all tubes are connected correctly as indicated during the test. See drawing in the description of the MCA wash system (→ Cross References).

13.5.11 Test Ready Sensor

Cross References

List of cross references to information provided in other sections:

Information	References
MCA Wash System	See section 13.5.1, 🗎 13-70

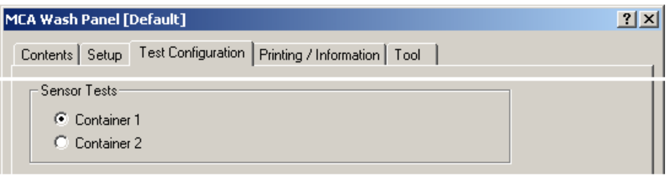
Purpose

The purpose of this test is to check the **Ready Sensor** of the MCA96 wash block.

Procedure

To carry out the test:

1 On the **Contents** page, select the **Ready Sensor** check box and change to the **Test Configuration** page.



Sensor Tests
● Container 1
○ Container 2

Fig. 13-81 *Wash System, Test Configuration page*

2 In the frame **Sensor Tests**, select the wash liquid container from which you want to pump liquid into the wash block.

3 Click **Start**.

*An **MCA Wash Process Prompt** instructs you to plug the wash tube into the “Waste” connector.*

4 Click **Next**.

The waste pump empties the wash block.

5 If the Ready sensor is still active after the waste pump stopped, dry the Ready sensor and click **Retry**.

6 Now you will be prompted to rearrange the tubing to original configuration, wash tube to “Wash” connector and waste tube to “Waste” connector (see Fig. 13-71, 🗎 13-71).

7 Click **Next** on the **MCA Wash Process Prompt**, which informs you that the waste pump will empty the wash block.

The waste pump starts emptying the wash block. After the time indicated on the process prompt the waste pump is stopped. The next process prompt appears, asking you if the wash block is empty now.

8 Click **OK** if the wash block is empty.

The wash pump starts to prime the wash block. At the same time the waste pump starts.

9 Observe the liquid level in the wash block:

- If the waste block is not emptied correctly, click **Cancel** to stop the pump.
- If the supply of liquid is stopped automatically the next process prompt appears.

10 Again follow the instructions provided.

The test results can be viewed on the **Printing / Information** page.

__Note:__ After you have finished the test, you should again dry the "Overflow" sensor with a lint-free cloth.

Pass/Fail Criteria

The test is passed if the **Ready Sensor** does sense the status "ready" within the given time limit and stops the pump.

If the Test Fails

Try the following:

1. Check if all tubes are connected correctly as indicated during the test. See drawings in descriptions of the corresponding wash system (→ Cross References).
2. Dry the "Overflow" sensor manually with a lint-free cloth.
3. Dry the "Ready" sensor manually with a lint-free cloth as indicated in point 5 in the test sequence.

__Note:__ It may be difficult to get the "Ready" sensor dry.

- *If available use compressed air.*
- *Wait long enough (several minutes) until the sensor is dry.*

4. Repeat the test when done.

13.5.12 Test Overflow Sensor

Cross References

List of cross references to information provided in other sections:

Information	References
MCA Wash System	See section 13.5.1, 🗎 13-70

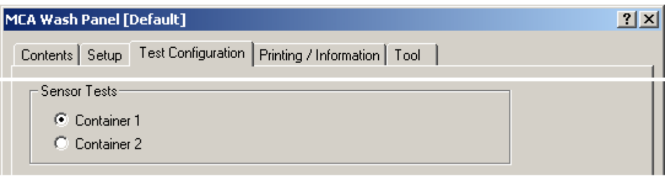
Purpose

The purpose of this test is to check the **Overflow Sensor** of the MCA96 or MCA 384 wash block.

Procedure

To carry out the test:

1. On the **Contents** page, select the **Overflow Sensor** check box and change to the **Test Configuration** page.



● Container 1
○ Container 2

Fig. 13-82 *Wash System, Test Configuration page*

2. In the frame **Sensor Tests**, select the wash liquid container from which you want to pump liquid into the wash block.
3. Click **Start**.

   The __MCA Wash Process Prompt__ appears and informs you that the wash block will be emptied.
4. Click **Next**.

The waste pump starts emptying the wash block. After the time indicated on the process prompt the waste pump is stopped. The next process prompt appears, asking you if the wash block is now empty.

5. Click **OK** if the wash block is empty.

   The wash pump starts to fill up the wash block.
6. Observe the liquid level in the wash block:
   - If the pump is not stopped when the liquid level reaches the Overflow sensor, click **Cancel** to stop the pump.
   - If the supply of liquid is stopped automatically the next process prompt appears.
7. Again follow the instructions provided. Click **Next** to start emptying the wash block.
8. Finally a process prompt notifies you if the tests are passed.

The test results can also be viewed on the **Printing / Information** page.

Note: *After you have finished the test, you should again dry the “Overflow” sensor with a lint-free cloth.*

Pass/Fail Criteria

The test is passed if the **Overflow Sensor** does sense the status “overflow” within the given time limit and stops the pump.

If the Test Fails

Try the following:

1. Check if all tubes are connected correctly as indicated during the test. See drawings in descriptions of the corresponding wash system (→ Cross References).
2. Dry the “Overflow” sensor manually with a lint-free cloth.
3. Repeat the test when done.

13.6 Refill

13.6.1 Overview

Parts

The Te-MO Refill option is a modular system that serves for automatically refilling troughs with reagent liquid. It can be used together with both Te-MO 96 and Te-MO 384 pipetting heads. The system consists of the following parts:

- **Bottles**. Troughs can be filled alternatively with up to four different types of reagent liquid. Four bottles containing reagent liquid can be placed on a rack that is equipped with four liquid level sensors (one for each bottle).
- **Refill unit**. The bottles are connected to the refill unit. The refill unit is a drawer located in the tower of the wash and refill system. It contains a pump and four valves that direct liquid from the required bottle into the trough. The valves and the pump are controlled by the software via the control unit.

***Note:** To obtain liquid from a bottle, the pump actually pumps air into the bottle. In this way, liquid is pressed out of the bottle and into the trough. This method serves to an even liquid flow through the tubes and prevents the formation of foam.*

- **Trough**. One or more troughs can be placed on the Y2-slide (middle slide). Liquid to be aspirated is contained in a special inset that can be inserted into the trough. There are three inset sizes:
  - Te-MO 96: 125 ml and 250 ml insets.
  - Te-MO 384: 200 ml inset.

To prevent the formation of waves a partition is inserted in the inset. This partition is a grid of metal sheets that subdivide the inset into 12 chambers. The partition is slightly smaller than the inset and the partition walls have cutouts at the bottom. For this reason liquid can circulate freely and the liquid level is the same in all chambers.

- **Liquid outlet**. To fill up a trough it is moved under the liquid outlet arranged under the portal above the service slide (Y2). The outlet contains an integrated ultrasonic sensor that measures the liquid level while the trough inset is being filled.
- **Control unit**: The control unit is also located in the tower. It contains the electronic circuits for switching the pump and the valves and for processing the sensor signals. The control unit is the interface between the software and the hardware components to control.

Required Tools

Measuring cup or graduated cylinder with 500 ml.

13.6.2 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the

SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 13-20 *Wash Unit Functions and User Permissions*

Function	Type	User	FSE
Autodetection of Refill Position	Setup		X
Set up Level Sensor	Setup		X
Check Bottle Sensors	Test	X	X
Check Tubing	Test	X	X
Check Flow Rate	Test	X	X
Printing / Information page	Page	X	X
QC-report	Report	X	X

Files

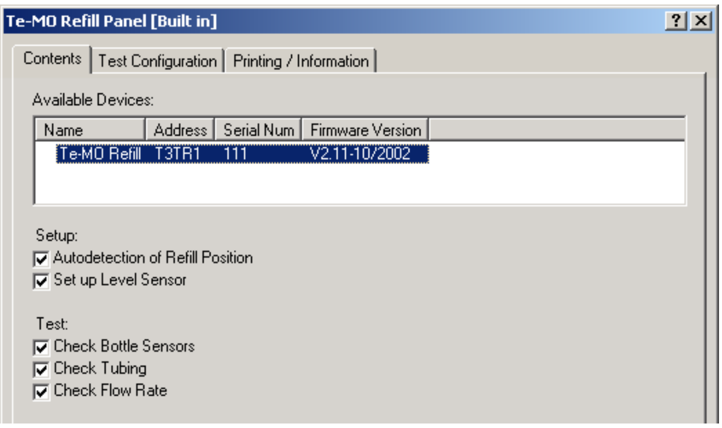
The **Refill** function creates result files in which test results are stored:

Directory	<data_path>\Results
File	TeMORefill_<serial_number>_<date>_<time>.any

Starting the Panel

To setup or test the Te-MO Refill System:

1 Start the panel with **Options > Multichannel > Refill**. The **Te-MO Refill** panel with activated **Contents** page appears. After starting the Te-MO Refill panel, no setup or test check box is selected and not all tabs are visible.



Available Devices:

Name	Address	Serial Num	Firmware Version
Te-MO Refill	T3TR1	111	V2.11-10/2002

Setup:
☑ Autodetection of Refill Position
☑ Set up Level Sensor

Test:
☑ Check Bottle Sensors
☑ Check Tubing
☑ Check Flow Rate

Fig. 13-83 *Te-MO Refill Unit Panel, Contents page*

Pages

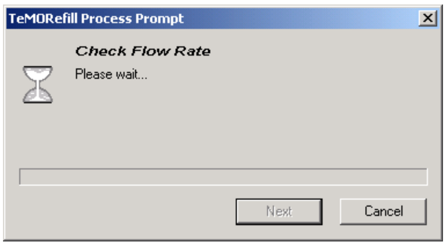
The **Te-MO Refill Panel** is subdivided into the following pages:

Tab. 13-21 Pages of Te-MO Refill Panel

Pages	Function
Contents	General overview, procedure selection
Test Configuration	Lets you set the test parameters
Printing / Information	Lets you configure a printed report

Initialization

Before the pump starts running during a test, the **Refill** system is initialized and a message like the following appears on the screen.


TeMORefill Process Prompt

Check Flow Rate

Please wait...

Fig. 13-84 Wait messages

The initialization takes about seven seconds. Reasons:

- During the initialization certain calculations are carried out.
- The liquid level must be stable before it can be measured.

13.6.3 Autodetection of Refill Position

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this setup procedure is to determine the optimum position for filling up the trough. In this position, the trough is so positioned that integrated ultrasonic level sensor in the liquid outlet measures the liquid level in the middle of the detectable range.

ATTENTION

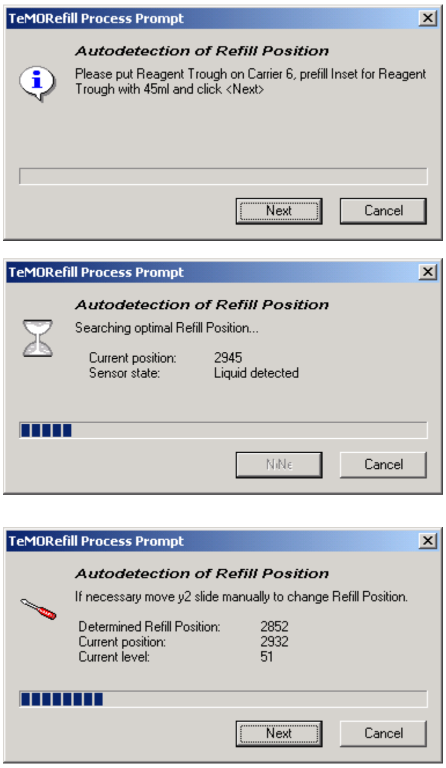
For this setup, you must use the largest inset that is used by the customer.

Procedure

To perform the setup:

1 On the **Contents** page, select the **Autodetection of Refill Position** check box and click **Start**.

You are guided through the procedure by a series of process prompts. Not all of them are shown here.


TeMORefill Process Prompt

Autodetection of Refill Position

Please put Reagent Trough on Carrier 6, prefill Inset for Reagent Trough with 45ml and click <Next>

TeMORefill Process Prompt

Autodetection of Refill Position

Searching optimal Refill Position...

Current position: 2945
Sensor state: Liquid detected

TeMORefill Process Prompt

Autodetection of Refill Position

If necessary move y2 slide manually to change Refill Position.

Determined Refill Position: 2852
Current position: 2932
Current level: 51

Fig. 13-85 *Autodetection of refill position*

1 Place the trough on the indicated carrier position and fill the inset with the indicated quantity.

2 Click **Next**

The trough is moved slowly under the sensor. First the outer wall of the trough is detected, then the optimum refill position is searched. This may take several minutes.

3 Wait

After the optimum refill position has been found it is checked automatically (prompt not shown here).

Then you are given the opportunity to optimize the position manually.

4 If necessary optimize the position manually and click **Next** to continue.

The Position will be checked again.

13.6.4 Set up Level Sensor

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this setup is to set up the level sensor in the liquid outlet to the following liquid levels:

- Trough inset filled with 45 ml of liquid.
- Trough full.

Inset to be Used

An inset is needed for this setup. Choose the correct one according to the following table:

Tab. 13-22 *Insets to be Used*

Te-MO Type	If customer uses…	then choose…
Te-MO 96	only 125 ml insets	125 ml inset
	only 250 ml insets	250 ml inset
	both 125 and 250 ml insets	125 ml inset
Te-MO 384	200 ml	200 ml inset

ATTENTION

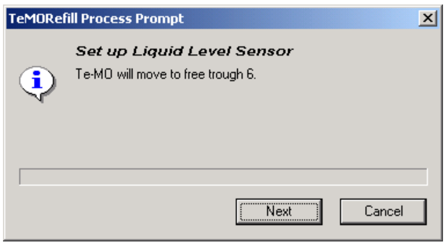
Make sure you choose the correct inset. The use of an incorrect inset may lead to unreliable results.

Procedure

To set up the level sensor:

1 On the **Contents** page, select the **Set up Level Sensor** check box and click **Start**.

You will be guided through the setup procedure by a series of process prompts. Read the information provided and follow the instructions.

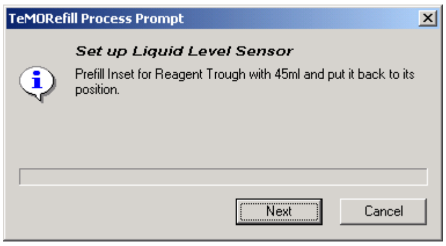


TeMORefill Process Prompt

Set up Liquid Level Sensor

Te-MO will move to free trough 6.

2 Click **Next** to continue.



TeMORefill Process Prompt

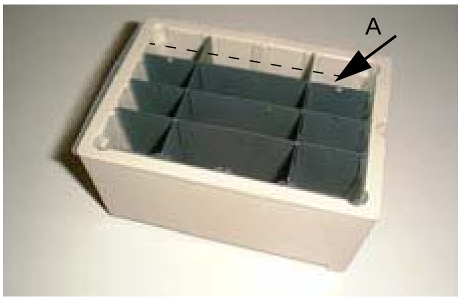
Set up Liquid Level Sensor

Prefill Inset for Reagent Trough with 45ml and put it back to its position.

3 Pour 45 ml of liquid into the inset and insert it into the trough. Place the trough on the rearmost carrier of the service slide Y2 (middle slide).

4 Click **Next** to continue.

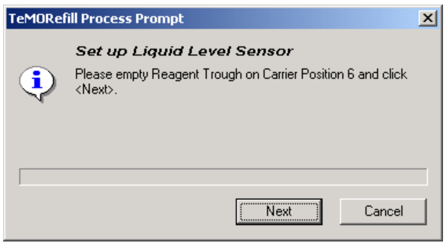
The sensor is now set up for the 45 [ml] level.



5 Fill up the inset to the level (A, dashed line)

6 Click **Next** to continue when done.

The sensor is now set up for the "full" level. Then, the next prompt appears.



Set up Liquid Level Sensor

Please empty Reagent Trough on Carrier Position 6 and click <Next>.

***Fig. 13-86** Set up liquid levels sensor*

7. Empty the inset and put it back.
8. Click **Next** to finish.

13.6.5 Check Bottle Sensors

Purpose

The purpose of this test is to check whether the bottle sensors (S1 to S4), located at the rear wall of the bottle rack (R), work properly. It can also be used to check whether the bottles are connected correctly to the refill unit.

Test Principle

During the test, liquid is pumped out of one of the bottles (B1 to B4) into the trough (not shown in figure below). The associated bottle sensor (S1 to S4) works properly if it is actuated when the liquid level is within the respective cutout (C1 to C4) in the lower half of the slot (Sl1 to Sl4). The test principle is the same for all sensors.

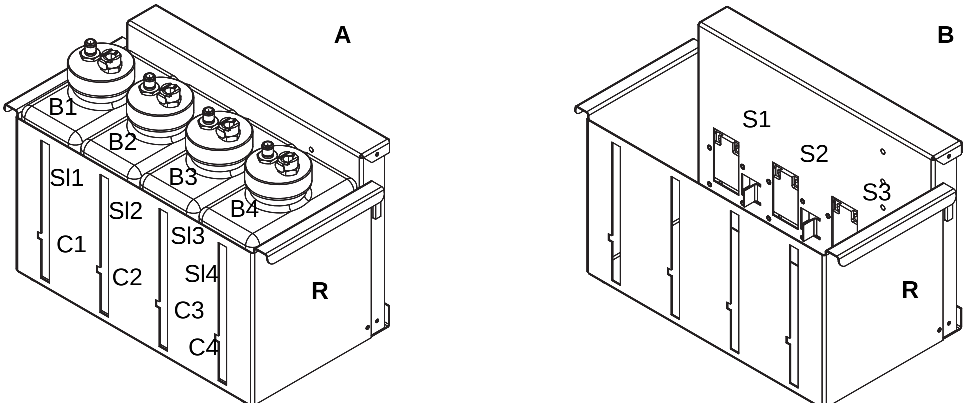


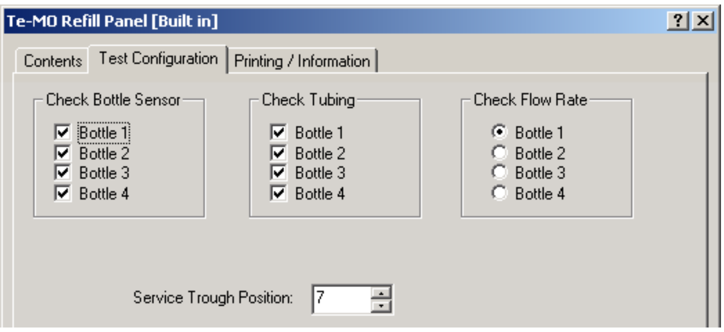
***Fig. 13-87** Bottle rack (A) with bottles, (B) without bottles*

R	*Bottle rack*	***C1-4***	*Cutouts*
B1-4	*Bottles 1 to 4*	***S1-4***	*Bottle sensors (# 4 not visible in figure)*
Sl1-4	*Slots (allow visual check level*		

Procedure

To test the bottle sensors:

1. On the **Contents** page, select the **Check Bottle Sensors** check box and change to the **Test Configuration** page.



Check Bottle Sensor
☑ Bottle 1
☑ Bottle 2
☑ Bottle 3
☑ Bottle 4

Check Tubing
☑ Bottle 1
☑ Bottle 2
☑ Bottle 3
☑ Bottle 4

Check Flow Rate
● Bottle 1
○ Bottle 2
○ Bottle 3
○ Bottle 4

Service Trough Position: 7

Fig. 13-88 *Test Configuration page*

2 In the **Check Bottle Sensor** frame, select the bottle(s) whose sensors you want to check.

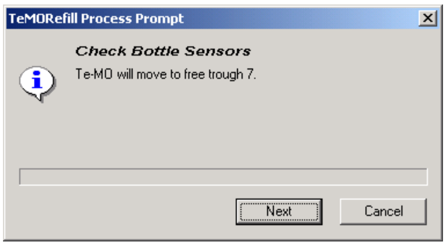
If you select more than one bottle the associated bottle sensors will be checked one by one (beginning with the leftmost sensor).

3 Use the spin box **Service Trough Position** to set the carrier position of the trough.

4 Click **Start** to begin.

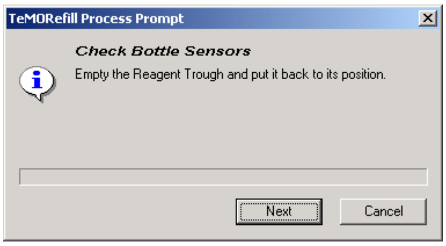
You will now be guided through the test by a series of process prompts.

5 Read the information provided and follow the instructions.



Check Bottle Sensors
Te-MO will move to free trough 7.

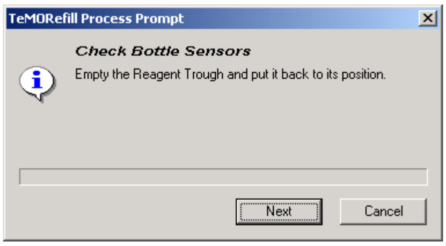
1 Click **Next** to continue



Check Bottle Sensors
Empty the Reagent Trough and put it back to its position.

2 Empty the trough and put it back.

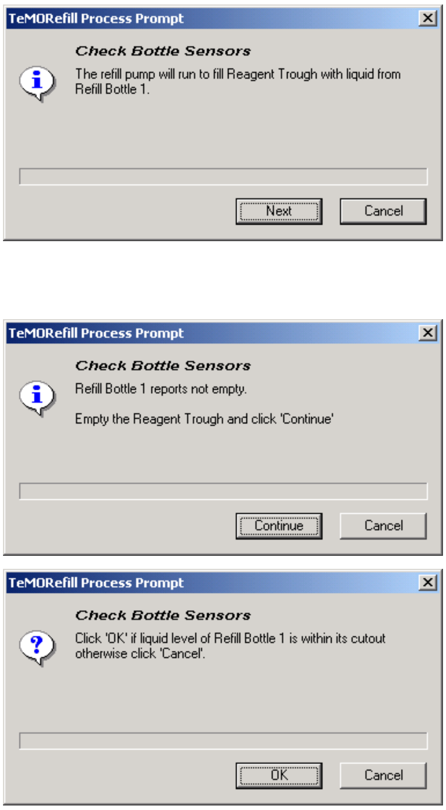
3 Click **Next** when you have done so.



Check Bottle Sensors
Empty the Reagent Trough and put it back to its position.

4 Now, fill the bottle until it contains 700 ml.

5 Click **Next** to continue.



Check Bottle Sensors

The refill pump will run to fill Reagent Trough with liquid from Refill Bottle 1.

Check Bottle Sensors

Refill Bottle 1 reports not empty.

Empty the Reagent Trough and click 'Continue'

Check Bottle Sensors

Click 'OK' if liquid level of Refill Bottle 1 is within its cutout otherwise click 'Cancel'.

Fig. 13-89 *Checking a bottle sensor*

6 Click **Next** to start the pump.

Liquid will be pumped out of the bottle until the bottle sensor detects that the liquid level is within the cutout.

7 Check whether the liquid comes from the correct bottle!

The message shown on the left appears if the trough is full before the bottle sensor detects no more liquid.

8 Empty the trough in such a case and click **Continue**.

The bottle sensor of the selected bottle notifies the system that it does not detect anymore liquid.

9 Check whether the liquid level is within the cutout.

10 Click **OK** if this is the case, **Cancel** otherwise.

11 Repeat the test for the other bottles you have selected. Always follow the instructions on the screen.

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

After the pump has pumped out liquid from the bottle and the level sensor detects the state “bottle empty” the level of the remaining liquid must be within the cutout.

If the Test Fails

Contact the nearest service organization for assistance.

13.6.6 Check Tubing

Purpose

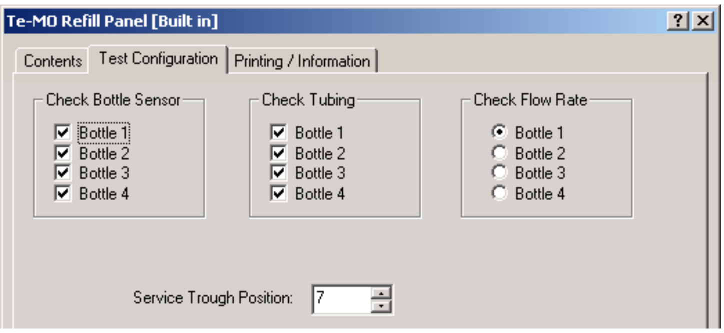
The purpose of this test is to check whether:

- the refill bottles are connected correctly to the refill unit
- the tubings within refill unit are correct
- the valves in the refill unit work properly.

