Operating Manual

Freedom EVO 75

Document Status Sheet

Title:	Freedom EVO 75 Operating Manual		**Part number:**	30024538.05
ID:	393248, en, Version 3.2		**Translated from:**	-
Version	**Revision**	**Issue**	**Document History**	
1	0	2004-04-30	New edition	
2	0	2006-12-20	Various minor updates and adaptations Implemented: RoMa; Lower DiTi eject Option	
2	1	2007-03-20	Various minor updates and adaptations	
2	2	2007-11-20	Implemented 8 plus access option Various minor updates and adaptations	
3	0	2012-01-30	Various minor updates and adaptations	
3	1	2018-09-10	Changes in chapter 1.3; Technical data chapter 3.2; adaptations in chapter 11.6	
3	2	2023-06-23	Chapter 3.2.4, Table 3-8: Include pollution factor Chapter 6.1.1: Align warning with wording on typeplate	

0 Preface

For Your Safety

Before performing any work on or with the Freedom EVO 75, 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

0.2.1 Intended Use

Intended Use

The Freedom EVO 75 is an open automation platform product for general laboratory use. It is intended for routine laboratory tasks, such as general purpose pipetting and general purpose liquid handling and robotic processes.

0.2.2 Improper Use

Improper Use

The Freedom EVO 75 must not be used with options or components which are not approved by Tecan.

WARNING

The use of not approved options may impair the safety concept of the Freedom EVO 75.
This means that the safety and compliance to national and international standards, as required for UL/CSA certification, by EC directives, etc. cannot be ensured any more.

0.3 CE Conformity

Declaration of Conformity

The Freedom EVO 75 is designed and built in compliance with the basic safety and health requirements of applicable EC Directives. With the declaration of conformity the manufacturer declares conformity with the provisions of the Directives.

CE Label

The CE label is affixed to the Freedom EVO 75.

0.4 CSA Certification

The Freedom EVO 75 is tested and certified by the Canadian Standards Association (CSA).

CSA Marking

The CSA marking is affixed to the Freedom EVO 75.

Radio Interference

According to the ICES-001 notice the following statement applies to the Freedom EVO 75:

English

Canadian Radio Interference Regulations

ICES-001 Notice for Industrial, Scientific and Medical Radio Frequency Generators:

This ISM apparatus meets all requirements of the Canadian interference-causing equipment regulations.

Please note that this requirement is only for generators which operate at over 10,000 Hz.

Français

Réglementation canadienne en matière de perturbations radioélectriques

Avis de l'ICES-001, générateurs de radiofréquences dans le domaine industriel, scientifique et médical:

Cet appareil ISM (industriel, scientifique et médical) satisfait à toutes les exigences définies par la réglementation canadienne en matière d'équipements générant des perturbations radioélectriques.

Veuillez noter qu'il s'agit d'une exigence concernant uniquement les générateurs fonctionnant au-delà de 10 000 Hz.

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 EVO 75:

English

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 18 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

1 About This Manual

Purpose of This Chapter

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

Purpose of This Manual

This manual describes the Freedom EVO 75 and provides all information required for its safe operation and to maintain it in good working order.

Product Pictures

The delivered instrument may not exactly match the product pictures shown in this operating manual.

Target Group

This manual is intended for everyone who wants to learn about the safe operation of the Freedom EVO 75 and how to maintain its perfect working condition. In particular, laboratory personnel and operators are addressed.

Laboratory personnel operating Freedom EVO 75 instruments require also thorough knowledge of applications, instrument functions and software programs as well as all applicable safety rules and regulations.

Scope

This manual is applicable for Freedom EVO 75 instruments operated by:

Freedom EVO 75 (with Freedom EVOware Standard)	Part No. 30025019; from serial No. 0612000000
Freedom EVO 75 (with Freedom Freedom EVOware Plus)	Part No. 30025869; from serial No. 0612000000

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 are 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, CD casing, etc.*

1.1.1 Manuals supplied with Freedom EVO 75 Instruments

The following manuals are provided on a compact disc included in the shipment and considered part of a Freedom EVO 75 instrument:

Doc ID 393248	Freedom EVO 75 Operating Manual (this manual)
Doc ID 392888	Instrument Software Manual
Doc ID 392815	Freedom EVO Maintenance and Service Logbook
Doc ID 392818	Freedom EVO Daily/Weekly Maintenance Checklist
Doc ID 393172	EVOware Software Manual

Any individual or separate operating manuals for optional equipment according to your order configuration can be applicable.

1.1.2 Other reference documents:

For information about the liquids to use with the Freedom EVO 75, refer to section 3.7 “Chemical Resistance Table”, 3-25.

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):

- Freedom EVOware® and Freedom EVO® are registered trademarks of Tecan Group Ltd. in major countries
- Kel-F® is a registered trademark of 3M Company, Maplewood, Minnesota, USA
- Bacillol Plus® is a registered trademark of the Bode Chemie Hamburg
- Bomix ® is a registered trademark of the Bode Chemie Hamburg
- DNAzap® is a registered trademark of Ambion Inc.
- Terralin® is a registered trademark of Schülke & Mayr GmbH, Norderstedt

1.3 Abbreviations

cLLD	capacitive Liquid Level Detection
CV	Coefficient of Variance or variation
DiTi	Disposable tip
DMSO	Dimethyl sulfoxide
EN	European Norm
FaWa	Fast Wash pump
FEP	Tetrafluoroethylene/Perfluoropropylene-copolymer
FFPM	Perfluoroelastomer
FSE	Field service engineer
ILID	Integrated liquid detection
LiHa	Liquid handling arm
PCTFE	Polychlorotrifluoroethylene
PTFE	Polytetrafluoroethylene
PVC	Polyvinylchloride
RoMa	Robotic manipulator arm

2 Safety

This chapter describes the safety concept of Freedom EVO 75, provides general rules of correct behavior, and warnings concerning hazards associated with the use of the Freedom EVO 75.

2.1 Safety Message Conventions

2.1.1 Signal Words

WARNING indicates the possibility of personal injury or even loss of life if the instructions are not followed.

ATTENTION indicates the possibility of equipment damage, malfunctions or incorrect process results, if instructions are not followed.

2.1.2 Safety Symbols


General warning


Caustic substances


Fire hazard


Electrical danger


Crushing hazard


Laser hazard


Read this

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

2.2 General Safety Information

WARNING

Freedom EVO 75 is designed and built in accordance with the present state-of-the-art technology and the recognized technical safety regulations. Nevertheless, risks to users, property and the environment can arise if the Freedom EVO 75 is used without due care and attention.

The safety of all users and personnel depends on the strict observation of these safety instructions and awareness of the safety-related warnings provided in this manual.

- Please pay great attention to the following general safety information.
- This manual must always be available to all persons performing the tasks described herein.
- Legal regulations, such as local, state and federal laws concerning the use or application, as well as the handling, of dangerous materials in connection with the Freedom EVO 75 must be strictly followed.
- The operating company is responsible for defining instructions in accordance with company procedures and local legal requirements. The instructions provided by the operating company must be strictly observed.
- Observe the correct environmental conditions for storage and operation.
- Structural changes to the safety devices are forbidden.
- Damaged safety devices must be replaced immediately as described in this manual.
- The Freedom EVO 75 must not be modified in any way without prior consultation and written approval of Tecan. Authorized modifications to the system may only be performed by an FSE certified for the repair and upgrading of the Freedom EVO 75.
  Tecan will reject any claim resulting from unauthorized modifications.
- Fire hazard caused by the improper use of the Freedom EVO 75. The Freedom EVO 75 should not be installed in locations where there is a hazard of explosion.
- Chemical, biological, and radioactive hazards can be associated with the substances used or the samples and reagents processed with the Freedom EVO 75 (e.g., during loading and unloading). 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 to regulations with regard to health, environment, or safety. Strictly observe the corresponding provisions.
- Any contamination must be dealt with immediately as described in this manual.
- The user is responsible for ensuring that the Freedom EVO 75 is always operated under proper conditions, and that maintenance, service, and repair tasks are performed with care, on schedule, and only by authorized personnel.
- Risk of incorrect measuring results. After system care or maintenance has been performed, operation must only be resumed after the correct system operating conditions have been verified.
- Always use recommended consumables and original spare parts for maintenance and repair to assure good system performance and reliability.
- 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.
- Ensure that there is enough room to access the main power switch and the power cord (to be able to disconnect the instrument in an emergency case).
- 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.
- 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.
- 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 EVO 75 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.
- 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.
- 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.

2.3 Operating Company

The operating company must ensure that the Freedom EVO 75 and in particular the safety features, function properly and that all the personnel in contact with the instrument are adequately trained.

Responsibilities

- Method and process validation.
- Defining the processes in compliance with the Standard Operating Procedures.
- Ensuring that installation and operational qualifications (IQ OQs) have been completed.
- Ensuring that all personnel in contact with the Freedom EVO 75 are adequately trained.
- Ensuring the availability of appropriate protective clothing and equipment.
- Ensuring the maintenance and safe operation of the Freedom EVO 75.
- Requiring adherence to laboratory safety regulations and directives.

2.4 User Qualification

The laboratory personnel must be fully qualified and trained to operate the Freedom EVO 75. The work described in this Operating Manual must only be performed by authorized personnel with the qualifications prescribed below.
Laboratory personnel must:

- have suitable technical training,
- be familiar with the laboratory safety regulations and directives,
- be familiar with the instructions for the safety elements of the instrument,
- use protective clothing and equipment,
- be familiar with and adhere to good laboratory practices,
- and have read and understood the instructions in the Operating Manual.

Tecan recommends that the operator attends an operator training course. Please ask the Tecan Customer Service about available courses. Refer to section 12.1 “Contacts”, 12-1.

2.4.1 Operator

The operator (lab technician) works for the operating company.

Required Skills

- No specific application or system knowledge
- Command of local languages
- Command of English is preferable

The operator has application software access rights allowing him to run methods and perform system care.

2.4.2 Key Operator

The key operator (application specialist) supports the operating company or works for the same company.

Required Skills

- Extensive application knowledge
- Limited system knowledge
- Command of local languages
- Command of English
- In-depth knowledge of the corresponding software manual

Responsibilities

- Instructing the operator
- Writing, running and validating methods
- Helping the operator to solve problems with the instrument

2.5 Product Safety Signs

Where are Safety Notices Attached?

Freedom EVO 75 Instrument

The figure shows the safety notices that are attached to the Freedom EVO 75 instrument. It also shows their locations:

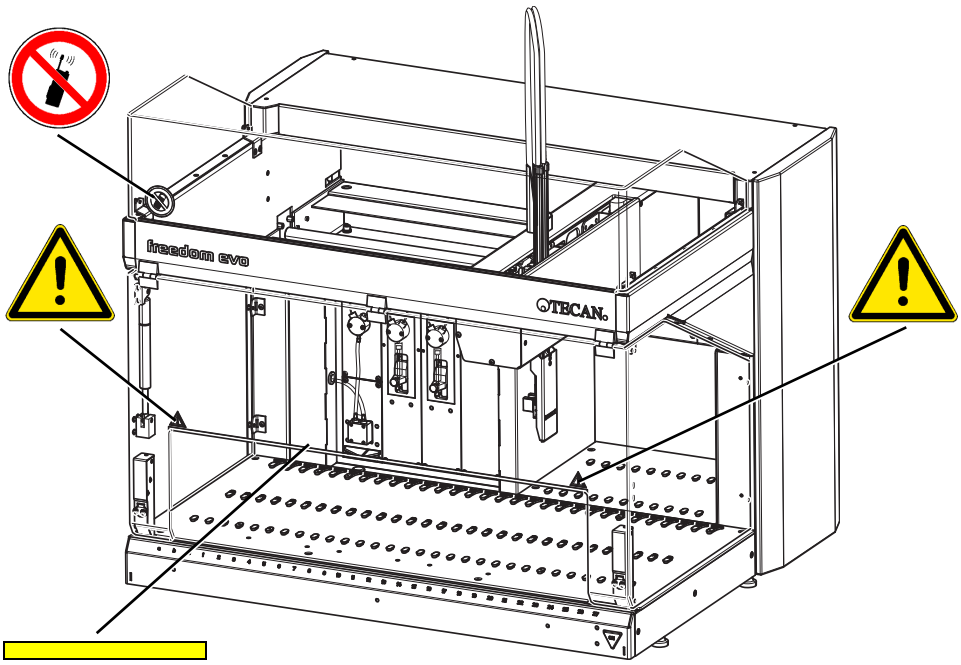
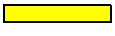


Fig. 2-1 *Safety notices attached to the product*

The following table explains the significance of the notices:

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

Symbol	Significance	Location
	Warning of hazards if you reach beyond the yellow line.	See Fig. 2-1 , 2-7
	Yellow safety line on top cover.	See Fig. 2-2 , 2-8
	Disturbance of functions by electromagnetic RF waves. Do not use cellular phones.	See Fig. 2-1 , 2-7

Worktable Extension

Safety Notices

The following figure shows the safety symbols and markings attached to the Freedom Freedom EVO 75 Worktable Extension.

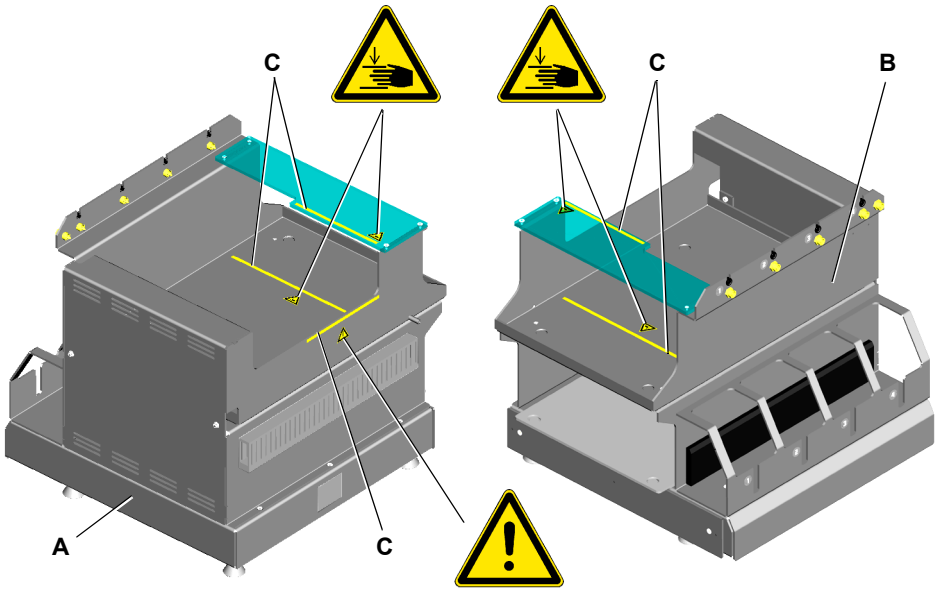
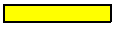


Fig. 2-2 *Location of safety symbols and markings*

A *Worktable extension, rear view*
B *Worktable extension, front view*
C *Safety line*

The following table explains the significance of the notices:

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

Symbol	Significance	Location
	Warning of hazards if the worktable extension is not maintained correctly.	See Fig. 2-1 , 2-7
	Warning of possible injuries if you reach beyond the yellow lines.	See Fig. 2-1 , 2-7
	Yellow safety lines on cover.	See Fig. 2-2 , 2-8

Type Plate

The following notices are printed on the type plate:

Tab. 2-3 *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

General

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

2.6 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 EVO 75.

Door Locks

During operation the front safety panel is locked by means of two door locks.
The safety concept of the Freedom EVO 75 assumes that the front safety panel is always closed when the instrument is running.

WARNING

If any safety element fails to operate as expected, e.g. if the door locks fail to lock or open at the expected time, immediately notify the Tecan field service engineer.

Which are Safety Elements?

The figure shows the elements of the Freedom EVO 75, which have a protective or safety function:

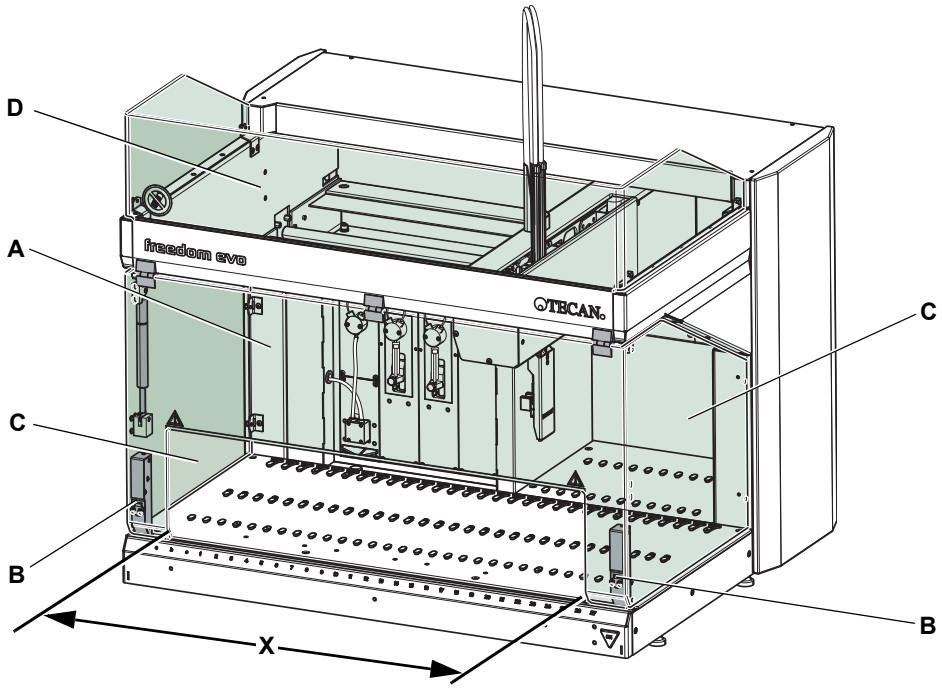


Fig. 2-3 *Safety elements*

A	*Front safety panel*	***D***	*Top safety panel*
B	*Door lock*	***X***	*Cutout*
C	*Side safety panel*		

Removal of Safety Elements

The protective and safety devices installed on the Freedom EVO 75 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.

2.7 Decontamination Declaration

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Decontamination	See section 7.8 “Decontamination”, 🗎 7-34

When to Decontaminate

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

- Before any maintenance or service work is performed on the instrument
- In case of accidents (e.g. crash, spilled substances, etc.)
- Before a Tecan field service engineer (FSE) performs any on-site work on the instrument
- Before the instrument or parts of it are 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.

Certificate of Decontamination

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 good laboratory practice guidelines. For this, the owner must enclose a declaration (e.g. Certificate of Decontamination).

Tecan can provide the corresponding forms (Certificate of Decontamination or Repair Order) in case the owner of the instrument has no template for such a declaration at hand. Contact the Tecan helpdesk for further information.

Note: *Tecan reserves the right to refuse any instrument or a part of it, or will charge an extra fee, if the decontamination is not declared sufficiently.*

2.8 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 EVO 75 must be strictly followed.

Duty of Maintenance and Care

The user is responsible for ensuring that the Freedom EVO 75 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 EVO 75 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 EVO 75 and its main components. It contains technical data, requirements and performance data.

3.1 Introduction

What is Freedom EVO 75?

The Freedom EVO is a precision instrument designed for automating routine laboratory tasks in the domains of life science and biopharma. The Freedom EVO is an open and flexible platform.

Delivery

The Freedom EVO 75 is delivered only to Tecan authorized field service engineers, who take responsibility for assessing and investigating each installation to comply with local requirements.

3.1.1 Product Identification and Labeling

Product identification details are listed on a type plate and serial number label attached to the Freedom EVO 75 instrument.

Type Plate

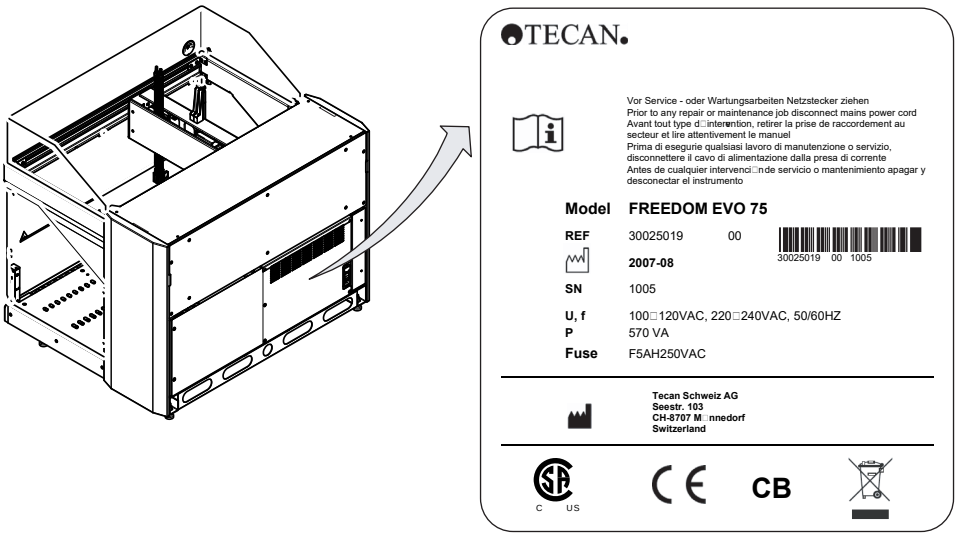


Fig. 3-1 *Freedom EVO 75, Type plate*

The main product identification labels provide the following instrument details:

- Identification data
  - Model
  - REF: Ordering information (material number)/revision level
  - Production date
  - SN: Serial number
- Technical data
  - U, f: Supply voltage (Volts), frequency (Hertz)
  - P: Power consumption (VA)
  - Fuse: Required fuse protection (A)
- Manufacturer’s name and address
- Conformity marking

Serial Number Label

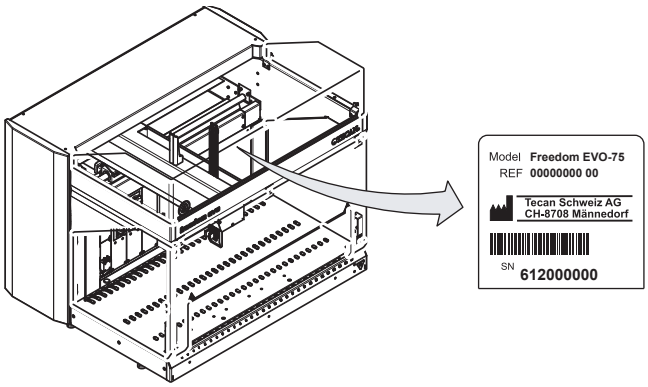


Fig. 3-2 *Freedom EVO 75, Serial Number Label*

The identification data is also printed on the serial number label. This label can be viewed from the front side of the instrument. It is attached to the inside of the rear right panel.

Fig. 3-3 *Freedom EVO 75 Serial number label*

Section	Definition
Identification data	Model: Product name / model REF: Reference number / Revision / Bar code Manufacturer Bar code SN: Serial number

Order Configuration Details

More details of product identification, such as specific data of the instrument according to the order configuration is provided by the **Freedom EVO Maintenance and Service Logbook**.

3.2 Technical Data

3.2.1 Dimensions and Weights

Overall Dimensions

Instrument Overall Dimensions

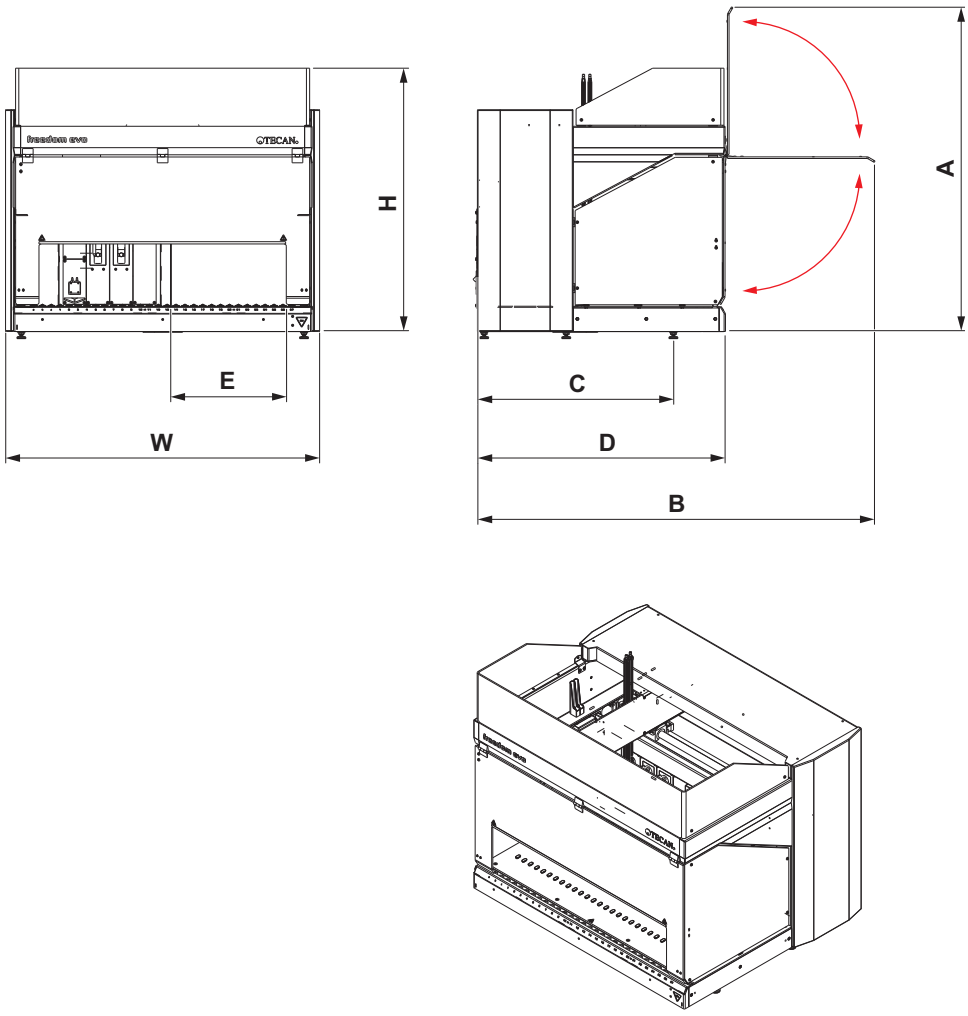


Fig. 3-4 *Instrument dimensions*

Tab. 3-1 *Dimensions*

Dimension	Designation	[mm]	[in.]
A	Height with front safety panel open	930	36.6
B	Depth with front safety panel open	1120	44.1
C	Width of recess area	325	12.8

Tab. 3-1 *Dimensions*

Dimension	Designation	[mm]	[in.]
D	Depth	696	27.4
E	Depth between back of instrument and front feet	540	21.3
H	Height	795	29.8
W	Width	881	34.7

With Dust Cover

Instrument with installed Dust Cover

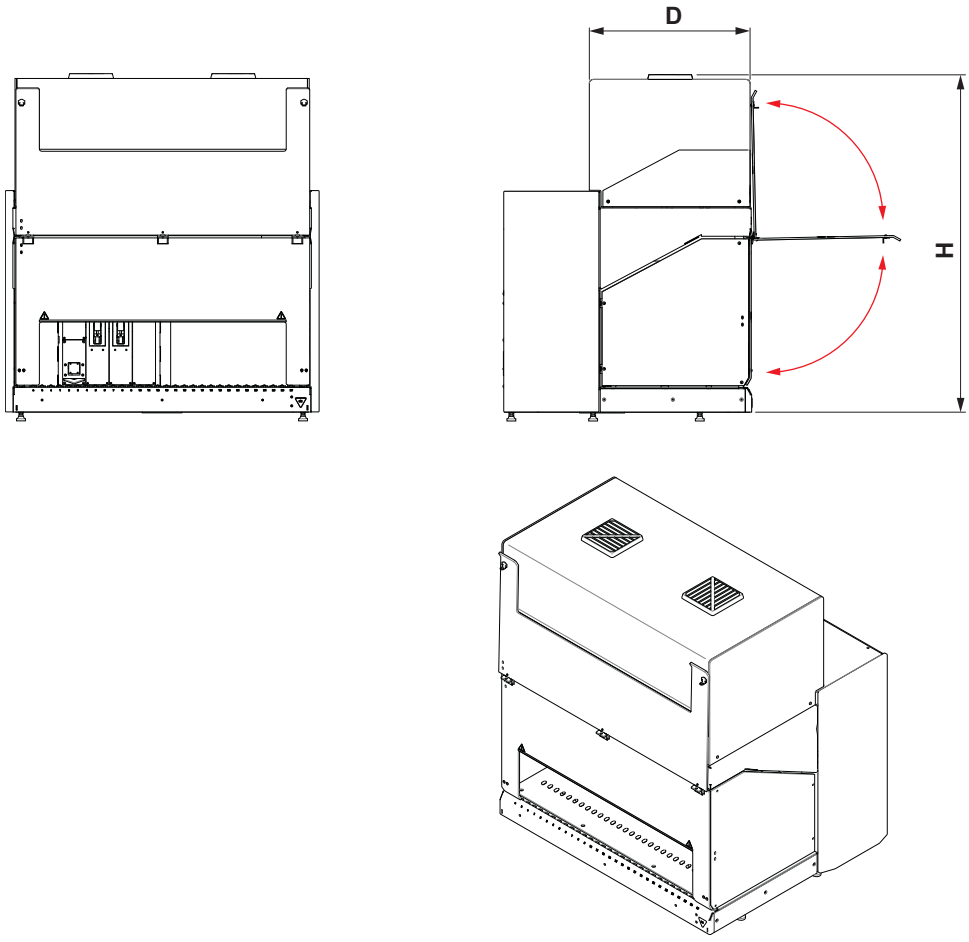


Fig. 3-5 *Instrument with installed dust cover*

Tab. 3-2 *Dimensions*

Dimension	Designation	[mm]	[in.]
D	Depth of installed dust cover	453	17.8
H	Height with installed dust cover	976	38.4

Instrument Heights

Tab. 3-3 *Instrument heights*

Instrument equipped with:	**Instrument height:**	
Liquid handling arm	910 mm	35.8 in.
Robotic manipulator arm, RoMa	880 mm	34.6 in.

