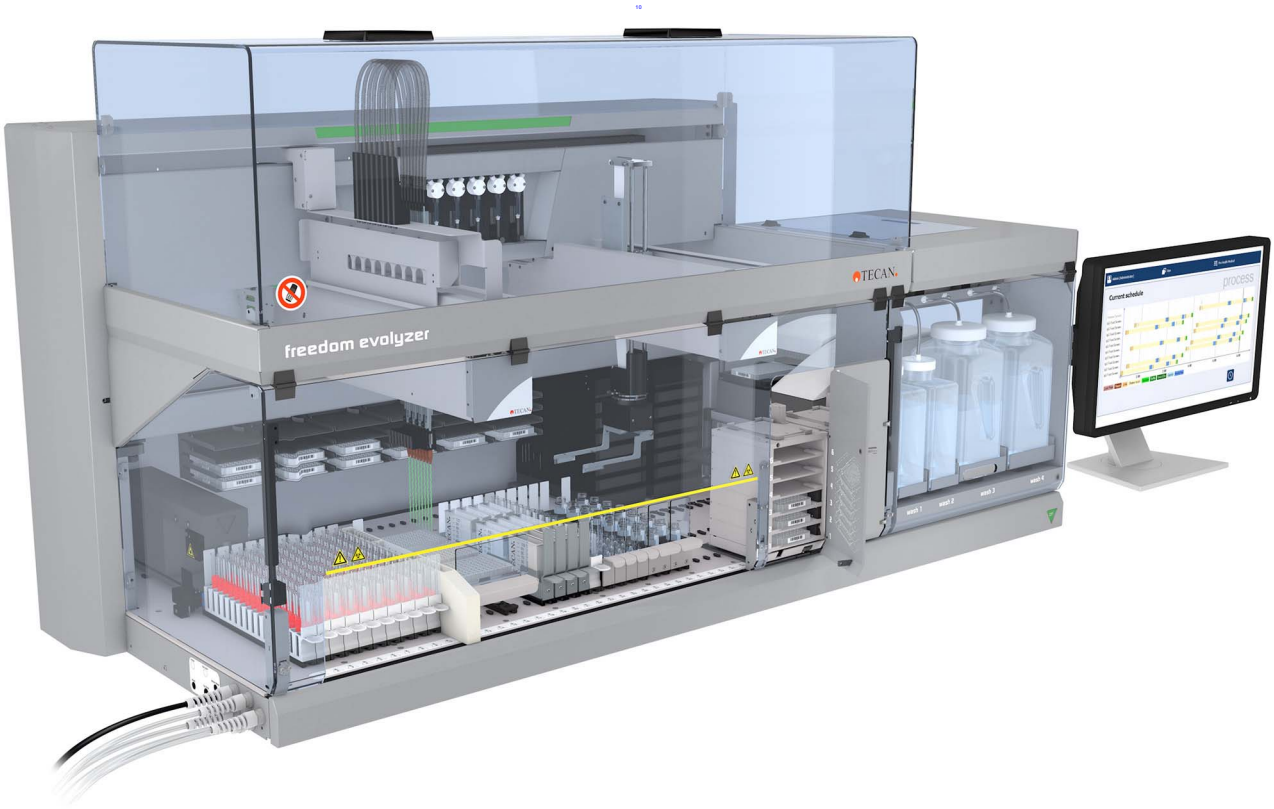
Operating Manual

Freedom EVOlyzer®



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0 Preface

For Your Safety

Before performing any work on or with the Freedom EVOlyzer, first read the Operating Manual carefully, in particular chapter 2 “Safety”.

0.1 Manufacturer

Address of Manufacturer

Tecan Schweiz AG
Seestrasse 103
CH-8708 Männedorf
SWITZERLAND

0.2 Use of the Product

The Freedom EVOlyzer is intended for In Vitro Diagnostic (IVD) use.

0.3 Intended Use

List of cross references to information provided in other sections:

Subject	Reference
Compatible liquids	See section “Chemical Resistance”, 3-27

Intended Use

Freedom EVOlyzer is a computer controlled automated liquid handling and microplate analyzer intended for the in vitro diagnostic processing of various specimen types. The device is intended to duplicate manual analytical procedures associated to an assay such as performing pipetting, identification, washing, incubation, and measuring color intensity according to the assays procedures provided by reagent manufacturers.

0.4 Improper Use

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Approved options	Refer to section 3.3.3, 3-11
Approved accessories	Refer to section 3.3.4, 3-12

The Freedom EVOlyzer must not be used with options or components which are not approved by Tecan.

WARNING

The use of options not approved by Tecan (see cross references above) may impair the safety concept of the Freedom EVOlyzer.
This means that the safety and compliance to national and international standards could not be ensured.

0.5 FCC Rules

Radio Interference

According to the rules of the US government agency “Federal Communications Commission (FCC)” the following statement applies to the Freedom EVOlyzer:

English

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Operating Manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

ATTENTION

Changes or modifications not expressly approved by the manufacturer could void the user’s authority to operate the equipment.

Table of Contents

3 Technical Data

4 Description of Function

5 Putting into Operation

6 Operation

1 About This Manual

Purpose of This Manual

This manual describes the Freedom EVOlyzer and provides all information required for its safe operation and maintenance.

This manual is part of the Instructions for Use according to the IVD-D.

Target Group

This manual is intended to provide instructions for the safe operation of the Freedom EVOlyzer. In particular, the duties and responsibilities of laboratory personnel and operators are addressed.

Scope

This manual is applicable for

- **FREEDOM EVOLYZER-2 100/2**
  Part No. 30025236 (two tips)
- **FREEDOM EVOLYZER-2 100/4**
  Part No. 30025237 (four tips)
- **FREEDOM EVOLYZER-2 150**
  Part No. 30025238 (four and eight tips)
- **FREEDOM EVOLYZER-2 200**
  Part No. 30025239 (eight tips)

Symbols and Conventions

- Cross references appear as follows: e.g. “Refer to section 1.1.1, 🗎 1-2“
  - 1.1.1 refers to the corresponding chapter number
  - The symbol 🗎 denotes “page number”
  - 1-2 refers to the page number, whereas the first number stands for the chapter number (chapter 1 page 2)

Note: *The symbols pertaining to safety (WARNINGS and ATTENTIONS are explained in chapter 2 “Safety”, 🗎 2-1.*

1.1 Reference Documents

Additional reference documents are listed below but not enclosed or linked.

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, USB casing, etc.*

1.1.1 Manuals available for Freedom EVOlyzer Instruments

The following manuals can be consulted for the Freedom EVOlyzer instrument:

Doc ID 393035	Freedom EVOlyzer Operating Manual
Doc ID 394803	Freedom EVOlution SW Runtime Controller Manual
Doc ID 394802	Freedom EVOlution SW Application Software Manual
Doc ID 392888	Instrument Software Manual
Doc ID 30115019	Instructions for Use for HydroFlex Platform (Washer)
Doc ID 30169003	Instructions for Use for SUNRISE Absorbance Reader

All manuals can be accessed by scanning the QR code.

https://www.tecan.com/manuals

Fig. 1-1 *QR code*

1.2 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):

- Bacillol Plus® is a registered trademark of the Bode Chemie Hamburg
- Bomix ® is a registered trademark of the Bode Chemie Hamburg
- Decon®/Contrad® is a registered trademark of Decon Laboratories Limited
- DNAzap® is a registered trademark of Ambion Inc.
- Freedom EVOlution™ is a trademark of Tecan Group Ltd.
- Freedom EVOlyzer® is a registered trademark of Tecan Group Ltd.
- Kel-F® is a registered trademark of the 3M Company, Maplewood, Minnesota, USA
- Microsoft® is a registered trademark of the Microsoft Corporation in the United States and other countries
- Monovette® is a registered trademark of Sarstedt, Inc.
- Pentium® is a registered trademark of the Intel Corporation
- Teflon® is a registered trademark of E.I. du Pont de Nemours and Company
- Terralin® is a registered trademark of Schülke & Mayr GmbH, Norderstedt
- Windows® is a registered trademark of the Microsoft Corporation in the United States and other countries

1.3 Abbreviations

ASTM	American Society for Testing and Materials
CE	Conformité Européenne
CSA	Canadian Standards Association
CV	Coefficient of Variance or variation
DiTi	Disposable tip
DMSO	Dimethyl sulfoxide
ELISA	Enzyme-Linked ImmunoSorbent Assay
EN	European Norm
ETFE	Ethylene/Tetrafluorethylene-copolymer
FCC	Federal Communications Commission
FEP	Tetrafluorethylene/Perfluorpropylene-copolymer
FFPM	Per-Fluor-elastomer
FSE	Field service engineer

HDPE	High density polyethylene
ILID	Integrated liquid detection
IVD-D	In-Vitro-Diagnostic Directive 98/79/EG
LiHa	Liquid handling arm
LIMS	Laboratory information system
MIO	Monitored incubator option
MP	Microplate
PCTFE	Polychlorotrifluoroethylene
PDE	Process Definition Editor
POM	Polyoxymethylene
PosID	Positive identification, barcode reader
PP	Polypropylene
PS	Polystyrene
PTFE	Polytetrafluorethylene
PVC	Polyvinylchloride
PVDF	Polyvinyl dienfluoride
RF	Radio frequency
RoMa	Robotic manipulator arm
RT	Room temperature
SPO	Sensored pump option
SW	Software

2 Safety

Purpose of This Chapter

This chapter points out the safety concept of the Freedom EVOlyzer and contains general rules of behavior and warnings from hazards pertaining to the use of the product.

Significance of These Safety Instructions

The safety of users and personnel can only be ensured if these safety instructions and the safety-related warnings in the individual chapters are strictly observed and followed.

Therefore, the Operating Manual must always be available to all persons performing the tasks described herein.

If the product is used as intended, the operator is able to recognize and avoid dangers.

2.1 User Qualification

Operator

What Users Must Know

Personnel must be qualified and trained to operate the Freedom EVOlyzer.

In particular, operators must fulfill the following qualifications:

- They must have a thorough knowledge of the application run on the system.
- They must be familiar with the applicable local regulations.
- They must have read and understood the instructions in this Operating Manual.

Only personnel that meet the qualifications prescribed here are authorized to perform the work described in this Operating Manual.

Training Courses

Note: *Tecan recommends that the operator attends an operator training course.*

- *Please ask your nearest Tecan representative about the available courses.*

Application Specialist or Expert Operator

Special Tasks

For special tasks, such as creating process sequences, teaching carrier positions, changing liquid handling parameters, or running device tests, a more profound knowledge of the system is necessary.

The following additional knowledge must be available to the personnel in charge of these tasks:

- They must have profound knowledge of the principles of assay functions and validation procedures.
- They must be familiar with the applicable guidelines and regulations for clinical laboratory environments.
- They must have a profound knowledge of the application software.
- They must have knowledge of the basic Setup & Service software functions.
- They must have received special training from the manufacturer.

Note: *Depending on the tasks, specific access rights may be necessary with regard to software login.*

2.2 Notices and Symbols

2.2.1 Warning Notices Used in This Manual

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.

Whenever possible, the symbol indicates the hazard a person is exposed to more specifically. The symbols used in this Operating Manual have the following significance:

WARNING

Toxic substances

WARNING

Biological hazard

WARNING

Radioactive radiation

WARNING

Caustic substances

WARNING

Fire hazard

WARNING

Electrical danger

WARNING

Laser hazard

WARNING

Pinch point, mechanical hazards

WARNING

Electrostatic discharge

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.

ATTENTION

Disturbance of functions by electromagnetic RF waves.
Do not use a cellular phone.

2.2.2 Warning Notices Attached to the Product or Its Surroundings

Where are Safety Notices Attached?

Freedom EVOlyzer Instrument

The figure shows the safety notices that are attached to the Freedom EVOlyzer instrument. It also shows their locations:

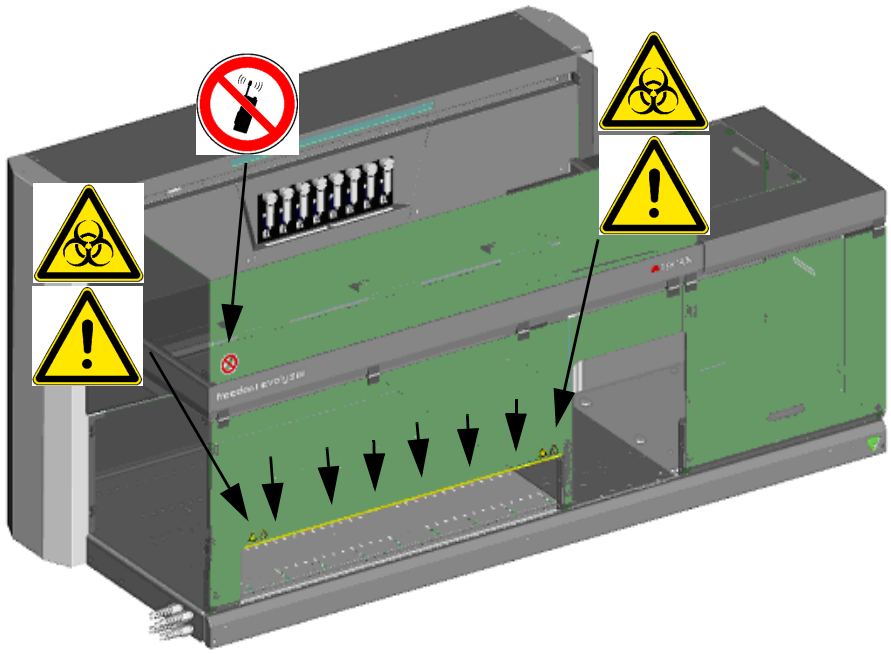


Fig. 2-1 *Safety notices attached to the product*

The table explains the significance of the notices:

Tab. 2-1 *Significance of the safety notices*

Symbol	Significance	Location
	Warning of hazards (chemical hazards or automatically moving parts) if you reach beyond the yellow line (see short arrows)	See Fig. 2-1 , 2-4
	Do not use a cellular phone	See Fig. 2-1 , 2-4
	Biological hazard Be aware of the potential biohazard associated with the samples and contaminated parts of the instrument	See Fig. 2-1 , 2-4

Type Plate

The following notices are printed on the type plate:

Tab. 2-2 Significance of the notices

Symbol	Significance	Location
	Pay attention to the applicable instructions for use, e.g. • Application Manual • Operating Manual • Software Manual	On the type plate

PosID

Safety Notices on the PosID

The figure shows the safety notices that are attached to the PosID.
Some laser parts on the instrument may show outdated labelling (e.g. Laser Notice No. 50), but the instrument including that part has been tested according to standard IEC 60825-1:2014.

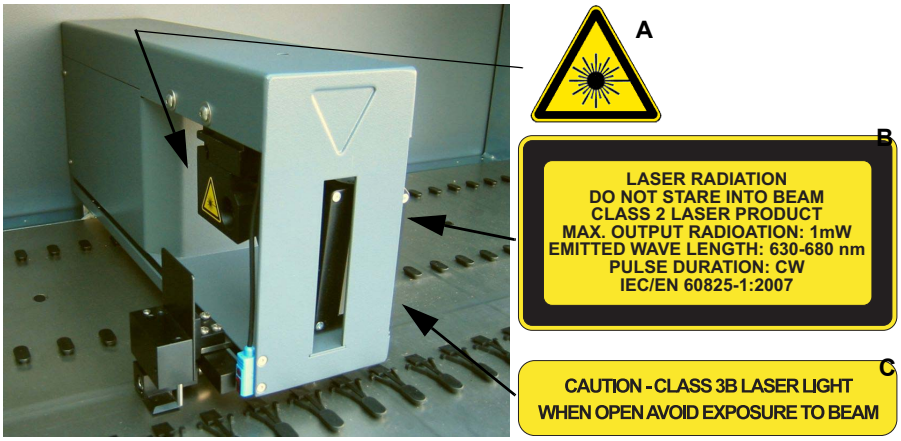


Fig. 2-2 Laser labelling on PosID

Class 2 Laser Product pursuant to IEC 60825-1:2007:
“Complies with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007”

Fig. 2-3 Label on PosID scanner head

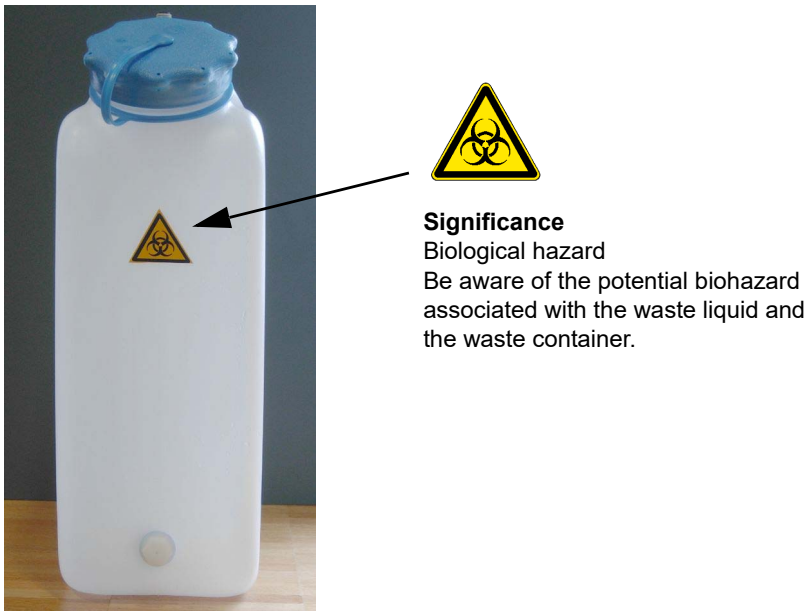
Tab. 2-3 Significance of the safety notices on the PosID

Label	Significance	Location
A	**Warning label:** Laser hazard symbol	See Fig. 2-2 , 2-5
B	**Explanatory label:** Identifies a CLASS 2 LASER PRODUCT[a] that contains an embedded visible low power laser barcode scanner. Warns against direct viewing into laser beam or its reflections.	On barcode scanner, see Fig. 2-2 , 2-5
C	**Label for panels:** Warns against removing or displacing of protective housing/panels, which permits human access to the laser light.	On barcode scanner, see Fig. 2-2 , 2-5
D	**Label for scanner head**: Warns against rotating the scanner head assembly by hand which could damage motor and head assembly.	On barcode scanner head, see Fig. 2-2, 2-5

a) According to IEC/EN 60825-1

Waste Container

Safety Notice on the Waste Container



Significance
Biological hazard
Be aware of the potential biohazard associated with the waste liquid and the waste container.

Fig. 2-4 *Waste container*

General

Damaged, lost or illegible symbols (notices or stickers) must be replaced immediately.

2.3 Product Safety

Principle

The Freedom EVOlyzer is designed and built in accordance with the present state-of-the-art technology and the requirements of the IVD directive 98/79 EC.

Nevertheless, risks to users, property, and the environment can arise when the instrument is used carelessly or improperly.

The manufacturer has determined residual dangers emanating from the instrument.

Appropriate warnings in this Operating Manual serve to make the user alert to these residual dangers.

2.3.1 Instrument-Related Hazards and Safety Measures

Pay attention to the following safety notices:

WARNING

Potentially lethal voltage inside the instrument.

- Equipment is to be connected to a grounded power source using an approved power cord with grounding conductor.
- Do not remove covers and other parts protecting from electricity.
- Always keep the areas of electric parts, such as power supply plug, mains switch, etc., dry.

WARNING

Automatically moving parts.

Injuries (crushing, piercing) possible if the safety panels are not in place.

- Before starting the Freedom EVOlyzer, make sure that the safety panel is closed.
- Never operate the instrument with the safety panels open.

Though the safety concept assumes that the safety panel is always closed during normal operation, it is necessary to have access to the elements in the working area behind the safety panel for setup, maintenance and troubleshooting purposes.

WARNING

Pointed tips and other sharp-edged elements, which might cause injuries when you reach into the working area with the safety panel open.

- Always be aware of the mechanical hazards.
- Wear laboratory apparel, rubber gloves, safety goggles, etc. as appropriate.

WARNING

Hazards originating from sub-components, such as instrument parts or options that are provided with separate documentation.

- Also pay attention to the safety instructions of these components.
- Read the corresponding operating manuals, instructions for use, etc.

ATTENTION

Possible worktable damage.
Do not spill liquids on worktable.

ATTENTION

- Unsafe operating condition and wrong measuring results in the process, if the system is leaking.
- If liquid is dripping from the tips or other parts of the liquid system, the Freedom EVOlyzer must not be operated any more.

Operation may only be resumed if the necessary maintenance or repair work has been performed and the proper condition of the system has been verified.

ATTENTION

Loading samples before system is initialized may cause collision with tips.

ATTENTION

Rapid temperature changes or direct sunlight may affect the instrument function.
Pipetting and barcode reading problems may be the result.
Do not open a window next to the instrument and do not expose the instrument to direct sunlight during operation.

Liquid Detection

ATTENTION

Electromagnetic RF waves from a cellular phone may affect the function of the liquid detection.
Faulty detection of the liquid surface may be the consequence, which causes the system to produce incorrect results.
Keep a distance of at least 2 m from the instrument when using a cellular phone.

ATTENTION

Damage to the ILID by electrostatic discharge.
Always make sure that you are earthed and discharge yourself by touching the worktable first before touching the tips.

Monitored Incubator Option

Heat-Resistant Microplates

The monitored incubator option has to be operated with heat-resistant microplates.

ATTENTION

Risk of deformation of microplates. Non heat-resistant microplates will get deformed if heated up.

- Make sure only heat-resistant microplates are used for incubation.

2.3.2 Other Hazards and Safety Measures

Pay attention to the following safety notices:

WARNING

Chemical, biological and radioactive hazards can be associated with the substances used or the samples processed with the Freedom EVOlyzer.
The same applies to waste disposal.

- Always be aware of possible hazards associated with these substances.
- Use appropriate protective clothing, safety goggles and gloves.
- The handling of substances and the disposal of waste may be subject to local, state or federal law or regulations with regard to health, environment or safety. Strictly observe the corresponding provisions.

WARNING

Caustic substances can cause burns and eye injury.

- Always be aware of possible hazards associated with these substances.
- Avoid exposure to caustic substances.
- Use appropriate protective clothing, safety goggles and gloves.

WARNING

Fire hazard.
The instrument is not explosion protected. Not for use in Ex zones.
When using flammable material take the risk of fire into consideration:

- Avoid the formation and accumulation of flammable vapors.
- Avoid the spillage of flammable material.

WARNING

Fig. 2-5 *Class 1 Laser Product*

Class 1 Laser Product pursuant to IEC 60825-1:2007
“Complies with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007”

Regarding all hazards (referring to the listed hazards earlier in this section) pay attention to the following:

- Prior to using hazardous materials perform a risk assessment.
- Consider specific workplace conditions, such as temperature, air ventilation, electrostatic discharge.
- Make sure that the risk is acceptable prior to use of the instrument.

2.3.3 Safety Elements

Safety Panels

The space around the worktable is protected with safety panels. Whereas the front safety panel can be opened, the other safety panels are permanently installed on the Freedom EVOlyzer.

Door Locks

During operation the front safety panel is locked by means of two door locks. The safety concept of the Freedom EVOlyzer assumes that the front safety panel is always closed when the instrument is running.

WARNING

If any safety element fails to operate as expected immediately discontinue use and notify the Tecan field service engineer.

Which are Safety Elements?

The figure shows the elements of the Freedom EVOlyzer, which have a protective function or have in any other way to do with safety:

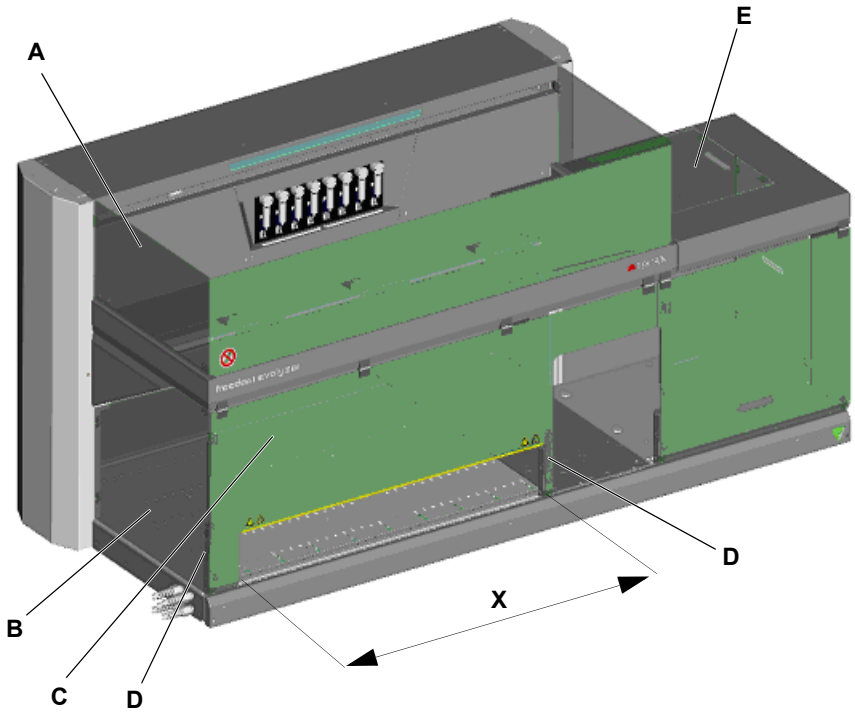


Fig. 2-6 *Safety elements*

A	*Top safety panel*	***D***	*Door lock*
B	*Side safety panel*	***E***	*Flap*
C	*Front safety panel*	***X***	*Loading interface (grid control)*

Removal of Safety Elements

The protective and safety devices installed on the Freedom EVOlyzer must not be removed or disabled during operation.

In the event such elements were removed, e.g. for maintenance work, operation may only be resumed when all protective and safety devices have been completely installed and checked.

2.4 Decontamination

When to Decontaminate

Apart from regular decontamination, the user must thoroughly decontaminate the instrument according to local regulations in the following cases:

- Before any maintenance or service work is performed on the instrument
- In case of accidents (e.g. crash, spilt substances, etc.)
- Before a Tecan field service engineer (FSE) performs any in-site work on the instrument
- Before the instrument or parts of it is returned to Tecan (e.g. for repair)
- Prior to storage of the instrument
- Prior to disposal of the instrument or parts of it
- Generally before the instrument or parts of it leave the user's site

Decontamination Method

The decontamination method must be adapted to the respective application and the substances associated with it. The user takes the full responsibility for the appropriate decontamination of the entire equipment.

WARNING

Biological or chemical hazard and/or radioactive radiation.

Contamination hazard due to parts of the instrument which are not completely decontaminated.

Not only the parts having direct contact with chemicals or biological material must be treated, but also the tubing system as well as the whole upstream equipment.

Decontamination Form

Before a Tecan FSE carries out any work on the instrument, or before the instrument is returned to Tecan, the owner of the instrument must confirm in writing that the decontamination has been performed properly and in accordance with local regulations.

The Decontamination Form can be requested from your local field service engineer, Tecan Helpdesk or can be downloaded: Fig. 1-1 "QR code", 1-2

Note: *Tecan reserves the right to refuse any instrument or a part of it, or will charge an extra fee, if the Instrument Decontamination Form or the Repair Order is not filled out and duly signed.*

2.5 General Safety Rules

Legal Regulations

All local, state and federal laws which prescribe the use, application, and/or the handling of dangerous materials in connection with the Freedom EVOlyzer must be strictly followed.

Duty of Maintenance and Care

The user is responsible for ensuring that the Freedom EVOlyzer is operated in proper condition, and that maintenance, service, and repair jobs are performed with care and on schedule, and by authorized personnel only.

Spare Parts to Be Used

Use only genuine consumables and genuine spare parts for maintenance and repair to assure good system performance and reliability.

Modifications

Modifications to the Freedom EVOlyzer are only permitted with the prior written approval of the manufacturer. Modifications and upgrades shall only be carried out by an authorized field service engineer. The manufacturer will decline any claim resulting from unauthorized modifications.

3 Technical Data

Purpose of This Chapter

This chapter introduces the reader to the Freedom EVOlyzer and its main components. It contains technical data, requirements and performance data.

3.1 Introduction

What is Freedom EVOlyzer?

The Freedom EVOlyzer is a computer controlled liquid handling and microplate handling system intended for fully automated processing of 96-well microplate based ELISA and ELISA-like tests, starting from sample pipetting and ending with result reading.

Delivery

The Freedom EVOlyzer is delivered only to Tecan authorized field service engineers, who take responsibility for assessing and investigating each installation at an end-user site in compliance with local requirements.

3.1.1 Freedom EVOlyzer Overview

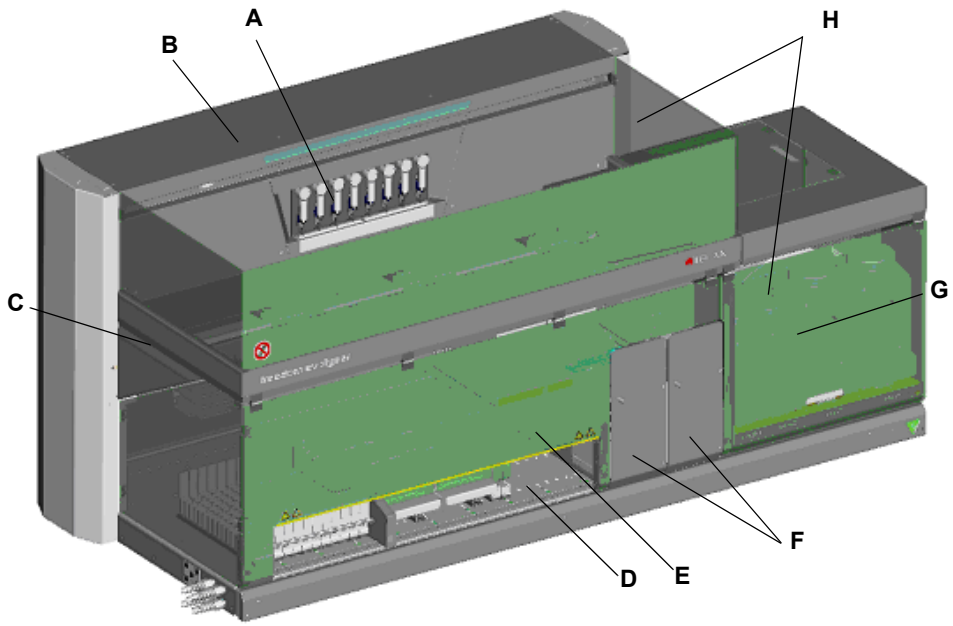


Fig. 3-1 *Freedom EVOlyzer instrument overview*

A	*Diluters with syringes*	***E***	*Front access panel*
B	*Housing*	***F***	*Room temperature incubators*
C	*Frame*	***G***	*Wash bottles*
D	*Worktable*	***H***	*Safety panels*

3.1.2 Product Identification and Labeling

Type Plate

Details for product identification can be read from the type plate that is located at the rear left of the Freedom EVOlyzer instrument.

Note: *The type plate shown below is a representative version of a type plate which might be subject to change.*

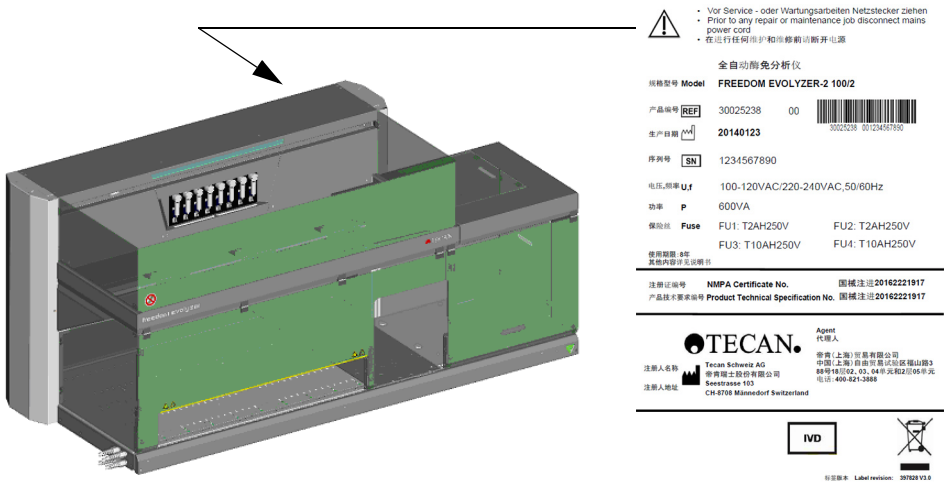


Fig. 3-2 *Freedom EVOlyzer*

On the type plate you find the following information:

- Identification data
  - Model
  - REF: ordering information (part number) of the Freedom EVOlyzer
  - SN: serial number
  - Date of Manuf.: production date
- Technical data
  - U, f: supply voltage (Volts), frequency (Hertz)
  - P: power consumption (Watts)
  - Fuse: required fuse protection (A)
  - Manufacturer’s name and address

3.1.2.1 For China only

Tab. 3-1 *Product identification and labeling for China*

Product name	FREEDOM EVOlyzer
Model No.	FREEDOM EVOlYZER-2 100/2 FREEDOM EVOlYZER-2 100/4 FREEDOM EVOlYZER-2 150 FREEDOM EVOlYZER-2 200
Applicant Name	Tecan Schweiz AG
Applicant Address	Seestrasse 103, CH-8708 Maennedorf, Switzerland
Address of manufacture site	Seestrasse 103, CH-8708 Maennedorf, Switzerland
Telephone No.	+41 44 922 82 82
China Agent & After-sale Service	Tecan (Shanghai) Laboratory Equipment Co., Ltd.
Address	1F, T15-4, #999, Ningqiao Road, Pilot Free Trade Zone, Shanghai, PRC, 201206
Telephone No.	+86 40 0821 38 88
Service Life	8 years. Based on a risk assessment approach according to the risk management file to define. During the useful life, the instrument is required to be maintained and repaired according to the requirements defined in operation manual. After maintenance and repair, the instrument can be used normally if confirmed to still keeping the essential safety and effectiveness.
Indications	Based on ELISA principle, used together with assorted reagent, the instrument is intended to be used in clinical qualitative and quantitative analysis for the analytes including tumor marker, autoimmunity, infectious diseases, neurotransmitter, neurodegeneration, endocrinology, food intolerance, cytokines, neonatal screening using specimen types of plasma, serum, cerebral spinal fluid, saliva, urine, cell culture supernatant, tissue homogenate from the human body.
Structure and Components	The product is made up of detection module, mechanical transportation module, pipetting module, PosID module, incubation and heating module, washing module, liquid storage module, circuit control module, power supply and software component (Release Version: V2.0)
CFDA Registration Certificate No.	**国械注进20162221917**
Product Technical Requirement No.	**国械注进20162221917**

3.2 Technical Data

3.2.1 Dimensions and Weights

Dimensions

Tab. 3-2 *Instrument dimensions*

	Freedom EVOlyzer 100	Freedom EVOlyzer 150	Freedom EVOlyzer 200
Height	910 mm/35.8 in.	910 mm/35.8 in.	910 mm/35.8 in.
Width	1520 mm/59.8 in.	1890 mm/74.4 in.	2490 mm/98 in.
Depth	800 mm/31.5 in.	800 mm/31.5 in.	800 mm/31.5 in.

Weights

Tab. 3-3 *Instrument/modules weights*

	Freedom EVOlyzer 100	Freedom EVOlyzer 150	Freedom EVOlyzer 200
Instrument, total	210 kg/462 lbs	260 kg/573 lbs	290 kg/639 lbs
LiHa	9 kg/20 lbs	9 kg/20 lbs	9 kg/20 lbs
RoMa standard	6.9 kg/15.2 lbs	6.9 kg/15.2 lbs	6.9 kg/15.2 lbs
XP SMART[a)]	0.8 kg/1.8 lbs	0.8 kg/1.8 lbs	0.8 kg/1.8 lbs
SPO	2 kg/4.4 lbs	2 kg/4.4 lbs	2 kg/4.4 lbs
PosID	9.1 kg/20 lbs	11 kg/24.3 lbs	14 kg/30.8 lbs
MIO standard	3.5 kg/7.7 lbs	3.5 kg/7.7 lbs	3.5 kg/7.7 lbs
MIO (shaking option)	4.4 kg/9.7 lbs	4.4 kg/9.7 lbs	4.4 kg/9.7 lbs
Packaging	35 kg/77 lbs	47 kg/104 lbs	71 kg/156.5 lbs

a) Two, four, or eight diluters, according to instrument configuration

Maximum Floor Load

Tab. 3-4 *Floor load specification*

	Freedom EVOlyzer 100	Freedom EVOlyzer 150	Freedom EVOlyzer 200
Floor load (maximum, with all options)	175 kg/m^2/ 35.8 lbs/ft^2	175 kg/m^2/ 35.8 lbs/ft^2	150 kg/m^2/ 30.7 lbs/ft^2

3.2.2 Worktable Access Range

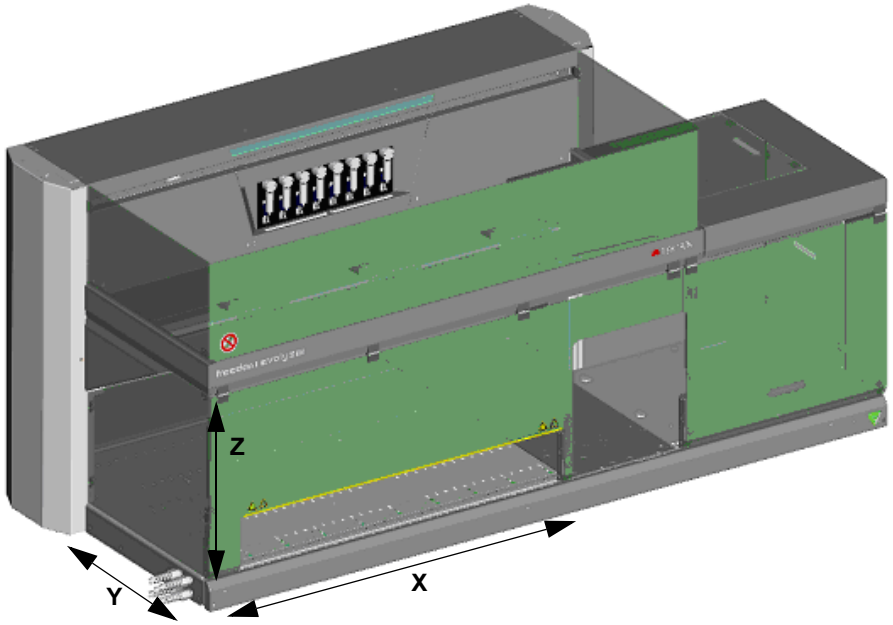


Fig. 3-3 *Worktable access range*

Worktable Dimensions

Tab. 3-5 *Worktable dimensions*

	Freedom EVOlyzer 100	Freedom EVOlyzer 150	Freedom EVOlyzer 200
Accessible X-range (X-travel)	745 mm/ 29.3 in.	1120 mm/ 44.1 in.	1720 mm/ 67.7 in.
Accessible Y-range (Y-travel)	Depending on LiHa type. Refer to Tab. 3-13 , 🗎 3-14	Depending on LiHa type. Refer to Tab. 3-13 , 🗎 3-14	Depending on LiHa type. Refer to Tab. 3-13 , 🗎 3-14
Grid positions on worktable	25	34/40 (depending on configuration)	58

3.2.3 Safety Panel Opening

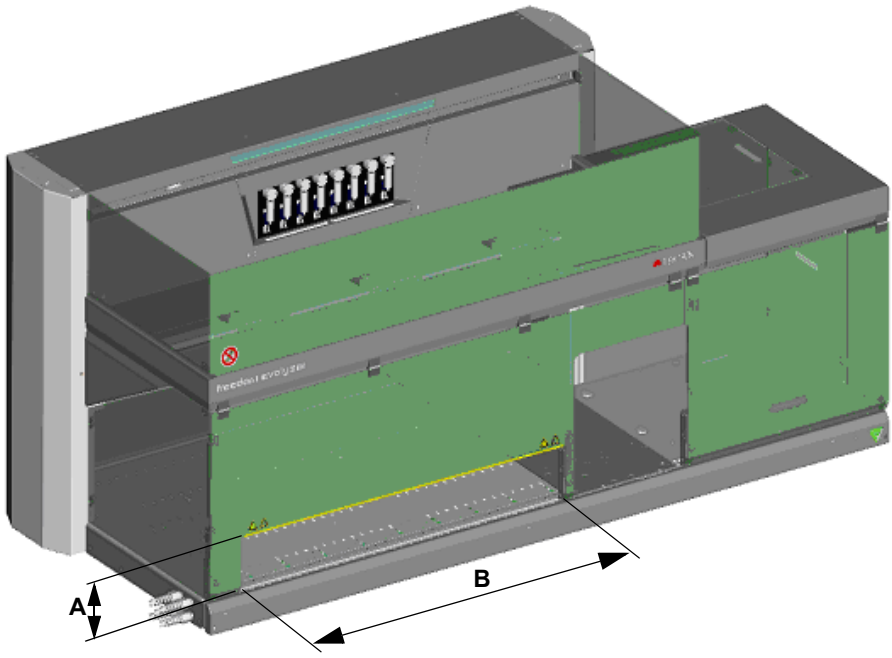


Fig. 3-4 *Safety panel opening*

A *Height of safety panel opening* ***B*** *Width of safety panel opening*

Dimensions

Dimensions of the opening in the front safety panel:

- Freedom EVOlyzer 100 (one incubator/single row):
  638.5 x 170 mm/25.14 x 6.69 in.
- Freedom EVOlyzer 150 (one incubator/single row):
  1013.5 x 170 mm/39.90 x 6.69 in.
- Freedom EVOlyzer 150 (two incubators/double row):
  863.5 x 170 mm/34.00 x 6.69 in.
- Freedom EVOlyzer 200 (two incubators/double row):
  1463.5 x 170 mm/56.56 x 6.69 in.