Procedure

To check the tubings:

1 On the **Contents** page, select the **Check Tubing** check box and change to the **Test Configuration** page (see following figure).



Check Bottle Sensor
☑ Bottle 1
☑ Bottle 2
☑ Bottle 3
☑ Bottle 4

Check Tubing
☑ Bottle 1
☑ Bottle 2
☑ Bottle 3
☑ Bottle 4

Check Flow Rate
● Bottle 1
○ Bottle 2
○ Bottle 3
○ Bottle 4

Service Trough Position: 7

Fig. 13-90 *Test Configuration page*

2 In the **Check Tubing** frame, select the bottle(s) whose tubing connections you want to check.

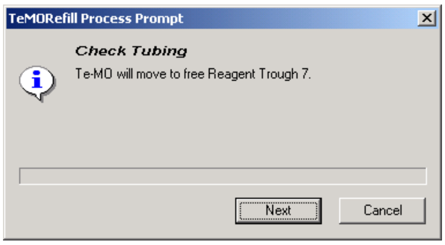
If you select more than one bottle the associated tubing connections will be checked one by one (beginning with the leftmost bottle).

3 Use the spin box **Service Trough Position** to set the carrier position of the trough.

4 Click **Start** to begin.

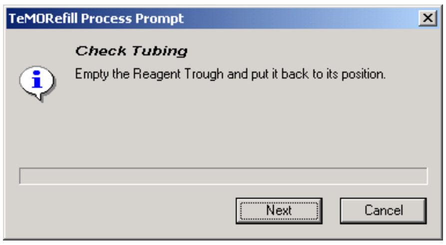
You will now be guided through the test by a series of process prompts.

5 Read the information provided on the prompts and follow the instructions.



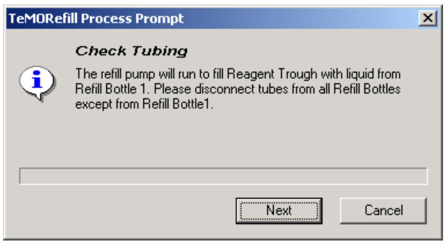
Check Tubing
Te-MO will move to free Reagent Trough 7.

1 Click **Next** to continue.



Check Tubing
Empty the Reagent Trough and put it back to its position.

2 Empty the trough and put it back.

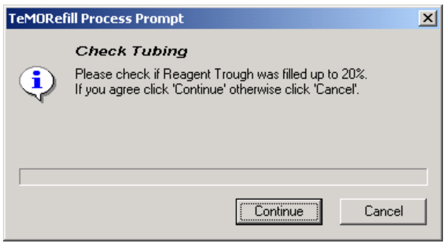


Check Tubing
The refill pump will run to fill Reagent Trough with liquid from Refill Bottle 1. Please disconnect tubes from all Refill Bottles except from Refill Bottle1.

3 Disconnect the tubes from the bottles, except from the one indicated on the prompt.

4 Click **Next** to continue.

Liquid will be pumped from the selected bottle into the trough.



TeMORefill Process Prompt

Check Tubing

Please check if Reagent Trough was filled up to 20%.
If you agree click 'Continue' otherwise click 'Cancel'.

***Fig. 13-91** Checking the tubings*

5 Check whether the trough was filled up to at least 20%.

6 Click **Continue** if okay, **Cancel** otherwise.

7 Repeat the test for the other bottles you have selected. Always follow the instructions on the screen.

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The trough must be filled up to at least 20%.

If the Test Fails

Try the following:

- Check the tubing of the bottles and the refill-unit.
- Contact the nearest service organization for assistance if necessary.

13.6.7 Check Flow Rate

Purpose

The purpose of this test is to check whether the trough can be filled up within a given time.

Inset to be Used

For this test, a 250 ml inset should be used. If none is available do not use any inset, but put the partition into the trough.

ATTENTION

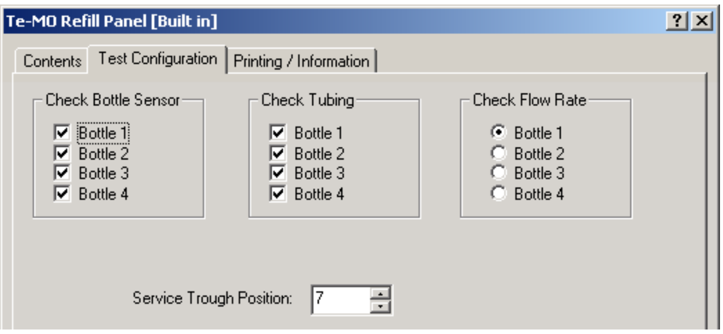
Make sure you use a 250 ml inset or the whole trough if none is available. The use of another inset would lead to unreliable results. Also insert the partition into the inset or trough.

Procedure

To test the bottle sensors:

1 Insert the partition into a 250 ml inset (or the trough).

2 On the **Contents** page, select the **Check Flow Through** check box and change to the **Test Configuration** page.



Check Bottle Sensor
☑ Bottle 1
☑ Bottle 2
☑ Bottle 3
☑ Bottle 4

Check Tubing
☑ Bottle 1
☑ Bottle 2
☑ Bottle 3
☑ Bottle 4

Check Flow Rate
● Bottle 1
○ Bottle 2
○ Bottle 3
○ Bottle 4

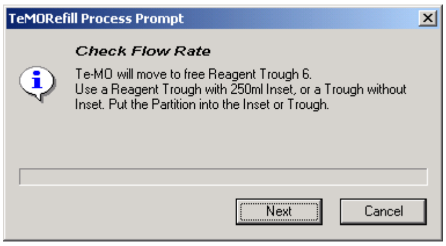
Service Trough Position: 7

Fig. 13-92 *Test Configuration page*

3. In the **Check Flow Through** frame, select a bottle.

   Any installed bottle can be used. You can select only one bottle at a time.
4. If necessary, use the spin box **Service Trough Position** to set the carrier position of the trough.
5. Click **Start** to begin. You will now be guided through the test by a series of process prompts.
6. Read the information provided on the prompts and follow the instructions.

Note: *You must use a 250 ml inset (or the whole trough if none is available). You must also put a partition into the inset or trough.*

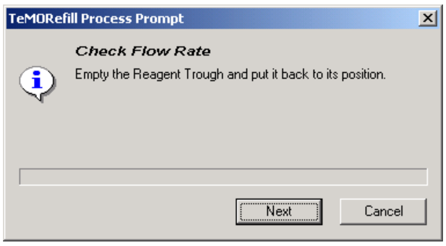


Check Flow Rate

Te-MO will move to free Reagent Trough 6.
Use a Reagent Trough with 250ml Inset, or a Trough without Inset. Put the Partition into the Inset or Trough.

1. Click **Next** to continue.

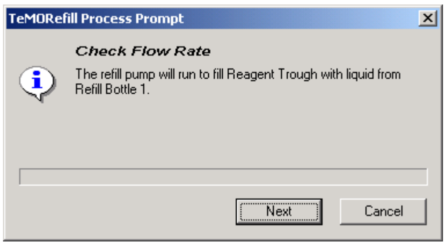
   The Te-MO is now initialized (prompts not shown here)



Check Flow Rate

Empty the Reagent Trough and put it back to its position.

2. After the initialization, empty the trough or inset and put it back.
3. Click **Next** to continue.

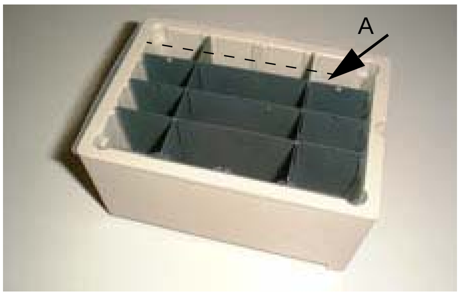


Check Flow Rate

The refill pump will run to fill Reagent Trough with liquid from Refill Bottle 1.

4. Click **Next** to start the pump.

   Liquid is pumped in to the trough or inset.

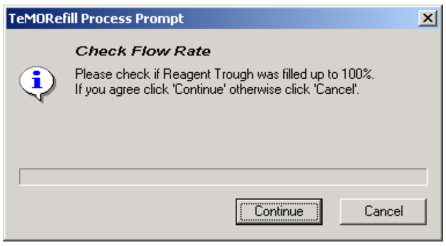


The pump must stop when the liquid level has reached the height of the recesses at the corners, see dashed line on figure (after max. 40 s).

Note that the pump stops automatically if the required liquid level is not reached within 44 s (emergency stop).

5 After the pump has stopped check whether the liquid has reached the level A (dashed line).

6 Click **Continue** if okay, **Cancel** otherwise.



Check Flow Rate

Please check if Reagent Trough was filled up to 100%.
If you agree click 'Continue' otherwise click 'Cancel'.

Fig. 13-93 *Checking the flow rate*

The test results can be viewed on the **Printing / Information** page.

Pass/Fail Criteria

The test is passed if the trough (with 250 ml inset or without inset) is filled up to the required level within 40 seconds.

If the Test Fails

Try the following:

- Check for bent tubings and leakages.
- Contact the nearest service organization for assistance if necessary.

13.6.8 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing a report	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The **Operator** field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the **Comment** field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

13.7 AutoLoader

13.7.1 Overview

Cross References

List of cross references to information provided in other sections:

Information	References
Cellerity	See section

What is an AutoLoader?

The AutoLoader is an optional device designed to handle and store various labware (microplates and DiTi boxes for Aquarius or flasks as used for systems like Cellerity) in up to six stacker columns that are arranged on a revolving support, the carousel.

A specially designed gripper module travels back and forth between the AutoLoader and a destination device (e.g., Aquarius 96/384 or Cellerity) and transports the labware objects to the destination or takes them back and inserts them in the appropriate stacker column.

In this way the Autoloader extends the functionality of the destination device with which it interacts.

Autoloader and Aquarius

The following figure shows, in simplified form, an AutoLoader connected to an Aquarius.

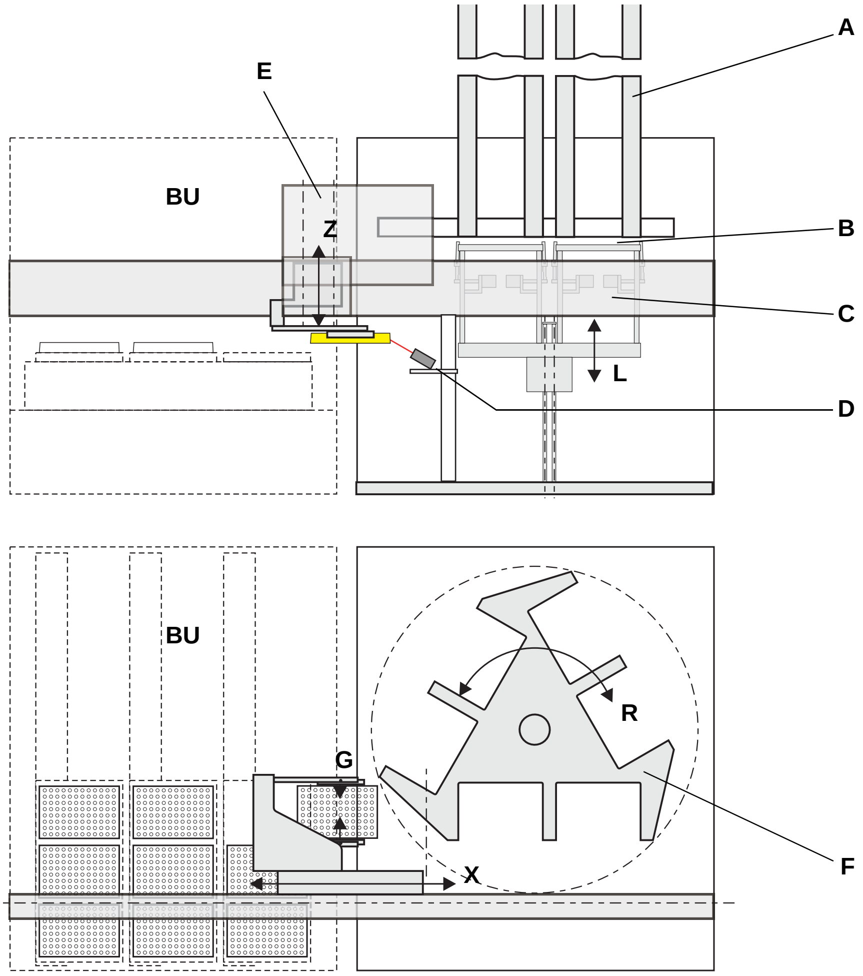


Fig. 13-94 *Front and top view of the Aquarius & AutoLoader (simplified)*

A	*Stacker column*	***BU***	*Aquarius base unit*
B	*Loader module*	***G***	*G-axis (gripper open/close)*
C	*Transfer rail*	***L***	*L-axis (loader up/down)*
D	*Barcode reader (option)*	***R***	*C-axis (rotation of carousel)*
E	*Gripper module*	***X***	*X-axis*
F	*Carousel*	***Z***	*Z-axis (gripper module up/down)*

AutoLoader and Cellerity

When combined with a Cellerity instrument, the AutoLoader places the flasks in the gripper module or picks them up from there.

Main Parts of AutoLoader

The most important parts of the AutoLoader are:

- **Stacker columns:** Up to six stacker columns (A) that hold labware (microplates, DiTi boxes or flasks) can be inserted in a revolving support, the carousel (F).
- **Loader module:** The loader module (B) is located at the front, below the carousel. It has two carrier positions in which racks extracted from a stacker column or to be loaded into a column can be placed.

- **Transfer rail:** The transfer rail (C) provides the mechanical link between the AutoLoader and the destination device (Aquarius, Cellerity). Racks are transported from and to the destination device along this rail. The transfer rail incorporates a drive motor and a belt that move the gripper module (E) along the rail.
- **Gripper module:** The gripper module (E) travels back and forth along the transfer rail (C) and transports the labware between the AutoLoader and the destination device.
  - The gripper module picks up a rack to be transported to the Aquarius from the loader module, carries it to the destination device where it deposits the labware (either on a carrier on a slide of the Aquarius or in the flipper module of Cellerity).
  - Likewise, it picks up the labware to be stored in the AutoLoader from the respective device and deposits it in the appropriate position of the loader module. The loader module then pushes it from below into the corresponding stacker column.
- **Carousel:** The carousel (F) is a revolving support that can hold up to six stacker columns. It can turn into three positions. To extract or store labware the carousel must be turned so that the respective columns are above the loader module.
- **Barcode reader.** The AutoLoader can be equipped with an optional barcode reader (D).

WARNING

Laser light (CLASS 2 LASER PRODUCT).

- Do not stare into beam nor into its reflections on metallic parts.
- Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Ensure appropriate FDA regulatory actions have been taken for any Class II laser products.

Movement Axes

The parts of the AutoLoader can be moved in the following axes:

- **X-axis.** Horizontal movement of the gripper module from left ↔ right between the AutoLoader and the Aquarius along the transfer rail.
- **Z-axis.** Up/down movement of the gripper module.
- **G-axis.** Open/close grippers.
- **L-axis.** Up/down movement of the loader module.
- **C-Axis.** Rotation of the carousel.

Safe Positions

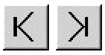
In order to avoid collisions between the above parts, not all of them may be moved in their respective axes at the same time. The gripper module and the loader module must be moved into safe positions before the carousel starts rotating:

- The gripper module is brought into its park position (465 mm left of the right end of the X-axis) or further left. Also see “Park Position” later in this section. The current position is monitored by the firmware.
- Likewise, the loader module must be lowered enough so that the carousel can be rotated without colliding with the loader module or with a racks that may be placed on it.

Logical Positions

The Setup and Service software knows the following logical positions for the AutoLoader.

- **X-axis.** The gripper module can be moved into up to five logical positions:
  - In the AutoLoader: Loading positions L1 and L2.
  - In the Aquarius: Slide positions Y1, Y2 and Y3.
  - Cellerity: Apart from the loading positions L1 and L2, the gripper module can be moved into to the initialization position, which is near the flipper module.
- **C-axis.** The carousel can be turned into three logical positions that correspond to the loading/unloading positions. For loading or unloading, the carousel must be turned until the respective stacker columns are above the loader module.



You can use these command buttons on the **Move Page** to move the gripper module or the carousel to the next or previous logical position.

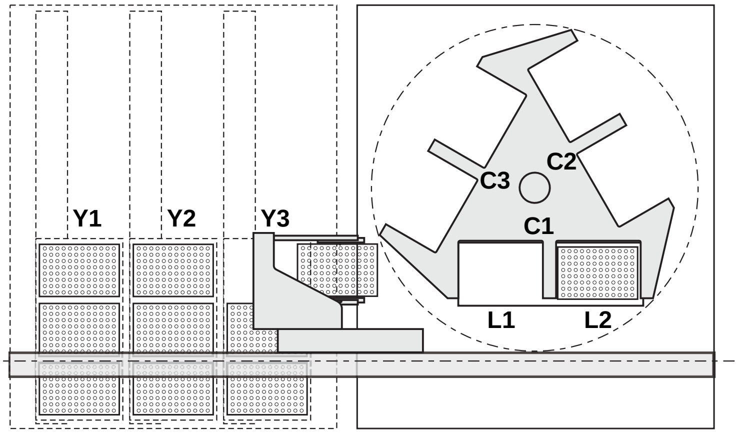


Fig. 13-95 *Logical positions in X and C-axes (Autoloader combined with Aquarius)*

Gripper Park Position

The parking position of the gripper module is left of the carousel, at 465 mm from the right end of the X-axis. Note that the park position of the gripper is not a logical position, i.e. you cannot reach it by pressing the appropriate button on the **Move Page**. As has been said before, the gripper module must be moved into the park position or further left before the carousel starts turning.

Exchange Position

- **Aquarius**: If the Autoloader is linked with an Aquarius, the exchange position is the position into which a slide (Y1, Y2 or Y3) in the Aquarius is moved when the gripper module has to place a rack on a carrier or to pick it up from there. Moreover, in the exchange position APCs (active positioning carriers) that may be installed on the Y1 or Y3 slides are opened.
  As far as the Setup and Service software is concerned, racks are always placed on or picked up from the rearmost carrier position.
- **Cellerity**: The flasks are placed in or picked up from the flipper module. Note that this is controlled by the application software. It is not possible to transport flasks to and from Cellerity by means of the Setup and Service software.

Extracting Labware

The following figure explains how labware (microplate, DiTi box or flask) is extracted from a stacker column. The loader module is equipped with release fingers (not shown in figure) with which the plate locks at the bottom of the stacker column are opened or closed.

- **A:** The loader module (F) moves upwards.
- **B:** The release fingers of the loader module open the plate locks (G). The loader module moves downwards and the bottommost rack slides out of the stacker column.
- **C:** Before the labware is extracted completely the plate locks begin to close thus preventing the subsequent rack from being extract as well. The distance (D) between the bottom of the labware and the upper edge of the plate locks is called the relock position.
- **E:** The plate locks are closed and hold the labware stored in the column.

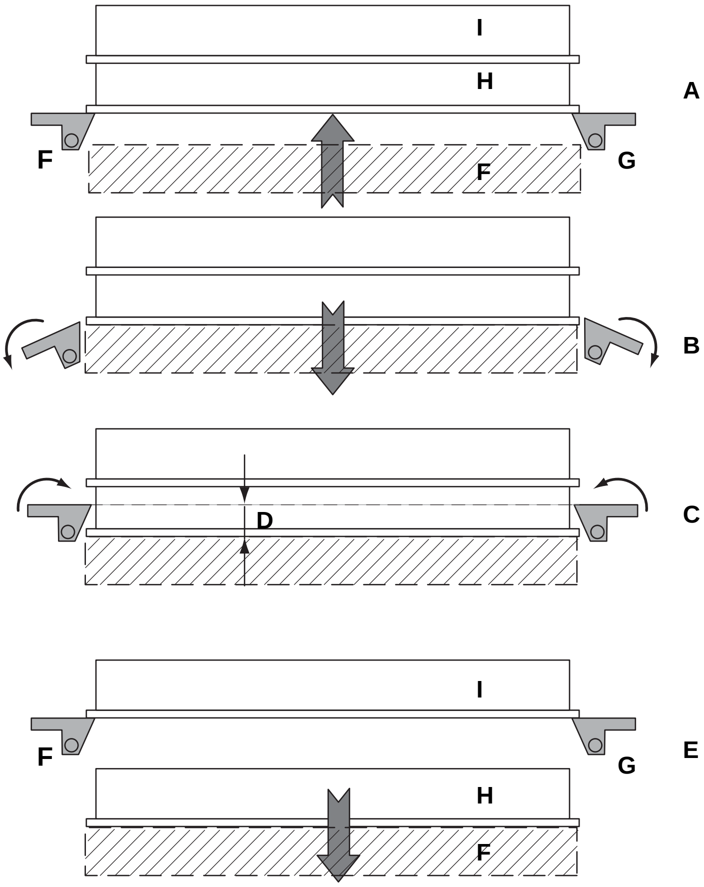


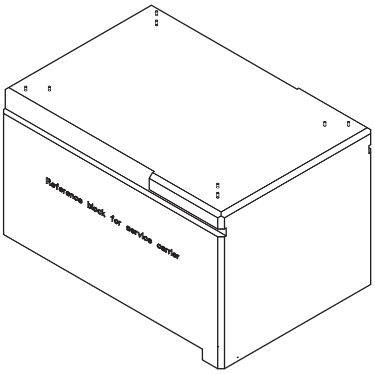
__Fig. 13-96__ Principle of plate extraction (simplified)

A	*Plate locks closed*	***F***	*Loader module*
B	*Plate locks are opened*	***G***	*Plate locks*
C	*Plate locks are closed again*	***H***	*Labware to extract*
D	*Relock position*	***I***	*Next piece of labware*
E	*Plate locks closed, labware is extracted*		

Inserting Labware

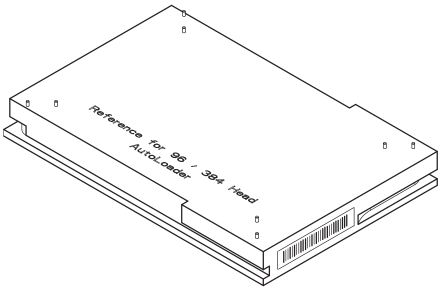
Labware is pushed into a stacker column from the bottom side.

13.7.2 Required Tools



Reference Block Y2: This reference is used if the AutoLoader is linked to an Aquarius.

Note, that for the AutoLoader the new version (with narrow left side) must be used.



Reference for 96/384 head. This reference plate is used for alignments if the AutoLoader is linked to an Aquarius or a Cellerity system.

Note, that for the AutoLoader the new version (with narrow left side) must be used.

Fig. 13-97 *Reference for 96/384 head*

13.7.3 Panel Description

Cross References

List of cross references to information provided in other sections:

Information	References
Using the panel	See section 5.2, 🗎 5-13
User Management System	See section 6.5, 🗎 6-3

Permissions, Procedures

Setup functions normally require at least the access rights of the SnS_FSE user group. Tests, on the other hand, can also be run by members of the SnS_Customer user group. For information about access rights refer to the description of the User Administration System (→ Cross References).