Weights

Tab. 3-4 *Weights*

Platform	79 kg / 174.2 lbs
Diluter XP SMART[a)]	0.8 kg / 1.8 lbs
Diluter XMP 6008	3.2 kg / 7 lbs
RoMa	6.9 kg / 50.2 lbs
LiHa/1 **LiHa/2** **LiHa/8+1**	3.7 kg / 8.1 lbs 4.1 kg / 9 lbs 6 kg / 13.2 lbs
Fast Wash pump	0.49 kg / 1.1 lbs
Lower DiTi Eject	0.38 kg / 0.8 lbs

a) One or two diluters, according to instrument configuration

Weight of Optional Equipment

Tab. 3-5 *Weights*

Worktable extension[a)]	10.5 kg / 23.1 lbs

a) Weight without bottles

3.2.2 Worktable Access Range

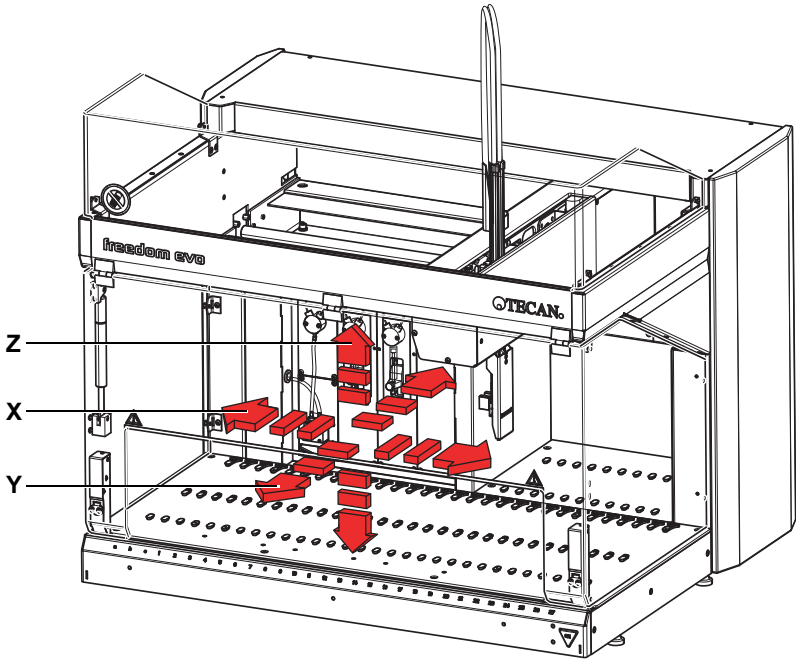


Fig. 3-6 *Worktable access range*

Operating ranges

Tab. 3-6 *Operating ranges*

	LiHa/1 and LiHa/2 (single arm instrument)	LiHa/1 and LiHa/2 (dual arm instrument)	LiHa/8+1 (single arm instrument)	LiHa/8+1 (dual arm instrument)	RoMa (dual arm instrument)	RoMa (single arm instrument)
Accessible X-range (X-travel)	65.5 cm (25.8 in)	54.5 cm (21.5 in)	65.5 cm (25.8 in)	54.5 cm (21.5 in)	54.5 cm (21.5 in)	65.5 cm (25.8 in)
Accessible Y-range (Y-travel)	29.5 cm (11.6 in)	29.5 cm (11.6 in)	28 cm (11.0 in)	28 cm (11.0 in)	32 cm (12.6 in)	32 cm (12.6 in)
Accessible Z-range (Z-travel)	20 cm (7.9 in)	20 cm (7.9 in)	20 cm (7.9 in)	20 cm (7.9 in)	24.5 cm (9.6 in)	24.5 cm (9.6 in)
Grid positions on worktable accessible by the LiHa	1 - 27	1 - 22	1 - 27	1 - 22	-	-

3.2.3 Safety Panel Opening

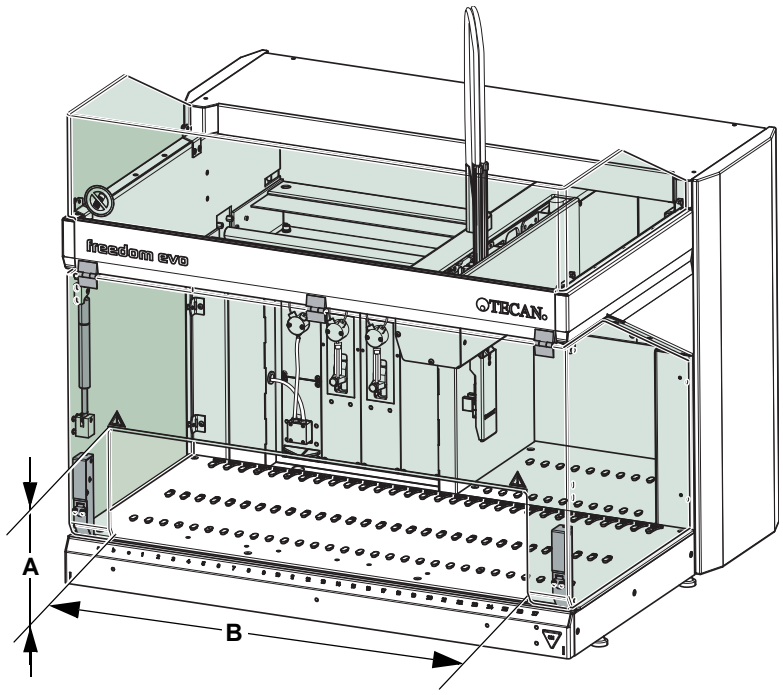


Fig. 3-7 *Safety panel opening*

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

Dimensions

Dimensions of the opening in the front safety panel:

- Freedom EVO 75: A x B = 170 x 694 mm (6.7 x 25.4 in.)

3.2.4 Supplies

Supply Ratings

Tab. 3-7 *Supply ratings*

	Freedom EVO 75
Line voltage	Single phase 100 - 120, 220 - 240 VAC (±10%)
Frequency	50/60 Hz
Power	570 VA
Fuses	2 x F5A (instrument power)
Fuse cable	2A 32VDC

Electrical Safety

Classification according to EN 61010-1 with regard to electrical safety:

Tab. 3-8 *Electrical specifications (safety)*

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

Power Switch

The main power switch is located at the back of the instrument.
The auxiliary power switch is located in the front right for the instrument. This is a “remote enable” for the DC power.

Uninterruptible Power Supply (UPS)

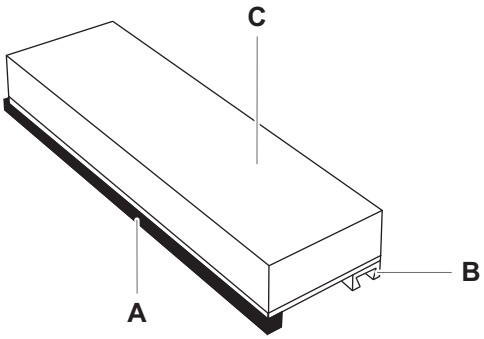
For an optimal operation of instruments and smooth running of the relevant application, Tecan recommends connecting an online UPS, so that the power supply runs via the UPS with a filter effect. A switched UPS type that switches over to batteries only after network breakdown is not recommended.
For further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

3.2.5 Carrier Data

Standard Carriers

Refer to 11.4 “Carriers, Racks, Troughs”, 11-3 for information on standard carriers for various containers, such as tubes, plates and troughs.

Custom Carrier



Carrier for reagents
Solid block, which can be drilled/ milled according to customer’s specific requirements
Width: 3 grid spaces (75 mm/2.95 in.)

A *Glider*
B *Positioning rail*
C *Plastic block*

Fig. 3-8 *Custom carrier (example)*

Custom Carrier Specifications

Customized carriers must fulfil the following specifications:

Width:	25 mm/0.98 in. or a multiple of 25 mm/0.98 in. minus 0.5 mm/0.02 in. to 1.5 mm/0.06 in.; e.g. 74 ±0.5 mm/2.91 ±0.02 in.	
Height:	Longest tip of instrument configuration	Max. carrier height (uppermost container rim)
	Standard tip	170 mm/6.69 in.
	10 µl DiTi, with/without filter	220 mm/8.66 in. (170 mm/6.69 in.)[a)]
	200 µl DiTi, with/without filter	210 mm/8.26 in. (170 mm/6.69 in.)[a)]
	1000 µl DiTi, with/without filter	170 mm/6.69 in.
Length:	max. 316 mm/12.44 in.	

a) If using lower DiTi eject option

Carrier Editor

384-Well Carrier

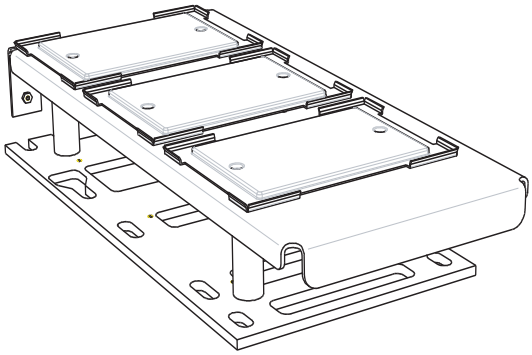


Fig. 3-9 *Carrier for three 384-well plates*

Note: *Plates by Greiner are required, in order to ensure exact mechanical accuracy. Accordingly, use one of the following microplate types:*

- *Greiner 96well microplate type U96 or*
- *Greiner 384-well microplate, polystyrene, flat bottom.*

Equivalent types with regard to material properties resulting in exactly identical dimensions are acceptable.

3.2.6 Environmental Conditions

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

Operating Conditions

Operating temperature	15 to 32 °C/59 to 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

This instrument has a ventilation panel on the back. To function correctly the back of the instrument should be no closer than 75 mm (3 in.) from a wall or obstruction surface.

Storage Conditions

The instrument must be protected against dust and debris with a cover. Recommendation: store the instrument in its original packaging. Store all manuals and the “Maintenance and Service Logbook” with the instrument.

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

Transport Conditions

Transport temperature	-20 to +60 °C / -4 to 140 °F
Transport humidity	20 to 80% relative (non condensing)

3.2.7 Emissions

Noise Emission

Noise emission (EN61010-1)	< 85 dBA [61.3 dBA (sound pressure), measured at a distance of 1 m from the instrument]

3.3 Configuration Data

3.3.1 Arm Configuration

Explanation

This section gives information about possible arm configurations for the Freedom EVO 75.

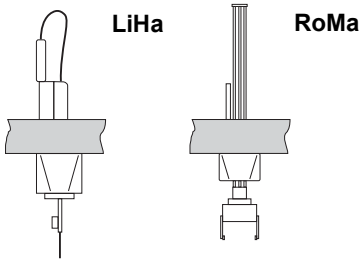


Fig. 3-10 *Symbols used to show the arm configurations*

LiHa *Liquid handling arm* ***RoMa*** *Robotic manipulator arm (RoMa)*

Possible Arm Configurations

The Freedom EVO 75 can be equipped with up to two arms. The table below shows all possible arm configurations:

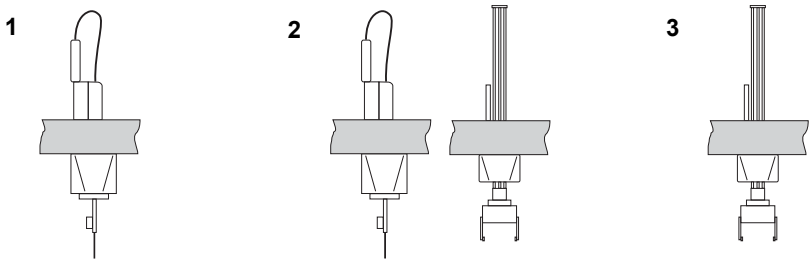


Fig. 3-11 *Possible arm configurations of instrument*

Liquid Handling Arm (LiHa) configuration

The LiHa is either equipped with one, two or eight tips with fixed spacing. Refer to 3.5.1 “Liquid Handling Arm (LiHa)”, 🗎 3-15.
Consequently, there are one or two diluters installed in the instrument.

Upgradeability

An existing Freedom EVO 75 instrument can be upgraded with a robotic manipulator arm, and the following liquid handling arms:

- Single-tip liquid handling arm (1 channel)
- Dual-tip liquid handling arm (2 channels)
- 8 Plus 1 Access liquid handling arm (8 channels)

Optional modules can be installed at a later date after the initial installation. Only field service engineers certified by Tecan are authorized to perform an instrument upgrade.

3.3.2 Optional Equipment

The following optional equipment is available and described in this Operating Manual:

Tab. 3-9 *Optional equipment*

Designation	Abbreviation
Dual-tip liquid handling arm	LiHa/2
Single-tip liquid handling arm	LiHa/1
8 Plus 1 Access liquid handling arm	LiHa/8+1
Robotic manipulator arm	RoMa
Fast wash option	FaWa
Lower disposable tip eject option	DiTi eject
Standard tips	–
Low volume tips	–
Disposable tips	DiTi
Extension table for readers and washer	–

3.4 Requirements

3.4.1 Computer Requirements

- Two USB 1.1 ports (standard)

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

3.4.2 Software Requirements

It is strongly recommended to use the latest software versions. Please contact your nearest Tecan representative for more information.

3.4.3 System Liquid Requirements

System liquid refers to the liquid which fills the liquid path and is used as wash fluid and/or can be added to samples for dilution.

- Standard system liquid
  - De-ionized water or aqueous buffer solution (conductivity must be 500 µS/cm)
  - Recommendation: add 1% isopropanol to the above

For more information about the liquids compatible with the Freedom EVO 75, refer to 3.7 “Chemical Resistance Table”, 3-25.

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 11.6.2 “Disposable Tips and Accessories”, 11-14
Carry over	See section 4.4.5 “Carry Over”, 4-19
Gravimetric precision test	See Tab. 3-14 “Pipetting precision -LiHa/1 and LiHa/2 with standard tubing”, 3-19

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 LiHa of the Freedom EVO 75 has one, two or eight tips.

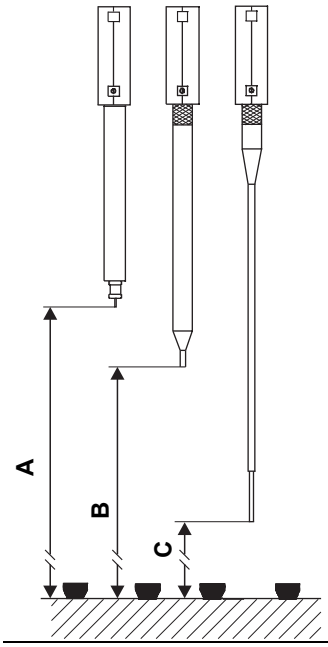
Spacing

- The dual-tip liquid handling arm configuration provides an 18 mm spacing between the tip centers and independent up and down movement of the two tips.
- The 8 Plus 1 Access liquid handling arm configuration provides an eight-tip array with 9 mm tip spacing for plate-to-plate operations.
- independent up and down movement of the first tip for tube-to-plate operations.

Tip Clearance

The tip clearance is the maximum space between the worktable surface and the mounted tip (initial position).

Tab. 3-10 *Tip clearance*

Distance tip to worktable[a)]	Tip type	Tip clearance
	Reference tip (B)	210 mm/8.27 in.
	Standard tip (C)[b)]	171 mm/6.73 in.
	DiTi adapter (A)	260 mm/10.24 in.
	DiTi mounted	According to DiTi length

a) Illustration not to scale, tip clearance shortened
b) Fixed tip, standard and low volume, 384 standard and low volume

LiHa Precision

Tab. 3-11 *LiHa positioning accuracy and repeatability*

Axis	Accuracy	Repeatability
X	±0.4 mm	±0.15 mm
Y	±0.4 mm	±0.15 mm
Z	±0.4 mm	±0.3 mm

Tip Configuration

Single- and dual-tip liquid handling arms can be equipped with any type of tip, i.e. disposable tips (all sizes), fixed tips (all sizes, different coatings, different lengths).
The 8 Plus 1 Access liquid handling arm can only be equipped with disposable tips (all sizes).

Note: *Use only genuine Tecan disposable tips to assure good system performance and reliability.*

Fixed Tip Coatings

The tips are made of stainless steel, in standard and low volume size, and are quite hydrophilic and porous. To increase the hydrophobicity, several coatings are used:

- soft PTFE outside coating for aqueous solutions,
- hard PTFE outside coating for aqueous solutions to improve durability of the tips

The outer tip coating is of either soft or hard PTFE (DMSO resistant). Two tip types designed to solve special carry over problems are available with either PTFE or ceramic inner coating. However, where no carry over is tolerable, the use of disposable tips with filters is strongly recommended.

Disposable Tips

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

- 5000 µl
- 1000 µl
- 350 µl
- 200 µl
- 50 µl
- 10 µl

Refer to cross references above for details.

Tip Supply Rack

A tip supply rack holds up to 3 x 96 tips of 10 µl or 200 µl or 1000 µl DiTis.

Syringe Volumes

The table below gives an overview of instruments and recommended application of syringe volumes.

Tab. 3-12 *Syringe Volumes*

XP Smart (LiHa/1 and LiHa/2)	XMP 6008 (LiHa/8+1)
25 µl	-
50 µl	-
-	100 µl
250 µl	250 µl
0.5 ml	0.5 ml
1.0 ml	1.0 ml
2.5 ml	-
5.0 ml	-

Free Dispense Volumes

- Minimum dispense volumes are optimized by adjusting the liquid class parameters in the software to meet application-specific requirements.
- With standard and disposable tips, the maximum dispense volume is the maximum syringe volume or the maximum disposable tip volume, which ever is the lowest.

Pipetting Precision

Based on Tecan quality control requirements, Tecan guarantees the following values for free dispense. The values are valid only if the maintenance schedule and the instructions have been strictly followed.

The precision test procedure provided by the instrument software uses a dedicated parameter setting for each tip type.

Depending on the tip type, the following rated volumes are tested:

Tab. 3-13 *Volumes examined*

Tip type	Volumes examined	
Standard fixed tip	10 µl	100 µl
DiTi 200 µl	10 µl	100 µl

Test Condition

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

Tab. 3-14 *Pipetting precision -LiHa/1 and LiHa/2 with standard tubing*[a)]

Volume	Standard washable	Disposable 200µl
10 µl	≤ 3%	≤ 3%
100 µl	≤ 0.5%	≤ 0.5%

a) CV specifications for free dispense using standard diameter tubing and 1000µl syringe measured with the gravimetric method

Tab. 3-15 *Pipetting precision -LiHa/1 and LiHa/2 with standard tubing*[a)]

Volume	Low-volume washable tip	Disposable 10µl
1 µl	≤ 10%	≤ 10%
10 µl	≤ 3%	≤ 3%

a) CV specifications for free dispense using small diameter tubing and 500µl syringe measured with the gravimetric method

Tab. 3-16 *Pipetting precision -LiHa/8+1* [a)]

Volume	Disposable 200µl
10 µl	≤ 3%
100 µl	≤ 0.5%

a) CV specifications for free dispense using 1000µl syringe measured with the gravimetric method

Tab. 3-17 Pipetting precision -LiHa/8+1[a)b)]

Volume	Disposable 200µl
10 µl	≤ 3%
100 µl	≤ 1.5%

a) CV specifications for free dispense using 1000µl syringe measured with the colorimetric method

b) The colorimetric method relies on a dye-plate-reader system with inherent CV. In this case the pass/fail criteria take into account the inherent CV of the measurement system and thus differ from the CV specifications measured with the gravimetric method.

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 low-conductive liquid in plates with round bottoms on a plate carrier, for fixed tips and DiTis
- ≥ 100 µl conductive liquid in sample tubes with a diameter of 10 or 13 mm on a tube carrier
- ≥ 150 µl conductive liquid in sample tubes with a diameter of 16 mm on a tube carrier
- ≥ 5 ml conductive liquid in reagent trough on a reagent carrier

Wetted Materials

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

Tab. 3-18 *Liquid system components: materials*

Component	Material
Tubing	FEP
Tubing	Silicone
Distributor	POM
Tubing	PVC
Disposable tips, Wash stations	PP
Fast Wash pump	PTFE coated diaphragm and FFPM valve
Tubing	PTFE
Valves	PCTFE (Kel-F)
Syringes	Borosilicate glass
Syringes, valves	PTFE
Tips	Stainless steel
Tips	Ceramic

3.5.2 Robotic Manipulator Arm (RoMa)

The Freedom EVO 75 instrument can be equipped with one robotic manipulator arm. The robotic manipulator arm is used to transport objects of the format of plates, such as reagent blocks, deep well plates, etc. from one to another position on the worktable or for storage onto the shelf.

Tab. 3-19 *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 (plates, etc.)
Use only labware that is rigid enough not to be deformed by the gripper force.

3.6 Optional Modules

3.6.1 Available Options

The following options are available for the Freedom EVO 75:

Tab. 3-20 *Options*

Designation	Abbreviations
Tecan vacuum separation module	Te-VacS
Tecan magnetic separation module	Te-MagS
Tecan plate shaker	Te-Shake
Monitored Incubator Option (6 slots with/without shaker)	MIO
Input/output option (4 digital inputs/4 digital outputs/RS485)	I/O Option
HydroFlex plate washer	-
Sunrise plate reader	-
Infinite F50 plate reader	-
Positive pressure cartridge carrier	-

Note: *Refer to the separate documentation of these options.*

3.6.2 Worktable Extension for Washer and Reader

Dimensions and Weights

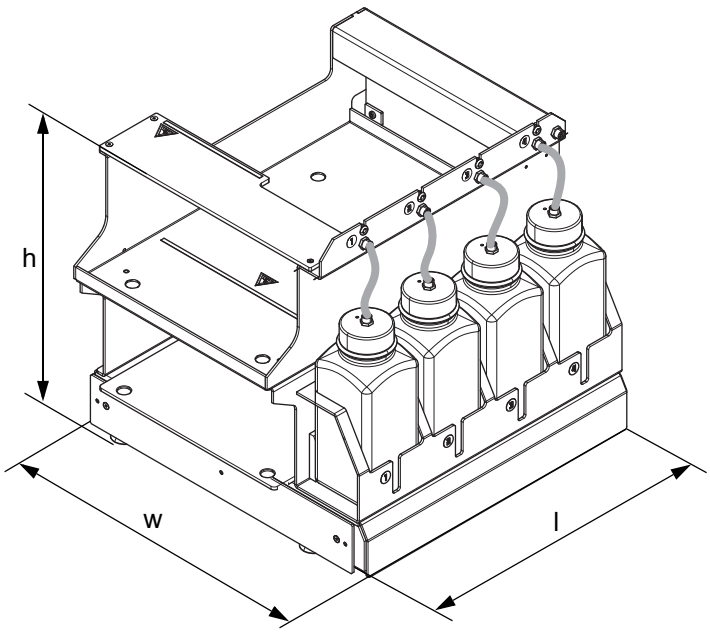


Fig. 3-12 *Dimensions of Worktable Extension*

Tab. 3-21 Dimensions and weight of worktable extension

Measurement		Value	Dimension
l	Overall length	410 / 16.1	mm / in.
w	Overall width	429.5 / 16.91	mm / in.
h	Overall height	430.4 / 16.94	mm / in.
W	Weight (without bottles)	10.5 / 23.1	kg / lb.

Wash Bottle

Tab. 3-22 Wash bottle specifications

Measurement / Property		Value	Dimension
l x w x h	Overall length x width x height	85 x 85 x 225.5 / 3.35 x 3.35 x 8.88	mm in.
V	Volume	1.0	liter
W	Weight (empty bottle)	0.1 / 0.22	kg / lb.
	Material	PE-HD	

Tubing

Tab. 3-23 Tubing specifications

Measurement / Property		Value	Dimension
d_1 x d_2	d_1 = inner diameter) x d_2 = outer diameter)	3 x 5 / 0.12 x 0.2	mm / in.
	Material	PVC transparent	

Note: *For the chemical resistance of the tubings and the wash bottles, refer to the "Tecan Chemical Resistance Table" (see section* *3.7 "Chemical Resistance Table", 3-25**)*

3.6.3 Worktable Extension for Reader

Dimensions and Weights

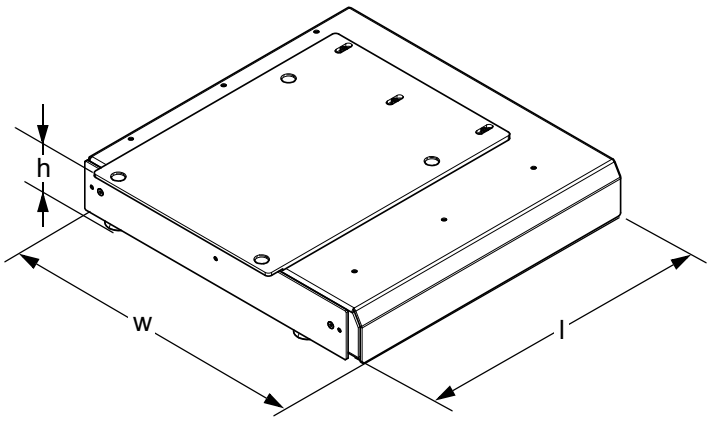


Fig. 3-13 *Dimensions of Worktable Extension for Reader*

Tab. 3-24 *Dimensions and weight of worktable extension for Reader*

Measurement		Value	Dimension
l	Overall length	410 / 16.1	mm / in.
w	Overall width	429.5 / 16.91	mm / in.
h	Overall height	90 / 3.54	mm / in.
W	Weight (without bottles)	5.2 / 11.46	kg / lb.

3.7 Chemical Resistance Table

Chemical Resistance

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

Tab. 3-25 *Chemical resistance table*

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

Tab. 3-25 *Chemical resistance table (cont.)*

Material	FEP	PVC	Silicone	POM	PP	PTFE	PCTFE[a)]
Perchloric acid 60 %	o	/	/	x	x	o	x
Petroleum ether 30/50	o	x	/	x	/	nd	nd
Hydrochloric acid 32 %	o	x	/	/	o	o	o
Trichloroace-tic acid 40 %	o	/	/	o	/	o	o

a) Kel-F

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 EVO 75, shows how it is structured and gives a functional description of the assemblies.

4.1 Introduction

Main Parts

The instrument consists of a platform (frame, housing, main electronic boards and power supply).

Robotic Arms

It is equipped with

- a liquid handling arm (LiHa). The LiHa includes a liquid system with diluters.
  - The LiHa is used for liquid handling (pipetting, diluting, etc.)
- an optional robotic manipulator arms (RoMa).
  - The RoMa is used to transport racks, such as plates.

Options

A variety of options is available for the Freedom EVO 75, e.g.

- Vacuum separation module
- Magnetic separation module
- Shaker
- Incubator
- Extension for plate washer and plate reader

Control

The operator controls the system via a personal computer, on which the instrument software as well as the relevant application software are installed.

4.2 Structure

4.2.1 Mechanical Structure

The figure shows the main parts of the Freedom EVO 75:

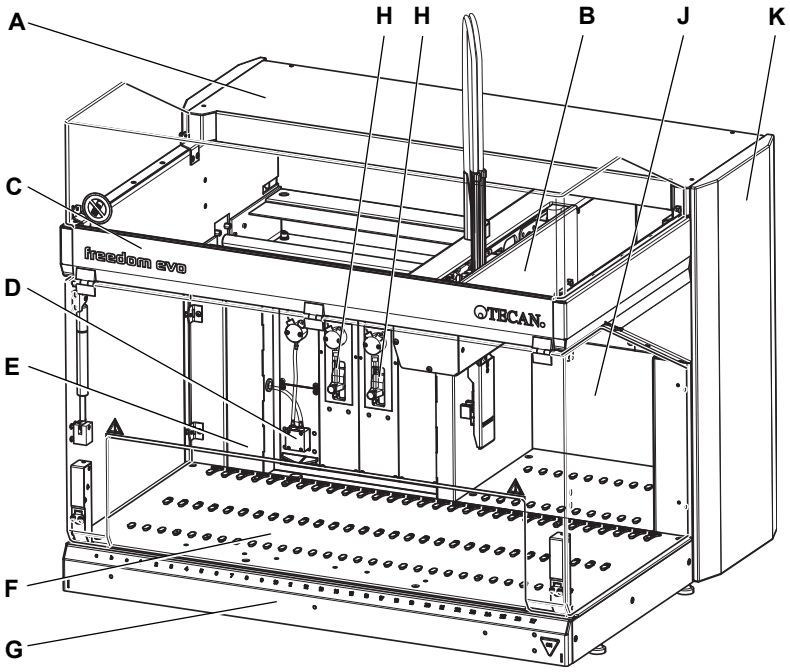


Fig. 4-1 *Freedom EVO 75 instrument overview*

A	*Top cover*	***F***	*Worktable with positioning pins*
B	*Liquid handling arm*	***G***	*Front access door*
C	*Front upper support*	***H***	*Diluters with syringes*
D	*Fast Wash pump*	***J***	*Safety panels*
E	*Front safety panel*	***K***	*Side panel*

4.2.2 The Freedom EVO 75 Worktable

Positioning Pins

On the Freedom EVO 75 worktable, evenly spaced positioning pins ensure proper positioning of all carriers according to the grid represented in the software. The minimal width of a carrier, e.g. wash station or strip racks for tubes, equals the distance from one grid position to the next. The positioning pins also enable the sliding of carriers/racks in the Y-direction.

Positioning pin spacing center to center: 2.5cm / 0.98 in.

Sliding Carriers and Racks

Sliding carriers and racks facilitate loading and unloading during operation.

4.2.3 Liquid System

The liquid system refers to all instrument modules and parts which contain liquid or influence liquid flow.