3.2.4 Supplies

Supply Ratings

Tab. 3-6 Supply ratings

	Freedom EVOlyzer 100	Freedom EVOlyzer 150, 200
Line voltage	100 - 120, 220 - 240 V AC (-15%/+10%)	100 - 120, 220 - 240 V AC (-15%/+10%)
Frequency	50/60 Hz	50/60 Hz
Power	600 VA	1200 VA
Fuses	2 x T10A (instrument power) 2 x T2A (main powered options)	2 x T10A (instrument power) 2 x T2A (main powered options)

Electrical Safety

Classification with regard to electrical safety according to EN/IEC standards:

Tab. 3-7 Electrical specifications (safety)

Overvoltage category	II	IEC 60364-4-443
Pollution degree	2	(EN) IEC 61010-1

Main Power Switch

The main power switch is placed at the level of the front access panel. The power switch does not switch the mains voltage directly, but gives a control signal to the power supply.

Tab. 3-8 Main power switch specifications

Specification	Description
Circuit break	By unplugging the instrument.
Power on delay	0.2 - 0.5 sec.
Power off delay	1 - 2 sec.

Status Lamp

The status lamp is located above the diluters in the center of the instrument front surface. It displays the instrument operational states with red and green light that is either continuous or flashing. When the status lamp light is red, an acoustic alarm sounds.

The illuminated area is: 540 x 18 mm.

Uninterruptible Power Supply, UPS

For an optimal operation of instruments and smooth running of the relevant application, Tecan recommends connecting an online UPS, so that the power supply runs via the UPS with a filter effect. A switched UPS type that switches over to batteries only after network breakdown is not recommended.

For further information, refer to the technical data and also take into consideration the power consumption of your computer.

For further assistance contact your nearest Tecan representative.

3.2.5 Internal Fuses

The fuses of the power supply and the internal electronics are not user serviceable.

Note: *A blown fuse requires the equipment to be checked for the reason of this condition. In case of a blown fuse contact your local service organization.*

3.2.6 Input / Output Connections

Freedom EVOlyzer Interfaces

The figure shows the components of an example system with its input and output connections. The parts that belong to the Freedom EVOlyzer instrument are shown within the rectangle.

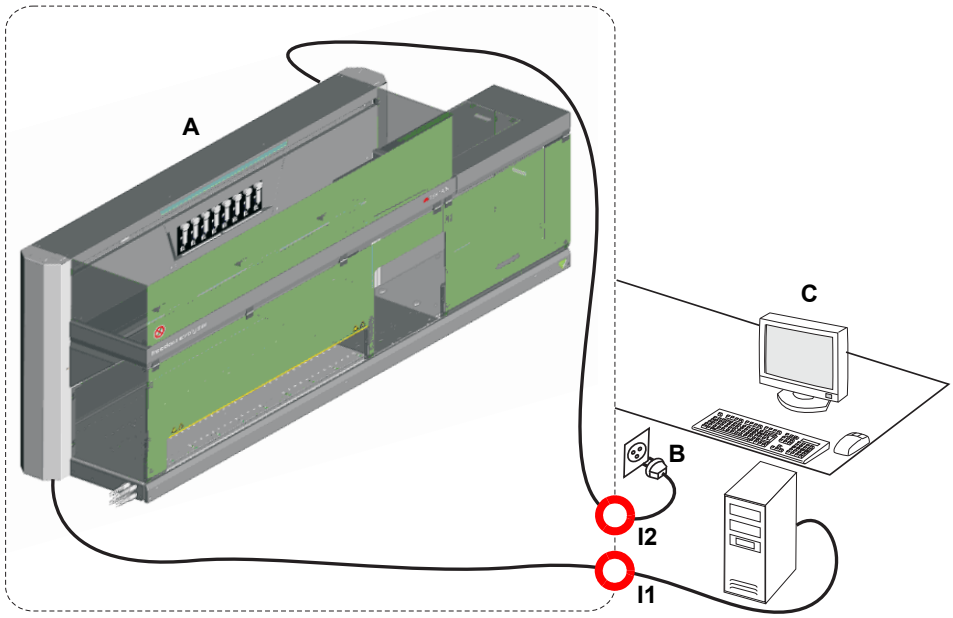


Fig. 3-5 *Freedom EVOlyzer interfaces*

A	*Freedom EVOlyzer instrument*	***I1***	*USB interface*
B	*Wall outlet*	***I2***	*Power connection*
C	*Control PC*		

USB

All data traffic to and from the Freedom EVOlyzer runs via the USB interface. The USB cable is connected to the PC that controls the instrument.

Power cord

The power cord is connected to a wall outlet for electrical energy supply.

Note: *Options may have additional interfaces to external devices (e.g. microplate reader to control system).*

3.2.7 Liquid Containers

The Freedom EVOlyzer comprises the following liquid containers:

Tab. 3-9 *Liquid containers and contents*

Container for	Number of containers	Contents
System liquid	1	20 l
Refill (system liquid)	2	10 l
Waste liquid	1 (plus optional 2nd container for continuous operation)	20 l
Wash buffer	2	2 l
Wash buffer	2	4 l

3.2.8 Environmental Conditions

All instruments are intended for indoor operation and storage only. The tables below give an overview.

ATTENTION

Barcodes cannot be read due to the influence of sunlight or other light sources on the barcode scanner.

- Do not expose the instrument to direct sunlight.
- Do not install strong light sources that may impair the function of the barcode scanner near the instrument.

Operating Conditions

Operating temperature	15 - 32 °C / 59 - 90 °F
Operating humidity	30 to 80% relative (non condensing) at 30 °C / 86 °F or below
Operating altitude	max. 2000 m above sea level

Storage Conditions

The instrument must be protected against dust and debris with a cover. Recommendation: store the instrument in its original packaging.

Storage temperature	1 to 60 °C / 34 to 140 °F
Storage humidity	5 to 80% relative (non condensing) at 30 °C / 86 °F or below

3.2.9 Emissions

Noise Emission

Noise emission (EN61010-1)	< 85 dBA [max. 65 dBA (sound pressure), measured at a distance of 1 m from the instrument]

3.3 Configuration Data

3.3.1 Standard Equipment

The following equipment is standard for the Freedom EVOlyzer 100, 150 and 200 and described in this Operating Manual:

Tab. 3-10 *Standard equipment*

Designation	Abbreviation
Liquid handling arm with 2 channels (only for Freedom EVOlyzer 100)	LiHa/2
Liquid handling arm with 4 channels (for Freedom EVOlyzer 100, 150)	LiHa/4
Liquid handling arm with 8 channels (for Freedom EVOlyzer 150, 200)	LiHa/8
Robotic manipulator arm with gripper	RoMa
Positive identification	PosID
Sunrise Reader (4 or 6 filters or gradient filter)	
HydroFlex Platform (Washer)	
1 room temperature incubator	RT-incubator
1 heated incubator	HT-incubator
Sensored pump option	SPO
Standard safety panel	
Standard worktable with loading interface	
Disposable tip adapter with DiTis and / or standard tips	

3.3.2 Arm Configuration

Explanation

The Freedom EVOlyzer is equipped with one LiHa and one RoMa. The following picture shows the configuration:

Possible Arm Configuration

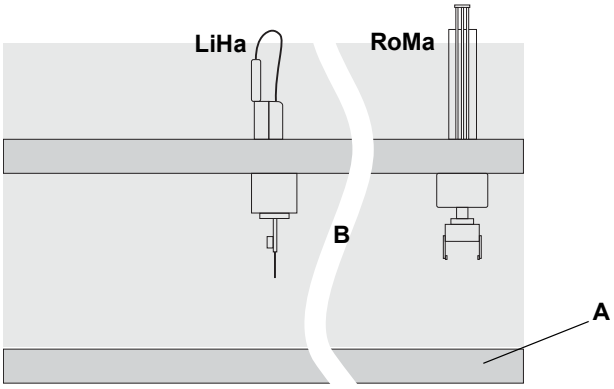


Fig. 3-6 *Arm configurations of the Freedom EVOlyzer*

A *Freedom EVOlyzer base unit*

B *Breaking line: Indicates that instruments of size 100, 150 and 200 are concerned*

LiHa *Liquid handling arm (with 2, 4 or 8 tips)*

RoMa *Robotic manipulator arm (RoMa standard)*

3.3.3 Optional Equipment

Upgradeability

A second room temperature incubator or any other optional module listed below can be installed at a later date after the initial installation.

Field upgrades must be performed by Tecan authorized field service engineers, FSEs, only.

Only the following optional equipment is available for the Freedom EVOlyzer and described in this Operating Manual:

Tab. 3-11 *Optional equipment*

Designation	Abbreviation
Lower disposable tip eject option (if DiTis are used)	Lower DiTi eject
DiTi waste and wash station unit (if DiTis are used)	
2nd room temperature incubator	RT-incubator
2nd heated incubator	HT-incubator
Shaking option for heated incubators	
Fan option for shaking incubator if used for room temperature incubation	

3.3.4 Accessories

For approved accessories see section 11 “Spare Parts and Accessories”, 🗎 11-1.

Note: *Accessories other than listed there are not tested with the Freedom EVOlyzer and, therefore, may not be used with the Freedom EVOlyzer.*

3.4 Requirements

3.4.1 Computer Requirements

Refer to your Application Software Manual and your Instrument Software Manual for details on minimal computer requirements.

3.4.2 Software Requirements

Only the following software can be used in combination with the Freedom EVOlyzer. It is strongly recommended that the latest software versions are used. Please contact your nearest Tecan representative for more information.

Tab. 3-12 *Software requirements*

Instrument Software	See "ReadMe" file on USB
Freedom EVOlution Software	See "ReadMe" file on USB
Magellan Software	See "ReadMe" file on USB

3.4.3 System Liquid Requirements

System Liquid

System liquid refers to a liquid which fills the liquid system and is used as wash fluid.

- System liquid
  - Deionized or distilled water with a conductivity between 0.5 µS/cm and 10 µS/cm.
- The system liquid must be free of particles.
- Make sure that the system liquid container is clean.
- The system liquid must be free of air bubbles and must be room temperature. Therefore we provide two additional fill-up containers. Place these containers filled with water near your system, allowing the water in it to attain the room temperature, which complies with ideal conditions. Thus, you always have system liquid at room temperature to fill up the system liquid container in use when it is empty.
- To reach the pipetting performance we recommend degassing the system liquid. For further information on this issue, please contact your responsible application specialist.
- In order to ensure that during operation no air bubbles form in the pipetting tubing, a sufficient quantity of system liquid must circulate in the system. We recommend at least 60 ml per hour.

Any additives to the system liquid must be validated to evaluate the influence on the pipetting performance and the overall analytical process.

3.4.4 Sample Requirements

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Sample preparation	See section 6.3.4.3 “Preparation of Samples”, 🗎 6-15

The instrument is validated for pipetting deionized water. Other liquids are only allowed after validation according to laboratory practice and state-of -the art by the kit manufacturer or operator of the system.
For sample preparation refer to cross references above.

3.4.5 Kit Requirements

The instrument is validated for processing validated ELISA kit reagents like wash buffer, conjugate, substrate, controls and standards and the corresponding plate. Other liquids are only allowed after validation according to laboratory practice and state-of -the art by the kit manufacturer or operator of the system.

Each combination of kit and Freedom EVOlyzer instrument must be validated by the kit manufacturer or the operator of the system.

3.5 System Modules

The system modules are briefly introduced in the following sections. According to your order configuration, some of these options might be installed.

3.5.1 Liquid Handling Arm (LiHa)

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Disposable tips, DiTis	See section Note: "The standard DiTi cone is used for all disposable tip sizes.", 11-14
Carry over	See section "Carry over", 6-19
Gravimetric precision test	See Tab. 3-17 "Pipetting precision, tested with Setup & Service Software", 3-16

The liquid handling arm is used for pipetting actions in different volume ranges, depending on the tip types used and the features of the liquid system.
The Freedom EVOlyzer instrument can be equipped with maximally one 2-, 4-, or 8-tip liquid handling arm depending on the customer's order configuration.

LiHa Operating Ranges

Tab. 3-13 *LiHa operating ranges (relative movement)*

Axis	LiHa type	Freedom EVOlyzer 100	Freedom EVOlyzer 150	Freedom EVOlyzer 200
X-axis	All	Refer to Tab. 3-5 , 3-5	Refer to Tab. 3-5 , 3-5	Refer to Tab. 3-5 , 3-5
Y-axis	8-tip LiHa[a)]	Not applicable	373 mm/14.69 in.	373 mm/14.69 in.
	4-tip LiHa[a)]	409 mm/16.10 in.	409 mm/16.10 in.	Not applicable
	2-tip LiHa[a)]	409 mm/16.10 in.	Not applicable	Not applicable
Z-axis[b)]	All	210 mm/8.27 in.	210 mm/8.27 in.	210 mm/8.27 in.

a) At 9 mm/0.354 in. spacing
b) Each tip individually with a reference tip

LiHa Precision

Tab. 3-14 *LiHa positioning accuracy at 9 mm/0.354 in. spacing, with all tips simultaneously*

Axis	Accuracy
X	±0.4 mm/0.016 in.
Y	±0.4 mm/0.016 in.
Z	±0.4 mm/0.016 in.[a)]

a) New LiHa; worn parts result in deterioration of accuracy

Tab. 3-15 *LiHa repeatability at 9 mm/0.354 in. spacing, with all tips simultaneously*

Axis	Repeatability
X	±0.15 mm/0.006 in.
Y	±0.15 mm/0.006 in.
Z	±0.3 mm/0.012 in.[a)]

a) New LiHa; worn parts result in deterioration of repeatability

Tip Configuration

Each channel of a liquid handling arm can be equipped with different types of tips, i.e. disposable tips and fixed tips. Any combination can be used on a single liquid handling arm. However, only certain combinations can be tested with the gravimetric test (refer to cross references above).
Original Tecan tips must be used exclusively.

Equidistant Tip Movement

The equidistant movement of sampling tips in Y direction is:

- from 9 mm/0.354 in. ± 0.4 mm/0.016 in.
- to 38 mm/1.496 in. ± 1 mm/0.039 in.

Fixed Tip Coatings

The tips are made of stainless steel and are quite hydrophilic and porous. To increase the hydrophobicity only soft Teflon outside coating for aqueous solutions is used.

Disposable Tips

Use only Tecan disposable tips. Conductive disposable tips are available with or without filter, in following volumes:

- 1000 µl
- 200 µl

Note: *The use of disposable tips with filters is strongly recommended to reduce the potential for carry over.*

Refer to cross references above for details.

DiTi Box

A DiTi box holds up to 96 tips of 200 µl or 1000 µl DiTis.

Carrier For Disposable Tips

Four different carriers for disposable tips can hold combinations of 200 µl or 1000 µl DiTi boxes.

Free Dispense Volumes

The following minimum and maximum free dispense volumes can be achieved with fixed and disposable tips:

Tab. 3-16 *Minimum and maximum free dispense volumes in single pipetting mode with deionized water*

Tip type	Min. volumes	Max. volumes for 1000 µl syringe[a)]
Fixed tip standard	10 µl	900 µl
Disposable tip 1000 µl	25 µl	900 µl
Disposable tip 200 µl	10 µl	190 µl

a) For higher maximum values liquid class must be optimized by a trained application specialist.

Pipetting Precision

QC Test with Setup & Service Software

Based on Tecan quality control requirements, the values in the tables below are only valid if maintenance instructions and schedule have strictly been followed. The precision test procedure provided by the instrument software uses a dedicated parameter setting for each tip type. So all tips of the same type are tested together, resulting in individual CVs, i.e. CVs for each channel, as well as in a CV comprising all measurements.

Test Conditions

General conditions for QC test, carried out with the **Setup & Service Software**:

- All liquid handling values have been verified under controlled laboratory environment at temperatures between 20°C and 27°C and a humidity between 30 % and 60 % at 25°C.
- Liquid: Water, standard liquid class parameters
- Free dispense; single pipetting mode
- According to the QC procedure the following limits apply:
  - CV manufacturer: Limits for internal QC; verification of the technical data.
  - CV field: Limits for QC in the field, which any instrument in use is expected to meet.
- Gravimetric measurements

Tab. 3-17 *Pipetting precision, tested with Setup & Service Software*

Volume	CV manuf.[a)]	CV field[a)]	Tip type	Syringe
10 µl	≤ 3 %	≤ 3.5 %	Standard[b)]	1000 µl
10 µl	≤ 3 %	≤ 3.5 %	DiTi 200 µl	1000 µl
100 µl	≤ 0.5 %	≤ 0.75 %	Standard[b)]	1000 µl
100 µl	≤ 0.5 %	≤ 0.75 %	DiTi 200 µl	1000 µl

a) CV calculated for each channel and across all eight tips, manufacturer's limit (manuf.) and limit used at the customer's site (field) by the field service engineer respectively
b) Teflon coated outside

Pipetting Precision in the Application

The table below shows the CV values that can be expected in the actual application.

General conditions, using **Freedom EVOlution SW** as application software:

- Liquid: Deionized water; standard liquid class parameters
- Free dispense, single pipetting mode

Tab. 3-18 *Pipetting precision, achievable in the application*

Volume	CV[a)]	Tip type
10 µl	≤ 3.5 %	Standard[b)]
10 µl	≤ 3.5 %	DiTi 200 µl
25 µl	≤ 3.5 %	Standard[b)]
25 µl	≤ 2 %	DiTi 200 µl
25 µl	≤ 5 %	DiTi 1000 µl
100 µl	≤ 0.75 %	Standard[b)]
100 µl	≤ 0.75 %	DiTi 200 µl
100 µl	≤ 1 %	DiTi 1000 µl
197 µl	≤ 0.4 %	DiTi 200 µl
200 µl	≤ 0.75 %	Standard[b)]
200 µl	≤ 0.75 %	DiTi 1000 µl
500 µl	≤ 0.75 %	Standard[b)]
500 µl	≤ 0.5 %	DiTi 1000 µl
750 µl	≤ 0.5 %	DiTi 1000 µl
900 µl	≤ 0.75 %	Standard[b)]
973 µl	≤ 0.5 %	DiTi 1000 µl

a) CV calculated for each channel and across all eight tips
b) Teflon coated outside

Note: *Only Tecan disposable tips guarantee attainment of the performance specified for the Tecan pipetting instruments.*

Liquid Level Detection

Each tip can individually detect the surface of a conductive liquid by measurement of changes in capacitance. Each channel has an individual liquid detection. Generally, detection of conductive liquids of following volumes is possible:

- ≥ 50 µl conductive liquid in 96-well round-bottom microplates
- ≥ 100 µl conductive liquid in sample tubes with a diameter of 10 or 13 mm
- ≥ 150 µl conductive liquid in sample tubes with a diameter of 16 mm
- ≥ 5 ml conductive liquid in reagent trough

For information on conductive liquid, see Tab. 6-5 “Liquid conductivity”, 6-18.

Clot Detection

Tab. 3-19 *Clot detection limitations*

Inner diameter of container in mm	h (= clot limit) in mm	Minimum aspiration volume in µl for proper function of clot detection
7	4	154
7.5	4	177
8	4	201
9	4	254
10	4	314
10.5	4	346
11	4	380
13	4	531
13.5	4	573
14.5	4	661

Wetted Materials

The standard liquid system components that come into contact with either system or sample liquid are of the following materials:

Tab. 3-20 *Liquid system components: materials*

Component	Material
Tubing until valve	FEP
Tubing liquid system	Silicone, PVC, FEP
Distributor	POM
Disposable tips, wash stations, troughs	PP
SPO	FFPM, PP, PTFE (Teflon)
Valves	PCTFE (Kel-F), PTFE (Teflon)
Syringes	Borosilicate glass, PTFE (Teflon)
Fixed tips standard	Stainless steel, PTFE (Teflon)
System liquid container	HDPE
Waste container	HDPE

3.5.2 Robotic Manipulator Arm Standard (RoMa Standard)

The Freedom EVOlyzer instrument is equipped with one robotic manipulator arm. The robotic manipulator arm is used to transport objects of the format of microplates, such as reagent blocks, deep well plates, etc. from one to another position on the worktable or for storage onto the shelf.

Tab. 3-21 *RoMa standard technical data*

Force in Z-direction	60 N
Z-range	Total range: 259 mm/10.2 in. Work range: 257 mm/10.12 in.
Transportable mass	max. 0.4 kg/0.88 lbs
Gripper force	10 N
Gripper space range	58 to 140 mm/2.28 to 5.51 in.
Rotation angle	270° (left or right oriented)

ATTENTION

Improper transport of labware (microplates, etc.)
Use only labware that is rigid enough not to be deformed by the gripper force.

3.5.3 Positive Identification (PosID)

What Is PosID?

The PosID (positive identification module) reads barcodes on carriers and containers e.g. sample tubes, microplates, etc.

Performance Data

The PosID is able to read horizontal and vertical barcodes.

Tab. 3-22 *General PosID performance data*

Number of different container code types per application	Up to 6 different container code types can be used at the same time
Reading positions on carrier	Up to 24 container positions
Max weight of a carrier to be handled by PosID	2.2 kg (4.85 lbs)
Immunity against external light sources	External light below 8000 lux is harmless
Work range for carriers (clear worktable, i.e. no elements, such as incubators that restrict the PosID access range, present)	The PosID can read the carrier ID in any grid position[a)]
Work range for containers on the worktable (clear worktable, i.e. no elements, such as incubators that restrict the PosID access range, present)	Restriction: The PosID cannot read the container IDs of carriers in the two rightmost grid positions[a)]
Throughput: Required time to read 10 strip racks (16 positions)	Max. 90 s (including carrier ID)

a) Restrictions due to additional elements on the worktable, e.g. incubators: See section "Access Restrictions" below.

ATTENTION

Barcodes cannot be read due to the influence of strong light sources (direct sunlight, artificial lighting, etc.).

- Make sure that the PosID is not exposed to direct sunlight.
- Do not install strong light sources near the PosID.

Reading Characteristics

The following typical read and detection rates can be expected:

Tab. 3-23 *Reading/detection data*

Item to be detected	Reading speed	Read rate[a)]	Detection rate[b)]
Carrier ID barcode	300 mm/s	99.9%	-
Container ID barcode, tubes of 16 mm diameter in carrier with 16 positions	300 mm/s	99.8%	99.98%
Container ID barcode, tubes of 10 mm diameter in carrier with 16 positions	300 mm/s	99.8%	99.98%
Container ID barcode, tubes of 10 mm diameter in carrier with 24 positions	200 mm/s	99.8%	99.98%
Container ID barcode, 3 microplates on carrier, landscape position	300 mm/s	99.8%	-
Container ID barcode, 100 ml trough on carrier	100 mm/s	99.8%	-

a) Barcode scanner
b) "No Tube" sensor, glass or plastic tube, filled or empty, with or without barcode

Barcode Symbology Types

The PosID recognizes a number of different barcode types. Not all types provide for sufficient reading security.
For that reason, the following considerations must be taken into account when defining the barcode types to be used for container identification:

Tab. 3-24 *Barcode symbology types*

Symbology	Characteristics	Recommendation
Code 128	Variable length, high density, alphanumeric symbology. Three different character sets can encode • upper case and ASCII control characters, • upper and lower case characters, • or numeric digit pairs. Employs a check digit for data security.	Recommended[a]. Widely used and good reading security.
Code 39 Standard[b]	Variable length, alphanumeric symbology. The character set can encode upper case, numeric, and the characters -.*$/+%. The asterisk (*) is reserved as start / stop character. Allows for a (modulo 43) check digit.	Use only with check digit (modulo 43).
Code 39 Full ASCII[b]	Same as code 39 standard, but can encode the complete 128 ASCII character set (including asterisk).	Use only with check digit (modulo 43).
Codabar[b]	Variable length symbology. The character set is restricted to numerics and the characters -$:/.+ABCD, whereas A, B, C and D are used as start and stop characters. Allows for a (modulo 16) check digit.	Not recommended (reading security). May only be used with defined code length and check digit (modulo 16).
Interleaved 2 of 5[b]	Variable length, high density, numeric symbology. Pairs of digits can be encoded in an interleaved manner (bars and spaces). **If partially scanned, there is the possibility of a barcode being decoded as a valid (but shorter) number.** Optionally allows for a (modulo 10) check digit.	Do not use (reading security insufficient). May only be used with defined code length and check digit (modulo 10). At least 6 characters are necessary.

a) Also used for standard carrier ID barcodes
b) The application SW may restrict the use of barcode types. See section "Permissible Barcode Types" below.

Barcode Label Quality

Barcode Label Specifications

The barcode labels must fulfil the following specifications:
- Module width: 5 to 15 mils (0.127 to 0.381 mm)
- Quiet zone (QZ): ≥ 5 mm
- Barcode height: min. 7 mm

- Barcode length: Max. 64 mm (without quiet zone)
- Number of characters: Max. 32
- Black symbols on white background

Standards define the quality of the barcode labels regarding symbol contrast, reflectance and edge determination, etc.

To avoid misreadings, the quality of the barcode labels must be graded **A**, **B** or **C** according to **ANSI X3.182** and **DIN EN 1635**. Tecan recommends using grade **A** for best reading performance.

A quality system in the production of barcode labels must be employed to ensure the conformity to the quality grades mentioned above.

Recommend-ations

To ensure good reading results, pay attention to the following recommendations:

- Use barcode testing device to verify the barcode quality.
- Print quality: Use barcodes printed by means of a thermal-transfer or photographic printer.
- Barcode label surface must be mat and clean.
- Do not use yellowed, stained, creased, wet or damaged barcode labels.

Barcode Label Positioning

Note: *The legibility of the barcodes can be increased by positioning the barcode labels accurately.*

Barcode Label on Tubes

The figure shows the dimensions for barcode label positioning on tubes.

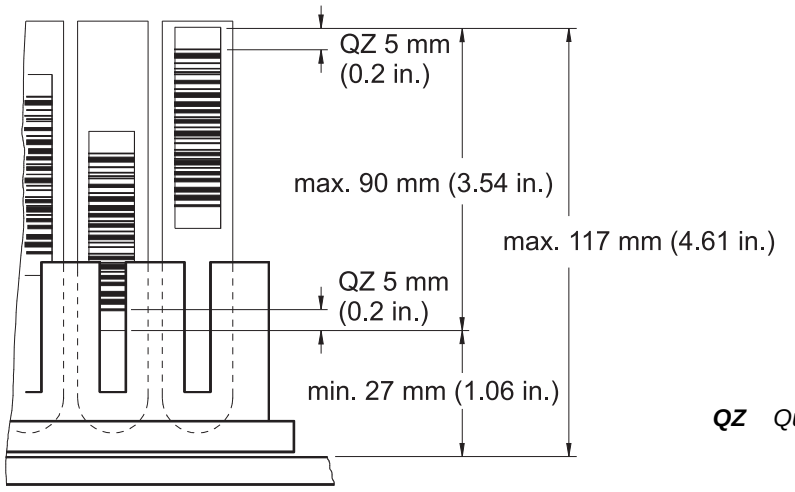
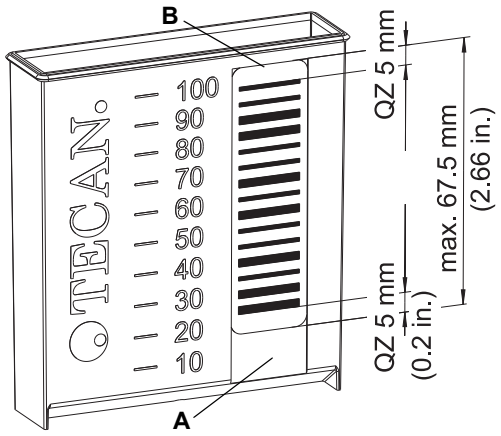


Fig. 3-7 *Barcode label on tubes*

Barcode Label on Trough

The figure shows how to position the barcode labels on reagent troughs.



A *Recess for barcode label*
B *Edge of barcode label must be flush with upper end of recess*
QZ *Quiet zone*

Fig. 3-8 *Barcode label on trough*

Barcode Label on Microplate

The figure shows the dimensions for barcode label positioning on microplates.

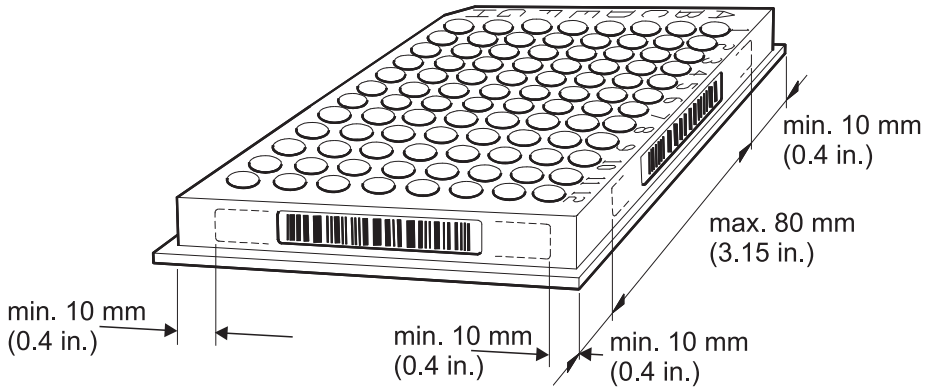
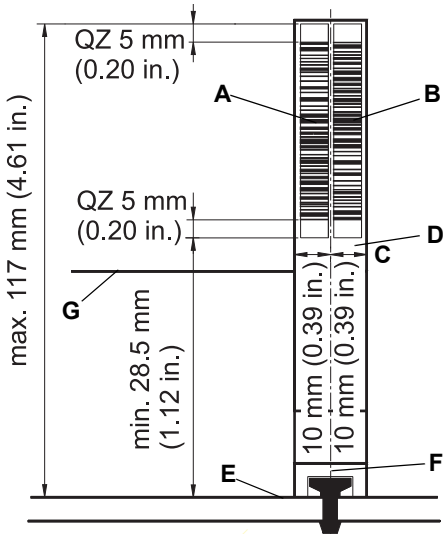


Fig. 3-9 *Barcode label on microplate*

Barcode Label on Carrier

The figure shows the dimensions for barcode label positioning on carriers:



A *Carrier ID code 1*
B *Carrier ID code 2 (used for verification)*
C *Max. distance from pin center*
D *Carrier barcode label support*
E *Worktable surface*
F *Center of positioning pin*
G *Carrier body*
QZ *Quiet zone*

Fig. 3-10 *Barcode label on carrier*

3.5.3.1 Access Restrictions

For the different sizes of the Freedom EVOlyzer instruments the following access restrictions for the PosID apply:

Tab. 3-25 *Access restrictions for the PosID*

Instrument size	Number of RT incubators	Number of heated incubators	Total of available grid positions	Number of scannable grid positions	Number of scannable carrier positions
100	1	1	25	23	21
150	1	1	40	38	36
150	1	2	40	34	31
150	2	1	34	34	34
150	2	2	34	34	31
200	2	2	58	58	55

3.5.3.2 Permissible Barcode Types

The Freedom EVOlution SW supports the following barcode types:

- Codabar
- 2 of 5 interleaved
- Code 39 (only standard, Full ASCII not supported)
- Code 128

The user can define which barcode types are permissible in the specific application as well as other barcode parameters.
Refer to the “Freedom EVOlution SW Runtime Controller Manual”.

3.5.4 Monitored Incubator Option (MIO)

Configurations

The monitored incubator option has two system configurations listed below:

- Standard
  - The standard configuration consists of six slots for one microplate each.
- Shaking Incubator
  - The shaking incubator can optionally be equipped with a cooling fan to provide room temperature incubation in conjunction with shaking.

Performance Data

Tab. 3-26 *MIO performance data*

Number of slots	6
Incubating temperature range	Actual room temperature [°C] + 5°C to 60°C Actual room temperature [°F] + 9°F to 140°F
Accuracy of chamber temperature	max. ±0.5°C (±0.9°F) at 37°C (99°F) and 46°C (115°F) max. ±2.0°C (±3.6°F) at 60°C (140°F)
Temperature accuracy over loaded microplates	max. ±1°C (±1.8°F) at 37°C (99°F) and 46°C (115°F) max. ±2°C (±3.6°F) at 60°C (140°F)
Warm-up time from 20 - 37°C, 45°C	max. 20 min.
Warm-up time from 20 - 60°C	max. 30 min.
Shaking / rotation frequency	1 to 8.5 Hz
Linear shaking	max. 2 mm amplitude in Y-dimension

3.5.5 Sunrise Microplate Reader

For common technical data refer to the separate documentation of the Sunrise Reader.

Tab. 3-27 *Sunrise reader main specifications*

Number of filters	4 or up to 6 filters or a gradient filter
Filter wavelength	From 340 nm to 750 nm
Measurement range	0 and 3 OD
Linearity	1% in the range of 0 to 2 OD
Precision	Better than +/-(0,5%+0,005 OD) in the range of 0 to 2 OD
Accuracy	Better than +/-(1,0%+0,010 OD) in the range of 0 to 2 OD
Number of shaking modes	4
Shaking frequency	2 to 12,3 Hz
Shaking time	Freely definable

3.5.6 HydroFlex Platform (Microplate Washer)

For common technical data refer to the separate documentation of the HydroFlex Platform.
Due to the integration of the HydroFlex Platform into the Freedom EVOlyzer the following data differs from the specifications of the HydroFlex Platform in stand-alone mode:

Tab. 3-28

Dispensing accuracy	<= 4%

3.6 Chemical Resistance Table

Chemical Resistance

In the following the chemical resistance of the used materials is specified:

Tab. 3-29 *Chemical resistance table*

Material	FEP	PVC	Silicone	POM	PVDF	PP	PTFE	FFPM	KEL F	ETFE
Acetone	o	/	o	x	/	o	o	o	o	o
Acetonitrile (C_2H_3N)	o	/	/	/	x	o	nd	nd	nd	o
Formic acid 100 %	o	x	x	/	x	o	o	x	o	o
Ammonium hydroxide 25 %	o	x	o	/	o	o	o	nd	o	o
Chloroform	o	/	/	x	o	x	o	x	x	/
Dimethyl-formamide	o	/	/	/	/	o	o	o	o	/
DMSO	o	/	x	o	/	o	nd	nd	nd	o
Acetic acid 96 %	o	/	x	/	o	x	o	o	o	x
Acetic acid ethylester	o	/	/	x	/	x	nd	nd	nd	x
Ethanol 96 %	o	x	x	o	o	o	o	o	o	o
Formalde-hyde 40 %	o	x	x	x	o	o	o	x	o	o
Sulfuric acid 40 %	o	x	/	/	o	o	o	o	o	o
Sulfuric acid 96 %	o	/	/	/	/	x	o	o	o	o
Isopropanol	o	/	x	o	o	o	o	o	o	o
Dilute bleach, NaOCl	o	x	x	/	o	x	o	o	o	o
Methanol	o	x	o	x	o	o	o	o	o	o
Methylene chloride	o	/	/	x	/	/	o	o	o	/
Sodium hydroxide 10M	o	x	o	/	x	o	nd	nd	nd	o

Tab. 3-29 *Chemical resistance table*

Material	FEP	PVC	Silicone	POM	PVDF	PP	PTFE	FFPM	KEL F	ETFE
Perchloric acid 60 %	o	/	/	x	o	x	o	x	x	/
Petroleum ether 30/50	o	x	/	x	o	/	nd	nd	nd	x
Hydrochloric acid 32 %	o	x	/	/	o	o	o	o	o	o
Trichloroace-tic acid 40 %	o	/	/	o	o	/	o	o	o	x

Legend:

o	resistant
x	partly resistant, use is possible with frequent replacements
/	not resistant, unsuitable for use
nd	not determined

4 Description of Function

Purpose of This Chapter

This chapter explains the basic principle of the Freedom EVOlyzer, shows how it is structured and gives a functional description of the assemblies.

4.1 Introduction

What is Freedom EVOlyzer?

The Freedom EVOlyzer is a precision instrument designed for automating routine laboratory tasks.

Main Parts

The instrument consists of a platform (frame, housing, main electronic boards, liquid handling arm and power supply) that is available in three different sizes.

The operator controls the system via a personal computer, on which the Instrument Software and the Application Software is installed.

4.2 Structure

4.2.1 Mechanical Structure

The figure shows the main parts of the Freedom EVOlyzer:

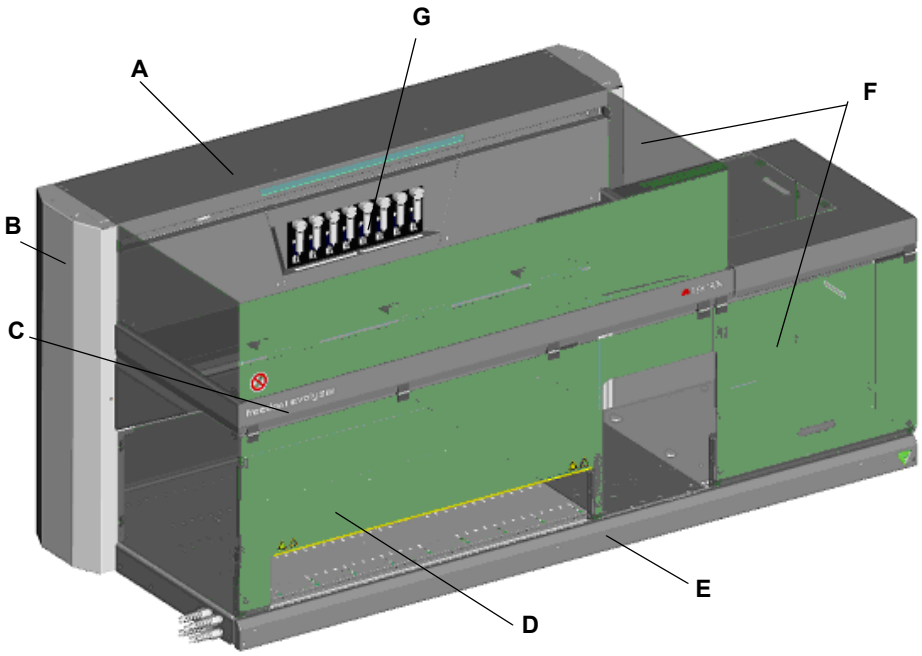


Fig. 4-1 *Freedom EVOlyzer instrument overview*

A	*Housing*	***D***	*Worktable with positioning pins*
B	*Electronic boards behind lateral covers*	***E***	*Front access panel*
C	*Frame*	***F***	*Safety panels*
		G	*Diluters with syringes*

4.2.2 Worktable

Positioning Pins

On the Freedom EVOlyzer worktable, evenly spaced positioning pins ensure proper positioning of all carriers according to the grid represented in all softwares. One grid position defines the minimal width of carriers, e.g. wash stations and strip racks for tubes. The positioning pins also enable the sliding of carriers/racks in Y-direction.

Sliding Carriers and Racks

Sliding carriers and racks are needed for:

- replacement (loading/unloading) of carriers or racks during operation,
- the identification of tubes, microplates, troughs etc. on carriers by the PosID.

4.2.3 Liquid System Structure

Liquid System refers to all instrument modules and parts which contain or directly influence liquid.

The following figure shows the main components of the liquid system with the sensored pump option (SPO).