Tab. 13-23 *Autoloader Functions and User Permissions*

Function	Type	User	FSE
Set Defaults in EEPROM	Setup		X
Autodetection of carousel positions	Setup		X
Autorange	Setup		X
Determine displacement of L-axis (Cellerity)	Setup		X

Tab. 13-23 Autoloader Functions and User Permissions

Function	Type	User	FSE
Determine displacements of X, Z and L-axes (Aquarius)	Setup		X
Teach positions of slides Y2 and Y3 (Aquarius)	Setup		X
Autodetection of barcode reader window	Setup		X
Gripper Test	Test	X	X
Range Move Test	Test	X	X
Random Move Test	Test	X	X
System Test	Test	X	X
Move Page	Tool	X	X
Printing / Information	Page	X	X
QC-report	Report	X	X

Files, Directories

The AutoLoader function creates the following files:

Directory: <data_path>\Results
File name: AutoLoader_<serial_number>_<date>_<time>.any

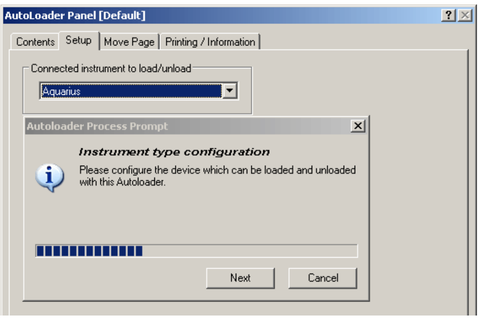
- Test Configuration Files

Directory: user defined
File name: <name>.any

Starting the Panel

To set up or test the AutoLoader:

1 Start the panel with **Options > Multichannel > AutoLoader**. If no Te-MO (Aquarius) is detected, the **Setup** page together with a process prompt appears.



Connected instrument to load/unload: Aquarius

Instrument type configuration

Please configure the device which can be loaded and unloaded with this Autoloader.

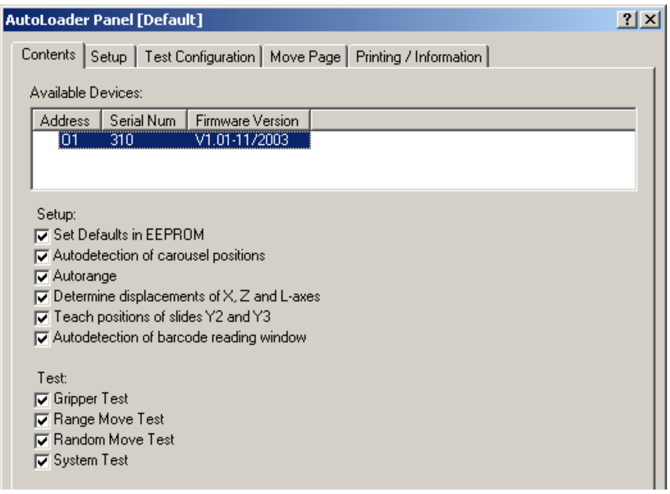
***Fig. 13-98** Specify device linked to AutoLoader*

2 If the **Setup** page is opened now, you must first specific the device to which the Autoloader is linked.

3 Select the device linked with the AutoLoader from the drop down list and confirm with **Next** on the process prompt.

Depending on your selection, the **Contents** page looks as shown in the following figures.

Autoloader Linked to Aquarius



Available Devices:

Address	Serial Num	Firmware Version
01	310	V1.01-11/2003

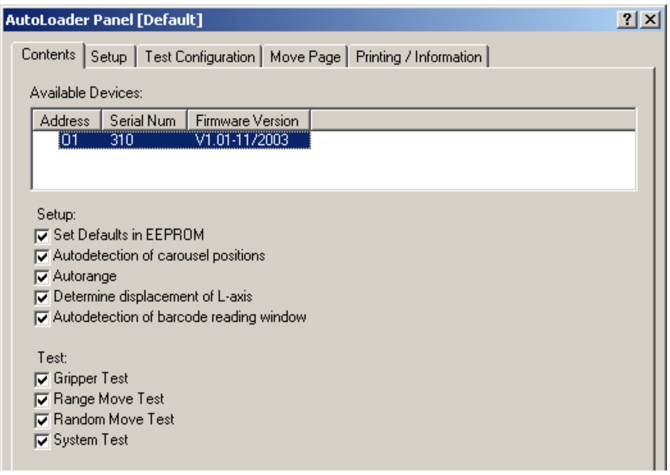
Setup:
- ☑ Set Defaults in EEPROM
- ☑ Autodetection of carousel positions
- ☑ Autorange
- ☑ Determine displacements of X, Z and L-axes
- ☑ Teach positions of slides Y2 and Y3
- ☑ Autodetection of barcode reading window

Test:
- ☑ Gripper Test
- ☑ Range Move Test
- ☑ Random Move Test
- ☑ System Test

Fig. 13-99 *Contents page if AutoLoader is linked to Aquarius*

If the AutoLoader is linked to the Aquarius:
- The setup procedure **Determine displacement…** is for the X, Z and L-axes.
- There is a setup procedure **Teach Positions of slides Y2 and Y3.**

AutoLoader Linked to Cellerity



Available Devices:

Address	Serial Num	Firmware Version
01	310	V1.01-11/2003

Setup:
- ☑ Set Defaults in EEPROM
- ☑ Autodetection of carousel positions
- ☑ Autorange
- ☑ Determine displacement of L-axis
- ☑ Autodetection of barcode reading window

Test:
- ☑ Gripper Test
- ☑ Range Move Test
- ☑ Random Move Test
- ☑ System Test

Fig. 13-100 *Contents page if AutoLoader is linked to Cellerity*

If the AutoLoader is linked to a Cellerity instrument:
- The setup procedure **Determine displacement…** is only for the L-axis.
- There is no setup procedure **Teach Positions of slides Y2 and Y3.**

Pages The **AutoLoader** panel is subdivided into the following pages:

Tab. 13-24 *Pages of Te-MO Refill Panel*

Pages	Function
Contents	General overview, procedure selection
Setup	Lets you select the device linked with the AutoLoader
Test Configuration	Lets you set the test parameters
Move Page	For moving the various parts of the AutoLoader in their axes
Printing / Information	Print selection of QC-report

13.7.4 Setup Page

Purpose The **Setup** page lets you define the target instrument to which the AutoLoader is linked.

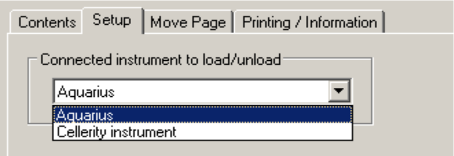


Fig. 13-101 *Setup page*

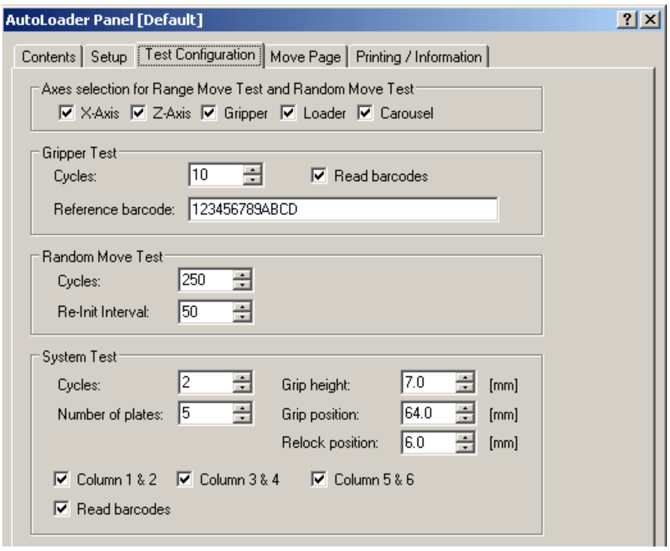
Controls The destination device can be selected from the drop down list box.

13.7.5 Test Configuration Page

Cross References List of cross references to information provided in other sections:

Information	References
Relock position	See "Extracting Labware", 🗎 13-100

Purpose The **Test Configuration** page allows you to set the parameters for the various AutoLoader tests.



AutoLoader Panel [Default]

Axes selection for Range Move Test and Random Move Test
☑ X-Axis ☑ Z-Axis ☑ Gripper ☑ Loader ☑ Carousel

Gripper Test
Cycles: 10 ☑ Read barcodes
Reference barcode: 123456789ABCD

Random Move Test
Cycles: 250
Re-Init Interval: 50

System Test
Cycles: 2 Grip height: 7.0 [mm]
Number of plates: 5 Grip position: 64.0 [mm]
Relock position: 6.0 [mm]
☑ Column 1 & 2 ☑ Column 3 & 4 ☑ Column 5 & 6
☑ Read barcodes

Fig. 13-102 *AutoLoader - Test Configuration page*

Controls

Axes selection	5 check boxes that allow you to select the axes for which you want to perform the **Range Move Test** and the **Random Move Test**.
Gripper Test	Frame containing the controls for the gripper test
- **Cycles**	For setting the number of test cycles
- **Read barcodes**	Activates/deactivates barcode readings (can only be selected if a barcode reader is installed).
- **Reference barcode**	Lets you enter a reference barcode (only possible if a barcode reader is installed)
Random Move test	Controls for the Random Move Test
- **Cycles**	- Number of test cycles
- **Re-Init Interval**	- Cycles after which an axis is reinitialized
System Test	Controls for configuring the system test
- **Cycles**	- Number of test cycles
- **Number of Plates**	- Plates (racks) to be moved in one test cycle
- **Grip height**	- Specifies the height (measured from the bottom) at which a plate is gripped.
- **Grip position**	- Specifies the distance from the left edge to the center of the gripper jaw that grips a rack.
- **Relock position**	- Position in which the plate locks close during the extraction of a rack from the stacker column in order to prevent the subsequent rack from being extracted as well. Details (→ Cross References).

- **Column 1 & 2** **Column 3 & 4** **Column 5 & 6**	- Specifies the stacker columns between which racks are to be moved during the **System Test**.
- **Read barcodes**	- If the (optional) barcode reader is installed and this check box is selected, barcode labels applied to the racks are read when the racks are moved to or from the Aquarius during the test.

13.7.6 Move Page

Cross References

List of cross references to information provided in other sections:

Information	References
AutoLoader movement axes	See section 13.6.1, 🗎 13-84

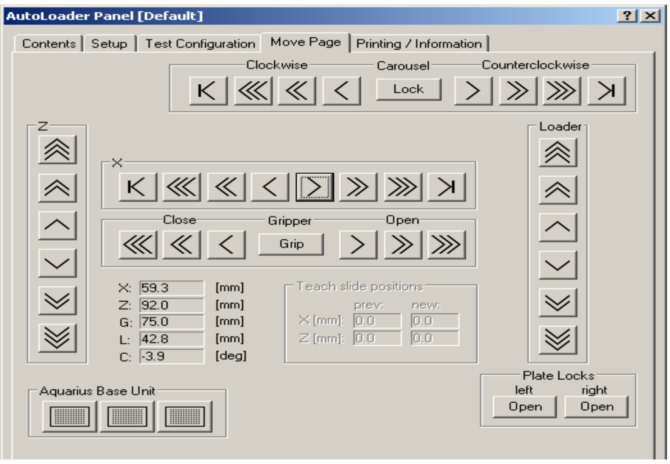
Purpose

The **Move Page** allows you to move parts of the AutoLoader in the appropriate axes: X, Z, L, C and G (→ Cross References).

- Whole gripper module in the X-axis (left ↔ right)
- Grippers:
  - in the Z-axis (up ↔ down)
  - in the G-axis (open ↔ close)
- Loader module in the L-axis (up ↔ down)
- Carousel in the C-axis (CW ↔ CCW rotation)

Note:

- *Not all movement axes are enabled during each setup or test procedure. However, the software always enables the possible movement directions automatically.*
- *The buttons in the frame **Aquarius Base Unit** are not available if the Autoloader is not linked to Aquarius.*



X: 59.3 [mm]
Z: 92.0 [mm]
G: 75.0 [mm]
L: 42.8 [mm]
C: -3.9 [deg]

Teach slide positions
prev: new:
X [mm]: 0.0 0.0
Z [mm]: 0.0 0.0

Fig. 13-103 AutoLoader - Move Page

Controls The **Move Page** contains the following controls

‹ › ˄ ˅	Single step (1/10 mm or 1/10°) movement/rotation buttons.
« » ︽ ︾	Ten steps (1 mm or 1°) movement/rotation buttons.
⋘ ⋙ ⤊ ⤋	Continuous movement/rotation buttons (if button is kept pressed).
|‹ ›|	Movement/rotation to next or previous position. • X-axis: Aquarius: Moves gripper module to next or previous logical position (Slides Y1, Y2 Y3 in Aquarius, loading positions L1 and L2 in AutoLoader.) Cellerity: Moves gripper module into the initialization position on the Cellerity side and into the loading positions L1 and L2 in AutoLoader. • C-axis: Turns carousel CW or CCW by 120° into next or previous logical position
Lock	C-axis (carousel): Pushes the lock pin upwards into the lock position (only for special cases).
Plate locks	Two command buttons that can be used to open or close the plate locks that hold the racks in a stacker column. The caption of the button changes between **Open/Close**.
Aquarius Base Unit	These three buttons are associated with the three slides in the Aquarius. They are not available if the AutoLoader linked with a Cellerity. • Left button: Moves the rearmost carrier on slide Y1 into the exchange position and opens the APC if there is one. • Middle button: Moves the rearmost carrier on slide Y2 into the exchange position. • Right button: Moves the rearmost carrier on slide Y3 into the exchange position and opens the APC if there is one.
X, Z, G, L, C	Five text boxes showing the current positions of the parts that move in the X, Z, G, L and C-axes.
Teach slide positions	Shows the previous and current differences for the X and Z-axes between the original carrier positions used for Aquarius and those needed for the AutoLoader • **prev.:** Difference obtained during the last setup • **new:** Current difference

Note:

- *The arrows on the movement buttons indicate the direction in which the respective parts will be moved.*
- *If you place the mouse pointer over a movement button, a text appears that explains what you can do with the button (so-called “tool tip”)*

Keyboard Control

It is also possible to use the keyboard for the movements in the various axes. You can use the corresponding keys of the numeric keypad or the keys in the key blocks left of the numeric keypad.

Tab. 13-25 *Moving the arm with the keyboard*

Key (left of numeric keypad)	Key in numeric pad (NumLock on)	Movement/ rotation axes	Part moved
→	6 →	X+ (right)	Gripper module
←	4 ←	X- (left)	Gripper module
↑	8 ↑	Z+ (up)	Gripper module
↓	2 ↓	Z- (down)	Gripper module
Delete	**.** Delete	G+ (open)	Grippers
Insert	0 Insert	G- (close)	Grippers
Page Up	PgUp 9	L+ (up)	Loader module
Page Down	PgDn 3	L- (down)	Loader module
End	1 End	C- (CCW)	Carousel
Home	7 Home	C+ (CW)	Carousel

Steps

The parts of the AutoLoader are moved as follows:

- Every time you hit one of the above keys the part is moved/rotated by one step (0.1 mm or 0.1 degree).
- If you keep the key pressed it is moved/rotated continuously at a speed of about five steps per second.
- You can press a key continuously and at the same time press the Ctrl key. In this case, the respective part of the AutoLoader is accelerated until it reaches a maximum speed.

13.7.7 Set Defaults in EEPROM

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

This procedure writes the default values of the corresponding device to the EEPROM. In general, this procedure must be performed once, when a new instrument is installed. Note that the default values are not altered by setups and adjustments.

Procedure

To write the corresponding default values to the EEPROM:

1 On the **Contents** page, select the **Set Defaults in EEPROM** check box.

No further parameters need to be defined.

2 Download the default values with **Start**.

13.7.8 Autodetection of Carousel Positions

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this procedure is to automatically search the carousel positions in which the columns 1 & 2 and 5 & 6 face the front of the Aquarius (home position).

Principle

First, the carousel is initialized and turned into the mechanical stop (approx. 5° in direction from the home position).

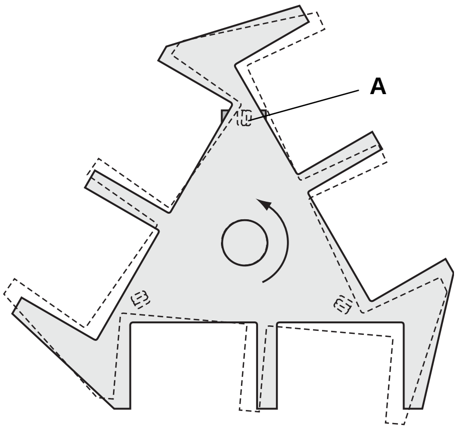


Fig. 13-104 *Carousel top view*

Now, the carousel in turned counterclockwise in steps of 0.5° until the positioning hole opposite the position 1 & 2 is exactly above the lock pin. After each step, the lock pin is pushed upwards against the bottom by means of a solenoid that is located below the carousel. As soon as the lock pin enters the slotted hole (A, is detected by an optical sensor), the required position is found.

After the carousel position 1 & 2 has been found the carousel is turned approx. 234° and positioning hole opposite the position 5 & 6 is searched in the same manner.

The following values are determined:

- After the detection of position 1 & 2: Calculated C-displacement.
- After the detection of position 5 & 6: Calculated scale-adjust factor and recalculated C-displacement.

The determined values are written to the EEPROM.

Procedure

1 On the **Contents** page, select the **Autodetection of Carousel Positions** check box.

No further parameters need to be entered.

2 Click **Start** to begin.

The carousel positions 1 & 2 and 5 & 6 are searched automatically as described above and the calculated values for the C-displacement and the scale adjust factor are stored in EEPROM.

13.7.9 Autorange

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this procedure is to determine the scaling adjust factors of the X, Z, and L-axes and the available ranges of the G and C-axes.

Principle

The procedure moves all movable parts of the AutoLoader in their respective axes to their extreme positions, counts the actual number of steps and determines the scaling adjust factors of the X, Z, and L-axes and the available range of the G and C-axes. In addition, the park position of the gripper module is determined. The values found are stored in EEPROM.

The parts are moved one by one in the following sequence:

- Gripper module along transfer rail (X-axis)
- Grippers up/down (Z-axis)
- Grippers open/close (G-axis)
- Loader module up/down (L-axis)
- Carousel (C-axis)

Procedure

1. Remove the stacker columns 1 and 2.

   You will not be able to start the procedure with the stacker columns inserted.
2. On the **Contents** page, select the **Autorange** check box

   No further parameters need to be entered.
3. Click **Start** to begin.

13.7.10 Determine Displacements of X, Z and L-Axes

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this procedure is to determine the displacements in the X, Z and L-axes so that labware can be picked up and placed correctly.

Note: *Depending on the device the AutoLoader is linked with, the displacements in the following axes are determined.*

- *Aquarius: X, Z and L axes.*
- *Cellerity: Only L-axis.*

Tools

For this setup you need the “Reference for 96 / 384 Head”.

Procedure

Start

To determine the displacements:

1 On the **Contents** page, select the following check box:
  – Aquarius: **Determine displacements of X, Z and L-axes**
  – Cellerity: **Determine displacements of L-axis**

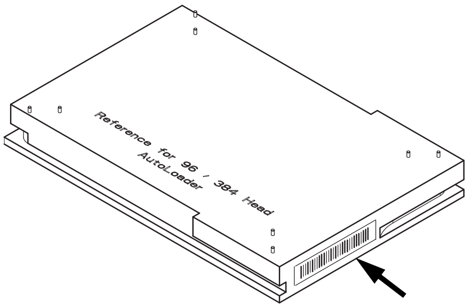
2 Click **Start** to begin.

3 Follow the instructions on the screen.

4 If the AutoLoader is linked with a Cellerity system, skip the following steps 5 to10 and continue with step 11.

Alignment in Aquarius

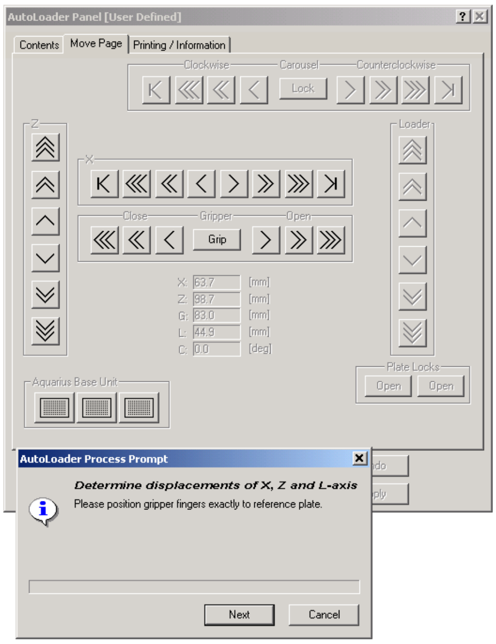
5 When prompted to do so place the “Reference for 96 / 384 Head” on the indicated carrier in the Aquarius as shown in the figure.



Make sure you place the reference plate correctly. The barcode label must be on the right side (arrow in figure).

The narrow part of the plate must be on the left side.

Fig. 13-105 *Reference plate*



X: 63.7 [mm]
Z: 98.7 [mm]
G: 83.0 [mm]
L: 44.9 [mm]
C: 0.0 [deg]

Determine displacements of X, Z and L-axis

Please position gripper fingers exactly to reference plate.

6 Click **Next** to continue

The respective carrier on slide Y1 and the gripper module are moved into the exchange position.

The grippers are not moved down yet.

7 Use the X, Z and G movement buttons on the **Move Page** to align the gripper module precisely with the reference plate.

8 Follow the instructions provided in "Alignment in AutoLoader", 🗎 13-112.

Fig. 13-106 *Aligning reference plate.*

Alignment in AutoLoader

9 Click **Next** to continue when done.

The X and Z-displacements are stored in the AutoLoader.

The grippers are opened and the gripper module is positioned temporarily above the slide Y3 (right side).

10 When prompted to do so, remove the reference plate from the exchange position.

11 You are now prompted to place the reference plate on the left carrier of the loader module. Click next to continue.

The gripper module moves into the left loader position.

12 Use the **Move Page** to move the gripper module some few millimeters towards the right.

13 Then align the gripper module and the reference plate as described in "Alignment in AutoLoader", 🗎 13-112.

14 Click Next when done.

The following values are stored in the AutoLoader: L-displacements, left and right loader positions.

Alignment Procedure

To carry out the alignment follow the instructions given below:

Note: *The following figure shows the reference plate. The corresponding procedure for the reference block is the same.*

1 Use the **Move Page** to move the gripper module/grippers in the X- and Z-axes until the right edges of the grippers are some mm right of the narrow part of the plate or block and their bottom edges are about 1 mm above the reference plate (see picture (A) in following figure).

2 Use the **Gripper** buttons to open the grippers until their distance is approx. 1mm larger than the narrow part of the reference plate or block.

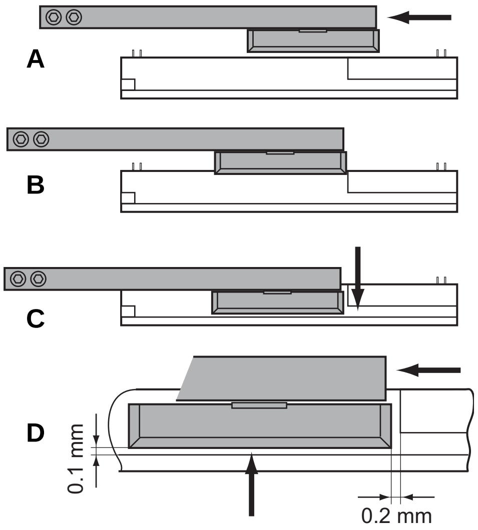


Fig. 13-107 *Aligning the grippers and the reference plate or block*

3 Use the **X**-axis buttons to move the grippers in 0.1 mm steps towards the left, until their right edges are just at the beginning of the narrow part. See picture (B).

4 Now move the grippers downwards (Z-axis) until their bottom edges just touch the rim at the bottom of the plate or block (picture C).

5 After you have done this, move the grippers 0.2 mm towards the left (X-axis) and 0.1 mm upwards (Z-axis) as shown in picture (D).

This compensates for a possible mechanical play.

ATTENTION

Be careful to make the adjustment correctly:

- Always begin some millimeters right of the narrow part of the reference plate or block as described above.
- In case you have moved the grippers too much towards the left go back and repeat the adjustment.

13.7.11 Teach Positions of Slides Y2 and Y3 (Aquarius)

Cross References

List of cross references to information provided in other sections:

Information	References
Required tools	See section 13.2.4, 🗎 13-9

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this setup is to align the gripper module in the X-axis and the Z-axis with the Y2 and Y3 slides of the Aquarius to ensure that the gripper module can pick up microplates and DiTi boxes from the carriers properly (or place them on the respective carriers).

