

Operating Manual

Tecan Vacuum Separator (Te-VacS™)



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1 About This Manual

This Operating Manual describes the Te-VacS and provides all the information required for operating it safely and for maintaining it in good working order. This manual must be read carefully before performing any work on the Te-VacS and before using it.

This chapter outlines the purpose of this manual and specifies the product referred to. Furthermore, it explains the use of symbols and conventions as well as further general information.



This Operating Manual contains no software description. For more information on the software please consult the corresponding software manual. Refer to section "Reference Documents" [▶ 8].

1.1 Scope of This Manual

This manual is applies to the Te-VacS.

1.2 Manufacturer

Address of
Manufacturer



Tecan Schweiz AG
Seestrasse 103
CH-8708 Männedorf
Switzerland

1.3 Intended Use

The Te-VacS is used for rapid separation or purification of biological molecules (e.g., DNA or proteins).

The Te-VacS is an instrument component. The intended use is defined for the instrument where it is used on. Refer to the corresponding Operating Manual of the instrument. Refer to section "Reference Documents" [▶ 8].

1.4 Improper Use

Improper use may prejudice the Te-VacS safety concept.

- The Te-VacS must not be used with options or components that are not approved by Tecan.
- The Te-VacS is not explosion-proof and should not be installed in locations where there is a hazard of explosion.
- The Te-VacS should not be used in the absence of functional safety devices.

Only liquids suitable for the Te-VacS, with respect to the chemical resistance of the liquid system and explosion/fire hazard, may be used. Special applications requiring the use of hazardous substances are run at the user's own risk.

1.5 Warranty

The Te-VacS must not be used with components that are not approved by Tecan. The use of unapproved components may impair the safety concept of the Te-VacS. The use of unapproved components would invalidate any warranty of safety and compliance to national and international standards, as required for UL/CSA certification, by EC directives, etc.

1.6 Trademarks

The product names, whether registered or unregistered trademarks, mentioned in this manual are reproduced solely for identification purposes and remain the exclusive property of their respective owners. For simplicity reasons, the trademark symbols such as ® and ™ are not repeated in the manual.

1.7 Reference Documents

This section provides a list of the documents that are needed or may be useful when using the Te-VacS.

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, hard copy, downloadable file, etc.) of the document.



On the basis of your order configuration, the Operating Manuals for optional equipment apply as well.

Check the scope of the corresponding document to ensure that you are in possession of the correct version.

The Doc ID does not refer to ordering information. When placing orders, please refer to the number on the binder, CD casing, etc.

1.7.1 Instrument Manuals

- Freedom EVO® Operating Manual (Doc ID 392886)
- Fluent® Operating Manual (Doc ID 396327)
- Fluent® Operating Manual (Doc ID 399706)
- Fluent® Reference Manual (Doc ID 398090)
- Fluent® Reference Manual (Doc ID 399937)

1.7.2 Application Software Manuals

- Freedom EVOware® Application Software Manual (Doc ID 393804)
- FluentControl™ Application Software Manual (Doc ID 396329)
- FluentControl™ Application Software Manual (Doc ID 399935)

1.8 Compliance with Laws and Standards

Covered by instrument conformity and certification.

Refer to the corresponding Operating Manual of the instrument. Refer to section [“Reference Documents” \[▶ 8\]](#).

1.9 Document Conventions

Cross-References

Cross-references appear as follows—e.g.:

Refer to section [“Safety” \[▶ 11\]](#)

- “Safety” refers to the corresponding section header
- The page number is given in square brackets

Prerequisites

Prerequisites appear as follows—e.g.:

- ✓ “General Safety Information” has been read.

Tips

Additional tips appear as follows—e.g.:



For safety conventions and symbols refer to section [“Safety” \[▶ 11\]](#).

2 Safety

This chapter describes the safety concept of Te-VacS, provides general rules of correct behavior, and warnings concerning hazards associated with the use of the Te-VacS.

2.1 Safety Message Conventions

2.1.1 Signal Words





Signal Word	Meaning
 DANGER	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
 WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
 NOTICE	Indicates a situation that is not hazard-related but, if not avoided, could result in damage to or malfunctioning of the equipment, or incorrect process results.

Table 1: Signal Words

2.1.2 Safety Symbols



General warning

2.2 General Safety Information

WARNING

Te-VacS 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 Te-VacS 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 Te-VacS 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 Te-VacS 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 Te-VacS. Tecan will reject any claim resulting from unauthorized modifications.
 - Fire hazard caused by the improper use of the Te-VacS. The Te-VacS 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 Te-VacS (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 Te-VacS 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.

- Observe all safety instructions of the instrument the Te-VacS is used on.

2.3 Operating Company

The operating company must ensure that the Te-VacS 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 Te-VacS are adequately trained.
- Ensuring the availability of appropriate protective clothing and equipment.
- Ensuring the maintenance and safe operation of the Te-VacS.
- Requiring adherence to laboratory safety regulations and directives.

2.4 User Qualification

The laboratory personnel must be fully qualified and trained to operate the Te-VacS. 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 [“Customer Support” \[▶ 51\]](#).

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

**Responsi-
bilities**

- Limited system knowledge
- Command of local languages
- Command of English
- In-depth knowledge of the corresponding software manual
- Instructing the operator
- Writing, running and validating methods
- Helping the operator to solve problems with the instrument

2.5 Decontamination Declaration

In addition to regular system care, and in accordance with standard laboratory regulations, the Te-VacS and its parts and accessories must be thoroughly decontaminated in the following circumstances:

- Before any maintenance or service work is performed on the Te-VacS and, in particular, before an FSE intervention on the Te-VacS
- In the event of accidents (e.g., crash, spillage, etc.)
- Before returning the Te-VacS or its parts or accessories, to Tecan (e.g., for repair)
- Prior to storage
- Prior to disposal
- In general, before moving the Te-VacS or its parts from its location

The owner of the instrument has full responsibility for the effective decontamination of all the equipment.

Before any intervention on the Te-VacS by an FSE, and before returning the Te-VacS or its parts or accessories to Tecan, the owner of the instrument must complete and sign the Decontamination Declaration form, confirming that the decontamination has been performed in accordance with good laboratory practice guidelines. Contact your local service organization to obtain this form and refer to section “[Decontamination](#)” [▶ 38].



Tecan reserves the right to refuse to deal with any Te-VacS or its parts or accessories that is not accompanied by the Decontamination Declaration form.