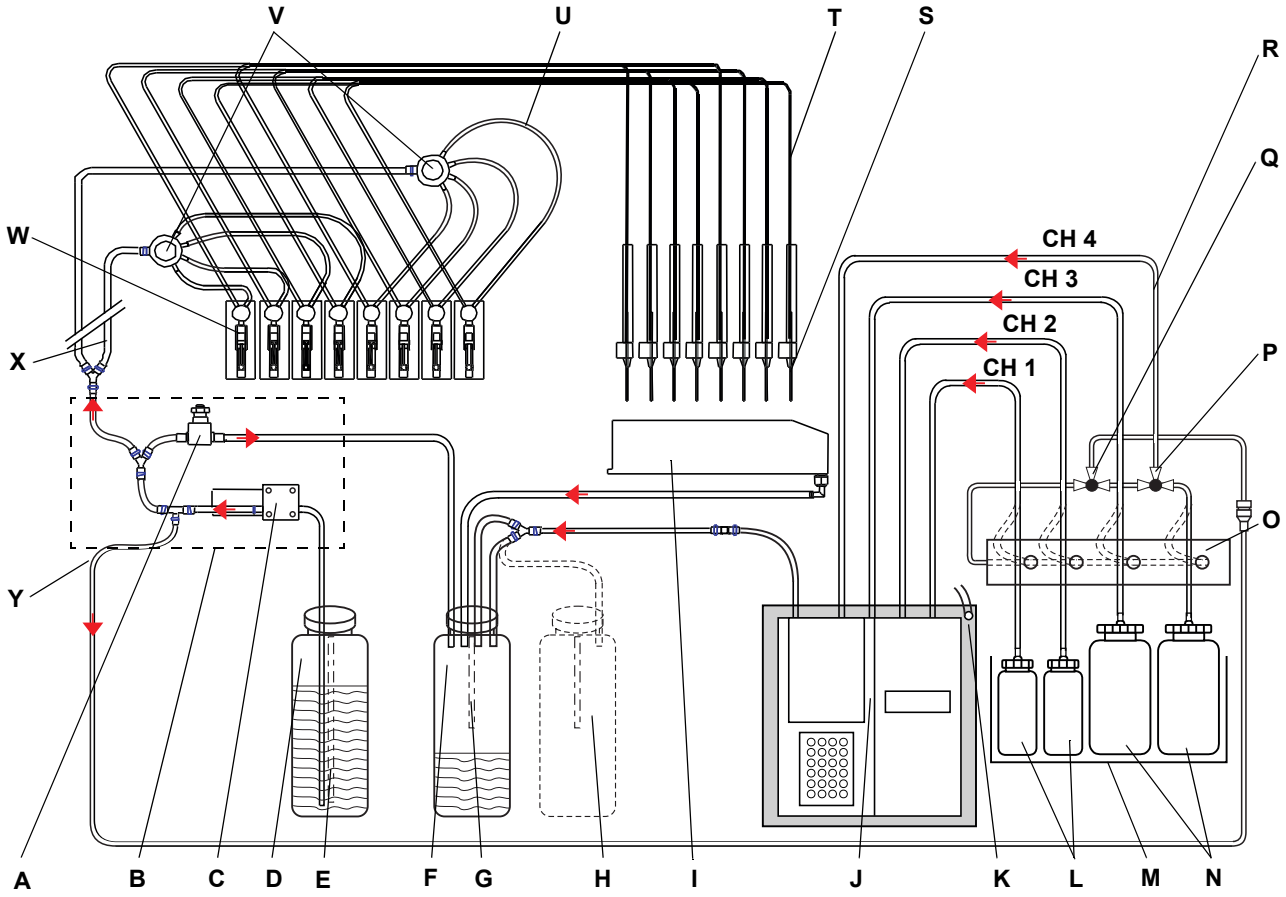


Fig. 4-2 Overview of typical 8-tip configuration

A *Pressure relief valve*
B *Sensored pump option (SPO)*
C *Fast wash pump (FaWa)*
D *System liquid container (20 l)*
E *System liquid level sensor*
F *Waste container (20 l)*
G *Waste liquid level sensor*
H *Second waste container (option)*
I *Wash station*
J *Washer*
K *Tray with drain*
L *Wash bottle (2 l)*
M *Weighing scale*
N *Wash bottle (4 l)*
O *Distribution channel*
P *2/3-way valve*
Q *2/3-way valve*
R *Tubing to washer*
S *Tip (LiHa)*
T *Pipetting tubing*
U *Interconnecting tubing (to diluter; one per tip)*
V *1 to 4 distributor*
W *Diluter with valve and syringe*
X *Aspirating tubing (to distributor)*
Y *Washer maintenance tubing*

4.3 Function

4.3.1 Liquid Handling Arm, LiHa

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Tip types	See section “Tip Configuration”, 🗎 3-15
Fixed tips volumes	See section “Pipetting Precision”, 🗎 3-16
Disposable tips, DiTis	See section Note: “The standard DiTi cone is used for all disposable tip sizes.”, 🗎 11-14 and 4.13 “Lower DiTi Eject Option”, 🗎 4-24

The liquid handling arm is part of the liquid system and is used for pipetting tasks.

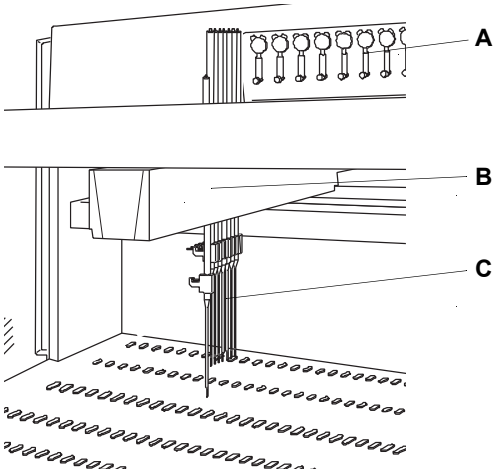


Fig. 4-3 *The liquid handling arm, LiHa*

A *Syringes*
B *Liquid handling arm*
C *Tips*

LiHa Movements

The liquid handling arm moves left and right driven by a servo motor.

Tip Movements

Each sampling tip is raised or lowered by a servo motor within the LiHa. Two additional servo motors inside the liquid handling arm drive the tips forward and backwards and control the Y-spacing of the tips.
Two, four or eight sampling tips are arranged on one liquid handling arm. The tips can be moved independently in Z-direction. In Y direction equidistant tip spreading of 9 to 38 mm/0.31 to 1.5 inches is possible.

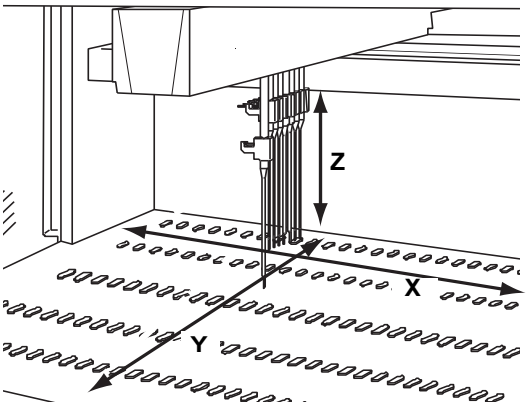


Fig. 4-4 *Liquid handling arm movement*

X	*X-range liquid handling arm movement left and right*	***Z***	*Z-range for tip movement up and down*
Y	*Y-range for tip movement and tip spacing front and rear*		

Tip Types

Tips serve to pipette liquids in different volume ranges. A variety of tip types are available, depending on the application to be run. Tip types are grouped into:

- Fixed tips
- Disposable tips

A universal tip type that could be generally used for every type of liquid and every application does not exist.
For the possible combinations of standard tips and disposable tips refer to cross references above.

Fixed Tips

The fixed tips serve to pipette liquids in different volume ranges.
Refer also to cross references above.

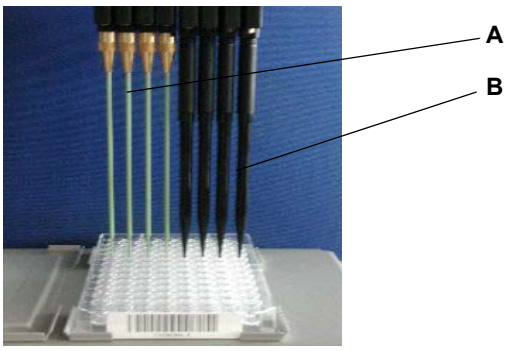


Fig. 4-5 *Fixed tips and disposable tips*

A	*Fixed tips*	***B***	*Disposable tips*

Disposable Tips

Disposable Tips are intended for one single transfer cycle, i.e. one aspiration and one or more dispense steps.

Disposable Tips are automatically picked up from a DiTi box. After use, DiTis are discarded into the DiTi waste and wash unit.
Refer also to cross references above.

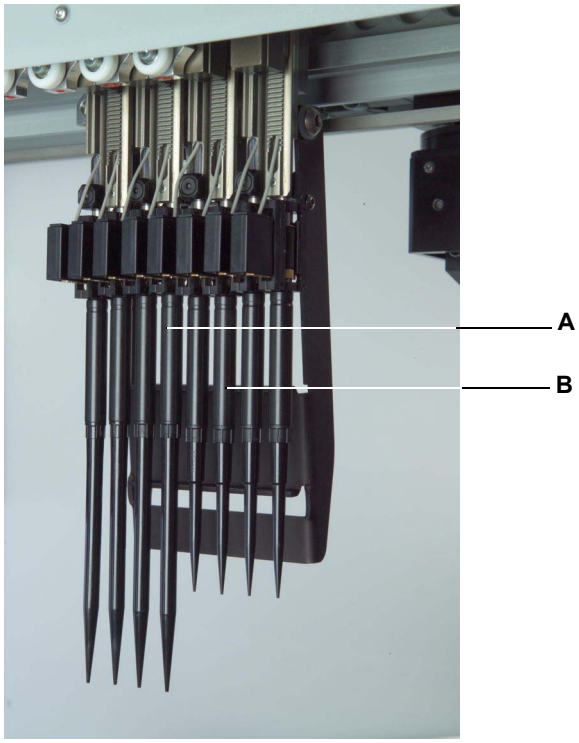


Fig. 4-6 *Disposable tips*

A *Disposable tip 1000 µl* ***B*** *Disposable tip 200 µl*

DiTi Adapter

The DiTi adapter is used to pick up and discard the disposable tips. The tip adapter automatically checks for correct tip pickup.

4.3.2 Robotic Manipulator Arm Standard, RoMa Standard

The robotic manipulator arm is used to transport microplates, reagent blocks, deep well plates, etc. to different positions on the worktable or for storage in the microplate shelf.

The RoMa standard coordinate system consists of five axes; the X-axis, the Y-axis and the Z-axis defining linear movements and the R-Axis defining rotational movements. The grippers can move in horizontal direction (G-axis).

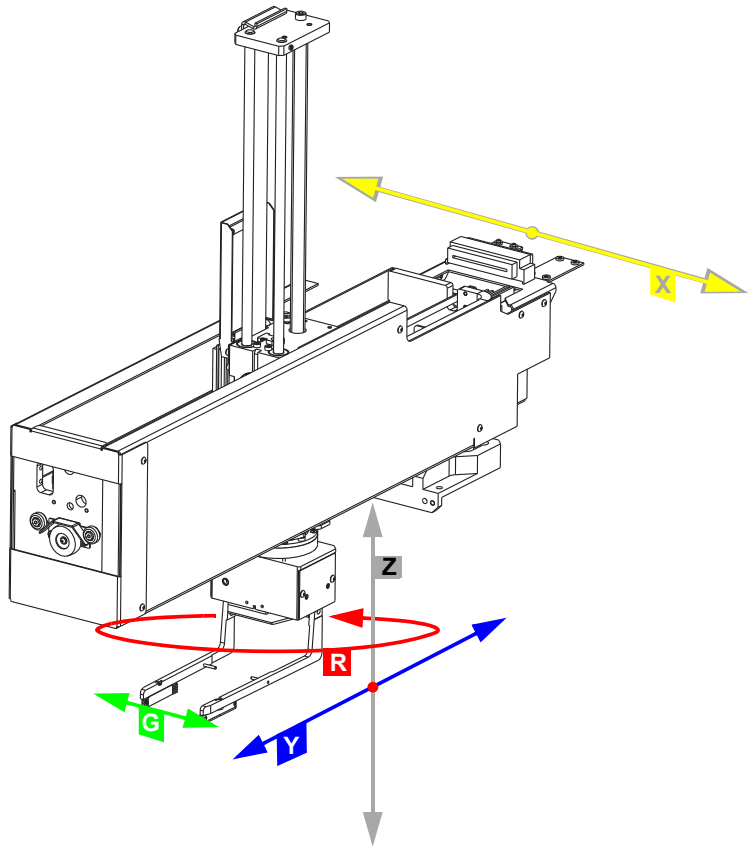


Fig. 4-7 *Robotic manipulator arm RoMa*

G	*Axis for gripper movements*	***Y***	*Axis from front to back of worktable*
R	*Rotational axis*	***Z***	*Vertical axis above worktable*
X	*Axis from left to right of worktable*		

4.3.3 Safety Elements

Front Safety Panels

The front safety panel is secured in closed position with the door locks. According to the size of the Freedom EVOlyzer, one or two gas springs facilitate the opening of the panel.

Standard Front Safety Panel

Functions of Safety Panel

The standard front safety panel has the following function:

- Restrict access to moving parts (moving parts, mechanical hazards)
- Protection from spilling sample or reagent

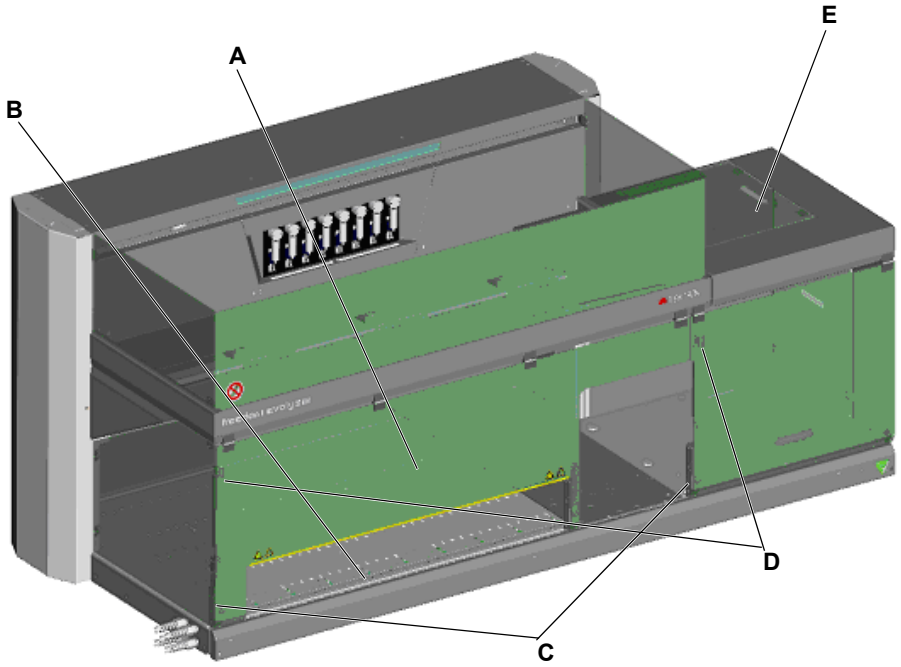


Fig. 4-8 *Freedom EVOlyzer with standard safety panel*

A	*Front safety pane*	***D***	*Gas spring*
B	*Loading interface*	***E***	*Flap*
C	*Door lock*		

Note: *With this safety panel, loading and unloading of samples is possible without opening.*

Flap

The flap restricts the access to the HydroFlex Platform (microplate washer) and its moving parts. The flap is not locked during operation of the instrument.

Door Locks

How do the Door Locks Work?

The door locks actively lock the front safety panel during operation of the Freedom EVOlyzer.

Application Software

The Application Software is programmed in such a way that

- if the safety panel is open the process cannot be started.
- the door locks can only be unlocked when the process is stopped.

The figure shows the door locks in connection with the standard safety panel:

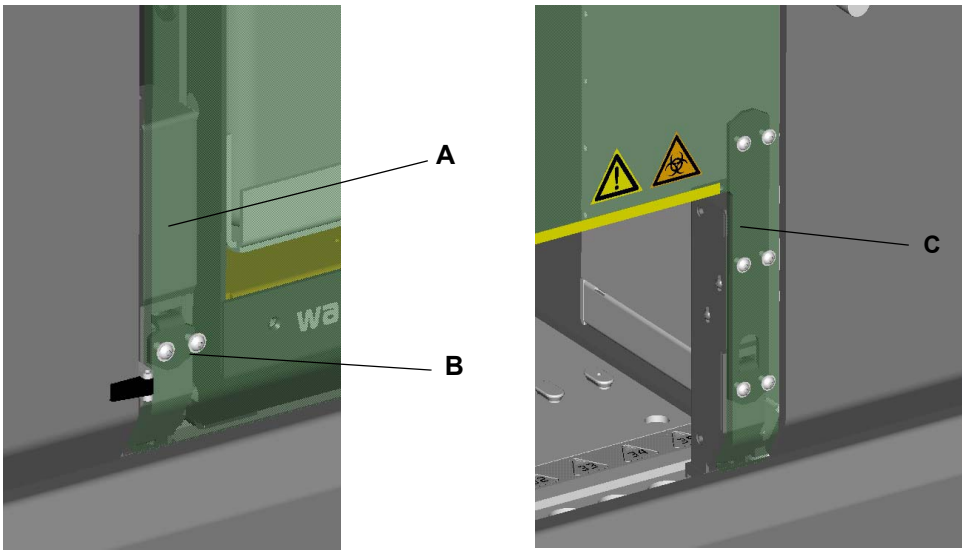


Fig. 4-9 *Door locks*

The door locks on the bottom right and left of the worktable consist of a locking device (A) with an electromagnetic actuator and a catch (B), which is mounted to the safety panel. A switch in the locking device monitors if the safety panel is open or closed. The door lock on the right side of the safety panel (C) is reinforced.

Loading Interface

The loading interface of the Freedom EVOlyzer detects the presence of carriers on the worktable. It can differentiate between:

- carrier present at the defined loading position
- carrier not present at the defined loading position

Furthermore, the loading interface indicates the carrier status by means of LEDs.

4.4 Positive Identification, PosID

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Barcode types and labels	See section 3.5.3, 3-20

What Does PosID Mean?

PosID stands for positive identification, i.e. whenever necessary an identification step for carriers or containers (tubes, microplates, reagent bottles and troughs) can be programmed in the application software in order to ensure that the correct labware is processed.

The PosID can automatically scan barcodes on carriers and containers by means of a built-in barcode laser scanner. Barcodes can be read on both the primary side (e.g. sample tube), and the secondary side (e.g. microplates). To enable identification with the PosID, all carriers and containers must be labeled with barcodes.

How Does it Work?

The PosID body runs past the carriers to scan the carrier ID barcode (through the front aperture). With its gripper, the PosID pulls the carriers towards the rear of the instrument (passing the barcode scanner) for barcode identification on containers and then shifts the carriers back into operating position.

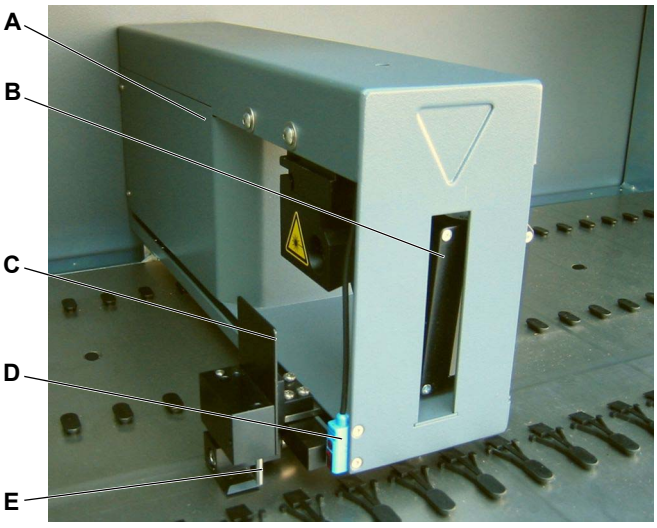


Fig. 4-10 *PosID*

A *PosID body*
B *Barcode scanner*
C *Barcode flag (alignment barcode for verification)*
D *“No Tube” sensor*
E *Gripper*

The barcode scanner is suspended in such a way that it can identify vertical and horizontal aligned barcodes.

Before each container scan the PosID scans the alignment barcode on the barcode flag, which is attached to the gripper, to verify that the barcode scanner and the gripper are in the correct position. This improves identification security for the containers.

Reading Positions

The figure shows how the barcodes for the carrier identification are scanned.

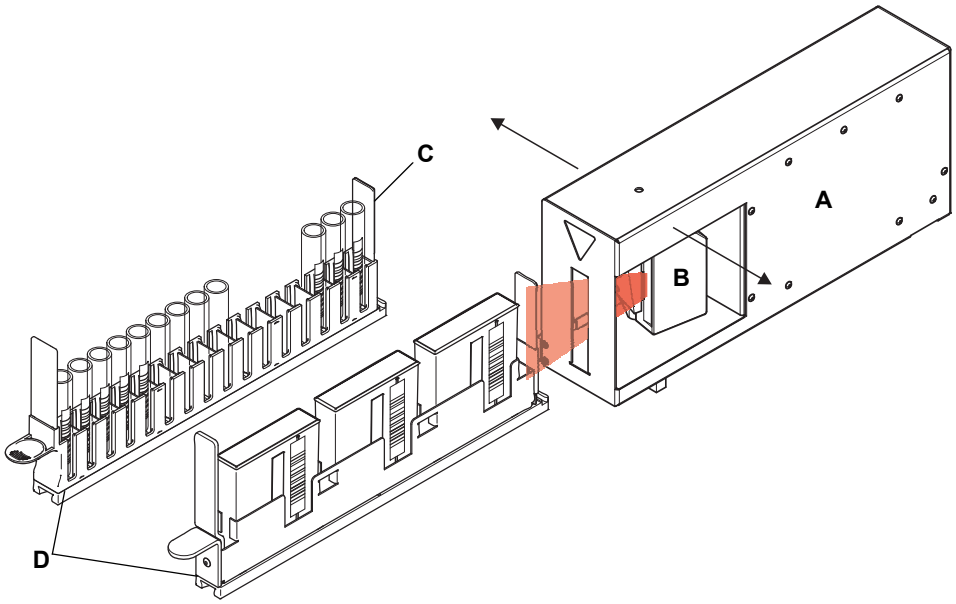


Fig. 4-11 *Barcode scanner position for scanning carrier ID*

A	*PosID body*	***C***	*Carrier ID barcode label*
B	*Barcode scanner*	***D***	*Carrier*

The figure shows how vertical barcodes (e.g. on tubes or reagent troughs) are scanned.

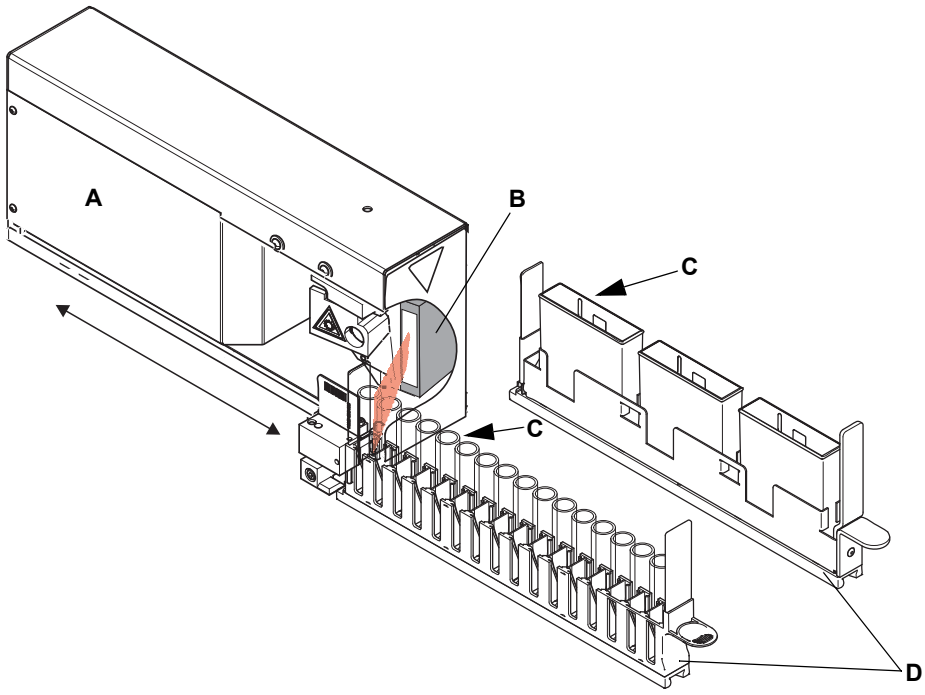


Fig. 4-12 *Barcode scanner position for scanning vertical barcodes*

A	*PosID body*	***C***	*Container barcode label*
B	*Barcode scanner*	***D***	*Carrier*

The figure shows how horizontal barcodes (e.g. on microplates) are scanned.

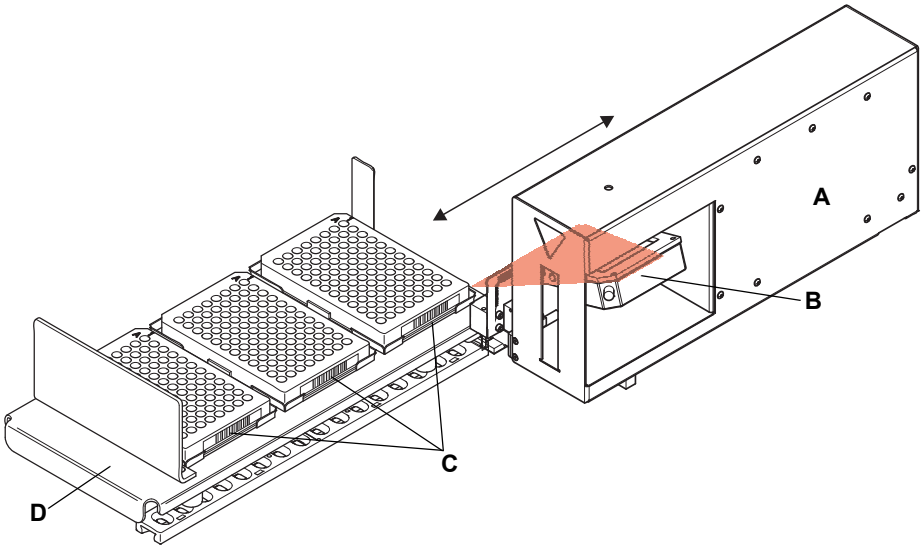


Fig. 4-13 *Barcode scanner position for scanning horizontal barcodes*

A	*PosID body*	***C***	*Container barcode label*
B	*Barcode scanner*	***D***	*Carrier*

“No Tube” Sensor

The “No Tube” sensor checks if a carrier is actually transported when the gripper moves. Furthermore, it monitors the presence of the tubes in the rack. This is necessary, because the barcode scanner cannot distinguish between a tube with missing or incorrectly positioned barcode and a missing tube.

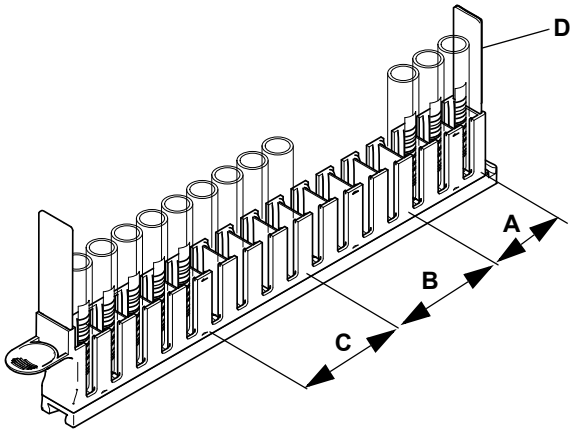
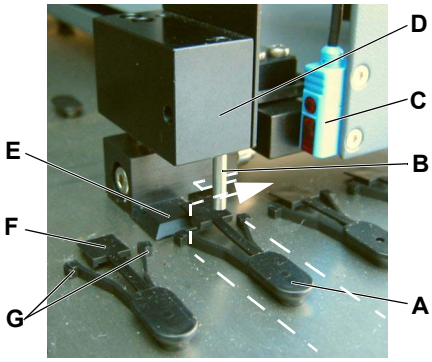


Fig. 4-14 *Detectable situations in a tube rack*

A	*Tubes with readable barcode*	***C***	*Tubes without barcode (or incorrect positioned barcode)*
B	*No tubes present*	***D***	*Carrier ID barcode*

How the Gripper Works

The figure shows how the gripper engages in the carrier to pull the containers past the barcode scanner.



A	*Lock pin*
B	*Pin (carrier transport)*
C	*“No Tube” sensor*
D	*Gripper*
E	*Wedge*
F	*Latch*
G	*Retainer*

Fig. 4-15 *PosID gripper and lock pin*

During normal operation the carriers (see dashed line) are positioned at the lock pin (A). The retainers (G) act as a stop for the carrier, because they are locked by the latch (F).

For barcode identification of the containers, the gripper (D) moves next to the carrier, then moves in X-direction (see arrow) to engage the pin (B) in the slot at the rear end of the carrier. At the same time the wedge (E) lifts the latch. The retainers give way and the carrier can be pulled to the rear.

Barcode Value Verification

The PosID verifies the barcode value before transmitting it to the application software. As a standard setting the barcode scanner requires two identical decoded values to transmit it as a valid result.

Barcode Types

Barcodes on Containers

There is a variety of different barcode types. Not all types are suitable for container identification for data security reasons. Only barcode types that employ a check digit are considered to yield sufficient reading security.

Up to six different container code types per application can be used at the same time.

Barcodes on Carriers

Tecan standard carriers are identified by means of two carrier barcodes (code 128). The second barcode is used to verify the carrier ID (the information on the two barcodes is identical except for one character). This improves identification security for the carriers.

The dimensions of the carrier are stored in the software. After matching the carrier ID with the database, the software is able to identify the carrier’s properties.

Barcode Labels

For detailed information on barcode types and proper positioning of barcode labels on carriers and containers refer to cross references above.

4.5 Sunrise Microplate Reader

The Sunrise microplate reader is a 96-well absorbance reader, loaded and unloaded by the RoMa. The Sunrise consists of a 12-channel optic with an additional reference channel for monitoring and regulating the light intensity for optimal results. The Sunrise is available with different filters with adjustable wavelengths.

When tests with colored reagent and sample addition monitoring systems are used, a verification read of the pipetting device can be defined as an individual action.

Furthermore, different shake modes with freely definable shaking times can be chosen to mix the liquid in the plates right before the measurement.

For more information on the Sunrise microplate reader, please refer to the corresponding Instructions for Use.

4.6 HydroFlex Platform (Microplate Washer)

The HydroFlex Platform microplate washer is loaded and unloaded by the RoMa. It is equipped with an 8- or 16-fold wash head (with 1 aspirating and 1 dispensing needle for each well). During the wash of a microplate the fill verification can be activated for the wash manifold to detect possible clogged tips.

Four different wash liquids can be placed on the front rack of the add-on module. To make sure that there is enough wash liquid during a run, a weighing scale supervises the liquid level in the containers. It is possible to fill the same wash liquid into more than one container (of the same size). If the first container gets empty, the washer will automatically switch to the next one.

For more information on the HydroFlex Platform microplate washer, please refer to the corresponding Instructions for Use.

4.7 Room Temperature Incubator

The darkened room temperature incubator for up to six microplates is placed at the front of the instrument worktable. The RoMa has access to the incubator from the backside to load and unload the microplates during the process run. The RoMa opens the doors passively when entering the incubator. After leaving the incubator, the doors will be closed automatically by a solenoid. An automated locking mechanism locks the front door while the RoMa accesses the plates.

If you need to load more than six plates a second room temperature incubator can be placed on the left side of the first one.

The incubator is equipped with a temperature sensor for the whole system.

4.8 Shaker / Heated Incubator (MIO)

The shaker / heated incubator can be placed opposite the room temperature incubator at the backside of the instrument. Up to six microplates can be loaded into the incubator at the same time. If you need to load more than six plates a second incubator can be placed on the left side of the first one.

Principle of Operation

The six slots can be heated to a controlled temperature. The heated incubator can be calibrated at 37°C (for normal assays) and 46°C (for special applications). Two ceramic heating plates, one at the bottom and one at the top of each slot, prevent the condensing of any evaporated liquid.

The shutter mechanism is identical to the one of the room temperature incubator, so the plates are kept dark during incubation.

The electronics shorten the warm up time for each new loaded plate with room temperature liquid by enhancing the heating power with simultaneous prevention of an overheat.

An optional shaking feature of the incubator is available. The whole incubator shakes in a linear mode with adjustable amplitude and frequency.

Part Locations

The following figure shows the main parts of the monitored incubator option:

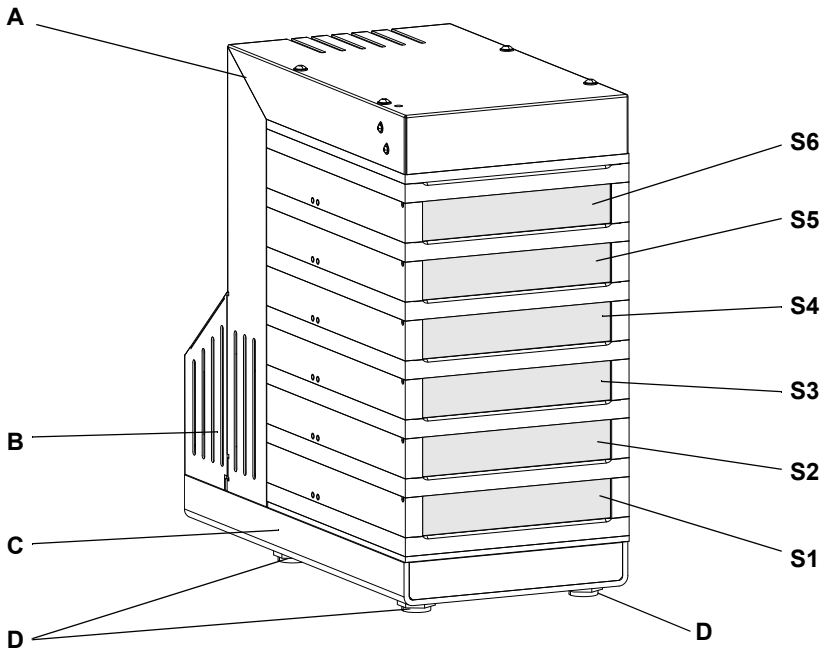


Fig. 4-16 *Overview of monitored incubator option*

A	*Cover*	***D***	*Adjustable foot*
B	*Shaker cover*	***S***	*Slots 1 to 6 with shutters*
C	*Support plate*		

Part Functions

Shutters

The slots are equipped with shutters providing protection against light exposure during the incubation process. Shutters open when pushed, and remain open, by the robotic manipulator arm to load the slots with microplates.

Slots

Six slots provide the dispatching of six microplates at the same time.
Fixing devices prevent the microplates from dislocating.
Heating devices provide uniform temperatures.

Adjustable Feet

Three adjustable feet provide correct positioning and aligning on the option on the worktable.

Shaker

The shaker option installed in conjunction with a fan provides the shaking of microplates at a defined frequency as well as room temperature incubation for a defined period of time.

4.9 Liquid System

The liquid system is a central component of the pipetting function. It transmits the precise movement of the diluter pistons to the tips through the system liquid.

Liquid System Function

The system liquid is delivered to the system in a container and is aspirated and distributed in the whole system via tubings, valves and connectors. The distribution of the system liquid is effected by the movement of the diluter pistons in several strokes. For washing purpose this procedure is considerably accelerated with the fast wash pump in the liquid system.

Precision Diluters

Precision diluters assure aspiration and dispensing of liquids and air gaps, the latter to separate the various liquids.

Washer Maintenance

For washer maintenance a distribution channel is installed above the wash bottles. It serves to rinse the washer tubing of all washer channels with system liquid. For this purpose, the tubing is removed from the wash bottles and connected to the distribution channel.
For rinsing the washer while the washer tubing remains connected to the wash bottles (without using the distribution channel), the 2/3 valves can connect one of the washer channels to the system liquid.

The following figure shows the schematic diagram of the liquid system and its liquid flow direction:

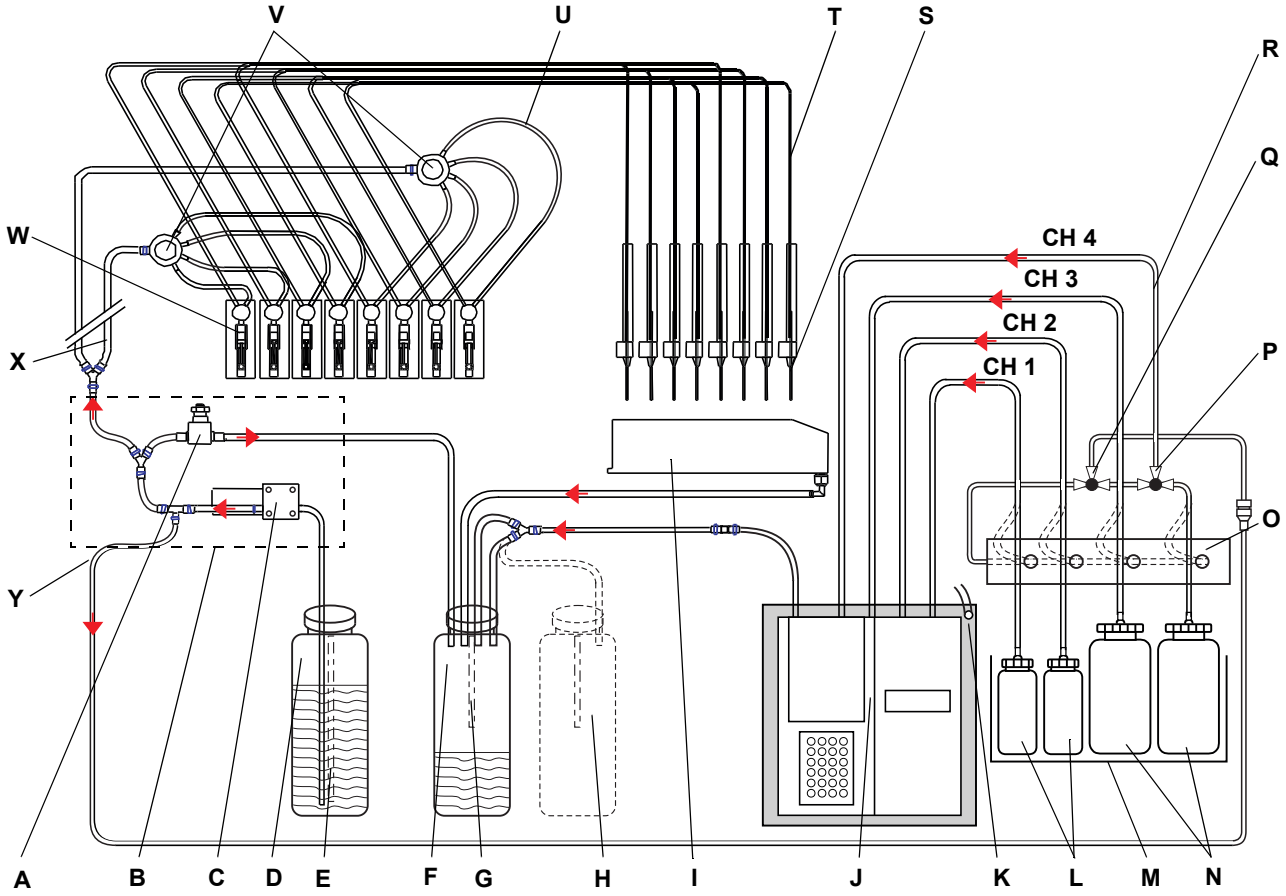


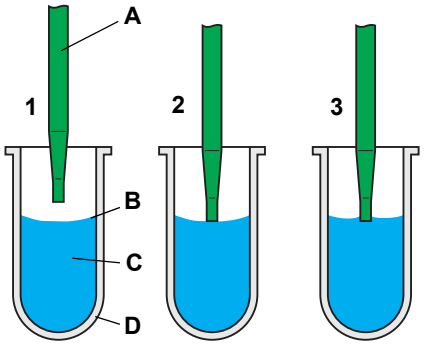
Fig. 4-17 *Overview of typical 8-tip configuration*

A *Pressure relief valve*
B *Sensored pump option (SPO)*
C *Fast wash pump (FaWa)*
D *System liquid container (20 l)*
E *System liquid level sensor*
F *Waste container (20 l)*
G *Waste liquid level sensor*
H *Second waste container (option)*
I *Wash station*
J *Washer*
K *Tray with drain*
L *Wash bottle (2 l)*
M *Weighing scale*
N *Wash bottle (4 l)*
O *Distribution channel*
P *2/3-way valve*
Q *2/3-way valve*
R *Tubing to washer*
S *Tip (LiHa)*
T *Pipetting tubing*
U *Interconnecting tubing (to diluter; one per tip)*
V *1 to 4 distributor*
W *Diluter with valve and syringe*
X *Aspirating tubing (to distributor)*
Y *Washer maintenance tubing*

4.9.1 Liquid Detection

How Does it Work?

The integrated capacitive liquid level detection (cLLD) 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. 4-18 *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.

Influencing Variables

The application software offers the following adjustments of influencing variables:

- The sensitivity of the liquid level detection can be adjusted.
- In order to improve the detection, “Double Detection” is used; i.e. the detection is performed once, then the tip retracts by a short distance and a second detection is performed. The results are only considered valid if the measured detection levels are within a specified limit. This is useful, e.g. if there are bubbles on the liquid surface.
  - The first detection run detects the surface of the bubble.
  - The bubble bursts at the latest when the tip retracts.
  - A second detection run will measure a different detection level.
  - The first value is rejected and the detection is repeated.

Advantages

Advantages due to the liquid detection feature:

- **Minimum submerge depth** of the tip
- **Reduced tip contamination** and accordingly less washing effort for tip
- Appropriate **message if no liquid or not enough liquid available** for sampling
- Software controlled, **constant submerge depth** during aspiration and dispensing
- Enabling **clot detection**

4.9.2 Clot detection

How Does it Work?

The clot detection is based on the liquid level detection. The application software monitors the exit signal while the tip is retracted after aspiration of a liquid and compares the level at which the exit signal appears with the liquid level detection value.

In the following the function of the clot detection and its limits are scrutinized.