Note: This procedure can only be carried out if the AutoLoader is linked with an Aquarius.

Tools

For this setup you need the following tools (→ Cross References):

- Reference plate for 96 / 384 Head / AutoLoader (version suitable for AutoLoader required)
- Reference block for service carrier (version suitable for AutoLoader required)

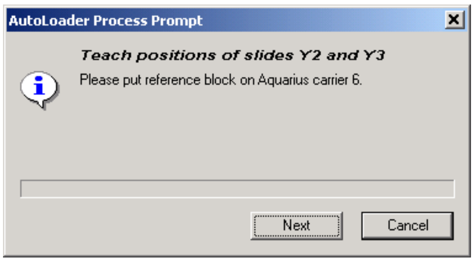
Procedure

To teach the slide positions:

1 On the **Contents** page, select the check box **Determine positions of Slides Y2 and Y3.**

2 Click **Start** to begin

You will be guided through the setup procedure by a series of process prompts. Not all of them are shown here.



Teach positions of slides Y2 and Y3

Please put reference block on Aquarius carrier 6.

Fig. 13-108 Teach slide positions

3 When the prompt shown in the figure appears put the reference block on the appropriate carrier on the slide Y2 (number is indicated on the prompt).

4 Click **Next** to continue and carry out the alignment as described below.

*The next process prompt, along with the **Move Page**, appears (not shown here)*

Alignment Procedure

To carry out the alignment follow the instructions given below:

Note: The following figure shows the reference plate. The corresponding procedure for the reference block is the same.

1 Use the **Move Page** to move the gripper module/grippers in the X- and Z-axes until the right edges of the grippers are some mm right of the narrow part of the plate or block and their bottom edges are about 1 mm above the reference plate (see picture (A) in following figure).

2 Use the **Gripper** buttons to open the grippers until their distance is approx. 1mm larger than the narrow part of the reference plate or block.

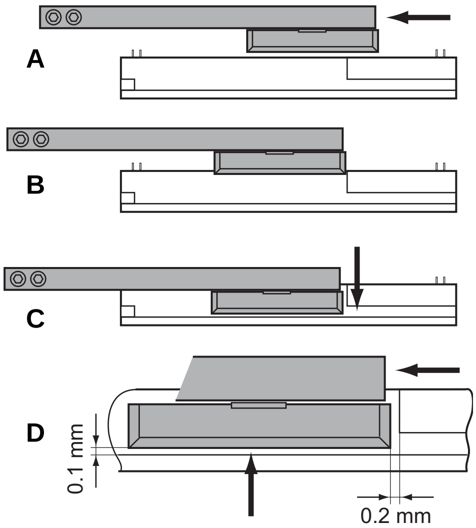


Fig. 13-109 *Aligning the grippers and the reference plate or block*

3 Use the **X**-axis buttons to move the grippers in 0.1 mm steps towards the left, until their right edges are just at the beginning of the narrow part. See picture (B).

4 Now move the grippers downwards (Z-axis) until their bottom edges just touch the rim at the bottom of the plate or block (picture C).

5 After you have done this, move the grippers 0.2 mm towards the left (X-axis) and 0.1 mm upwards (Z-axis) as shown in picture (D).

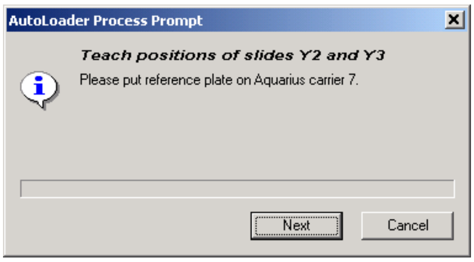
This compensates for a possible mechanical play.

ATTENTION

Be careful to make the adjustment correctly:

- Always begin some millimeters right of the narrow part of the reference plate or block as described above.
- In case you have moved the grippers too much towards the left go back and repeat the adjustment.

6 Click **Next** to continue when done.



Teach positions of slides Y2 and Y3

Please put reference plate on Aquarius carrier 7.

Fig. 13-110 *Teach slide Y3 position*

7 When the prompt shown in the figure appears put the reference plate on the appropriate carrier on the slide Y3 (number is indicated on the prompt).

8 Now perform the alignment you have done before with the reference plate on slide Y3.

The procedure is the same. The only difference is that you carry it out with the reference plate and not with the reference block.

9 Click **Next** when done

10 When prompted to do so remove the reference plate and the reference block from the slides and click **Next** to continue.

The X/Z-differences between the carrier positions (on Y2/Y3 slides) for the AutoLoader and those required by Aquarius are stored in the AutoLoader.

13.7.12 Autodetection of Barcode Reader Window

Field Service Engineers

This procedure is for field service engineers and can only be carried out by users belonging at least to the SnS_FSE user group.

Purpose

The purpose of this procedure is to automatically detect the range within which the barcode reader can recognize barcode labels applied to racks when they are moved along the transfer rail.

Note: *This procedure can only be performed if the AutoLoader is equipped with the optional barcode reader.*

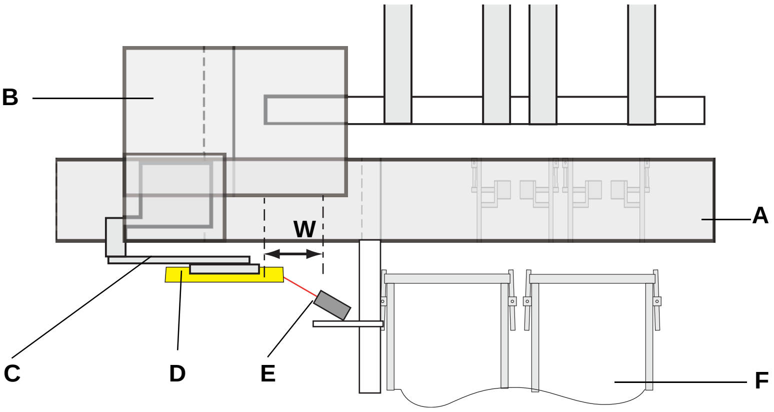
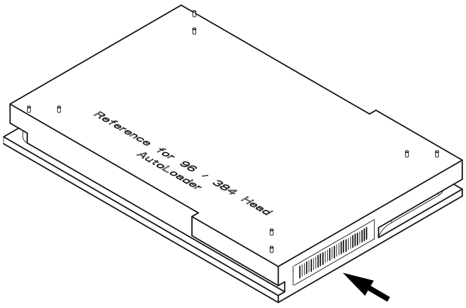


Fig. 13-111 *Barcode reader window*

A	*Transfer rail*	***E***	*Barcode reader*
B	*Gripper module*	***F***	*Loader module*
C	*Gripper*	***W***	*Barcode reader window*
D	*Rack (reference plate for this setup)*		

Tools

For this setup you need the “Reference for 96 / 384 Head”.



Placing the reference plate correctly:

- The barcode label must be on the right side (arrow in figure).
- The narrow part of the plate must be on the left side.

Fig. 13-112 *Position of barcode label*

Procedure

To determine the barcode reader window:

1. On the **Contents** page, select the check box **Autodetection of Barcode Reader Window**.
2. Click **Start** to begin.
3. Follow the instructions on the screen.
4. When prompted to do so place the “Reference for 96/384 head” on the left carrier of the loader module if not done yet

   Make sure you place the plate correctly (see previous figure).
5. Click **Next** to continue.

   The gripper module picks up the reference plate and moves it along the transfer rail. At the end of the setup it puts the plate back on the left carrier of the loader module.

13.7.13 Gripper Test

Purpose

The purpose of this test to verify whether labware is transported correctly from the AutoLoader to the destination device and back. If the AutoLoader is equipped with a barcode reader it is also possible to check the correct function of the barcode reader.

Tool

The test is preferably performed with the “Reference for 96 / 384 Head”. The advantage is that the reference plate weighs approx. 300 grams. Therefore, it can be used to test whether the gripper force is large enough. If no reference plate is available, use an “ordinary” microplate as the test rack.

Test Run

The test can be performed for a user-defined number of cycles. During one cycle, the following is carried out:

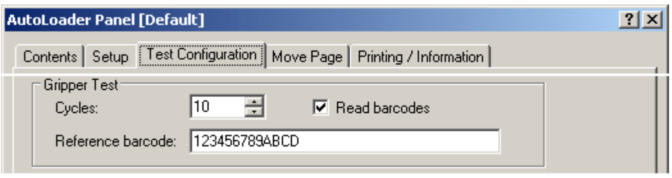
- First, the test rack is picked up from a loader position (L_{Left} or L_{Right}) and transported to the destination device:
  - Aquarius: The reference plate (or rack) is moved over a slide (Y1, Y2 or Y3). There it is first moved downwards, then upwards again. By measuring the supply current of the gripper motor, the system is able to detect whether the object is still held between the grippers.
  - Cellerity: The reference plate is moved to three different X-positions, but it is not moved downward/upward. By measuring the supply current of the gripper motor, the system is able to detect whether the object is still held between the grippers.
- Afterwards, the rack is brought back to the other loader position. Note that the loader positions as well as the positions in the destination device are changed after each cycle.
- If the barcode test is active the barcode is read twice: When the rack is transported to the destination device and on the way back.

The above steps are carried out for the defined number of cycles.

Procedure

To perform the gripper test:

1. On the **Contents** page, select the **Gripper Test** check box and change to the **Test Configuration** page.



Gripper Test
Cycles: 10
☑ Read barcodes
Reference barcode: 123456789ABCD

Fig. 13-113 *Test Configuration page - Parameters gripper test*

2 In the frame **Gripper Test** , set the number of **Cycles** or accept the value suggested by the software.

3 If you wish to verify the correct reading of the barcode, then enter the following in the frame **Gripper Test** (only possible if a barcode reader is installed):

- Select the check box **Read barcodes.**
- If you use the “Reference for 96 / 384 Head” you can accept the barcode that appears in the **Reference barcode** text box.
- If you use a microplate for the test, type the barcode that is printed on the label in the **Reference barcode** text box.

4 Place the test rack on the left carrier of the loader module. Make sure that the barcode label is on the right side.

5 Click **Start** to begin.

*The rack is now transported for the predefined number of cycles from the AutoLoader to the destination device and back. At the end of the test a **Test Passed** or **Failed** message is displayed.*

*Test results can be viewed on the **Printing / Information** page.*

Pass/Fail Criteria

The test is passed if none of the following values exceeds 0:

Gripping errors	Number of times the rack was not gripped correctly	0
Plate lost	Number of times the plate was lost	0
Barcodes not read	Number of times the barcode could not be read	0
Barcodes read wrong	Number of times the barcode was read incorrectly	0

If the Test Fails

If the test rack is lost or not gripped correctly:

- Repeat the following setup procedures:
  - All destination devices: **Autorange**
  - Aquarius: **Determine Displacement of X, Z and L-Axes**.
  - Cellerity: **Determine Displacement of L-Axis**.
- If the test fails again call your nearest service organization.

If the barcode is not read correctly:

- Check whether the rack is placed correctly (barcode label on right side).
- Check whether barcode label is damaged.
- Check whether the reference code has been entered correctly.
- Carefully clean the front of the barcode reader with alcohol.
- Repeat the setup **Autodetection of Barcode Reader Window**.
- If the test fails again call your nearest service organization.

13.7.14 Range Move Test

Purpose

The purpose of this test is:

- To ensure that the movement ranges are not too large.
- To ensure that the parts are moved at the maximum speed over the whole range.
- To detect possible losses of movement steps.

Principle

The movable parts of the AutoLoader (gripper module, grippers, loader module, carousel) are moved one by one several times to the extreme positions of their axes (X, Z, G, L and C). Then, they are reinitialized. The parts (axes) to be moved can be selected on the **Test Configuration** page.

The parts are moved in their axes (if selected) in the following sequence X, Z, G, L and C.

***Note:** If you intend to perform the **System Test** automatically after this test (possible if the corresponding check boxes are selected on the **Contents** page) it is advisable to insert stacker columns into carousel position # 1, 3 or 5 that already contain the racks you will need for the **System Test**.*

Procedure

To perform the **Range Move Test**:

1. On the **Contents** page select the **Range Move Test** check box and change to the **Test Configuration** page.
2. In the frame **Axes selection for Range Move Test and Random Move Test** select the axes for which you want to perform the test.
3. Click **Start** to begin.

   *Test results can be viewed on the **Printing / Information** page.*

Pass/Fail Criteria

The test is passed if the values of all axes are within the given deviation limit (0.1 mm).

If the Test Fails

Repeat the **Autorange** setup procedure. If the test fails again, call your nearest service organization.

13.7.15 Random Move Test

Purpose

The purpose of this test is to verify whether the movable parts of the AutoLoader (gripper module, grippers, loader module, carousel) can be moved at random, without losing steps, in their axes (X, Z, G, L and C) at various speeds and to various positions for a great number of times.

Principle

The parts of the AutoLoader that have been selected for this test are initialized and then moved at random one by one for a user-defined total number of **Cycles**. During the test, a part is reinitialized after every **Re-Init Interval** cycles (can also be defined by the user).

In order to avoid collisions during the test, each part is moved in its axis according to the following pattern:

- The first of the selected parts is moved **Re-Init Interval** cycles and then re-initialized and moved into save position where no collisions with other movable parts are possible.
- Then the same is done with the second, third, etc. axes.

- After all selected parts have been moved for **Re-Init Interval** cycles the sequence is repeated until the total number of test cycles is reached.
- The parts are moved in their axes (if selected) in the following sequence X, Z, G, L and C.

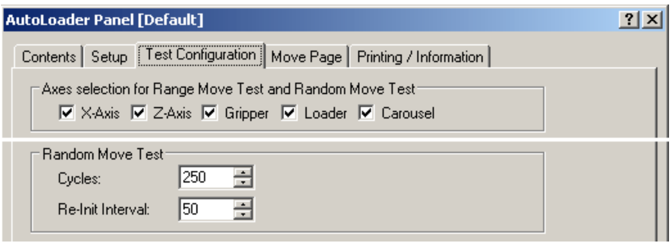
Example: **Cycles** = 3000, **Re-Init Interval** = 500, all axes selected. With this configuration, each part is moved 6 x 500 **Cycles** according to the pattern described above.

***Note:** If you intend to perform the **System Test** automatically after this test (possible if the corresponding check boxes are selected on the **Contents** page) it is advisable to insert stacker columns into carousel position # 1, 3 or 5 that already contain the racks you will need for the **System Test**.*

Procedure

To perform the **Random Move Test**:

1 On the **Contents** page, select the **Random Move Test** check box and change to the **Test Configuration** page.



☑ X-Axis ☑ Z-Axis ☑ Gripper ☑ Loader ☑ Carousel

Cycles: 250

Re-Init Interval: 50

Fig. 13-114 *Test Configuration page*

2 In the frame **Axes selection for Range Move Test and Random Move Test,** select the axes for which you want to perform the test.

3 In the frame **Range Move Test**, set the total number of test **Cycles** and the **Re-Init Interval**.

4 Click **Start** to begin.

*Test results can be viewed on the **Printing / Information** page.*

Pass/Fail Criteria

The test is passed if the values of all axes are within the given deviation limit (0.1 mm).

If the Test Fails

Repeat the **Autorange** setup procedure. If the test fails again, call your nearest service organization.

13.7.16 System Test

Cross References

List of cross references to information provided in other sections:

Information	References
Relock position	See "Extracting Labware", 🗎 13-100

Purpose

This test allows the user to check whether labware is transported properly from the stacker columns to the destination device and back and stored again in a stacker column.

Principle

The test is carried out with a number of labware objects for a defined number of test cycles. During one test cycle each object (microplate, DiTi box, flask) is:

- Extracted from the left or right stacker column by the loader module (see note below).
- Picked up by the gripper module and transported to the destination device.
  - Aquarius: The object is placed on the rearmost carrier of slide Y1 or Y3 and picked up again (the first plate is put on slide Y1, the second on Y3, the third on Y1 and so forth).
  - Cellerity: The object is transported to three different X-positions, but is not placed and picked up again.
- Transported back to the AutoLoader and stored in the neighboring stacker column.
- If the AutoLoader is equipped with a barcode reader it is also possible to check the barcode labels while the racks are moved to or from the Aquarius. The barcodes read during the first cycle (movement towards Aquarius) are used as references during subsequent cycles.

Note: *During the first cycle the racks are moved via the destination device from the left to the right stacker column of a column pair, during the second cycle from the right to the left column and so forth.*

Note: *You can carry out the test for one, two or all carousel positions. If you select more than one carousel position the defined number of test cycles is performed for each column pair and the total test duration increases accordingly.*

Procedure

To perform the **System Test**:

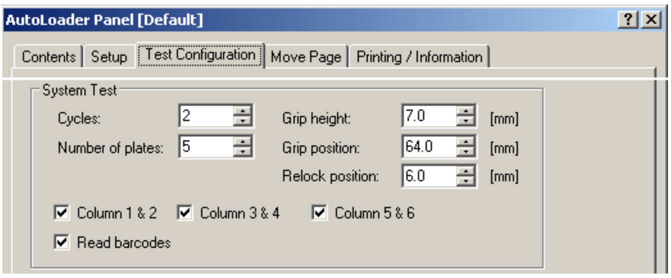
1 If not already done (i.e. before starting the **Range Move Test** or **Random Move Test**), fill the required number of labware objects into the left stacker column at each carousel position for which you wish to carry out the test:

ATTENTION

Make sure you fill the labware into the stacker columns correctly:

- All left stacker columns must be filled with the same number and type of objects.
- The right-hand stacker columns must be empty at the beginning of the test.
- The barcode labels musts be on the right side of the objects.

2 On the **Contents** page, select the **System Test** check box and change to the **Test Configuration** page.



AutoLoader Panel [Default]

System Test

Cycles: 2
Number of plates: 5
Grip height: 7.0 [mm]
Grip position: 64.0 [mm]
Relock position: 6.0 [mm]

☑ Column 1 & 2 ☑ Column 3 & 4 ☑ Column 5 & 6
☑ Read barcodes

Fig. 13-115 *Test Configuration page*

3 On the **Test Configuration** page, enter the following:

- **Cycles:** Number of times you wish to move the plates between two neigboring stacker columns.
- **Number of Plates**: The number of labware objects you want to move between the left and right stacker column of a carousel position. Remember that the number and type of objects must be the same for all carousel positions.
- **Grip heigth:** Distance (h) measured from the bottom of the object to the bottom edge of the gripper (see following figure). The value to be entered depends on the rack type.
- **Grip position:** Distance (p) between the middle of the gripper jaw and the left side of the object (see following figure). The value to be entered depends on the object type.

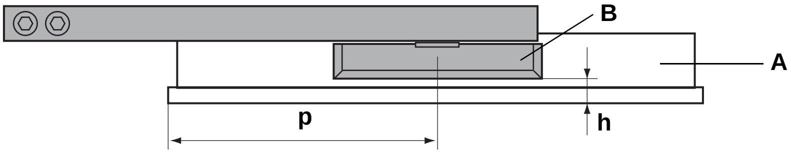


Fig. 13-116 *Grip height and position*

A	*Rack (microplate)*	***h***	*Grip height*
B	*Gripper jaw*	***p***	*Grip position*

- **Relock position:** Position in which the plate locks close again while an object is being extracted in order to prevent the subsequent one from being extracted as well. For details (→ Cross References).
- **Column 1 & 2, Column 3 & 4, Column 5 & 6:** Select the check boxes of those columns between which you want to move objects.
- **Read barcodes:** Select this check box if a barcode reader is installed and you wish to check the barcode while the labware objectes are moved to or from the destination device.

4 Click **Start** to begin.

*The AutoLoader starts now moving the plates according to the specifications. At the end of the test, a **Passed** or **Failed** message appears.*

5 Confirm with **OK**.

*Test results can be viewed on the **Printing / Information** page.*

Pass/Fail Criteria

The test is passed if none of the following values exceeds 0:

Move errors	Number of times objects could not be moved to their destinations (e.g., because of collisions).	0
Gripping errors	Number of times an object could not be gripped properly.	0
Barcode not	Number of times the barcode could not be read	0
Barcode read wrong	Number of times the barcode was read incorrectly	0

If the Test Fails

If the test plate is lost or not gripped correctly:

- Check the settings for this test.
- Repeat the following setup procedures:
  - All destinations: **Autorange**
  - AutoLoader: **Determine Displacement of X, Z and L-Axes**.
  - Cellerity: **Determine Displacement of L-Axis**.
- If the test fails again call your nearest service organization.

If the barcode is not read correctly:

- Check whether the labware objects are inserted in the stacker columns correctly (barcode label on right side).
- Check whether barcode labels are damaged.
- Carefully clean the front of the barcode reader with alcohol.
- Repeat the setup **Autodetection of Barcode Reader Window**.
- If the test fails again call your nearest service organization.

13.7.17 Printing / Information

Cross References

List of cross references to information provided in other sections:

Information	References
Printing page	See section 5.2.8, 🗎 5-24

Purpose

The **Printing / Information** page lets you compose a QC-Report that meets your requirements. For more detailed information (→ Cross References).

Note: *The* ***Operator*** *field automatically shows the full name of the logged-in user. Remember, however, that you must fill out the* ***Comment*** *field BEFORE running any setup and test procedures, otherwise your comments will not appear in the printed report.*

QC-Report

The QC-Report summarizes the results of the tests peformed according to the selections made on the **Printing / Information** page. For more detailed information (→ Cross References).

14 Worktable Complete Editor

14.1 Introduction

Cross References

References to information provided in other sections.

Information	Reference
Windows Start Menu	See section 5.1.1, 🗎 5-1
User groups, User rights	See section 6.5.3, 🗎 6-6
Data files, directories	See section 5.3, 🗎 5-29

Description

The Worktable Complete Editor is an independent module within the Instrument Software that allows you to define worktable maps, carriers, racks and containers.

It is advisable to use Tecan specified layouts for the tests. By using these layouts and loading the relevant instrument configuration file, the racks are automatically chosen for the tests. However, if you wish to set up a test that uses alternate racks, you must use the Complete Worktable Editor to set up the worktable map.

Permissions

The users of the Worktable Editor must have the appropriate rights granted by the **User Managemant System**. For details about access rights refer to the description of the User Administration System *(→ Cross References)*:

Tab. 14-1 *User rights for worktable editor*

User Group	Right to do
SnS_Customer	Creating worktables
SnS_FSE	Creating worktables Creating / editing carriers, racks and containers

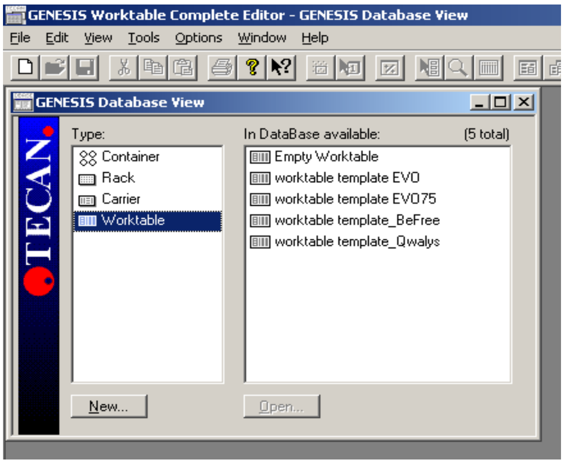
Note:

- Tecan labware data cannot be overwritten.
- All changes made are stored in the directory <data_path> *(→ Cross References)*

Starting the Software

1 In the Windows start menu, run the Worktable Editor with **Start > All Programs > Tecan > Instrument Software <version> > Worktable Complete Editor** (→ Cross References).

*The Worktable Complete Editor starts up with the **GENESIS Worktable Complete Editor** main window with opened **GENESIS Database View** window.*



Type:

- Container
- Rack
- Carrier
- Worktable

In DataBase available: (5 total)

- Empty Worktable
- worktable template EVO
- worktable template EVO75
- worktable template_BeFree
- worktable template_Qwalys

Fig. 14-1 GENESIS Worktable Complete Editor main window

Parts of Worktable Complete Editor

The Worktable Complete Editor consists of the following editors that allow you to compose a complete worktable map with all required carriers, racks, and containers:

Tab. 14-2 Parts of the Worktable Complete Editor

Editor	Description	Details see
Worktable Editor	Serves to create or edit worktable maps from the Genesis database	14.2, 🗎 14-2
Container Editor	Serves to create or edit containers from the Genesis database.	14.4, 🗎 14-11
Rack Editor	Serves to create or edit racks from the Genesis database.	14.5, 🗎 14-17
Carrier Editor	Serves to create or edit carriers from the Genesis database.	14.6, 🗎 14-26

14.2 Worktable Editor

Cross References

References to information provided in other sections.