3 Technical Data

3.1 Type Plate

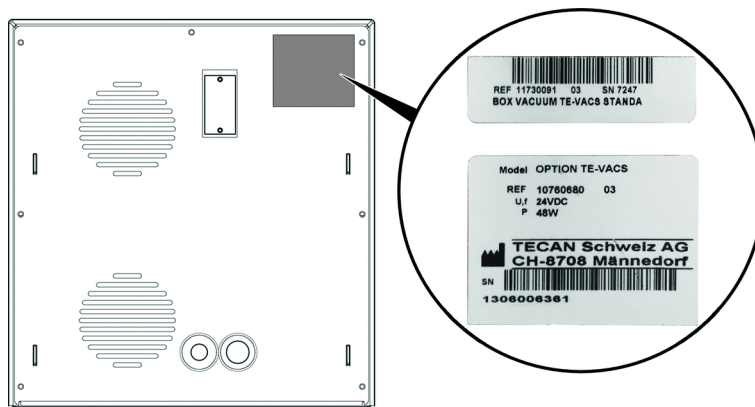


Illustration 1: Location of the type plate

The type plate is on the rear side of the Te-VacS and contains the following information:

Identification data	Model
	REF: Ordering information (material number and revision level)
	Date of manufacture (YYYYMMDD)
	SN: Serial number
Technical data	U, f: Supply voltage (Volts), frequency (Hertz)
	P: Power consumption (W)
Address data	Manufacturer's name and address
Conformity data	Conformity marking

3.2 Dimensions and Weights

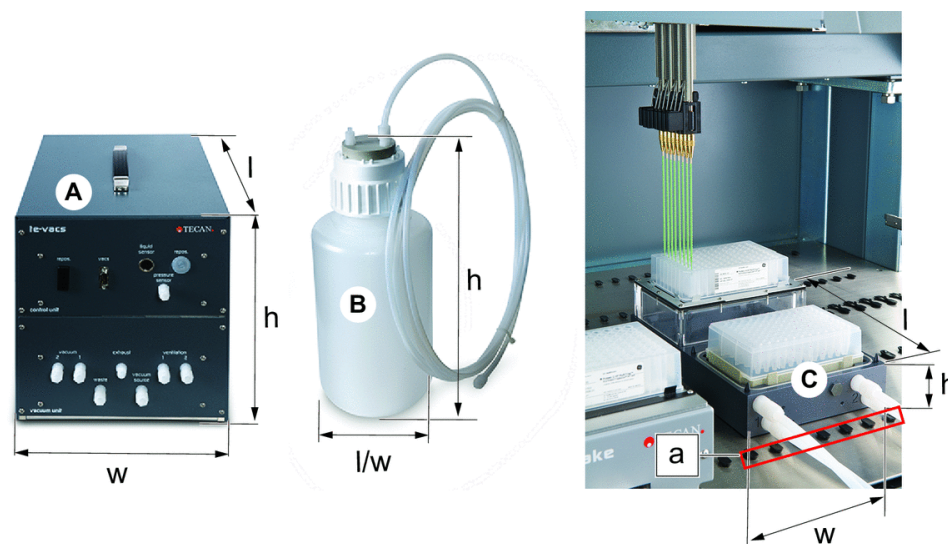


Illustration 2: Te-VacS components

- A** Te-VacS tower
- B** Waste bottle
- C** Base plate vacuum block

Component	Dimension Length (l) x Width (w) x Height (h)
Te-VacS tower	300 mm x 700 mm x 340 mm (11.8 in. x 27.6 in. x 13.4 in.)
Waste bottle	160 mm x 160 mm x 530 mm (6.3 in. x 6.3 in. x 20.9 in.)
Base plate vacuum block	285 mm x 155 mm x 49 mm (11.2 in. x 6.1 in. x 1.9 in.)

The base plate vacuum block extends over seven grid spaces (a) on the Freedom EVO worktable as well as on the Fluent deck.

Component	Weight
Te-VacS tower	<13.0 kg (<28.7 lbs.)
Waste bottle	2.0 kg (4.4 lbs.)
Base plate vacuum block	3.3 kg (7.3 lbs.)

3.3 Power Consumption

Power consumption	48 W
Voltage	24 VDC

3.4 Vacuum Conditions

Max. effective flow rate	33 l/min
Max. pressure difference	700 mbar

3.5 Environmental Conditions



Te-VacS is intended for indoor operation and storage only. For detailed information on operating conditions refer to the Operating Manual of the instrument the Te-VacS is used with. Refer to section [“Reference Documents” \[8\]](#).

Storage temperature	1–60°C (34–140°F)
Storage humidity	5–80% relative (non condensing) at 30°C (86°F) or below
Transport temperature	-20 to 60°C (-4 to 140°F)
Transport humidity	20–80% relative (non condensing)

3.6 Chemical Resistance

The following tables contain the chemical resistance of Te-VacS components to some frequently used liquids and vapors.



The tables below have been compiled from producer information. They are not comprehensive and are updated on the basis of new information available from the producers. The information has been taken "as is" and has not been systematically controlled nor retested by Tecan. Please be aware that chemical resistance varies with temperature and solvent concentration.

3.6.1 Chemical Resistance to Liquids

(1) resistant, (2) resistant to a limited extend, (3) not resistant

Parts	DMSO	Acetonitrile	Methanol	Methylene Chloride	Hexane, Chloroform	DMF, Ethyl Acetate	Ethanol, Isopropanol	Sodium Hypochlorite, 10%
Pump head	1	1	1	1	1	1	1	1
Pump diaphragm	1	1	1	1	1	1	1	1
Valve plate	1	1	1	1	1	1	1	1
Sealing rings	2	1	1	1	1	3	1	1
Waste bottle	1	1	1	3	2	2	1	1
Tubing	1	1	1	1	1	1	1	1
Screw couplings Fast Snap (PVDF)	3	2	1	2	1	3	1	1
Screw couplings (PP)	1	1	1	3	2	2	1	2
Extraction valve bodies	3	2	1	2	1	3	1	1
Extraction valve sealings	1	1	1	1	1	1	1	1
Liquid level float switch	1	1	1	3	2	2	1	2

Table 2: Parts with contact to liquids

3.6.2 Chemical Resistance to Vapors

(1) resistant, (2) resistant to a limited extend, (3) not resistant

Parts	DMSO	Acetonitrile	Methanol	Methylene Chloride	Hexane, Chloroform	DMF, Ethyl Acetate	Ethanol, Isopropanol	Sodium Hypochlorite, 10%
Waste bottle sealing	2	1	1	3	3	2	1	1
Vacuum control valve: Sealing, O-rings	1	3	1	2	1	3	1	1
Pressure sensor	3	3	2	3	3	3	1	2

Table 3: Parts with contact to vapors

3.6.3 Foam Formation

Substances causing foam formation should be avoided. Please note that often protein solutions can be a source of foam.