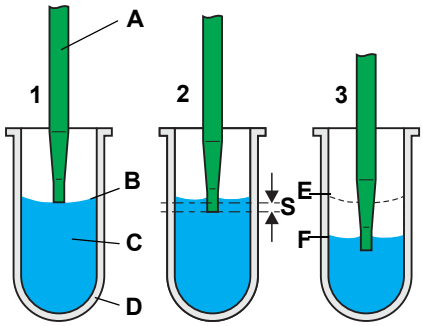


Fig. 4-19 Sample aspiration

1 The tip detects the liquid level.

2 The tip moves down into the liquid to the specified submerge depth (S).

3 The tip aspirates a sample while continuously maintaining the submerge depth (called “tracking”).

The application software calculates the theoretical level of the liquid surface after aspiration.

A *Tip*
B *Liquid level*
C *Sample*
D *Tube*
E *Original liquid level*
F *Liquid level after aspiration*
S *Submerge depth*

If There Are No Clots

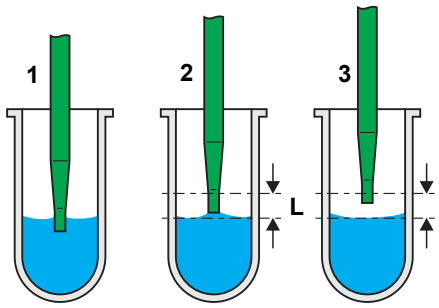


Fig. 4-20 No clot detected

After aspiration:

1 The tip retracts from the sample.

Normally, i.e. if there is no clot, the exit signal is detected shortly after passing the level of the calculated liquid surface.

This delay is caused by adhesion forces that make the liquid stick to the tip.

2 The clot detection checks if the exit signal is within a predefined limit (L).

3 The tip is still within the limit after detection of the exit signal.

No error message will be generated.

If There Is a Clot Detected

There are two situations in which the clot detection generates an error message during retraction of the tip. In both situations a clot sticking to the tip or clogging the tip is the most possible cause for the non-appearance of the exit signal within the limit.

Situation 1

Clot Sticking to the Tip

A clot sticking to the tip may be the cause for the delayed exit signal.

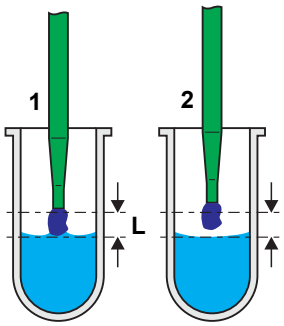


Fig. 4-21 *Clot detected*

1 The tip is beyond the limit (L) and there is still no exit signal.

2 When the exit signal appears the tip is out of the limit.

An error message will be generated.

Situation 2

Expected Volume not Aspirated

Alternatively, a clogged tip or other problems may be the cause for the fact that no or too little liquid is aspirated.

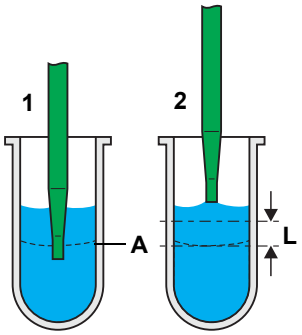


Fig. 4-22 *No liquid aspirated*

1 There is an attempt to aspirate liquid, but the liquid level remains the same (e.g. because the tip is clogged).

The liquid surface is expected to be at level (A) after aspiration.

2 The tip retracts and there is no exit signal within the limit (L).

An error message will be generated.

A *Theoretical liquid level after aspiration*

This error situation is only given when larger volumes in relation to the geometry of the vessel are to be aspirated. At very low volumes the expected difference of the liquid surface level before and after aspiration is not sufficient for the detection.

Limits of the Clot Detection

The following critical situation may occur if the sample has not been centrifuged properly.

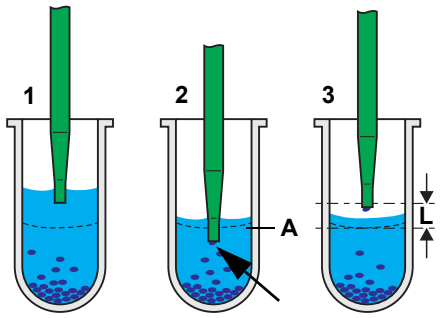


Fig. 4-23 Sample not completely aspirated

1 There are floating particles in the sample. The tip aspirates liquid.

2 During aspiration (in the worst case shortly before the end of the aspiration process) a particle clogs the tip (see arrow).

The liquid surface is expected to be at level (A) after aspiration.

3 The tip retracts and the exit signal appears within the limit (L).

No error message will be generated though the tip is clogged.

A *Theoretical liquid level after aspiration*

Though a certain amount of liquid has been aspirated, the expected difference of the liquid surface level before and after aspiration is too small for proper functioning of the clot detection.

IMPORTANT
For that reason it is very important that the samples are properly centrifuged and handled carefully to avoid floating particles.

For clot detection limitations, see Tab. 3-19 , 🗎 3-18.

4.10 Sensored Pump Option

The sensored pump option (SPO) is located at the bottom left of the worktable and is used to fill and flush the liquid system. When fixed tips are used, the membrane pump of the SPO improves the reduction of carry over by means of a more powerful inside and outside cleaning of the tips in the wash station. The sensored pump option monitors the system liquid and the waste liquid level in the containers by means of a liquid level switch. The filling height is polled every 30 seconds and reported as full or empty respectively, when the corresponding status is notified for three minutes or longer.

4.11 Weighing Scale with Wash Bottles

Fig. 4-24 *Extension with weighing scale and wash bottles*

A *Extension*
B *Wash bottle*
C *Weighing scale*

The wash bottles containing the wash liquid for the HydroFlex Platform (Washer) are positioned on the four compartments of the weighing scale.

The filling height of the wash liquid is checked by the weighing scales. When the level is too low the system will display an announcement, requiring the operator to refill the wash bottles.

4.12 Liquid Containers / Trolley

Containers

The Freedom EVOlyzer is equipped with a system liquid container and a waste container, which are placed next to the instrument. Both containers have a liquid capacity of 20 l.

The filling height of the system liquid and the waste container is monitored by two sensors, the system liquid and the waste sensor of the SPO. When the filling level in one of the containers falls below the limit or exceeds it, the system will display an announcement, requiring the operator to refill or empty the corresponding container.

Second Waste Container

To enable continuous operation of the system an optional second waste container can be employed. The waste tubing is designed in such a way that it can be connected to the second waste container during the run. After switching over to the second waste container the first one can be removed from the system and emptied.

Trolley

The system liquid container and the waste container can be mounted together on an optional trolley with lockable wheels.

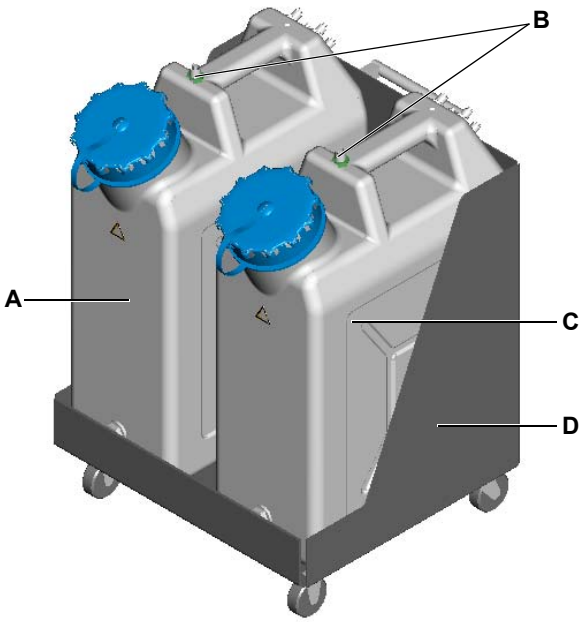


Fig. 4-25 *Trolley*

A	*Waste container*	***C***	*System liquid container*
B	*Liquid level sensor*	***D***	*Trolley*

4.13 Lower DiTi Eject Option

The lower DiTi eject option enables disposable tip ejection at a lower position. With the optional DiTi waste slide with cover the user can avoid risks of projection onto the worktable and thus minimize contamination risks.

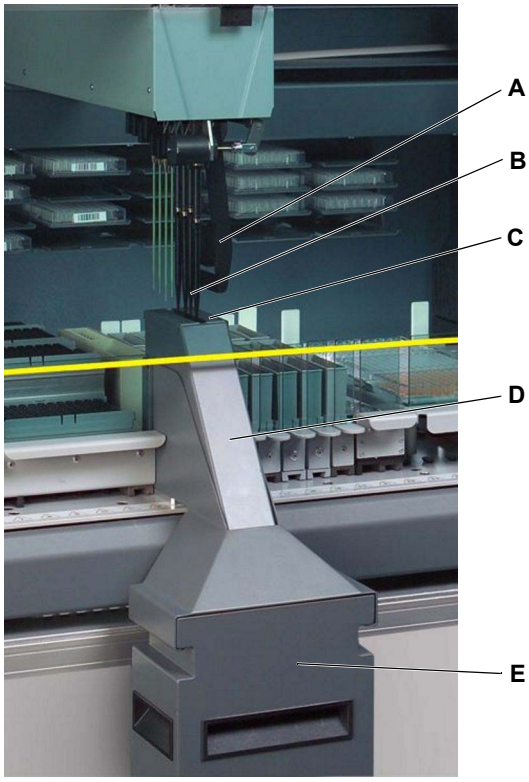


Fig. 4-26 *Lower DiTi eject option with cover and waste slide*

A	*Rocker of lower DiTi eject option*	***D***	*DiTi waste slide*
B	*DiTis in lower tip eject position*	***E***	*Container for DiTi waste bag*
C	*Cover with slot (plash protection)*		

4.14 Carriers and Racks

Cross References

List of cross references to information provided in other sections:

Subject	Reference
List of carriers, racks and troughs	See section 11.5 “Carriers, Racks, Troughs”, 11-3
Function of PosID	See section 4.4 “Positive Identification, PosID”, 4-10

What Are Carriers and Racks?

Carriers are supports that hold racks - which contain tubes or other containers - and are placed at precisely definable positions on the worktable.

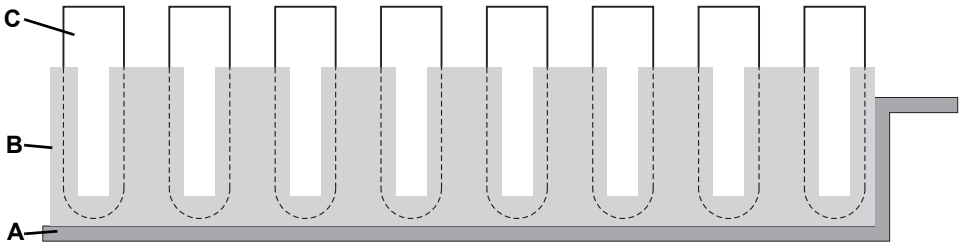


Fig. 4-27 *Example of typical carrier/rack/container assembly*

A *Carrier (can slide on worktable)*
B *Rack (here: Tube rack)*
C *Container (here: Tube)*

Note: *For a list of carriers and racks, refer to the cross reference above.*

Carrier Positioning

Racks can be placed and handled by the software at almost any position on the worktable.

Before deciding on the positions of carriers on the worktable, especially before installing wash stations or other stationary carriers, the handling concepts of the application software and the consequences of the carrier positioning for the application run must be considered.

Carefully plan the application and study the relevant sections in the Application Software Manual before deciding on the placement of carriers and racks.

Barcode Identification

Barcodes on the carriers and on most of the individual containers can be identified by the PosID.
Refer to cross references above.

5 Putting into Operation

Purpose of This Chapter

This chapter describes how the Freedom EVOlyzer is installed and gives instructions on initial operation.

5.1 Installation

ATTENTION

Damage to the system is possible, if installation has been carried out improperly.

- The initial installation of the Freedom EVOlyzer must be carried out by a Tecan FSE only.

5.1.1 Space Requirements

Space Around Instrument

Check the size of the room where the instrument will be installed:

- Enough space to place instrument, cabinet and extensions?
- Enough space to open doors of instrument and cabinet?
- Enough walking space around the instrument?
- Space for placing container trolley?
- Space for the control computer?

Make sure to meet the following space requirements:

- Minimum space between instrument and wall: 10 cm / 4 in.
- Minimum space in front of the instrument 100 cm / 40 in.

Note: *Though the instrument works perfectly at this minimum distance to the wall, be aware of the fact that it is an advantage if the rear of the instrument is accessible, e.g. for maintenance and service work.*

5.1.2 Connecting to the Mains

WARNING

Electrical and fire hazard, if the mains plug of the power supply unit cannot be disconnected immediately in an emergency situation.

- Make sure that the wall outlet, where the Freedom EVOlyzer power supply is connected, is always accessible.
- Do not place furniture or other obstacles in front of the wall outlet.

5.2 Setting Language

The Freedom EVOlution SW Run Control supports several user languages. The language is defined during setup. However, the language setting can be changed later on without installing the software new.

Refer to the Runtime Controller Manual of the Freedom EVOlution Software.

5.3 Data Administration

Note: *Be aware of the fact that Freedom EVOlyzer produces a great amount of data, depending on the processes run on it.*

Data administration and clearing needs to be organized to prevent the hard disk from exceeding its capacity.

5.4 Startup

The following section describes all operational steps, from switching the system on to switching it off.

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Daily maintenance	See section 7.2 “Maintenance Schedule”, 7-5
Start up the Freedom EVOlyzer instrument	See section 6.3.3 “Switching the System On”, 6-7
Switch the instrument off	See section 6.3.6 “Instrument Switch OFF”, 6-16
Prepare other instrument hardware components	See section 6.3.4 “Instrument Preparation and Checks”, 6-9)

WARNING

Automatically moving parts.
Injuries (crushing, piercing) possible if the safety panels are not in place.

- Before starting the Freedom EVOlyzer, make sure that the safety panel is closed.
- Never operate the instrument with the safety panels open.

WARNING

Automatically moving parts.
Injuries (crushing, piercing) possible when using the instrument with the standard front safety panel.

- Do not reach into the instrument through the aperture beneath the yellow line on the instrument front side.

Startup Procedure

Running the Freedom EVOlyzer involves the following **general** steps:

1 Start up the Freedom EVOlyzer instrument (refer to cross references above).

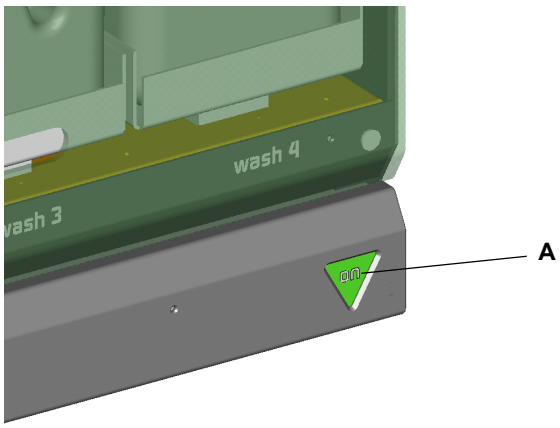


Fig. 5-1 *Main power switch*

A *Main power switch*

2 Start up the computer system connected with the Freedom EVOlyzer.

3 On the computer system, make sure that the software required for routine operation is installed and functioning properly. If necessary, have the corresponding software installed by the FSE responsible for the instrument.

4 Make sure that the corresponding labware, e.g. plate carriers, wash station, necessary for the configuration you intend to run is present on its appropriate position on the worktable.

5 On the computer system, start up the Freedom EVOlution SW Run Control by double-clicking the corresponding icon on the desktop or using the start menu and log in.

6 From the main menu, select the Daily Maintenance - Start of Day, click the **Next** button and follow the instructions on the screen.

7 After the maintenance procedure is finished, from the main menu select Start Run and follow the instructions on the screen.

8 At application termination, if you plan another application run, continue with step 7 of this procedure.

9 When you have finished your daily operation, perform the daily maintenance “End of day” and follow the instructions on the screen.

10 Exit the Freedom EVOlution SW Run Control.

11 Switch the instrument off (refer to cross references above).

6 Operation

Purpose of This Chapter

This chapter explains the operating elements and possible operating modes. It gives instructions on how to operate the Freedom EVOlyzer properly and safely.

6.1 Operating and Display Elements

6.1.1 Operating Keys

Main Power Switch

The main power switch is located at the instrument's lower right corner. A status light in the switch indicates if the instrument is switched on. The status light in the switch is off if the instrument is switched off.

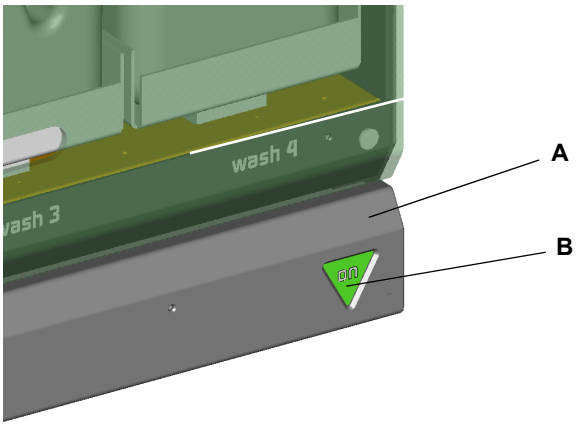


Fig. 6-1 *Main power switch*

A *Front access panel, closed* ***B*** *Main power switch*

Note: *The control for switching on or off is delayed to accept only definite commands.*

- *For switching on: Keep the power ON/OFF switch pressed for at least 0.5 seconds.*
- *For switching off: Keep the power ON/OFF switch pressed for at least 2 seconds.*

ATTENTION

Unintended switching off of the instrument.

- When opening the front access panel, make sure that the **ON** switch is not pressed unintentionally.

Internal Communication

Communication within the Freedom EVOlyzer, and also the communication between the instrument and its modules is achieved by means of cable connections between the respective control electronics.

User Interface

Display functions and controls are available in the software packages and user interfaces on the PC. Depending on your application, refer to the relevant separate documentation. The Freedom EVOlution SW Run Control for routine operation is described in the Runtime Controller Manual of the Freedom EVOlution Software. Also see section 6.3.5 “Freedom EVOlution SW Run Control”, 6-16.

6.1.2 Display Elements

Status Lamp

The status lamp displays the instrument status and is combined with an acoustic alarm device.
The sound level (loudness) and mode (continuous or intermittent) can be selected during installation of the instrument.

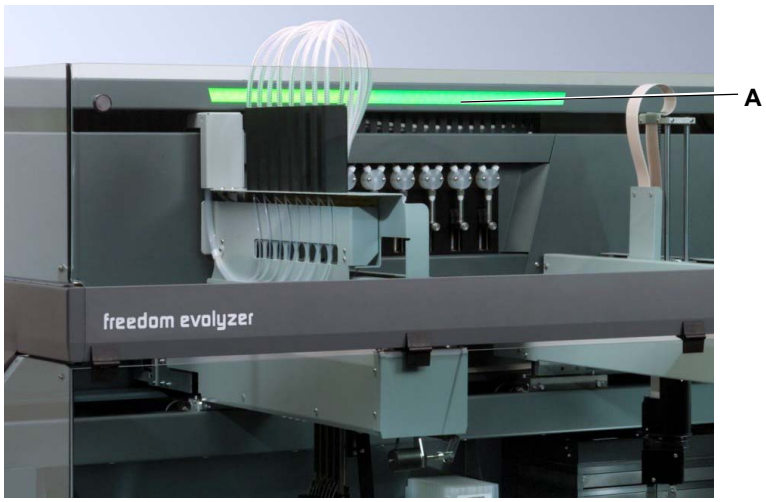


Fig. 6-2 *Freedom EVOlyzer status indication*

A *Status lamp*

Tab. 6-1 *Instrument status lamp signals*

Status lamp color:	**Instrument status:**
lamp off	The instrument is idle or switched off
green continuously lit	A process is running
green flashing	User intervention is required (e.g initial load)
red flashing, alarm sound is on	Process is in error state, software displays error message, user intervention is required
red continuously lit	Fatal error, system stops operation

Loading Interface

The loading interface of the Freedom EVOlyzer detects the presence of carriers on the worktable. It can differentiate between:

- carrier present at the defined loading position
- carrier not present at the defined loading position

Furthermore, the loading interface indicates the carrier status by means of LEDs:

Tab. 6-2 *LED signals*

LED color:	Carrier status:
Green	Carrier is not in process and ready to be removed or no carrier is present on the corresponding position.
Green flashing[a)]	The user is expected to place or remove a carrier on or from the corresponding worktable position to continue the process.
Red	Carrier is in process and must not be removed or the corresponding position is blocked, so that no carrier must be placed on it.
Red flashing	An error occurred. The user is expected to place or remove a carrier on or from the corresponding worktable position to fix the problem and enable the process to continue.

a) In addition to this, the PC speaker emits a beep sound

Fig. 6-3 *Loading interface*

6.2 Operating Modes

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Freedom EVOlution SW Run Control	See section 6.3.5 “Freedom EVOlution SW Run Control”, 6-16

Possible Operating Modes

The Freedom EVOlyzer can be run in three different operating modes:

- Routine operation mode (operator)
  - This is the normal operating mode, in which the application is run.
  - In this mode, the Freedom EVOlyzer is controlled by the Freedom EVOlution SW Run Control.
    - Refer to cross references above.
- Process definition and service mode (application specialist, maintenance personnel)
  - Special tasks are performed in this operating mode, such as
    - adjustments to establish the process.
    - tests to ensure the operating readiness.
  - For these tasks, different software tools are used.
    - Refer to the “Freedom EVOlution SW Application Software Manual”.
    - For service mode refer to the “Instrument Software Manual”.
- Setup and service mode (field service engineer)
  - Serves to setup the instrument, to make adjustments and run tests.
  - In this mode, the Freedom EVOlyzer is controlled by the setup and service software.
    - Refer to the “Instrument Software Manual”.

6.3 Operating in Routine Operation Mode

6.3.1 Safety Instructions

WARNING

Automatically moving parts.
Injuries (crushing, piercing) possible if the safety panels are not in place or if the standard front safety panel is installed. The standard front safety panel is partially open, allowing access to the worktable and continuous load

- Before starting the Freedom EVOlyzer, make sure that the safety panel is closed.
- Never operate the instrument with the safety panels open.
- Do not reach into the instrument through the aperture beneath the yellow line on the instrument front side.

WARNING

Contamination risks through contamination of the worktable or frame. Hazardous system liquids or samples can be spilled onto the worktable, due to the failure of liquid system.

- Visually inspect all hardware components, e.g. the worktable for possible spillage of hazardous liquids.
- Make sure that the vessels are accurately placed on the worktable.

Safe Worktable Layout

ATTENTION

Unsafe layout of the worktable can cause e.g.:

- Loss or dropping of DiTi
- Loss or dropping of microplates
- Spillage of hazardous liquids because of collisions or too high filling level (more than 80%) of cavities

Before and during instrument use, check the worktable for the safety of its layout.

Liquid System / Liquids

ATTENTION

The usage of the wrong wash liquid causes incorrect results. It is strongly recommended that all wash bottles be labelled. Verify corresponding tubings are connected to the containers.

ATTENTION

Leakage of the liquid system.
By the continuous up and down movements of the syringes during operation, the syringe and plunger lock screws may get loose, if not tightened properly. This causes leakage of the liquid system.

- Check the plunger lock screws and syringe screws and tighten manually before switching the Freedom EVOlyzer on.

ATTENTION

To ensure a proper liquid flow, make sure that the tubings are not twisted or inhibited from free flow.

ATTENTION

Instruments are intended for indoor operation with controlled temperatures. DiTis may leak due to pipetting liquids with high vapor pressure. It is important to maintain constant temperature plus air gaps.

Tips

ATTENTION

Two, four or eight tips are arranged on one Liquid Handling arm.

- Each tip must be exactly in line with the center of the tube to maximize the distance between wall and tip.
- When loading disposable tips, make sure that all disposable tips are straight in a line and in parallel to each other. If necessary, exchange disposable tips in rack.

6.3.2 Enclosed Work Area

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Detailed maintenance procedures	See section 7 “Preventive Maintenance and Repairs”, 7-1

WARNING

Unexpected, fast movements of arms and tips.
Interfering with the arm and tip movements can lead to serious injuries or equipment damaging.

- Never operate the instrument while safety panels, covers or access doors are open or removed.
- The operator will be prompted by the software when the worktable setup requires new racks or carriers. Any further interference in the work area is strictly prohibited.

The operator might need to open or remove the work area safety panels for instrument setup, cleaning and maintenance purposes.
For detailed procedures refer to cross references above.

6.3.3 Switching the System On

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Checks before starting a run	See section 6.3.4 “Instrument Preparation and Checks”, 6-9

WARNING

Automatically moving parts.
If the safety panels are not in place, injuries (crushing, piercing) are possible.
Before starting the Freedom EVOlyzer, make sure that the safety panel is closed.
Never operate the instrument with the panel open.

To switch the Freedom EVOlyzer on, proceed as follows:

1 Press the main power switch for 0.5 seconds to switch the instrument on.
2 Wait until the status light in the main power switch is lit.

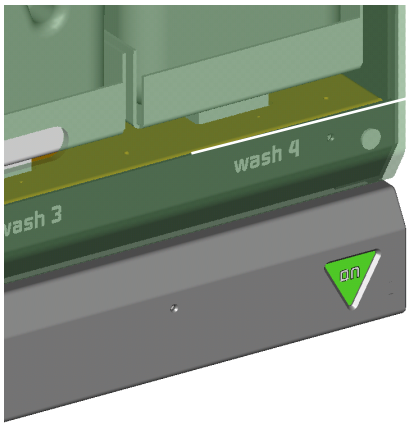


Fig. 6-4 *Lit main power switch*

3 Start up the Freedom EVOlution SW Run Control.
The instrument is now ready to receive commands from the Freedom EVOlution Software.
4 Perform the necessary checks before starting a run.
Refer to cross references above.

6.3.3.1 After a Power Failure

Objects Held by PosID, RoMa

If you want to resume operation after a power failure, it is important that objects still held by the grippers of the PosID and the RoMa are removed manually before switching the instrument on. Otherwise, the objects will be dropped during instrument initialization, which may lead to a crash or spillage.

ATTENTION

In the event of power failure or an otherwise aborted run, all partially processed samples should be discarded. Do not attempt to restart an interrupted program unless the computer screen displays explicit instructions for resuming operation.

6.3.4 Instrument Preparation and Checks

Cross References

List of cross references to information provided in other sections:

Subject	Reference
User qualification	See section 2.1 “User Qualification”, 2-1
No air bubbles in the tubing	See section 7.3.1.2 “Flushing the Liquid System”, 7-12
No liquid droplets on DiTi adapters or tips	See section 7.3.1.1 “Checking the Liquid System for Leakages”, 7-10

General Information

This section contains instructions for routine use. It is intended as a guide to build your SOP (Standard Operating Procedure).
Any modifications of the implemented tests in your Application Software must be carried out by application specialists or expert operators.
Refer to cross references above.

1. Check disposable tip rack and add tips if necessary.
2. Make sure that the splash protection of the DiTi waste and wash unit is mounted.
3. Ensure that daily maintenance has been carried out according to the Maintenance chapter.
4. If possible, place the system liquid container on worktable level to avoid pressure difference in the supply tubing.
5. The waste container must remain on floor level to provide for proper waste liquid flow.

Furthermore, take the following notices into consideration:

ATTENTION

The cover for the DiTi waste and the DiTi waste slide must always be installed. This allows the user to avoid risks of projection on to the worktable and thus minimizes contamination risks.

Worktable

ATTENTION

Improper positioning of objects on the worktable may lead to disturbances or errors in the process, e.g. misinterpretation of barcodes. Do not use free space on the worktable to deposit any objects.

ATTENTION

Improper initialization of robotic arms.
The robotic arms cannot initialize properly if there is an object, such as a lost sample tube or a tool, etc., between the arm and the initial stop position.

- Make sure that there are no unwanted objects present in the instrument.
- Check the arm position after the initialization command.

ATTENTION

Before starting an application, thoroughly flush the whole liquid system. Make sure that daily maintenance procedures have been performed. Make sure that there are no air bubbles in the tubing and that there are no liquid droplets on DiTi adapters or tips.
Refer to cross references above.

ATTENTION

Possible malfunction due to tip clogging.

- Using liquids with undissolved particles could lead to clogged tips and thus result in liquid not being dispensed.
- Clogging can also result if the tips have not been thoroughly washed.

6.3.4.1 Carriers

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Carrier cleaning	See section 7.3.11 “Carriers, Racks and Gripper”, 7-37
Positioning pin replacement	See section 7.4.3 “Positioning Pins”, 7-56

Carrier Positioning

Slide carriers over the positioning pins until they abut on the lock pins.
Make sure that the barcode on the carrier corresponds to the settings in the Application Software.

Carrier Fixation and Replacement

The positioning pins hold the carriers in defined positions, but still allow carriers to be exchanged during an application. A rail in the carrier base fixes the carrier in X, the stop pins in the third row on the worktable fix the carrier in Y. When prompted to do so by the software, the operator can replace a carrier during an application.

ATTENTION

Make sure that the stop pins limit the carrier movement correctly, otherwise crashes or incorrect pipetting may occur.

Positioning Pins

If a positioning pin is damaged, replace it immediately.
Refer to cross references above.

Place the carriers only on the provided positions as the instrument is adjusted to these positions. Carriers placed e.g. on the left of positioning pin 1 can cause mechanical problems (collision) or errors in the identification of barcoded samples.

Placing Carriers

All carriers must be in close contact with the worktable, so that the capacitive liquid level detection is guaranteed. For this purpose, clean the carriers and the worktable in regular intervals.
Refer to cross references above.

Make sure that the correct rack is used for the carrier.

If a carrier is damaged, replace it immediately.

Carrier ID

Each carrier ID must be unique.

Carriers Identification by PosID

Always place the carriers correctly on the worktable as shown in the figure (B):

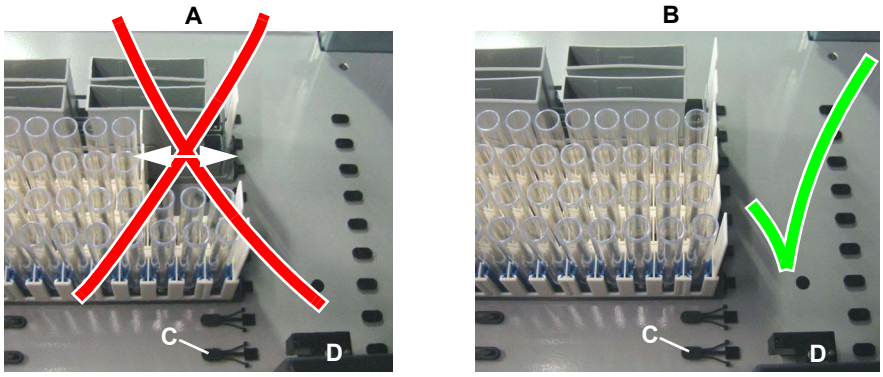


Fig. 6-5 *Carriers on worktable*

A *Incorrect position of carriers (offset of carriers indicated with arrows)*

B *Correct position of carriers*

C *Lock pin*

D *PosID barcode reader*

WARNING

Wrong identification of a carrier.
If carriers are not placed correctly on the worktable and if there are unfavorable circumstances (barcode labels not within specified limit, distance of the incorrectly placed carriers to the barcode reader still enables reading), the barcode reader might read the wrong carrier.

- When loading carriers, always slide them all the way to the stop at the lock pin.
- When carriers need to be removed, always remove them completely from the worktable.
- Never remove or place a carrier on the worktable while the PosID is reading.

6.3.4.2 Racks and Containers

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Check plate positioning springs in shelf site	See section 7.3.18 “Shelf Sites”, 7-47

Racks (Microplates, etc.)

On Carriers

Racks, e.g. microplates must be positioned correctly on the carrier, seating well in its holder. Make sure that the microplate is not resting on the holder rim in a skew position.
If a rack is damaged, replace it immediately.
Make sure that the correct barcode is used for the rack.

Microplates in the Shelf

Always place the microplates correctly in the shelf site as shown in the figure (B):

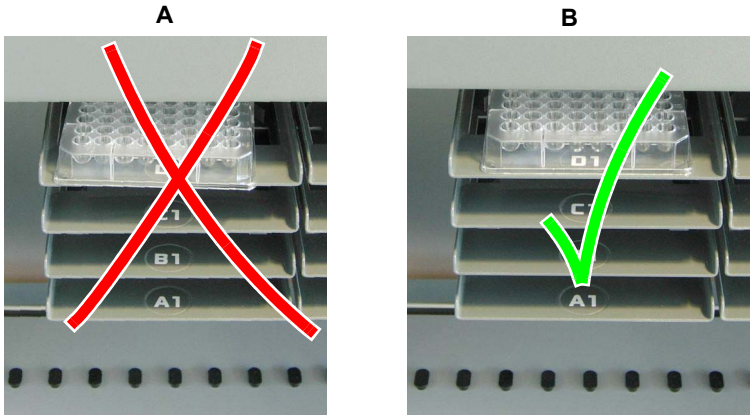


Fig. 6-6 *Microplate in shelf site*

A *Incorrect position of microplate in shelf site (not in the center, not straight)*

B *Correct position of microplate*

Note: *If the microplate is not positioned in the center of the shelf site, check the plate positioning springs.*
Refer to cross references above.

Strip Racks

ATTENTION

Cross check strip configuration after the microplate has been processed, preferably by another person, prior to loading the microplate to ensure the assay is processed correctly.

- At least one positive control must be contained in the last strip of a test when using strip-based tests.

Racks for Disposable Tips

Before positioning the new racks in the DiTi carrier on the worktable, carefully check the DiTis for transport or storage damage (refer to the instructions enclosed in the outer package):

- The DiTis must not be damaged
- The DiTis must not be bent

ATTENTION

Erroneous pipetting results if the wrong DiTis are loaded on the worktable.

- If tips are shorter than expected: Aspiration of air instead of liquid, which may result in erroneous results.

Make sure that the tip lengths of DiTis present on the worktable correspond with the ones defined in the application software.

Note: *The design of the DiTi racks prevents the loading of DiTis that are longer than specified for the corresponding rack. However, DiTis that are shorter than specified for the corresponding rack could be erroneously loaded.*

Containers (Troughs, Bottles, etc.)

ATTENTION

Risk of mixing up containers during loading.

If you load containers without barcode identification, e.g. in a carrier that does not allow the containers to be identified by the PosID, pay attention to the following:

- Strictly follow the loading instructions provided by the software.
- Double-check all containers for correct placement on the carrier.

Use of Tubes

- For sample and reagent tubes, use the appropriate racks (strip rack) according to the following list.

Tab. 6-3 *Racks for sample and reagent tubes*

Striprack	Tube diameter, outside
with black insert	10 mm
with blue insert	12 to 13 mm
without insert (white)	15 to 16 mm

Note: *For parameters other than listed here, choose the striprack the tubes best fit in and make sure they do not jam. The deviations in diameter must be adapted within the Application Software.*

- In each rack, use tubes of one size only. Tube height and diameter must be identical for all tubes.

ATTENTION

Make sure that all tubes are positioned correctly in the rack and touch the rack bottom, otherwise liquid level detection and clot detection might not work properly.

Note: *The filling level of tubes, troughs and containers must not exceed 80 % to avoid spillage during PosID reading.*

Tab. 6-4 *Minimum inner diameter for primary sample tubes*

Tip type	Tube diameter, inside
DiTi 1000 µl	8 mm
DiTi 200 µl	8 mm
Fixed tips	7 mm

6.3.4.3 Preparation of Samples

Visually inspect the samples before pipetting. They must be free of:

- Clots
- Foam
- Droplets on the tube wall

For this purpose we strongly recommend to centrifugate the samples before pipetting. After the sample collection wait for at least 10 minutes before centrifuging the sample.

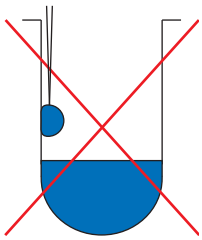


Fig. 6-7 *Droplet on wall*

- Maximally fill the sample tubes to 80%.
- The sample tubes must not contain any additional (non-conductive) inserts or have covers.

ATTENTION

Risk of error occurrence. The monitored incubator option is unsuitable for warming up of frozen microplates.

- Make sure samples respectively microplates have ambient temperature before operation.

6.3.4.4 Wash Bottles

ATTENTION

The usage of the wrong wash liquid within a container causes incorrect results.

- We strongly recommend to label the containers, so that their content and position on the weighing scale is always known.

6.3.4.5 System Liquid and Waste Container

Make sure that the corresponding tubing is connected to the containers.
See section 7.3.1.5 “Container Connections”, 7-15.

6.3.5 Freedom EVOlution SW Run Control

The Freedom EVOlyzer is controlled by the Run Control of the Freedom EVOlution Software.

With the Run Control the following tasks are performed:

- Login for lab operator, application specialist or administrator:
  - The software only allows authorized users with a valid login to perform any action on the instrument.
- Starting a run
  - The software guides the user through the procedure (e.g. loading consumables and samples) and calculates the schedule, then runs the process.
- Performing maintenance:
  - The software guides the user through the necessary maintenance procedure.
- Application settings:
  - Allows the application specialist to perform a number of settings (e.g. workmode of the instrument).
- User management
  - Allows the administrator to set up users with the corresponding access rights.

The Run Control for the routine operation can be operated via a touchscreen. Refer to the Runtime Controller Manual of the Freedom EVOlution Software.

6.3.6 Instrument Switch OFF

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Maintenance tasks	See section 7 “Preventive Maintenance and Repairs”, 7-1

Before switching the instrument off, some maintenance tasks might need to be performed, e.g. tip cleaning.
Refer to cross references above.
Except in an emergency situation, switch the instrument off only after an application is completed.

To switch the instrument off:

1 Press the power ON/OFF switch and keep it pressed for at least 2 seconds.

ATTENTION

Wait until the status light in the power switch is off (for approx. 10 sec.) before switching the instrument on again.

6.3.7 When a Crash Occurred

When a crash occurred, consult chapter 8 “Troubleshooting”, 🗎 8-1 for possible corrective measures. Also check the log files generated by the application software.

ATTENTION

After a harsh crash some components of the instrument may be out of alignment or even defective.

- If a harsh crash occurred, contact your local service organization to have the instrument checked.

RoMa Crash

After a crash with the RoMa, check the gripper and the RoMa alignment. Refer to 8.2.1 “RoMa / Gripper Alignment”, 🗎 8-7.

6.4 Operating in Process Definition Mode

6.4.1 Process Validation

The device must be validated in the specific application according to laboratory practice and state-of-the-art before putting into service and after changes. Use of kits or kit components on Freedom EVOlyzer is only allowed after validation by Tecan, the kit manufacturer or operator of the system.

For all applications of the Tecan instrument, the user must ensure that the requirements of each protocol are carefully observed.

A systematic approach of risk analysis, validation of critical parameters and system validation should be followed to ensure that the system or combination with kit provides reliable and reproducible performance.

Make sure that the validation process is executed according to national laws and standards.

ATTENTION

The Freedom EVOlyzer requires accurate positioning of all reagents, samples, racks, and plates on the worktable. The corresponding positions must be taught properly.

Verify these positions accordingly before executing any program.

ATTENTION

Make sure that your test layout is set up as to detect potential pipetting errors, e.g. by means of integrated controls.

6.4.2 Liquid Handling

For more details refer to the Freedom EVOlution SW Application Software Manual.

ATTENTION

Submerge depth:
To avoid aspirating bubbles or debris at the liquid surface the minimum submerge depth must be set as follows:

- Microplates: 1 mm
- Sample tubes: 2 mm
- Troughs: 3 mm

ATTENTION

Use double detection, adapted detection speed, sensitivity setting, and clot detection.

Liquid Conductivity

Tab. 6-5 *Liquid conductivity*

Conductivity	Liquid	Sensitivity
Very good	Sample, DNA solution, buffer	Medium
Good	Tap water	High
Bad	DMSO, ethanol, distilled water	Very high
Not conductive	e.g. oil	Detection not possible

ATTENTION

Inaccurate LLD may result if the sensitivity setting is too high.

Clot Detection

- To generally prevent problems with clots (clogging of the tips and particles sticking to the tips) the samples must be properly centrifuged.
- The clot detection functions properly if certain volumes of samples to be aspirated are observed, see Tab. 3-19 , 🗎 3-18.
- For the above mentioned reasons we recommend you to proceed with great care in the following cases:
  - During the preanalytic phase, in particular with the centrifugation step
  - During sample collection and distribution of the samples

ATTENTION

Malfunction of clot detection:

- Do not use labware with non-parallel walls (tolerance: 1°), e.g. only cylindrical tubes.
- Do not use the clot detection function when pipetting from 100 ml Tecan troughs.

Carry over

Definition

Carry over is the term for a possible residue of sample liquid that remains inside and/or outside of a tip after rinsing at the end of a pipetting cycle. Such a residue is carried over to the next cycle. Where no carry over is admissible, disposable tips (DiTis) with filter must be used.

Carry over depends on several parameters, as e.g.

- type of liquid,
- tip material,
- tip geometry,
- adhesion, etc.

In addition, the aspirate and dispense methods used (i.e. the liquid handling parameters programmed in the Application Software) influence carry over.