Information	Reference
Carrier, Rack and Container Editor	See section 14.3, 🗎 14-10

Description

With the Worktable Editor module, graphical representations of carriers are simply assigned by picking them from the list with the mouse and placing them on one of the grid positions on the worktable map. Since carriers can be freely assigned to any position on the worktable, various worktable maps that are suitable for different applications can be defined.

The worktable map is stored in the database and is used by the software to retrieve physical positions and dimensions of containers. The map also informs the software about the ways in which the tips are allowed to travel (and in which they are not!) when moving from one position to the next.

Note: *With the Instrument Software, carriers are defined as complete objects in the database. All physical properties of such a carrier are related to the positioning rails. Carriers must conform to the 25 mm positioning array ruling the worktable. Once defined, they can be repositioned on any position on the worktable. No further carrier or positioning data is required.*

Note: *The Worktable Editor only allows the positioning of carriers that have previously been defined! Before attempting to create your own worktable map, make sure the carriers you wish to use are either standard Tecan carriers (i.e. they are predefined) or use the CRC Editor to define your own custom carriers (→ Cross References).*

14.2.1 Create Worktable

Purpose

Lets you create a new worktable. Your entries will be stored as a new record in the database.

Files, Directories

The function creates the following files, depending on the user rights:

User rights	File
SnS_FSE	WorktableDatabase.Common.zip
SnS_Production	WorktableDatabase.QC.zip

Directory: <data_path>

Procedure

To create a new worktable map:

1 Select the **Worktable** entry in the **Type list** of the **GENESIS Database View** window.

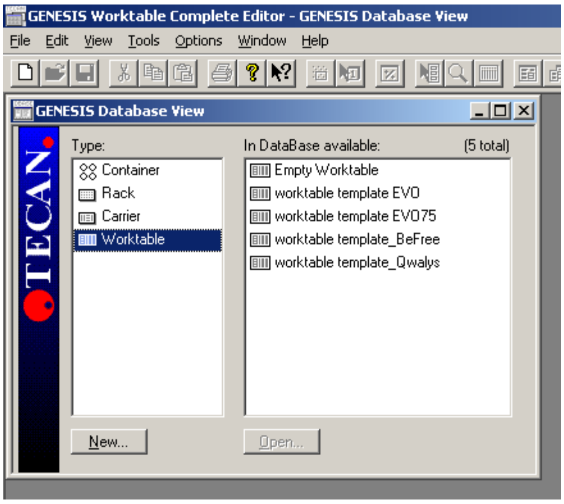


Fig. 14-2 GENESIS Database View window

2 Create a new worktable map with **New**.

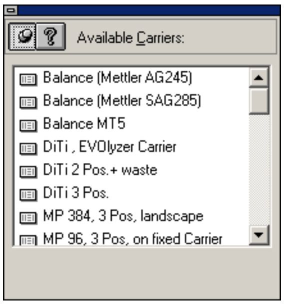


Fig. 14-3 Available Carriers window

3 Start **View > Show Available Carriers** to receive a list of all carriers defined in the database.

4 Select the appropriate carrier and drag it over the worktable map to the grid position where you wish the carrier to be placed.

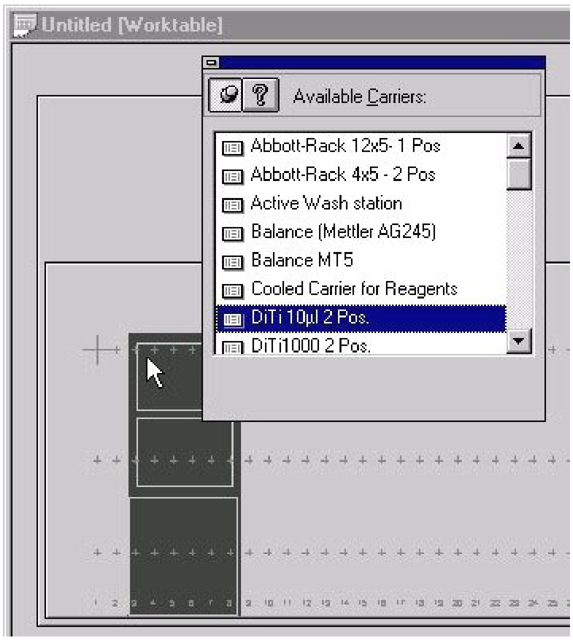


Fig. 14-4 *Carrier Placement*

5 Allow some time till the program has loaded the data of the selected carrier into the memory.

When ready, the cursor will change to indicate that the program is ready to place a copy of the carrier. A graphical representation of the carrier becomes visible on the worktable map.

6 Drop the carrier to the required grid.

7 Repeat steps 4 through 6 to continue and load all carriers you wish to have on the worktable map.

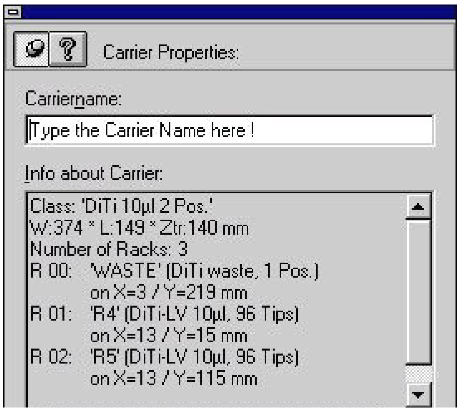
8 Use the mouse to readjust the positions of the carriers until their arrangement fits your application requirements.

9 To delete a carrier, click it with the mouse and press the **Delete** button on your keyboard.

10 Double-click a carrier on the worktable map to call the **Carrier Properties** window. It displays a short description of the carrier and allows you to give every carrier a unique name. Use a suitable short name (max. 10 characters without dots) for the carrier function in the application you wish to run on this worktable map.

11 Repeat step 10 for all carriers on the worktable map.

To prevent system crashes, always keep the ***Available Carriers*** *window open when working with the* ***Carrier Properties*** *window.*



Carriername:

Type the Carrier Name here !

Info about Carrier:

Class: 'DiTi 10µl 2 Pos.'
W:374 * L:149 * Ztr:140 mm
Number of Racks: 3
R 00: 'WASTE' (DiTi waste, 1 Pos.)
on X=3 / Y=219 mm
R 01: 'R4' (DiTi-LV 10µl, 96 Tips)
on X=13 / Y=15 mm
R 02: 'R5' (DiTi-LV 10µl, 96 Tips)
on X=13 / Y=115 mm

Fig. 14-5 *Carrier Properties window*

12 When the arrangement on the worktable map meets your requirements save it under an appropriate name with **File > Save as**.

Reloading the Map

The worktable map is now saved in the database. It can be reloaded by the application software that will automatically recognize the positions of all the objects on the worktable.

14.2.2 Edit Worktable

Cross References

References to information provided in other sections.

Information	Reference
Database View window, Create Worktable	See section 14.2.1, 🗎 14-3

Purpose

Lets you edit an existing user defined worktable. The corresponding record in the database will be modified.

Procedure

To edit an existing user defined worktable map:

1. Select the worktable map you wish to edit in the **In DataBase available list** of the **GENESIS Database View window** (→ Cross References).
2. Open it with **Open**.
3. Refer to Create Worktable to change arrangements according to your requirements (→ Cross References).
4. Save the worktable map with **File > Save** to overwrite the exiting data or save it under a new name with **File > Save as**.

14.2.3 Delete Worktable

Cross References

References to information provided in other sections.

Information	Reference
Database View window, Create Worktable	See section 14.2.1, 🗎 14-3

Purpose

Lets you delete an existing user defined worktable. The corresponding record will be removed from the database.

Procedure

To delete an existing user defined worktable map:

1 Select the worktable map in the **In DataBase available** list of the **GENESIS Database View** window (→ Cross References).

2 Press the **Delete** button of the keyboard to delete the worktable.

*The **Are you sure to delete the Worktable** message appears.*

3 Confirm with **OK**. The name disappears from the list.

Note: *The worktable map data is lost and cannot be recovered (no Undo).*

14.2.4 Tips and Tricks

When planning a worktable map, remember that the particular arrangement will affect the execution time and throughput of the application. Avoid any unnecessary arm or tip movement. The arrangement of all the tips in a row on a single arm imposes certain rules of how to position racks and containers:

Timing

- Samples are usually placed on the leftmost position of the worktable. However, depending on the options selected for the run, the software normally processes the sample in the carrier position with the higher grid number first (right to left).
- Within the carrier it processes the rearmost sample first and works from there towards the front. Therefore, the first sample carrier, which is usually full, should be positioned at the rightmost position and additional strip carriers to its left. If the number of strip racks for a certain application is variable, leave enough space on the left side of the first sample carrier (see following figure).

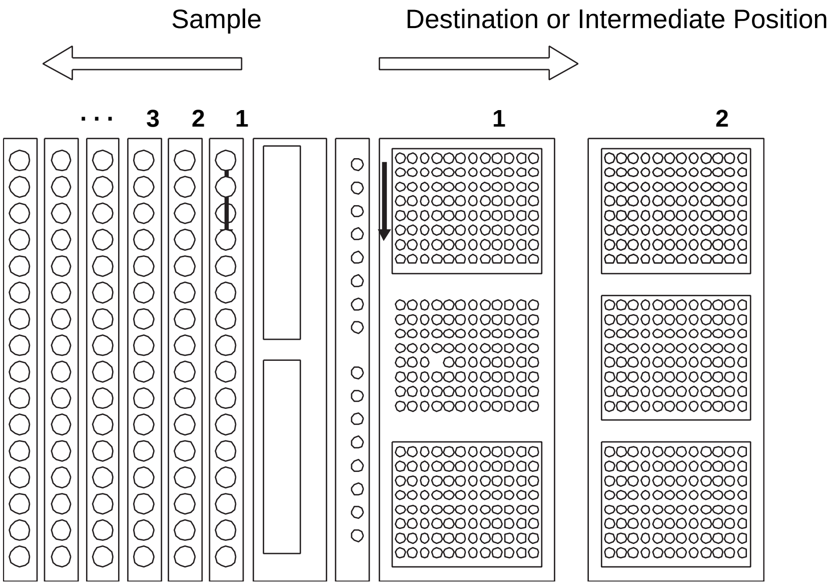


Fig. 14-6 Process direction

Critical Process Time

- If the processing time is critical, consider reserving less space for samples than required, but to have the software prompt the operator for new sample supplies, thus reducing arm travel. This applies above all if a PosID module is installed. However, this will reduce the hands-off time, i.e. the operator must be present in order to reload more samples when prompted.
- If, on the other hand, the instrument is expected work without operator interaction for as long as possible, and if the number of samples to be processed will not change, sufficient space for all samples should be reserved. Process time will be increased due to longer arm travel.

Steel Tips

- If standard steel tips are used, the wash carrier should be placed in the center of the arrangement, usually between the sample and the destination carriers.

Disposable Tips

- If disposable tips are used, the DiTi Carrier (with the disposable tips supply and the tip waste) should be placed in the center of the arrangement.

Number of Tips

- Depending on the number of tips used, arrange the tip types in a way that allows the maximum number of tips to work simultaneously. At the same time, rack positioning should take the tip type (standard steel or disposable tip) into account, so that the maximum number of tips involved in the transfer have access within the rack.

Additives

- When planning the process, remember that additives that are dispensed together with the sample must always be picked up before the sample in order to avoid contamination of the additive.

Optimizing Positions

- The positioning of standards and controls in the destination rack can decisively affect throughput. Depending on the number of tips involved, it might be preferable to leave certain positions in the first row or column of the destination rack empty, rather than cause the instrument to use the tips ineffectively over the whole rack (see following figure). Similarly, portrait and landscape positioning of the rack (e.g., microplate) should be chosen according to it the number of tips involved in the process.

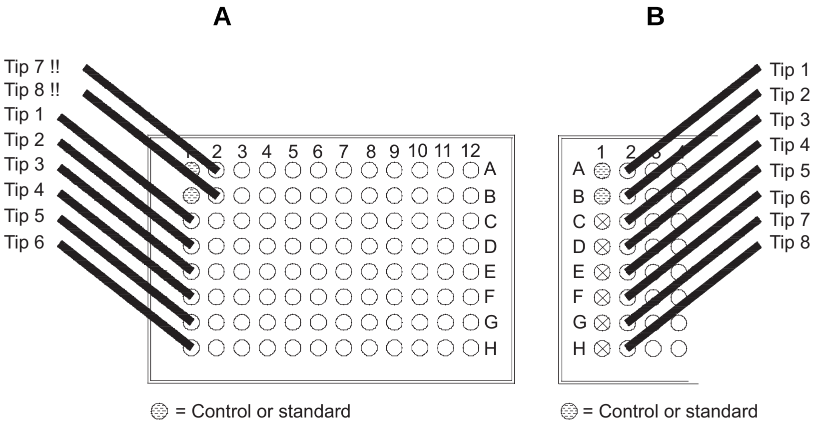


Fig. 14-7 *Planning access of the tips*

The above figure shows two possible arrangements of the tips:

- **A (not optimized).** Here, the throughput would be reduced because only 6 tips access column # 1, then 2 tips access column # 2. This pattern is repeated for the entire microplate!
- **B (optimzed).** With this arrangement, 6 wells remain empty, to allow 8 tips to access column # 2 simultaneously:. this increses the throughput.

14.3 Carrier, Rack and Container Editors

14.3.1 Introduction

Cross References

List of cross references to information provided in other sections:

Information	References
Container Editor	See section 14.4, 🗎 14-11
Rack Editor	See section 14.5, 🗎 14-17
Carrier Editor	See section 14.6, 🗎 14-26

Description

The Carrier/Rack/Container Editors (CRC-Editors) are used to define custom carriers, racks and containers in the terms legible by the Instrument Software. Once the critical dimensions of a container (e.g., tube, bottle, microplate well dimensions) are defined, this virtual definition can be imported into a formerly defined rack, and the latter into a formerly defined carrier.

Standard Tecan Carriers, Racks and Containers

At the delivery, the database of the Instrument Software package already includes predefined sets of standard Tecan carriers, racks and containers.

Note: *Any positioning information (e.g., the position where the instrument should discard a disposable tip) is implemented like a container, even if the position is only imaginary. Thus, for example the disposable tip waste position should be understood as a virtual container, implemented like a sample tube or a microplate well.*

14.3.2 Procedure

Purpose

Informs you how to define a custom carrier.

Procedure

In order to successfully implement a custom carrier, follow these steps:

1. Use the Container Editor to Implement and save your custom container.
2. Use the Rack Editor to Implement and save your custom rack.
3. Use the Carrier Editor to Implement and save your custom carrier.

For details → Cross References.

Note: *Follow certain naming conventions to make sure that you can find your custom objects in the growing list. Check the name convention used for Tecan objects.*

If a standard Tecan container fits your custom defined rack, it is not necessary to define the containers separately. In this case, implement your custom rack using the standard Tecan container. The same applies to carriers.

14.4 Container Editor

A container is usually a bottle, a tube or a well of a microplate. Also, other tip destinations, such as disposable tip waste positions, must always be defined as containers first.

14.4.1 Create Container

Cross References

References to information provided in other sections.

Information	Reference
Database View window	See section 14.2.1, 🗎 14-3
Permissions	See section “Permissions”, 🗎 14-1

Permissions

The users of the Container Editor must have the appropriate rights granted by the **User Managemant System** (→ Cross References).

Purpose

Lets you create a new container. Your entries will be stored as a new record in the database.

Procedure

To create a new container:

1. To implement a new custom container, for example a reagent bottle used in your application, take the metric measurements from a drawing, or, if not available, measure the container itself.
2. Select the **Container** entry in the **Type** list of the **GENESIS Database View** window (→ Cross References).
3. Create a new object with **New**.

   *The **New Object** dialog appears.*

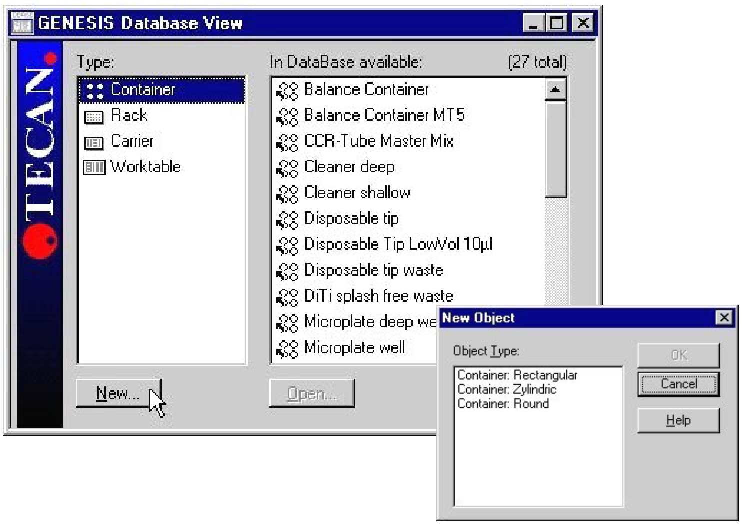


Fig. 14-8 New Object dialog

- Alternatively, you can select an existing container from the **In Database available** list, open it with **Open**, and save it under a new name with **File > Save as**.
- To call the property window of this container, select **Edit > Properties**.

Note: *Follow certain naming conventions to make sure that you can find your custom objects in the growing list. Check the name convention used for Tecan objects.*

4 In the **New Object** window select the suitable container:

Container: Rectangular	for a rectangular container.
Container: Zylindric	for a cylindric container with flat bottom.
Container: Round	for a cylindric container with round bottom.

5 Open it with **OK**. A graphical representation screen and the **Container Properties** window will pop up. If this object is new the graphic representation is empty.

6 Define the properties of the container with **Edit > Properties.**

- If a **rectangular container** was selected, the **Rectangular Container Properties** window appears. See **Rectangular Container** later in this section
- If a **cylindric container** with either a flat or a round bottom was selected, the **Zylindric Container Properties** window appears and the graphic representation screen will show a circle, See **Cylindric Container** later in this section.
- After the custom container has been defined, it is possible to define the custom rack holding a number of such containers.

7 Close the **Properties** screen with **OK** and a graphical representation of the container will be visible in the graphic screen below.

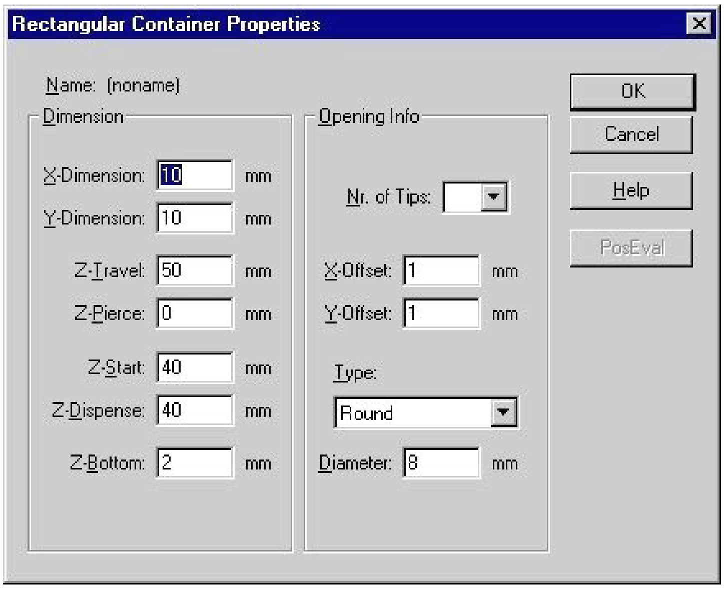
*If you close the **Properties** screen with **Cancel** all property entries will be lost.*

ATTENTION

If you close the graphical representation at this point, before saving the container under a new name, the new container will not be saved and the procedure must be repeated!

8 Save the newly defined container under a unique name with **File > Save as**.

Note: *Follow certain naming conventions to make sure that you can find your custom objects in the growing list. Check the naming used for standard objects.*



Name: (noname)

Dimension

X-Dimension: 10 mm
Y-Dimension: 10 mm
Z-Travel: 50 mm
Z-Pierce: 0 mm
Z-Start: 40 mm
Z-Dispense: 40 mm
Z-Bottom: 2 mm

Opening Info

Nr. of Tips:
X-Offset: 1 mm
Y-Offset: 1 mm
Type: Round
Diameter: 8 mm

Fig. 14-9 Rectangular Container Properties window

Rectangular Container

The **Rectangular Container Properties** window shows the following parameters:

X-Dimension	Exact width (X) in millimeters of your container.
Y-Dimension	Exact length (Y) in millimeters of your container.
Z-Travel	Height at which a tip should travel above the container (see following figure). It is usually approx. 3 mm above the top rim of the container.
Z-Pierce	Not functional at the moment. Do not change this value.

***Note:** If a specific position is used for other purposes than holding liquid, some of the following data need not be defined.*
*For example, when defining the point where disposable tips are to be removed from the tip adapter, it is not necessary to define **Z-Start** or **Z-Bottom**. The values in the **Opening Info** section (see figure **Container Opening** later in this section) and its description) would then refer to the area in which tips are to be ejected, rather than a physical opening of a container.*

***Note:** For containers, Z=0 is always the upper rim, as shown in the following figure. Therefore, Z-Bottom and (usually) Z-Dispense are negative values, **Z-Travel** and (usually) **Z-Start** are positive values.*

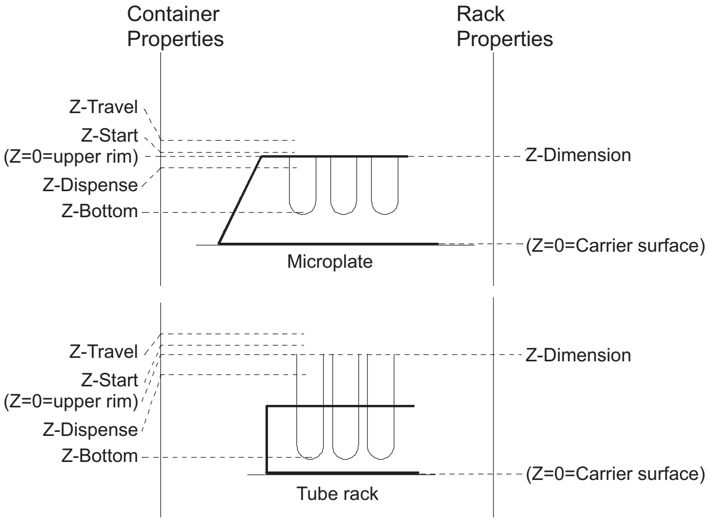


Fig. 14-10 *Z-Positions of container and rack*

Z-Start	Designates the point where the instrument will switch on liquid detection when the tip is moving down. Since tip movement is slower with the liquid detection enabled, this point should be implemented approx. 1 mm above the rim. Enter this value in millimeters here. If you are certain that the liquid level in the container will always be much lower, enter a point approx. 1 mm above this maximum level.
Z-Dispense	Refers to the height at which a tip will dispense liquid into the container. Depending on the application, this might be just above or a certain distance below the rim of the container. Enter an appropriate value manually. If this value is below the rim of the container, it is negative.
Z-Bottom	Lowest accessible point in the container

Note:

- *In standard Tecan microplate wells, **Z-Bottom** is defined at -9.3 mm, leaving a very narrow safety margin to the actual well bottom, which is at -10 mm from the rim. If you intend to use the microplate well in a custom rack or as a model for a custom container, take special care to precisely implement the **Opening Info** (see figure Container Opening later in this section).*
- *Especially in round bottom microplate wells, the tips must access the wells precisely in the center - otherwise they will touch the wall of the well (causing damage to the coating of tip and/or well) or even crash into the well bottom. If the application does not require the removal of all liquid from the well, it is also possible to change **Z-bottom** to, for example, -8.8 mm, which will leave a wider safety margin.*

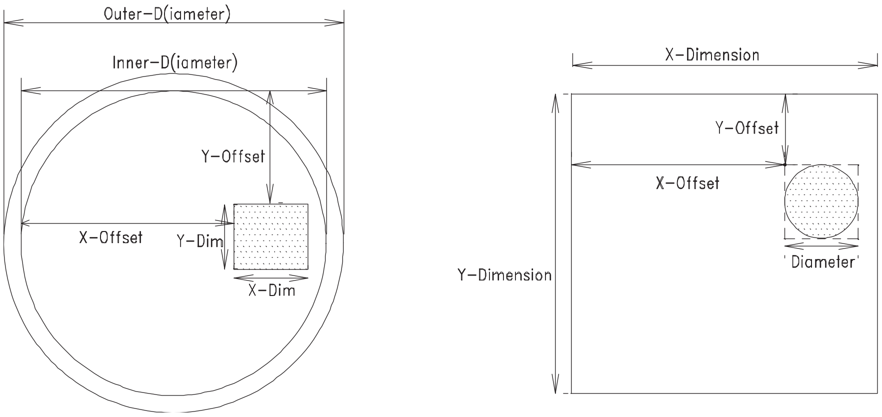


***Fig. 14-11** Container opening*

Opening Info	Size and form of the opening of the container that the tips are to access.
- **Nr. of Tips**	Number of tips that are to access this container simultaneously. Select the correct number.
- **Type**	The opening can be either **Round** or **Rectangular**. In both cases, the X- and Y-Offset entries describe the upper left corner of the (imaginary) square enclosing this opening in relation to the upper left corner of the container (see above).
- **Diameter**	Diameter of the opening in millimeters, if the opening is circular. If the opening is rectangular, use the two edit boxes to enter the X- and Y-Dimensions of the opening.