If foam formation cannot be avoided, it is recommended to install a second waste bottle with sufficient tubing.

Refer to [“Connecting an Additional Waste Bottle”](#) [▶ 31].

3.7 Emissions

Refer to the Operating Manual of the instrument. Refer to section [“Reference Documents”](#) [▶ 8].

3.8 Software Requirements

The Te-VacS may be operated by the following software packages:

- Freedom EVOware
- FluentControl
- Other Tecan software packages supporting Te-VacS



It is strongly recommended to use the latest software version. For further information please consult the [“Customer Support”](#) [▶ 51].

4 Description of Function

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

4.1 Overview

The Te-VacS cannot be operated as a stand-alone system, but only as a device integrated into a Tecan instrument.

The microplates, SPE cartridge blocks and the vacuum blocks are loaded and unloaded by the instrument equipped with a gripping device.



Illustration 3: Te-VacS components

- | | |
|----------------------------------|-----------------------|
| A Te-VacS tower | B Control unit |
| C Vacuum unit | D Vacuum block |
| E Base plate vacuum block | F Waste bottle |
| G Spacer | |

4.2 Te-VacS Tower

The control unit and the vacuum unit are assembled in the Te-VacS tower. A sound absorber (A) can be mounted directly on the TeVacS tower.



Illustration 4: TeVacS tower with sound absorber

4.2.1 Control Unit

The control unit contains the MPO VacS board including a pressure sensor.

The MPO VacS board receives the pressure control commands from the system control and controls the vacuum pump accordingly. The interface of the board to the instrument is given by D-sub plug (9-pin, male) on the front side of the control unit.

4.2.2 Vacuum Unit

The vacuum unit contains the vacuum pump and the valves. The tubes from and to the vacuum block and to the waste bottle are connected via screw or plug (optional) couplings on the front side of the unit.

4.2.3 Waste Bottle

The waste bottle is for the intermediate storage of the solvents extracted from the vacuum block. An integrated liquid level sensor is used to monitor the liquid level in the bottle.

The waste bottle can be clipped to the bottle holder of the Te-VacS tower.

4.3 Base Plate Vacuum Block

The base plate vacuum block consists of two basins, which may be equipped with accessories used for the extraction processes (e.g., microplates, SPE cartridge blocks, MALDI targets, etc.). The basins are pumped and vented independently of each other.

4.4 Vacuum Block

The vacuum block is used to support the SPE cartridge blocks during the extraction process. Depending on the specific processes different vacuum blocks can be used.

A special application is given by the Pro Team Wash Adapter. This vacuum block is vented via two ventilation valves. The ventilation valves are opened by the gripping device during the unloading of the SPE cartridge block. The abrupt ventilation of the vacuum block causes turbulences on the underside of the wash adapter that tear off dangling drops.

4.5 Spacers

The spacer is used to decrease the distance between SPE cartridge block and the collection plate in order to avoid cross contamination.

4.6 Optional Accessories

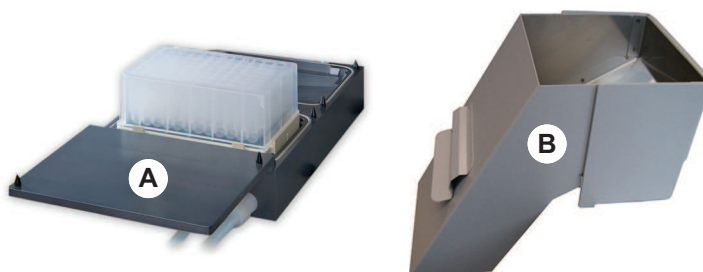


Illustration 5: Optional accessories

- Park position (A): A park position with positioning pins for the vacuum blocks can be fixed on the front side of the vacuum block.
- Plate waste (B): Ramp for the disposal of used labware.

4.7 Operating Elements and Displays

The Te-VacS has no operating or display elements of its own.

It is switched on and off by means of the main switch of the instrument. All commands and feedback information are handled via the application or setup and service software modules and their interfaces.



For more information please consult the corresponding Operating Manual of the instrument. Refer to section [“Reference Documents” \[8\]](#).

4.8 Function

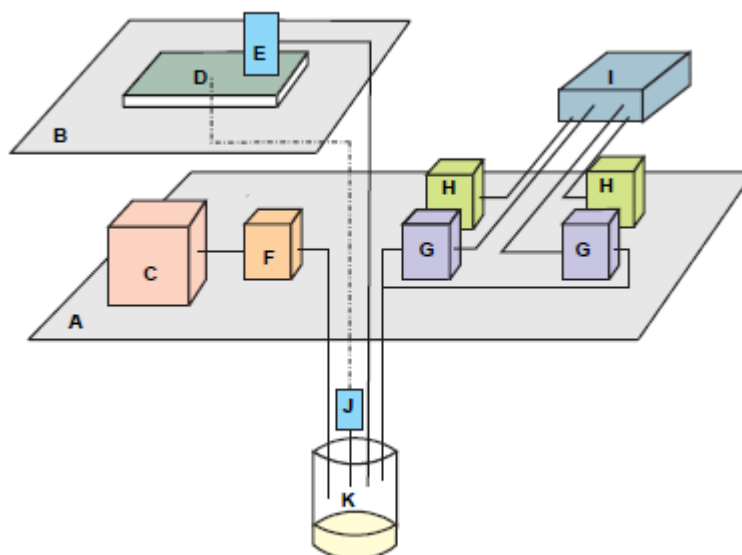


Illustration 6: Operation principle of the Te-VacS

- | | |
|----------------------------------|-------------------------------|
| A Vacuum unit | B Control unit |
| C Vacuum pump | D MPO VacS board |
| E Pressure sensor | F Vacuum control valve |
| G Extraction valve | H Ventilation valve |
| I Base plate vacuum block | J Liquid level sensor |
| K Waste bottle | |

The vacuum pump (C) generates a vacuum in the waste bottle (K). Via the extraction valves (G) the vacuum can be applied to the base plate vacuum block (I). This results in drainage of the liquid from the SPE cartridge block into the waste bottle. The vacuum can be released via ventilation valves (H).

To compensate for variations of ambient pressure in different altitudes and weather conditions, the Te-VacS pressure control system is based on pressure difference measurement.

The following illustration shows an example of pressure difference. The current ambient pressure is supposed to be 1000 mbar. According to the script in the software, in this example, the system must reach a negative pressure difference (vacuum) of 700 mbar. Thus, the final absolute pressure results in 300 mbar.