Carry Over Measurements

For any application where carry over might lead to erroneous or unacceptable results, the actual carry over properties must be measured, using reference samples (positive and negative). The measurements must be conducted with test conditions identical to those of the application.

Optimization of Liquid Handling Parameters

The liquid handling parameters of applications whose results are sensitive to carry over must be optimized in that sense by a person having the liquid handling knowledge and having successfully attended the corresponding training proposed by Tecan.

Use of Disposable Tips

Disposable tips with filter must be used where no carry over is tolerable.

It is essential that the instrument's operating condition is adequately maintained (preventive maintenance and performance check at regular time intervals) to ensure the appropriate performance.

Disposable Tips

For disposable tips, all the rules listed in this section apply. The following list contains additional information to be taken into account:

- Disposable tips with or without filter are used when contamination and carry over must be prevented.
- Disposable tips must not be reused as this bears the risk of incorrect detection and influences the precision. Disposable tips are intended for one single transfer cycle i.e., one aspiration and one or more dispense steps.

ATTENTION

Problems in the process due to inapt disposable tips.
In case the Freedom EVOlyzer is equipped with the DiTi option, full system functionality can only be guaranteed when Tecan disposable tips are used.

Reagent Troughs / Wash Station

Be aware of the fact that splashes from the wash station may get into reagent troughs that are placed near the wash station. In critical cases do not place the reagents troughs next to the wash station.

DiTi Waste and Wash Station Unit

The same applies to the DiTi waste and wash station unit. Avoid placing critical reagents in the troughs next to the wash station.

HydroFlex Platform

HydroFlex Platform (microplate washer) with 16-way manifold:
The 16-way manifold HydroFlex washer poses some risk for cross contamination when microplates with empty wells (not filled with liquid) in columns with uneven numbers (1, 3, 5, 7, 9, 11) or microplates that have more than 4 empty wells in any even numbered columns (2,4,6,8,10,12) are washed.
In combination with highly sensitive assays, this cross contamination may generate false positive results for wells following a positive sample. For that reason, the results for such a situation must be validated.
Furthermore, it is possible to establish a procedure to identify potential cross contamination and retest the samples accordingly. This is indicated in case there are two or more positive results in consecutively processed wells.
The validation step can be omitted if an internal laboratory procedure ensures that only completely filled pairs of columns in microplates are washed on the Hydroflex Platform.

6.4.3 Use of Barcodes and Positive Identification

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Alignment and quality of barcode labels	See section 3.5.3 “Positive Identification (PosID)”, 🗎 3-20
Carriers: PosID access restrictions	3.5.3.1 “Access Restrictions”, 🗎 3-24

Note: *We recommend you to use barcodes on all carriers and racks and to ensure the barcode quality by means of a quality control process.*
Refer to cross references above.

- Container barcodes cannot be read in the three rightmost grid positions due to limited movement space. If operating with the Positive Identification, do not place carriers with containers to be identified in the three rightmost grid positions.
  For details refer to cross references above.

6.4.4 Use of Containers Without Barcode Identification

ATTENTION

Risk of mixing up troughs without barcode identification.

- If troughs cannot be labelled with barcodes that can read by the PosID, Tecan recommends you implement human controlled intervention (i.e. color coding, etc.)

ATTENTION

Risk of mixing up containers during loading.

If you load containers without barcode identification, e.g. in a carrier that does not allow the containers to be identified by the PosID, pay attention to the following:

- Use only a single carrier of that kind to minimize the risk of mixing up containers.

ATTENTION

Risk of mixing up samples.
It is not recommended to process samples without barcode identification using the sample identification in mode “sample without barcode ID”.

6.4.5 Defining Processes

Please take the following essential considerations into account when defining processes:

6.4.5.1 Robotic Manipulator Arm

Regarding the RoMa arm, pay attention to the following:

- Create a worktable layout that minimizes the risk of collision and contamination, e.g. avoid movements of microplates over critical sections, such as sample sections, etc.
- Do not exceed the recommended fill levels for cavities.

6.4.5.2 Monitored Incubator Option

The incubator slots can be operated with different temperatures.
Validate the temperature profiles before operation.

ATTENTION

Risk of crosstalk. Processes with different slot temperatures not validated sufficiently could lead to temperature crosstalk between slots.

- Make sure one slot in between is left free if slots are operated with high temperature gradients.

Heating up

The monitored incubator option is not suitable for warming up of frozen microplates.

ATTENTION

Risk of erroneous results. Highly variable fill levels of microplates may lead to temperature gradients between cavities.

- Perform process validation to incubate microplates with variable fill levels.

6.5 Freedom EVOlution SW Utilities

6.5.1 Plate Manager

The **Plate Manager** is a separate software tool for reporting purposes. For each plate processed by the Freedom EVOlyzer, a plate report file is generated. This file contains all sample tracking information for the plate. With the **Plate Manager**, the plate report files can be viewed and printed out.

Refer to the Runtime Controller Manual of the Freedom EVOlution Software.

6.5.2 Worklist Creator

When you are not working with an LIMS, the separate utility **Worklist Creator** enables the easy creation of worklist files for the Freedom EVOlution Software.

Refer to the Runtime Controller Manual of the Freedom EVOlution Software.

7 Preventive Maintenance and Repairs

Purpose of This Chapter

This chapter gives instructions on all maintenance work to be performed in order to keep the Freedom EVOlyzer in good working condition.

In addition to this, adjustment and repair jobs the operator can carry out by himself/herself are explained.

Principle

Only operate the Freedom EVOlyzer when it is in good working condition. Strictly observe the maintenance instructions as set out in this manual. To achieve specified performance and reliability of the instrument, regularly carry out the maintenance and cleaning tasks.

In case of any problems and for inquiries contact the local service organization.

7.1 Tools and Consumables

7.1.1 Cleaning Agents

WARNING

Working with cleaning agents may be hazardous.

- Always observe the safety measures given by the manufacturer.

WARNING

Fire hazard.

- Do not use flammable liquids without supervision by the operator.
- Take measures to prevent electrostatic discharge.

Commercially Available Cleaning Agents

Tab. 7-1 *Commercially available cleaning agents*

Agent	Description	Manufacturer	Part No.
Contrad 70[a)]	Surface active cleaning agent	Decon Labs Inc., USA www.deconlabs.com	Please contact the manufacturer
Contrad 90[a)] Contrad 2000[a)]	Surface active cleaning agent	Decon Laboratories Limited, UK www.decon.co.uk	Please contact the manufacturer
Decon 90[a)]	Surface active cleaning agent	Decon Laboratories Limited, UK www.decon.co.uk	Please contact the manufacturer
Bacillol Plus	Alcoholic, disinfection agent, free of formaldehyde, for surface cleaning	Bode Chemie, Hamburg www.bode-chemie.de	Please contact the manufacturer
Bomix	Cleaning instrument disinfectant for highly contaminated surfaces (to remove protein residues)	Bode Chemie, Hamburg www.bode-chemie.de	Please contact the manufacturer
DNAzap	Cleaning agent for surfaces contaminated with nucleic acids	Ambion www.ambion.com	Please contact the manufacturer
Meliseptol	Surface disinfectant	B. Braun www.bbraun.ch	Please contact the manufacturer
Lysetol FF	Disinfectant	B. Braun www.bbraun.ch	Please contact the manufacturer
Buraton 10F	Surface disinfectant	Schülke&Mayr www.schuelke-mayr.com	Please contact the manufacturer
Kohrsolin	Surface disinfectant	Bode www.bode-chemie.de	Please contact the manufacturer
Peraclean	Disinfectant	Degussa www.degussa.com	Please contact the manufacturer
SporGon	Disinfectant	Decon Laboratories www.deconlabs.com	Please contact the manufacturer
Liqui-Nox	Weak detergent	Alconox www.alconox.com	Please contact the manufacturer
Terralin	Surface disinfectant	Schülke&Mayr www.schuelke-mayr.com	Please contact the manufacturer

a) These are identical products; are hereafter called Decon / Contrad

Cleaning Agents Specifications

Tab. 7-2 Cleaning agents specifications

Agent	Specification
Water	Distilled or deionized water
Alcohol	70% ethanol or 100% isopropanol (2-Propanol)
Decon / Contrad	Liquid concentrate, for dilution with water (normally 2%, 5% in case of severe contamination)
System cleaner	Preference: Water, 70% ethanol Alternative: Decon / Contrad[a)] **Do not use**: Isopropanol
Weak detergent	E.g. Liqui-Nox
Disinfectant	E.g. Bacillol plus, Bomix[b)], Lysetol FF, Peraclean, SporGon
Surface disinfectant	All disinfectants except: Lysetol FF, Peraclean, SporGon
Base	E.g. 0,025 - 0,25 mol/l NaOH
Bleach	6% sodium hypochlorite

a) Cleaning agents, such as Decon / Contrad can have influence on the process. Therefore, careful validation is necessary if such agents are used.
b) For concentrations and application see the description of the manufacturer

How to Apply Cleaning Agents

Instrument Parts and Cleaning Agents

Tab. 7-3 Cleaning agents application

Instrument part	Cleaning agent
Liquid system, including waste system (without washer)	Water, alcohol, weak detergent, base Suitable for flushing are: Bleach, Decon / Contrad, Terralin
Liquid system, washer section[a)]	System cleaner
DiTi waste slide	Water, alcohol, weak detergent, disinfectant, base, bleach
Worktable	Water, alcohol, weak detergent, disinfectant, base, bleach
MIO housing	Water, alcohol, weak detergent, disinfectant, base, bleach
Housing	Water, alcohol, disinfectant
Metal parts	Water, alcohol, disinfectant
Carriers	Water, alcohol, weak detergent, disinfectant **Use**: Decon / Contrad or Bomix for surface cleaning only **Do not use**: Decon / Contrad, Bomix, Bleach, Peraclean, SporGon as cleaning bath for carriers (damage to aluminum)
Racks	Water, alcohol, weak detergent, disinfectant
Gripper	Water, alcohol, weak detergent, disinfectant

Tab. 7-3 *Cleaning agents application (cont.)*

Instrument part	Cleaning agent
Tips	Water, alcohol, weak detergent, disinfectant, base
Safety panels	Water, alcohol, disinfectant, suitable for acrylic glass
Disposable tip cones	Alcohol
PosID scanner head laser beam output window	Alcohol
Arm guide, arm guide roller of liquid handling and robotic manipulator arm	Do not use any agent
Z-rack	Do not use any agent

a) Automated maintenance as described in 7.3.1.4 "Cleaning the Liquid System", 7-13

Note: *After use of weak detergents, base or bleach, thoroughly clean with water and wipe dry to totally remove the cleaning agent and obtain normal operating conditions.*

Hints Concerning Elimination of Nucleic Acid Residues

Elimination of nucleic acid residues in standard tips and pipetting tubing is usually achieved by wash or decontamination cycles with bleach solution.

Appropriate commercially available agents (e.g. DNAzap) are used to keep the pipetting area (worktable, carriers, gripper etc.) free of interfering nucleic acids.

7.2 Maintenance Schedule

Maintenance Record

Note: *In order to be able to track the maintenance performed on the Freedom EVOlyzer over the whole lifetime, most of the periodic maintenance tasks are recorded by the Freedom EVOlution SW Run Control.*

Maintenance Tables

The maintenance tables are divided according to the frequency the corresponding maintenance task must be periodically performed. For example, there are tables for:

- Daily maintenance
- Weekly maintenance
- Half-yearly maintenance

Example and Explanations

Example for a maintenance table, followed by explanations:

Tab. 7-4 *Example (e.g. daily maintenance)*

Instrument/Component	Maintenance Task	Reference
Part A	Clean thoroughly	Water with weak detergent
Part B	Check adjustment of component C	Refer to section X.X.X, Y-Z

- Instrument/Component
  - Specifies the instrument or one of its individual components on which a maintenance task must be performed.
- Maintenance Task
  - States briefly what maintenance must be performed on the instrument/ component mentioned before.
- Reference
  - Gives additional information, e.g. on means, tools, etc. that are necessary to perform the maintenance task mentioned before.
  - Contains references to the sections in this manual or to other documents where the corresponding instructions can be found.

General Guideline

Note: *The daily and weekly maintenance schedule described here is a general guideline. The schedule and the cleaning agents may have to be adapted to your special laboratory conditions and depending on your application.*

Software

For most maintenance tasks the software guides you through the procedure. Follow the instructions on the screen. For details refer to the corresponding section in this chapter.

7.2.1 Maintenance: Immediate Maintenance

If the instrument is leaking, switch it off immediately and eliminate the source of leakage. Refer also to section 7.3.1.1 “Checking the Liquid System for Leakages”, 🗎 7-10.

If a LiHa crash occurred:

- Check the tip alignment.
- Verify that the fixed tips / DiTis are well aligned and hit their target.
- Verify that the positioning of objects on the worktable is still correct.

If a harsh crash occurred or the alignment check described above shows misalignment, call the FSE for repair.

If a RoMa crash occurred:

- Check the correct alignment of the gripper fingers, i.e. parallelism to the worktable surface in the complete rotational area.
- Verify that the positioning of objects on the worktable is still correct.

If a harsh crash occurred or the alignment check described above shows misalignment, call the FSE for repair.

7.2.2 Maintenance Table: Daily Maintenance

At Start of Day

Tab. 7-5 *Daily maintenance at start of day in chronological order*

Instrument/ Component	Maintenance Task	Reference
Liquid system	Check for leakages	See section 7.3.1.1 “Checking the Liquid System for Leakages”, 🗎 7-10
Syringe	Tighten syringe and plunger lock screws	See section 7.3.2 “Syringe”, 🗎 7-16
Tips	Tighten the lock nuts	See section 7.3.3.1 “Tighten the Lock Nuts”, 🗎 7-17
	Check for damage	See section 7.3.3.2 “Checking Fixed Tips for Damage”, 🗎 7-18
	Clean outside	See section 7.3.3.3 “Cleaning the Fixed Tips Outside”, 🗎 7-18
DiTi cones	Check for deposits	See section 7.3.4.1 “Check for Deposits”, 🗎 7-20
	Clean	See section 7.3.4.2 “Cleaning the DiTi Cones”, 🗎 7-20
	Tighten	See section 7.3.4.3 “Tightening the DiTi Cones”, 🗎 7-20
HydroFlex Platform (Microplate Washer)	Perform washer check	See section 7.3.9.1 “Washer Check”, 🗎 7-32

During Day

Tab. 7-6 Daily maintenance during the day

Instrument/ Component	Maintenance Task	Reference
Liquid system	Flush prior to each application run and perform tightness check	See section 7.3.1.2 “Flushing the Liquid System”, 7-12 and 7.3.1.3 “Performing the Tightness Check”, 7-13
Waste container	Check filling height prior to each application run and empty, if necessary	See section 7.3.7 “Waste Container”, 7-26
Wash bottles	Check filling height prior to each application run and fill, if necessary	See section 7.3.10.1 “Refilling the Wash Bottles”, 7-35
System liquid container	Check filling height prior to each application run and fill up, if necessary, with water of room temperature	See section 7.3.6 “System Liquid Container”, 7-22
Shelf	Each time when loading plates into the shelf, check plate position in shelf site	See section 7.3.18 “Shelf Sites”, 7-47
DiTi waste bag	Check and change when it is full	See section 7.3.8 “DiTi Waste Bag”, 7-30
DiTi waste and wash station unit	Clean DiTi waste slide	See section 7.3.13.1 “Cleaning the DiTi Waste Slide”, 7-41
Liquid system / DiTi cones	If DiTis are in use: Check the worktable for drops after each application run (drops may indicate a leakage in the liquid system / DiTi cone)	See section 7.3.1.1 “Checking the Liquid System for Leakages”, 7-10

At End of Day

Tab. 7-7 Daily maintenance at end of day in chronological order

Instrument/ Component	Maintenance Task	Reference
HydroFlex Platform (Microplate Washer)	Rinse with water	See section 7.3.9.2 “Rinsing of HydroFlex Platform (Microplate Washer)”, 7-34
Tips	Clean inside	See section 7.3.3.4 “Cleaning the Fixed Tips Inside”, 7-19
Liquid system	Flush	See section 7.3.1.2 “Flushing the Liquid System”, 7-12
System liquid container	Rinse with water and fill up	See section 7.3.6.2 “Rinsing the System Liquid Container”, 7-23 and 7.3.6.1 “Refilling the System Liquid Container”, 7-22

Tab. 7-7 Daily maintenance at end of day in chronological order (cont.)

Instrument/ Component	Maintenance Task	Reference
Wash bottles	Perform the maintenance according to your specific requirements, i.e. either • Keep the wash bottles on the instrument • Store them in a refrigerator • Empty and rinse them with water • Clean the wash bottles	See section 7.3.10 “Wash Bottles”, 🗎 7-35
DiTi cones	Clean	See section 7.3.4.2 “Cleaning the DiTi Cones”, 🗎 7-20
DiTi waste bag	Change	See section 7.3.8 “DiTi Waste Bag”, 🗎 7-30
Rocker of lower DiTi eject option	Clean	See section 7.3.5 “Rocker of Lower DiTi Eject Option”, 🗎 7-21
Wash station	Clean wash station	See section 7.3.12 “Wash Station”, 🗎 7-38
DiTi waste and wash station unit	Clean	See section 7.3.13.2 “Cleaning the Complete DiTi Waste and Wash Station Unit”, 🗎 7-43
DiTi waste and wash station unit	Clean DiTi waste slide thoroughly, as necessary	See section 7.3.13.1 “Cleaning the DiTi Waste Slide”, 🗎 7-41
Tips	Clean outside	See section 7.3.3.3 “Cleaning the Fixed Tips Outside”, 🗎 7-18
Waste container	Empty and rinse with water	See section 7.3.7.1 “Emptying the Waste Container”, 🗎 7-26
Liquid system	Check for leakages	See section 7.3.1.1 “Checking the Liquid System for Leakages”, 🗎 7-10
Carriers, racks and gripper	Clean	See section 7.3.11 “Carriers, Racks and Gripper”, 🗎 7-37
Worktable	Clean	See section 7.3.15 “Worktable”, 🗎 7-45
Front safety panel	Clean	See section 7.3.16 “Front Safety Panel”, 🗎 7-46

Note: *If the working day exceeds eight hours, the daily maintenance should be repeated.*

7.2.3 Maintenance Table: Weekly Maintenance

Weekly Maintenance

Tab. 7-8 Weekly maintenance in chronological order

Instrument/Component	Maintenance Task	Reference
Liquid handling arm/ Robotic manipulator arm	Clean front arm guide	See section 7.3.17 “Arm Guide”, 7-46
PosID	Clean laser beam output window	See section 7.3.19 “Positive Identification (PosID)”, 7-48
	Clean PosID working area of the worktable (abrasion)	Lint-free cloth and alcohol
System liquid container	Clean and fill up[a)]	See section 7.3.6 “System Liquid Container”, 7-22
Liquid system / HydroFlex Platform (Microplate Washer)	Clean / rinse[a)]	See section 7.3.1.4 “Cleaning the Liquid System”, 7-13
Waste container	Empty and clean[a)]	See section 7.3.7 “Waste Container”, 7-26
MIO	Clean (this task is not recorded by the software)	See section 7.3.14 “Monitored Incubator Option (MIO)”, 7-44

a) *These tasks can be executed simultaneously as described in the corresponding sections*

Note: *The weekly maintenance should be performed*

- *on the last working day of each week*
- *after longer periods of non-use (more than 3 days).*

7.2.4 Maintenance Table: Every Two Months

Two-Monthly Maintenance

Tab. 7-9 Two-monthly maintenance

Instrument/Component	Maintenance Task	Reference
HydroFlex Platform (Microplate Washer)	Clean manifold	See section 7.3.9.3 “Cleaning the HydroFlex Platform Manifold”, 7-34

7.2.5 Maintenance Table: Half-yearly Maintenance

ATTENTION

To ensure a proper working condition of the instrument a half-yearly maintenance must be carried out by a Tecan authorized field service engineer (FSE).

7.3 Maintenance Tasks

WARNING

Automatically moving parts.
Injuries (crushing, piercing) possible if the safety panels are not in place.

- Never reach into the instrument if not explicitly prompted by the Freedom EVOlution SW Run Control.

7.3.1 Liquid System

7.3.1.1 Checking the Liquid System for Leakages

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Chemical resistance of the tubing material	See section "Chemical Resistance", 🗎 3-27
Lock nut tightening	See section 7.3.3.1 "Tighten the Lock Nuts", 🗎 7-17
DiTi cone tightening	See section 7.3.4.3 "Tightening the DiTi Cones", 🗎 7-20
Syringe and plunger lock screw tightening	See section 7.3.2 "Syringe", 🗎 7-16

The liquid system is leaking

- if liquid droplets are hanging on the fixed tips or DiTi cones before the instrument is switched on or when it is in stand-by mode.
- if the syringes are leaking, e.g. liquid accumulates around the dilutors before the instrument is switched on or when it is in stand-by mode.
- if there are drops on the worktable.

Leakages in the liquid system can also be caused by an empty liquid system or by aggressive liquids. When using aggressive liquids, take into account the chemical resistance of the tubing material.
Refer to cross references above.

Instructions

If the system is leaky, do the following:

1. Make sure that the system liquid container is full.
2. Tighten the lock nut and the DiTi cones.
   Refer to cross references above.
3. Tighten syringe and plunger lock screw.
   Refer to cross references above.
4. Flush the liquid system until all air is removed.
   Refer to cross references above.
5. Observe the tips or DiTi cones for 1 minute.
   If no droplets are formed, the liquid system is tight.
6. If the system is still leaky, remove the top cover of the instrument by loosening the two outer screws.
7. Tighten the tubing connections (A) according to the figure:

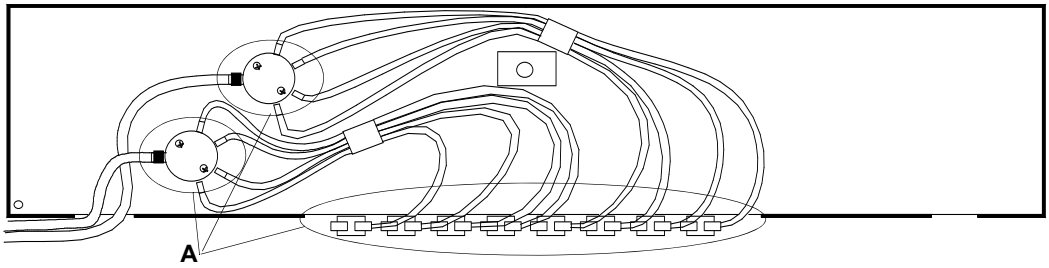


Fig. 7-1 *Tubing connections (top view of instrument)*

8. Flush the liquid system.
   Refer to cross references above.
9. Observe the tips or DiTi cones for 1 minute.
   If no droplets are formed, the liquid system is tight.
10. If the system is still leaky, call your local Tecan service organization.

ATTENTION

A leaky liquid system causes pipetting inaccuracy and cross-contamination.

- Never operate the Freedom EVOlyzer if the liquid system is leaky.

7.3.1.2 Flushing the Liquid System

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Replace fixed tip	See section 7.4.1 “Fixed Tips”, 7-50
Replace DiTi adapter	See section 7.4.2 “Disposable Tips (DiTis)”, 7-53

When the liquid system is not in use, e.g. overnight, outgassing of the stagnant system liquid results in air bubbles accumulating in the system.
Even during a run, air bubbles may then remain in the liquid system.
Therefore, the liquid system must be flushed at the start of day as part of the daily maintenance routine and before each application run as part of the run preparation routine.

ATTENTION

Air bubbles in the liquid system cause pipetting inaccuracy.

- Never operate the Freedom EVOlyzer with air bubbles in the liquid system.

At the end of day, the liquid system must be flushed to prevent the accumulation of substances that may crystallize and clog the system.

To flush the liquid system, proceed as follows:

1. Make sure that the system liquid container is full. If not, fill it up with system liquid of room temperature (from the refill containers).
2. Flush the liquid system with the following settings defined in the Application Software:
   - Volume 30 ml
   - Use sensored pump option (SPO).
   - Watch the outflow of the fixed tips / DiTi cones during flushing. The water jet has to come out straight without any spray effect. If this is not the case, replace the fixed tip or the DiTi adapter.
     Refer to cross references above.
3. Flush again. During flushing, carefully observe the tubing. If necessary, gently move the tubing to make sure all air bubbles are removed.
4. If there are still air bubbles in the tubing, repeat step 3.

Before Application Run

To flush the liquid system before the application run, proceed as follows:

1. Make sure that the system liquid container is full.
2. Flush the liquid system with the settings defined in the Application Software.
3. During flushing, carefully observe the tubing. If necessary, gently move the tubing to make sure all air bubbles are removed.
4. If there are still air bubbles in the tubing, repeat step 2.

7.3.1.3 Performing the Tightness Check

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Leaky system	See section 7.3.1.1 “Checking the Liquid System for Leakages”, 🗎 7-10

Proceed as follows:

1. After the start-up flush is completed, the tips are located above the waste station.
2. Observe the tips for 30 seconds.

   If no droplets form at the tips, the tightness check is passed.

   If droplets form, follow the instructions given for a leaky liquid system: Refer to cross references above.

   If this does not help, call your local Tecan service organization for assistance.

7.3.1.4 Cleaning the Liquid System

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Clean system liquid container	See section 7.3.6.3 “Cleaning the System Liquid Container”, 🗎 7-24
Empty waste container	See section 7.3.7.1 “Emptying the Waste Container”, 🗎 7-26
Clean waste container	See section 7.3.7.2 “Cleaning the Waste Container”, 🗎 7-27
Refill system liquid container	See section 7.3.6.1 “Refilling the System Liquid Container”, 🗎 7-22

Note: *This maintenance task can be performed at the same time with the cleaning of the system liquid container. Otherwise, the maintenance bottle is used to provide the cleaning agent (see Fig. 7-2 “Maintenance bottle”, 🗎 7-14).*
Refer to cross references above.

Note: *The cleaning agent remaining in the waste container after this procedure can be used to clean the waste container as well. In this case empty the waste container before this maintenance task.*
Refer to cross references above.

Purpose

To prevent growth of micro-organisms in the liquid system tubing, the liquid system must be cleaned once a week.

Note: *The software guides you through the procedure. Follow the instructions on the screen.*

Note: *The automated maintenance procedure also includes the liquid system of the HydroFlex platform (microplate washer).*

ATTENTION

Damage to the microplate washer, if wrong cleaning agents are used.

- Only use approved agents (system cleaner) for this maintenance task.

To clean the liquid system, proceed as follows:

Fig. 7-2 *Maintenance bottle*

1. Fill approx. three liters of system cleaner into the system liquid container (in case you want to clean the container at the same time).

   Or Provide sufficient system cleaner in the maintenance bottle (shown in the figure).
2. Connect the system liquid tubing to the corresponding container.

WARNING

Fire hazard due to evaporation of flammable liquids from an unsealed container.

- The maintenance bottle has a vent hole in the cap. Therefore, do not store flammable liquids in the maintenance bottle.
- Pour remaining flammable liquid back to the storage container.

3. Flush the liquid system according to the software guidance.
4. Allow to soak for ten minutes according to the software guidance.
5. Clean the system liquid container and fill it with system liquid, reconnect the container.
   Refer to cross references above.

   Or Reconnect the system liquid tubing to the system liquid container (in case you used the maintenance bottle).

   NOTE: Do not delay the subsequent flush step in order to prevent backflow of cleaning agent into the system liquid.
6. Flush the liquid system according to the software guidance.

Note: *In cases of severe contamination of the liquid system repeat the procedure with alcohol.*

7.3.1.5 Container Connections

Cross References

List of cross references to information provided in other sections:

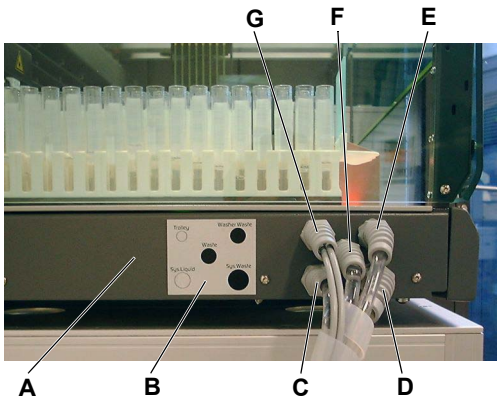
Subject	Reference
Switch to second waste container	See section 7.3.7.1 “Emptying the Waste Container”, 7-26

The following figures show how the containers are connected:

ATTENTION

Erroneous container monitoring if the liquid level sensor cables are not connected properly.

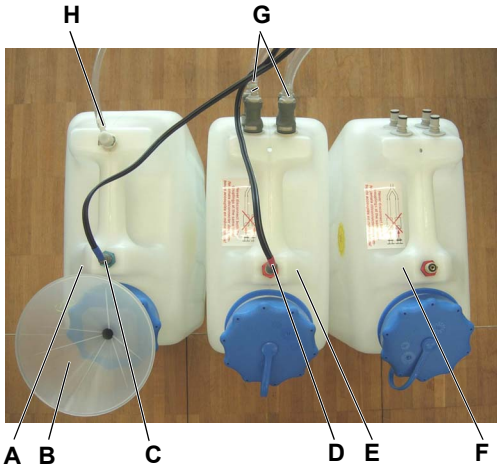
- Make sure to correctly connect the cables as described below.



A *Left worktable cover*
B *Label (connections)*
C *System liquid tubing*
D *System waste tubing (from wash station)*
E *Washer waste tubing*
F *Waste tubing (from pressure relief valve)*
G *Level sensor cables*

Fig. 7-3 *Tubing/cables to containers*

Note: *Pay attention to the label next to the tubing outlet to identify the tubing and cable.*



For information on how to switch to the second waste container, refer to cross references above.

A *System liquid container*
B *Refill funnel*
C *System liquid level sensor cable*
D *Waste liquid level sensor cable*
E *Waste container*
F *Second waste container*
G *Waste tubing*
H *System liquid tubing*

Fig. 7-4 *Container connections*

Note: *Make sure that the liquid level sensor cables are connected properly.*

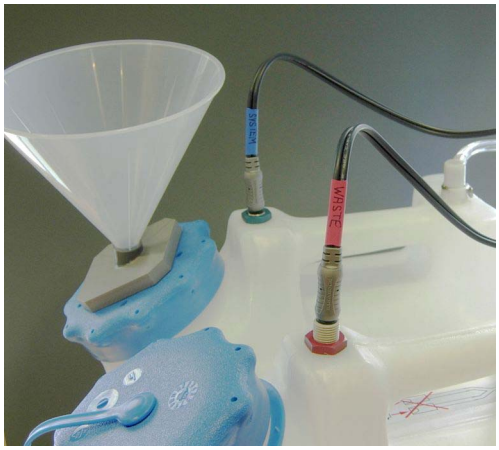


Fig. 7-5 *Cable connections*

The liquid level sensor cables are labeled as follows:

- Waste container
  - "Waste" on the red sleeve of the cable
  - Red nut on the container
- System liquid container
  - "System" on the blue sleeve of the cable
  - Blue nut on the container

Make sure that the plugs are pushed down completely to ensure proper container monitoring.

7.3.2 Syringe

By the continuous up and down movements of the syringes during operation, the syringe and plunger lock screw can loosen. This can cause leakage of the liquid system. Therefore:

Tightening Syringe and Plunger Lock Screws

1. Manually tighten the plunger lock screw and syringe screw.
2. If leakages occur, the plunger cap or syringe have to be replaced immediately by an FSE.

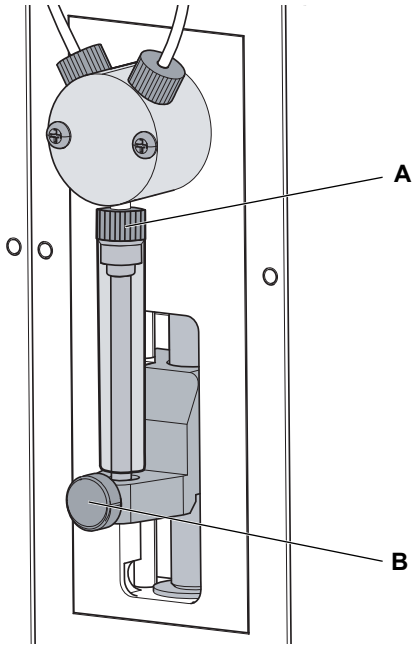


Fig. 7-6 *Syringe and valve*

A *Syringe screw*

B *Plunger lock screw*

7.3.3 Tips

ATTENTION

Tips are very delicate. Handle them with extreme care all the time.

ATTENTION

Electric discharge can damage the liquid detector.

- Discharge yourself electrically through contact with an earthed object, e.g. the worktable, before touching the tips.

WARNING

Pipetting tubing and tips can be contaminated.

- Decontaminate the instrument and assure appropriate safety measures.

WARNING

Pipetting tips can cause injuries.

- Avoid contact with the pipetting tips and contact with aerosols when accessing the worktable, by wearing adequate protective clothing.

7.3.3.1 Tighten the Lock Nuts

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Tighten the lock nuts	See section 7.4.1 “Fixed Tips”, 🗎 7-50

Tighten the lock nuts manually.
For more details, refer to cross references above.

ATTENTION

The lock nuts are very delicate. Never use tools to tighten them.

7.3.3.2 Checking Fixed Tips for Damage

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Replacing fixed tips	See section 7.4.1 “Fixed Tips”, 🗎 7-50

Visually inspect the tip coating before switching on the instrument. Use a mirror for proper inspection of the tip outlet. Make sure that the tips are not bent. If the tip coating is damaged or the tip is bent, the tip must be replaced.
Refer to cross references above.

ATTENTION

Bent tips or damaged tip coating cause pipetting inaccuracy, contamination and liquid level detection errors.

- Never work with damaged or bent tips.

7.3.3.3 Cleaning the Fixed Tips Outside

Before switching on and after switching off the instrument, use a lint free tissue soaked in alcohol to clean the fixed tips from the outside. Make sure not to damage the tip coating.

7.3.3.4 Cleaning the Fixed Tips Inside

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Clean tips outside	See section 7.3.3.3 “Cleaning the Fixed Tips Outside”, 7-18

Before switching the instrument off (for a time period of more than one hour) the fixed tips need to be cleaned from the inside to complete the maintenance task (as recorded by the software).

Note: *The software guides you through the procedure. Follow the instructions on the screen.*

- *If you do not want to perform this step, ignore the* ***Load Consumables*** *dialog displayed by the software.*

To clean the inside of the tips, proceed as follows:

1. Choose the appropriate cleaning agent according to your application (e.g. 0,25 mol/l NaOH, disinfectant, etc.).
2. Aspirate a syringe volume of the cleaning agent and let it act on for at least 10 minutes.
3. Flush the system.
4. Aspirate a syringe volume of alcohol.
5. Flush the system thoroughly with water afterwards.
6. Switch off the instrument.
7. Clean the tips outside.
   Refer to cross references above.

Note: *The amount of system liquid used for the flushing procedure can be set in the Process Definition Editor of the Freedom EVOlution Software. Refer to the Freedom EVOlution SW Application Software Manual for details.*

7.3.4 DiTi Cones

WARNING

Possible contamination.
The space between disposable tip cones and the tubing extension can become contaminated and thus create a contamination risk.

- Decontaminate the entire equipment thoroughly before maintenance work.
- Decontaminate also the space between disposable tip cones and the tubing extension before manipulating the DiTi pickup mechanism.

7.3.4.1 Check for Deposits

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Disassemble and install the DiTi adapter	See section 7.4.2 “Disposable Tips (DiTis)”, 7-53

Visually check if the DiTi cones and the tubing extension are clean and free of all deposits. If deposits are visible, thoroughly clean the disposable tip adapter and replace the critical components, if necessary.
Refer to cross references above.

7.3.4.2 Cleaning the DiTi Cones

Proceed as follows to clean the DiTi cones:

1. Touch the worktable before touching the DiTi cones to discharge static electricity from your body.
2. Wipe the DiTi cones with a lint-free tissue dampened with alcohol.

7.3.4.3 Tightening the DiTi Cones

Make sure that the DiTi cones are tightened in such a way that the DiTis will not become loose during operation. Proceed as follows:

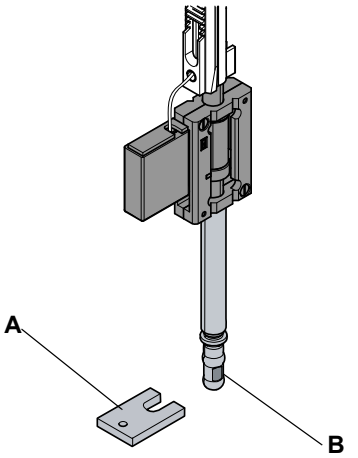


Fig. 7-7 *Tightening the DiTi cones*

1. Touch the worktable before touching the DiTi cones to discharge static electricity from your body.
2. Use the DiTi cone wrench to tighten the DiTi cones hand-screwed.

A *Cone wrench*
B *DiTi cone*

7.3.5 Rocker of Lower DiTi Eject Option

WARNING

Potentially infectious

Instrument parts may be contaminated with potentially infectious materials.

- Follow basic biohazard precautions
- Wear appropriate personal protective equipment, such as gloves, lab coats and protective eye wear

Cleaning the Rocker

Perform the following procedure to clean rocker of the Freedom EVOlyzer:

1 Wipe the surface of the rocker with a suitable cleaning agent (e.g. alcohol, disinfectant).

2 If necessary, additionally clean with water.

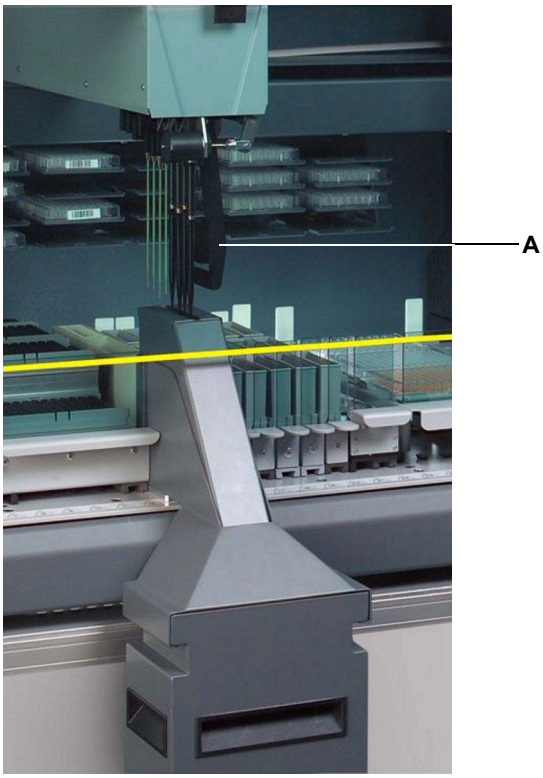


Fig. 7-8 *Lower DiTi eject option*

A *Rocker*

7.3.6 System Liquid Container

7.3.6.1 Refilling the System Liquid Container

Check the system liquid container and refill it with system liquid when necessary or when prompted by the software.

To refill the system liquid container, proceed as follows:

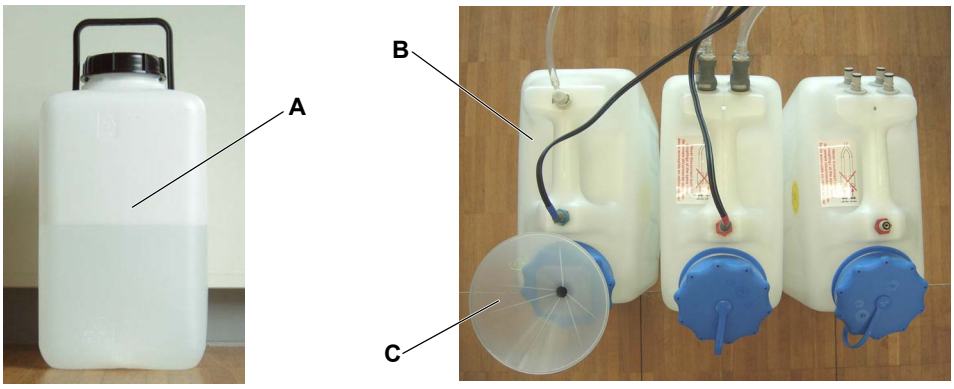


Fig. 7-9 *Refill container and system liquid container with funnel*

1. Take the two refill containers (A) containing water of room temperature.
2. Pour the water from the refill containers carefully into the system liquid container (B) by means of the funnel (C).

Fig. 7-10 *Cap on container*

3. Fill the refill containers with water, so that they can be used to fill up the system liquid container with water of room temperature again the next time.
4. Put the caps on the refill containers, but do not tighten them firmly as shown in the figure.

   Covering the containers in such a way serves to protect the system liquid from dust but allows the system liquid to degas.

7.3.6.2 Rinsing the System Liquid Container

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Refill container	See section 7.3.6.1 “Refilling the System Liquid Container”, 🗎 7-22
Connect container	See section 7.3.1.5 “Container Connections”, 🗎 7-15
Flushing the liquid system	See section 7.3.1.2 “Flushing the Liquid System”, 🗎 7-12

Rinse the system liquid container before refilling at least once a week. At the same time, rinse the refill containers as well.