Liquid Path of Freedom EVO 75 with Single Tip

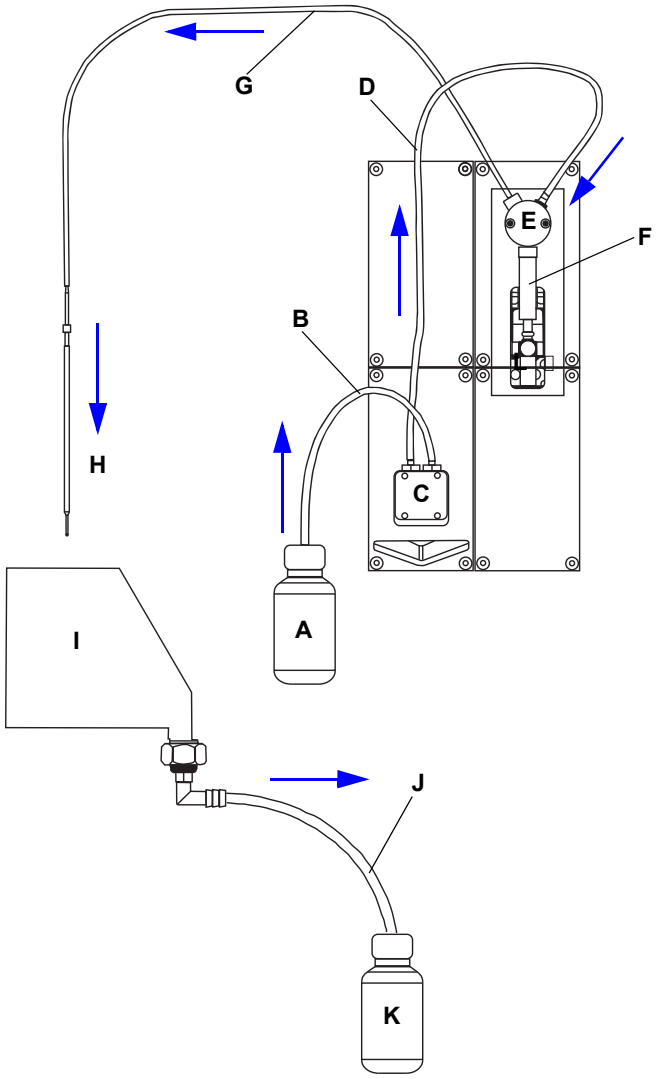


Fig. 4-2 *Liquid system: Components of single-tip configuration*

A	*System liquid container*	***G***	*Pipetting tubing*
B	*Aspirating tubing*	***H***	*Tip*
C	*Fast Wash pump (optional)*	***I***	*Wash station*
D	*Interconnecting tubing*	***J***	*Waste tubing*
E	*3-way valve*	***K***	*Waste container*
F	*Syringe*		

Note: *The arrows indicate the direction of liquid flow.*

Liquid Path of Freedom EVO 75 with Two Tips

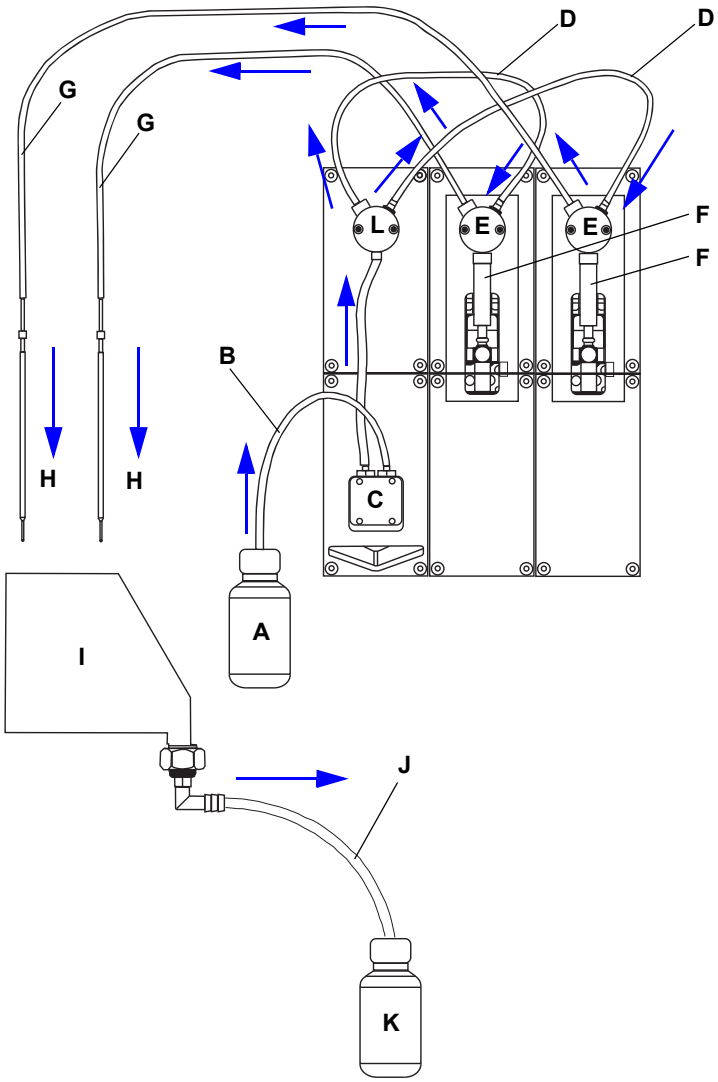


Fig. 4-3 *Liquid system: Components of the dual-tip configuration*

A	*System liquid container*	***G***	*Pipetting tubing*
B	*Aspirating tubing*	***H***	*Tip*
C	*Fast Wash pump (optional)*	***I***	*Wash station*
D	*Interconnecting tubing*	***J***	*Waste tubing*
E	*3-way valve*	***K***	*Waste container*
F	*Syringe*	***L***	*Distributor 1 to 2*

Note: *The arrows indicate the direction of liquid flow.*

Liquid Path of Freedom EVO 75 with Eight Tips

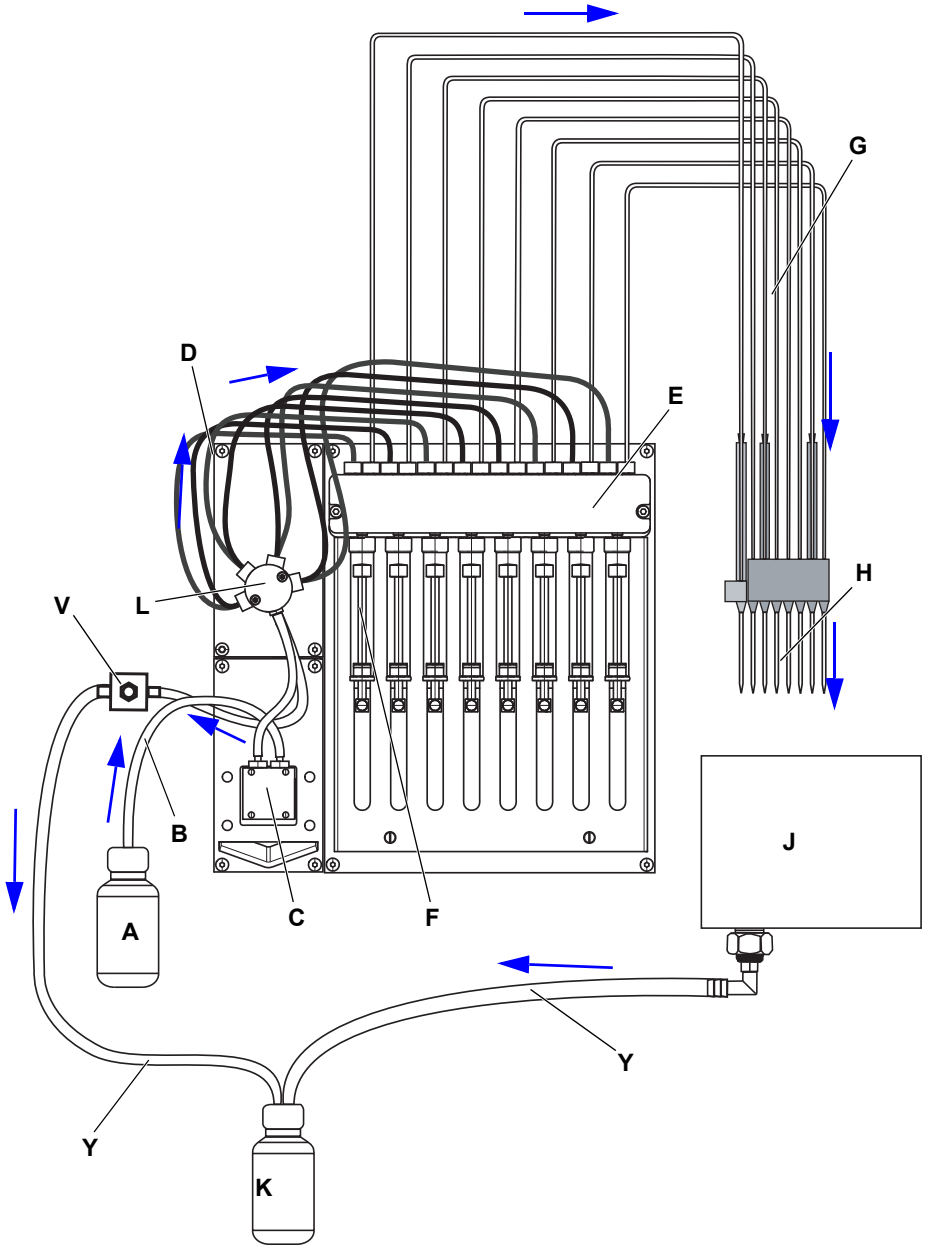


Fig. 4-4 *Liquid system: LiHa/8+1 configuration*

A	*System liquid container*	***H***	*Tip (DiTi)*
B	*Aspirating tubing*	***J***	*Wash station*
C	*Fast Wash pump (optional)*	***Y***	*Waste tubing*
D	*Interconnecting tubing*	***K***	*Waste container*
E	*Valves on diluter*	***L***	*Distributor*
F	*Syringe*	***V***	*Pressure release valve (optional)*
G	*Pipetting 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	“Tip Configuration”, 3-16
Pipetting precision	“Pipetting Precision”, 3-18
Fixed tips details	11.6.1 “Fixed Tips and Accessories”, 11-13
Disposable tips, DiTis	11.6.2 “Disposable Tips and Accessories”, 11-14

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

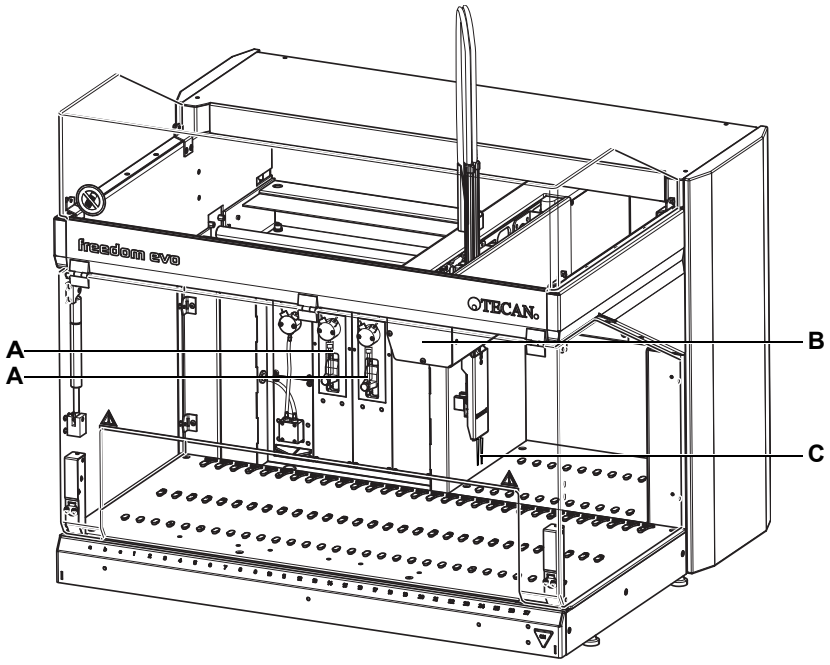


Fig. 4-5 *The liquid handling arm, LiHa*

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

LiHa Types

The Freedom EVO 75 can be equipped with following liquid handling arm types:

- Single-tip liquid handling arm
- Dual-tip liquid handling arm
- 8 plus 1 Access liquid handling arm

4.3.1.1 Movements

LiHa Movements

The liquid handling arm moves left and right driven by a servo motor (X-direction).

Tip Movements

Single- and Dual-Tip Liquid Handling Arms

Each sampling tip is raised or lowered by a servo motor within the LiHa (Z-direction). An additional servo motor inside the liquid handling arm drives the tips forward and backwards (Y-direction).

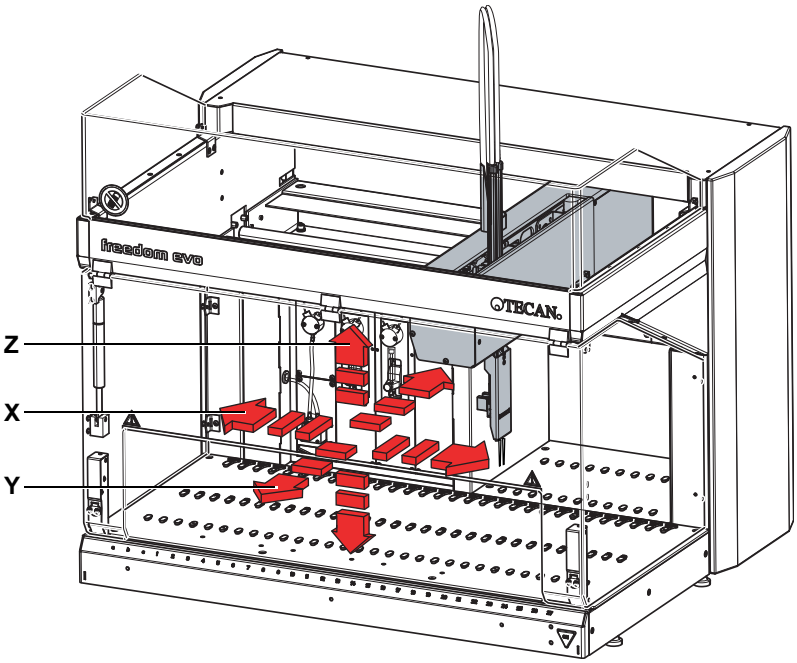


Fig. 4-6 *Liquid handling arm movement*

X *X-range liquid handling arm movement left and right*

Y *Y-range for tip movement back and forth*

Z *Z-range for tip movement up and down*

One or two sampling tips are arranged on one liquid handling arm. In the dual-tip configuration, the tips can move independently in Z-direction. The distance between the tips is fixed in Y-direction at 18 mm from center to center.

For movement ranges refer to Tab. 3-11 “LiHa positioning accuracy and repeatability”, 3-16.

8 Plus 1 Access Liquid Handling Arm

Tip Movements

A 7-tip array is raised or lowered by a servo motor within the LiHa (Z-direction). A second (Z-direction) servo motor drives the independently operational versatile sampling tip.
An additional servo motor drives the tips forward and backwards (Y-direction).

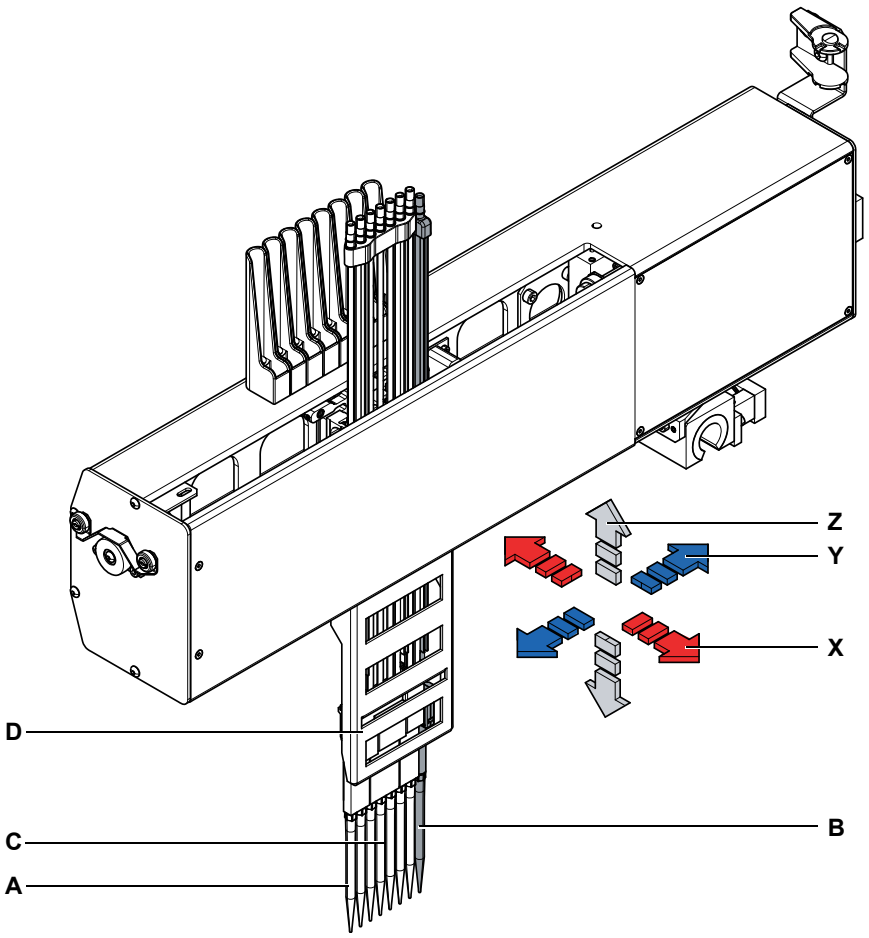


Fig. 4-7 *Liquid handling arm movement*

- ***A*** *Disposable tips (DiTi)*
- ***B*** *Versatile tip*
- ***C*** *7-tip array*
- ***D*** *DiTi ejector*
- ***X*** *X-range liquid handling arm movement left and right*
- ***Y*** *Y-range for tip movement back and forth*
- ***Z*** *Z-range for tip movement up and down*

Access Modes

The 8 Plus 1 Access liquid handling arm has two access modes allowing operation with one or 8 tips.

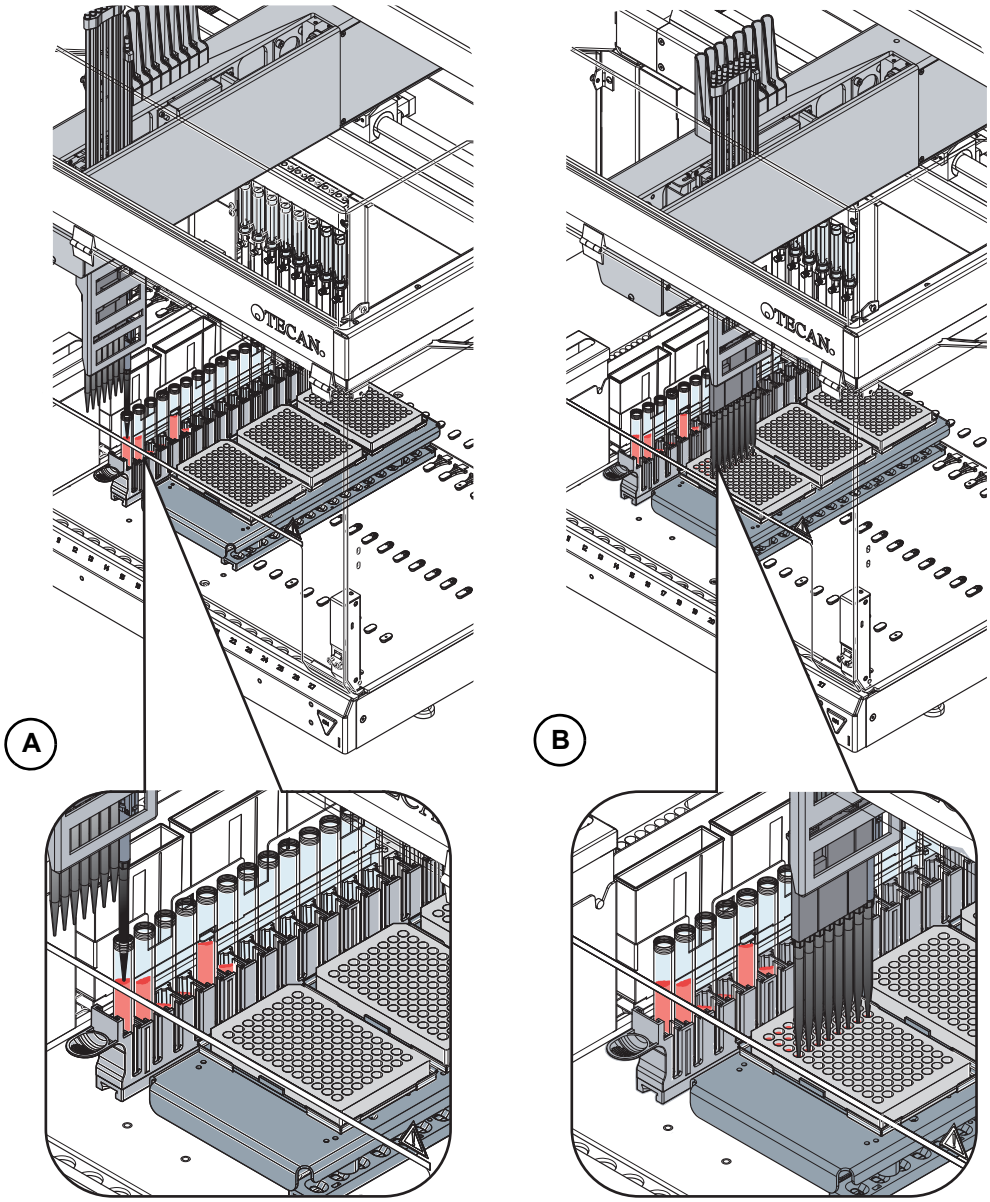


Fig. 4-8 *Access Modes*

A *1 Channel access mode*

B *8 Channel access mode*

Tip Types

Tips serve to pipette liquids in different volume ranges. A variety of tip types is 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).

Some tips are adjustable to pipette into 384-well plates.

Coating

The coating renders the tips more hydrophobic, preventing adhesion of droplets or collars and improving free dispenses and dispenses at or even below liquid level, due to optimized dip out.

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 tip supply rack. After use, DiTis are discarded into a waste bag or the optional disposable tip waste slide.

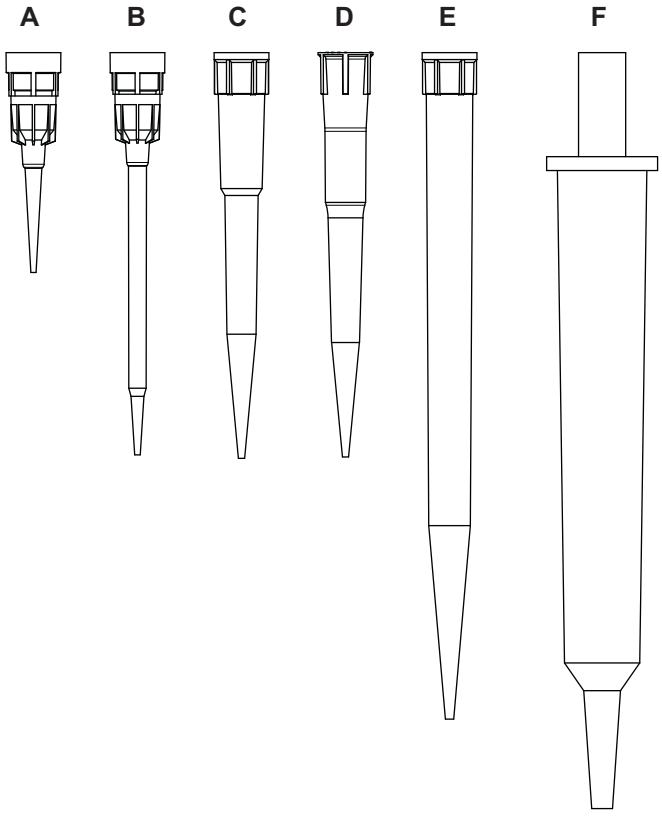


Fig. 4-9 *Disposable tips*

A *Disposable tip 10 µl*
B *Disposable tip 50 µl*
C *Disposable tip 200 µl*
D *Disposable tip 350 µl*
E *Disposable tip 1000 µl*
F *Disposable tip 5000 µl*

4.3.2 Robotic Manipulator Arm, RoMa

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

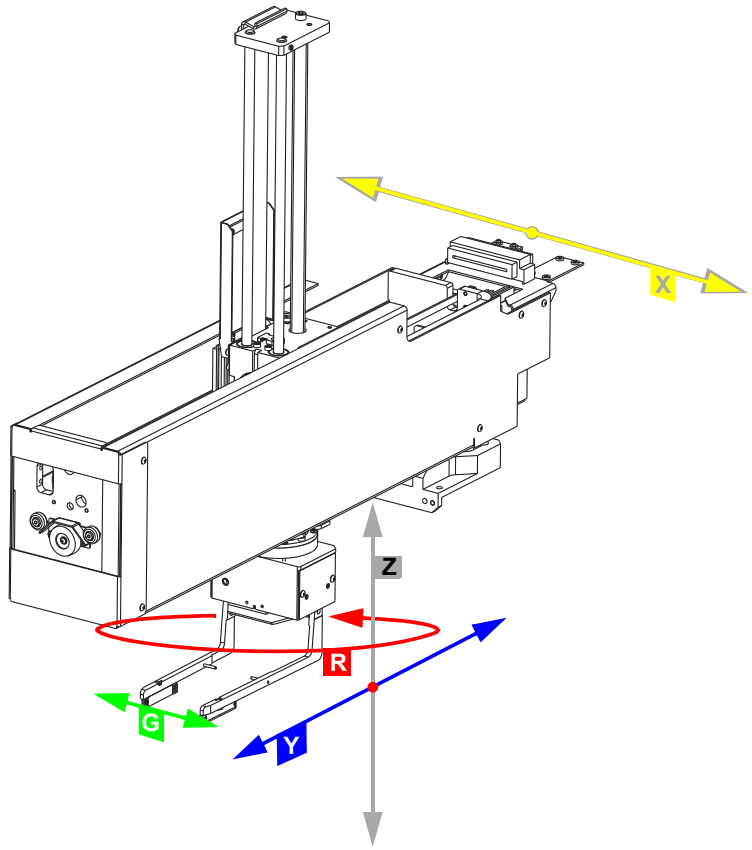


Fig. 4-10 *Robotic manipulator arm RoMa*

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 Gripper Fingers for the RoMa

The RoMa is equipped with eccentric gripper fingers.

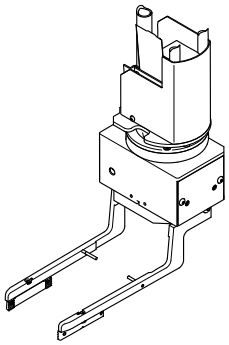


Fig. 4-11 *Eccentric RoMa gripper fingers*

4.3.4 Safety Elements

Front Safety Panel

During operation the front safety panel is secured in its closed position with door locks.
A gas spring retains the panel up when open.

Functions of Safety Panel

The front safety panel has the following function:

- Restrict access to moving parts (moving parts, mechanical hazards)

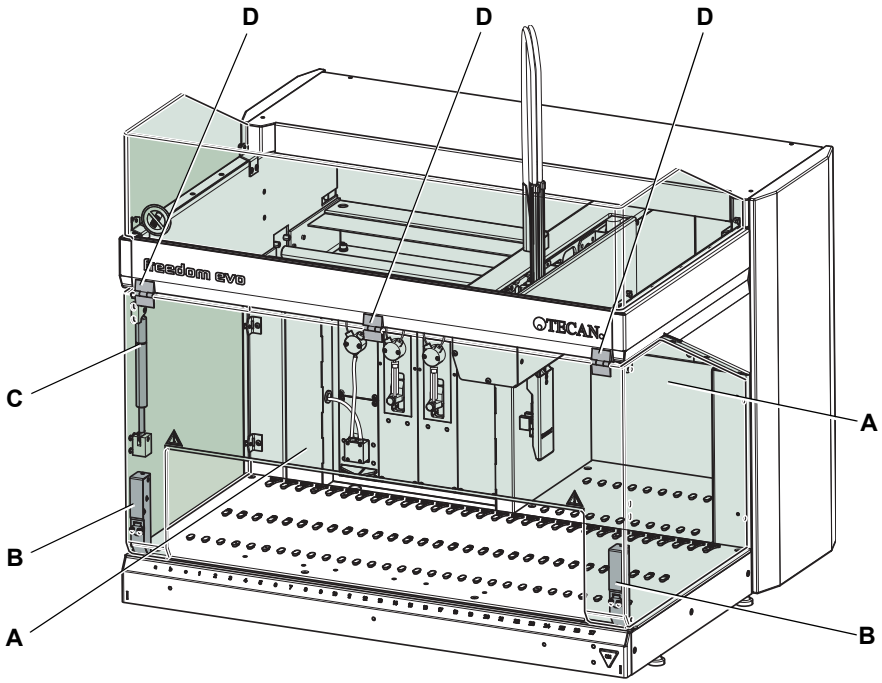


Fig. 4-12 *Freedom EVO 75 safety elements*

A	*Safety panel*	***C***	*Gas spring*
B	*Door lock*	***D***	*Hinge*

The figure shows the elements of the Freedom EVO 75, which have a protective or safety related function:

Note: The panel opening allows the placement of the disposable tip waste chute in several positions of the Worktable.

Door Locks

How do the Door Locks Work?

The door locks actively lock the front safety panel during operation of the Freedom EVO 75. This is achieved with a software command from the application software.

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.

Door Locks

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

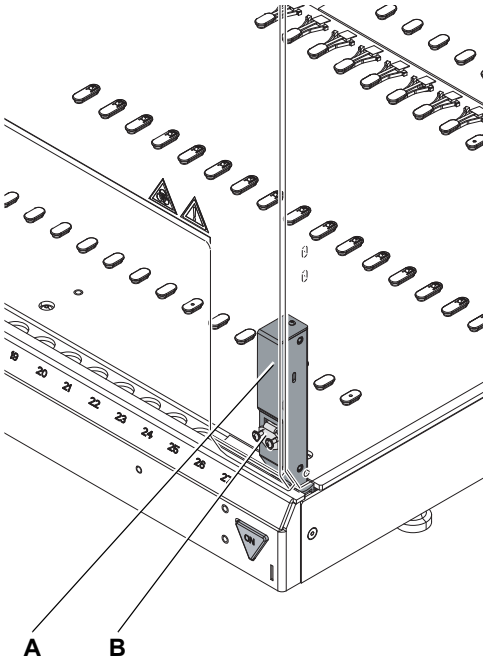


Fig. 4-13 Door locks

The door locks consist of a locking device (A) with an actuator on each side of the worktable 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.

4.4 Liquid System

Introduction

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 tubes, valves and connectors. The distribution of the system liquid is effected by the movement of the diluter pistons in several strokes or by the Fast Wash pump.

For the schematic diagram of the liquid system refer to

- Fig. 4-2 “Liquid system: Components of single-tip configuration”, 4-3
- Fig. 4-3 “Liquid system: Components of the dual-tip configuration”, 4-4
- Fig. 4-4 “Liquid system: LiHa/8+1 configuration”, 4-5

4.4.1 Aspirating and Dispensing

Precision Diluters

Precision diluters are used for accurate aspiration and dispensing of liquids.

Fast Wash Pump

An optional Fast Wash pump is used to pump a greater amount of liquid with higher speed through the system, usually to prime the liquid system and rinse tips.

4.4.2 Tubing System

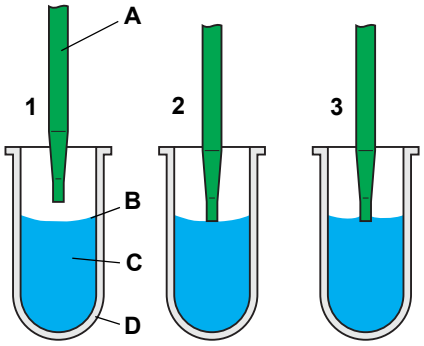
Tubing Types

Flexible tubing connects the liquid system container(s), pumps, valves and tips.

4.4.3 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. 4-14 *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**

ATTENTION

Risk of erroneous process results. High sensitive liquid level detection is not recommended for critical applications.
For appropriate process validation see 6.4 “Recommended Use of Freedom EVO 75”, 6-11

4.4.4 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.