Cylindric Container

If a cylindric container with either a flat or a round bottom was selected, the graphic representation screen will show a circle:

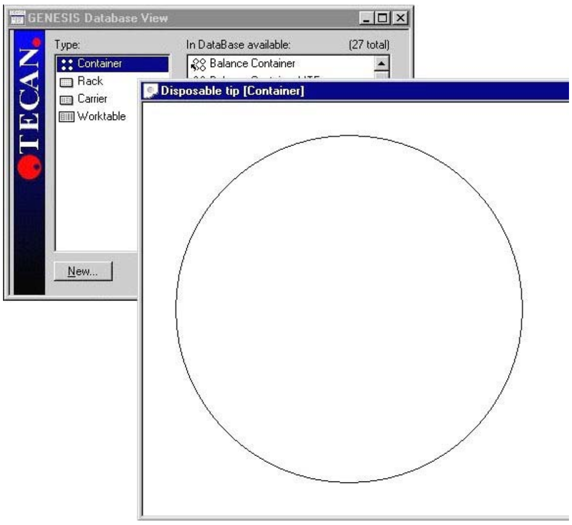
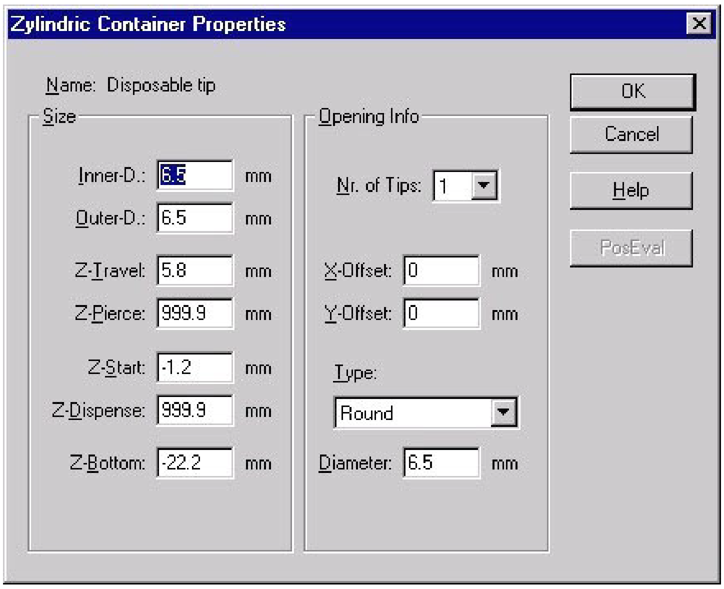


***Fig. 14-12** Cylindric container*



Zylindric Container Properties

Name: Disposable tip

Size

Inner-D.: 6.5 mm
Outer-D.: 6.5 mm
Z-Travel: 5.8 mm
Z-Pierce: 999.9 mm
Z-Start: -1.2 mm
Z-Dispense: 999.9 mm
Z-Bottom: -22.2 mm

Opening Info

Nr. of Tips: 1
X-Offset: 0 mm
Y-Offset: 0 mm
Type: Round
Diameter: 6.5 mm

Fig. 14-13 *Cylindric Container Properties window*

The **Zylindric Container Properties** window does not differ from the one used to define a rectangular container, except for **Inner-D** and **Outer-D** that define the inner and outer diameters of the container in millimeters.
For the other parameters see **Rectangular Container** earlier in this section.

Note: *The outer diameter has no effect on positioning and graphical representation.*

14.4.2 Edit Container

Cross References References to information provided in other sections.

Information	Reference
Database View window	See section 14.2.1, 🗎 14-3
Rectangular/cylindric containers	See section 14.4.1, 🗎 14-11
Permissions	See section "Permissions", 🗎 14-1

Permissions The users of the Container Editor must have the appropriate rights granted by the **User Managemant System** (→ Cross References).

Purpose Lets you edit an existing container. The corresponding record in the database will be modified.

Procedure To edit an existing container:

1 Double-click the container in the **In DataBase available** list of the **Genesis Database View** window (→ Cross References).

ATTENTION

If you want to use a standard container as a model for creating a new one, first save it under a new name with **File > Save as**. After editing, save the new settings!

2. The properties can now be edited with **Edit > Properties**, depending on the container type (cylindric or rectangular, → Cross References).
3. Save the data with **File > Save** at the end of implementation.

14.4.3 Delete Container

Cross References

References to information provided in other sections.

Information	Reference
Database View window	See section 14.2.1, 🗎 14-3
Permissions	See section “Permissions”, 🗎 14-1

ATTENTION

Make sure the container to be deleted in not used by any rack.

Permissions

The users of the Container Editor must have the appropriate rights granted by the **User Managemant System** (→ Cross References).

Purpose

Lets you delete an existing container. The corresponding record will be removed from the database.

Procedure

1. Select the container from the **In DataBase available** list of the **GENESIS Database View** window (→ Cross References).
2. Use the **Delete** button of the keyboard to remove it. The **Are you sure to delete the Container** message appears.
3. Confirm with **OK**. The name is removed from the list. The container data is lost and cannot be recovered (no Undo).

14.5 Rack Editor

A rack is an arrangement of containers of the same kind. To implement a rack you should have the physical rack at hand.

__Note:__ A rack is not the same as a carrier.

- *The rack only describes the way in which a number of containers are arranged or grouped together and the enumerating system to be applied when relating to this rack.*
- *The classical case for a rack is the microplate, i.e. a regular rectangular arrangement of 8 rows and 12 columns.*
- *Even if a rack is the same physical object as the carrier, for example, in the case of a standard Tecan tube carrier, the rack (i.e. in this case a single column of containers) is defined and then assigned to the carrier.*

__Note:__ If the same rack (e.g., a microplate) is used in portrait and in landscape mode - two versions must be defined individually. For the software, they are different racks!

14.5.1 Create New Rack

Cross References

References to information provided in other sections.

Information	Reference
Genesis Database View window	See section 14.2.1, 🗎 14-3
User defined enumeration	See section 14.5.2, 🗎 14-23
Z-positions of racks and containers	See Fig. 14-10 , 🗎 14-14
Permissions	See section "Permissions", 🗎 14-1

ATTENTION

If you want to use a standard rack as a model for creating a new one, first save it under a new name with **File > Save as**. After editing, save the new settings.

Permissions

The users of the Rack Editor must have the appropriate rights granted by the **User Managemant System** (→ Cross References).

Purpose

Lets you create a new rack. Your entries will be stored as a new record in the database.

Procedure

To create a new rack:

1. Select the **Rack** entry in the **Type** list of the **GENESIS Database View** window (→ Cross References).
2. Create a new object with **New**.

   The __New Object__ dialog appears.

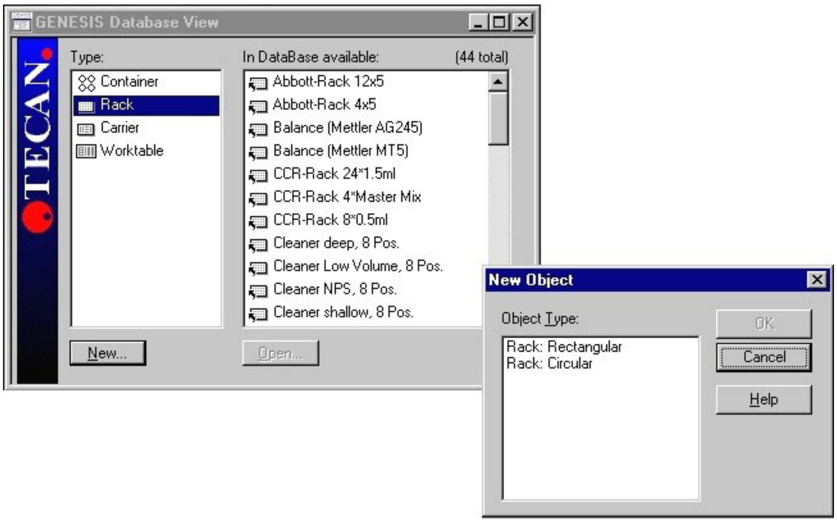


Fig. 14-14 New Object dialog

Alternatively, you can select an existing rack from the **In Database available** list, open it with **Open**, and save it under a new name with **File > Save as**.
To call this rack’s property window, start **Edit > Properties** (see following figure for an example).

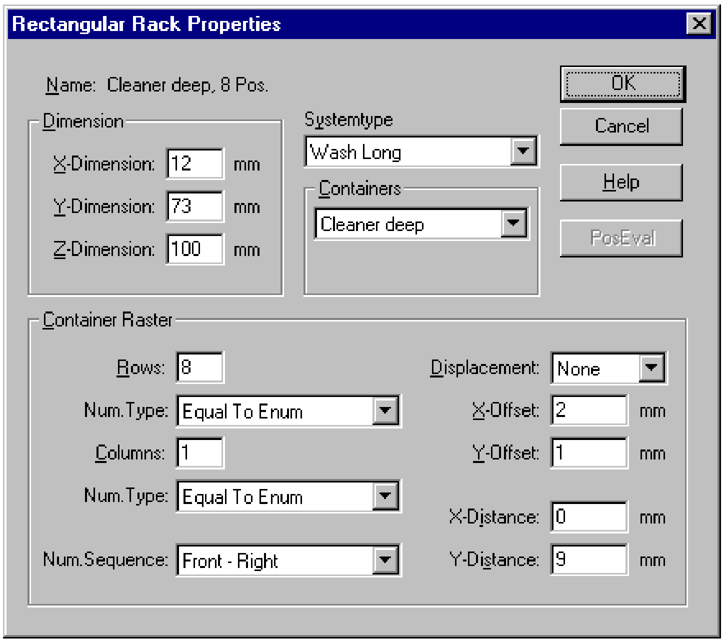
Note: *Follow certain naming conventions to make sure that you can find your custom objects in the growing list. Check the name convention used for Tecan objects.*

3 From the **New Object** window select the suitable rack:

Rack: Rectangular	for a rectangular rack.
Rack: Circular	for a circular rack.

4 Open it with **OK**. A graphic representation screen and the **Rack Properties** window pops up. If this object is new, therefore the graphical representation is empty.

5 Define the properties of the rack with **Edit > Properties**. The **Rectangular Rack Properties** window appears.



Name: Cleaner deep, 8 Pos.

Dimension
X-Dimension: 12 mm
Y-Dimension: 73 mm
Z-Dimension: 100 mm

Systemtype: Wash Long

Containers: Cleaner deep

Container Raster
Rows: 8
Num.Type: Equal To Enum
Columns: 1
Num.Type: Equal To Enum
Num.Sequence: Front - Right
Displacement: None
X-Offset: 2 mm
Y-Offset: 1 mm
X-Distance: 0 mm
Y-Distance: 9 mm

Fig. 14-15 *Rectangular Rack Properties window*

6 In the **X-Dimension** and **Y-Dimension** input fields enter the physical outline of the rack in millimeters.

7 In the **Z-Dimension** input field enter the highest point of the rack as measured from the surface on which it rests—for example, the carrier surface (see figure Z-Positions of racks and containers, → Cross References).

8 Select the intended purpose of the rack from the **System type** list.

9 Select the container that is on the rack in the **Containers** list.

If containers of various types are to be placed on a carrier, define a rack for every container type and then gather the various racks on one carrier.

10 Enter the number of rows and columns in the **Rows** and **Columns** input fields in the **Container Raster** section.

11 Select the enumeration of the containers on the rack in the **Num. Type** list:

Numeric Rear-Front	Numbers are used for the enumeration from rear to front.
Numeric Front-Rear	Numbers are used for the enumeration from front to rear.
Alpha Rear-Front	Letters are used for the enumeration from rear to front.
Alpha Front-Rear	Letters are used for the enumeration from front to rear.
Equal to Enum User-defined	Enumeration system follows a user defined numeric sequence (→ Cross References).

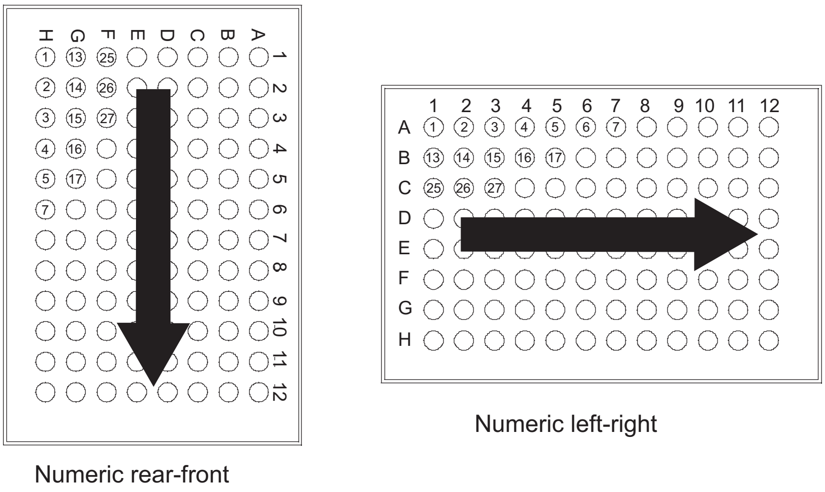


Fig. 14-16 Numeric sequence

12 Define the order in which the instrument must run through the various positions on the rack in the **Num. Sequence** list. This order can be independent of the enumeration appearing on the rack:

Bottom	Towards the front of the instrument
Top	Towards the rear of the instrument

- Thus a sequence can be defined (e.g., as Right-Bottom), meaning that the first position is at the very left rear corner of the rack, the second position is to the right of it, etc., until one row is finished. Only the next following position will be one towards the front of the instrument below the first position.

13 Select the displacement type from the **Displacement** list.

- Rows or columns may be displaced against each other in honey-comb fashion as in the two examples shown in the following figure.
- The displacement shown illustrates a **Y-Plus displacement**, since the second column is displaced towards a higher Y-Level.
- Note that the even columns will be displaced by half the distance between two rows. An **X-Minus** displacement for example would move the second row (counting from the rear) towards the left by half the distance between two container columns.

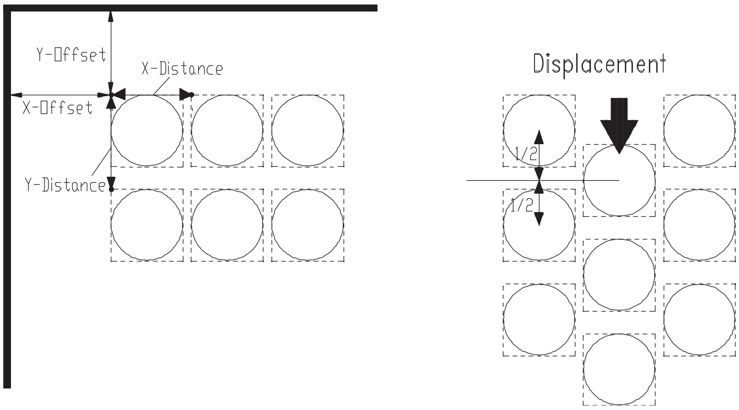


Fig. 14-17 Column displacement on racks

14 Enter the distance between the rearmost left corners of the rack and that of the square circumscribing the container (as shown above) in the **X-Offset** and **Y-Offset** input fields.

15 Enter the X- and Y-Distance between the rows and the columns (measured in millimeters as shown above) in the **X-Distance** and **Y-Distance** input fields.

16 Confirm your entries with **OK**. The graphic screen will show a representation of the rack rectangle with the containers marked as circles in the correct proportions.

17 With the graphic representation screen still open (!!) save the new rack under a new, distinct name with **File > Save as**.

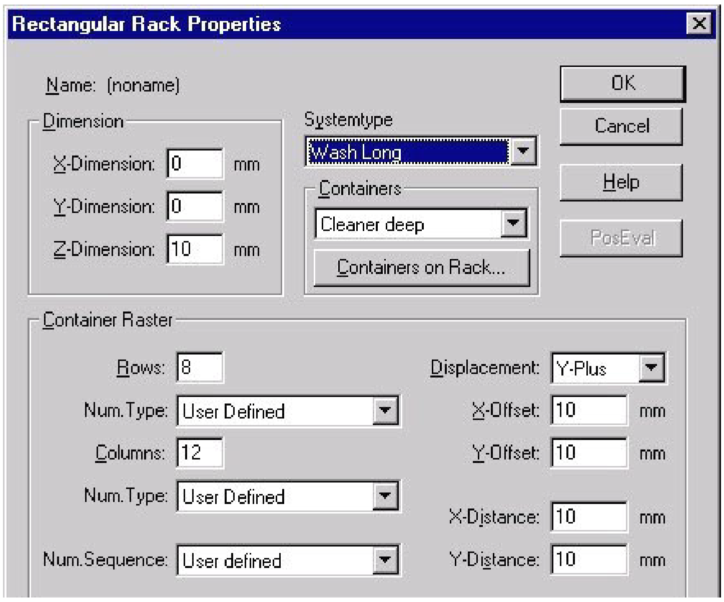
Follow certain naming conventions to make sure that you can find your custom objects in the growing list. Check the name convention used for Tecan objects.

18 Close the graphical representation screen.

14.5.2 User Defined Enumeration

Purpose This function allows you to use a non-standard enumeration system.

Prerequisite The **Containers on Rack** button appears only if **User defined** is selected in the **Num.Type** list.

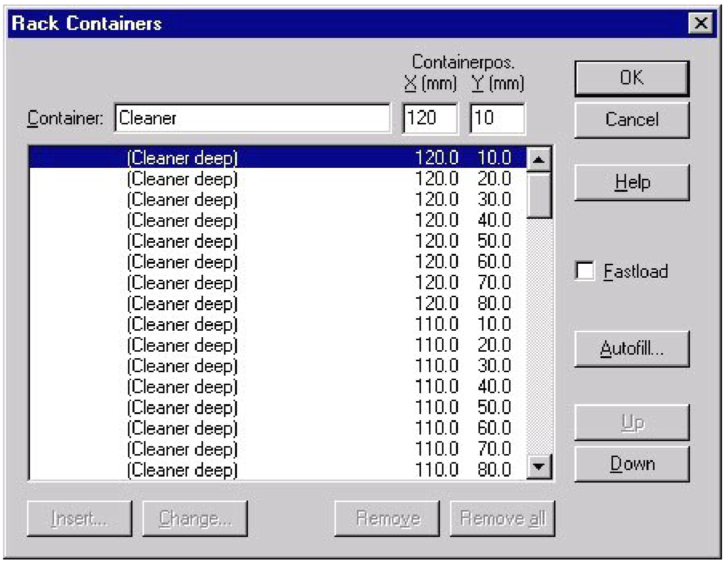


Name: (noname)
X-Dimension: 0 mm
Y-Dimension: 0 mm
Z-Dimension: 10 mm
Systemtype: Wash Long
Containers: Cleaner deep
Rows: 8
Num.Type: User Defined
Columns: 12
Num.Type: User Defined
Num.Sequence: User defined
Displacement: Y-Plus
X-Offset: 10 mm
Y-Offset: 10 mm
X-Distance: 10 mm
Y-Distance: 10 mm

Fig. 14-18 Rectangular Rack Properties window

Procedure To define a non-standard enumeration:

1 Open the **Rack Containers** window (see following figure) with **Containers on Rack**. This allows you to define the exact position of every container on the rack. However, remember that the containers must be of the same kind!



Container: Cleaner
Containerpos. X (mm): 120 Y (mm): 10

Container	X (mm)	Y (mm)
(Cleaner deep)	120.0	10.0
(Cleaner deep)	120.0	20.0
(Cleaner deep)	120.0	30.0
(Cleaner deep)	120.0	40.0
(Cleaner deep)	120.0	50.0
(Cleaner deep)	120.0	60.0
(Cleaner deep)	120.0	70.0
(Cleaner deep)	120.0	80.0
(Cleaner deep)	110.0	10.0
(Cleaner deep)	110.0	20.0
(Cleaner deep)	110.0	30.0
(Cleaner deep)	110.0	40.0
(Cleaner deep)	110.0	50.0
(Cleaner deep)	110.0	60.0
(Cleaner deep)	110.0	70.0
(Cleaner deep)	110.0	80.0

Fig. 14-19 Rack Containers window

2. Define the container positions and confirm your data with **OK**.

   It is possible to define the enumeration independently of the position of the container on the rack.
3. In the **Rectangular Rack Properties** window (see above), select **User defined** from the **Num.Sequence** list and confirm with **OK**.
4. Start **Layout > Set Order**. A new window (see following figure) appears.

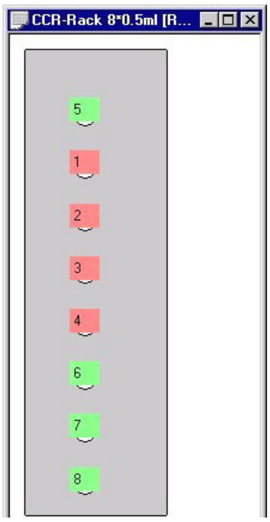


Fig. 14-20 *CCR-Rack window*

5. Click through all the positions in the rack and assign an individual sequential number in the order suiting your requirements.

   This may be very useful for a special layout on microplates depending on the application and measurement procedure.

14.5.3 Edit Rack

Cross References

List of cross references to information provided in other sections:

Information	References
Genesis Database View window	See Fig. 14-8 , 🗎 14-11
Editing rack properties	See section 14.5.1, 🗎 14-18
Permissions	See section "Permissions", 🗎 14-1

Permissions

The users of the Rack Editor must have the appropriate rights granted by the **User Managemant System** (→ Cross References).

Purpose

Lets you edit an existing rack. The corresponding record in the database will be modified.

Procedure

To edit an existing rack:

1. Select the rack in the **In DataBase available lis**t of the **Genesis Database View window** (→ Cross References).
2. Open it with **Open**. The graphical representation of the rack will pop up.
3. The properties can now be edited with **Edit > Properties** (→ Cross References).
4. Save the data with **File > Save** before closing the graphical representation!.

14.5.4 Delete Rack

Cross References

List of cross references to information provided in other sections:

Information	References
Genesis Database View window	See Fig. 14-8 , 🗎 14-11
Permissions	See section “Permissions”, 🗎 14-1

ATTENTION

Make sure the rack to be deleted is not used in any carrier.

Permissions

The users of the Rack Editor must have the appropriate rights granted by the **User Managemant System** (→ Cross References).

Purpose

Lets you delete an existing rack. The corresponding record will be removed from the database.

Procedure

To delete an existing rack:

1. Select the rack in the **In DataBase available** list of the **GENESIS Database View** window (→ Cross References).
2. Use the **Delete** of the keyboard to delete the rack. The **Are you sure to delete the Rack** message appears.
3. Confirm with **OK**. The name will disappear from the list.