To rinse the system liquid container, proceed as follows:

1. Disconnect the tubing from the container.
2. Unplug the level detection sensor cable from the container.
3. Remove the funnel and the funnel pipe.
4. Remove the cap from the container.
5. Empty the container.
6. Visually check the container for damage and replace it, if necessary.
7. Fill approx. one liter of water into the container.

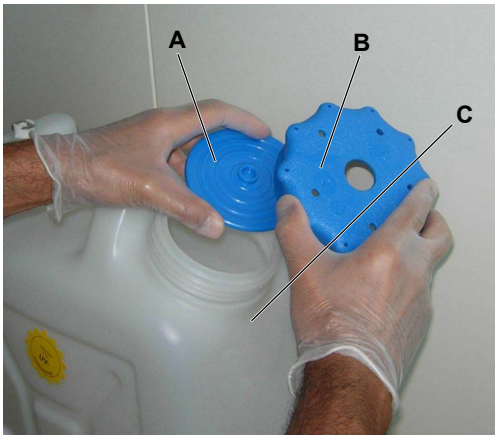


Fig. 7-11 Seal disk and cap

8. Mount the special seal disk (A) and the cap (B) on the system liquid container (C) as shown in the figure.
9. Shake the container in such a way that all spots inside the container are wetted.
10. Remove the cap and the seal disk from the container.
11. Empty the container.
12. Repeat the steps 7 to 11.
13. Rinse the cap with water and put it back onto the container.
14. Rinse the funnel pipe and the funnel and insert them in the container.
15. Refill the container with system liquid.
    Refer to cross references above.

NOTE: Make sure that the system liquid has attained room temperature before you continue system operation.

16 Make sure that the instrument and the control software are ready for a flush command.

17 Reconnect the tubing and the liquid level sensor cable to the container. Refer to cross references above.

7.3.6.3 Cleaning the System Liquid Container

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Cleaning the liquid system	See section 7.3.1.4 “Cleaning the Liquid System”, 🗎 7-13
Refill container	See section 7.3.6.1 “Refilling the System Liquid Container”, 🗎 7-22
Connect container	See section 7.3.1.5 “Container Connections”, 🗎 7-15
Flushing the liquid system	See section 7.3.1.2 “Flushing the Liquid System”, 🗎 7-12

Note: *For practical reasons, the cleaning agent in the container can be used to perform the cleaning procedure for the liquid system during this maintenance task as well.*
Refer to cross references above.

Purpose

To prevent the growth of micro-organisms in the system liquid container and the two refill containers, they must be cleaned at least once a month.

To clean the system liquid container, proceed as follows:

1 Disconnect the tubing from the container.

2 Unplug the level detection sensor cable from the container.

3 Remove and clean the funnel and the funnel pipe.
- Immerse the parts in Decon / Contrad.
- Allow to soak for ten minutes.
- Rinse the parts five times with water.

4 Remove and clean the cap from the container.
- Clean the inside of the cap using a lint-free tissue soaked with alcohol.

5 Empty the container.

6 Visually check the container for damage and replace it, if necessary.

7 Fill approx. three liters of system cleaner into the container.

8 Mount the special seal disk and the cap.
Refer to Fig. 7-11 “Seal disk and cap”, 🗎 7-23.

9 Shake the container in such a way that all spots inside the container are wetted.

10 Allow to soak for at least ten minutes.

Or In case of performing the automated maintenance procedure: Remove the cap and the seal disk from the container to avoid building up of vacuum during flushing.

If you are cleaning the liquid system at the same time follow the corresponding instructions before proceeding with the current maintenance task.
Refer to cross references above.

11 In case of performing the automated maintenance procedure: Remount the seal disk and the cap.

12 Shake the container again.

13 Remove the cap and the seal disk from the container.

14 Rinse the container with water at least five times to ensure that all cleaning agent is removed.

NOTE: Be sure to dispose of the liquid waste according to your laboratory guidelines.

15 Put the cap back onto the container.

16 Insert the funnel pipe and the funnel.

17 Refill the container with system liquid.
Refer to cross references above.

NOTE: Make sure that the system liquid has attained room temperature before you continue system operation.

18 Make sure that the instrument and the control software are ready for a flush command.

19 Reconnect the container.
Refer to cross references above.

NOTE: Do not delay the subsequent flush step in order to prevent backflow of cleaning agent into the system liquid.

20 Flush the liquid system.
Refer to cross references above.

7.3.7 Waste Container

WARNING

Potentially infectious
Instrument parts and liquid waste may be contaminated with potentially infectious materials.

- Follow basic biohazard precautions
- Wear appropriate personal protective equipment, such as gloves, lab coats and protective eye wear

7.3.7.1 Emptying the Waste Container

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Connect container	See section 7.3.1.5 “Container Connections”, 7-15

The waste container must be emptied daily and, if necessary, before each new application run or when prompted by the software.

For continuous operation (working with a second waste container) proceed as follows:

1 Place the second waste container close to the first, currently used container.

WARNING

Potentially infectious
Due to building up of pressure in the washer waste tubing the tubing may become loose and emit liquid waste, if both tubing from the Y-piece are removed at the same time.

- Never remove both washer waste tubing from the waste container at the same time (valve in coupling closes when tubing is disconnected).

2 Remove only one washer waste tubing from the first container and connect it to the coupling of the second container. Thus, the waste tubing from the HydroFlex Platform (Washer) is always attached and no pressure will build up.

3 Now remove the other connections from the first container and attach them to the second one.
Refer to cross references above.

Note: *You have 30 seconds to attach the level detection sensor cable to the second container after removing it from the first. Otherwise the software will display an error message.*

4 Empty the first container and put it back next to the second, connected container to have it at hand for the next emptying procedure.

Note: *Be sure to dispose of liquid waste according to your laboratory guidelines.*

Note: *The tubing between the instrument and the waste container must not be bent or must not sag.*

When you do not work with continuous loading and only have one waste container, the emptying procedure is not carried out during a run.

7.3.7.2 Cleaning the Waste Container

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Cleaning the liquid system	See section 7.3.1.4 “Cleaning the Liquid System”, 7-13
Connect container	See section 7.3.1.5 “Container Connections”, 7-15

Note: *For practical reasons, the cleaning agent remaining in the waste container after the cleaning procedure for the liquid system can be used to perform this maintenance task as well.*
Refer to cross references above.

To clean the waste container(s), proceed as follows:

1 Use the cleaning agent remaining in the waste container after the cleaning procedure of the liquid system.

Or Choose the suitable cleaning agent according to your application (e.g. disinfectant, weak detergent) and fill it into the container.

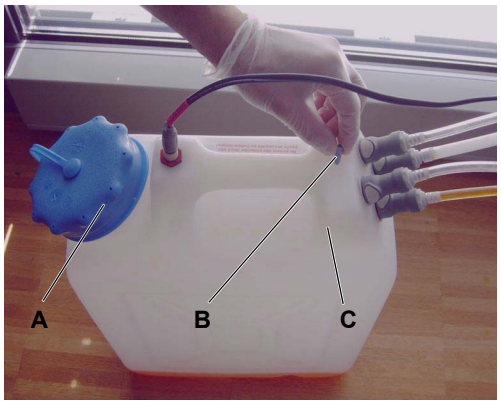


Fig. 7-12 *Rubber stopper / vent hole*

2 Make sure that the cap (A) is tightened firmly.

3 Put the rubber stopper (B) into the vent hole of the waste container (C) to close it.

4 Remove the waste tubing from the container(s).

5 Remove the level detection sensor cable from the container.

6 Shake the container in such a way that all spots inside the container are wetted.

7 Allow to soak for at least ten minutes.

8 Shake the container again.

NOTE: In case of performing the automated maintenance procedure: If you are cleaning the liquid system at the same time reconnect the level sensor cable and the waste tubing and remove the rubber stopper before flushing the liquid system.

9 Remove the cap from the container(s).

10 Empty the container(s).

NOTE: Be sure to dispose of waste according to your laboratory guidelines.

11 Rinse the container(s) with water at least five times.

12 Visually check the container(s) for damage and replace it/them, if necessary.

13 Remove the rubber stopper from the vent hole in the waste container.

ATTENTION

Liquid spillage on the worktable.
To prevent the building up of pressure in the waste container, which results in overflow of the wash station, do not forget to unplug the rubber stopper from the vent hole of the waste container.

14 Put the cap back onto the container(s).

15 Reconnect the waste tubing and the level detection sensor cable.
Refer to cross references above.

7.3.7.3 Waste Tubing

Installing the Waste Tubing

When installing the waste tubing, pay attention to the following:

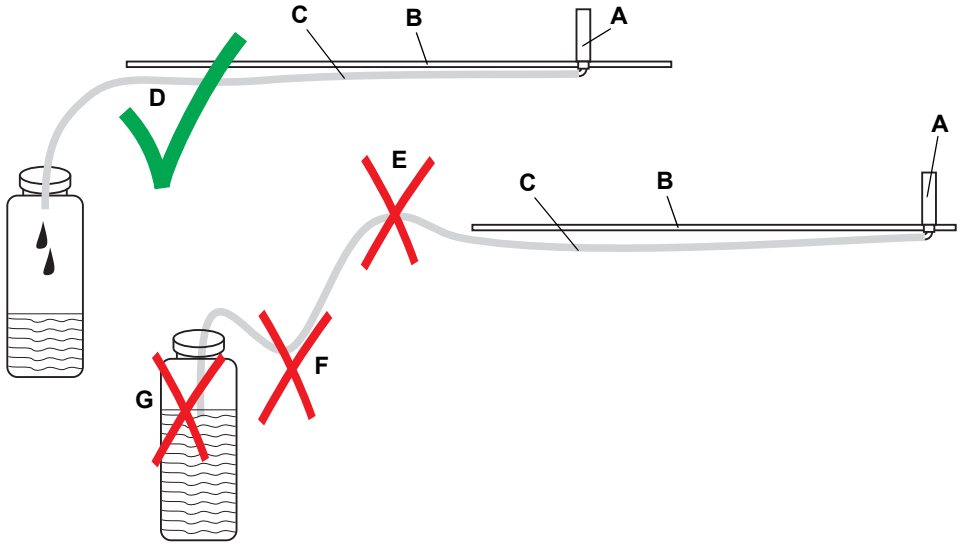


Fig. 7-13 *Correct and disadvantageous course of waste tubing*

Correct installation of waste tubing

- ***A*** *Wash station*
- ***B*** *Worktable*
- ***C*** *Waste tubing*
- ***D*** *Correct course of waste tubing*

Incorrect installation of waste tubing

- ***E*** *Rising waste tubing*
- ***F*** *Sagging waste tubing*
- ***G*** *Waste tubing reaching into liquid*

ATTENTION

Liquid spillage on the worktable.

To prevent overflow of the wash station the waste tubing must be routed in such a way that the back pressure is as low as possible.

- The waste tubing must not be longer than necessary.
- The waste tubing must not be kinked or squeezed (reduction of clear cross section).
- The waste tubing must not rise after wash station (back pressure).
- The waste tubing must not sag (back pressure).
- The lower end of the waste tubing must not be in the liquid (back pressure).

7.3.8 DiTi Waste Bag

WARNING

Potentially infectious
Instrument parts and solid waste may be contaminated with potentially infectious materials.

- Follow basic biohazard precautions
- Wear appropriate personal protective equipment, such as gloves, lab coats and protective eye wear

WARNING

Risk of fire or explosion.
If inflammable reagents were used in the process, remains of these substances on the waste DiTis may accumulate and form combustible vapors.

- If inflammable reagents are in use change the DiTi waste bag frequently.
- Perform a risk assessment to define further measures.

The filling height of the DiTi waste bag must be checked regularly. Make sure that there is no DiTi jam within the DiTi waste slide and change the DiTi waste bag at least once at the end of the day.

Removal

Follow the procedure below to change the DiTi waste bag:

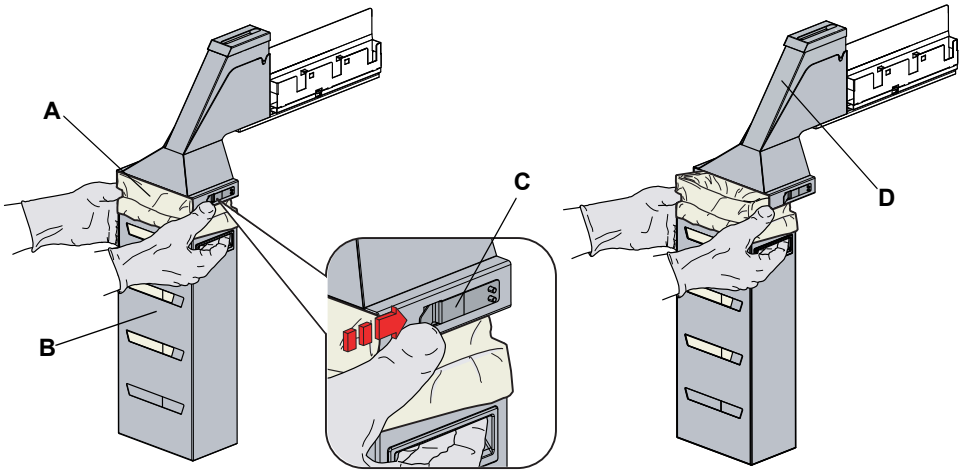


Fig. 7-14 *Changing the waste bag*

A	*DiTi waste bag*	***C***	*Fastener*
B	*Bag housing*	***D***	*DiTi waste slide*

1 Lift the fastener to remove the bag housing.

Note: *Be sure to dispose of waste according to your laboratory guidelines.*

2 Remove the DiTi waste bag and dispose of it appropriately.

Installation

3 Install a new DiTi waste bag into the empty bag housing.

Note: *The waste bag must be suitable for disposable tips and, in case you are operating with biohazardous material suitable for those material as well, it must e.g. have an adequate thickness and be labeled with a corresponding biohazard label.*

Waste Bag Specification

Typical dimensions for the waste bag (W x L): 300 mm x 600 mm
Thickness: 0.05 mm
Material: Polypropylene, Polyethylen or Co-Polymer (autoclavable)
Imprint: Biohazard

Note: *The waste bags used must meet your local safety guidelines.*

7.3.9 HydroFlex Platform (Washer)

Note: *For additional maintenance steps not mentioned in this manual, also refer to the Instructions for Use for the HydroFlex Platform (Washer).*

ATTENTION

Do not run the HydroFlex Platform dispensing and aspiration pumps for longer than a few minutes without liquid, otherwise they will be damaged.

To access the HydroFlex Platform (Washer), a flap is provided on the top of the Freedom EVOlyzer.
Step on a stool and open the flap.

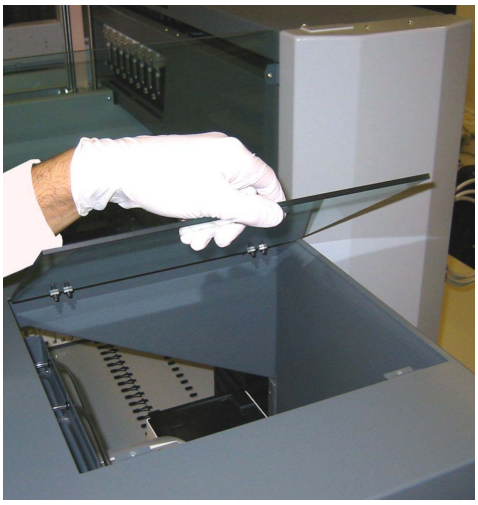


Fig. 7-15 *Washer access*

7.3.9.1 Washer Check

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Troubleshooting instructions	See section 8.2.2 “Washer Check Failed”, 8-7

Purpose

The washer check procedure checks the wash function of the microplate washer. For this, a microplate[1)] needs to be placed on top of the RT incubator as shown in the figure (see arrow).

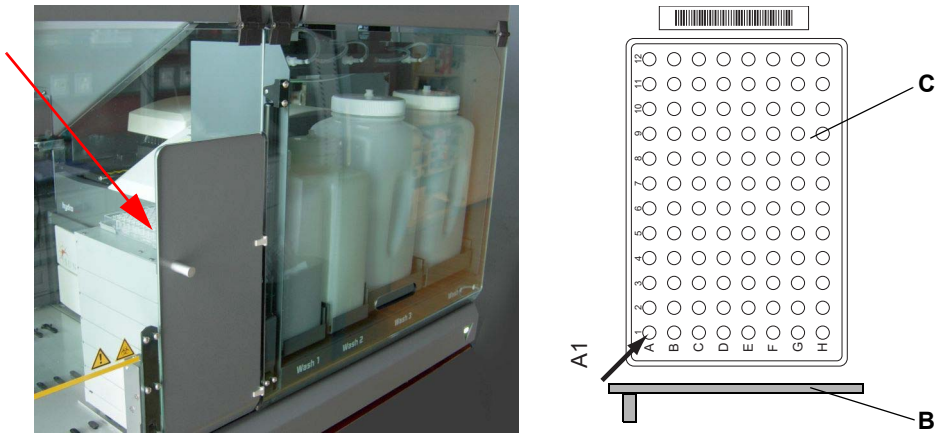


Fig. 7-16 *Microplate for washer check on the RT incubator*

A1 *Position of well A1 on the microplate* ***C*** *Microplate*
B *Door of RT incubator*

Note: *The software guides you through the procedure. Follow the instructions on the screen.*

Principle

The RoMa transfers the plate to the washer, where it is processed, and brings it back.
During the washer check the wells are filled and emptied in a sequence by means of the washer’s 8-channel manifold.

At the end of the test the plate must meet the following conditions:

- The wells of one halve of the plate will be filled completely.
- The wells of one second halve of the plate will be emptied completely.

The plate needs to be evaluated visually as described below.

Test Solution

Use wash buffer or Tween 20[2)] (0.1%) as test solution.

Note: *Deionized water is not suitable for the test due to its high surface tension.*

1) *Greiner Cat.-No. 655 101 F-bottom MICROLON, 5 pcs delivered with instrument*
2) *Tween 20 can have influence on the process. Therefore, careful validation is necessary if this agent is used*

Evaluation of the Microplate

The following figure shows cross-sections of one column of the microplate and the fill level in the wells. Examples for incorrectly filled wells (test failed) are given:

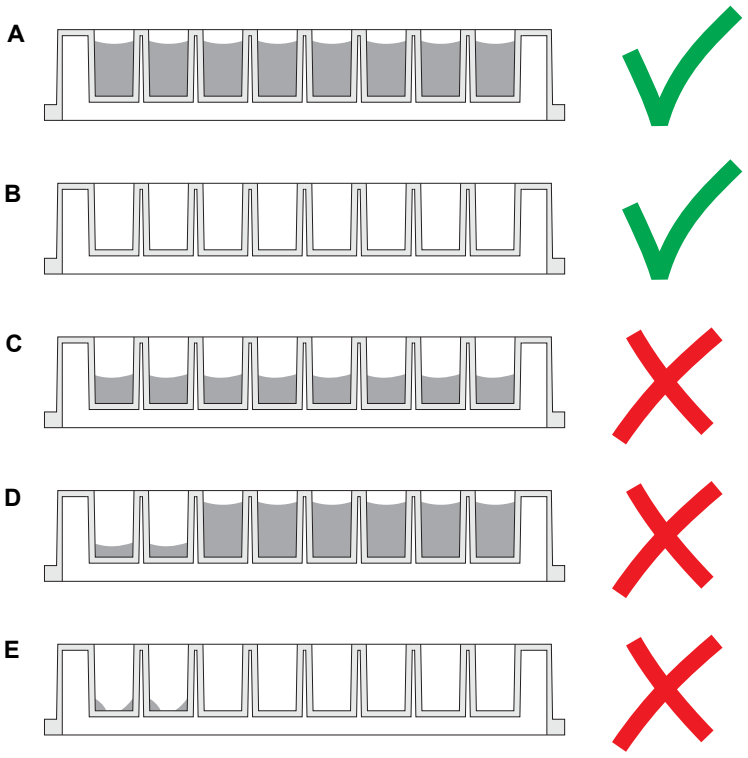


Fig. 7-17 *Evaluation of microplate fill level after washer check*

A *Full wells: Test passed*
B *Empty wells: Test passed*
C *Half-full wells: Test not passed*
D *First 2 wells insufficiently filled: Test not passed*
E *First 2 wells not completely emptied: Test not passed*

Pass / Fail Criteria

After the washer check, the wells of the returned microplate must fulfil the following conditions to pass the test:

- The wells in the columns 1 to 6 are empty (contain less than 2 µl liquid)
- The wells in the columns 7 to 12 are evenly full (contain 350 µl liquid)
- There are no droplets on the microplate surface

The following errors may occur (test failed):

- Irregularly filled wells
- Insufficiently filled wells (e.g. half-full)
- Not completely emptied wells (contain more than 2 µl liquid)
- Droplets on the microplate surface (needle lost liquid during plate movement)

If the washer check has failed, refer to the troubleshooting instructions.
Refer to cross references above.

7.3.9.2 Rinsing of HydroFlex Platform (Microplate Washer)

Purpose

The aggregation of material in the needles, e.g. microorganisms, deposits of material, crystallization, etc. may result in clogged needles.
For that reason the manifold of the microplate washer must be rinsed after usage.

Note: *The software guides you through the procedure. Follow the instructions on the screen.*

7.3.9.3 Cleaning the HydroFlex Platform Manifold

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Open the flap	See section 7.3.9 “HydroFlex Platform (Washer)”, 🗎 7-31

Regardless of the frequency of use (the accumulation of debris does not depend on the liquid flow alone but also on the exposure time), the washer’s needles must be maintained regularly according the following procedure:

1. Open the top flap.
   Refer to cross references above.
2. Follow the procedure as described in the “Instructions for Use for HydroFlex Platform” to mechanically clean the washer’s aspirating and dispensing needles. Use the special cleaning needles that are delivered with the HydroFlex Platform (washer).

7.3.10 Wash Bottles

ATTENTION

Incorrect measuring results of the weighing scale.
Damaged, kinked or clogged wash bottle tubing may cause incorrect results.

- Check the tubing every time you connect it to the wash bottle.

ATTENTION

Incorrect measuring results of the weighing scale.
A plastic deformation of the weighing scale springs cause incorrect measuring results.

- Handle the weighing scales with care when removing and putting back the wash bottles.

7.3.10.1 Refilling the Wash Bottles

ATTENTION

Possible damage to the electronics if liquid is spilled into the weighing scale.

- Do not refill wash bottles on the weighing scale.

To refill the wash bottles, proceed as follows:

1. Disconnect the tubing from the wash bottle caps and attach them to the distribution channel for storage.
2. Remove the wash bottles from the weighing scales.
3. Take the caps off.
4. Refill the bottles with wash liquid.
5. Put the caps back onto the wash bottles.
6. Reconnect the tubing to the caps.
7. Reposition the bottles on their previous position on the weighing scales.

Note: *The filling height of the wash liquid is checked by the weighing scales. When the level is too low the system will be paused, requiring the operator to refill the wash bottles.*

7.3.10.2 Rinsing the Wash Bottles

Regularly rinse the wash bottles before refilling.

To rinse the wash bottles, proceed as follows:

1. Disconnect the tubing from the wash bottle caps.
2. Remove the wash bottles from the weighing scales.
3. Take the caps off.

4 Rinse the bottles with water.
5 Remove particles from the filters.
6 Fill some water into the bottles.
7 Put the caps onto the bottles and shake them.

8 Press the bottle together while closing the vent hole in the cap with a finger to rinse the inside tube in the bottle as shown in the figure.
9 Repeat the steps 6 to 8.

Fig. 7-18 *Rinsing wash bottle*

10 Allow the bottles to dry.
11 Put the caps back onto the wash bottles.
12 Reconnect the tubing to the caps.
13 Reposition the bottles on their previous position on the weighing scales.

7.3.10.3 Cleaning the Wash Bottles

To prevent the growth of micro-organisms in the wash bottles, they must be cleaned at least once a week.

To clean the wash bottles, proceed as follows:

1 Disconnect the tubing from the wash bottle caps.
2 Remove the wash bottles from the weighing scales.
3 Take the caps off.
4 Rinse the bottles with water.
5 Remove particles from the filters.
6 Fill approx 100 ml of system cleaner into the bottles.
7 Put the caps onto the bottles and shake them.
8 Press the bottle together while closing the vent hole in the cap with a finger to rinse the inside tube in the bottle (see Fig. 7-18 , 🗎 7-36).
9 Allow to soak for ten minutes.
10 Repeat the steps 6 to 8 five times with water to rinse the bottle.
11 Allow the bottles to dry.
12 Put the caps back onto the wash bottles.

7.3.11 Carriers, Racks and Gripper

WARNING

Potentially infectious

Instrument parts may be contaminated with potentially infectious materials.

- Follow basic biohazard precautions
- Wear appropriate personal protective equipment, such as gloves, lab coats and protective eye wear

Cleaning Carriers, Racks and Gripper

Racks, carriers and the gripper can come in contact with reagents and samples, which must be removed. Perform the following procedure to clean the carriers and racks and the gripper.

1. Remove all carriers and racks from the Freedom EVOlyzer worktable.

   The wash station can be cleaned on the worktable.
2. Before cleaning, remove the barcode labels from the carriers, if possible.
3. Wipe the surface of the racks, carriers and the gripper with a suitable cleaning agent (e.g. water, alcohol, disinfectant) to remove any spilled reagent.

   If you have not removed the labels on the carriers and racks, make sure not to damage them with the cleaning agent.

Note: *Do not use bleach to clean the carriers and racks and do not clean them in a laboratory washing machine.*

4. If necessary, rinse the carriers and racks and clean them additionally with water or alcohol.
5. Replace the barcode labels and make sure to put them back to their original position.
6. Return the carriers and racks to the Freedom EVOlyzer worktable.

Note: *If barcode labels are damaged or contaminated, replace them immediately.*

7.3.12 Wash Station

WARNING

Potentially infectious
Instrument parts may be contaminated with potentially infectious materials.

- Follow basic biohazard precautions
- Wear appropriate personal protective equipment, such as gloves, lab coats and protective eye wear

Always make sure that the wash station is installed in the correct grid position when it has been removed. If the grid position has changed, verify the corresponding definitions in the application software.

7.3.12.1 Cleaning the (Separate) Wash Station

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Clean worktable	See section 7.3.15 “Worktable”, 🗎 7-45

The wash station can come in contact with reagents and samples. If a spillage occurred, the wash station needs to be removed from the worktable for cleaning.

Clean the wash station as follows:

1 Wipe the surface of the wash station with a suitable cleaning agent (e.g. water, alcohol, disinfectant) to remove any spilled reagent.

Note: *Do not use bleach to clean the wash station and do not clean it in a laboratory washing machine.*

2 If necessary, rinse the wash station and clean it additionally with water or alcohol.

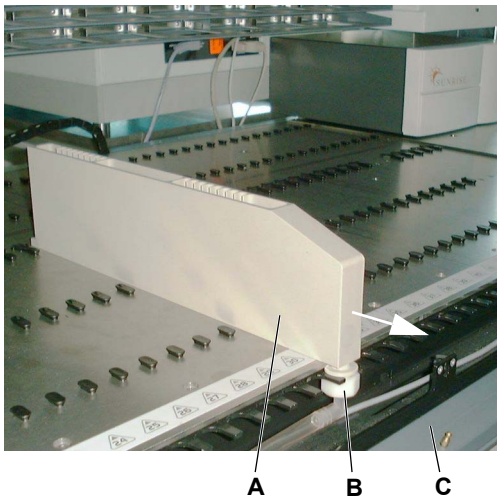


Fig. 7-19 Wash station

If necessary, remove the wash station from the worktable.

1. Open the front access panel (C).
2. Loosen the nut (B).
3. Pull the wash station (A) to the front (see arrow).

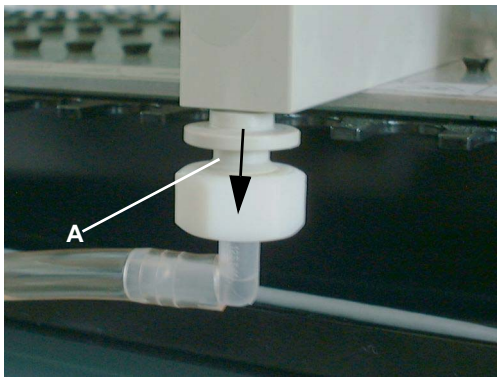


Fig. 7-20 Waste tubing connector

4. Pull the waste tubing connector (A) out of the wash station (see arrow).
5. Remove the wash station from the worktable.
6. Clean the wash station as described above.
7. Clean the worktable.
   Refer to cross references above.
8. Reinstall the wash station on the worktable.

   Make sure that the wash station is pushed all the way back to the stop during installation.

7.3.12.2 Cleaning the Wash Station of the DiTi Waste and Wash Station Unit

The wash station may be contaminated with residues from reagents and samples, which must be removed.

To remove and clean the wash station, proceed as follows:

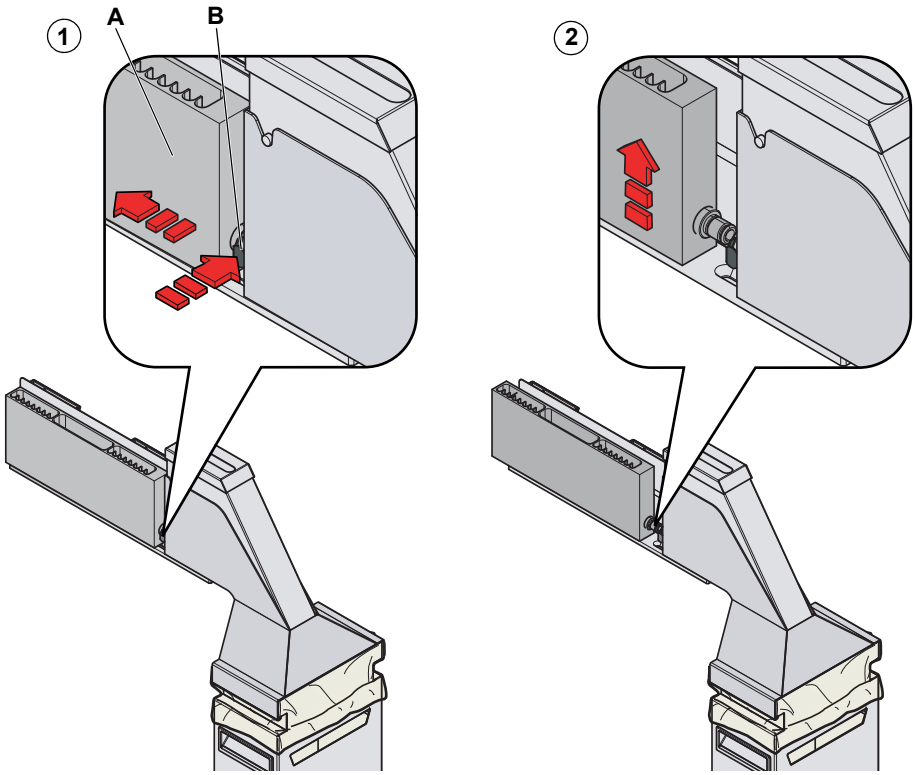


Fig. 7-21 *Removing the wash station from the worktable*

Removal

1 Unplug the wash station (A) from the DiTi waste and wash station unit by pushing the button (B) of the quick release fastener and sliding the wash station backwards.

2 Remove the wash station from the DiTi waste and wash station unit.

Cleaning

3 Wipe the surface of the wash station with a suitable cleaning agent (e.g. water, alcohol, disinfectant) to remove any spilled reagent.

Note: *Do not use bleach to clean the wash station and do not clean it in a laboratory washing machine.*

4 If necessary, rinse the wash station and clean it additionally with water or alcohol.

Installation

5 Return the wash station to the Freedom EVOlyzer worktable by pushing the button of the quick release fastener again and sliding the wash station to its original positioning until it engages at the fastener.

7.3.13 DiTi Waste and Wash Station Unit

WARNING

Potentially infectious
Instrument parts may be contaminated with potentially infectious materials.

- Follow basic biohazard precautions
- Wear appropriate personal protective equipment, such as gloves, lab coats and protective eye wear

To clean the wash station of the DiTi waste and wash station unit, see 7.3.12.2 “Cleaning the Wash Station of the DiTi Waste and Wash Station Unit”, 7-40.

7.3.13.1 Cleaning the DiTi Waste Slide

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Suitable agents	See section 7.1 “Tools and Consumables”, 7-1

The discarded DiTis contain residues of sample and reagents, which contaminate the DiTi waste slide.

Note: *Heavy contamination of the slide might cause the DiTis to get stuck in the DiTi waste slide.*

Quick Cleaning

To clean the DiTi waste slide, proceed as follows:

1 Open the front safety panel.

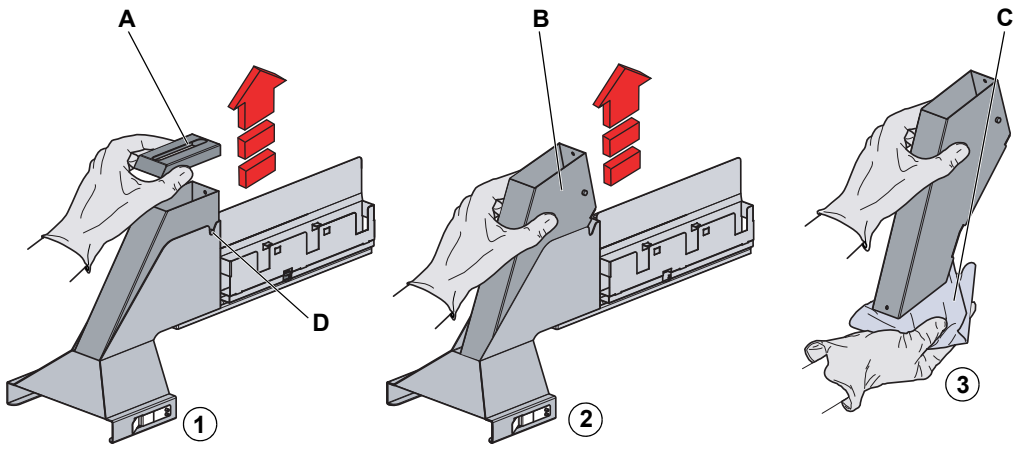


Fig. 7-22 *Removing DiTi waste slide inset*

2 Remove the cover (A) from the DiTi waste slide.

3 Remove the DiTi waste slide inset (B) from its holder.

Hold a tissue (C) under the DiTi waste slide inset when carrying it away to prevent contaminated substances and DiTis from dropping to the floor.

4 Spray some disinfectant on the inner surface of the DiTi waste slide as shown in the figure.

Suitable agents:
See cross references above.

5 Check if there are residues of contamination on the inner surface of the DiTi waste slide.

If yes, schedule a thorough cleaning of the parts as described below.

Fig. 7-23 *DiTi waste slide*

6 Reinstall the DiTi waste slide inset.

Make sure that the positioning pin of the DiTi waste slide is properly positioned in the slot (D, Fig. 7-22 , 7-41).

7 Reinstall the cover.

Thorough Cleaning

To thoroughly clean the DiTi waste slide, perform the following procedure:

1 Remove the cover from the DiTi waste slide as described above.
2 Remove the DiTi waste slide inset from its holder as described above.
3 Put the DiTi waste slide inset and the cover into a basin filled with cleaning agent and allow to soak for 30 minutes to 4 hours (depending on agent).
4 Allow the parts to dry.
5 Reinstall the DiTi waste slide inset as described above.
6 Reinstall the cover as described above.

7.3.13.2 Cleaning the Complete DiTi Waste and Wash Station Unit

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Remove wash station	See section 7.3.12.2 “Cleaning the Wash Station of the DiTi Waste and Wash Station Unit”, 🗎 7-40
Remove DiTi waste bag	See section 7.3.8 “DiTi Waste Bag”, 🗎 7-30
Remove DiTi waste slide inset	See section 7.3.13.1 “Cleaning the DiTi Waste Slide”, 🗎 7-41
Clean wash station	See section 7.3.12.2 “Cleaning the Wash Station of the DiTi Waste and Wash Station Unit”, 🗎 7-40
Clean worktable	See section 7.3.15 “Worktable”, 🗎 7-45

The DiTi waste and wash station unit may be contaminated with residues from reagents and samples, which must be removed.

To remove and clean the DiTi waste and wash station unit, proceed as follows:

Removal

1 Remove the wash station.
Refer to cross references above.

2 Remove the DiTi waste bag housing.
Refer to cross references above.

3 Remove the DiTi waste slide inset.
Refer to cross references above.

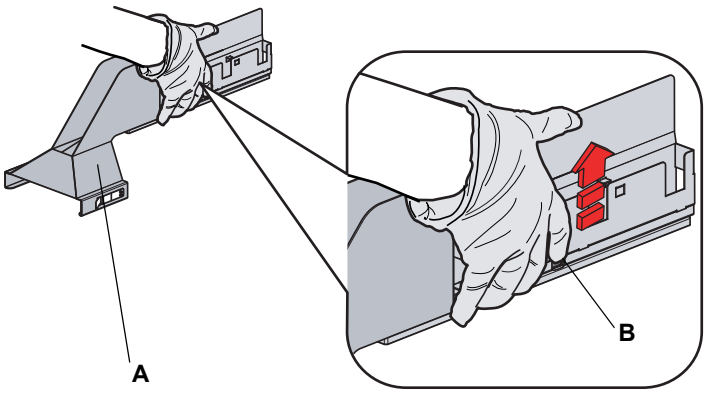


Fig. 7-24 *Removing the DiTi waste and wash station unit from the worktable*

4 Pull and hold the quick release lever (B).

5 Pull the DiTi waste and wash station unit (A) towards yourself.

Note: Apart from the normal position (work position) the unit can take the following positions:

– *If pulled to the mechanical stop: The front access panel can be opened, but the unit cannot be removed.*

– *If pulled to the middle position: The unit can be removed, but the front access panel cannot be opened.*

6 Open the front access panel to be able to release the waste tubing.

7 Remove the waste tubing.

8 Close the front access panel.

9 Shift the unit back to the middle position and remove (lift) it.

Cleaning

Note: *To clean the unit, it is not necessary to disconnect the waste tubing.*

10 Wipe the surface of the DiTi waste and wash station unit with a suitable cleaning agent (e.g. water, alcohol, disinfectant) to remove any spilled reagent.

Note: *You can now clean the wash station and the worktable.*
Refer to cross references above.

Installation

11 Reapply the waste tubing under the front access panel and close the panel.

12 Reinstall the DiTi waste and wash station unit on the worktable by pushing the button of the quick release fastener again and sliding the option to its original position until it engages on the positioning pins of the worktable.

7.3.14 Monitored Incubator Option (MIO)

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Suitable agents	See section 7.1 “Tools and Consumables”, 7-1

The clean to MIO, proceed as follows:

1 Use a wetted cloth to clean the incubator housing.
Refer to cross references above

ATTENTION

Risk of damage to equipment. Foreign objects caught in the incubator slots from the cleaning procedure could lead to damage to equipment.

- Make sure no foreign objects get caught in the incubator slots.

Decontamination

Agents

Note: *The selection of the appropriate decontamination agent depends on the contamination degree and the kind of contaminant.*
Refer to cross references above.

7.3.15 Worktable

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Remove separate wash station	See section 7.3.12.1 “Cleaning the (Separate) Wash Station”, 🗎 7-38
Remove wash station of DiTi waste and wash station unit	See section 7.3.12.2 “Cleaning the Wash Station of the DiTi Waste and Wash Station Unit”, 🗎 7-40

WARNING

Potentially infectious
Instrument parts may be contaminated with potentially infectious materials.

- Follow basic biohazard precautions
- Wear appropriate personal protective equipment, such as gloves, lab coats and protective eye wear

WARNING

Possible worktable damage

- Only clean the worktable with small amounts of cleaning agent, e.g. with a damped cloth
- Do not spill cleaning agent on the worktable

Cleaning the Worktable

Perform the following procedure to clean the worktable:

1. Remove all racks, carriers and the wash station from the worktable.
   Refer to cross references above.
2. Wipe the surface of the worktable with a suitable cleaning agent (e.g. alcohol, disinfectant) to remove any spilled reagent.
3. Clean PosID working area from abrasion.
4. If necessary, additionally clean with water.

7.3.16 Front Safety Panel

WARNING

Potentially infectious
Instrument parts may be contaminated with potentially infectious materials.

- Follow basic biohazard precautions
- Wear appropriate personal protective equipment, such as gloves, lab coats and protective eye wear

Cleaning the Front Safety Panel

Perform the following procedure to clean the front safety panel.

- Wipe the inner and outer surface of the front safety panel with a suitable cleaning agent, e.g. water, alcohol or disinfectant, to remove any spilled reagent or sample.
- If necessary, additionally clean the surface with water or alcohol.

7.3.17 Arm Guide

Cleaning the Arm Guide

In order to avoid uneven movements of the arm, use a cotton tab or a lint-free tissue on a screwdriver to clean the arm guide roller and a lint-free tissue to thoroughly clean the arm guide rails.