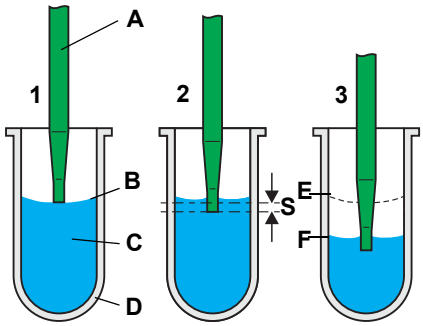


Fig. 4-15 Sample aspiration

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

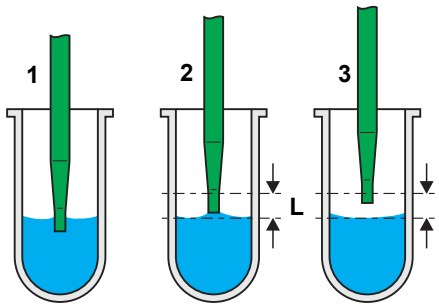


Fig. 4-16 No clot detected

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.

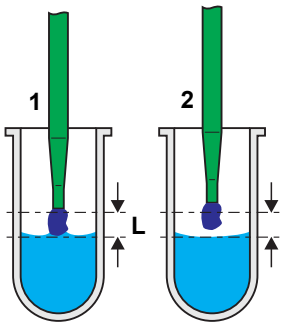


Fig. 4-17 Clot detected

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.

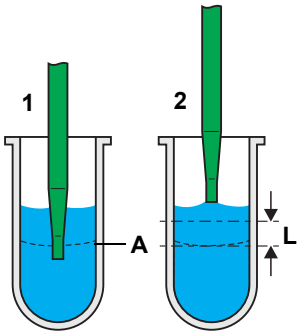


Fig. 4-18 No liquid aspirated

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.

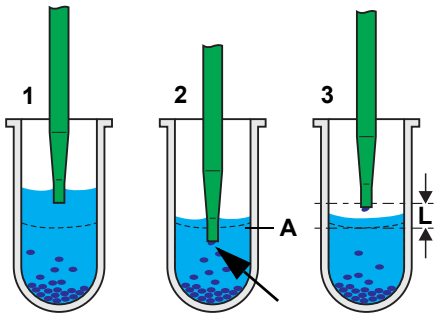


Fig. 4-19 Sample not completely aspirated

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.

4.4.5 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 carry over needs to be minimized, 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 to this, the aspirate and dispense methods used (i.e. the liquid handling parameters programmed in the relevant application software) influence carry over.

Furthermore, the measurement of carry over is heavily dependent on the detection technique used, so the value of carry over obtained with one method can differ from the one obtained with another.

Carry Over Values

A universal carry over value, generally valid for and representative of every type of liquid and every application, cannot be given and would be both incorrect and misleading.

The carry over figures in the advertising material for instruments are given as an indication of the performance that can be achieved with these instruments under certain conditions. These figures must in no way be understood as binding for Tecan with regard to user's applications.

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 by a person having the liquid handling knowledge and having successfully attended the corresponding training proposed by Tecan.

Use of Disposable Tips

In critical cases disposable tips with filter must be used as a means of minimizing carry over.
It is essential that the instrument's operating condition be adequately maintained (preventive maintenance and performance check at regular time intervals) to ensure the appropriate performance.

4.5 Optional Equipment and Modules

4.5.1 Fast Wash Option, FaWa

Fast Wash Function

Refer to the figure Fig. 4-2 , 🗎 4-3 and Fig. 4-3 , 🗎 4-4, Fig. 4-4 , 🗎 4-5
The Fast Wash pump (C) accelerates the liquid flow to the tips.

During pump actions the valves (E) are set to bypass the syringes, enabling direct flow to the tips:

- Single-tip liquid handling arm, see Fig. 4-2 , 🗎 4-3
- Dual-tip liquid handling arm, see Fig. 4-3 , 🗎 4-4.
- 8 Plus 1 Access liquid handling arm, see Fig. 4-4 , 🗎 4-5

4.5.2 Lower DiTi Eject Option (LiHa/1 and LiHa/2)

Lower DiTi Eject Option

The lower DiTi eject option enables disposable tip ejection at a lower position. With the optional cover DiTi waste and the DiTi waste slide, it allows to avoid risks of projection onto the worktable and thus minimizes contamination risks.

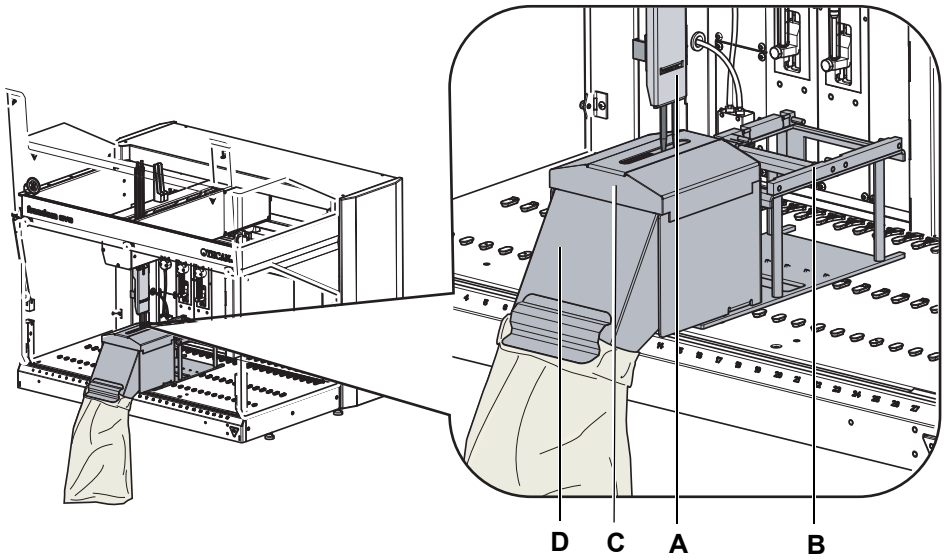


Fig. 4-20 *Lower DiTi eject option with cover and waste slide*

A	*DiTi ejector (rocker)*	***C***	*Cover for DiTi waste*
B	*Carrier for 2 x 96 disposable tips, with*	***D***	*DiTi waste slide and bag holder*

The single- and the dual-tip liquid handling arms can optionally be equipped with a lower DiTi eject module.

Note: *The lower DiTi eject module is an integral part of the 8 Plus 1 Access liquid handling arm.*

4.5.3 Carriers and Racks

Cross References

List of cross references to information provided in other sections:

Subject	Reference
List of carriers, racks and troughs	11.4 “Carriers, Racks, Troughs”, 11-3

Definition

Carriers are supports that hold racks - which contain tubes or other containers - and are placed at precisely definable positions on the worktable. Racks can be placed and handled by the software at almost any position on the worktable. Carefully study the relevant sections in the Instrument Software Manual before placing any carriers and racks.

Note: *For a list of carriers and racks follow the cross reference above.*

5 Putting into Operation

Purpose of This Chapter

This chapter describes how the Freedom EVO 75 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 EVO 75 must be carried out by a Tecan FSE only.

Modifications on the Safety Panels

Some options for the Freedom EVO 75 require modifications on the safety panels. These modifications must be performed by an authorized Tecan FSE (field service engineer) when the option is installed.

WARNING

If the options which require modifications on the Freedom EVO 75 are installed improperly, the safety concept may be impaired.

Always make sure that the options are installed in compliance with the instructions given by the manufacturer.

5.2 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	7.2 “Maintenance Schedule”, 🗎 7-3
Start the instrument up	6.3.3 “Switching the System On”, 🗎 6-6
Switch the instrument off	6.3.8 “Switching Instrument Off”, 🗎 6-9
Prepare other instrument hardware components	6.3.4 “Worktable Layout”, 🗎 6-7)

WARNING

Automatically moving parts.
Injuries (crushing, piercing) possible if the safety panels are not in place or if you reach through the opening in the front safety panel.

- Before starting the Freedom EVO 75, 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 opening below the yellow line on the front safety panel.

Startup Procedure

Running the Freedom EVO 75 involves the following **general** steps:

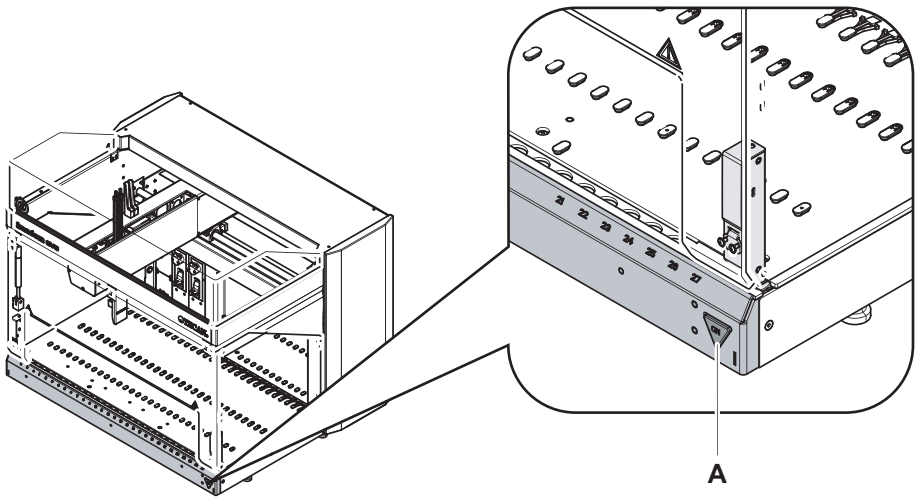


Fig. 5-1 *Auxiliary power switch*

A *Auxiliary power switch*

1 Perform daily maintenance.

2 Start up the Freedom EVO 75 instrument (refer to cross references above)

3 Start up the computer system connected with the Freedom EVO 75.

4 On the computer system, make sure that the application software is installed and functioning properly. If necessary, have the application software installed by the person responsible for the instrument.

5 On the computer system, start up the application software.

6 In the application software, define the required application if necessary.

7 In the application software, select the required application for execution.

8 Place the required carriers, racks or reagents in the required positions on the instrument worktable.

9 Prepare the other instrument hardware components, e.g. system liquid container, waste container or tips (refer to cross references above).

10 In the application software, start the application (refer also to cross references above).

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

12 Perform the appropriate (e.g. daily or weekly, etc.) maintenance.

13 Exit the application software.

14 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 EVO 75 properly and safely.

For the options used by your configuration, refer to the manuals of the respective optional equipment.

6.1 Operating and Display Elements

6.1.1 Operating Elements

Apart from the main power switch and the auxiliary power switch there are no specific operating elements on the Freedom EVO 75 instrument.

Main Power Switch

The main power switch is located at the back of the instrument in the lower right (viewed from the rear) corner.

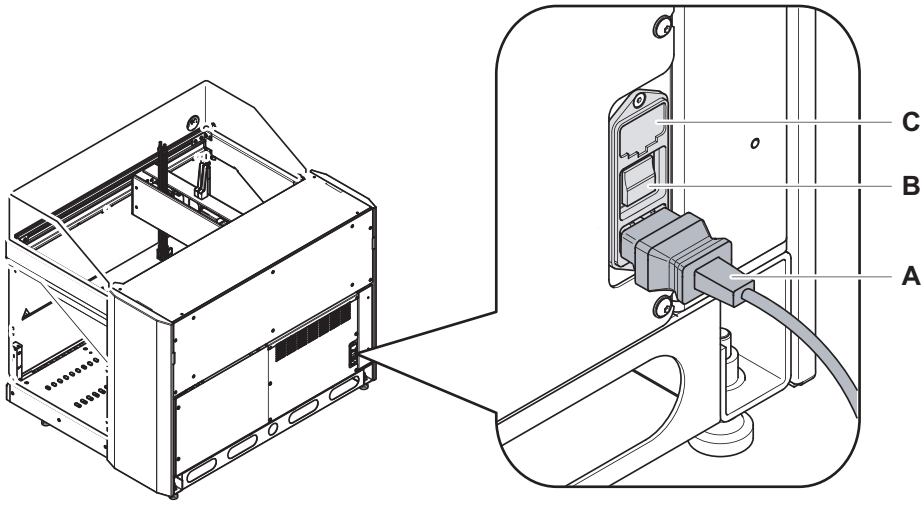


Fig. 6-1 *Main power switch*

A *Power cable*
B *Main switch*
C *Fuse drawer*

WARNING

Potential lethal voltage.

- Always unplug instrument before servicing (e.g. exchanging fuses).
- Prior to any repair or maintenance job disconnect mains power cord.

Auxiliary Power Switch

The auxiliary power switch is located at the front of the instrument on the right side of the front access panel.
A light in the auxiliary power switch indicates that the instrument is switched on.

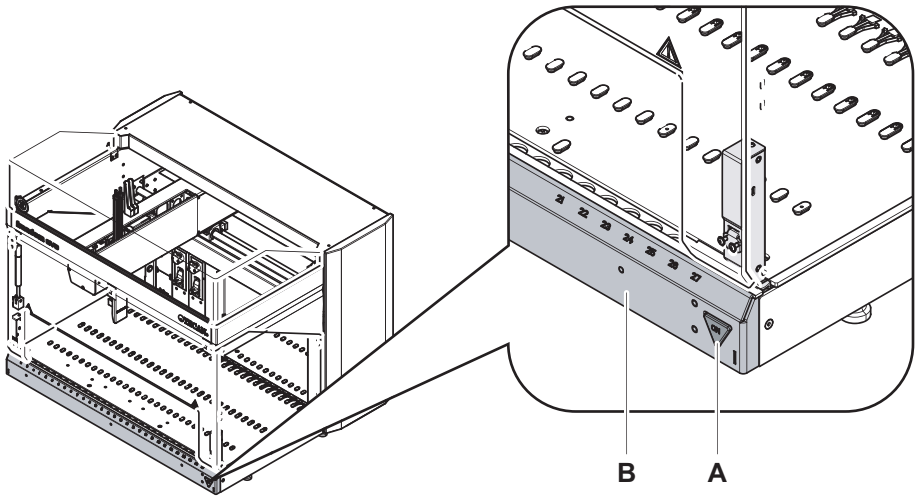


Fig. 6-2 *Auxiliary power switch*

A *Auxiliary power switch with indicator light* ***B*** *Front access panel*

Note: *During operation, keep the front access panel closed to have access to the switch.*

ATTENTION

Avoid unintended switching off of the instrument.

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

Internal Communication

Communication within the Freedom EVO 75, 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.

6.1.2 Display Elements

There are no display elements attached directly to the Freedom EVO 75. The corresponding data is displayed on the PC screen.

6.2 Operating Modes

Possible Operating Modes

The Freedom EVO 75 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 EVO 75 is controlled by the runtime controller of the corresponding application software.
    - 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 “Application Software Manual”.
    - For service mode refer to the “Instrument Software Manual”.

- Setup and service mode (field service engineer)
  - Serves to set up the instrument, to make adjustments and to run tests.
  - In this mode, the Freedom EVO 75 is controlled by the setup and service software.
    - Refer to the “Instrument Software Manual”.

6.3 Operating the Freedom EVO 75

6.3.1 Safety Instructions

WARNING

Automatically moving parts.
Injuries (crushing, piercing) possible if the safety panels are not in place or if you reach through the opening in the front safety panel.

- Before starting the Freedom EVO 75, 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 opening below the yellow line on the front safety panel.

WARNING

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

- Visually inspect all hardware components on the worktable for possible spillage of hazardous liquids.
- Fix the vessels on the worktable.

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 EVO 75 on.

ATTENTION

One or two 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.

ATTENTION

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

- Loss or dropping of disposable tips
- Spillage due to imprecise pipetting
- Collision

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

For all applications of the Tecan instrument, the user must ensure that the requirements of each protocol are carefully observed. Attention must be given to:

- Sample/reagent volumes and concentrations
- Test plate layout
- Sequence of steps
- Temperature restrictions
- Time limits

Controls, standards, or reference materials should be processed by the Freedom EVO 75 in the same manner as test samples. Prior to any first time application, test runs should be made with the assay to allow optimization of all liquid handling parameters.

Before running an application with real samples for the first time, it is recommended to optimize all liquid handling parameters by a test run with a neutral liquid (e.g. water).

The Freedom EVO 75 requires accurate positioning of all reagents, samples, racks, and plates on the instrument's worktable. The operator should verify these positions accordingly before executing any program.

6.3.2 Enclosed Work Area

Cross References

List of cross references to information provided in other sections:

Action	Reference
Detailed maintenance procedures	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.

6.3.3 Switching the System On

Check that the syringe locknuts are tight before switching the instrument on.

WARNING

Automatically moving parts.
Injuries (crushing, piercing) possible if the safety panels are not in place or if you reach through the opening in the front safety panel.

- Before starting the Freedom EVO 75, 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 opening below the yellow line on the front safety panel.

To switch on the Freedom EVO 75 on follow instructions below:

1. Make sure that the main switch at the back of the instrument is on.
2. Press the front auxiliary power switch to turn the Freedom EVO 75 instrument on.

   The auxiliary power switch is lit when the instrument is switched on.

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.

3. Start up the application software.

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.

The instrument is now ready to receive commands from the application software package. Refer to the separate documentation.

6.3.4 Worktable Layout

Refer to your EVOware Software Manual and follow the instructions.

Note: *Note: When defining processes, also refer to section 6.4 “Recommended Use of Freedom EVO 75”, 6-11 which gives guidance on good usage and safe worktable layout.*

Carrier Positioning

Slide carriers over the positioning pins until they are pushed all the way against the stop pins. A carrier's location used by the software program corresponds to the respective grid position number at the front of the worktable.
Refer to the Instrument Software Manual for further information.

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.

Wash Station

When installing the wash station, pay attention to the following:

ATTENTION

Possible overflow of the wash station.
When installing the wash station, make sure that the waste tube is not kinked.

6.3.5 Connecting Liquid Containers

When connecting liquid containers, also pay attention to the maintenance instructions given in section 7.6.5 “Liquid Containers”, 7-28.

Wash Station/Waste Tubing

Installing the Waste Tubing

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

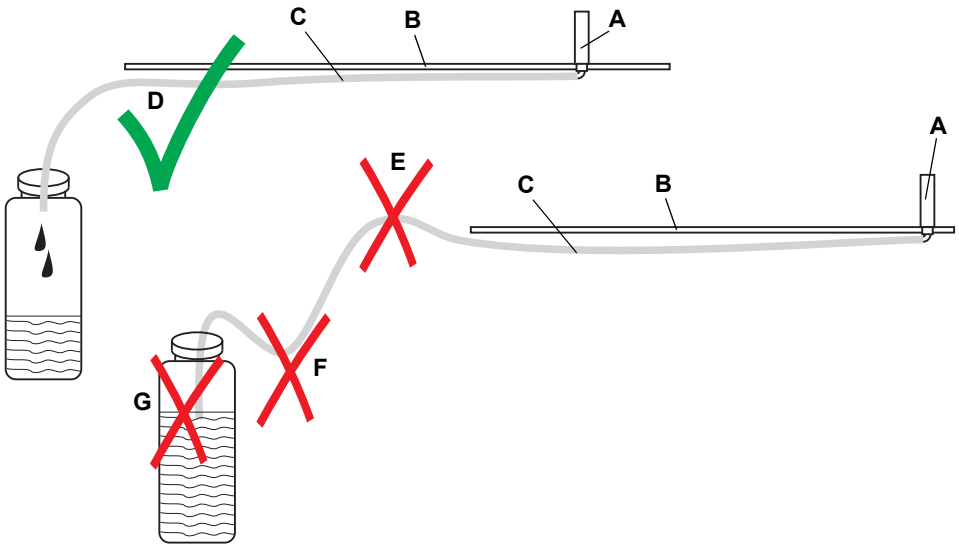


Fig. 6-3 *Correct and disadvantageous course of waste tubing*

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).

6.3.6 Before Starting a Run

Containers

1. Empty the waste liquid container and the disposable tip waste bag if necessary.
2. Check the system liquid container and refill if necessary.
3. If possible, place the system liquid bottles at worktable level or at the height of the diluter, to avoid pressure differences within the tubing system.
4. Make sure that the reagent troughs are filled appropriately.
5. Check the disposable tip rack and add tips if necessary.
6. Ensure that the daily maintenance has been carried out according to the maintenance chapter.

RoMa and Gripper

Use caution when the instrument needs to be restarted after a power failure, objects held by the RoMa grippers have to be removed before starting up. RoMa grippers disengage and drop objects held during the startup process.

ATTENTION

Crash or erroneous pipetting results when the wrong tips are loaded on the worktable.

- If tips are longer than expected:
  Crash of the tips with the labware.
  Wrong pipetting results because the tips are pressed against the bottom of the container, which constricts the liquid flow through the tip orifice.
- If tips are shorter than expected:
  Aspiration of air instead of liquid, which may result in erroneous results.

Make sure that the DiTis presently installed on the worktable correspond with the ones defined in the application software.

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 on the worktable.

6.3.7 Checks and Terminating Tasks

Cross References

List of cross references to information provided in other sections:

Action	Reference
Empty/clean the waste container	See section 7.6.5, 🗎 7-28
Empty/clean the wash liquid container	See section 7.6.5, 🗎 7-28

Performing the Checks and Tasks

1. Check if the run has been terminated without any error (check for error messages).
2. Empty and clean the reagent troughs.
3. Empty and clean the waste container and rinse it with ethanol.
   Refer to cross references above.

6.3.8 Switching Instrument Off

Cross References

List of cross references to information provided in other sections:

Action	Reference
Maintenance tasks	7 “Preventive Maintenance and Repairs”, 🗎 7-1

Before switching off the instrument, some maintenance tasks might need to be performed, e.g. liquid system rinsing. 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:

- Press the auxiliary power switch.

6.3.9 When a Crash Occurred

When a crash occurred, consult chapter 8.1 “Troubleshooting Table”, 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.

6.4 Recommended Use of Freedom EVO 75

General Information

This section is intended as a guide to building your SOP (Standard Operating Procedure). It requires observance of the instructions in the operating manual. Any modifications of the tests in your application software must be carried out by Tecan trained staff or application specialists.

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 EVO 75 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

Crash or erroneous process results

The Freedom EVO 75 requires accurate positioning of all reagents, samples, racks, and plates on the worktable. The corresponding positions must be taught properly in the application software.

- Verify these positions accordingly before executing any program.

ATTENTION

Undetected pipetting errors (e.g. due to incorrect tip height)

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

ATTENTION

Cross-contamination due to inefficient wash procedure

If wash steps are included in your process, verify the efficiency of your wash procedure.

6.4.2 Instrument Preparation

Cross References

List of cross references to information provided in other sections:

Action	Reference
System liquid requirements	See section 3.4.3 “System Liquid Requirements”, 🗎 3-14

System Liquid

- The standard system liquid is deionized water, alternatively mixed with a small portion of isopropanol.
  Refer to cross references above.
- The system liquid must be free of particles. Use clean containers only.

Note: *Air bubbles in the system are often the cause of insufficient pipetting precision. Air bubbles can be caused e.g. by replenishing with cold system liquid, or by insufficient circulation of the system liquid.*

- The system liquid must be free of air bubbles.
- It is recommended to fill the system liquid into its container one day before use, and place the system liquid container beside the worktable. This allows the system liquid to attain ambient temperature, for optimal pipetting results.
- Degassing the system liquid is also recommended to optimize results. For further information contact the responsible application specialist.
- When establishing an application, it is recommended to make sure that under the current conditions the pipetting accuracy is sufficient.
- If pipetting accuracy is insufficient, we recommend improving it by positioning the system liquid container at worktable height.

Worktable

- Only Tecan approved carriers should be placed on the worktable. No other object should remain on the worktable during operation.
- All carriers must be in close contact with the worktable, so that the capacitive liquid detection is guaranteed. Regular cleaning of carriers and worktable ensures good contact between the surfaces. Carriers and racks must not show any sign of mechanical damaging.
- Plates must be positioned correctly on the carrier, seated well in their holder. Make sure that the plate is not resting on the holder rim or otherwise in skew position.
- Check the DiTis for **transport or storage damages**. Damaged packing can be indicative of such problems. The packing must be opened, and the DiTis must be checked:
  - the DiTis must not be damaged
  - the DiTis must not be bent.
- Ensure that the DiTis to be loaded onto the carriers correspond to the ones indicated in the application software (size, with filter/without filter).

ATTENTION

DiTi crash/erroneous pipetting results due to incorrect DiTi types.

- Do not confuse the different DiTi types.
- Pay attention to the labels on the DiTi boxes/packaging.

In the application software, the following rack parameters are predefined:

Tab. 6-1 *Racks for test tubes*

Striprack	Test tube diameter, outside
with black insert	10 mm
with blue insert	13 mm
without insert (white)	16 mm

Note: *In the case of deviating parameters, these values must be adjusted in the application software.*

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

ATTENTION

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

Rack Configuration in the Application Software

- Make sure that the log file function is always switched on.
- It is recommended to have the user management function always switched on. This prevents unqualified or untrained operators from making undesired changes in the application.
- Make sure that all coordinates (X, Y, Z) of the carriers/racks/containers have been calibrated carefully. Well calibrated carriers/racks/containers help avoiding collisions and malfunction.

- Setting of Z-heights:

Z-travel

A carrier’s Z-travel is the unobstructed Z-height above any obstacles that go with this carrier.

Z-dispense

Z-dispense is the Z-height from which liquid is dispensed from the air. It should be adjusted to a height from which no droplets can fall into adjacent cavities.

Z-start

Z-start is the Z-height at which liquid detection is activated.
Z-start must be situated at least 1 mm below the cavity rim and above the liquid level. The plate, for which Z-start is defined 1 mm above the cavity rim, is an exception to this rule.

Z-max

Z-max is the Z-height which lies as close as possible to the lowest cavity point without touching the cavity bottom.

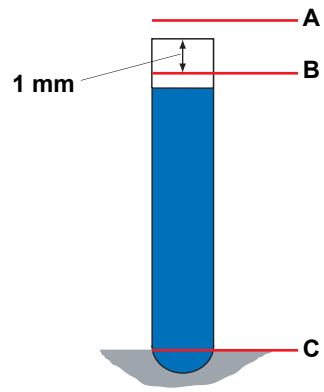


Fig. 6-4 *Sample tube Z-heights*

A *Z-travel*
B *Z-start, Z-dispense*
C *Z-max*

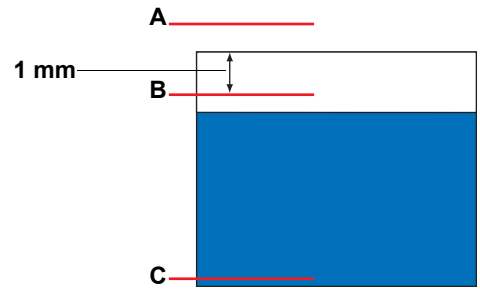


Fig. 6-5 *Reagent trough Z-heights*

A *Z-travel*
B *Z-start, Z-dispense*
C *Z-max*

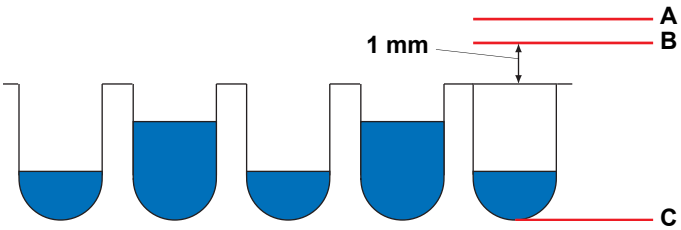


Fig. 6-6 *Plate Z-heights*

A *Z-travel*
B *Z-start, Z-dispense*
C *Z-max*

The use of deviating parameter values must be discussed with the responsible application specialist.

Cylindric or cuboid-shaped cavities allow for optimal tracking. When using differently shaped cavities, their inner dimensions and their immersion depth must be optimized.

The inner diameter of the cavities (or of test tubes) must be calibrated carefully and typed in the corresponding data fields.

Preparation of Samples

- The samples must be free of:
  - blood clots
  - foam
  - droplets or liquid films on the tube wall
- Centrifuging the samples before pipetting is recommended to remove foam, droplets or liquid film and to pellet clots.

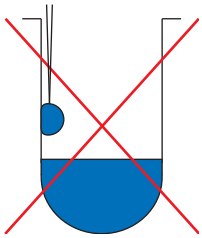


Fig. 6-7 *Droplet on Wall*

- It is recommended to fill the sample tubes to maximum 80%.
- We advise against using non-conductive inserts or covers with the sample tubes.

Fill Level of Cavities

To ensure safe handling (e.g., movement by PosID, transport by means of RoMa, PnP, etc.) of the containers, make sure that the fill level of the cavities does not exceed the following limits:

- Fill the sample tubes to a maximum of 80 %.
- Fill plates to a maximum of 80 % of the cavity volume
- Fill reagent troughs at maximum to the specified volume (e.g. 100 ml trough: 100 ml equals approx. 90 % of the total trough volume)

6.4.3 Liquid Handling

Cross References

List of cross references to information provided in other sections:

Action	Reference
Minimum pipetting volumes	See section "Free Dispense Volumes", 3-17
Minimum volume for liquid detection	See section "Liquid Level Detection", 3-20
Process Validation	See section 6.4.1 "Process Validation", 6-11

This information is valid for Tecan one or two-channel pipetting instruments with 1000 µl syringes.

ATTENTION

Crash or erroneous process results
The Freedom EVO 75 requires accurate positioning of all reagents, samples, racks, and plates on the worktable. The corresponding positions must be taught properly in the application software.

- Verify these positions accordingly before executing any program.

ATTENTION

Undetected pipetting errors (e.g. due to incorrect tip height)
Make sure that your test layout is set up as to detect potential pipetting errors, e.g. by means of integrated controls.

ATTENTION

Cross-contamination due to inefficient wash procedure
If wash steps are included in your process, verify the efficiency of your wash procedure (especially the wash efficiency for the MCA multiple tips must be verified).

Minimum Volumes

Pay attention to the minimum volumes for the corresponding tip types.
Refer to cross references above.

Note: *Lower volumes can be dispensed with contact dispense. Please discuss the possibilities with the responsible application specialist.*

Aspiration Speed and Delay/Waiting Time

In order to obtain optimal pipetting results, the following settings for aspiration speed and delay/waiting time must be considered:

- Recommended slow aspirating speed between 30 and 200 µl/s.

Tab. 6-2 Examples for recommended aspirating speed

Aspiration speed	Pipetted volume
30 µl/s	**10 µl**
70 µl/s	**100 µl**
150 µl/s	**500 µl**
150 µl/s	**750 µl**
200 µl/s	**1000 µl**

- Sufficient delay after aspiration, recommended delay is between 300 and 1000 ms.
- When working with viscous samples and solutions like serums or highly concentrated reagents, observing a delay of ≥ 500 ms is recommended.
- Very high viscous liquids may require lower aspiration speed.