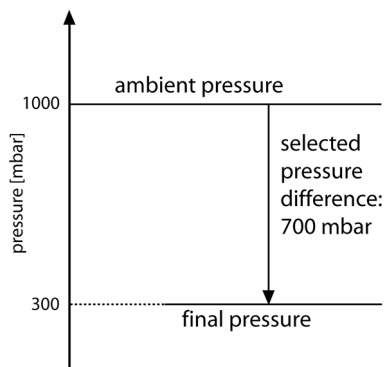


Illustration 7: Definition of pressure difference

All vacuum extractions take place in a 96-well format. The eluate is usually collected either in a 96-well microplate or in a deepwell plate.

4.8.1 Basic Principle of an Extraction Process

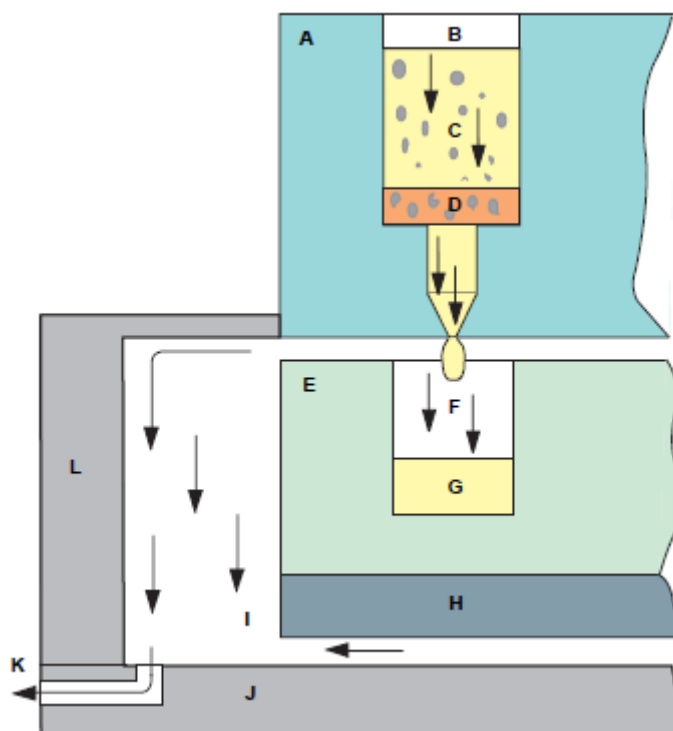


Illustration 8: Basic principle of an extraction process

- | | |
|----------------------------------|---|
| A SPE cartridge block | B Single well of SPE cartridge block |
| C Crude mixture | D Resin or filter |
| E Collection plate | F Single well of collection plate |
| G Purified product | H Spacer |
| I Low pressure atmosphere | J Base plate vacuum block |
| K To the waste bottle | L Vacuum block |

The illustration shows a cross section of the base plate vacuum block during the extraction process (view from right hand side).

Typically, an extraction process runs through the following sequence:

1. The resin in the separation column (D) is prepared by application of an appropriate solvent (C).
2. After the solvent has drained into the waste bottle (K), samples can be loaded into the wells.
3. Undesired compounds are removed from the resin by repeated addition of wash solutions to the wells and subsequent draining.
4. The elution solvent is pipetted into the wells (B) and the eluant with the purified sample(s) is collected in a collection plate (E).

4.8.2 Pumping Procedures

In general, two pumping procedures with different time dependencies of the pressure drop in the vacuum block are used:

- Fast pumping
- Soft pumping

Fast Pumping

With the fast pumping procedure at first the extraction valves are closed while the waste bottle is pumped. After vacuum has been reached in the waste bottle, the extraction valves are opened, which results in a fast pressure drop in the vacuum block.

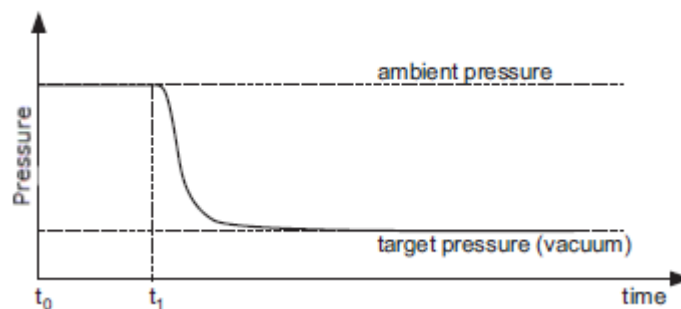


Illustration 9: Pressure drop in the vacuum box during fast pumping

Reaction time in the separation columns:

- t_0 : Start of pumping the waste bottle
- t_1 : Opening of the extraction valves

The fast pumping procedure guarantees

- that the plates are pressed on the vacuum box by the vacuum,
- abrupt evacuation for high flow resistance in the separation columns and/or big volumes.

The fast pumping procedure leads to a shorter reaction time in the separation columns.

Soft Pumping

With the soft pumping procedure the whole vacuum path is pumped (i.e., the extraction valves are open from the start). This results in a slow pressure drop in the vacuum block.

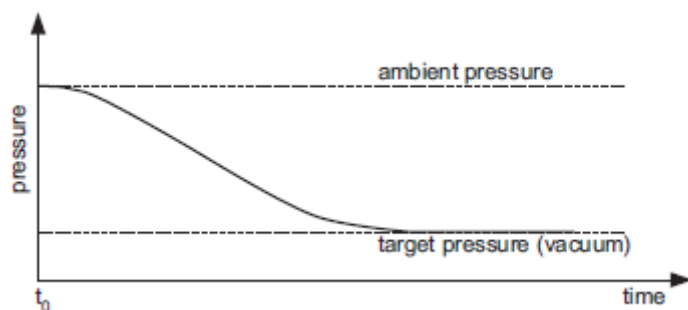


Illustration 10: Pressure drop in the vacuum box during soft pumping

Reaction time in the separation columns:

- t_0 : Start of pumping the waste bottle

The soft pumping procedure is applied if

- slow processing is desired,
- the substances require long reaction times,
- delicate contents (filters) are placed in the separation columns.

5 Operation

This chapter describes how the Te-VacS is installed and gives instructions on initial operation.

5.1 Process Validation

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.

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

5.2 Putting into Operation

5.2.1 Mounting the Base Plate Vacuum Block

To mount the base plate vacuum block, proceed as follows:

1. Place the base plate vacuum block on the instrument's worktable.
2. Screw in the positioning pins (A) to the corresponding threaded bore holes in the vacuum block.