Note: *Do not use alcohol or solvents to clean the arm guide. Do not use grease on the arm rails.*

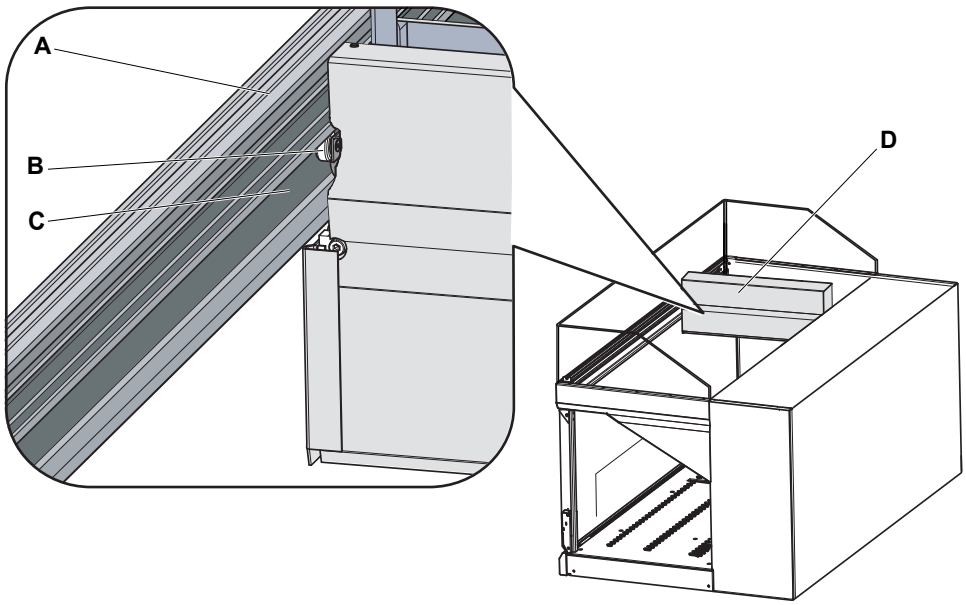


Fig. 7-25 *Arm guide and roller*

A	*Arm guide*	***C***	*Arm rail*
B	*Arm guide roller*	***D***	*Arm*

7.3.18 Shelf Sites

Each site in the shelf is equipped with two plate positioning springs (see arrows) as shown in the figure:

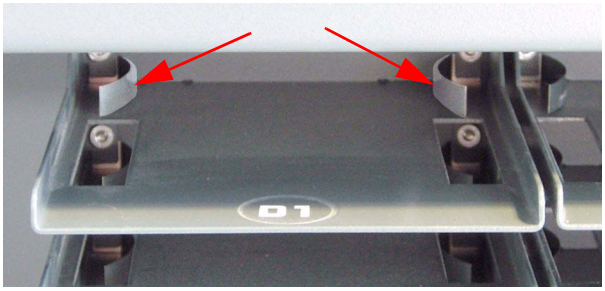


Fig. 7-26 Plate positioning springs in the shelf

To check the plate positioning springs, put a microplate into the shelf and check if the plate is centered and held in straight position.

Note: *If the positioning springs are deformed or the plates are not positioned properly, call a Tecan authorized field service engineer.*

7.3.19 Positive Identification (PosID)

WARNING

Fire hazard, if heated parts are cleaned with flammable agents.

- Allow the PosID to cool down before cleaning.

ATTENTION

The laser output window of the PosID barcode scanner must be perfectly clean at all times. Even slight soiling may cause errors.

- For cleaning, avoid abrasive substances.
- Do not scour the surface. Use a soft, clean tissue.

Barcode Scanner

To clean the laser output window of the barcode scanner, proceed as follows:

WARNING

Laser light (CLASS 2 LASER PRODUCT).

- Do not stare into beam nor into its reflections on the worktable.
- 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.

1 Check if the barcode scanner (A) is in vertical position and if the laser output window is accessible as shown in the figure below.

If this is not the case, initialize the PosID.

ATTENTION

Damage to the barcode scanner drive if the position of the barcode scanner is forced manually.

- Do not attempt to rotate the barcode scanner manually.
- Use the initialization routine to run the barcode scanner into maintenance position.

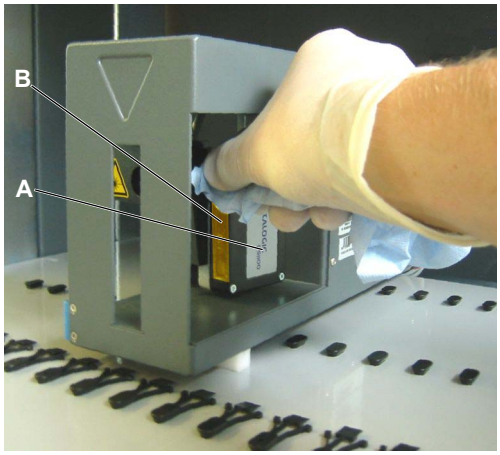


Fig. 7-27 PosID barcode scanner

2 Switch the instrument off.

3 Remove the carriers in front of the PosID to gain access to the PosID.

4 Visually check the laser output window (B) for cleanliness.

5 Moisten a lint-free tissue with alcohol and clean the output window, if necessary.

"No Tube" Sensor

To clean the "No Tube" sensor, proceed as follows:

1 Switch the instrument off.

2 Remove the carriers in front of the PosID to gain access to the PosID.

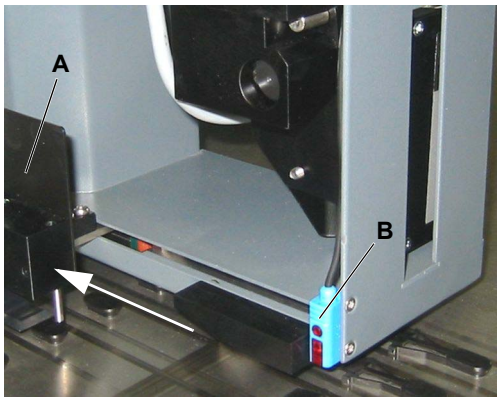


Fig. 7-28 PosID "No Tube" sensor

3 Slide the PosID gripper (A) back to gain access to the "No Tube" sensor (B).

4 Moisten a lint-free tissue with alcohol and clean the front surface of the "No Tube" sensor.

7.4 Adjustments and Replacements

WARNING

Potentially infectious
Instrument parts may be contaminated with potentially infectious materials.
- Follow basic biohazard precautions
- Wear appropriate personal protective equipment, such as gloves, lab coats and protective eye wear

7.4.1 Fixed Tips

ATTENTION

Electrostatic discharge can damage the liquid detector.
- Discharge yourself electrically through contact with an earthed object before touching the tips.

WARNING

Pipetting tubing and tips can be contaminated.
- Decontaminate the instrument and assure appropriate safety measures.

WARNING

Pipetting tips can cause injuries.
- Avoid contact with the pipetting tips and contact with aerosols when accessing the worktable, by wearing adequate protective clothing.

Cleaning the Fixed Tips

Before switching on the instrument, use a lint free tissue soaked in ethanol (70%) or isopropanol to clean the fixed tips. Make sure not to damage the tip coating.

Checking Fixed Tips for Damage

Visually inspect the tip coating before switching on the instrument. Use a mirror for proper inspection of the tip outlet. Make sure that the tips are not bent. If the tip coating is damaged or the tip is bent, the tip must be replaced (refer to cross references above).

ATTENTION

Bent tips or damaged tip coating cause pipetting inaccuracy and liquid detection errors.
- Never work with damaged or bent tips.

Replacing Fixed Tips

This section covers the principle of the exchange procedure for fixed tips.

ATTENTION

Handle tips with extreme care at all times.

- Do not use bent tips or tips with damaged coating. Replace them.
- If a tip is to be reinstalled, do not remove the lock nut from the tip.
- Always hold the tip at its upper end, avoiding contact with the coated surface whenever possible.

Preparation

To prepare for tip replacement, proceed as follows:

1. Switch the instrument off.
2. Open the front safety panel.
3. Manually move all Z-racks up to their topmost position.
4. Move all Z-racks together towards the front of the instrument.
5. Spread the Z-racks all the way.

Removal

To remove a fixed tip, proceed as follows:

1. Unscrew lock nut, holding the tip immediately below the lock nut with the other hand.

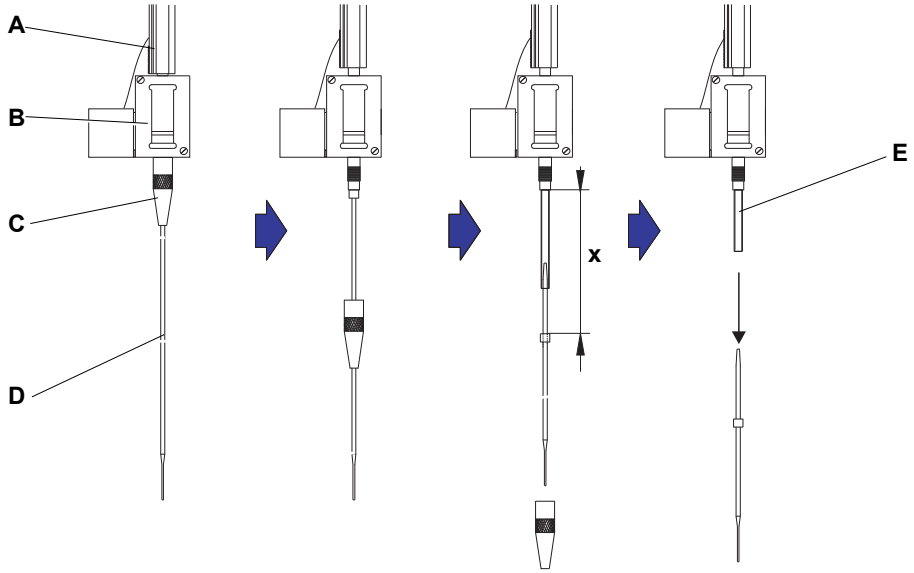


Fig. 7-29 *Standard tip removal*

A *Z-rack*
B *Tip adapter*
C *Lock nut*
D *Tip*
E *Pipetting tubing*

2. Remove the lock nut by moving it along the tip axis, avoiding contact between the lock nut and the tip coating.
3. Pull pipetting tubing some distance (x) out of the tip adapter by pulling on the tip.

Hold the tip at its upper end when pulling.

4 Pull the tip off the tubing, withholding the tubing with the other hand.
Use a dry piece of emery cloth for an improved grip on the tubing only.

Installation

To install a fixed tip, proceed as follows:

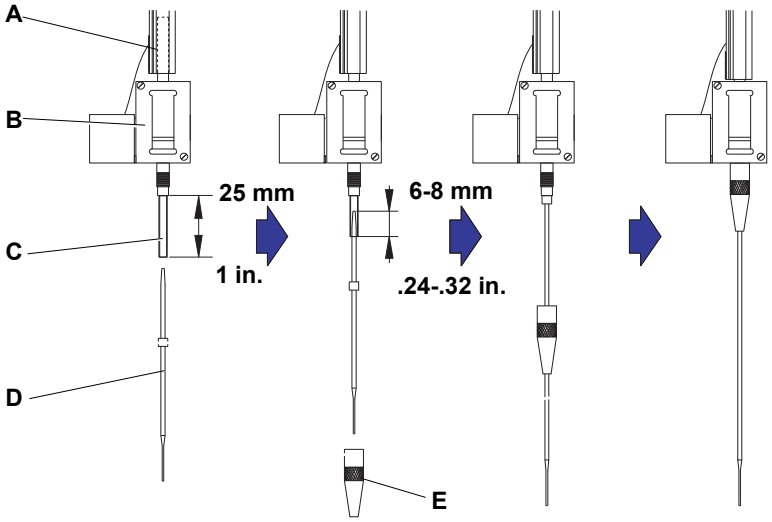


Fig. 7-30 *Standard tip installation*

A *Z-rack*
B *Tip adapter*
C *Pipetting tubing*
D *Tip*
E *Lock nut*

1 Carefully pull the pipetting tubing approx. 25 mm (1 in.) out of the tip adapter.
If a tip has been installed before, cut off approx. 5 mm (0.2 in.) of the tubing, using a sharp knife to obtain a proper, straight cut.

ATTENTION

Emery cloth on tips must not be used, as it would abrade the delicate tip coating.
Use a dry piece of emery cloth for an improved grip on tubing only.
Wet sandpaper could leave tiny particles and thus clog inside tubing and tips.

2 Wrap the tubing near its end with a small piece of emery cloth, to have a better grip of the tubing.
3 Seize the tubing end wrapped in emery cloth.
4 For all fixed tips, insert the blank, conical end of the tip 6 - 8 mm into the tubing along its axis.
5 Slide the lock nut on the tip avoiding contact with the delicate end of the tip and its coating.
6 Shift the tip and the tubing into the tip adapter.
7 Screw the lock nut on the tip adapter and tighten it.
8 Clean the tip, using alcohol and a lint-free tissue.

Checks after Tip Installation

Check the new tip as follows before running any application:

- Check tip visually for good condition and that tip is not clogged (see also “Checking Fixed Tips for Damage” above).
- Use a maintenance script in the application software for checking correct pipetting or use a pipetting test script written by yourself.

7.4.2 Disposable Tips (DiTis)

ATTENTION

Possible contamination of samples, or leaking of DiTis.
Prior to loading disposable tip trays into the rack and onto the worktable, make sure that the DiTis are faultless and clean:

- Ensure that only regular and straight Tecan disposable tips are being used.
- Inspect the DiTi box for traces of microbial contamination.

WARNING

Pipetting tips can cause injuries.

- Avoid contact with the pipetting tips and contact with aerosols when accessing the worktable, by wearing adequate protective clothing.

WARNING

Possible contamination. Tips can be contaminated.

- Assure appropriate safety measures (e.g. wear rubber gloves).
- Dispose of used DiTis properly and safely according to your local regulations.

Disposable Tip Cone (DiTi Cone)

WARNING

Possible contamination.
The space between the disposable tip cones and the tubing extension can become moistened with sample liquid and thus create a contamination risk.

- Decontaminate the entire equipment thoroughly before maintenance work.
- Decontaminate also the space between disposable tip cones and the tubing extension before manipulating the DiTi pickup mechanism.

ATTENTION

Possible malfunction due to deposits in or on the disposable tip cone.
If the DiTi cones get moistened with sample liquid containing certain substances, a hard coating can build up.

- Eventually the DiTis do not fit any more and pick-up problems or leakages are the result.
- Deposits can clog the tubing extension after a period of time.
- Replace DiTi cones that cannot be cleaned with the means mentioned below.

Cleaning and Inspection

Perform the following maintenance on the DiTi cone:

1. Clean the DiTi cones with a lint-free tissue and isopropanol.
2. Visually check the disposable tip cones and the protruding tip during maintenance. Make sure that the tubing extensions are clean and free of deposits.
3. If deposits are visible, remove DiTi cone and
   - disassemble and thoroughly clean the DiTi adapter.
   - replace critical components every 6 months.

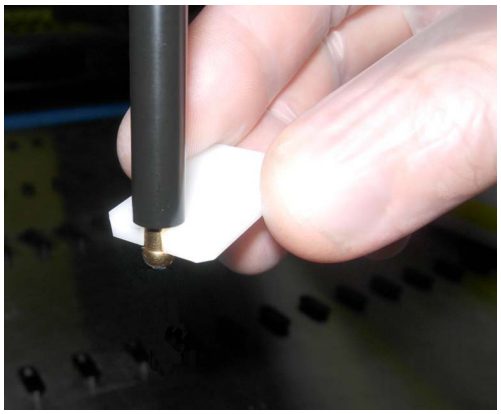


Fig. 7-31 Cone wrench

4. Check if the DiTi cones are not loose. If necessary, use the cone wrench to tighten the DiTi cones.

Replacing DiTi Adapter

This section describes the replacement of the DiTi adapters.

Preparation

To prepare for replacement, proceed as follows:

1. Switch the instrument off.
2. Open the front safety panel.
3. Manually move all Z-racks up to their topmost position.
4. Move all Z-racks together towards the front of the instrument.
5. Spread the Z-racks all the way.

Removal

To remove the DiTi adapter, proceed as follows:

1. Hold the tip ejector tube while unscrewing the DiTi cone, using the supplied cone wrench.

2 Remove the tip ejector tube.
3 Unscrew the adapter cylinder.
4 Pull the tubing extension and the pipetting tubing approx. 25 mm (1 in.) out of the tip adapter.
5 Separate the tubing extension from the pipetting tubing.
6 Remove the tubing extension together with the adapter cylinder.

Installation

To install the DiTi pickup mechanism, proceed as follows:

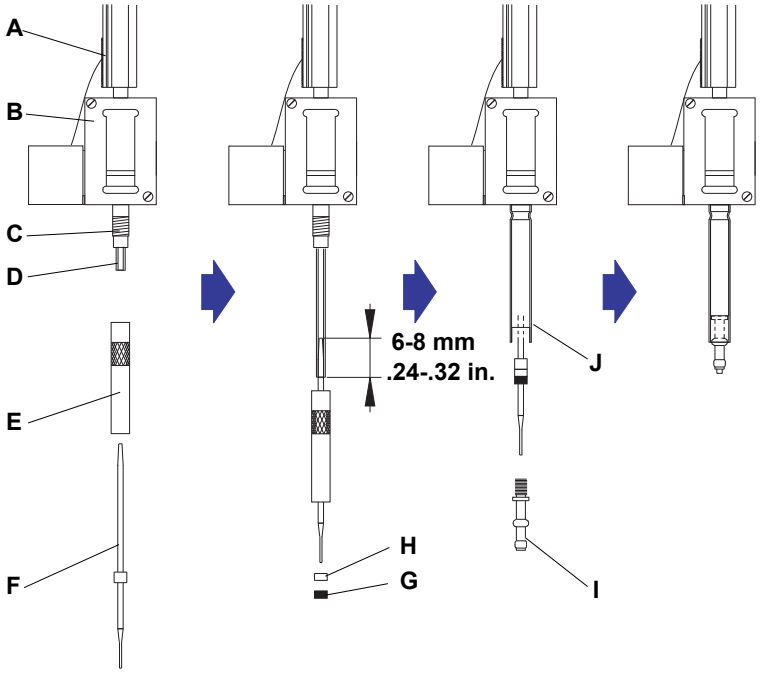


Fig. 7-32 *DiTi pick up mechanism installation*

A	*Z-rack*	***F***	*Tubing extension*
B	*Tip adapter*	***G***	*O-ring*
C	*Thread*	***H***	*Separator ring (white)*
D	*Pipetting tubing*	***I***	*DiTi cone*
E	*Adapter cylinder*	***J***	*Tip ejector tube (outer rim pointing upwards)*

1 Carefully pull the pipetting tubing approx. 25 mm (1 in.) out of the tip adapter.
2 Put the adapter cylinder on the tubing extension (knurled part pointing upwards).
3 Seize the two parts and push the conical (blank) part of the tubing extension 6 to 8 mm (0.24 to 0.32 in.) into the tubing.
4 Screw the adapter cylinder onto the tip adapter and tighten slightly.
5 Slide the separator ring and then the O-ring onto the lower part of the tubing extension.
6 Shift the tubing into the adapter cylinder.
7 Slide the tip ejector tube (outer rim pointing upwards) on the adapter cylinder, hold it with one hand and screw the DiTi cone into the adapter cylinder.

8 Tighten the DiTi cone carefully, using the supplied cone wrench.

7.4.3 Positioning Pins

Replacing Positioning Pins

To replace a positioning pin on the worktable, proceed as follows:

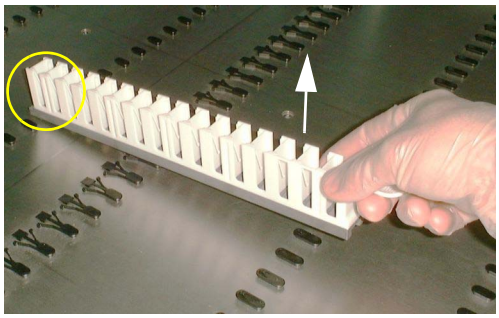


Fig. 7-33 *Extracting a positioning pin*

1 Slide the frontmost part of a carrier onto the positioning pin to be replaced.

2 Carefully lift the carrier (see arrow) to pull out the positioning pin.

Do not use force to extract the pin. If it doesn't come loose, retry with the carrier in a slightly changed position.

Fig. 7-34 *Inserting a positioning pin*

3 Carefully press the new pin into the hole on the worktable.

You can use a small rubber mallet if the pin cannot be inserted manually.

Note: *Make sure to only replace a pin by one of exactly the same type and pay attention to the orientation.*

8 Troubleshooting

Purpose of This Chapter

This chapter helps to resume operation after a minor problem has occurred with the Freedom EVOlyzer. It lists possible occurrences, their probable cause and suggests how to remedy the problem.

Which Errors can the Operator Correct?

The troubleshooting table below lists possible malfunctions and errors of the Freedom EVOlyzer. The operator is enabled to correct some of those problems or errors by him/herself. For this, appropriate corrective measures are listed in the column “Corrective measures”.

The elimination of more complicated malfunctions or errors is usually performed by the Tecan FSE according to separate instructions. In this case, reference to the FSE is made.

8.1 Troubleshooting Table

Trouble-shooting by the Operator

The following table lists problems and errors and gives instructions on how to eliminate them:

Tab. 8-1 *Troubleshooting Table*

Problem, error	Possible cause	Corrective measure
Problem, error on instrument level		
System liquid leakage	Tubing and or tubing connections not tight	Switch off instrument immediately Perform decontamination and/or maintenance See 7.3.1.1 “Checking the Liquid System for Leakages”, 7-10
Communication error	Power not ON Power/communication interrupted No communication	Switch on instrument Check cable and plug Switch off instrument and PC, wait until the status lamp is dark, switch on instrument and PC
	X, Y or Z-drive or PosID scanner head blocked	Check for obstacles
Initialization error	Arms cannot initialize	Make sure that the arms can move freely, i.e. that their movement range is not obstructed by other objects.
	Hardware defective	Notify your local service organization
Front safety panel does not unlock properly	Mechanical failure of the door locks	Notify your local service organization
Front safety panel does not lock properly	Mechanical failure of the door locks	Switch off the instrument. Notify your local service organization

Tab. 8-1 Troubleshooting Table (cont.)

Problem, error	Possible cause	Corrective measure
Problem, error on liquid handling arm (LiHa) and tips		
Positioning error	X, Y or Z-drive blocked Crash Hardware defective	Check for obstacles Check container, rack and carrier positions Notify the Tecan field service engineer (FSE) See “Carrier Positioning”, 🗎 6-10
No Tip available	A DiTi reload was missed	Abort the run and start a new one
Tip not picked up	Error in tip adapter	Check the tip adapter function. Call your local service organization for assistance
Tip not removed	Wet or unclean cone Disposable tip adapter mounted incorrectly	Clean disposable tip cone Check correct installation of disposable tip adapter See 7.4.2 “Disposable Tips (DiTis)”, 🗎 7-53
No liquid detected	Not enough liquid Bad ground connection of carrier Wrong detection parameters Dirty tips Dirty DiTi cone	Check/add liquid Place rack correctly on carrier Clean carrier, to ensure good connection Assure container-rack-carrier-worktable contact Clean tips See 7.3.3.3 “Cleaning the Fixed Tips Outside”, 🗎 7-18 Clean DiTi cones. See 7.3.4.2 “Cleaning the DiTi Cones”, 🗎 7-20
Not enough liquid detected	Not enough liquid Incorrect container/rack definition	Check/add liquid Check container, rack definition, see “Application Software Manual”
Clot detected	Clot aspirated Wrong container diameter	Clean tip and retry Check container data See “Application Software Manual”
Level sense failure	Use of mobile phone or high level of static electricity in the area	Do not use mobile phones, not even in standby-mode closer than 2 m to the instrument. Use of an UPS as the main switch
	Low humidity in the room	Increase ambient humidity (humidifier)

Tab. 8-1 Troubleshooting Table (cont.)

Problem, error	Possible cause	Corrective measure
	Incorrect probe positioning Bent tips Use of incorrect carrier Incorrect LiHa, X-, Y- and Z-setup Incorrect tip configuration	Rectify probe positioning Replace bent tips. Use/configure the correct carrier. Rectify LiHa setup Rectify tip configuration
	Wrong settings for liquid conductivity Wrong liquid class settings Foam or bubbles in the liquid containers	Rectify the settings for liquid conductivity Rectify the settings for liquid classes
	Loose or leaking connections causing drops at tips to appear Insufficient system liquid	Perform daily maintenance Perform daily maintenance
	Extremely charged clothing or furniture	Discharge electrically through contact with an earthed object
	Highly conductive system liquid	Use system liquid with a conductivity below 500 µS/cm
Precision (Gravimetric) Test failed	Air bubbles in liquid system Dirty tips Noticeable significant temperature change in the room Dirty DiTi cone	Flush liquid system and check for leakages Clean tips Ensure constant temperature in room Clean DiTi cones. See 7.3.4.2 “Cleaning the DiTi Cones”, 7-20
Problem, error on Positive Identification, PosID		
Positioning error	Hardware defective	Notify the Tecan field service engineer (FSE)
Barcode not read	Barcode not facing reader	Check for barcode label, label orientation See 3.5.3 “Positive Identification (PosID)”, 3-20
	Bad barcode quality	Check with new barcode label See 3.5.3 “Positive Identification (PosID)”, 3-20
	Barcode not to specifications	Check if barcode/barcode position meets specifications See 3.5.3 “Positive Identification (PosID)”, 3-20
	Used barcode type not configured in the Application settings	Define the used barcode type in the Application settings. Refer to the Runtime Controller Manual of the Freedom EVOlution Software.

Tab. 8-1 Troubleshooting Table (cont.)

Problem, error	Possible cause	Corrective measure
	Laser beam output window dirty	Clean See 7.3.19 “Positive Identification (PosID)”, 7-48
Alignment barcode on barcode flag not read	PosID adjustment/setup not correct	Contact your local service organization
Carrier or tube presence not detected	“No Tube” sensor dirty	Clean “No Tube” sensor See 7.3.19 “Positive Identification (PosID)”, 7-48
Unusual noise during movement	Worn out or damaged parts	Contact your local service organization
Problem, error on robotic manipulator arm (RoMa)		
Microplate not picked up	No microplate on carrier Cannot pick up microplate	Put microplate on carrier Set gripper position Clean grippers
Unusual noise during arm movement	Worn or damaged parts	Contact your local service organization
RoMa gripper out of alignment	A harsh crash occurred	Check RoMa alignment. Adjust gripper. See 8.2.1 “RoMa / Gripper Alignment”, 8-7
Problem, error on Wash station		
Overflow of wash station	Waste tubing does not allow free liquid flow	Correctly route the waste tubing See 7.3.7.3 “Waste Tubing”, 7-29
	Wash station is blocked	Clean the wash station
Problem, error on RT incubators		
RT out of range Incubator temperature out of range	Room temperature diverges from the specification Incubator thermometer defective	Check your room temperature and adapt it, if necessary. If this does not help, call your local service organization for assistance Call your local service organization
Problem, error on shaker / heated incubators (MIO)		
Spillage	Spillage in of substance in slot due to inadequate fill level of microplates	Switch off instrument immediately Perform decontamination and/or maintenance Refer to the manufacturers specification of the microplates for adequate fill level, adapt shaking frequency
Communication error	interrupted No communication Fuse blown	Check cable and plug Switch off instrument and PC, switch on instrument and PC Call your local service organization

Tab. 8-1 Troubleshooting Table (cont.)

Problem, error	Possible cause	Corrective measure
Shutter does not close properly	Mechanical failure of the shutter locks	Perform shutter test (refer to Instrument Software Manual) Call your local service organization
Microplate is loose and not held by fixing device	Mechanical failure of the fixing device	Check if foreign objects have been caught in the fixing device. Call your local service organization
Loading not possible shutter does not open	Slots occupied by other microplate	Remove microplate by opening the shutters by hand
Loading not possible microplate is dropped or not placed in slot	Incubator is not aligned/ installed correctly	Call your local service organization
Shaker stops	Incubator not levelled correctly Incubator not properly applied to adapter plate	Call your local service organization Call your local service organization
Problem, error on HydroFlex platform (microplate washer)		
Washer check failed	Various	See section 8.2.2 “Washer Check Failed”, 8-7
Samples are marked with “bubble flag”.	Sample produced foam Air in the wash liquid (e.g. empty wash bottle or leaking tubing)	Find out the reason for the bubbles and check from which sample the error occurred to rule out false interpretation of previous measuring results. Eliminate the cause for the bubbles.
Problem, error message during initial load / reload		
Reagents or controls not installed on worktable	Expected reagents or controls not loaded on the worktable	Load the expected reagents or control on the worktable and try again
Consumables carrier not installed on worktable	Expected consumable carriers are not loaded on the worktable	Load the expected consumable carrier on the worktable and try again
Barcode read error	Control tube exchanged with tube without barcode or with unreadable barcode inserted during reload	See the corrective measured listed under the PosID errors
Problem, error message during sample load		
Assays assigned in worklist not available	Assays not included in configuration	Change the configuration and download the worklist again
Sample ID from worklist not on worktable	Sample with expected ID not loaded on the worktable	Place the sample with the expected ID on the worktable or ignore the error. Then try again.

Tab. 8-1 *Troubleshooting Table (cont.)*

Problem, error	Possible cause	Corrective measure
Duplicate sample ID	Samples with identical ID were reloaded	Remove the one of the samples in question, change the sample ID and reload it again or ignore the error. Then try again.
Problem, error message, general		
After reconnecting the USB interface (e.g. of the washer) the **Windows Hardware Installation Wizard** appears	The USB cable was not connected to the same port as it was before	Click button **Manual** and browse to the directory **Windows\system32**. The corresponding driver will be installed.
Fatal error	Plate crash, DiTi was dropped, plate was dropped	Clean the worktable and restart the process. If necessary, call your local service organization for assistance.

8.2 Troubleshooting Instructions

8.2.1 RoMa / Gripper Alignment

Checking the Gripper Fingers

To check the adjustment of the gripper fingers, proceed as follows:

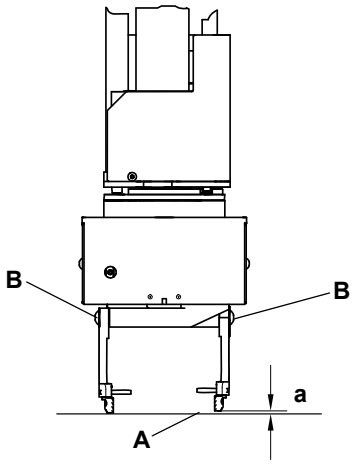


Fig. 8-1 *Adjustment of gripper fingers*

1. Switch the instrument off.
2. Move the RoMa down until the gripper fingers almost touch the worktable surface (A).
3. Check if the gripper fingers are at the same height and if they are parallel.
4. If necessary (difference in height, [a]), adjust the height of the gripper fingers by slackening the screws (B) and moving the gripper fingers in the correct position.
5. Make sure that the gripper fingers are parallel.
6. Tighten the screws.

Checking the RoMa Alignment

To check the alignment of the RoMa Z-axis, proceed as follows:

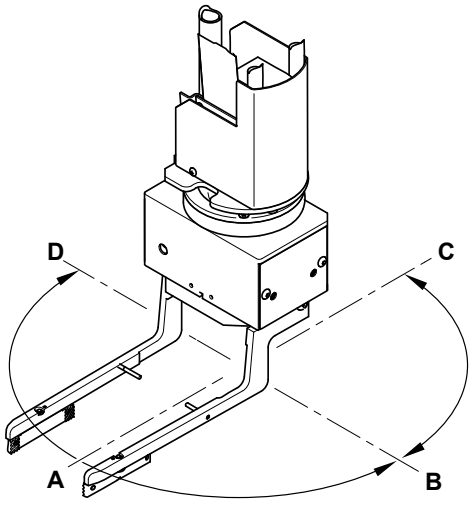


Fig. 8-2 *Checking RoMa alignment*

1. Switch the instrument off.
2. Move the RoMa down until the gripper fingers almost touch the top surface of the positioning pins.
3. Check the gap to the worktable surface (or to the positioning pins).
4. Swivel the gripper module head and compare the gap in all positions as indicated in the figure (A, B, C, D).
5. If the difference of the gap exceeds 0.5 mm (0.02 in.) the RoMa is misaligned.

   In this case contact your local service organization.

8.2.2 Washer Check Failed

The following table gives instructions on error handling in case the washer check has failed:

Tab. 8-2 Error handling washer

Irregularly or in-sufficiently filled wells	Not completely emptied wells	Liquid on the plate surface	Possible cause	Measure	Reference
x		x	Insufficient prime or wrong channel connected	Prime the corresponding wash bottle solution using the standalone HydroControl SW. Make sure that the SW requests the connected buffer.	Instructions for Use for HydroControl SW
x		x	Clogged dispense needles	Prime the corresponding wash bottle solution using the standalone HydroControl SW. If not sufficient clean the needles mechanically using the special cleaning tool. If the problem persists check the liquid system cleaning as mentioned below.	Instructions for Use for HydroControl SW/ Section 7.3.9.3, 🗎 7-34 in this manual
	x		Clogged aspirating needles	Prime one of the wash bottle solutions using the standalone HydroControl SW. If not sufficient clean the needles mechanically using the special cleaning tool. If the problem persists check the liquid system cleaning as mentioned below.	Instructions for Use for HydroControl SW/ Section 7.3.9.3, 🗎 7-34 in this manual
x	x	x	Leaky manifold	Call your local service organization if other causes can be excluded.	
x		x	Wear or defects of dispense pump	Call your local service organization to recalibrate and monitor the slope drift.	
	x	x	Wear or defects of aspirating pump	Call your local service organization for replacement if other causes can be excluded.	
x		x	Bent or leaky tubing	Check for bent tubing. Observe tubings during operation: Are there bubbles? Call your local service organization to replace tubing if necessary.	
x	x	x	Insufficient liquid system cleaning -> aggregations within the needles	If not already done: Follow the instructions for clogged needles. Continue here if the problem persists. Make sure to strictly follow the instructions for daily and weekly maintenance, given by the SW and the manual. If necessary, use an alternative system cleaner as suggested in the manual.	Section 7.3.9.3, 🗎 7-34 Section 7.2.2, 🗎 7-6 and 7.2.3, 🗎 7-9¨ Tab. 7-2 , 🗎 7-3
x	x	x	Dirty plate centering mechanism	Check centering mechanism and clean it, if necessary.	Instructions for Use for HydroFlex Platform

9 Shutdown, Storage and Shipping

Purpose of This Chapter

This chapter instructs how to shut down the Freedom EVOlyzer, how to pack it for storage or transport, and specifies the storage and shipping conditions.

9.1 Shutdown

Since the material processed by the Freedom EVOlyzer is not known to Tecan, detailed information on how to dispose of it cannot be given here.

WARNING

Chemical, biological and radioactive hazards can be associated with the waste material from the process run on the Freedom EVOlyzer.

- Treat these substances and disposables, such as DiTis, wash liquid, etc. in accordance with your national regulations.

Inquire about appropriate collecting points and approved methods of disposal in your country, state or region.
When disposing of operating material of the Freedom EVOlyzer the relevant national and regional laws, directives and recommendations must be followed.

To shut down the instrument for a long period:

1. Empty the liquid system and thoroughly clean and decontaminate all liquid system components.
2. Save data and exit the software.
3. Press the main power switch for 2 seconds to switch off the instrument.
   The status lamp is off.

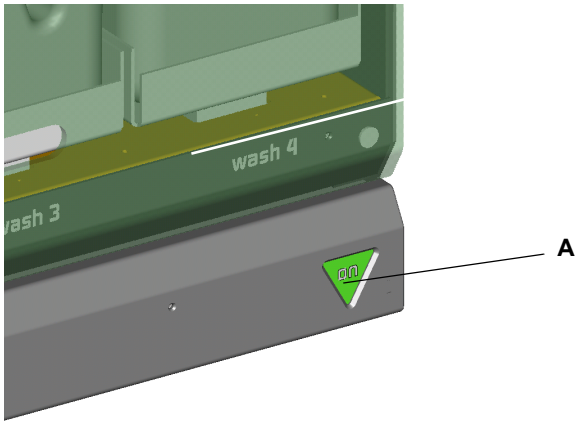


Fig. 9-1 *Main power switch*

A *Main power switch*

Wait until the status lamp is off before switching the instrument on again.

4 Unplug the mains socket at the rear of the instrument from the power supply.

Fig. 9-2 *Mains socket*

5 Disconnect the USB interface cable from the PC.

6 Clean the entire instrument according to the instructions given in chapter 7 “Preventive Maintenance and Repair”.

9.1.1 Reporting

1 Fill out a copy of the decontamination form and place it with the instrument.

9.2 Packing

Packing

Use original packing material that has been carefully designed to prevent damage to instrument and parts under normal shipping conditions. Faulty packaging will cause instrument damage.

ATTENTION

The unpacking of the instrument may be done by Tecan service personnel only.

Unpacking

The instrument packaging has been carefully designed to prevent damage to instrument and parts for normal shipping conditions.
Store original packing materials for possible shipments in case an instrument or module needs repair at the manufacturer's site.

ATTENTION

The instrument must be moved by Tecan service personnel and with the help of the special lifting devices only.

- Always use the transport handles. Do not attempt to lift the instrument by holding it at arm guides or safety panels.
- Each instrument is a precision instrument. Transporting or moving it by the arm guides or safety panels can cause damage. Serious instrument damage or even injuries can result if this instruction is disregarded.

Before taking the instrument into operation, make sure to remove all transport paddings and moorings:

- 2 top corner protection paddings
- 2 transport locks for frame stabilization
- X-drive transport cardboard strip
- 2 positioning pin transport guards (cardboard)
- 1 padding between X-drive and diluters
- Arm transport padding for each arm
- If a PosID module is installed: PosID transport paddings

ATTENTION

Do not remove the transport moorings before the instrument is in its final operating position.

9.3 Storage

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Storage conditions	See section 3.2.8 “Environmental Conditions”, 3-9

Protect the instrument against dust and debris with a cover. Recommendation: store the instrument in its original packaging.

9.4 Transport

All Tecan guarantees are void if the instrument is not correctly packed by Tecan authorized service personnel for shipping. Contact your Tecan representative for assistance.

10 Disposal

Purpose of This Chapter

This chapter gives instructions on how to lawfully dispose of waste material accumulating in connection with the Freedom EVOlyzer.

Statutory Basis

With the information given in this chapter, the situation in the European Union and the EC-Directives pertaining to waste disposal are taken into consideration.
Outside the European Union, comparable statutory regulations are binding.

10.1 Disposal of Packing Material

According to Directive 94/62/EC on packaging and packaging waste, the manufacturer is responsible for the disposal of packing material.

Returning Packing Material

If you do not intend to keep the packing material for future use, e.g. for transport and storage purposes:
Return the packaging of the product, spare parts and options via the field service engineer (FSE) to the manufacturer.

10.2 Disposal of Operating Material

Since the material processed by the Freedom EVOlyzer is not known to Tecan, detailed information on how to dispose of it cannot be given here.

WARNING

Chemical, biological and radioactive hazards can be associated with the waste material from the process run on the Freedom EVOlyzer.

- Treat these substances and disposables, such as DiTis, wash liquid, etc. in accordance with your national regulations.

Inquire about appropriate collecting points and approved methods of disposal in your country, state or region.
When disposing of operating material of the Freedom EVOlyzer the relevant national and regional laws, directives and recommendations must be followed.

10.3 Disposal of the Freedom EVOlyzer

10.3.1 General Instructions

WARNING

Depending on the applications, parts of the Freedom EVOlyzer may have been in contact with biohazardous, poisonous or even radioactive material.

- Make sure to treat this material according to the applicable safety standards and regulations.
- Always decontaminate the parts before disposal.

How to Dispose of the Freedom EVOlyzer

For the disposal of the Freedom EVOlyzer please contact your local service organization.

10.3.2 Local Requirements European Union

EC Directive WEEE

The European Commission has released the Directive on Waste Electrical and Electronic Equipment (WEEE; 2012/19/EU).

Since August 2005, producers have been responsible for taking back and recycling electrical and electronic equipment.

ATTENTION

Negative environmental impacts associated with the treatment of waste.

- Do not treat electrical and electronic equipment as unsorted municipal waste.
- Collect waste electrical and electronic equipment separately.

10.3.3 Local Requirements People's Republic of China

Marking for the Restriction of the Use of Hazardous Substances in Electronic and Electronic Product

Required Marking

The People's Republic of China Electronic Industry Standard SJ/T11364–2014 "Marking for the Restriction of the Use of Hazardous Substances in Electronic and Electronic Product" requires the marking for the restriction of the use of hazardous substances in electronic and electronic product.

Product Marking

In accordance with the requirements specified in SJ/T11364–2014, all Tecan electronic products sold in the People's Republic of China are marked with a marking for the restriction of the use of hazardous substances.

Tab. 10-1 *Marking for the restriction of the use of hazardous substances*

Marking	Explanation
	This marking indicates that Tecan electronic product contains some hazardous substances, which can be safely used within the environment-friendly use period but they shall enter the recovery system if exceed the environment-friendly use period.

11 Spare Parts and Accessories

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Ordering address	See section 12 “Customer Support”, 12-1

Purpose of This Chapter

This chapter lists disposables that are used in connection with the Freedom EVOlyzer, spare parts, accessories and options including their ordering information.

How to Find Spare Parts

- Refer to the figure below to identify the spare parts needed.
- Look up the ordering information in the table.

How to Order Spare Parts

Order the parts from Tecan. Always state the designation and the part number when ordering spare parts.