Submerge

If the liquid level is used as reference for the aspiration position, the submerge should be adapted to the container:

- Plates: 1 mm
- Sample tubes: 2 mm
- Reagent troughs: 3 mm

Example: *In Freedom EVOware, this is achieved by adapting the setting for the offset of the expression "Aspiration Position", e.g. liquid level ± offset 2 mm in the appropriate liquid class.*

Air gaps

The following table shows the recommended air gap volumes:

Tab. 6-3 Recommended air gap volumes

Tip Type	Mode	STAG	LAG	TAG
Standard tip	Single	Σ (sum) ≤ 30 µl		5–20 µl, 10 µl ideal
	Multi	Σ (sum) ≤ 30 µl		0 µl
DiTi 10 µl	Single	20 µl	5 µl	10 µl
	Multi	10 µl	0 µl	0 µl
DiTi 200 µl	Single	Σ (sum) ≤ 30 µl		5-20 µl, 10 µl ideal
	Multi	Σ (sum) ≤ 30 µl		0 µl
DiTi 1000 µl	Single	Σ (sum) ≤ 30 µl		5-20 µl, 10 µl ideal
	Multi	Σ (sum) ≤ 30 µl		10-20 µl

STAG *System trailing air gap* ***LAG*** *Leading air gap*
TAG *Trailing air gap*

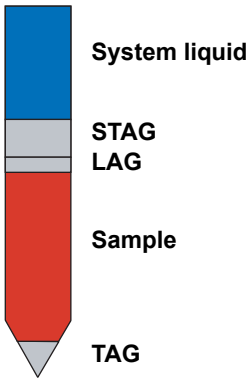


Fig. 6-8 *Air gaps in tip*

Dispense and Breakoff Speed and Waiting Time

In order to obtain optimal pipetting results using the standard pipetting method (free dispense), the following settings are recommended:

- Fast dispense speed is between 250 and 600 µl/s.
  Ideal dispense speed: ≥ 400 µl/s
- The ideal breakoff speed is 70% of the dispense speed.
  Minimum breakoff speed: ≥ 150 µl/s
- Sufficiently long delay when using viscous samples and solutions like serums or highly concentrated reagents ≥ 200 ms.
- Very high viscous liquids may require lower dispense speed and dispense in contact mode.

Multi Pipetting

The term **Multi Pipetting** designates the pipetting method which aspirates once and then dispenses several aliquots. For this pipetting method, all the rules listed in this section apply. In addition, the following parameters are needed:

- A **conditioning volume** is needed, to attain for the first aliquot the same conditions as for all the following aliquots.
  The recommended conditioning volume is ≥ 30 µl, or is ideally of the same volume as one aliquot.
  The conditioning volume is dispensed back into the original container or into the wash station.
- An **excess volume** is used to attain for the last aliquot the same conditions as for all the preceding aliquots.
  The recommended excess volume is ≥ 30 µl. Ideally it amounts to 15% of the total volume.
  The excess volume is either dispensed back into the original container or into the wash station.

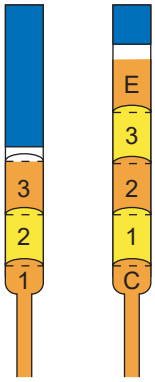


Fig. 6-9 *Conditioning and excess volumes*

1,2,3 *Aliquots* ***E*** *Excess volume*
C *Conditioning volume*

- Best precision is attained with 4 to 12 aliquots.
- Recommendation: When pipetting aliquots of various volumes using the multiple dispense mode, dispense the smaller volumes earlier than the larger volumes. The largest volume is then the last to be dispensed.

Liquid Detection

- Liquid detection should always be switched on. Switching off the liquid detection function should be discussed with the responsible application specialist.
- Liquid detection depends on liquid conductivity. The following sensitivity settings must be used:

Tab. 6-4 *Sensitivity settings for liquid detection*

Conductivity	Liquid	Sensitivity
Very good	Serum, DNA solution, buffer	medium
Good	Tap water	high
Low	DMSO, distilled water	very high

ATTENTION

Wrong liquid level detection may result in the sensitivity setting is too high.

ATTENTION

For critical application use double detection, adapted detection speed, sensitivity setting, and clot detection.

In borderline cases, a lower sensitivity must be chosen.

- There are various modes of liquid detection that can be chosen.
  For security reasons, double detection mode can be used for all cavities and containers (sample tubes, troughs, etc.).
  Maximum security is assured by the following detection modes:
  - Detecting twice with separate tips, with retract
  - Detecting twice with even/odd tips
  - Detecting twice with first tip.
- The use of other liquid detection modes must be discussed with the responsible application specialist.
- For the aspiration, the offset (submerge) must be set as follows:
  - Plates: ≥ 1 mm
  - Sample tubes: ≥ 2 mm
  - Troughs: ≥ 3 mm
- The minimum volumes needed for liquid detection, must be provided.
  Refer to cross references above.
- Each liquid has to be tested in the appropriate labware and corresponding carriers for its detectability before using it. Liquid detection for each channel must be tested.

Clot Detection

- Clot detection must always be switched on during sample aspiration in order to be able to detect possible clogging of the tips by blood clots, etc. The application range of the clot detection depends on the geometry of the sample container as well as on the quantity and adhesion of the aspirated sample liquid.

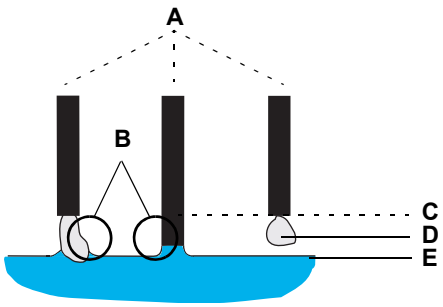


Fig. 6-10 *Adhesion*

A	*Standard tip or DiTi*	***D***	*Clot*
B	*Adhesion*	***E***	*Liquid level*
C	*Limit*		

- To generally prevent problems with clots (clogging of the tips and particles sticking to the tips) the sample containers must be properly centrifuged.
- The clot detection works more reliably if the following volumes of samples to be aspirated are observed:
  - At least 100 µl for sample containers with an outer diameter of 10 mm
  - At least 300 µl for sample containers with an outer diameter of 13 mm
- 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.

Wash

- The wash volume for one wash step should amount to at least 7 ml.
- The wash volume must be checked for each application within the scope of the validation.

Disposable Tips

For disposable tips, all the rules listed in this section apply. The following list contains additionally relevant 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.
- Always use a Trailing Airgap (TAG) when operating with 1000 µl disposable tips. In this case a conditioning volume in multipipetting mode is not necessary.
- Liquids with high vapor pressure require increased sample trailing air gaps. Sometimes, prewetting and decreased temperatures have to be taken into consideration.

ATTENTION

Full system functionality of a Freedom EVO 75 equipped with the DiTi option can only be guaranteed when Tecan disposable tips are used.

6.4.4 Defining Scripts and Processes

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

6.4.4.1 LiHa Arm

High-Density Applications

Vibrations, caused by the movement of other arms, may result in positioning difficulties in high density applications.
If you encounter such difficulties, please contact your local service organization.
In such applications, where the mechanical precision is very critical, speed and acceleration of the arm movements may be adapted accordingly.

ATTENTION

Risk of erroneous process results. High sensitive liquid level detection is not recommended for critical applications.

- Do appropriate process validation.

For appropriate process validation see 6.4 “Recommended Use of Freedom EVO 75”, 6-11.

6.4.4.2 Robotic Manipulator Arm RoMa

If your instrument is equipped with a RoMa arm, pay attention to the following:

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

ATTENTION

Risk of collision. An undefined or incorrectly set home position of the EVOware software will lead to spillage and damage to equipment.

- Make sure the home position has been defined correctly in the EVOware software.

1. Define the home position in the EVOware software. See Freedom EVOware Software Manual section “Defining the Home Position for a RoMa”.
2. Remove objects held by the RoMA grippers.

RoMa Initialization

- Manually position the gripper head in a safe position, half way between the front and the back position before initialization.

Note: *Manual positioning of the RoMa gripper head to a safe position allows the system to initialize without touching (colliding with) the front safety panel or pumps and tubing.*

6.4.4.3 Monitored Incubator Option

All Incubator Configurations

If your instrument is equipped with a Monitored Incubator Option take notice of following:

ATTENTION

Risk of error occurrence. The Freedom EVO 75 is unsuitable for warming up of frozen plates.

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

ATTENTION

Risk of deformation of plates. Non heat-dependent plates will get deformed if heated up.

- Make sure only heat-dependent plates are used for incubation.

Shaker Unit Configuration

If the Monitored Incubator Option is equipped with a shaking Unit take notice of following:

ATTENTION

Risk of parasitic vibrations. Operating the shaker configuration may lead to parasitic vibrations in certain shaking frequencies affecting the pipetting accuracy.

- Only the shaker configuration on stable and steady stands.
- Increase or decrease shaking frequency to avoid parasitic vibrations.

6.4.5 Maintenance

Make sure that your instrument and devices are in a faultless state. Regular maintenance guarantees the high accuracy and precision you require and at the same time minimizes downtime of instrument and devices. For detailed descriptions of the maintenance tasks, refer to 7 “Preventive Maintenance and Repairs”, 7-1 in this Operating Manual.

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 EVO 75 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 EVO 75 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.

Refer to chapter 12 “Customer Support”, 12-1.

Additional Documents

The maintenance work that has been carried out can be recorded in the **Freedom EVO 75 Daily/Weekly Maintenance Checklist and** kept in the **Freedom EVO 75 Maintenance and Service Logbook**.

7.1 Tools and Consumables

WARNING

Fire hazard.

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

ATTENTION

Strong detergents can dissolve carrier and worktable surface coatings.

- For cleaning the instrument, use alcohol or water as cleaning agents.

Commercially Available Cleaning Agents

Tab. 7-1 *Commercially available cleaning agents*

Agent	Agent category	Manufacturer
DNAzap	Disinfectant for surfaces contaminated with nucleic acids	Ambion www.ambion.com
SporGon	Disinfectant	Decon Laboratories www.deconlabs.com
Liqui-Nox	Weak detergent	Alconox www.alconox.com

Cleaning Agents Specifications

Tab. 7-2 Cleaning agents specifications

Agent	Specification
DI water	Distilled or deionized water
Alcohol	70% ethanol or 100% isopropanol (2-propanol)
Weak detergent	e.g., Liqui-Nox
Surface active agent	e.g., Contrad 70, Contrad 2000, Decon 90
Disinfectant	e.g., Bacillol plus, SporGon
Weak acid	e.g., sulfuric acid 0.3 M, 10% acetic acid, 30% to 40% formic acid
Base	e.g., 0.1 mol/l sodium hydroxide
Bleach	6% sodium hypochlorite
System liquid	As defined in the method

Instrument Parts and Cleaning Agents

Tab. 7-3 Cleaning agents application

Instrument part	Cleaning agent
Liquid system, waste system	Water, alcohol, weak detergent, base Suitable for flushing are: Bleach, Contrad 90/Decon, Terralin
Worktable	Water, alcohol, weak detergent, disinfectant, base, bleach
Casing	Water, alcohol, disinfectant
Metal parts	Water, alcohol, disinfectant
Carriers	Water, alcohol, weak detergent, bleach, disinfectant **Use**: Contrad 90/Decon or Bomix for surface cleaning only **Do not use**: Contrad, Decon 90, Bomix, Bleach, SporGon as cleaning bath for carriers (damage to aluminum)
Racks	Water, alcohol, weak detergent, disinfectant
Gripper	Water, alcohol, weak detergent, disinfectant
Tips	Water, alcohol, weak detergent, disinfectant, base
Safety panels	Water, alcohol, disinfectant
DiTi cones	Alcohol
DiTi kit	Alcohol. Dry thoroughly after cleaning
Arm guide, arm guide roller of liquid handling and robotic manipulator arm	Do not use any agent
Z-rack	Do not use any agent

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

7.2 Maintenance Schedule

Note: *To ensure optimum performance and reliability, perform the maintenance and cleaning tasks as recommended in this chapter.*

Maintenance Record

Note: *In order to be able to track all maintenance performed on the Freedom EVO 75 over the instrument lifetime, the periodic maintenance must be recorded as follows:*

- *Fill in the necessary data in the form "Freedom EVO 75 Daily/Weekly Maintenance Checklist".*
- *File the form in the "Freedom EVO 75 Maintenance and Service Logbook".*

Maintenance Tables

The maintenance tasks must be performed at regular intervals—namely, daily, weekly, and half-yearly.

7.2.1 Maintenance: Immediate Maintenance

If the instrument is leaking, switch off power immediately and eliminate the source of leakage. Refer also to section "Checking the Liquid System for Leaks", 🗎 7-9.

7.2.2 Maintenance Table: Daily Maintenance

At Beginning of Day

Tab. 7-4 *Daily maintenance in chronological order*

Instrument/ Component	Maintenance Task	Reference
Liquid system	Check for leakage	See section "Checking the Liquid System for Leaks", 🗎 7-9
	Check and tighten the tubing connections	See figure in 7.4.1 "Liquid System", 🗎 7-8
Diluters and Syringes	Check and tighten syringes and plunger lock screws	See section 7.9.2 "Diluter", 🗎 7-36
Tips	Clean	See section "Cleaning the Fixed Tips", 🗎 7-12
	Check for damage	See section 7.4.2 "Fixed Tips of LiHa", 🗎 7-12
DiTi-Cones	Clean	See section "Cleaning the DiTi Cones", 🗎 7-16
	Check for deposits and remove if present.	

Tab. 7-4 Daily maintenance in chronological order (cont.)

Instrument/ Component	Maintenance Task	Reference
	Check and tighten if necessary	See section 7.4.4 “Disposable Tip Cone, DiTi cone”, 7-16
System liquid container	Make sure that it is full	
Waste container	Make sure that it is empty	
Liquid system	Flush	See section 7.4.1.1 “Flushing the Liquid System”, 7-10
	Check for air bubbles	See section 7.4.1.1 “Flushing the Liquid System”, 7-10
RoMa	Visually check grippers for deformities and damage	Call Tecan customer service if damaged

At End of Day

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

Instrument/ Component	Maintenance Task	Reference
Tips[a)]	Clean inside and outside	See section 7.4.2 “Fixed Tips of LiHa”, 7-12
	Clean standard tips	Caustic soda solution (1% NaOH)
	Check all tubing, tubing connections, syringes and DiTis for leakages	See section “Checking the Liquid System for Leaks”, 7-9
Carriers and racks	Clean using a detergent or antiseptic solution	
Worktable	Clean using a detergent or antiseptic solution	
Worktable extension	Clean using a detergent or antiseptic solution	
Safety panel	Clean with DI water, alcohol or weak detergent	
Wash station	Clean using a detergent or antiseptic solution	See section 7.6 “Wash Stations”, 7-22
Lower DiTi eject option	Clean rocker	See section 7.6.6 “Lower DiTi Eject Option”, 7-29
System liquid container	Rinse with water and fill up	

Tab. 7-5 Daily maintenance at end of day in chronological order (cont.)

Instrument/ Component	Maintenance Task	Reference
Waste container	Clean using a detergent or anti-septic solution	See section 7.6.5 “Liquid Containers”, 7-28
RoMa	Clean grippers using alcohol or acetone	
Liquid system	Check for leakages after every 8 hours of operation	See section “Checking the Liquid System for Leaks”, 7-9
	If liquids other than water are used as system liquid, flush with deionized water	See section 7.4.1.1 “Flushing the Liquid System”, 7-10

a) If you work with disposable tips, clean the part of the adapter in contact with liquid

7.2.3 Maintenance Table

Weekly Maintenance

Tab. 7-6 Weekly maintenance

Instrument/Component	Maintenance Task	Reference
Liquid system	Clean	See section 7.4.1.2 “Cleaning”, 7-11
System liquid container	Empty and clean	See section 7.6.5 “Liquid Containers”, 7-28
Waste container	Empty and clean	See section 7.6.5 “Liquid Containers”, 7-28
Liquid handling arm LiHa/1 and LiHa/2	Clean front arm guide	See section 7.6.7 “Arm Guide”, 7-30
Liquid handling arm LiHa/8+1	Clean front arm guide	See section 7.6.7 “Arm Guide”, 7-30
Robotic manipulator arm RoMa	Clean front arm guide	See section 7.6.7 “Arm Guide”, 7-30

Note: *The weekly maintenance should be performed on the last working day of each week.*

Yearly Maintenance

The yearly ensures on-going optimal accuracy and precision and minimizes instrument downtime. It also helps to prolong the life-span of the instrument.

Please contact the local Tecan service organization to schedule the yearly maintenance appointment. Refer to 12 “Customer Support”, 12-1.

7.2.4 Worktable Extension

Weekly Maintenance

Instrument/Component	Maintenance Task	Reference
Worktable Extension - Liquid Containers	Clean liquid containers	See section 7.6.5 “Liquid Containers”, 🗎 7-28
Worktable Extension - Tubing system	Check tubing system for leakage	See section 7.6.5 “Liquid Containers”, 🗎 7-28
Worktable Extension - Washerchannels	Rinse washer via distribution channel	See section 7.7.2 “Rinsing the Washer via the Distribution Channel”, 🗎 7-31 or 7.7.3 “Rinsing the Washer without Special Maintenance Program”, 🗎 7-33

7.3 Access Panel and Door

The following section describes the interactions with panels and doors to perform the Freedom EVO 75 maintenance tasks.

7.3.1 Front Safety Panel

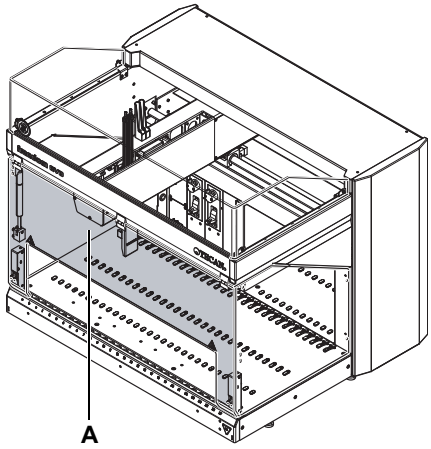


Fig. 7-1 Front safety panel

The front safety panel door locks are connected to the safety circuit. Opening the front safety panel during operation will lead to a immediate stop.

1 Open the front safety panel.

The front safety panel is held open by a gas spring.

7.3.2 Front Access Door

ATTENTION

Risk of damage to equipment. Cables and auxiliary power switch assembly can break if flexed, pulled or bent excessively.

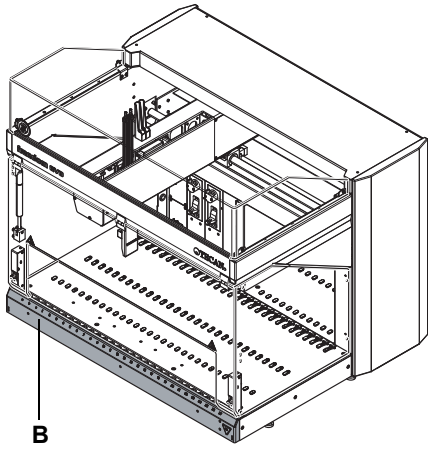


Fig. 7-2 Front access panel

***Note:** Pull the front access door to the mechanical stop before swiveling downwards.*

1 Open the front access panel (P).

7.4 Maintenance Tasks

WARNING

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

- Always switch off the instrument for maintenance tasks or to clean the instrument surfaces, e.g. worktable, instrument panels etc.
- Never clean the instrument while it is switched on.

7.4.1 Liquid System

Cross References

List of cross references to information provided in other sections:

Action	Reference
Chemical resistance of the tubing material	See section 3.4.3 “System Liquid Requirements”, 3-14
Lock nut tightening	See section 7.4.2 “Fixed Tips of LiHa”, 7-12
DiTi cone tightening	See section 7.4.3 “Disposable Tip, DiTi”, 7-15
Syringe and plunger lock screw tightening	See section 7.9.2 “Diluter”, 7-36
Flushing the liquid system	See section 7.4.1.1 “Flushing the Liquid System”, 7-10
Replacing the fixed tips	See section “Replacing Fixed Tips”, 7-12

The liquid system is leaking:

- when liquid droplets are hanging on to the DiTi cones before the instrument is switched on or when it is in stand-by mode.
- when 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.

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

ATTENTION

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

- Never operate the Freedom EVO 75 if the liquid system is leaking.

Checking the Liquid System for Leaks

To check the liquid system for leaks. proceed as follows:

1 Make sure that the container is full with degassed system liquid at room temperature.

2 Freedom EVOware: Flush the liquid system (refer to cross references above) and observe the tips or DiTi cones for 1 minute. If no droplets are formed, the liquid system is tight.

Alternatively, use maintenance script in application software (tightness test for DiTis).

If the system is leaking, do the following:

3 Tighten the lock nut and the DiTi cones.

Refer to cross references above.

4 Tighten syringe and plunger lock screw.

Refer to cross references above.

5 Tighten the tubing connections (see arrows) of LiHa/1 and LiHa/2.

6 Recheck the liquid system for leaks as described above.

7 If the system is still leaking, call a Tecan authorized field service engineer.

Note: *Tightening tubing-valves connections is not applicable for the LiHa/8+1*

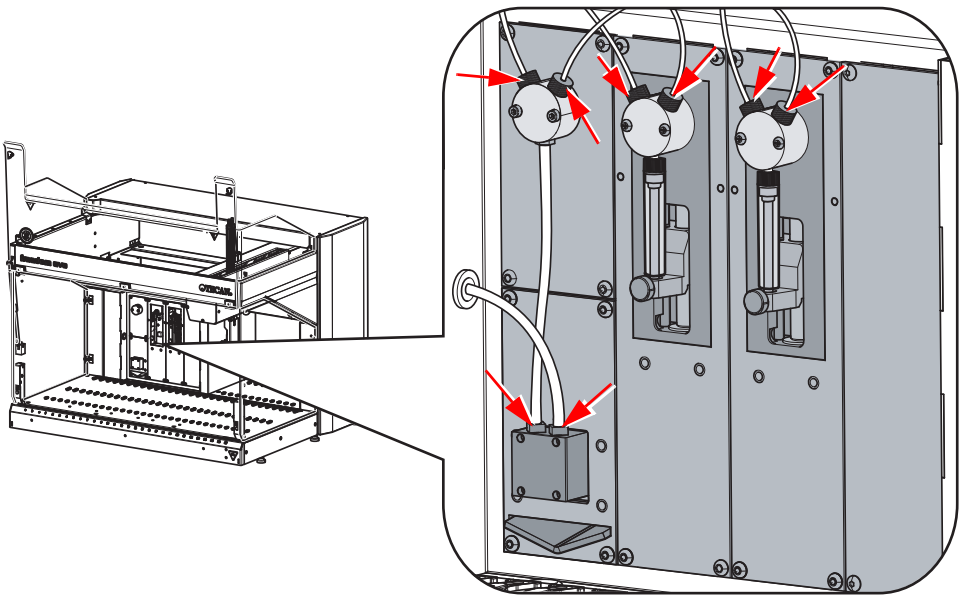


Fig. 7-3 *Tubing connections*

7.4.1.1 Flushing the Liquid System

When to Flush

Air bubbles in the liquid system may ensue when the instrument is idle. Flushing eliminates potential bubbles:

- During start-up or after more than 2 hours in standby mode
  - 50 ml using the Fast Wash pump
  - 5 ml using the diluter
- Before starting a new run
  - 20 ml using the Fast Wash pump
  - 2 ml using the diluter

Flush Procedure

To flush the liquid system:

1. Make sure that the system liquid container is full.
2. Switch on the instrument and start the application software.
3. Flush the liquid system with the following settings:
   - Volume: As recommended above
   - Use Fast Wash pump (if available)
4. Click **Execute**.

   The liquid system is flushed.
5. During flushing, carefully observe the tubing. If necessary, gently move the tubing to make sure all air bubbles are removed.
6. If there are still air bubbles in the tubing, repeat steps 3 - 5.

ATTENTION

Air bubbles in the liquid system cause pipetting inaccuracy.

- Never operate the Freedom EVO 75 with air bubbles in the liquid system.

7.4.1.2 Cleaning

Cleaning the Liquid System

To prevent growth of micro-organisms in the liquid system, we recommend cleaning the liquid system once a week. Depending on your application you can fill the system with one of the following agents (water is used as system liquid):

- Mild detergent
- Weak acid and base in sequence
- Disinfectant

Note: *If a system liquid other than de-ionized water is used, confirm the suitability of the cleaning agents with the manufacturer.*

To fill the liquid system and allow the agent to react, proceed as follows:

1. Place the tubing in a bottle with the cleaning agent and flush the liquid system twice.
   Refer to cross references above.
2. Allow the cleaning agent to react for at least 10 minutes.
3. Place the tubing in a bottle with distilled or de-ionized water and flush the liquid system twice.
   Refer to cross references above.
4. Flush the liquid system eight times with system liquid.
   Refer to cross references above.

7.4.2 Fixed Tips of LiHa

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 Z-rack up to their topmost position.
4. Move Z-rack towards the front of the instrument.

Removal

To remove a fixed tip, proceed as follows:

1. If an adjustable tip is installed on the system, loosen the four tip adjustment screws.
2. Unscrew lock nut, holding the tip immediately below the lock nut with the other hand.

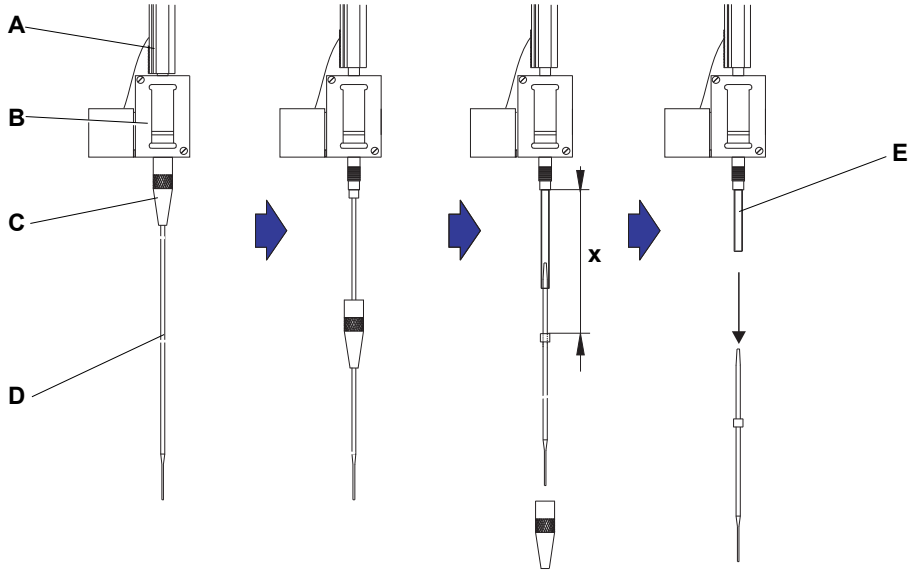


Fig. 7-4 *Standard tip removal*

A *Z-rack*
B *Tip adapter*
C *Lock nut*
D *Tip*
E *Pipetting tubing*

3. Remove the lock nut by moving it along the tip axis, avoiding contact between the lock nut and the tip coating.
4. Pull pipetting tubing some distance (x) out of the tip adapter by pulling on the tip.
5. If the tip is adjustable, turn the lock nut upside down above a clean surface to remove the O-ring and the PTFE washer. Make sure that both the O-ring and the washer are no longer inside the lock nut.

   Hold the tip at its upper end when pulling.
6. 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:

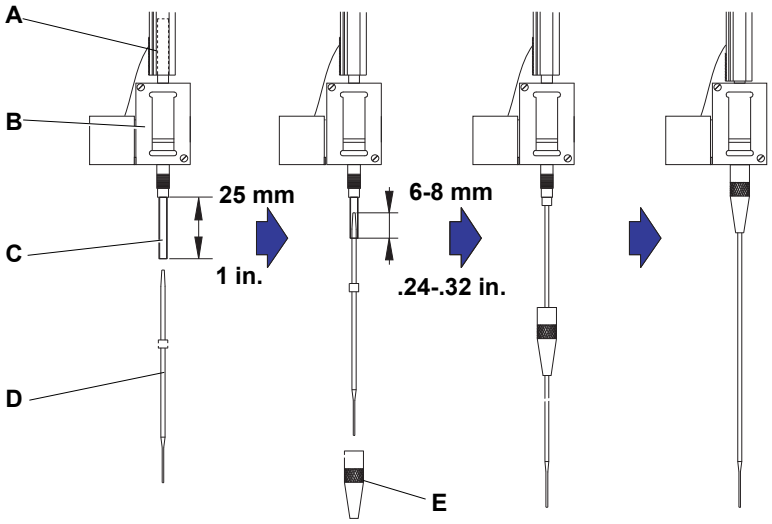


Fig. 7-5 *Standard tip installation*

A	*Z-rack*	***D***	*Tip*
B	*Tip adapter*	***E***	*Lock nut*
C	*Pipetting tubing*		

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.

7.4.3 Disposable Tip, DiTi

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.

7.4.4 Disposable Tip Cone, DiTi cone

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 instrument 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 of the DiTi adapter.

- Disposable tip cones can get wet or contaminated, and in time, deposits on the cone can result in tip pick-up problems and can clog the tubing extension.

Cleaning and Inspection

Cleaning the DiTi Cones

Do instructions below for the DiTi cone maintenance.

1. Clean DiTi cones with a lint-free tissue and isopropanol alcohol.
2. Visually check during daily maintenance that disposable tip cones and the protruding tip, i.e. tubing extension are clean and free of all deposits.
3. If deposits are visible, remove DiTi cone and
   - disassemble and thoroughly clean the disposable tip adapter.
   - replace critical components every 6 months; use disposable tip preventive maintenance set.

Disposable Tip Pick up Adapter

The disposable tip adapter is used to pick up and discard 10 µl, 200 µl and 1000 µl disposable tips. The tip adapter automatically checks for correct tip pickup.

Removal

To remove the DiTi adapter:

1. Hold the tip adapter while unscrewing the DiTi cone, using the supplied cone wrench.
2. Remove Tip Ejector Tube.
3. Free approx. 2 cm of tubing by pulling down the tubing extension.
4. Pull the tubing extension off the tubing, unscrew the adapter cylinder.