Note: *The rack data is lost and cannot be recovered (no Undo).*

14.6 Carrier Editor

Cross References

List of cross references to information provided in other sections:

Information	References
Worktable Editor	See section 14.2, 🗎 14-2
Rack Editor	See section 14.5, 🗎 14-17

Description

The carrier is the device that holds racks (with containers) on the worktable. It can hold various rack types.
To define a carrier with the CRC-Editor, the appropriate carrier and racks must be at hand. Use a precise metric ruler or drawing to enter the properties.

Note: *The carrier relates the container and rack information previously defined to a column of positioning pins (i.e. any grid position) and the surface height of the worktable.*

- *Once a carrier is defined, as many copies as required by an application can be placed on specific grid positions on the worktable (see Worktable Editor, → Cross References) - and with it, all the information entered for containers, racks and carriers become available to the software controlling the instrument movements. It is not necessary to define a carrier more than once!*
- *In the Instrument Software, carriers are defined as complete objects in the database. All physical properties of such a carrier are related to the positioning rails. Carriers must conform to the 25 mm positioning array ruling the worktable. Once defined, they can be re-positioned on any position on the worktable. No further carrier or positioning data is required.*
- *The Carrier Editor only allows the usage of racks that have previously been defined! Before attempting to create your own carrier, make sure the racks you wish to use are either standard Tecan racks (i.e. they are predefined), or use the CRC Editor to define your own custom racks (→ Cross References).*

14.6.1 Create New Carrier

Cross References

List of cross references to information provided in other sections:

Information	References
Worktable Editor	See section 14.2, 🗎 14-2
Genesis Database View window	See Fig. 14-8 , 🗎 14-11
Positions of Container and Rack	See Fig. 14-10 , 🗎 14-14
Permissions	See section "Permissions", 🗎 14-1

Permissions

The users of the Carrier Editor must have the appropriate rights granted by the **User Managemant System** (→ Cross References).

Purpose

Lets you create a new carrier. Your entries will be stored as a new record in the database.

Procedure

To create a new carrier:

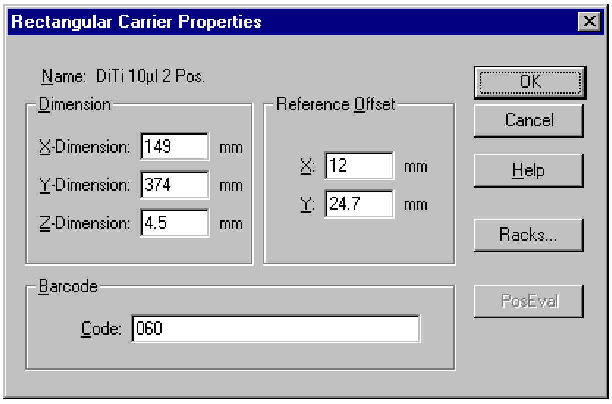
1 Select the **Carrier** entry in the **Type** list of the **Genesis Database View window** (→ Cross References).

2 Create a new object with **New**. The **New Object** dialog appears.

3 In the **New Object** window select **Carrier: Rectangular.**

4 Open it with **OK**. The graphical screen appearing now is still empty since the properties of the carrier are not yet defined.

5 Define the properties of the carrier with **Edit > Properties**. The **Rectangular Carrier Properties** window appears.



Name: DiTi 10µl 2 Pos.

Dimension
X-Dimension: 149 mm
Y-Dimension: 374 mm
Z-Dimension: 4.5 mm

Reference Offset
X: 12 mm
Y: 24.7 mm

Barcode
Code: 060

Fig. 14-21 *Rectangular Carrier Properties window*

6 In the **X-Dimension** and **Y-Dimension** input fields enter the physical outline of the carrier in millimeters.

7 In the **Z-Dimension** input field enter the Z-Distance, by which the carrier raises the rack from the worktable surface. This is the difference between the rack 0-level as shown in the figure “Positions of Container and Rack” (→ Cross References) and the worktable surface (absolute 0 !).

8 Since a carrier can be placed at any grid position on the worktable, its X- and Y-Properties must be related precisely to the positioning grid. The **Reference Offset** section defines the X- and Y-Distance between the rear left corner of the carrier and the center of the first positioning pin (i.e. the positioning pin closest to it, under the carrier, as shown in the following figure.

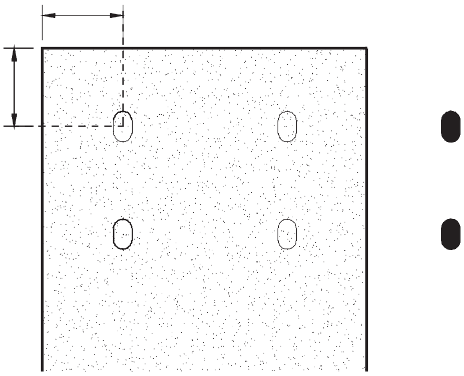


Fig. 14-22 *Carrier Reference Offset*

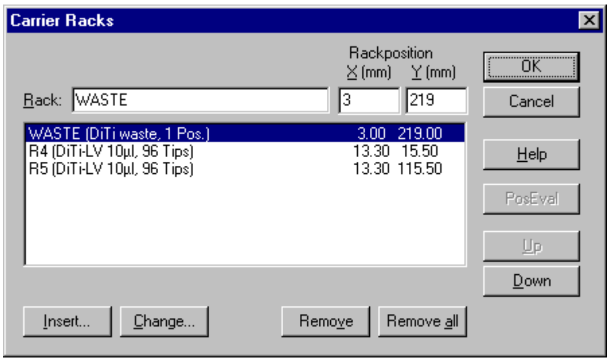
9 Enter the carrier type barcode in the **Barcode** input field. This is the barcode label at the rear end of the carrier. All standard Tecan carriers have such a barcode. It allows the (optional) PosID module to check the carrier type automatically.

ATTENTION

When assigning barcode numbers to custom carriers, avoid using a number reserved for standard Tecan carriers. Use only barcode numbers in the range (500 to 999) reserved for custom carriers!

***Note:** If there is no barcode on the carrier code label or if the PosID module is to skip the reading of this code, enter the text string **NOCODE**.*

10 Open the **Carrier Racks** window with **Racks**. This allows you to define the racks and their position on the carrier.



Rack: WASTE
X (mm): 3
Y (mm): 219

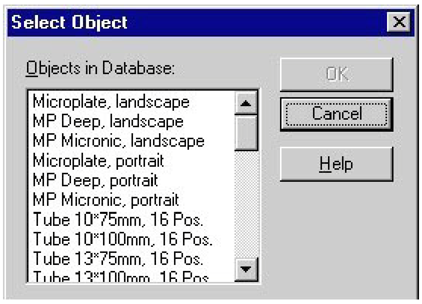
```
WASTE (DiTi waste, 1 Pos.)          3.00  219.00
R4 (DiTi-LV 10µl, 96 Tips)         13.30   15.50
R5 (DiTi-LV 10µl, 96 Tips)         13.30  115.50
```

Fig. 14-23 *Carrier Racks window*

The **Carrier Racks** window contains the following controls:

Rack	Input field to specify a rack name.
Rackposition X	Input field for the distance in X-direction between the rear left corner of the carrier and the rear left corner of the rack.
Rackposition Y	Input field for the distance in Y-direction between rear left corner of carrier and rear left corner of rack.
<list>	Displays all racks for the carrier. The data of the selected rack can be edited with the input fields.
Insert	Adds a new rack to the list.
Change	Replaces the selected rack.
Remove	Removes the selected rack from the list.
Remove all	Removes all racks from the list.
OK	Finishes the function and saves the values defined.
Cancel	Aborts the function without saving any changes.

11 Click **Insert** to open the list of available racks.



Microplate, landscape
MP Deep, landscape
MP Micronic, landscape
Microplate, portrait
MP Deep, portrait
MP Micronic, portrait
Tube 10*75mm, 16 Pos.
Tube 10*100mm, 16 Pos.
Tube 13*75mm, 16 Pos.
Tube 13*100mm, 16 Pos.

Fig. 14-24 *Select Object window*

12 Select the rack you wish to place onto the carrier and add it with **OK**. The **Select Object** window will close and the selected rack is now listed in the **Carrier Racks** window.

13 Repeat steps 11 and 12 for all other racks on the carrier. The order in which racks are listed or selected is not important. The software will automatically add a default rack name indicator (**R1**, **R2**, etc.) in order to allow you the differentiation between the racks.

14 After adding all racks to the carrier select a rack from the list. The rack's data appear in the input fields.

15 Enter an appropriate and unique name for the rack, for example, **Microplate Land Rear** for microplate Landscape Rear position in the **Rack** input field. The names assigned to the various racks will appear later on, when the worktable map is assigned to a specific application.

16 Use a metric ruler to measure the exact X- and Y-Distances between the rear left corners of the carrier and the rear left corner of the rack and enter them in the **Rackposition X** and **Rackposition Y** input fields.

17 Repeat steps 14 through 16 until all racks in the list are named and assigned to their correct X- and Y-Position on the carrier.

Replacing a Rack

To replace a rack:

18 Select from the list and click **Change**, otherwise continue with "Removing a Rack" later in this section.

19 Select a new rack in the **Select Object** window (see previous figure) and add it with **OK**. The **Select Object** window will close and the selected rack is now listed instead of the old rack in the **Carrier Racks** window.

20 Enter the rack data in the input fields as described above (steps 15 and 16).

Removing a Rack

To remove a rack

21 If desired, you can either remove a selected rack with **Remove** or remove all racks (e.g., before defining a new list) with **Remove all**. The latter is particularly useful when an already defined carrier is edited to define a similar one but with different racks on it.

22 When all racks on the carrier are defined, close the **Carrier Racks** window with **OK** and return to the **Rectangular Carrier Properties** window.

To Conclude Your Work

23 When the carrier is defined, close the **Rectangular Carrier Properties** window with **OK** and return to the graphical representation. It will now show a schematic drawing of the carrier and the racks on it.

24 Check carefully, if all racks are assigned correctly.

Note: *When the carrier is correctly defined, do not close the graphical representation screen!*

25 If not all racks are assigned correctly, go back to step 5 and repeat this procedure.

26 Save the new carrier under a distinct name with **File > Save as**.

Note: *Follow certain naming conventions to make sure that you can find your custom objects in the growing list. Check the name convention used for Tecan objects.*

Note: *Remember that any carrier must be defined only once. Once all the carriers needed in your application are defined, the "Worktable Editor" module (→ Cross References), can be used to define the worktable map appropriate for your application.*

14.6.2 Edit Carrier

Cross References

List of cross references to information provided in other sections:

Information	References
Genesis Database View	See Fig. 14-2 , 🗎 14-4
Edit properties of a carrier	See section 14.6.1, 🗎 14-26
Permissions	See section "Permissions", 🗎 14-1

Permissions

The users of the Carrier Editor must have the appropriate rights granted by the **User Managemant System** (→ Cross References).

Purpose

Lets you edit an existing carrier. The corresponding record in the database will be modified.

Procedure

To edit an existing carrier:

1 Select the carrier in the **In DataBase available** list of the **Genesis Database View** window (→ Cross References).

ATTENTION

If you want to use a standard carrier as a model for creating a new one, first save it under a new name with **File > Save As**. After editing, save the new settings!

2 Open it with **Open**. The graphical representation of the rack will pop up.

3 The properties can now be edited with **Edit > Properties** (→ Cross References).

4 Save the data with **File > Save** before closing the graphical representation!

14.6.3 Delete Carrier

Cross References

List of cross references to information provided in other sections:

Information	References
Genesis Database View	See Fig. 14-2 , 🗎 14-4
Permissions	See section “Permissions”, 🗎 14-1

ATTENTION

Make sure the carrier to be deleted in not used in any worktable map.

Permissions

The users of the Carrier Editor must have the appropriate rights granted by the **User Managemant System** (→ Cross References).

Purpose

Lets you delete an existing carrier. The corresponding record will be removed from the database.

Procedure

To delete an existing carrier:

1. Select the carrier in the **In DataBase available** list of the **Genesis Database View** window (→ Cross References).
2. Press the Delete button on the keyboard to remove the carrier.

   *The **Are you sure to delete the Carrier** message appears.*
3. Confirm with **OK**. The name will disappear from the list.

Note: *The carrier data is lost and cannot be recovered (no Undo).*

14.7 Export and Import

Cross References

List of cross references to information provided in other sections:

Information	References
Installing the Instrument SW	See section 4.2.1, 🗎 4-2
Export function	See section 14.7.1, 🗎 14-32
Import function	See section 14.7.2, 🗎 14-34

Purpose

The export and import functions are intended for users who install a new version of the Instrument Software. In such a case it may be necessary to export (→ Cross References) the customized data (i.e. customized CRC objects) used in the older software version, and to reimport (→ Cross References) them into the new version of the Instrument Software.

Note: The worktable database of Instrument Software V6.1 is no more compatible with the one of Instrument Software V6.0 and below. Therefore data exported out of former versions cannot be imported into Instrument Software V6.1

14.7.1 Export

Cross References

List of cross references to information provided in other sections:

Information	References
Installing the Instrument SW	See section 4.2.1, 🗎 4-2
Export function	See section 14.7.1, 🗎 14-32
Import function	See section 14.7.2, 🗎 14-34

ATTENTION

Before starting the Export function make sure that both the Setup and Service software and the Worktable Complete Editor are closed.

Purpose

This function lets you export customized data from the existing database.

Procedure

To export customized data:

1. In the Windows start menu, run the Worktable Editor with **Start > All Programs > Tecan > Instrument Software <version> > Worktable Complete Editor**.
   The Worktable Editor starts up with the **Genesis Worktable Complete Editor** main window with opened **Genesis Database View** window.

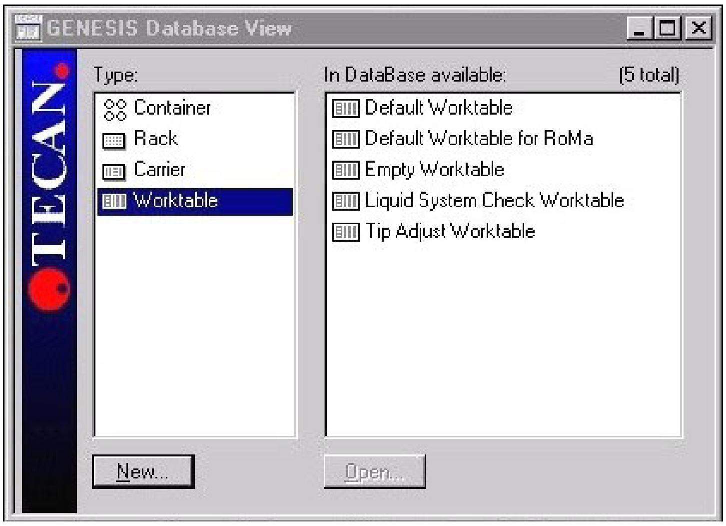


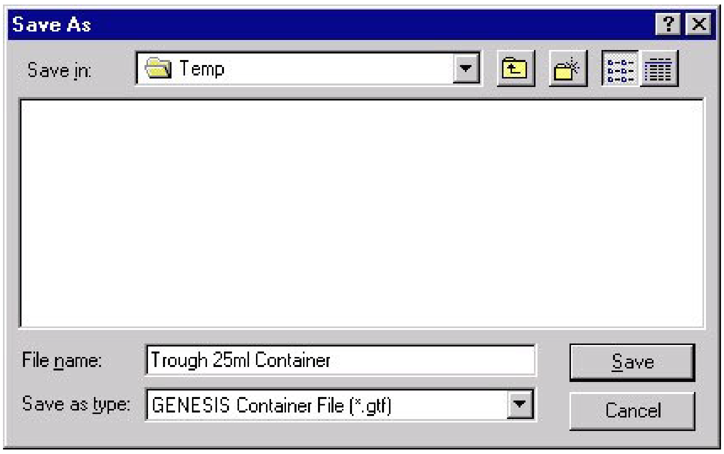
Fig. 14-25 *Genesis Database View window*

2 From the **Type** list select a CRC object you intend to export to the destination database.

Note: *The four possible CRC objects stand all in parent-child relations, i.e. carriers belong to (or are parts of) worktables, racks are parts of carriers, etc.*

Note: *Select a parent object from the list (e.g.,* ***Worktable*** *or* ***Carrier****). The smaller CRC objects belonging to that object will be exported automatically together with the selected one.*

3 Export the selected CRC object with **File > Export**. The standard Windows **Save As** dialog appears.



Save in: Temp

File name: Trough 25ml Container

Save as type: GENESIS Container File (*.gtf)

Fig. 14-26 *Standard Windows Save As dialog*

4 Select a path for the export file with the **Save in** list.

Recommendation: Choose the directory where your export source database is stored.

5 Specify a file name for the export file in the **File name** input field. The file extension will be added automatically:

*.gwf	for worktable files
*.gcf	for carrier files
*.grf	for rack files
*.gtf	for container files

6 Save the export file with **Save**. The **Save As** dialog closes.

7 Finish the Worktable Complete Editor with **File > Exit**.

14.7.2 Import

Cross References

List of cross references to information provided in other sections:

Information	References
<data_path>	See section 5.3, 🗎 5-29

Purpose

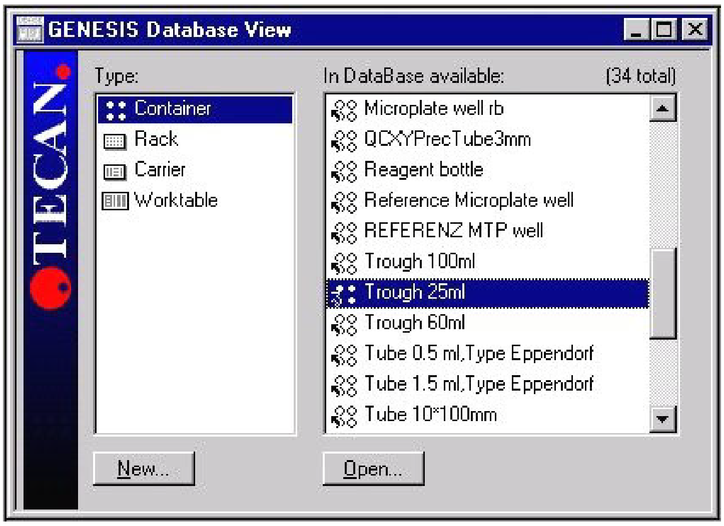
This function lets you import customized container, rack and carrier data into the current database. These data were possibly exported previously from another database, for example, from a previous installation of the current version of the Instrument Software. Data are stored under <data_path> (→ Cross References).

***Note:** The database of Instrument Software V6.1 or higher is not compatible to a database of Instrument Software V6.0 or lower.*

Procedure

To import customized data:

1 In the Windows start menu, run the Worktable Editor with **Start > All Programs > Tecan > Instrument Software <version> > Worktable Complete Editor**.
The Worktable Editor starts up with the **GENESIS Worktable Complete Editor** main window with opened **GENESIS Database View** window.



Type:

- Container
- Rack
- Carrier
- Worktable

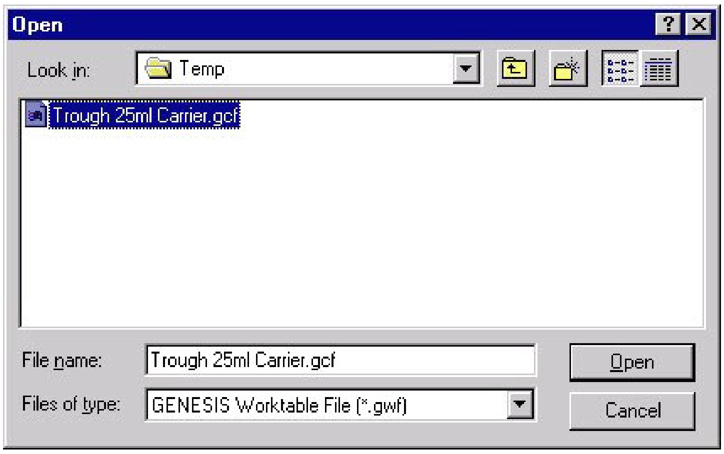
In DataBase available: (34 total)

- Microplate well rb
- QCXYPrecTube3mm
- Reagent bottle
- Reference Microplate well
- REFERENZ MTP well
- Trough 100ml
- Trough 25ml
- Trough 60ml
- Tube 0.5 ml,Type Eppendorf
- Tube 1.5 ml,Type Eppendorf
- Tube 10*100mm

__Fig. 14-27__ GENESIS Database View window

2 Select a CRC object you intend to import to the database from the **Type** and **In DataBase available** lists.

3 Import the selected CRC object with **File > Import**. The standard Windows **Open** dialog appears.



Look in: Temp

Trough 25ml Carrier.gcf

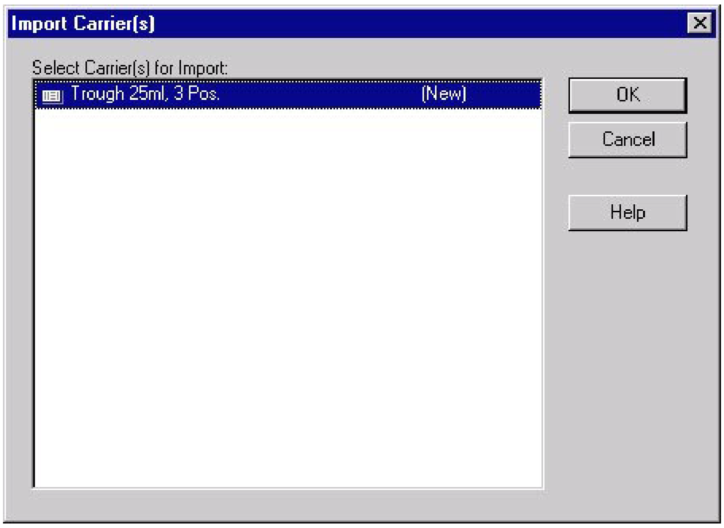
File name: Trough 25ml Carrier.gcf

Files of type: GENESIS Worktable File (*.gwf)

__Fig. 14-28__ Standard Windows Open dialog

4 Select the path of the import file with the **Look in** list.

5 Select the import database file and load it with **Open**. The **Import xxx** window opens showing the selected CRC object.



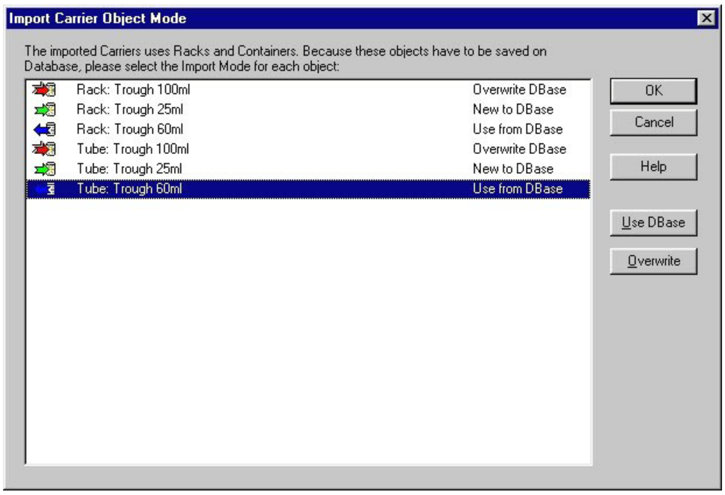
Select Carrier(s) for Import:

Trough 25ml, 3 Pos. (New)

__Fig. 14-29__ Import Carrier(s) window

6 Make sure the object you want to import is selected.

7 Import with **OK**. The **Import Carrier Object Mode** window opens, showing the CRC objects belonging to the object you are going to import.



The imported Carriers uses Racks and Containers. Because these objects have to be saved on Database, please select the Import Mode for each object:

Rack: Trough 100ml	Overwrite DBase
Rack: Trough 25ml	New to DBase
Rack: Trough 60ml	Use from DBase
Tube: Trough 100ml	Overwrite DBase
Tube: Trough 25ml	New to DBase
Tube: Trough 60ml	Use from DBase

__Fig. 14-30__ Import Carrier Object Mode window

The **Import Carrier Object Mode** window contains the following controls:

OK	Finishes the mode selection function and saves the settings.
Cancel	Aborts the mode selection function without saving any changes.
Use DBase	Uses the object of the current database file, without importing data from a source file.
Overwrite	Overwrites the object of the current database file with data from a source file.