Note: *This chapter only contains spare parts which can be replaced by the operator him/herself. To order spare parts other than listed here, please contact the Tecan Customer Support.*

Ordering Address

Order the parts from Tecan.
For addresses, refer to cross references above.

11.1 Documentation

Tab. 11-1 *Documentation*

No.	Plain Text Designation	p/n	Label Designation
1	Freedom EVOlyzer Operating Manual, Chinese	30033260	MANUAL OPERATING FDM. EVOLYZER-2 ZH
2	Freedom EVOlyzer Operating Manual, Russian	30066767	MANUAL OPERATING FDM. EVOLYZER-2 RU
3	Runtime Controller Manual for Freedom EVOlution SW, Chinese	30036641	MANUAL RUNTIME FREEDOM EVOLUTION ZH V2.X
4	Runtime Controller Manual for Freedom EVOlution SW, Russian	30066768	MANUAL RUNTIME FREEDOM EVOLUTION RU V2.X

11.2 Freedom EVOlyzer Basic Accessory Kit

Tab. 11-2 *Freedom EVOlyzer basic accessories kit*

No.	Plain Text Designation	p/n	Label Designation
1	Accessory kit Freedom EVOlyzer, including:	30030582	KIT ACCESSORY FREEDOM EVOLYZER-2
2	1 USB Freedom EVOlyzer V2.0 including: • Freedom EVOlution Software • Language files in all available languages • All Instrument Software For current manuals refer to 1.1.1 “Manuals available for Freedom EVOlyzer Instruments”, 1-2	-	Not for sale
3	Set of Allen keys	-	Not for sale
4	Screw driver #1.5	-	Not for sale
5	Screw driver #2	-	Not for sale
6	2 stainless screws M4	-	Not for sale
7	2 screw caps	-	Not for sale
8	1 cone wrench	-	Not for sale

11.3 Tools, Gauges

Tab. 11-3 *Tools, gauges*

No.	Plain Text Designation	p/n	Label Designation
1	Transport handles, 1 set	10612003	HANDLE TRANSPORT SET GENESIS
2	DiTi cone wrench (5 pcs)	10619517	WRENCH CONE DITI OPTION 5 PCE.

11.4 Optional Equipment

Tab. 11-4 *Optional equipment and modules*

No.	Plain Text Designation	p/n	Label Designation
1	Trolley (for two 20 liter containers)	10650480	TROLLEY 20/20L WASTE+SYSTEM LIQ.EVOLYZER

11.5 Carriers, Racks, Troughs

11.5.1 Carriers for Microplates

Tab. 11-5 *Carriers for microplates*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Carrier for 3 microplates, landscape	10650010	CARRIER MP 3 POS. LANDSCAPE RELOAD-ABLE	6 50 mm (5.9 in.)	See Fig. 11-1 , 11-3

a) Number or grid positions the carrier occupies

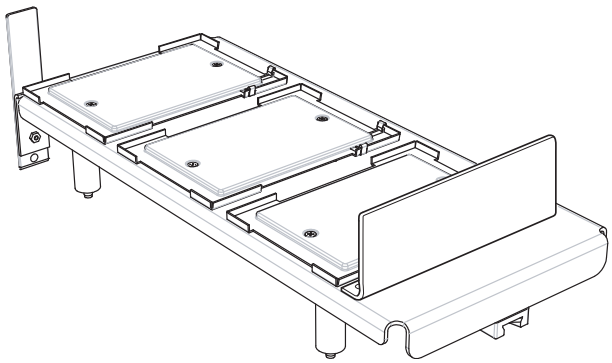


Fig. 11-1 *Carrier for 3 microplates landscape*

11.5.2 Carriers for Reagents and Troughs

Tab. 11-6 *Carriers for reagents and troughs*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Carrier for 3 reagent troughs In use with 100 ml trough (10613048 and 10613049)	10650020	CARRIER TROUGH 100ML 3 POS. RELOAD-ABLE	1 25 mm (0.98 in.)	See Fig. 11-2 , 11-4
Reagent troughs 100 ml, 108 pcs, with liquid level indication markings 10 to 100 ml, gray For use with carrier for 3 reagent troughs (10650020)	10613049	TROUGH DISPOSABLE 100ML PP GREY 108 PCE.	-	See Fig. 11-3 , 11-4
Like reagent troughs (10613049), but cleanliness certified, natural	10613048	TROUGH DISPOSABLE 100ML PP TRA. 108 PCE.	-	See Fig. 11-3 , 11-4

a) Number or grid positions the carrier occupies

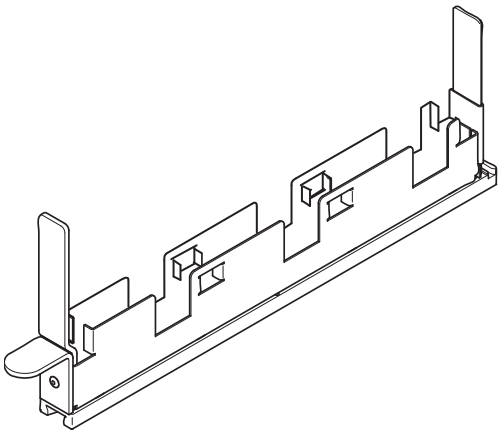


Fig. 11-2 *Carrier for 3 reagent troughs 100 ml*

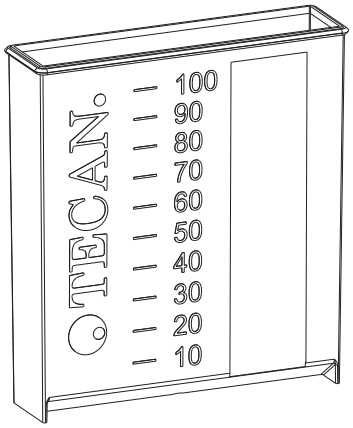


Fig. 11-3 *Trough 100 ml*

11.5.3 Carrier for Disposable Tips

Tab. 11-7 *Carrier for disposable tips*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Carrier for 3 DiTi racks (200 µl DiTis)	30030578	CARRIER 3 RACK DITI 200	6 150 (5.91 in.)	See Fig. 11-4 , 11-5
Carrier for 3 DiTi racks (2 x 200 µl DiTis) (1 x 1000 µl DiTis)	30030579	CARRIER 2 RACK DITI 200 1 RACK DITI 1000	6 150 (5.91 in.)	See Fig. 11-5 , 11-6
Carrier for 3 DiTi racks (1 x 200 µl DiTis) (2 x 1000 µl DiTis)	30030580	CARRIER 1 RACK DITI 200 2 RACK DITI 1000	6 150 (5.91 in.)	See Fig. 11-6 , 11-6
Carrier for 3 DiTi racks (1000 µl DiTis)	30030581	CARRIER 3 RACK DITI 1000	6 150 (5.91 in.)	See Fig. 11-7 , 11-6
Rack for DiTi box (96 disposable tips, 200 µl)	30030576	RACK DITI 200 EVO-LYZER-2	–[b)]	See Fig. 11-8 , 11-7
Rack for DiTi box (96 disposable tips, 1000 µl)	30030575	RACK DITI 1000 EVO-LYZER-2	–[b)]	See Fig. 11-9 , 11-7
DiTi waste and wash station unit with 3 trough container positions	See Fig. 11-19 , 11-13 and section 11.5.6, 11-12			

a) Number or grid positions the carrier occupies
b) See carrier

Note: *The different carriers for DiTis racks are coded (coding pins A in the figures below) in such a way that only the corresponding DiTi racks can be placed on them (coding holes B, see Fig. 11-8 , 11-7 and Fig. 11-9 , 11-7), i.e that they cannot be confused.*

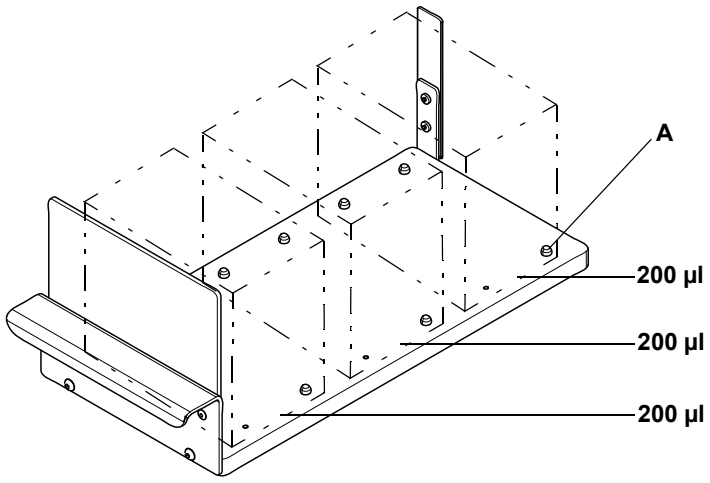


Fig. 11-4 *Carrier for DiTi racks (3 DiTi racks 200 µl)*

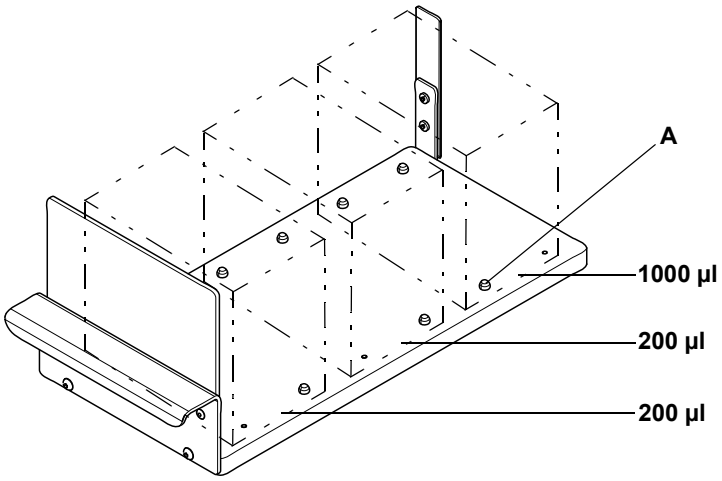


Fig. 11-5 *Carrier for DiTi racks (2 DiTi racks 200 µl, 1 DiTi rack 1000 µl)*

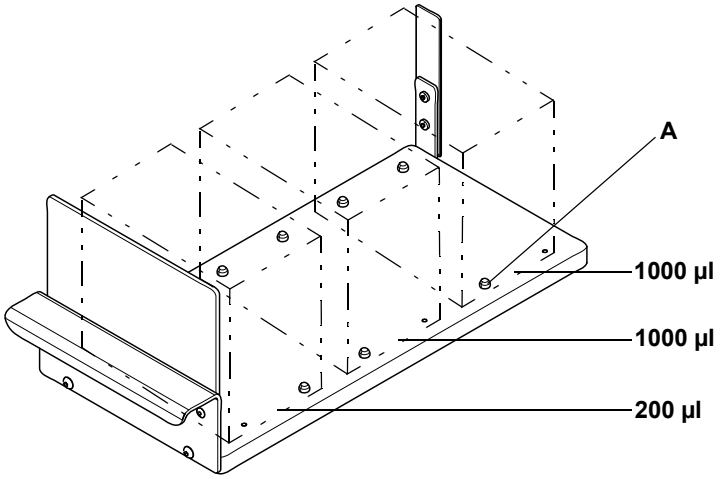


Fig. 11-6 *Carrier for DiTi racks (1 DiTi rack 200 µl, 2 DiTi racks 1000 µl)*

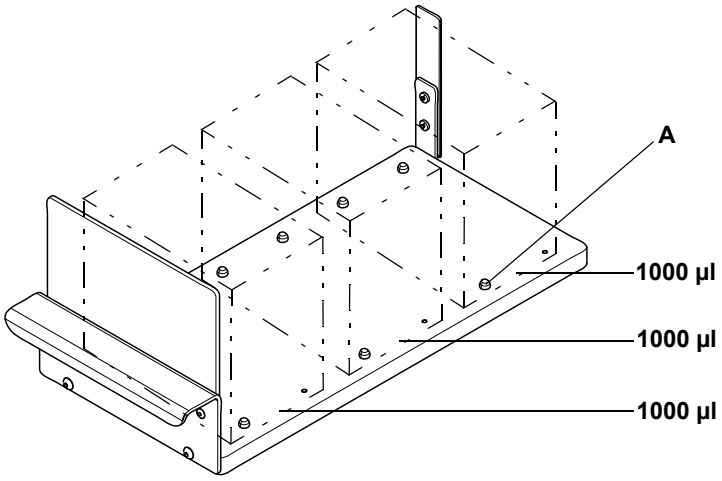


Fig. 11-7 *Carrier for DiTi racks (3 DiTi racks 1000 µl)*

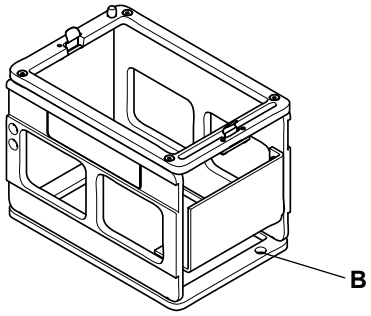


Fig. 11-8 *DiTi rack for 200 µl DiTis*

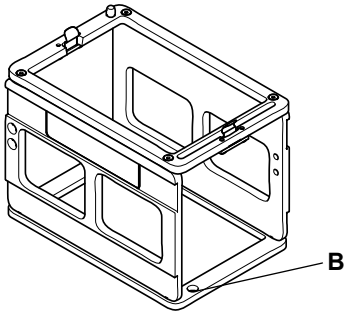


Fig. 11-9 *DiTi rack for 1000 µl DiTis*

11.5.4 Carrier for Various Containers

Tab. 11-8 *Various carriers*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Carrier for 14 control/reagent positions	10650050	CARRIER REAGENT 14 POS. RELOADABLE	2 50 mm (1.97 in.)	See Fig. 11-10 , 11-8
Carrier for 10 control/reagent positions	10650051	CARRIER REAGENT 10 POS. RELOADABLE	2 50 mm (1.97 in.)	See Fig. 11-11 , 11-8
Eppendorf carrier for 16 positions	30022480	CARRIER 16*1.5ML TUBE RELOADABLE	1 25 mm (0.98 in.)	See Fig. 11-12 , 11-9

Tab. 11-8 *Various carriers (cont.)*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Carrier for controls 12/1 pos.	30014651	CARRIER CONTROL 12+1 BEFREE	2 50 mm (1.97 in.)	See Fig. 11-13 , 11-9
Carrier for reagents 6 pos.	30015017	CARRIER GW-FL INSERT+BASE BEFREE	2 50 mm (1.97 in.)	See Fig. 11-15 , 11-10
Carrier for reagents 6/2 pos.	30015018	CARRIER KU-FL INSERT+BASE BEFREE	2 50 mm (1.97 in.)	See Fig. 11-16 , 11-10
Carrier for reagents 9 pos.	30015019	CARRIER KU/GW-FL INSERT+BASE BEFREE	2 50 mm (1.97 in.)	See Fig. 11-14 , 11-9

a) Number or grid positions the carrier occupies

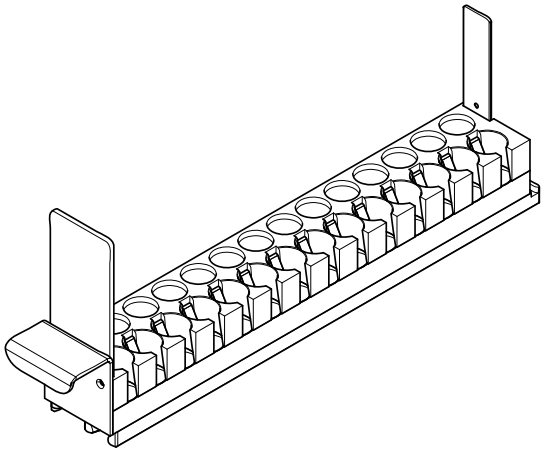


Fig. 11-10 *Carrier with 14 pos. for reagents / controls*

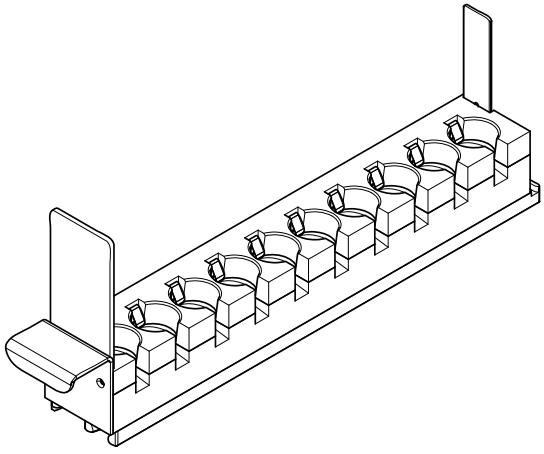


Fig. 11-11 *Carrier with 10 pos. for reagents / controls*

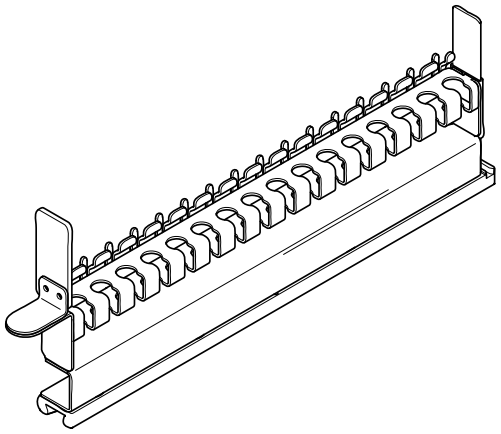


Fig. 11-12 *Carrier “Eppendorf” with 16 pos.*

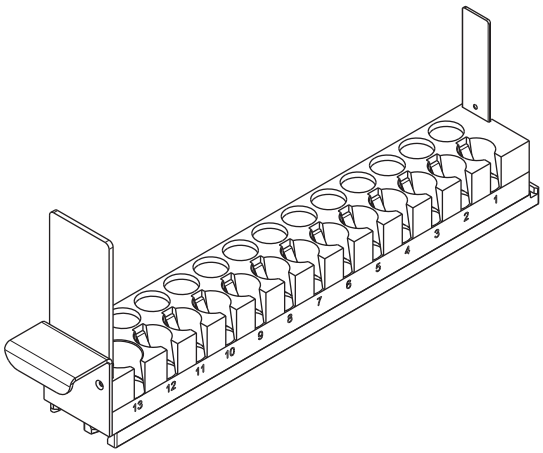


Fig. 11-13 *Carrier for controls 12/1 pos.*

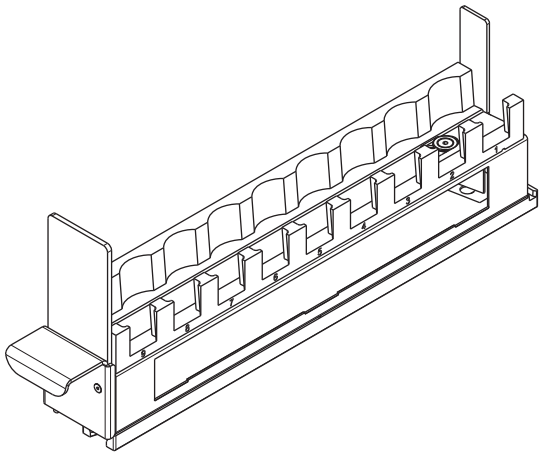


Fig. 11-14 *Carrier for reagents 9 pos.*

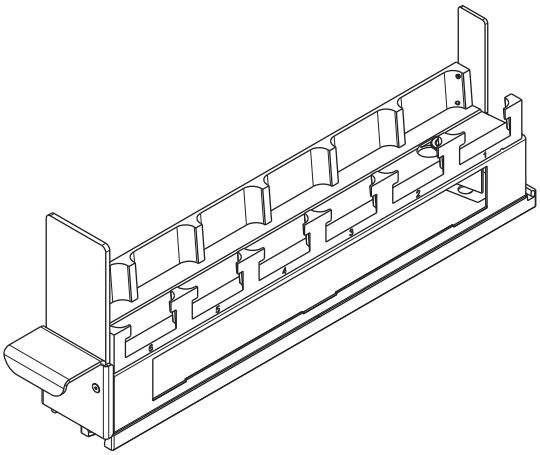


Fig. 11-15 *Carrier for reagents 6 pos.*

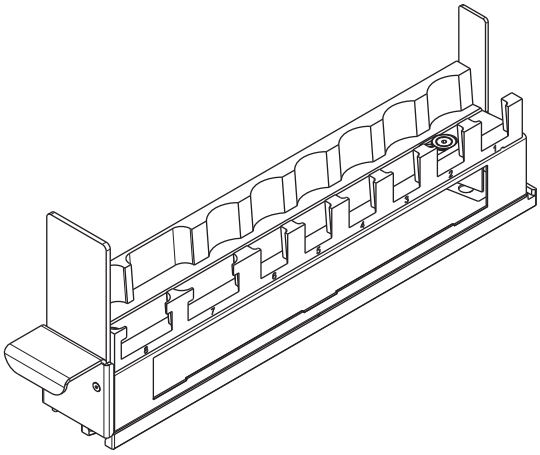


Fig. 11-16 *Carrier for reagents 6/2 pos.*

11.5.5 Carriers for Sample Tubes

Tab. 11-9 *Carriers for sample tubes*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Carrier for tubes 10 mm, 16 positions, set of 6 carriers	10650001	CARRIER 16*10MM TUBE RELOADABLE	1 25 mm (0.98 in.)	See Fig. 11-17 , 11-11
Carrier for tubes 13 mm, 16 positions, set of 6 carriers	10650002	CARRIER 16*13MM TUBE RELOADABLE	1 25 mm (0.98 in.)	See Fig. 11-17 , 11-11
Carrier for tubes 16 mm, 16 positions, set of 6 carriers	10650003	CARRIER 16*16MM TUBE RELOADABLE	1 25 mm (0.98 in.)	See Fig. 11-17 , 11-11

a) Number or grid positions the carrier occupies

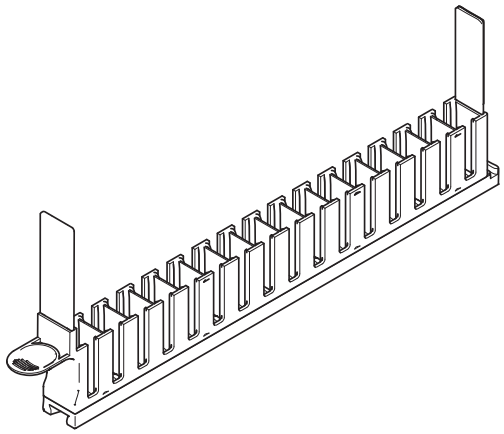


Fig. 11-17 *Tube carrier*

11.5.6 Wash Station

Tab. 11-10 *Wash/waste stations*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Wash/waste station standard, PP 8 wash positions shallow at rear 1 waste position at center 8 wash positions deep at front	10613001	WASHSTATION GENE-SIS 8+8POS.WIDTH 1 CAR.	1 25 mm (0.98 in.)	See Fig. 11-18 , 11-12
DiTi waste and wash station unit with 3 trough container positions (necessary when using disposable tips)	10650037	DITI WASTE + WASH-STATION UNIT	2 50 mm (1.97 in.)	See Fig. 11-19 , 11-13 and section 11.5.3, 11-5

a) Number or grid positions the carrier occupies

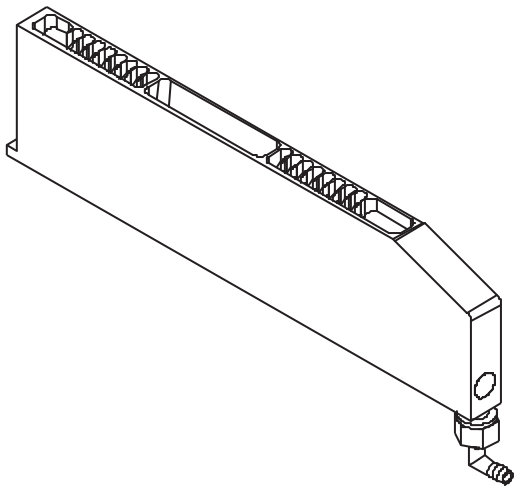


Fig. 11-18 *Wash/waste station, standard*

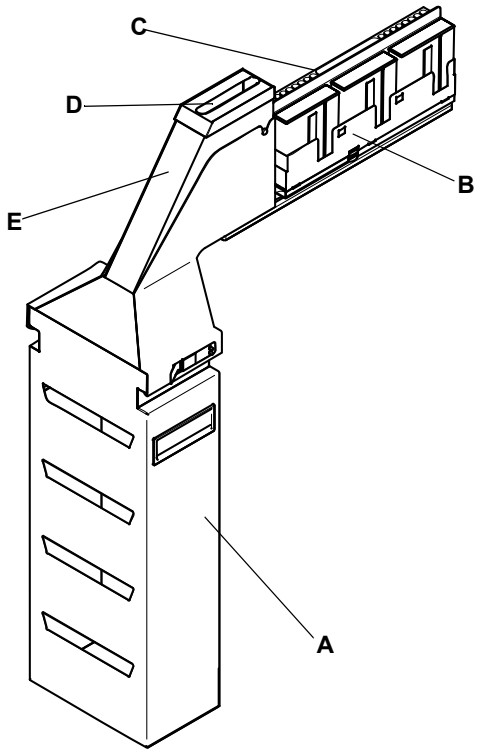


Fig. 11-19 *DiTi waste and wash station unit*

A *Container for DiTi waste bag*
B *Trough holder*
C *Wash station*
D *Cover of DiTi waste slide*
E *DiTi waste slide*

11.6 Spare Parts

11.6.1 Tips and Accessories

Tab. 11-11 *Fixed tips and accessories*

No.	Plain Text Designation	p/n	Label Designation
1	Standard tip with lock nuts	10643050	TIP STANDARD 96 WELL LOCK NUT EVO
2	Adapter option for disposable tips (DiTi)	10612502	OPTION DITI CONE 10/200/1000µL GENESIS

Note: *The standard DiTi cone is used for all disposable tip sizes.*

11.6.2 Containers, Wash Bottles and Accessories

Tab. 11-12 *Containers*

No.	Plain Text Designation	p/n	Label Designation
1	System liquid container 20 l with floating sensor (including two refill containers 10 l and a funnel)	30033275	CONTAINER SYSTEMLIQUID 20L EVOLYZER-2
2	Waste container 20 l with floating sensor	30033274	CONTAINER WASTE LIQ. 20L NON SPILL ASSY
3	Set bottle reagent 4 l (with tubing and filter)	30034249	SET OF 2 BOTTLE REAGENT 4L EVOLYZER-2
4	Set bottle reagent 2 l (with tubing and filter)	30034248	SET OF 2 BOTTLE REAGENT 2L EVOLYZER-2
5	Liquid filter set weighing scale (set of 4 pieces)	30034247	FILTER LIQUID WEIGHING SCALE EVO-LYZER-2
6	Maintenance bottle 2 l	30029280	BOTTLE MAINTENANCE 2L GLASS EVO-LYZER-2

11.6.3 Barcode Labels

Tab. 11-13 *Barcode labels*

No.	Plain Text Designation	p/n	Label Designation
1	Carrier barcode label set for all Freedom EVOlyzer carriers (barcodes for carrier flags)	30034051	BARCODE LABEL SET CARRIERS EVOLYZER-2

11.6.4 Positioning Pins (Worktable)

Tab. 11-14 *Positioning pins*

No.	Plain Text Designation	p/n	Label Designation
1	Stop pins for instrument worktables (set of 100 pcs)	10619030	PIN STOP 100 PCE. GENESIS WORKTABLE
2	Carrier lock pins for instrument worktables (set of 100 pcs)	10619017	PIN LOCK FROG 100 PCE.GENESIS/MINIPREP
3	Guide pins for instrument worktables (set of 25 pcs)	10619439	PIN GUIDE SET 25 PCE. WORKTABLE

11.7 Consumables

11.7.1 Disposable Tips and Accessories

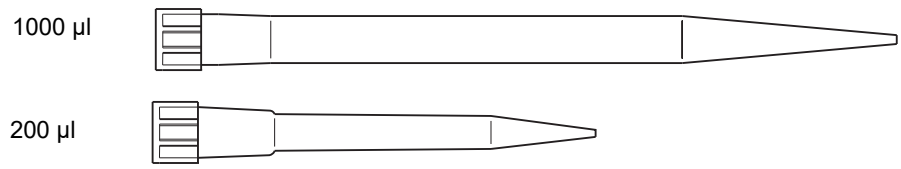


Fig. 11-20 *Disposable tips*

Tab. 11-15 *Disposable tips and accessories*

Plain Text Designation	p/n	Former p/n[a)]	Label Designation	Volume
Disposable tips without filter, conductive, cardboard boxes, 17280 tips (180 trays of 96 tips)	10612510	612510	DITI 200µL CONDUCTIVE 17280 TIP STD.CONE	200 µl
Disposable tips without filter, conductive, blister packaging, 2304 tips (24 trays of 96 tips)	30000627	612510.1	DITI 200µL CONDUCTIVE 2304 TIP STD.CONE	200 µl
Disposable tips with filter, conductive, cardboard boxes, 17280 tips (180 trays of 96 tips)	10612511	612511	DITI 200µL CONDUCT.FI.17280 TIP STD.CONE	200 µl
Disposable tips with filter, conductive, blister packaging, 2304 tips (24 trays of 96 tips)	30000629	612511.1	DITI 200µL CONDUCT.FI.2304 TIP STD.CONE	200 µl
Disposable tips without filter, conductive, cardboard boxes, 9600 tips (100 trays of 96 tips)	10612512	612512	DITI 1.0ML CONDUCTIVE 9600 TIP STD.CONE	1000 µl
Disposable tips without filter, conductive, blister packaging, 2304 tips (24 trays of 96 tips)	30000630	612512.1	DITI 1.0ML CONDUCTIVE 2304 TIP STD.CONE	1000 µl
Disposable tips with filter, conductive, cardboard boxes, 9600 tips (100 trays of 96 tips)	10612513	612513	DITI 1.0ML CONDUCT.FI.9600 TIP STD.CONE	1000 µl
Disposable tips with filter, conductive, blister packaging, 2304 tips (24 trays of 96 tips)	30000631	612513.1	DITI 1.0ML CONDUCT.FI.2304 TIP STD.CONE	1000 µl

a) For a transitional period the consumable packaging will be labelled with the “old” part No.

12 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 Operating 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).

12.1 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 Unit 2, 475 Blackburn Road, Mount Waverly VIC 3149 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. Mechelen Campus Schaliënhoevedreef 20A 2800 Mechelen Belgium	Phone Fax E-mail	+32 15 42 13 19 +32 15 42 16 12 tecan-be@tecan.com
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USA (Tecan Systems)	Tecan Systems, Inc. 2450 Zanker Road San Jose, CA 95131 USA	Phone Fax E-mail	+1 408 953 3100 Toll Free: +1 800 231 0711 +1 408 953 3101 helpdesk-sy@tecan.com

13 Glossary

Purpose of This Chapter

This chapter contains a glossary to explain terms and expressions used in this Operating Manual.

Accuracy

The degree of conformity of a measure to a standard or true value (difference between expected value and actual value, divided by the expected value multiplied by 100%).

Additive

A liquid (e.g. reagent, diluent) taken from a *container* on the work table and added to several or all *Samples/Standards/Controls/Blanks* in order to cause or influence a reaction.

Additive distribution

A *distribution* which adds an *additive* to *destination* containers which have already received liquid during a previous *distribution* or are going to receive liquid in a *follow-up distribution*.

Application

Generally refers to a software package with a specific purpose, for example ELISA, RIA, EIA etc.

Aspirating tubing

The tubing leading from the reservoir of *System Liquid* (diluent) to the diluter valve.

Blank

A position in a d*estination rack* which does not receive *sample* but only the *additive(s)*. It is used to determine the background signal in the detection or measurement system (e.g. a photometer).

Carrier

A carrier is a mount for *microplates* or other *racks*. It is positioned on the worktable.

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 potential for carry over, *disposable tips (DiTis)* must be used.

Cleaner

The well in which a tip is positioned in order to wash both its interior and exterior surfaces, by dispensing *system liquid* through the tip.

Clot detector

A program function issuing a message if the difference between the liquid levels measured before and after sample aspiration does not correspond to the calculated difference of level, indicating clots attached to the tip.

Coefficient of variation

A statistical representation of the precision of a test.
The function: standard deviation / mean x 100%.

Conditioning volume

The volume of excess liquid which is aspirated together with the liquid to be distributed and immediately discarded (usually in the source container) before the dispense process starts. It serves to create a controlled state of the system.

Configuration
A group of tests performed in one run.

Container
Any vessel placed on or under the worktable and containing a liquid or other chemical, e.g. one well in a microplate, a sample tube or a system liquid tank.

Control
A liquid containing a known concentration of the substance which is to be tested. Used to determine (high/low/cutoff) limits and/or as reference for quality control. The properties of the control are well known and stable.

Destination
The *rack* holding the c*ontainer(s)* into which liquid is dispensed.

Device
An addressable component of the Freedom EVOlyzer or additional option which can communicate with the *Te-CU*, e.g. arm, diluter, *PosID*, etc.

Diluter
Precision pump used for aspirating and dispensing exactly defined volumes of liquid by means of a motor driven syringe.

Disposable tip
Tip used for one single aspiration/dispensation cycle and discarded afterwards. Used when it is absolutely necessary that no residues from one sample are carried over to the next. See also *Carry over*.

Distribution
One or a sequence of *pipetting cycles* defined together with the appropriate liquid handling parameters.

Excess volume
The volume of excess liquid which is aspirated together (not separated by an airgap) with the liquid to be distributed. It is not dispensed anywhere, but discarded to waste (or a special position) after use, and serves to minimize dilution of the reagents by the system liquid.

Field service engineer
Technical staff to perform maintenance and service tasks who are, based on special training, authorized by the manufacturer.

Fixed tip
General term for a tip that can be screwed to a pipetting device (e.g. LiHa). Unlike a *disposable tip* it is rinsed after each pipetting cycle and can be reused.

Flush
The procedure which rinses the total *liquid system* with the purpose of removing air pockets or exchanging the *system liquid*. It is executed only at the beginning or the end of a *distribution*.

Follow-up distribution
A *distribution* which uses as source a position filled in a previous distribution.

Free dispense
Dispensing without the tip touching the liquid.

Incubation device
Subsystem, consisting of a heating block and a control circuit, that is used for heating up samples and keeping them at a defined temperature.

Integrated liquid detection (ILID)

Electronic device mounted on the liquid handling arm. The ILID monitors the capacitance between the pipetting tip and the electrical ground (worktable). It generates a signal when there is a sudden change in capacitance, caused by the pipetting tip coming in and out of contact with an ionic solution. This signal is used for liquid and clot detection.

Laser scanner

Scanner (e.g. LS Series Laser Scanner) used to scan substrates in standard glass arrays, membrane arrays, gel on glass, etc. for sample imaging. Sample images are then processed further, e.g. for quantification or spot finding.

Liquid class

A set of properties defining a theoretical model of one type of liquid. Identified by a generic name (e.g. 'Sample', 'Buffer', 'Ethanol' etc.), it includes all default *liquid handling parameters* required to process liquids of this type.

Liquid handling arm (LiHa)

A Freedom EVOlyzer component mounted to the X-slide containing and holding the pipetting tips.

Liquid handling parameters

The set of parameters which influence the liquid distribution process (e.g. aspirate and dispense speeds, delays, tracking, etc.).

Liquid system

All instrument modules and parts which contain or directly influence liquid (tubing, diluters, valves, tips, etc.).

Microplate

A plate of standardized size, comprising 96, 384 or 1536 containers (wells).

Multi pipetting

The pipetting mode where one aspiration is performed for aliquoting into several destination positions.

Offset

After the instrument detects the initialization signal in one of the three axes during the initialization cycle it moves back a certain distance. This distance is the offset.

Piercing

The pipetting tip’s penetrating or perforating the sealing membrane on a *microplate* or other container.

Pipetting cycle

A sequence of *Steps* which is repeated in identical or closely similar manner.

Pipetting mode

Describes the main method by which a liquid can be distributed: either by *single pipetting* or *multi pipetting*.

Plate layout

Definition of the positions in a rack into which samples and additives etc. are to be pipetted.

Plunger

The piston in a *Syringe* or a channel of a *multichannel pipetting head*. It aspirates liquid by moving in one direction and dispenses it when moving in the opposite direction.

Position

The physical coordinates of the pipetting tip at a given location on the worktable. It is expressed as X, Y and Z mm from the initialization position.

Positive identification (PosID)

Moveable barcode reader used to read the barcode labels on tubes, racks and carriers.

Precision

See *Coefficient of Variation (CV%)*.

Predilution

A technique in which a liquid (e.g. sample or control) is first diluted with *additive* or *system liquid*. Some of the resulting mixture is processed further in a *follow-up distribution*. The remainder of the mixture is usually discarded.

Rack

A physical arrangement of *containers* whose dimensions are uniform, e.g. a microplate. Each row and column has the same number of containers and the distances between rows or columns are uniform.

Reader

Microplate reader, e.g. Sunrise absorbance reader, Safire, or ULTRA Evolution.

Reference tip

Special tool that can be fixed to a pipetting device (e.g. LiHa or Te-MO). Used to exactly adjust the device in the various axes. Reference tips can not be used for pipetting.

Retract

The process of pulling a tip back up after aspiration or dispensing.

Robotic manipulator arm (RoMa)

Component which picks up and moves objects within the working area of the instrument.

Run

A sequence of processes on the instrument started by the user.

Sample

Specimen of the substance to be analyzed by means of a *Test*.

Sensored pump option (SPO)

Device with a fast wash pump to fill or flush the liquid system without using he *diluters*. The device features level sensors to monitor the system liquid and waste container fill level.

Serial dilution

A fraction of the liquid dispensed into a destination position is re-aspirated and then dispensed together with additive or system liquid into a further destination position. This process can be repeated. Usually, all destination positions filled in this manner are processed later on.

Setup

The implementation of the hardware on an instrument (e.g. tip type, number of diluters per channel, etc.) and the assignment of basic settings (e.g. permissible X-range of a specific instrument, size of installed syringes on a diluter, etc.). This is usually done during the installation of a new instrument.

Single pipetting

The *pipetting mode* in which an individual aspiration is performed for every destination position. See also: *Multi pipetting*.

Source rack

The rack holding the container(s) out of which liquid is aspirated.

Standard

A liquid containing a defined concentration of the substance to be tested. Used to create a standard curve by which concentration of the analyte in the *Samples* can be determined. The properties of the standard are well known and stable.

Standard tip

A Tecan 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).

Step

A sub-procedure or an element of a *distribution*.

Submerge

The distance the tip will travel downward after liquid is detected. This parameter is programmed by the operator to avoid aspirating bubbles or debris at the liquid surface.

Syringe

Part of the *diluter*. A glass cylinder with a motor-driven *plunger* that aspirates/dispenses the required quantity of liquid.

System liquid

A liquid which fills the *liquid system* and is used as wash fluid and /or can be added to several or all *samples* analogously to the *additive*.

Test

A sequence of actions that is performed automatically and gives a result that is automatically measured.

Test kit

An assembly of liquids and consumables necessary to make an assay.

Tip

A needle-like device that can be mounted to a pipetting device for aspirating/dispensing liquid. The following tip types are used with Freedom EVOlyzer:

– Standard tip

– Disposable tip

Tracking speed

Refers to the speed at which the tip moves up or down to follow the liquid level during aspiration and dispense operations.

Tube

Small round glass *container* which holds the substance to be analyzed. Tubes are often marked with a barcode label so that they can be distinguished from one another.

Wash

Aspirating system liquid from the diluent reservoir and dispensing it through the system into the wash position, to clean the inside and the outside of the pipetting tip.

Wash station

Generally referred to as the physical combination of a c*leaner* position and a *waste* position.

Washer

Microplate strip washer, like e.g. HydroFlex Platform.

Waste

The position in the wash/waste carrier into which a tip is placed for washing its interior. The system liquid is dispensed through the tip and then into the outer cavity of the wash /waste carrier. From there, waste liquid flows off through the waste tubing to the waste container.

Well

One of the containers in a *microplate*.

Work area

The instrument area which can be accessed by the pipetting tips and the RoMa.

Worktable

Part of the instrument where the carriers are placed for access by the robotic arms.

Worklist

A list in which tests and other pertinent information (e.g. status of the individual distribution) are assigned to a number of individually identified samples. Often downloaded by a host to the instrument PC, the worklist allows to run various tests on a given set of samples, so that every individual sample is subjected to only the required tests.

X/Y/Z-movement

The left-right (X), front-back (Y), and up-down (Z) motions of the arms.

Z-dispense

The height of the point of the tip at which liquid is dispensed.

Z-bottom

The lowest possible position the tip is allowed to reach. During a “search liquid command” the instrument will search for liquid from Z-start down to Z-bottom. If the tip reaches Z-bottom without finding liquid, the instrument reacts according to the liquid detection error mode selected.

Z-start

The height of the tip at which the *integrated liquid detection* is switched on during a “search liquid command”. It is usually slightly above the rim of the liquid *container*.

Z-travel

The height at which the tip moves from one X/Y-position to another. Moves which cross different racks always use the highest Z-travel defined.

14 Index

Purpose of This Chapter

This chapter contains an alphabetical index which offers you help in finding information more quickly.