Installation

For the DiTi pickup mechanism installation:

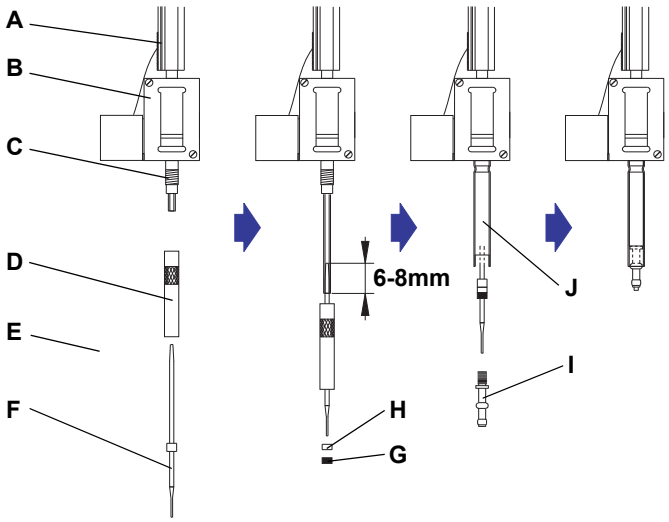


Fig. 7-6 *DiTi pick up mechanism installation*

A	*Z-rack*	***F***	*Tubing extension*
B	*Tip adapter*	***G***	*O-ring*
C	*Thread*	***H***	*Separator ring (white)*
D	*Adapter cylinder*	***I***	*DiTi cone*
E	*Pipetting tubing*	***J***	*Tip ejector tube (outer rim pointing upwards)*

1. Switch off the instrument and open the front safety panel.
2. Manually move the Z-rack to its upmost position.
3. Move it towards the front of the instrument.
4. Pull pipetting tubing approx. 2 cm out of the tip adapter.
5. Screw adapter cylinder (knurled part up) onto tip adapter.
6. Tighten the adapter cylinder slightly.
7. Push conical (blank) part of the tubing extension 6 - 8 mm (0.23 - 0.31 in) into the tubing.
8. Insert tubing into adapter cylinder.
9. Slide separator ring and O-ring onto tubing extension.
10. Glide tip ejector tube, outer rim pointing upwards, over adapter cylinder and fasten with DiTi cone.
11. Tighten carefully, using supplied cone wrench.

7.4.5 8 Plus 1 Access Liquid Handling Arm

7-Tip Array Tip Cone

The following procedure describes the replacement of the 8 Plus 1 Access DiTi cones of 7-tip array.

Removal

To remove the DiTi cone, proceed as follows:

1 Empty the liquid system:
   – Pull tube out of system liquid container.
   – Flush the liquid system with air by running the EVOware direct command **Flush** with:
      • 50 ml using the Fast Wash pump
      • 5 ml using the diluter
2 Switch the instrument off.

ATTENTION

Risk of damage to equipment. Damaged and incorrectly installed O-rings respectively ejector blocks will lead to malfunctions or contamination.

◆ Only remove one DiTi cone at a time

3 Remove the DiTi cone (A) and the O-ring (B) with the DiTi cone key (W) Fig. 7-7 , 🗎 7-18.
4 Discard the O-ring (B) Fig. 7-7 , 🗎 7-18.

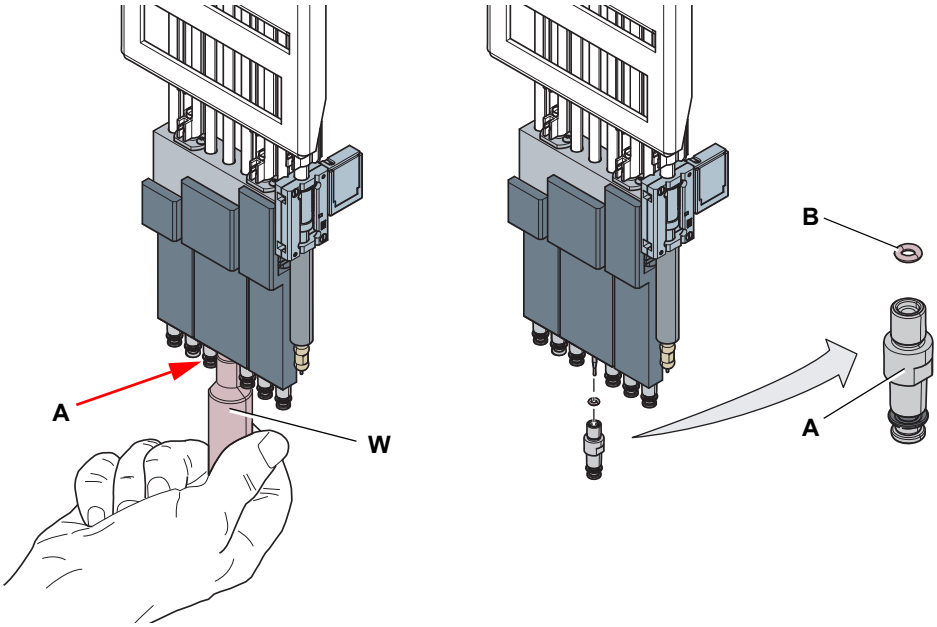


Fig. 7-7 *7-tip array, DiTi cone removal*

ATTENTION

Risk of damage to equipment. Damaged or scratched DiTi cone surfaces will lead to leakage and contamination.

- Use caution that surfaces are not scratched during the removal procedure

ATTENTION

Risk of damage to equipment. Damaged O-rings will lead to leakage and contamination.

- Make sure that O-rings are not damaged by finger nails

Installation

5 Apply the O-ring (B) into the DiTi cone (A) Fig. 7-8 , 🗎 7-19.

6 Install the new DiTi cone (A) onto LiHa pipetting head with the DiTi cone key (W) Fig. 7-8 , 🗎 7-19.

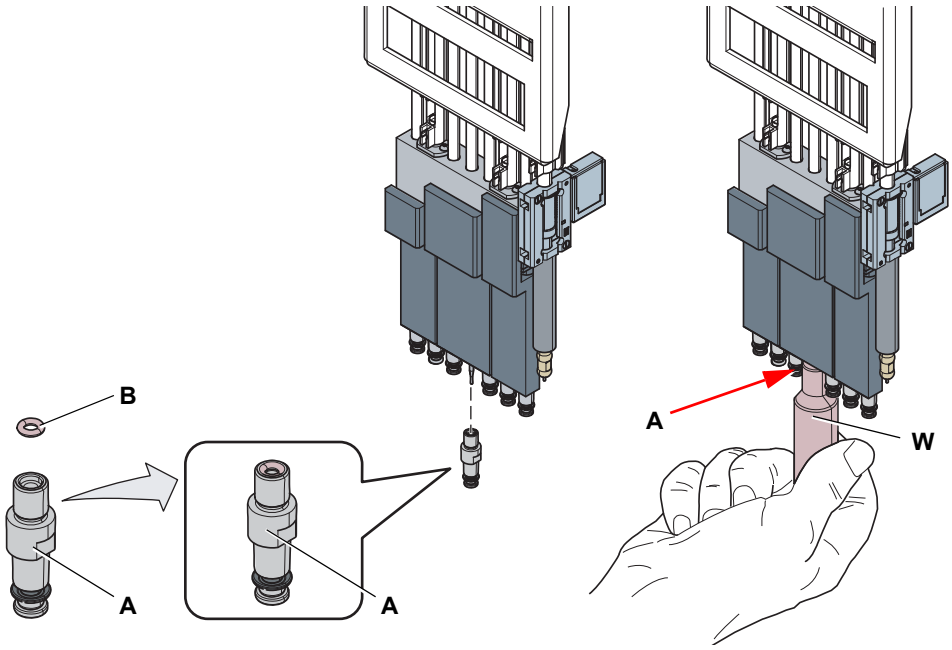


Fig. 7-8 *7-tip array, DiTi cone installation*

Note: *Repeat the procedure for the other DiTi cones if required.*

7.5 DiTi Waste Bag

Follow the respective procedure to change the DiTi waste bag:

- “Wash Station with DiTi Slide Bag”, 🗎 7-20
- “DiTi Carrier with Waste Slide Bag”, 🗎 7-21

Wash Station with DiTi Slide Bag

Bag Housing removal

1 Lift the fastener (C) to remove the bag housing (B) Fig. 7-9 , 🗎 7-20.

Note: *DiTi waste bags need to be disposed according to your country's hazardous waste regulations and laboratory guidelines.*

2 Remove and dispose the waste bag (A) appropriately Fig. 7-9 , 🗎 7-20.

Installation

3 Install a new DiTi waste bag (A) into the empty bag housing (B) Fig. 7-9 , 🗎 7-20.

4 Install the bag housing (B) onto the DiTi waste slide Fig. 7-9 , 🗎 7-20.

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.*

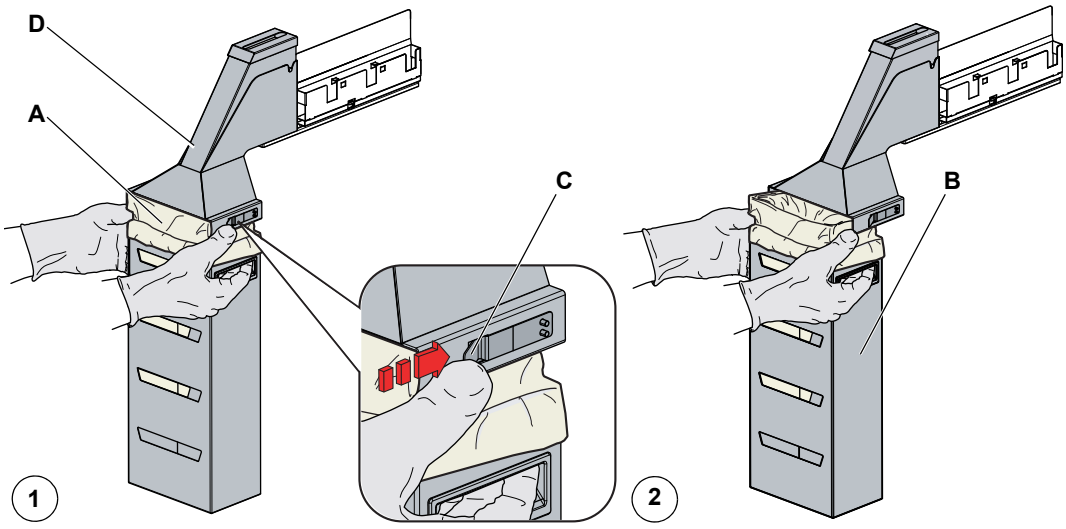


Fig. 7-9 *Changing the waste bag*

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

DiTi Carrier with Waste Slide Bag

Bag Removal

1 Lift the fastener (C) to remove the waste bag (A) Fig. 7-10 , 🗎 7-21.

Note: *DiTi waste bags need to be disposed according to your country's hazardous waste regulations and laboratory guidelines.*

2 Dispose the waste bag (A) appropriately Fig. 7-10 , 🗎 7-21.

Installation

3 Install and secure, a new DiTi waste bag (A) onto the DiTi waste slide (B), with the fastener (D) Fig. 7-10 , 🗎 7-21.

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.*

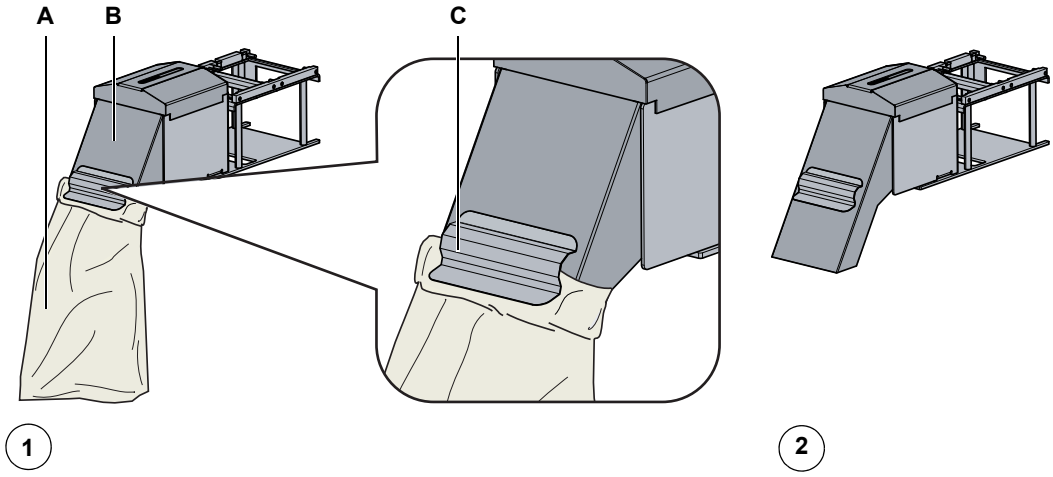


Fig. 7-10 *Changing the waste bag*

A *Waste bag*
B *DiTi waste slide*
C *Fastener*

7.6 Wash Stations

Note: *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.*

7.6.1 Cleaning the Wash Stations

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Clean worktable	See section 7.2.3 “Maintenance Table”, 7-5
Opening the front access panel	See section 7.3.2 “Front Access Door”, 7-7

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.
The Freedom EVO 75 can be equipped with different wash stations requiring other maintenance tasks.

Follow the sub steps below to clean the wash stations:

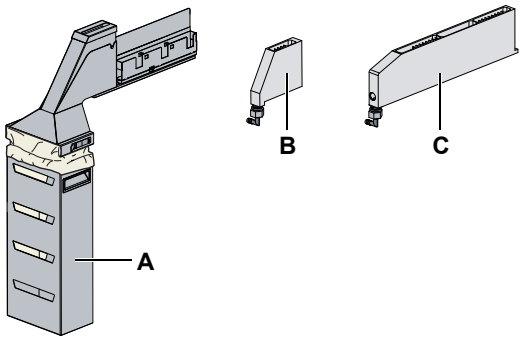


Fig. 7-11 *Wash station types*

A *Wash station with DiTi slide*
B *Wash station small (1 grid)*
C ***Wash/waste station, standard (1 grid)***

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.*

The wash station can be cleaned on the worktable.

- Wipe the surface of the wash station with a suitable cleaning agent (e.g. water, alcohol, disinfectant) to remove any spilled reagent.

If necessary, rinse the wash station and clean it additionally with water or alcohol.

Wash Station (with out DiTi Slide)

Removal

Remove the wash station as follows:

Note: *Pull the front access panel to the mechanical stop before swiveling downwards.*

ATTENTION

Risk of damage to equipment. Cables and auxiliary power switch assembly can break if flexed, pulled or bent excessively.

1 Open the front access panel.
Refer to cross reference above

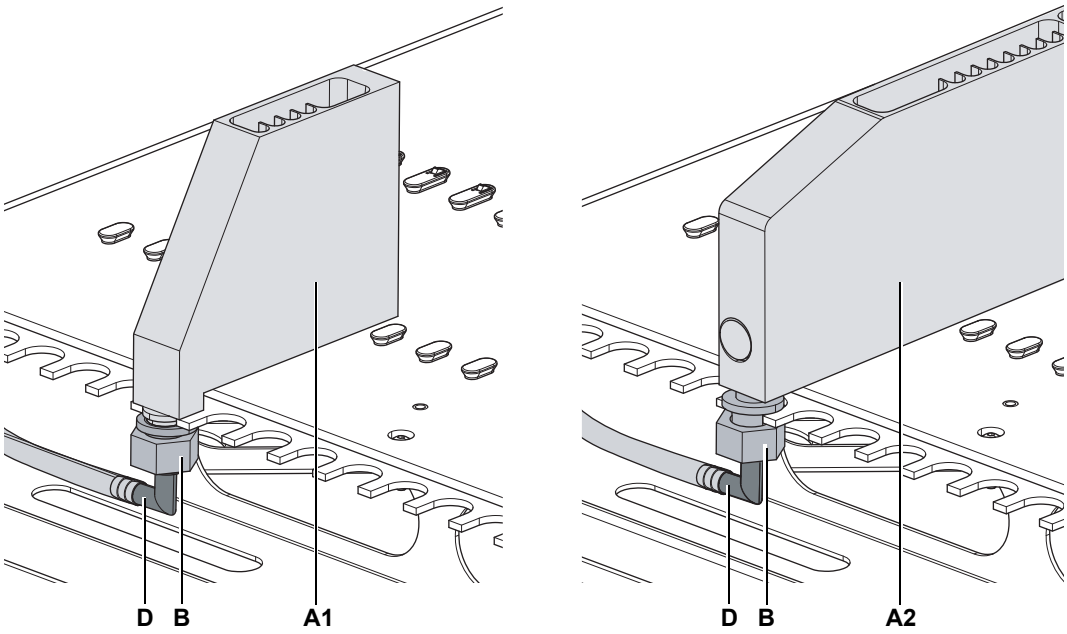


Fig. 7-12 *Wash station types*

2 Loosen the nut (B) Fig. 7-12, 🗎 7-23.

Note: *Pull the wash station (A1) respectively (A2) to the front until it disengages.*

3 Pull the waste tubing connector (D) out of the wash station Fig. 7-12, 🗎 7-23.
4 Remove the wash station (A1) respectively (A2) from the worktable Fig. 7-12, 🗎 7-23.
5 Clean the wash station as described above.
6 Clean the worktable.
Refer to cross references above.

Installation

7 Reinstall the wash station (A1) respectively (A2) on the worktable.
Make sure that the wash station is pushed all the way back to the stop.

8 Tighten the nut (B) Fig. 7-12, 🗎 7-23.

9 Close front access panel (P) Fig. 7-12, 🗎 7-23.

Wash station with DiTi slide

Cleaning the DiTi Waste Slide

Follow the sub steps below for the cleaning procedure.

1 Remove the DiTi waste cover (A) Fig. 7-13 , 🗎 7-24.

Note: *Use caution when removing the DiTi waste slide. Contaminating substances and DiTi could fall.*

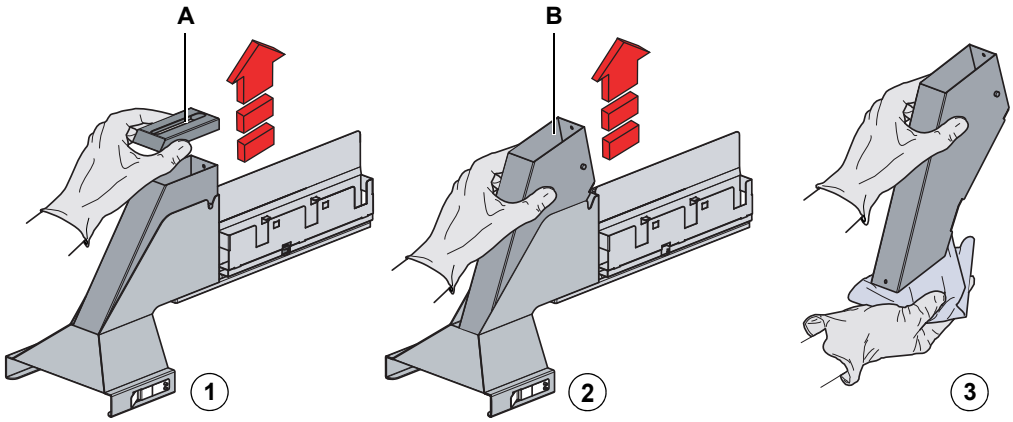


Fig. 7-13 *Removing the DiTi waste and slide*

A *DiTi waste Cover* ***B*** *DiTi Slide*

2 Remove the DiTi waste slide (B) Fig. 7-13 , 🗎 7-24.

3 Clean and rinse the DiTi waste slide.

4 Reinstall the DiTi waste slide (B) and DiTi waste cover (A) Fig. 7-13 , 🗎 7-24.

Wash Station as Integral Part of the DiTi Waste and Wash Station

The wash station might be contaminated with residua from reagents and samples, which need to be removed. Follow the sub steps below to remove and clean the the wash station.

Removal

1 Press the quick release fastener (A) and pull the wash station (B) to the mechanical stop until it disengages (see arrow) Fig. 7-14, 🗎 7-25.

2 Completely remove the wash station (B) (see arrow) Fig. 7-14, 🗎 7-25.

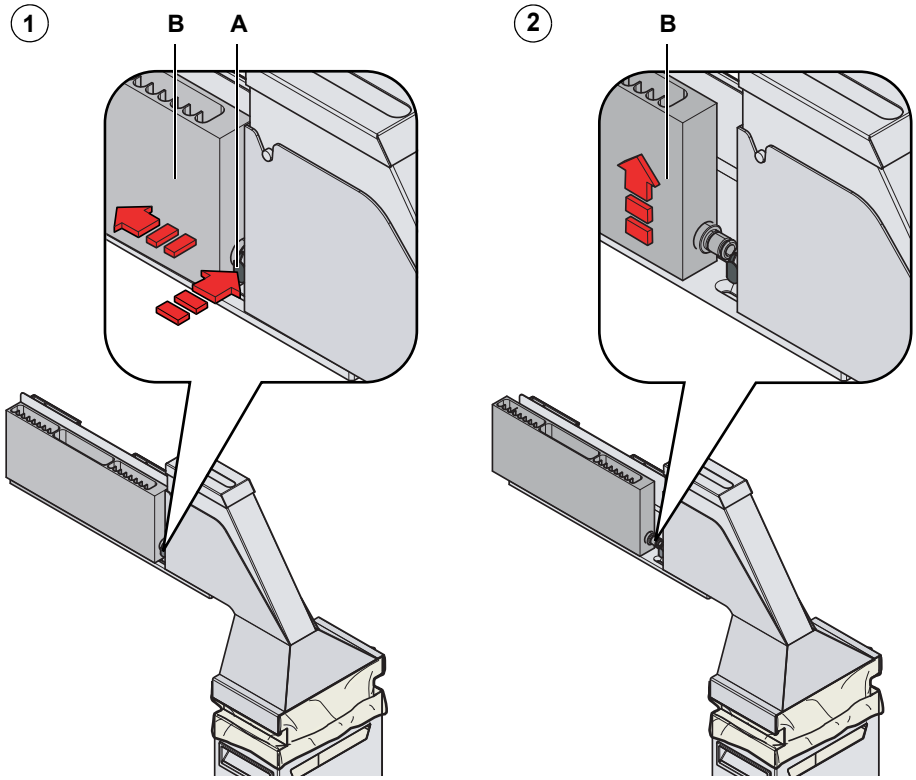


Fig. 7-14 *Removing the wash station from the worktable*

A *Quick release fastener* ***B*** Wash station

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 Reinstall the wash station (B) to the designated position while keeping the quick release fastener (A) pressed Fig. 7-14, 🗎 7-25.

DiTi Waste Unit

Removal

Follow the sub steps below to remove the DiTi waste Unit

Subject	Reference
Removing and cleaning the waste slide	See section "Cleaning the DiTi Waste Slide", 7-24
Removing the bag housing	See section "Wash Station with DiTi Slide Bag", 7-20
Opening the front access panel	See section 7.3.2 "Front Access Door", 7-7

6 Remove the DiTi waste bag housing.
Refer to cross reference above

7 Remove the DiTi waste slide.
Refer to cross reference above

8 Pull and hold the quick release lever (C) Fig. 7-15 , 7-26.

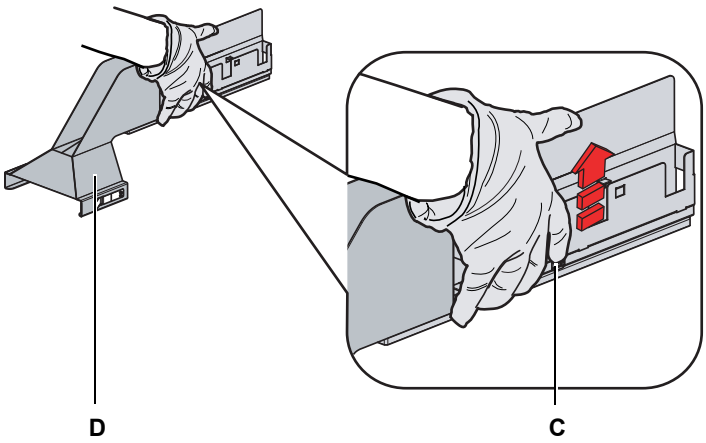


Fig. 7-15 *Removing the DiTi waste and wash unit from the worktable*

C *Quick release fastener lever* ***D*** *Wash Unit*

9 Synchronously pull the wash unit (D) outwards and open the front access panel for until the wash unit (D) disengages from the worktable Fig. 7-15 , 7-26.

10 Disconnect the waste tubing and completely remove the wash unit.

11 Wipe the surface of the DiTi waste and wash unit 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.*

12 If necessary, rinse the wash station and clean it additionally with water or alcohol.

Installation

13 Clean the worktable.

Note: *Make sure that worktable has been cleaned before reinstalling the DiTi waste unit.*

14 Reconnect the waste tubing behind the front access panel and close the panel.

15 Pull and hold the quick release lever (C) to reinstall the DiTi waste wash unit onto the worktable Fig. 7-15 , 🗎 7-26.

16 Apply the wash unit to its designated position and release the quick release fastener.

17 Make sure the wash unit is completely arrested in it designated position.

7.6.2 DiTi Carrier with Waste Slide

Cleaning the DiTi Carrier with Waste Slide

Follow the sub steps below for the cleaning procedure.

1 Remove the DiTi waste cover (A) Fig. 7-16 , 🗎 7-27.

Note: *Use caution when removing the DiTi waste slide. Contaminating substances and DiTi could fall.*

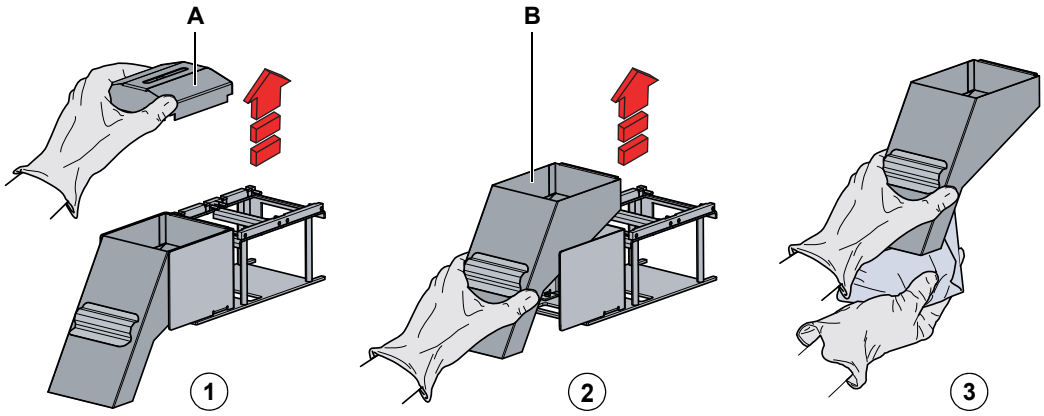


Fig. 7-16 *Removing the DiTi waste and slide*

A *DiTi waste Cover* ***B*** *DiTi Slide*

2 Remove the DiTi waste slide (B) Fig. 7-16 , 🗎 7-27.

3 Clean and rise the DiTi waste slide.

7.6.3 Worktable

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 pipetting instrument's worktable:

1. Remove all racks and carriers from the worktable.
2. Wipe the surface of the worktable with a suitable cleaning agent (e.g. alcohol, disinfectant) to remove any spilled reagent.
3. If necessary, additionally clean with water.

7.6.4 Safety Panels

Cleaning the Safety Panels

Perform the following procedure to clean the safety panels.

- Wipe the inner and outer surface of the safety panels 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.

7.6.5 Liquid Containers

System Liquid Container

To prevent deposition of crystals and growth of micro-organisms in liquid containers, clean all liquid containers at least once a week. Make sure to allow solvents (e.g. ethanol) to evaporate before filling reagents into the containers again.

Waste Container

Clean the waste container at least once a day.

7.6.6 Lower DiTi Eject Option

Cleaning the Rocker

Perform the following procedure to clean the rocker of the lower DiTi eject option:

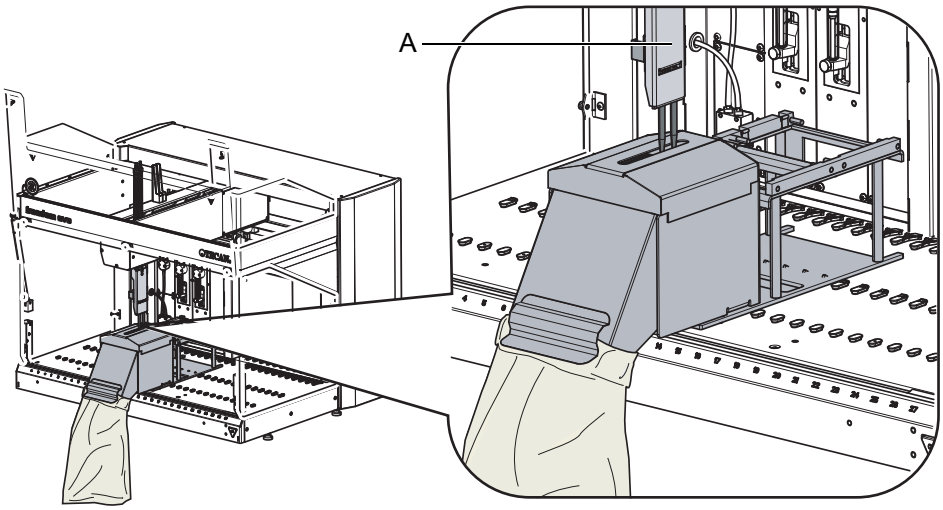


Fig. 7-17 *Lower DiTi eject option*

1. Wipe the surface of the rocker (A) with a suitable cleaning agent (e.g. alcohol, disinfectant) Fig. 7-17 , 🗎 7-29.
2. If necessary, additionally clean with water.

7.6.7 Arm Guide

In order to avoid uneven movements of the arm, clean the arm guide rails. The following description is applicable to:

- Single-tip Liquid handling arm (LiHa/1)
- Dual-tip Liquid handling arm (LiHa/1)
- 8 plus 1 Access arm (LiHa/8+1)

ATTENTION

Risk of damage to equipment. Using unspecified cleaning agents may lead to damage of the LiHa.

1 Clean the arm guide rollers (D) with a dry and clean cotton cloth.

2 Clean the upper and lower arm guide rails (B), (C) with an alcohol moistened lint-free tissue.

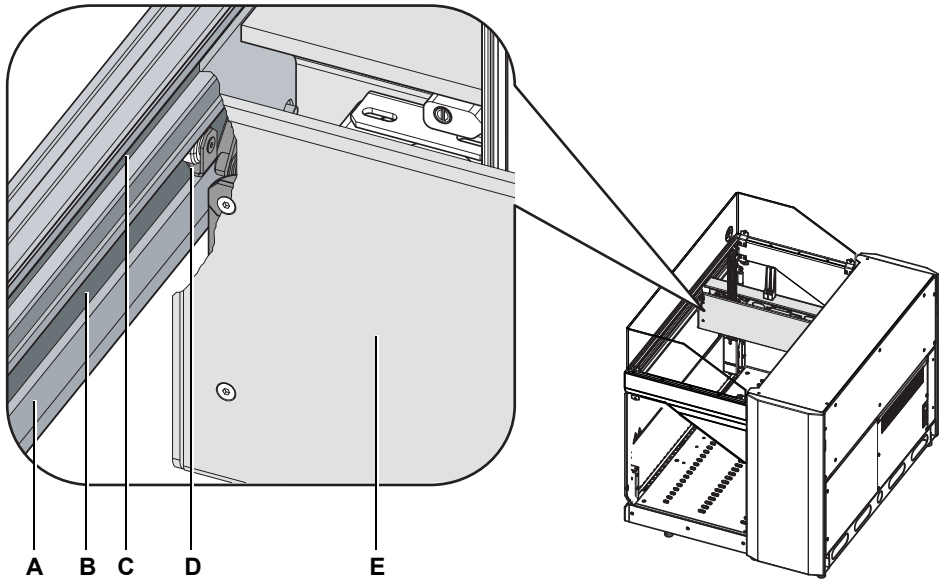


Fig. 7-18 *Arm guide and roller*

A *Arm guide*
B *Guide rail (lower face)*
C *Guide rail (upper face)*
D *Arm guide roller(s)*
E *Robotic arm*

7.7 Worktable Extension Maintenance Tasks

7.7.1 Wash Bottles

Refill / Clean Wash Bottles

Refer to the “Instructions for Use” of the plate washer.