➡	Indicates **Overwrite DBase** mode.
➡	Indicates **New to DBase** mode.
⬅	Indicates **Use from DBase** mode.

8 Click **OK**. All listed objects are imported and the **Import Carrier Object Mode** window closes.

9 Select the CRC object from the **Type** list of the **GENESIS Database View** window and check in the **In DataBase available** list whether the imported CRC objects are present.

15 Customer Support

Purpose of This Chapter This chapter informs you how to contact us in case help is needed. It lists addresses and telephone numbers of the manufacturer's representatives.

How to get Help Tecan and its representatives maintain a fully trained staff of technical specialists around the world. For any technical question, contact the nearest Tecan representative.

Feedback on This Manual If you have any comments on this Software Manual or suggestions for improvement, please send them by e-mail to **docfeedback@tecan.com**.
In your e-mail, please specify the manual name, the document ID and the manual version. This information is shown at the bottom of each printed page and on the first page of the help file (context-sensitive help of software products).

15.1 Contacts

Addresses Contact your local distributor or one of the addresses below.
Also see our homepage on the web: **www.tecan.com**

Country/Region	**Address**	**Telephone/Telefax/E-mail**	
Asia	Tecan Asia Pte Ltd. 18 Boon Lay Way, #10-106 TradeHub 21 Singapore 609966 Singapore	Phone Fax E-mail	+65 6444 1886 +65 6444 1836 tecan@tecan.com.sg
Australia New Zealand Pacific Islands	Tecan Australia Pty Ltd 21 / 3 Westside Avenue Port Melbourne Vic 3207 Australia	Phone Phone Fax E-mail	Toll Free: 1300 808 403 +61 3 9647 4100 +61 3 9647 4199 helpdesk-aus@tecan.com
Austria	Tecan Austria GmbH Untersbergstrasse 1a 5082 Grödig Austria	Phone Fax E-mail	+43 6246 8933 256 +43 6246 72770 helpdesk-at@tecan.com
Belgium	Tecan Benelux B.V.B.A. Businesspark E19 Battelsesteenweg 455B 2800 Mechelen Belgium	Phone Fax E-mail	+32 15 709 054 (en) +32 15 709 055 (fr) +32 15 421 612 helpdesk.benelux @tecan.com
China	Tecan (Shanghai) Trading Co., Ltd. Room 1802-1804 and Room 205, No. 388, Fushan Road, Pudong New Area, 200122 Shanghai, P.R.China	Phone Fax E-mail	+86 21 2206 32 06 +86 40 0821 38 88 +86 21 2206 52 60 helpdesk-cn@tecan.com

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Germany	Tecan Deutschland GmbH Werner-von-Siemens-Straße 23 74564 Crailsheim Germany	Phone Fax E-mail	+49 1805 8322 633 or +49 1805 TECAN DE +49 7951 9417 92 helpdesk-de@tecan.com
Italy	Tecan Italia, S.r.l. Via Brescia, 39 20063 Cernusco Sul Naviglio (MI) Italy	Phone Fax E-mail	+39 800 11 22 91 +39 (02) 92 72 90 47 helpdesk-it@tecan.com
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15.2 Remote Support

Tecan uses GoToMeeting to facilitate remote support.

Prerequisites

To establish a remote support session, you need the following:

- Internet access
- Voice over IP (VoIP) with a suitable headset or a normal telephone connection

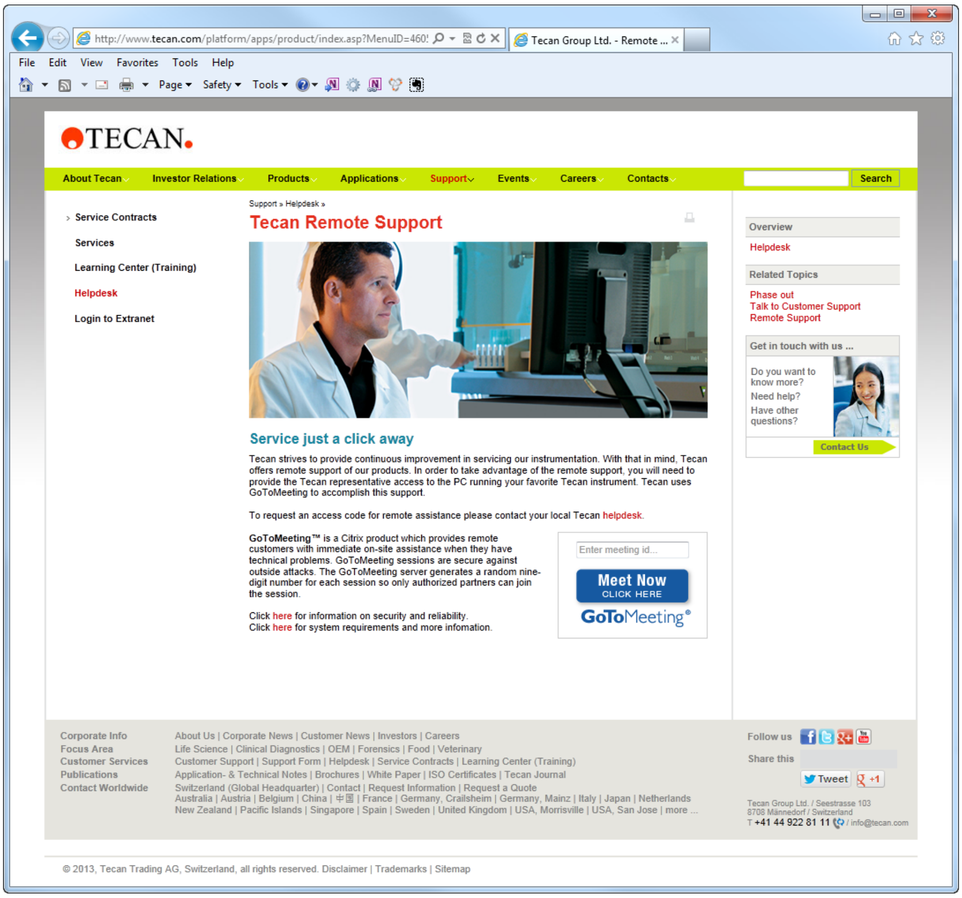
Starting a Support Session

Once you have arranged a remote support session with your local Tecan Helpdesk, you will receive a GoToMeeting meeting ID.

To start the session, do the following:

1. Select **Start > All Programs > Tecan > Instrument Software <version> > Remote Support**.
2. After the most up to date GoToMeeting component has been installed, enter the meeting ID.

The remote session will be established.



Tecan Remote Support

Service just a click away

Tecan strives to provide continuous improvement in servicing our instrumentation. With that in mind, Tecan offers remote support of our products. In order to take advantage of the remote support, you will need to provide the Tecan representative access to the PC running your favorite Tecan instrument. Tecan uses GoToMeeting to accomplish this support.

To request an access code for remote assistance please contact your local Tecan helpdesk.

GoToMeeting™ is a Citrix product which provides remote customers with immediate on-site assistance when they have technical problems. GoToMeeting sessions are secure against outside attacks. The GoToMeeting server generates a random nine-digit number for each session so only authorized partners can join the session.

Click here for information on security and reliability.
Click here for system requirements and more infomation.

Corporate Info	About Us | Corporate News | Customer News | Investors | Careers
Focus Area	Life Science | Clinical Diagnostics | OEM | Forensics | Food | Veterinary
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Fig. 15-1 *Tecan Remote Support*

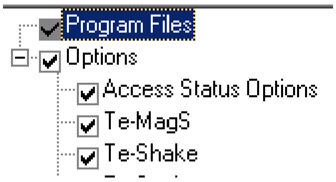
16 Glossary

Purpose of This Chapter

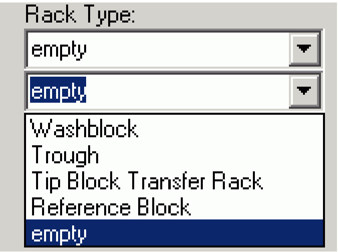
This chapter consists of two parts:

- The first part (section 16.1 “Important Windows Controls”, 🗎 16-1) explains the most common Windows controls you will encounter on many screens, dialog boxes, message boxes and forms shown in this manual.
- The second part (section 16.2 “Glossary”, 🗎 16-3) explains a number of important terms as used in this manual. The terms are listed in alphabetical order.

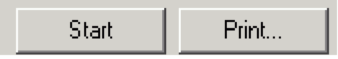
16.1 Important Windows Controls



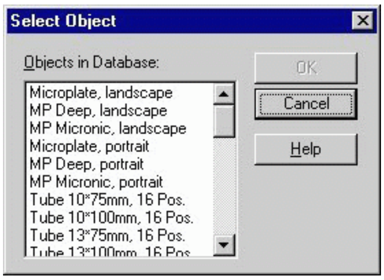
Check box
Square box that is selected or cleared to turn on or off an option. It is possible to select zero, one or more options at a time. Selected check boxes are marked with a tick ✓ or a similar check mark.



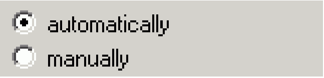
Combo box
Combination of a text box and an attached drop down list box. When you click on the arrow on the right side a list appears that lets you select one of the listed items. In many cases it is possible to type a selection in the text box (depends on how the combo box is configured in the software).



Command button
Button that initiates an action when clicked.

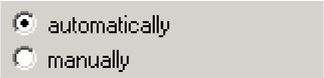


List box
A box containing a list of items the user can select. It is not possible to type a selection in a list box.



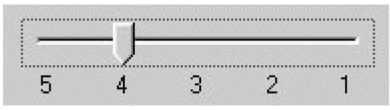
Option button
Round button used to select one of a group of mutually exclusive options. Option buttons are also called → **Radio button**.

Progress bar
A control that displays how many per cent of a particular process have been completed so far.



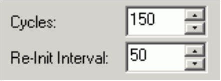
Radio button

See → **Option button**.



Slider

Indicator that can be moved to display and set a value from a number of values or from a continuous range.


Cycles: 150
Re-Init Interval: 50

Spin box

Text box with up and down arrows that the user can click to move through a set of fixed values. It is also possible to type a valid value in the box.

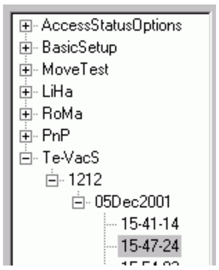
Tab

Labeled group of page tops that can be selected to display the related page.


Enter Password: *****

Text box

Rectangular box in which the user can type text or numeric values.



Tree view

Tree view controls are similar to list boxes, except that they display information in a tree-like structure. Tree view controls are especially suitable for representing hierarchical data structures. The small square boxes with a + or - sign in them are called “nodes”. These nodes can be expanded or collapsed to show or hide elements on a lower hierarchical level.

16.2 Glossary

Active Positioning Carrier (APC)

Carrier with electromagnetic clamping device used to hold microplates and align them precisely.

Administrator

→ **System Administrator**

Air (displacement) liquid handling arm (Air LiHa)

Robotic arm with multiple tips for general pipetting tasks. The Air LiHa picks up disposable tips to aspirate / dispense liquids. Its working principle is based on air displacement technology (variation of an air chamber); the → **Plunger Drive** is directly mounted on top of each Z-rod (pipetting channel), emulating a → **Dilutor** (compare: Liquid handling arm (LiHa)).

Air LiHa

→ **Air (displacement) liquid handling arm (Air LiHa)**

Aquarius

A multipipetting instrument that incorporates a
Te-MO 3/3.

AutoLoader

An optional plate handling and storage system that extends the functionality of the → **Aquarius.**

Basic Input/Output System (BIOS)

On PC-compatible systems, the BIOS is used to perform all necessary functions to properly initialize the system's hardware when power is first applied. The BIOS also controls the boot process, provides low-level input/ output routines (hence its name) and (usually) allows the user to modify details of the system's hardware configuration.

Burn-in Test

An extended test in which electric or mechanical components of an assembly are exposed to special ambient conditions (high temperature, mechanical stress, etc.). Serves to provoke early failures of “weak” components.

Calibration

Precise adjustment, standardization of a measuring instrument (e.g., a temperature gauge) by determining the deviation from a standard (e.g., a high precision thermometer) so as to ascertain the proper correction factors.

Carry over

Residue of sample liquid that remains in a tip after rinsing at the end of a pipetting cycle. Such residue is “carried over” to the next cycle. To reduce the risk of carry over to a minimum, → **Disposable tips (DiTis)** are used.

Cellerity

Modular system that allows performing standard cell biology processes for adherent cell lines such as cell feeding, harvesting, and passaging in microplate-sized, automation-friendly, cell-culturing flasks.

Combo Wash Station

→ **DiTi Wash Waste Station**

Controller Area Network (CAN)

Network used to exchange information between connected devices. Information is sent/received in the form of “messages” via a high-speed bus, the CAN-bus. Each “message” consists of a “label” that is unique throughout the network and a “data part”. From the label, the receiving device knows what kind of information the data part contains.

Dilutor

Precision pump that aspirates and dispenses exactly defined volumes of liquid by means of a motor-driven syringe.

On the → **Air (displacement) liquid handling arm (Air LiHa)** the dilutor is substituted by a → **Plunger Drive**.

DiTi Wash Waste Station

Combination of a wash station, two troughs and a DiTi waste carrier to which a DiTi waste bag can be attached. This station is also called → **Combo Wash Station**.

Disposable tip (DiTi)

Tip used for one single aspiration/dispensation cycle and discarded afterwards. Used to reduce the risk of carry over (residues of liquid) from one sample to the next to a minimum → **Carry over**.

Dynamic Link Library (DLL)

A Dynamic Link Library (DLL) is a collection of programs that can be loaded and used while the executable application program (exe) is running. One DLL can be shared by several application programs at the same time.

Early Validation

Method employed during the → **Validation** of the Heated Incubator that allows predicting, by means of extrapolation, whether or not the heating validation is likely to succeed before the validation time has elapsed (after about 50 to 60% of the total validation time).

EEPROM

(Electrically Erasable Programmable Read-Only Memory) Electronic device that behaves like an ordinary → **ROM (Read-Only Memory)** during normal operation. However, an EEPROM can be erased electrically and then reprogrammed. It can contain parameters and also executable software instructions.

Exchange Position

Position into which a slide in the Aquarius or Te-MO moves so that racks can be placed on or picked up from the respective carrier. If the carrier is an APC it is automatically opened in the exchange position.

Firmware

Control software residing semi-permanently in an → **EEPROM**. In the various instruments, firmware is used to control hardware components (motors, pumps, syringes, etc.) via the respective control boards. In certain cases it is necessary to download a firmware from the hard disk to the respective EEPROM.

Fixed Tip

General term for a tip that can be screwed to a pipetting device (e.g., → **LiHa**). Unlike a → **Disposable tip (DiTi)** it is rinsed after each pipetting cycle and can be used again.

Flask

Robotic cell culture flask with microplate footprint such as Corning® Roboflask™.

Flipper

Assembly mounted on the worktable of instruments like Cellerity that serves for loading, unloading holding and shaking flasks needed for the growth of cell cultures.

Floating sensor

A float with integrated permanent magnet used to detect the liquid levels in the system liquid and waste liquid bottles connected to the → **SPO-board**.

Free Dispensing

Dispensing liquid without touching the liquid suface.

Freedom EVO 75

Small pipetting instrument with one liquid handling arm (→ **LiHa**) that can be equipped with one or two tips with a fixed spacing. The instrument can optionally be equipped with an 8 Plus 1 Access LiHa. The instrument provides all essential pipetting functions and can be used with various tip types. Certain optional devices, such as Te-MagS, Te-Shake and Te-VacS, can also be used together with the EVO 75.

Freedom EVOlyzer

An open system for professional use, intended for the automatic processing of Microplate Enzyme Immuno Assays (EIA) within the scope of the device application. Complete or partial steps of the EIA may be executed on the system.

Gravimetric Test

The gravimetric test is used to check the precision and the accuracy of a liquid transfer by means of a precision balance placed on the worktable. The test can be performed with standard or disposable tips. There are two types:

- Standard gravimetric test: The test is performed with predefined parameters
- User-defined gravimetric test: User can define their own test parameters (for advanced users only).

Heating block

Part incorporated in options like Te-MagS, Te-Shake or the Incubation Device that is used to heat up samples and to keep them at a defined temperature.

Hyperlink

Electronic link providing direct access from one distinctively marked place in a hypertext or hypermedia document to another in the same or a different document.

Hypertext Markup Language

A markup language that is a subset of SGML and is used to create hypertext and hypermedia documents on the World Wide Web incorporating text, graphics, sound, video, and hyperlinks.

Hyper-Threading (HTT)

Hyper-Threading technology is Intel's trademark, for their implementation of the simultaneous multithreading technology on the Pentium 4 micro architecture. Basically, the technology improves processor performance by executing two threads simultaneously.

Incubation Device

Subsystem, consisting of a → **Heating Block** and a control circuit, that is used in devices for sample preparation.

LiHa

→ **Liquid Handling Arm**

Liquid Handling Arm (LiHa)

The Liquid Handling Arm is used for pipetting samples in different volume ranges, depending on the tip types used and the features of the liquid system [compare: Air (displacement) liquid handling arm].

Matrix Assisted Laser Desorption Ionization (MALDI)

Technique in which the sample is in a state where it is evenly mixed with a mass matrix. The matrix absorbs a nitrogen laser and converts it into thermal energy. At the same time, a minute amount of the matrix rapidly heats (within several nanoseconds) and vaporizes with the sample.

Movement axes

The various arms with which an instrument can be equipped can move in several axes. The most important axes are listed below. Note that not all arms can move in all of the listed axes.

- X-axis, left/right movement along the worktable front
- Y-axis, front/rear movement
- Z-axis, vertical up/down movement
- R-axis, for rotational movements (e.g., RoMa gripper head)
- G-axis, for opening/closing grippers (RoMa, PnP)

Multichannel Arm

Pipetting arm equipped with a multichannel pipetting head (e.g., for 96 channels) that can move across the worktable. For pipetting either a 96 tip block or a set of DiTis can be attached to the pipetting head.

Multichannel pipetting head

Pipetting head with 96 or 384 channels through which liquid can be aspirated/dispensed simultaneously.

Panel

A panel consists of a number of related pages for setting up or testing a specific device and for displaying the associated results. An individual page is selected by clicking the corresponding tab.

PCR-Block

Heating block (as can be used in te-MagS or Te-Shake) used for polymerase chain reaction sample preparation.

Pick and Place Arm (PnP)

Robotic arm equipped with special grippers that can pick up, transport and place tubes within the working area of the instrument.

Plunger

The piston in a → **Syringe** or in a channel of a → **Multichannel pipetting head** or in the plunger drive of an → **Air (displacement) liquid handling arm (Air LiHa)** channel. It aspirates liquid by moving in one direction and dispenses it when moving in the opposite direction.

Plunger Drive

On top of each Z-rod of an → **Air (displacement) liquid handling arm (Air LiHa)** a plunger drive is mounted that moves a → **Plunger** within the Z-rod for pipetting. It substitutes the dilutor of a standard → **LiHa** pipetting channel.

Polymerase Chain Reaction (PCR)

An in vitro technique for rapidly synthesizing large quantities of a given DNA segment. It involves separating the DNA into its two complementary strands and synthesizing two-stranded DNA from each single strand, and repeating the process.

Positive Identification (PosID)

Movable barcode reader used to read the barcode labels on tubes, racks and carriers.

Pressure based Liquid Level Detection (pLLD)

To detect the liquid surface the dilutor or plunger drive is actuated for a slow aspiration, while pressure changes inside the DiTi are monitored. When the DiTi dips into the liquid the tip’s orifice will be sealed, causing a pressure change that can be detected.

Pressure Monitored Pipetting (PMP)

Pipetting option that measures the pressure of the air gap between the system liquid or plunger of a plunger drive and the sample. The pressure information is used for liquid detection, clot detection, and for analyzing the stability and quality of the pipetting. It works with disposable tips only.

Random Access Memory (RAM)

A read-write memory that is used by the software for storing intermediate results. Each memory cell can be addressed individually. Note that a RAM is volatile, i.e. stored information becomes lost when the RAM is not supplied with electricity.

Read-Only Memory (ROM)

Electronic memory device from which information can only be read, but cannot be overwritten.

Reference tip

Special tool that can be fixed to a pipetting device (e.g., LiHa or Te-MO). Serves to exactly adjust the device in the various axes. Reference tips cannot be used for pipetting.

Robotic Manipulator Arm (RoMa)

Robotic arm equipped with grippers that serves for transporting microplates and similar objects within the working area of the instrument.

Sample

Substance (blood, urine, etc.) to be analyzed in a test.

Septum

A dividing tissue in the screw cap of the flasks with two cuts through which a pipetting device (such as the LiHa Tips) can penetrate for pipetting. Once the pipetting device has been withdrawn the septum closes again.

Solid Phase Extraction (SPE)

sample preparation technique for selective adsorption of analyses or interferences from complex matrices.

SPO-Board

Electronic board, used in Freedom EVOlyzer, to which the **Licos** tubes and/or the → **Floating Sensors** can be connected. The board serves for controlling the FaWa pump

Standard tip

A “Standard Tip” is a special type of → **Fixed tip** that has predefined characteristics. There are various models of standard tips (with/without coating, various volumes).

Structured Query Language (SQL)

A standard language used to communicate with databases to perform tasks such as update data on a database, or to retrieve data from a database.

Syringe

Part of the → **Dilutor**. A glass cylinder with a motor-driven → **Plunger** that aspirates/dispenses the required quantity of liquid.

System Administrator

A special user of the → **User Management System** who is authorized add, change and otherwise user accounts for the users of the Setup and Service software and to set password properties.

TCP/IP

TCP/IP stands for stands for Transmission Control Protocol/Internet Protocol. It is a collection of protocols, or rules, that govern the way in which data travels from one computer to another across networks. The Internet is based on TCP/IP.

Teach block

Alignment tool equipped with four pseudo tips. It is used instead of a → **Tip block** and serves for aligning a 96-channel pipetting head with carriers.

Teach pin

Pin that can be screwed to a 384-channel pipetting head. Used for aligning the head precisely with carriers.

Te-Link

Optional device with which two neighboring instruments can be linked, so that racks (microplates) can be transported from one instrument to another.

Te-MagS

The Te-MagS (magnetic separation module) is a module that uses commercially available magnetic beads to isolate biomolecules (e.g., DNA, RNA, proteins, etc.) or whole cells from various crude mixtures by means of magnetic forces.

Te-MO

A multipipetting device that contains a multi-pipetting head and 3 slides with 3 or 5 carriers, on which racks (microplates, DiTi boxes) or wash blocks, troughs, etc. can be placed.

Te-Shake

Orbital shaker for micro plates that is used for mixing functions.

Te-Stack

Loading and unloading device for standard microplates or DiTis

Te-VacS

Solid phase extraction vacuum system used for vacuum separation of biological molecules and chemical compounds.

Tip

A needle-like device that can be mounted to a pipetting device for aspirating/dispensing liquid. The following tip types are used:

→ Standard tip

→ Disposable tip

→ ActiveTip

→ Fixed tip

→ Tip block (multipipetting heads)

Tube

Small round glass container that holds the substance to be analyzed. Tubes are often marked with a barcode label so that they can be distinguished from one another

User

Person who is authorized to perform certain tasks on the Setup and Service software. Every user must have a user account with a user name and a password. The tasks a user is allowed to perform are defined through the membership to a certain → **User group**. The user accounts are managed by the → **System Administrator.**

User Management System

A system used for managing the accounts for the various → **Users** and → **User groups** of the Setup and Service software.

User Group

The user group defines the tasks that an individual → **User** of the Setup and Service Software is authorized to perform. Users are assigned to the various user groups by the → **System Administrator.**

Validation

A test to determine the degree of validity of a process, a measuring device or a method (also see . → **Early Validation**).

17 Index

Purpose of This Chapter

This chapter contains an alphabetical index which offers you help in finding information more quickly.