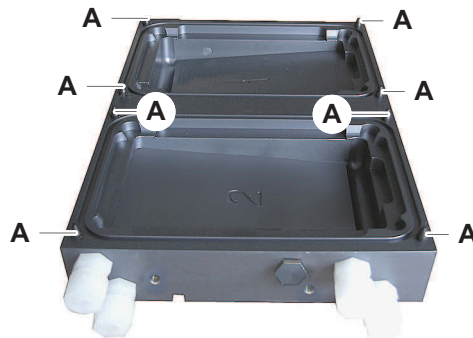


Illustration 11: Screw in the positioning pins

For the standard version use a total of four pins and place them opposite to the gripping device access site (B). Otherwise, the gripping device's gripper fingers may collide with the positioning pins (C).

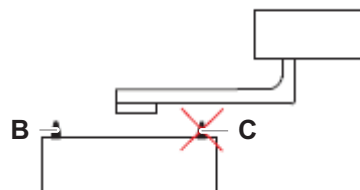


Illustration 12: Vacuum block pins

5.2.2 Preparing the Waste Bottle

To prepare the waste bottle, proceed as follows:

1. Remove the waste bottle cap (A).

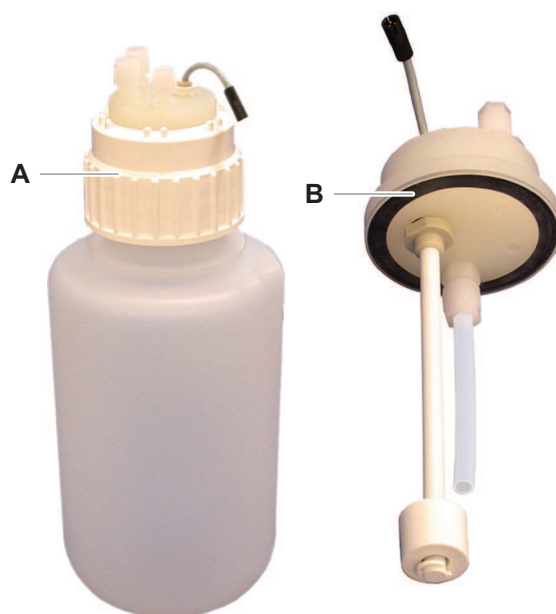


Illustration 13: Preparing waste bottle

2. Ensure that the waste bottle is empty.
3. Ensure that the sealing (B) is properly placed in the bottle cap.
4. Manually tighten the bottle cap.
5. Clip the waste bottle to the bottle holder of the Te-VacS tower.

5.2.3 Preparing the Tubing

When cutting the tubing, the end of the tubes must be cut exactly perpendicular to the tube. Otherwise the connection may be leaky. Use a tube cutter (A) if available.

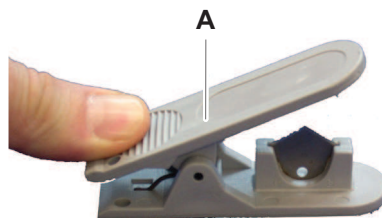


Illustration 14: Tube cutter

1. Cut the supplied tubing into five pieces that are specified as follows.
 - 3 pieces with the same length for the connection between the waste bottle and the vacuum unit. A tube length of 65 cm (26 in.) is recommended.*
 - 2 pieces with the same length per vacuum block for the connection between the base plate and the vacuum unit. The tube length depends on the distance between the vacuum unit and the base plate vacuum block.*
2. Ensure that there is a fixing ring (B) in each fixing nut (C).
NOTICE! Otherwise the tubing (D) is not tight.

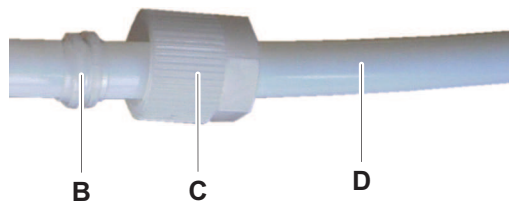


Illustration 15: Tubing preparation

5.2.4 Connecting the Waste Bottle

To connect the waste bottle, proceed as follows:

1. Connect the waste bottle to the Te-VacS tower using three tubes of the same length (A, B, C).



Illustration 16: Waste bottle connections

2. Connect the liquid level sensor cable to the Te-VacS tower (D).
3. Carefully tighten the tubing's fixing nuts using a wrench.

NOTICE! It is recommended to tie the tubes together using cable ties.

5.2.5 Connecting an Additional Waste Bottle

To connect an additional waste bottle (e.g., for foamy solutions) proceed as follows:

1. Connect the standard waste bottle to the Te-VacS tower using two tubes of the same length (A, B).



Illustration 17: Waste bottle connections

2. Connect the two waste bottles using a tube that is at least 5 m long (C).
3. Connect the additional waste bottle to the Te-VacS tower using a tube of suitable length (D).
4. Connect the liquid level sensor cable (E) to the vacuum unit.
5. Carefully tighten the tubing's fixing nuts using a wrench.
NOTICE! It is recommended to tie the tubes together using cable ties.

5.2.6 Connecting the Base Plate

1. Connect the extraction holes of the base plate vacuum block with the corresponding connections at the Te-VacS tower (A, B) using two tubes of the same length.



Illustration 18: Vacuum block connections

2. Connect the ventilation holes of the base plate vacuum block with the corresponding connections at the Te-VacS tower (C, D) using two tubes of the same length.
3. Carefully tighten the tubing's fixing nuts using a wrench.
NOTICE! It is recommended to tie the tubes together using cable ties.

5.2.7 Tubing Identification

Color markers facilitate to assign tubes to their corresponding fittings on the Te-VacS tower. This may help you to find the right connections more easily after disassembly (e.g., for cleaning or moving purposes). The color markers are delivered with the Te-VacS.

1. After all tubes are correctly connected to the Te-VacS tower, label each connection with a color sticker (B).

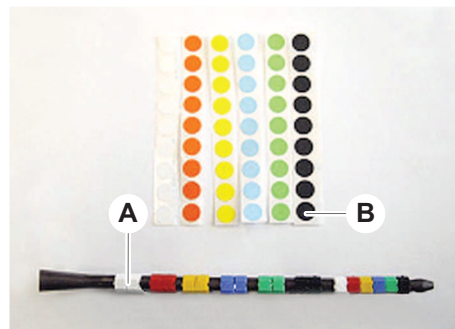


Illustration 19: Color markers (clips and stickers)

2. Attach the clips (A) to the connected tubes according to the colors of the stickers on the Te-VacS tower. Slide the clips from the tool onto the tubes as shown in the illustration below.



Illustration 20: Clip for tubings

5.2.8 Mounting the Sound Absorber

1. Remove the fixing nut of the tubing connector at the exhaust outlet (C) of the vacuum unit (A).
2. Screw on the sound absorber (B) to the exhaust outlet of the vacuum unit.