7.7.2 Rinsing the Washer via the Distribution Channel

General Function

- During normal operation the plate washer is connected as shown in the following figure Fig. 7-19 , 🗎 7-31. In this mode, the wash liquid for each channel comes from the corresponding wash bottle.
- For maintenance purposes, the plate washer can be connected in a different way, as shown in Fig. 7-20 , 🗎 7-32. The tubings from the wash bottles are reconnected to the distribution channel. The wash liquid is supplied by a separate bottle. This arrangement allows rinsing the washer and the tubing system simultaneously.

Note: *To run the washer and the tubing system in this mode, a special program must first be defined by an application specialist. This can be done with a special Freedom EVOware script.*

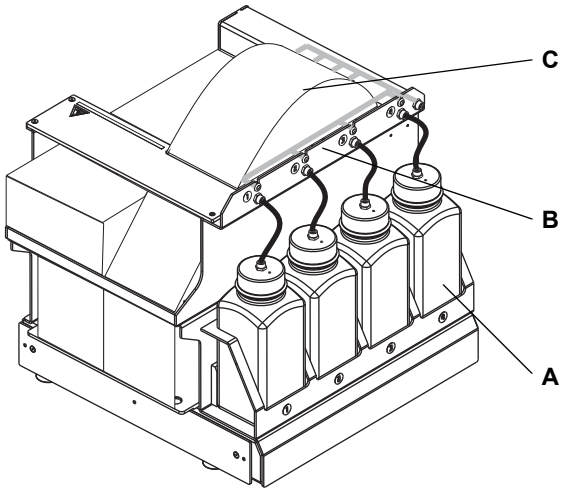


Fig. 7-19 *Washer in operating mode*

A *Wash bottle*
B *Distribution channel*
C *Plate washer*

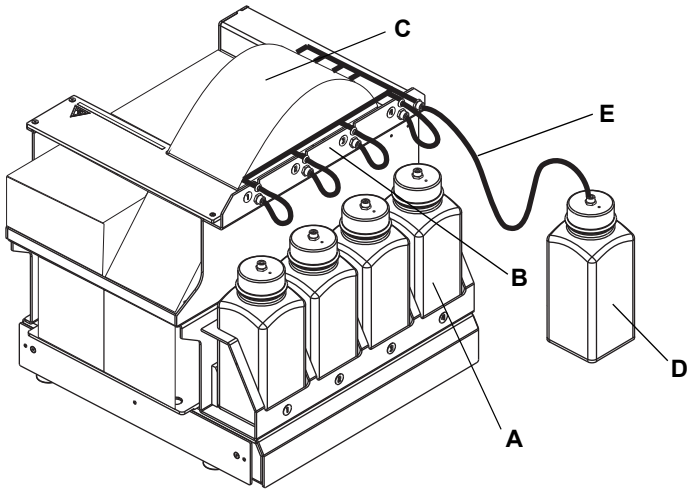


Fig. 7-20 *Washer in maintenance mode*

A	*Wash bottle*	***D***	*Rinse bottle*
B	*Distribution channel*	***E***	*Rinse tubing*
C	*Plate washer*		

ATTENTION

Do not run the washer's dispense and aspiration pumps for longer than a few minutes without liquid, otherwise they will be damaged.

Procedure

To rinse the washer and the tubing system via the distribution channel:

1. Disconnect the bottle tubings from the bottles and connect them to the distribution channel couplings as shown in Fig. 7-20 , 🗎 7-32.
2. Connect a separate bottle (D) filled with an appropriate cleaning liquid to the rightmost coupling of the distribution channel.

   The cleaning liquid to be chosen (e.g. distilled water, disinfectant etc.) depends on the materials processed and must be defined by the customers.
3. Start the custom-defined rinsing procedure or script.
4. When the rinsing procedure is finished, disconnect at least on end of the rinse tubing (D) before disconnecting the wash bottle tubings from the distribution channel.

   This ensures that the next rinsing procedure will be carried out properly and prevents the washer pumps from being damaged.
5. To return to the operating mode reconnect the wash bottles (A).

7.7.3 Rinsing the Washer without Special Maintenance Program

If no special maintenance program is available, you can use the arrangement according to the figure below to rinse the washer.

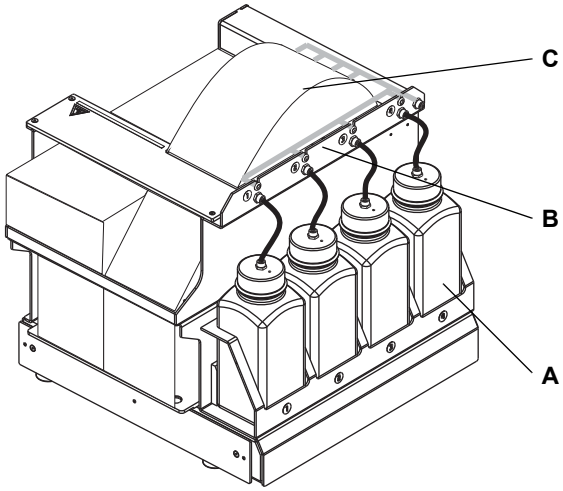


Fig. 7-21 *Rinsing the washer from the wash bottles*

A *Wash bottle*
B *Distribution channel*
C *Plate washer*

1 Do one of the following:
- Empty the bottles (A), clean them and fill them with an appropriate cleaning liquid (distilled water, disinfectant etc.)
- or use a separate set of bottles for this purpose.

2 Use the washer functions to run an appropriate rinsing program. For details see chapter “Maintenance and Cleaning” in the “instructions for Use” of the plate washer.

7.8 Decontamination

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Decontamination	Refer to section 2.7 “Decontamination Declaration”, 🗎 2-11.
Commercially available agents	Refer to section Tab. 7-1 “Commercially available cleaning agents”, 🗎 7-1

Agents

Note: *The selection of the appropriate decontamination agent depends on the contamination degree and the kind of contaminant.*

Decontamination can be performed with the following agents:

- Bleach 5%-12%
- 70% ethanol + 30% H_2O
- Weak acid, followed by base

Commercially Available Agents

For commercially available agents that can be used for decontamination or disinfection, refer to cross references above.

Hints Concerning Decontamination

In order to remove protein residues in the tubing and tips, flush the liquid system periodically with weak acid, followed by base. Alternatively, use the above mentioned commercially available agents.

Certain agents can be used as system liquid additives. Most of the immunological assays will not be affected by them.

Elimination of Nucleic Acid Residues

Nucleic acid residues in standard tips and pipetting tubing can usually be eliminated by means of wash or decontamination cycles with a 6% bleach solution.

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

7.9 Adjustments and Replacements

7.9.1 Positioning Pins

Installation

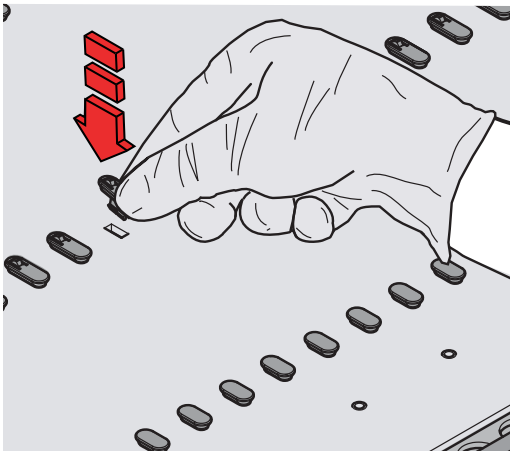


Fig. 7-22 *Inserting a positioning pin*

Note: *Hold the positioning pin slightly tilted to facilitate installation.*

3 Press the positioning pin into the designated groove of the worktable Fig. 7-22 , 🗎 7-35.

Note: *Use a small rubber mallet if the pin cannot be inserted manually.*

7.9.2 Diluter

Cross References

List of cross references to information provided in other sections:

Subject	Reference
Fill Liquid System	Refer to the Instrument Software Manual

Syringe

The continuous up and down movements of the syringe plunger during operation can loosen the plunger lock screw and cause leakage. Therefore:

Tightening Syringe and Plunger Lock Screws

1. Manually tighten the plunger lock screw (B) and syringe screw (A) before switching on the instrument Fig. 11-14 , 11-12.
2. If leakages still occur, replace the plunger cap or syringe.

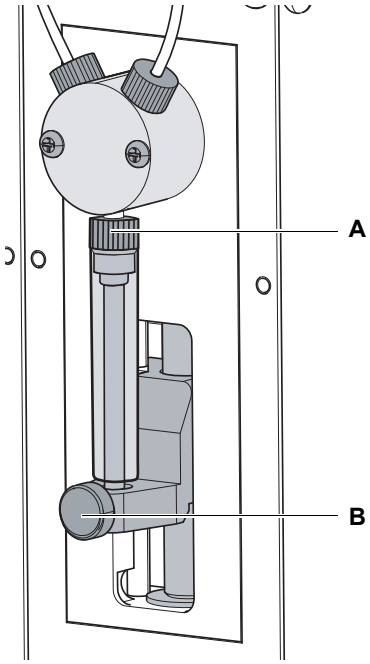


Fig. 7-23 *Syringe and Valve*

A *Syringe screw*

B *Plunger lock screw*

Preparation

3. To empty the liquid system: pull tube out of system liquid, then run **Fill Liquid System.**
   Refer to cross references above.
4. Switch the instrument off.

Removal

To remove the syringe, proceed as follows:

1 Loosen the plunger lock screw (H) Fig. 7-24 , 🗎 7-37.

2 Move the plunger drive downwards (G) with EVOware Fig. 7-24 , 🗎 7-37.
Refer to the EVOware Software Manual for further information.

3 Remove syringe (A) from valve (C) Fig. 7-24 , 🗎 7-37.

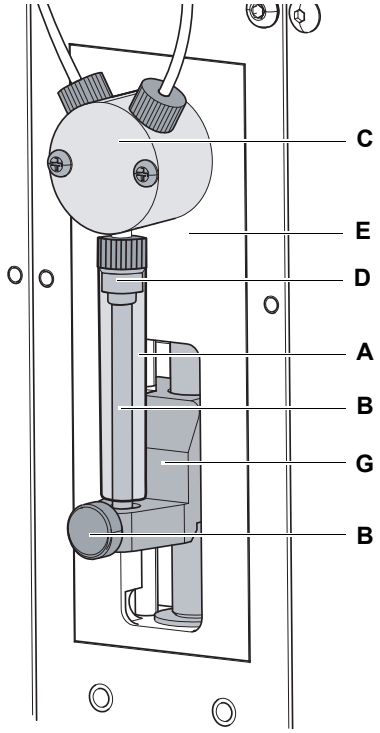


Fig. 7-24 *Syringe components*

A *Syringe*
B *Plunger*
C *3-way valve*
D *Syringe cap*
E *Diluter*
F *Syringe barrel (glass)*
G *Plunger drive*
H *Plunger lock screw*

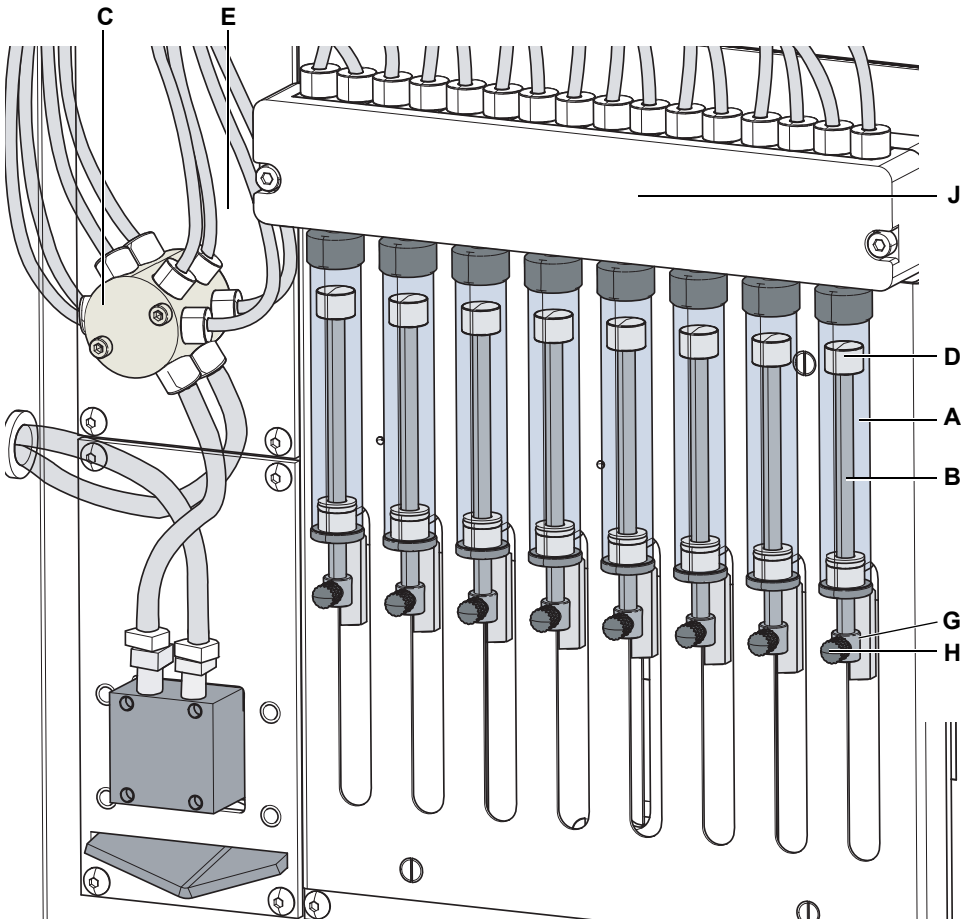


Fig. 7-25 *Syringe components*

A	*Syringe*	***F***	*Syringe barrel (glass)*
B	*Plunger*	***G***	*Plunger drive*
C	*Distributor*	***H***	*Plunger lock screw*
D	*Syringe cap*	***J***	*Valve block*
E	*Diluter*		

Installation

To install the syringe, proceed as follows:

1. Move the plunger drive (G) rod downwards.
   Refer to the EVOware Software Manual for further information.
2. Install the syringe (A) into the valve (C).
3. Push the plunger drive (G) down into the plunger drive rod and tighten the plunger lock screw (H).
4. Tighten syringe (A) in valve (C).

Replacing the Syringe Cap

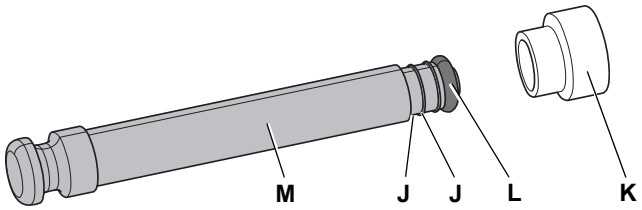


Fig. 7-26 *Syringe plunger and cap*

J	*Sharp edges*	***L***	*O-ring*
K	*Syringe cap*	***M***	*Plunger*

1 Pull the plunger (A) out of the syringe barrel Fig. 7-24 , 🗎 7-37.

2 Carefully cut out a piece of the syringe cap (K) as shown Fig. 7-24 , 🗎 7-37:

ATTENTION

Damage to O-ring. A damaged O-ring will lead to malfunction and erroneous pipetting volumes.

- Use caution when removing syringe cap from plunger.

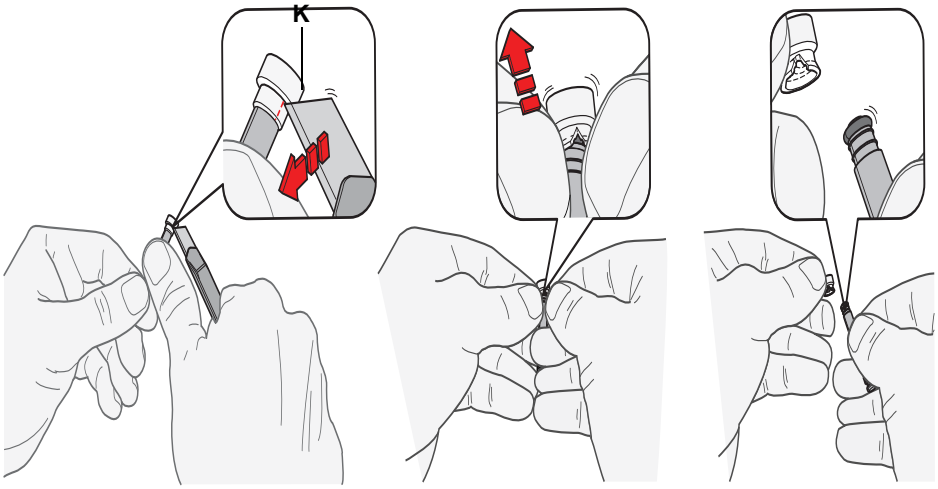


Fig. 7-27 *Syringe cap*

3 Remove the cap (K) from the plunger Fig. 7-27 , 🗎 7-39.

4 Moisten the O-ring (L) with distilled or de-ionized water Fig. 7-26 , 🗎 7-39.

Note: *To facilitate the installation of the plunger syringe cap, place the cap onto a table and press the plunger into the cap opening as straight as possible.*

5 Install a new syringe cap (K) onto the plunger (M) Fig. 7-26 , 🗎 7-39.

6 Press cap wall onto sharp edges on the plunger (M) for anchoring Fig. 7-26 , 🗎 7-39.

7 Moisten cap (K) and push plunger (M) into syringe barrel Fig. 7-26 , 🗎 7-39.

8 Troubleshooting

Purpose of This Chapter

This chapter helps to resume operation after a minor problem has occurred with the Freedom EVO 75. 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 EVO 75. 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		
Instrument does not power on	Fuse blown	Unplug instrument and check/ replace fuses. Press the tab at the fuse drawer (see Fig. 6-1 , 🗎 6-1), pull it out and replace fuses (type F5A).
System liquid leakage	Tubing and or tubing connections not tight Leaky valve Syringe seal failure	Switch off instrument immediately Perform decontamination and/or maintenance Have the defective parts replaced
Tips are dripping	Instrument was shut down during an operation run and caused valve(s) to remain in the open position	Initialize instrument
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 blocked	Check for obstacles

Tab. 8-1 Troubleshooting table (cont.)

Problem, error	Possible cause	Corrective measure
Initialization error	Arms can not 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.
Problem, error on liquid handling arms (LiHa/1, LiHa/2 and LiHa/8+1) and tips		
Positioning error	X, Y or Z-drive blocked Crash Hardware defective	Check for obstacles Check container, rack and carrier positions Notify your local service organization See "Carrier Positioning", 🗎 6-7
No Tip available	Disposable tip rack empty Wrong tip rack selected	Place disposable tip supply rack at specified position Use worktable editor to assign tip rack See 6.3.4, 🗎 6-7 See Application Software Manual
Tip not picked up	Wrong tip position coordinates	Define tip position See Application software manual
Tip not removed	Wet or unclean cone Disposable tip adapter mounted incorrectly	Clean disposable tip cone Check correct installation of disposable tip adapter See 7.4.4, 🗎 7-16
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 "Cleaning the Fixed Tips", 🗎 7-12 See Instrument Software Manual or "Instrument Parts and Cleaning Agents", 🗎 7-2 Clean DiTi cone See 7.4.4 "Disposable Tip Cone, DiTi cone", 🗎 7-16
Not enough liquid detected	Not enough liquid Incorrect container/rack definition	Check/add liquid Check container, rack definition "Containers", 🗎 6-8 See Application Software Manual

Tab. 8-1 Troubleshooting table (cont.)

Problem, error	Possible cause	Corrective measure
No liquid or incorrect volume of liquid dispensed	DiTi cone O-ring not sealing properly	Replace O-ring of DiTi cone See 7.9.2 “Diluter”, 🗎 7-36 “Replacing the Syringe Cap”, 🗎 7-39
Clot detected	Clot aspirated Wrong container diameter	Clean tip and retry Check container data See “Containers”, 🗎 6-8 See Application Software Manual
Tip clogged	Contaminant in system liquid, e.g. algae, plastic particles Aspiration of large particles	Clean tip
Liquid level detection 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)
	Incorrect sample positioning Bent tips Use of incorrect carrier Incorrect LiHa, X-, Y- and Z-setup Incorrect tip configuration	Rectify sample 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

Tab. 8-1 *Troubleshooting table (cont.)*

Problem, error	Possible cause	Corrective measure
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 cone See 7.4.4 “Disposable Tip Cone, DiTi cone”, 7-16
Problem, error on robotic manipulator arm, RoMa Standard		
Plate not picked up	No plate on carrier Cannot pick up plate	Put plate on carrier Set gripper position in EVOware Clean grippers
Unusual noise during arm movement	Worn or damaged parts	Contact your local service organization
Problem, error on wash station		
Overflow of wash station	Waste tube is below liquid surface in the waste container	Use a wash container with fixed wash tubing inlet
	DiTis or algae block the wash station	Clean the wash station
	Waste tubing kinked	Check tubing for kinks

9 Shutdown, Storage and Shipping

Purpose of This Chapter

This chapter instructs how to shut down the Freedom EVO 75, 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 EVO 75 is not known to Tecan, detailed information on how to dispose of it cannot be given here.

your country, state or region.
When disposing of operating material of the Freedom EVO 75 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 application software and the instrument software.
3. Start up the computer system connected with the Freedom EVO 75.
4. Press the auxiliary power switch (C) to switch the instrument off.

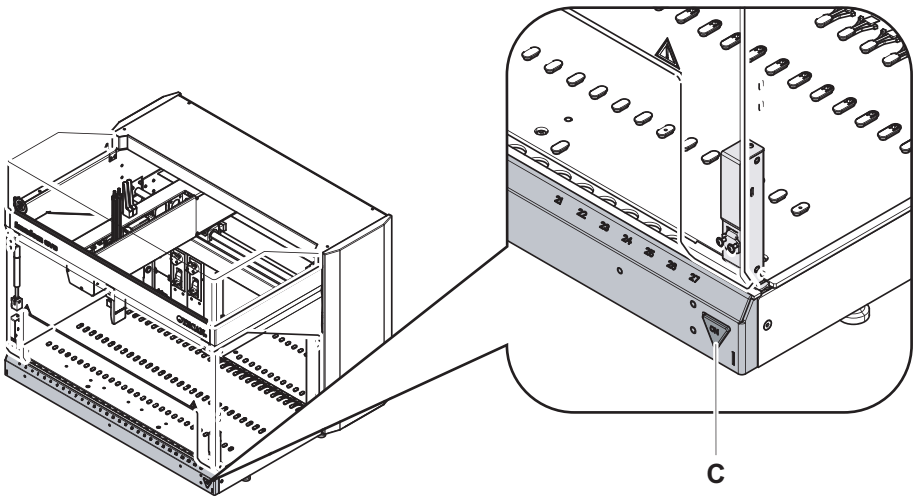


Fig. 9-1 *Auxiliary power switch*

5 Switch the main switch (B) at the rear of the instrument off.

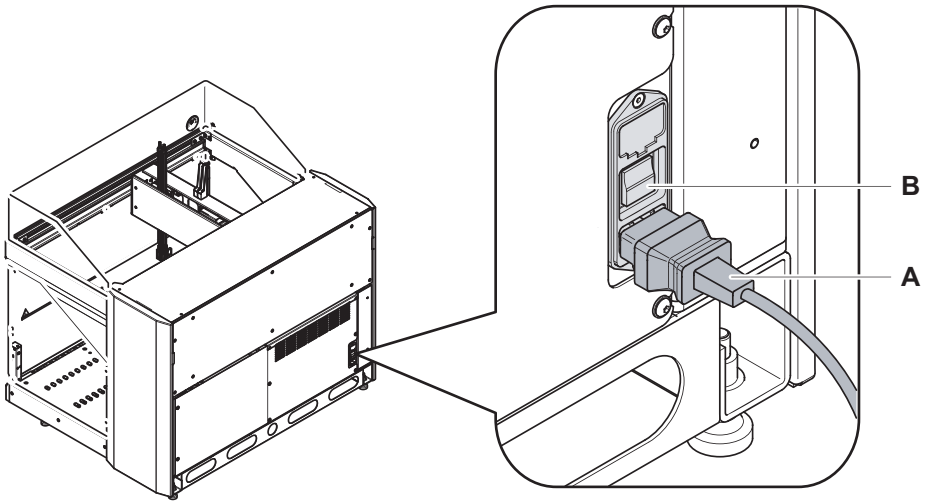


Fig. 9-2 *Main socket*

6 Unplug the mains socket (A) from the power supply.

7 Disconnect the USB cable (or optional RS 232 cable) from the PC.

8 Clean and, if necessary, decontaminate the entire instrument according to the instructions given in chapter 7 Maintenance.

9.1.1 Reporting

1 Fill out a copy of the decontamination form and place it with the instrument.

2 Record the shut down in your “Maintenance and Service Logbook”.

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

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

When moving the instrument, pay attention to the following:

- 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

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	3.2.6 “Environmental Conditions”, 3-11

Protect the instrument against dust and debris with a cover. Recommendation: store the instrument in its original packaging. Store all manuals and the “Maintenance and Service Logbook” with the instrument.

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 includes regulatory information about recycling that needs to be followed.

NOTICE

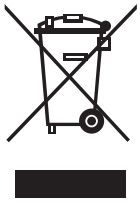
Recycling in accordance with applicable legal regulations!
Observe the laws applicable in your country for recycling.

10.0.1 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.

Tab. 10-1 *Electrical and electronical equipment waste logo*

Marking	Explanation
	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.

10.0.2 Local Requirements People's Republic of China

Marking for the Restriction of the Use of Hazardous Substances in Electronic and Electrical Products

Required Product Information

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 Electrical Products" requires the marking for the restriction of the use of hazardous substances in electronic and electrical products.

Product Marking

In accordance with the requirements specified in SJ/T11364-2014, all electronic and electrical Tecan products sold in the People's Republic of China are labeled with a marking for the restriction of the use of hazardous substances.

Tab. 10-2 *Marking for the restriction of the use of hazardous substances*

Marking	Explanation
	This marking indicates that this electronic product contains certain hazardous substances and can be safely used during the environment-friendly use period, but it shall enter the recycling system after 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	12 “Customer Support”, 12-1

Purpose of This Chapter

This chapter lists disposables that are used in connection with the Freedom EVO 75, 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
1	Freedom EVO 75 Operating Manual (this Manual)	393248
2	Instrument Software Manual	392888
3	Problem report form	390713
4	Freedom EVO 75 Maintenance and Service Logbook	392815
5	EVOware Software Manual	393172

11.2 Tools, Gauges

Tab. 11-2 *Tools, gauges*

No.	Plain Text Designation	p/n	Label Designation
1	Cone wrench for DiTi option	10619517	WRENCH CONE DITI OPTION 5 PCE.
2	DiTi cone key	30031178	DITI CONE KEY LIHA 75 8-CHA.

11.3 Optional Equipment and Modules

Tab. 11-3 *Optional equipment and modules*

No.	Plain Text Designation	p/n	Label Designation
1	Disposable tip standard option for LiHa/1 and LiHa/2	10612502	OPTION DITI CONE 10/200/1000µL GENESIS
2	Adapter plate for balance WXS205SDU/15 Mettler balance	10619014	PLATE ADAPTER BALANCE GENESIS
3	Standard washable fixed tip option (for LiHa/1 and LiHa/2 equipped with standard tubing)	10643050	TIP STANDARD 96 WELL LOCK NUT EVO
4	Ceramic washable fixed tip option (for LiHa/1 and LiHa/2 equipped with standard tubing)	10643051	TIP CERAMIC 96 WELL LOCK NUT EVO
5	384-well tip washable fixed tip (for LiHa/1 and LiHa/2 equipped with low-volume tubing)	10643053	TIP STANDARD 384 WELL LOCK NUT EVO
6	Te-PS tip washable fixed tip (for LiHa/1 and LiHa/2 equipped with low-volume tubing)	10643055	TIP TE-PS LOCK NUT EVO
7	Eccentric RoMa Fingers	30017037	GRIPPER ECCENTRIC ROMA-3
8	Eccentric finger with rubber pads	30065673	GRIPPER FINGER ECCENTRIC ROMA RUBBER PAD
9	Dust cover	30097465	COVER GLASS ACRYLIC TOP

11.4 Carriers, Racks, Troughs

11.4.1 Carriers for Plates

Tab. 11-4 *Carriers for plates*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Carrier for plates, RoMa, 3 pos., landscape orientation	10612604	CARRIER MP ROMA 3 POS. LANDSCAPE	6 150 mm (5.9 in.)	See Fig. 11-2 , 11-4
Carrier for plates for RoMa, 2 microplates portrait	10612605	CARRIER MP ROMA 2 POS. PORTRAIT	6 150 mm (5.9 in.)	-
Carrier for plates, flat, RoMa, 3 pos., landscape orientation	10612624	CARRIER MP FLAT ROMA 3 POS. LANDSCAPE	6 150 mm (5.9 in.)	-
Carrier for 3 plates landscape, with centering springs	10613006	CARRIER 3 MP LANDSCAPE WIDTH 6 CAR.UNIT	6 150 mm (5.9 in.)	See Fig. 11-2 , 11-4
Carrier for 2 plates portrait, with centering springs	10613007	CARRIER 2 MP PORTRAIT WIDTH 6 CAR.UNIT	6 150 mm (5.9 in.)	See Fig. 11-1 , 11-3
Carrier for 384-well plates, RoMa, 3 pos., landscape orientation, not accessible for PosID; mandatory for use with 384-well tips/ActiveTips	10613031	CARRIER 384WELL MP 3 POS.ACCESSIBLE ROMA	6 150 mm (5.9 in.)	See Fig. 11-3 , 11-4
Heated/cooled carrier for plates, RoMa, 3 pos., landscape orientation	10290111	CARRIER COOLING/ HEATING 3 PLATES	6 150 mm (5.9 in.)	-

a) Number or grid positions the carrier occupies

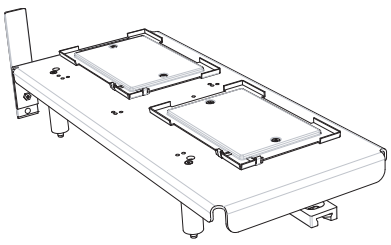


Fig. 11-1 *Carrier for 2 plates portrait*

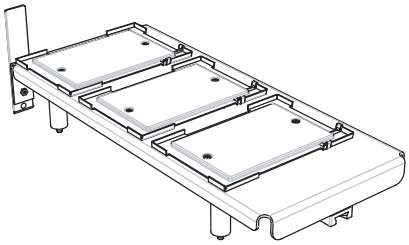


Fig. 11-2 *Carrier for 3 plates landscape*

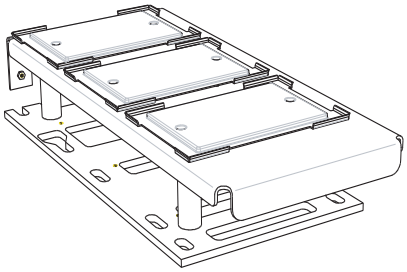


Fig. 11-3 *Carrier for 3 384-well plates landscape*

11.4.2 Carriers for Reagents and Troughs

Tab. 11-5 *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 (10613049) or 3 trough holders (10619626)	10613020	CARRIER ADDITIVE TROUGH 3 PCE. MAX.100ML	1 25 mm (0.98 in.)	See Fig. 11-4 , 11-5
Trough holder, aluminum for low volumes up to 25 ml In use with troughs 25 ml (10520629); 1 pc.	10619626	HOLDER TROUGH ALUMINIUM 25ML	1 25 mm (0.98 in.)	See Fig. 11-6 , 11-6
Reagent troughs 25 ml COA, PS with cover, PE; 100 pc., for low volumes up to 25 ml In use with trough holder (10619626)	10520629	TRAY TROUGH 100 PCE.	1 25 mm (0.98 in.)	See Fig. 11-6 , 11-6
Cold pack set, 4 pc. In use with reagent carrier, cooled (10613016)	10613017	COLDPACK SET 4 PCE.	-	-
Temperature controlled reagent carrier for 2 x 0.8 l beakers	10290066	CARRIER COOLING/ HEATING 2 GLASS 800 ML	7 175 mm (6.89 in.)	-
Reagent troughs 100 ml for carrier 10613020, 100 pc.	10613049	TROUGH REAGENT PP 100ML 100 PCE.	1 25 mm (0.98 in.)	See Fig. 11-5 , 11-5

Tab. 11-5 Carriers for reagents and troughs (cont.)