Illustration 21: Mounting the sound absorber

3. Carefully tighten the fixing nut using a fork wrench.

5.2.9 Exchanging the Sheet Metal Frame of the Vacuum Block

Certain SPE cartridge blocks might not fit into the installed sheet metal frame on the vacuum block. If necessary, exchange the sheet metal frame on your vacuum block with the appropriate one that was delivered with your vacuum block.

For exchanging the sheet metal frame of the vacuum block, proceed as follows:

1. Remove the 10 fixing screws (A) of the sheet metal frame using a hexagon socket key.
2. Remove the sheet metal frame.
3. Put the spare sheet metal frame (B) onto the vacuum block and fix it by means of the 10 hexagon socket head screws.

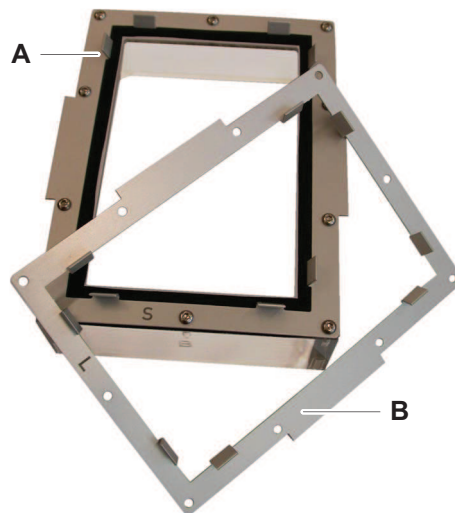


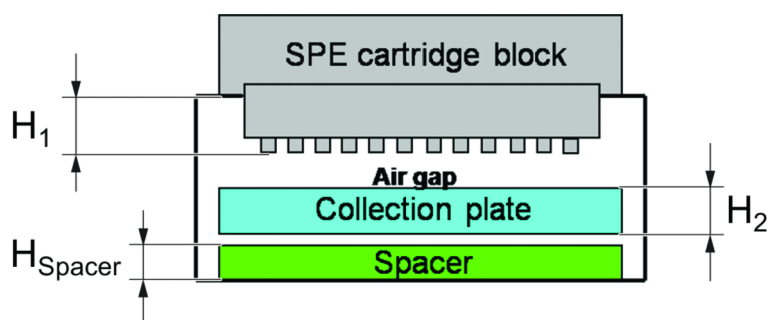
Illustration 22: Vacuum block with spare sheet metal frame

5.2.10 Using the Correct Spacer for a Given Application

To avoid cross contamination in the target collection plate, an appropriate spacer should be used. Spacer selection depends on the SPE cartridge block type and the height of the collection plate.

To select the appropriate spacer, proceed as follows:

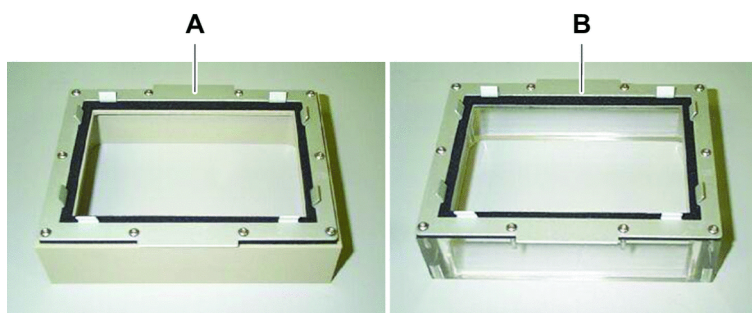
1. Measure the distance H_1 on the SPE cartridge block.
2. Measure the total height of the collection plate (H_2).



3. Calculate the required spacer height (H_{Spacer})

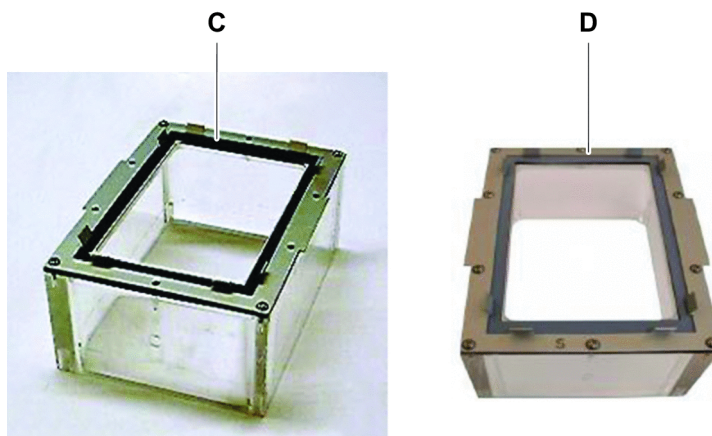
For vacuum blocks A and B:

$$H_{Spacer} = 46 \text{ mm} - H_1 - H_2$$



For vacuum blocks C and D:

$$H_{Spacer} = 71 \text{ mm} - H_1 - H_2$$



4. Find the appropriate spacer according to the table, rounding the calculated result to the closest lower value in the table.

Spacer Height (mm)	Spacer No	Tecan Part No
7.5	1	10760663
26.5	2	10760662
3.5	3	10760661
33.5	4	10760652
16.5	5	10760664
36.2	6	10760666
10.5	7	10760691

Table 4: Available spacers

5.3 Running a Method

The application software that is used for running methods is described in the corresponding Application Software Manual. Refer to [“Reference Documents” \[8\]](#).

6 Preventive Maintenance and Repair

6.1 Decontamination

Decontamination, according to standard laboratory regulations, is required under the circumstances listed in section [“Decontamination Declaration” \[▶ 14\]](#).

WARNING

Contamination!

Substance residues on the Te-VacS can cause personal injury and affect the integrity of the process.

- Decontaminate the Te-VacS and its parts and accessories before any interaction.

The decontamination method must be defined by the key operator based on the type of contaminant and degree of contamination. Guidance on the selection of decontamination agents and application modes is provided in this chapter.

6.2 Cleaning Agents

Special cleaning agents are required. All the recommended cleaning agents have been carefully selected and tested.

NOTICE

Reduced effectiveness and chemical compatibility!

There is no guarantee for the effectiveness of cleaning agents and chemical compatibility if other cleaning agents than those recommended by Tecan are used.

- Only use cleaning agents recommended by Tecan.



For more information about cleaning agents please consult the Operating Manual of the Tecan instrument used. Refer to section [“Reference Documents” \[▶ 8\]](#).

6.3 Maintenance Schedule

To ensure optimum performance and reliability, perform the maintenance and cleaning tasks as recommended.

6.3.1 End of Day Maintenance Table

The following maintenance tasks must be performed after 8 hours of operation or after each run.

The following table lists the maintenance tasks at the end of the day in chronological order:

Component	Maintenance Task	Cleaning Agent	Reference
Base plate vacuum block Spacer Vacuum block	Clean and decontaminate	Use isopropyl alcohol, a commercially available mild detergent or a decontamination solution as cleaning agents.	Refer to section “Cleaning the Te-VacS” [▶ 41].
Waste bottle	Empty and flush	Use isopropyl alcohol, a commercially available mild detergent or a decontamination solution as cleaning agents.	Refer to section “Cleaning the Te-VacS” [▶ 41].
Vacuum path	Clean and flush	Use isopropyl alcohol, a commercially available mild detergent or a decontamination solution as cleaning agents.	Refer to section “Cleaning the Te-VacS” [▶ 41].
Tubing connections	Check	–	–

Table 5: End of day maintenance

6.3.2 Monthly Maintenance Table

The following preventive maintenance tasks must be performed at the end of each month or after 160 hours of operation.

Component	Maintenance Task	Cleaning Agent	Reference Maintenance Activities
Base plate vacuum block	Check the sealing	Silicone grease	If the sealing sticks to the microplate, clean and lubricate the sealing with silicone grease.
Vacuum block Sealing	Clean and flush	Silicone grease	If the sealing sticks to the microplate or if salt is crystalized on the surface, clean and lubricate the sealing with silicone grease.

Table 6: Monthly maintenance

See also

 ["Reference Documents" ▶ 8](#)

6.4 Maintenance Tasks

6.4.1 Cleaning the Te-VacS

1. Clean the base plate vacuum block, the vacuum block, the spacer (if used), the waste bottle and the tubes.
2. Clean the ventilation holes (A) and extraction holes (B) in the base plate vacuum block and remove any obstructions.

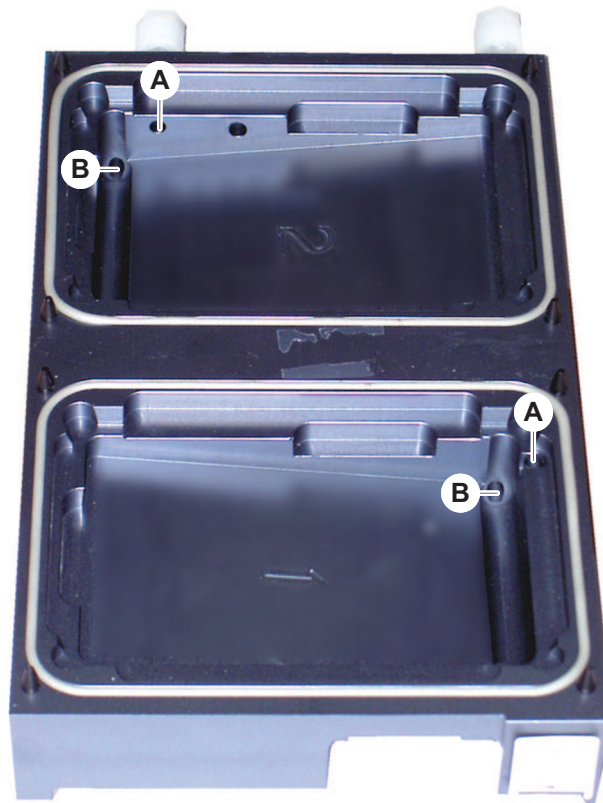


Illustration 23: Ventilation and extraction holes in the base plate vacuum block

7 Troubleshooting

Consult this chapter for help on resuming operation after a problem has occurred with the Te-VacS.

7.1 Troubleshooting Table

Problem/Error	Possible Cause	Corrective Measure
Pressure loss in general	Leak in the vacuum system	Check the tubing, the tubing connectors and the sealings. If the problem cannot be solved, please consult the “ Customer Support ” [▶ 51].
Pressure loss during application	Leak test failed	Check the tubing, the tubing connectors and the sealings. If the problem cannot be solved, please consult the “ Customer Support ” [▶ 51].
System does not reach the required pressure	Performance test failed	Check the tubing, the tubing connectors and the sealings. If the problem cannot be solved, please consult the “ Customer Support ” [▶ 51].
Valve, vacuum pump or pressure sensor failure		Please consult the “ Customer Support ” [▶ 51]. NOTICE! Never open the Te-VacS vacuum unit and do not perform any service procedures.
No vacuum applied	Plate not correctly placed on sealing Too much flow through the cartridge	Check the plate position and/or the vector setpoints for the gripping device. Change from soft to fast pumping procedure. Use the vacuum block sealing with the soft side (EPDM side) upwards or replace it. Cover unused wells. Refer to the Operating Manual and the Application Software Manual of the Tecan instrument used. Refer to section “ Reference Documents ” [▶ 8].
Instrument does not recognize the Te-VacS	Technical damage Incorrect setup	Please consult the “ Customer Support ” [▶ 51].

Problem/Error	Possible Cause	Corrective Measure
Gripping device access failed	Wrong adapter	Use the adapter that fits to the SPE cartridge.
Gripping device crash	Positioning pins or neighboring carriers block the arm access Vector setpoints for the arm incorrect	Check the positioning pins. Check the distance to the neighboring carrier on the worktable. Check the vector setpoints for the arm. Refer to the operating manual or/ and the instrument software manual of the Tecan instrument used.
Decreasing pump capacity	Salts crystallized in the pump head	If possible, use solutions with lower salt concentration. Please consult the "Customer Support" [▶ 51] .

Table 7: Te-VacS troubleshooting table

8 Packaging, Transport, Storage and Disposal

This chapter includes regulatory information about recycling and labels on packaging that needs to be followed.

NOTICE

Prevent damage by unqualified and unauthorized personnel!

Packing, unpacking, transport and storage may only be performed by Tecan personnel or personnel authorized by Tecan!

- Please consult the “[Customer Support](#)” [▶ 51].

8.1 Packaging Labels

Correct and complete marking of packaging helps to prevent incorrect handling, accidents, incorrect delivery, loss of weight and damage during storage.







Symbol	Meaning	Description
	Recycle	The packaging material can be recycled. Do not dispose of as domestic waste. Information on the material used for this packaging is provided beneath the symbol.
	This side up	Ensure that the package is transported and stored with the top side, indicated by the arrows, uppermost. Do not topple over.
	Keep dry	Ensure that the package does not get wet during transport and storage.
	Fragile	Handle the package with care. There are fragile goods inside.
	Keep away from sunlight	Ensure that the package will not be exposed to heat during transport and storage. Protect against strong sunlight.
	Do not stack	Do not stack packages. The package is not designed to carry extra weight.

Table 8: Packaging symbols

8.2 Disposal

NOTICE

Recycling in accordance with applicable legal regulations!