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Like reagent troughs (10613049), but cleanliness certified, natural	10613048	TROUGH DISPOSABLE 100ML PP TRA. 108 PCE.	-	See Fig. 11-5 , 11-5
Carrier for 16 Eppendorf tubes, PosID compatible	10613035	CARRIER 16*1.5ML TUBE POSID COMP.SPE/MBS	1 25 mm (0.98 in.)	-
Carrier for 16 Eppendorf tubes, PosID compatible	10613035	CARRIER 16*1.5ML TUBE POSID COMP.SPE/MBS	1 25 mm (0.98 in.)	-
Temperature controlled carrier, 4 x 400 ml trough	10613052	RACK TEMP.CTLD.TROUGH 4*400ML GENESIS	7 175 mm (6.89 in.)	-

a) *Number or grid positions the carrier occupies*

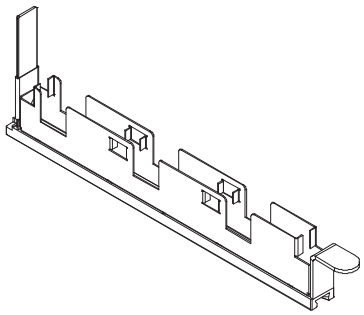


Fig. 11-4 *Carrier for 3 reagent troughs 100 ml*

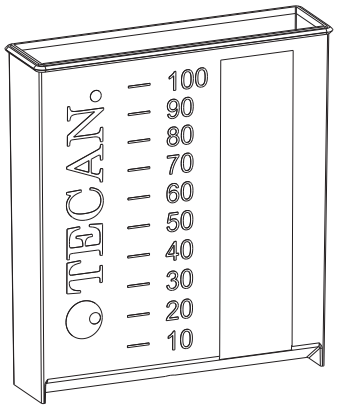


Fig. 11-5 *Trough 100 ml*

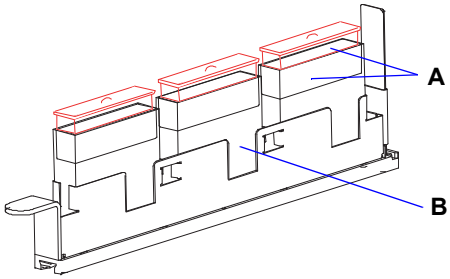


Fig. 11-6 *Trough holder and troughs*

A	520629	Trays for low volume containers up to 25 ml and covers
B	619626	Trough holder for low volumes up to 25 ml for 520629 Width: 1 grid position (25 mm)

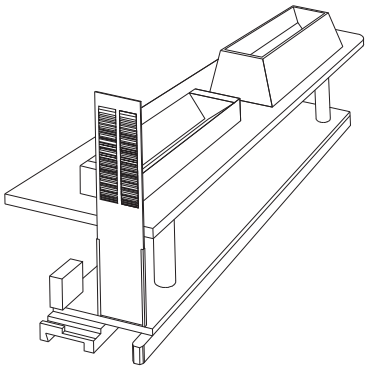


Fig. 11-7 *Carrier for 2 reagent troughs 60 ml*

Note: *Troughs are standard Eppendorf*

11.4.3 Carrier for Disposable Tips

Tab. 11-6 *Carrier for disposable tips*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
DiTi carrier for 2 trays of 96 disposable tips 10 µl, 200 µl or 1000 µl, with 2 pick-up and 1 waste position (without waste slide and cover)	10613012	CARRIER RACK 2 DITI+1 WASTE POS.6 CAR.U.	6 150 (5.91 in.)	See Fig. 11-10 , 11-8
DiTi waste slide and bag holder In use with DiTi carrier (10613012)	10613013	SLIDE WASTE+BAG HOLDER DITI RACK	6 150 (5.91 in.)	See Fig. 11-10 , 11-8
Waste chute for plates In use with DiTi carrier (10613012)	10290193	WASTE CHUTE MP	-	-
DiTi waste slide cover, only for lower DiTi eject	10613030	COVER SLIDE DITI WASTE	6 150 (5.91 in.)	See Fig. 11-8 , 11-7
DiTi carrier for 3 trays of 96 disposables tips	10613022	CARRIER RACK 3 DITI WIDTH 6 CARRIER UNIT	6 150 (5.91 in.)	-

a) Number or grid positions the carrier occupies

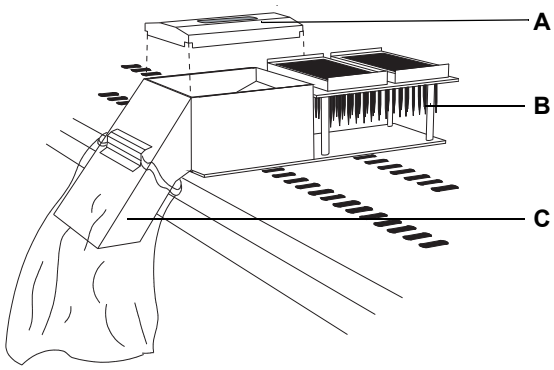


Fig. 11-8 *Carrier for disposable tips*

A 613030 Cover Waste: protective cover to minimize splashing, only for lower DiTi eject.

B 613012 Carrier for disposable tips: holds 2 frames with 96 10 µl, 200 µl or 1000 µl disposable tips each, with waste position

C 613013 DiTi waste slide and bag holder: collects used tips in waste bag
Width: 6 grid positions (150 mm)

11.4.4 Customized Carriers

Tab. 11-7 *Carriers, customized*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Carrier for reagents, solid block ready to be drilled	10613010	CARRIER+PLASTIC BLOCK UNDRILLED 75MM	3 75 mm (2.95 in.)	See Fig. 11-9 , 11-8
Custom carrier kit: 1 positioning rail, 1 glider and 8 screws	10613011	CARRIER CUSTOM KIT RAIL/GLIDER/SCREWS	3 75 mm (2.95 in.)	See Fig. 11-10 , 11-8
Reagent block, undrilled plastic block, plate format, transportable with robotic manipulator arm	10613019	RACK REAGENT TRANSPORT-ABLE+ROMA RMP	-	-

a) Number or grid positions the carrier occupies

Note: *Refer to cross references above for detailed information and specification.*

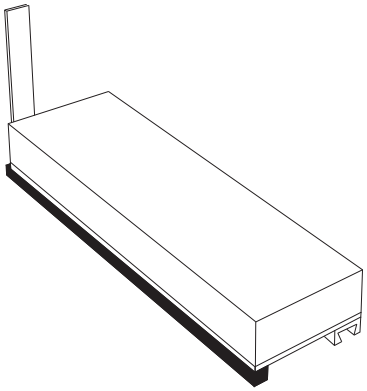


Fig. 11-9 *Carrier for reagents, solid block*

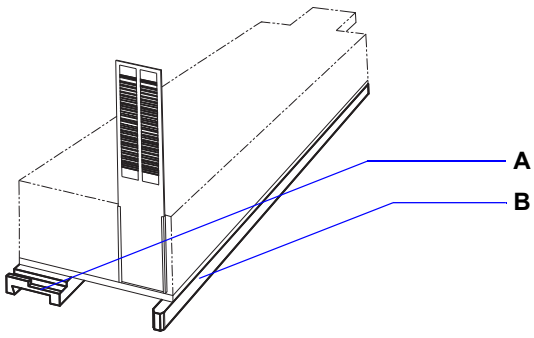


Fig. 11-10 *Custom carrier kit*

A Positioning rail ***B*** *Glider wIdth*

11.4.5 Carriers for Tubes

Tab. 11-8 *Carriers for plates*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Strip racks for tubes 10 mm; set of 6 racks (6 x 16 pos.)	10613014	RACK STRIP 16 POS. TUBE 10MM 6 PCE.	1 25 mm (0.98 in.)	See -Fig. 11-10 , 11-8
Carrier for tubes 13 mm 6 x 16 pos. Set of 6 carriers	10613002	RACK STRIP 16 POS. TUBE 13MM 6 PCE.	1 25 mm (0.98 in.)	See -Fig. 11-10 , 11-8
Carrier for tubes 16 mm 6 x 16 pos. Set of 6 carriers	10613003	RACK STRIP 16 POS. TUBE 16MM 6 PCE.	1 25 mm (0.98 in.)	See -Fig. 11-10 , 11-8
Carrier for tubes 10 mm 96 pos.	10613015	CARRIER 6*16 POS. TUBE 10MM	6 150 (5.91 in.)	-
Carrier for tubes 13 mm 96 pos.	10613004	CARRIER 6*16 POS. TUBE 13MM	6 150 (5.91 in.)	-
Carrier for tubes 16 mm 96 pos.	10613005	CARRIER 6*16 POS. TUBE 16MM	6 150 (5.91 in.)	-

a) Number or grid positions the carrier occupies

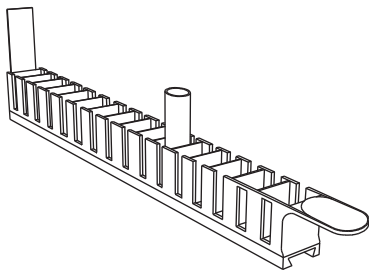


Fig. 11-11 *Strip rack*

11.4.6 Wash Station

Tab. 11-9 *Wash/waste stations*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Wash station assembly Freedom EVO 75	30026161	WASHSTATION ASSY EVO75 SPARE	1 50 mm (1.97 in.)	See Fig. 11-12 , 11-10
Wash/waste station standard, PP 8 wash positions shallow at rear 1 waste position at center 8 wash positions deep at front	10613001	WASHSTATION GENESIS 8+8POS.WIDTH 1 CAR.	1 25 mm (0.98 in.)	See Fig. 11-12 , 11-10

a) Number or grid positions the carrier occupies

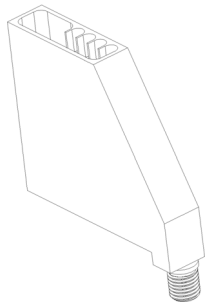


Fig. 11-12 *Wash station*

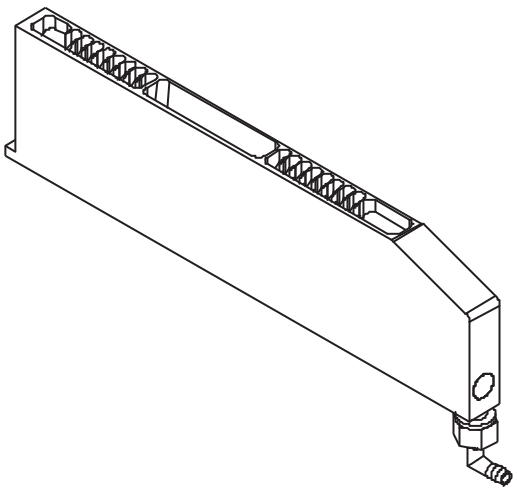


Fig. 11-13 *Wash/waste station, standard*

11.5 Syringes and Accessories

Tab. 11-10 *Syringes and accessories*

Plain Text Designation	p/n	Label Designation	Cap form
Syringe 0.025 ml for diluter type XP SMART	30025512	SYRINGE 25µL NANO-PIP.DIL.XP3000 PLUS V2	flat
Syringe 0.05 ml for diluter type XP SMART	30025511 a)	SYRINGE 50µL NANO-PIP.DIL.XP3000 PLUS V2	flat
Syringe 0.25 ml for diluter type XP SMART	10619530	SYRINGE 250µL NEW	conical
Syringe 0.50 ml for diluter type XP SMART	10619531	SYRINGE 500µL CONICAL CAPS	conical
Syringe 1.00 ml for diluter type XP SMART	10619532	SYRINGE 1.0ML NEW	conical
Syringe 2.50 ml for diluter type XP SMART	10619426	SYRINGE 2.5ML	flat
Syringe 5.00 ml for diluter type XP SMART	10619427	SYRINGE 5.0ML	flat
Syringe, 500 µL for diluter type XMP 6008	20734804	SYRINGE 500µL XLP	conical
Syringe, 1.0 mL for diluter type XMP 6008	20734805	SYRINGE 1.0 ML XLP	conical
Syringe, 100 µL for diluter type XMP 6008	20734802	SYRINGE 100 UL XLP	conical
Syringe cap for syringe 0.25 ml, PTFE, 8 pc.	10619428	CAP SYRINGE 250µL SET 8 PCE.	–
Syringe cap for syringe 0.50 ml, PTFE, 8 pc.	10619429	CAP SYRINGE 500µL SET 8 PCS.	–
Syringe cap for syringe 1.00 ml, PTFE, 8 pc.	10619430	CAP SYRINGE 1.0ML SET 8 PCS.	–
Syringe cap for syringe 2.50 ml, PTFE, 8 pc.	10619431	CAP SYRINGE 2.5ML SET 8 PCS.	–
Syringe cap for syringe 5.00 ml, PTFE, 8 pc.	10619432	CAP SYRINGE 5.0ML SET 8 PCS.	–
Syringe cap for syringe 0.05 ml, PTFE, 8 pc.	10619473	CAP PTFE XP SYRINGE 50µL SET 8 PCE.	–

a) 0.05 ml syringes are mandatory for channels with ActiveTips.

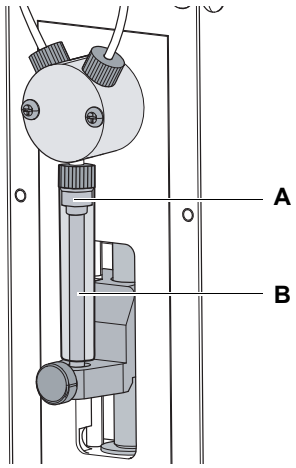


Fig. 11-14 *XP smart Syringe*

A *Syringe cap* ***B*** *Syringe*

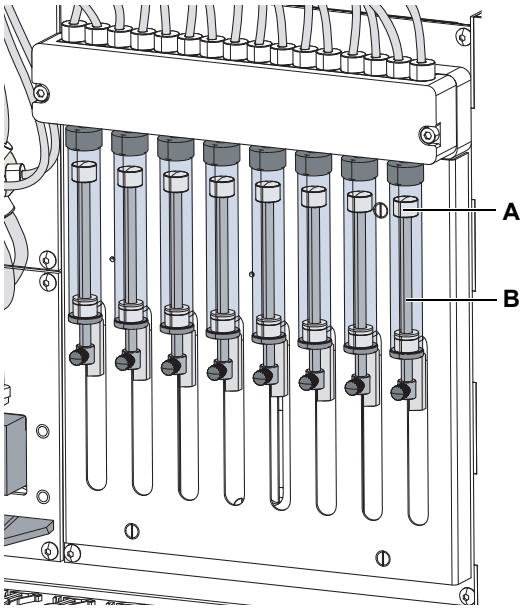


Fig. 11-15 *XMP smart 6008 syringe*

A *Syringe cap* ***B*** *Syringe*

11.6 Tips and Accessories

11.6.1 Fixed Tips and Accessories

Tab. 11-11 *Fixed tips and accessories*

No.	Plain Text Designation	p/n	Label Designation
1	Standard tip, stainless steel tip with soft PTFE outside coating, without lock nut - color light green, not adjustable	10612501	TIP STD. STA.STEEL PTFE-COATED GENESIS
2	Ceramic tip, stainless steel tip, hard ceramic coating inside and outside, without lock nut - color black, not adjustable	10612504	TIP STEEL CERAMIC-COATED TRA. GENESIS
3	Lock nut for standard and ceramic tip	10619515	NUT LOCK TIP STANDARD+CERAMIC
4	Lock nut for 96-well tips	10619548	NUT LOCK GOLDPLATED TIP STD.+CERAMIC
5	Lock nut for Te-PS tips	10643006	NUT LOCK TIP TE-PS
6	Lock nut for 384-well tips, set of 8 pc.	10643521	NUT LOCK EVO 384 ACTIVETIP M SET
7	Standard tip, stainless steel tip with hard PTFE inner coating for 384-well pipetting - color dark green	10612530	IP STD. 384WELL PTFE HARD COAT.INSIDE
8	384-well Standard tip, stainless steel tip with hard PTFE outside coating, DMSO resistant, excluding lock nut (619518), adjustable with 613032 - color gray	10612532	TIP STD.384WELL STA. PTFE HARD DMSO-RES.
9	384-well low volume tip, stainless steel tip with hard PTFE outside coating, DMSO resistant, excluding lock nut (619518), adjustable with 613032 - color gray	10612533	TIP LV 384WELL STA. PTFE HARD DMSO-RES.
10	Low Volume tip, stainless steel tip with soft Teflon outside coating color light green	10612804	TIP PTFE-COATED LOWVOLUME
11	Low Volume tip standard, non-adjustable, short, hard Teflon, DMSO resistant stainless steel, without lock nut.	10612534	TIP LV STD. SHORT STA.PTFE HARD DMSO-RES.
12	Low Volume tip 384-well, short, hard Teflon, DMSO resistant stainless steel, without lock nut	10612535	TIP LV 384W SHORT STA.PTFE HARD DMSO-RES.
13	Te-PS tip, 1536-well, short, hard Teflon, DMSO resistant stainless steel (excluding locknut).	10643004	TIP PIPETTING TE-PS

11.6.2 Disposable Tips and Accessories

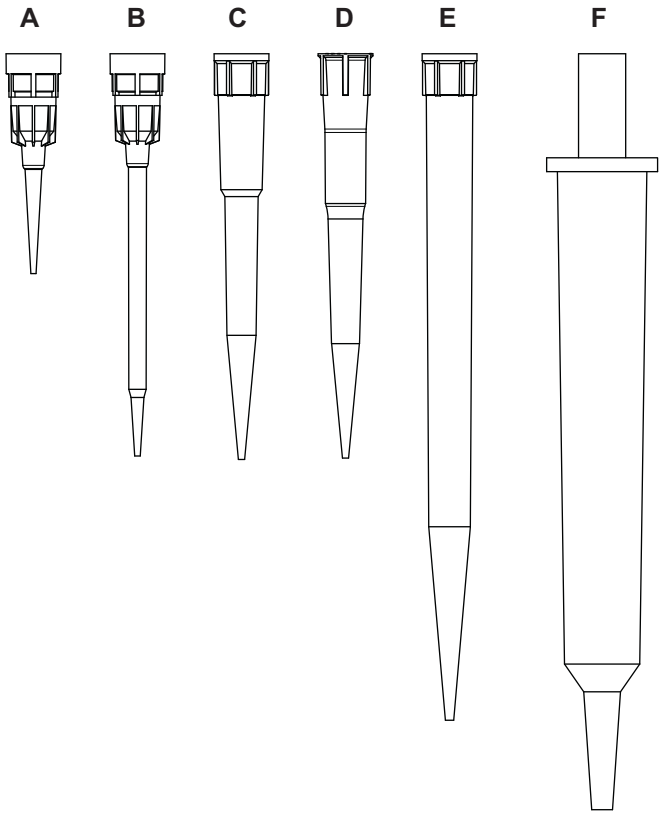


Fig. 11-16 *Disposable tips*

Note: *The standard DiTi cone is used for all disposable tip sizes. For free dispense pipetting of low volumes (i.e. 1 - 3 µl) with 10 µl tips, the low volume option must be used.*

Accessories

Tab. 11-12 *DiTi option accessories*

No.	Plain Text Designation	p/n	Label Designation
1	Disposable tip option for one standard channel LiHa 1-tip and LiHa 2-tip, 1 pc.	10612502	OPTION DITI CONE

Tab. 11-12 DiTi option accessories (cont.)

No.	Plain Text Designation	p/n	Label Designation
2	Disposable tip option for standard channels LiHa 1-tip and LiHa 2-tip. Set of 8.	10619460	MAINTENANCE PREVENTIVE SET 8 DITI
3	Set of sealing rings for disposable tip option. Set includes: 8 washers and 8 O-rings.	10619508	RING SEAL SET 8P.+O-RING 8P.DITI OPTION
4	Disposable tip option for one low volume channels LiHa 1-tip, LiHa 2-tip and 1st tip (independent tip) of LiHa 8 Plus 1 Access.	10612518	OPTION DITI CONE LOW VOLUME
5	Disposable tip option for 8 Plus 1 Access channels 2-8. Set of 7.	30031038	SET DITI 8 PLUS 1 ACCESS SPARE

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 21 / 3 Westside Avenue Port Melbourne Vic 3207 Australia	Phone Phone Fax E-mail	Toll Free: 1300 808 403 +61 3 9647 4100 +61 3 9647 4199 helpdesk-aus@tecan.com
Austria	Tecan Austria GmbH Untersbergstrasse 1a 5082 Grödig Austria	Phone Fax E-mail	+43 6246 8933 256 +43 6246 72770 helpdesk-at@tecan.com
Belgium	Tecan Benelux B.V.B.A. Businesspark E19 Battelsesteenweg 455B 2800 Mechelen Belgium	Phone Fax E-mail	+32 15 709 054 (en) +32 15 709 055 (fr) +32 15 421 612 helpdesk.benelux @tecan.com
China	Tecan (Shanghai) Trading Co., Ltd. Room 1802-1804 and Room 205, No. 388, Fushan Road, Pudong New Area, 200122 Shanghai, P.R.China	Phone Fax E-mail	+86 21 2206 32 06 +86 40 0821 38 88 +86 21 2206 52 60 helpdesk-cn@tecan.com

France	Tecan France S.A.S.U 6, Avenue du Château de Gerland F-69007 Lyon France	Phone Fax E-mail	+33 820 88 77 36 +33 4 72 76 04 99 helpdesk-fr@tecan.com
Germany	Tecan Deutschland GmbH Werner-von-Siemens-Straße 23 74564 Crailsheim Germany	Phone Fax E-mail	+49 1805 8322 633 or +49 1805 TECAN DE +49 7951 9417 92 helpdesk-de@tecan.com
Italy	Tecan Italia, S.r.l. Via Brescia, 39 20063 Cernusco Sul Naviglio (MI) Italy	Phone Fax E-mail	+39 800 11 22 91 +39 (02) 92 72 90 47 helpdesk-it@tecan.com
Japan	Tecan Japan Co., Ltd. Kawasaki Tech Center 580-16, Horikawa-cho, Saiwai-ku Kawasaki, Kanagawa 212-0013 Japan	Phone Fax Phone E-mail	+81 44 556 7311 (Kawasaki) +81 44 556 7312 (Kawasaki) +81(0) 6305 8511 (Osaka) helpdesk-jp@tecan.com
Netherlands	Tecan Benelux B.V.B.A. Industrieweg 30 NL-4283 GZ Giessen Netherlands	Phone Fax E-mail	+31 20 708 4773 +31 183 44 80 67 helpdesk.benelux@tecan.com
Scandinavia	Tecan Nordic AB Sveavägen 159, 1tr SE-113 46 Stockholm Sweden	Phone Fax E-mail	+46 8 750 39 40 +46 8 750 39 56 info@tecan.se
Spain Portugal	Tecan Ibérica Instrumentación S.L. Edificio Mapfre C/ de la Marina 16 - 18, Planta 11a C-1 E-08005 Barcelona Spain	Phone Fax E-mail	+34 93 40 91 237 +34 93 330 87 00 helpdesk-sp@tecan.com
Switzerland	Tecan Schweiz AG Seestrasse 103 8708 Männedorf Switzerland	Phone Fax E-mail	+41 44 922 82 82 +41 44 922 89 23 helpdesk-ch@tecan.com
United Kingdom	Tecan UK Ltd. Theale Court 11-13 High Street Theale, Reading, RG7 5AH United Kingdom	Phone Fax E-mail	+44 118 930 0300 +44 118 930 5671 helpdesk-uk@tecan.com
USA	Tecan US, Inc. 9401 Globe Center Drive, Suite 140, Morrisville, NC 27560 USA	Phone Fax Phone E-mail	+1 919 361 5200 +1 919 361 5201 Toll Free in the US: +1 800 TECAN US or +1 800 832 2687 helpdesk-us@tecan.com

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 tecan-sy@tecan.com

13 Glossary

Purpose of This Chapter

This chapter contains a glossary to explain terms and expressions used in this Operating Manual.

8 Plus 1 Access liquid handling arm

A Freedom EVO 75 with an 8 channel arm with 8-channels for use with disposable tips.

Accuracy

Average percent difference between the expected value and the reported value, divided by the expected value.

Additive

A liquid (e.g. reagent, diluent) taken from a c*ontainer* on the Worktable 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 RIA, EIA, etc.

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 *plates* 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. Where no carry over is admissible, *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; expressed in percent.

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.

Container

Any vessel placed on or under the worktable and containing a liquid or other chemical, e.g. one well in a plate, 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 EVO 75 or additional option which can communicate with the *Te-CU*, e.g. arm, diluter, 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.

DiTi
see *disposable tips*

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.

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.

Global liquid
A liquid used for several tests. It is in a defined position on the worktable.

ILID
Integrated Liquid Detector. Electronic device mounted on the 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.

Instrument Software
Software package that includes the setup & service software, the complete worktable editor and other software modules for special purposes.

LiHa
see *liquid handling arm*

Liquid class
A set of properties defining a theoretical model of one type of liquid. Identified by a generic name (e.g. 'Serum', 'Buffer', 'Ethanol', etc.), it includes all default *liquid handling parameters* required to process liquids of this type.

Liquid handling arm (LiHa)
A Freedom EVO 75 component mounted to the X-slide containing and holding the pipetting tips.

Liquid system
All instrument modules and parts which contain or directly influence liquid (tubing, diluters, valves, tips, etc.).

Local liquid
A liquid used for one test only, and which is placed into a test-specific (transportable) reagent rack.

Plate
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.

Piercing
The pipetting tip's penetrating or perforating the sealing membrane on a *plate* 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*.

Plunger
The piston in a *Syringe*. It aspirates liquid by moving in one direction and dispenses it when moving in the opposite direction.

PosEval
Position Evaluation. A software feature enabling the operator to control the X/Y/Z position of a robotic arm via keyboard arrow (cursor) keys.

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.

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, Rectangular Rack
A physical arrangement of *containers* whose dimensions are uniform, e.g. a *plate*. Each row and column has the same number of containers and the distances between rows or columns are uniform.

Reference tip
Special tool that can be fixed to a pipetting device (e.g. LiHa). Used to exactly adjust the device in the various axes. Reference tips can not be used for pipetting.

Reader
Plate reader, such as Sunrise absorbance reader, Safire, GENios Pro, Ultra, or Infinite 200 reader.

Reagent trough
A reagent trough is a container from which reagents can be aspirated to be used in the process.

Retract
The process of pulling a tip back up after aspiration or dispensing.

RoMa
Robotic Manipulator Arm

Run
A sequence of processes on the instrument started by the user.

Sample
Specimen of the substance (e.g. blood, serum, urine, etc.) to be analyzed by means of a *Test*.

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.

Shaker
See “Te-Shake”.

Setup & service software
Part of the instrument software. The setup & service software is used to perform setups and tests on the product.

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*.

Single pipetting
The *pipetting mode* in which an individual aspiration is performed for every destination position. See also: *multi pipetting*.

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.

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*.

Te-CU
Control unit, central electronics board with the Freedom EVO 75 main microprocessor and EPROM. Is the control center for the instrument and all of its optional devices.

Te-MagS
The Te-MagS (Tecan Magnetic Separation Module) is a module that uses commercially available magnetic beads to isolate biomolecules (e.g. DNA, RNA, proteins, etc.) or whole cells from various crude mixtures by means of magnetic forces.

Te-Shake
Orbital shaker for plates that is used for mixing functions.

Te-VacS
Solid phase extraction vacuum system used for vacuum separation of biological molecules and chemical compounds.

Test
A sequence of actions that is performed automatically and gives a result that is automatically measured.

Tip
A needle-like device that can be mounted to a pipetting device for aspirating/ dispensing liquid. The following tip types are used with Tecan instruments:

– Standard tip

– Disposable tip

– Fixed tip

Tip adapter
Multichannel arm: The tip adapter is used to hold and center the DiTis or the

Trough
Refer to “Reagent trough”.

Tube
Small round *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.

Vacuum Separation
See “Te-VacS”.

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.

Washer
Plate strip washer, like e.g. Columbus PW 96 or PW 384.

Wash station

Generally referred to as the physical combination of a c*leaner* position and a *waste* position.

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 *plate*.

Worktable

Part of the instrument where the carriers are placed for access by the robotic arm.

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-rod

A toothed rack that carries the tip and its tubing. A pinion gear drives the Z-rack in Z-axis direction.

Z-start

The height of the tip at which the *ILID* 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.