Observe the laws applicable in your country for recycling.

For further information refer to the Operating Manual of the instrument. Refer to section "[Reference Documents](#)" [▶ 8].

9 Spare Parts and Accessories

How to Order Spare Parts

This chapter lists spare parts and accessories that are needed for maintenance and repair of the Te-VacS including their corresponding ordering information.

- Look up the ordering information in the tables.
- Order the parts from Tecan. Refer to [“Customer Support” \[▶ 51\]](#).

Always state the designation and the part number when ordering spare parts.



This chapter only contains spare parts that can be replaced by the operator. To order spare parts other than listed here please consult the [“Customer Support” \[▶ 51\]](#).

9.1 Te-VacS Tower

No	Plain Text Designation	SAP No	Label Designation
1	Te-VacS tower, complete	10760680	OPTION TE-VACS
2	Control unit, complete	10760916	UNIT CONTROL TE-VACS
3	Vacuum unit, complete	10760917	UNIT VACUUM TE-VACS
4	Sound absorber	10760655	ABSORBER SOUND TE-VAC
5	Waste bottle fixing device: clamp (part of 10760680)	30006444	CLIP BOTTLE TE-VACS
6	Waste bottle fixing device: base plate (part of 10760680)	11730095	PLATE BOTTLE SPE VACUUM BOX GRAY

Table 9: Te-VacS tower spare parts

9.2 Waste Bottle

No	Plain Text Designation	SAP No	Label Designation
1	Complete waste bottle with 4 connectors (including floating switch, sealings, etc.).	30013321	BOTTLE WASTE 4L TE-VACS SPARE
2	4l waste bottle including cap with 2 connectors. The waste bottle does not contain any liquid level sensor. This bottle is used for foamy solutions only.	30045220	BOTTLE WASTE 4LWITH CAP

Table 10: Spare Parts for the waste bottle

9.3 Tubing and Cables

No	Plain Text Designation	SAP No	Label Designation
1	Connection Cable to Optibo PCB	10619415	CABLE CONNECT.FWO/MPO RIGHT RSP 100/ 150
2	Liquid sensor cable	30013326	CABLE SENSOR LIQUID VAC.BOTTLE TEVACS
3	Tubing 6 x 1 mm PTFE (length = 12.5 m)	10760904	TUBE PTFE 6*8MM 12M TE-VACS
4	Tubing 4 x 1 mm PTFE (length = 2.5 m)	10760915	TUBE VACUUM PTFE 4*6MM 2.5M

Table 11: Tubings, tubing connectors and cables for the Te-VacS

9.4 Base Plate Vacuum Block

No	Plain Text Designation	SAP No	Label Designation
1	Complete base plate vacuum block	10760920	PLATE BASE VACUUM BLOCK TE-VACS
2	Positioning pin	10760640	PIN POSITIONING BASE PLATE VACUUM BLOCK

Table 12: Spare Parts for the Te-VacS base plate vacuum block

9.5 Spacers

No	Plain Text Designation	SAP No	Label Designation
1	Spacer no 1, height 7.5 mm	10760663	SPACER NO.1 H7.5MM SPE TE-VACS
2	Spacer no 2, height 26.5 mm	10760662	SPACER NO.2 H26.5MM SPE TE-VACS
3	Spacer no 3, height 3.5 mm	10760661	SPACER NO.3 H3.5MM SPE TE-VACS
4	Spacer no 4, height 33.5 mm	10760652	SPACER NO.4 H33.5MM SPE TE-VACS
5	Spacer no 5, height 16.5 mm	10760664	SPACER NO.5 H16.5MM SPE TE-VACS
6	Spacer no 6, height 36.2 mm	10760666	SPACER NO.6 H36.2MM SPE TE-VACS
7	Spacer no 7, height 10.5 mm	10760691	SPACER NO.7 H10.5MM SPE TE-VACS
8	Set of spacer no 2 and 3	10760625	SET SPACER NO. 2+3 SPE TE-VACS
9	Set of spacer no 1 and 4	10760628	SET SPACER NO. 1+4 SPE TE-VACS

Table 13: Spacers for the Te-VacS

9.6 Vacuum Blocks

No	Plain Text Designation	SAP No	Label Designation
1	SPE Vacuum block type A, short, 37mm high, Material PP (chemical resistant, non transparent). For bottom skirted cartridges from Eppendorf, Invitrogen, BioRad, Millipore. Comes with hard sealing (30021774, mounted) and soft sealing (10760637).	10760624	BLOCK VACUUM PP H37MM TE-VACS TYPE A
2	SPE Vacuum block type B, short, 37mm high, Material PMMA (non chemical resistant, transparent). For bottom skirted cartridges from Eppendorf, Invitrogen, BioRad, Millipore. Comes with hard sealing (30021774, mounted) and soft sealing (10760637).	10760623	BLOCK VACUUM PMMA H37MM TE-VACS TYPE B
3	SPE Vacuum block type C, tall, 62mm high, Material PMMA (non chemical resistant, transparent). For top skirted cartridges from Qiagen, Promega and Macherey-Nagel. Comes with hard sealing (10760638, mounted) and soft sealing (30021773).	10760626	BLOCK VACUUM PMMA H62MM TE-VACS TYPE C

No	Plain Text Designation	SAP No	Label Designation
4	SPE Vacuum block type D, tall, 62mm high, Material PP (chemical resistant, non transparent). For top skirted cartridges from Qiagen, Promega and Macherey-Nagel. Comes with hard sealing (10760638, mounted) and soft sealing (30021773).	10760627	BLOCK VACUUM PP H62MM TE-VACS TYPE D
5	SPE vacuum box type P, ALU, for TecPrep96 plates designed for spotting onto MALDI targets (with repositioner).	10760902	BOX VACUUM ALU TYPE P TE-VACS
6	SPE vacuum box type PW, ALU, for TecPrep96 plates wash designed for low contamination wash of TecPrep96 plates.	10760903	BOX VACUUM ALU TYPE PW TE-VACS WASH

Table 14: Vacuum boxes for the Te-VacS

9.7 Accessories

No	Plain Text Designation	SAP No	Label Designation
1	Plate waste	10760649	SLIDE WASTE TE-VACS-B/TE-VACS-C
2	Paper holder (for filter paper)	10760653	HOLDER FILTER PAPER 10760656
3	Filter paper, ca. 8.5 cm x 12.5 cm	10760656	FILTER PAPER 125MM*85MM 10760653

Table 15: Accessories for the Te-VacS

10 Customer Support

This chapter informs you how to contact us in case help is needed. It lists addresses and telephone numbers of the manufacturer's representatives.

Tecan and its representatives maintain a fully trained staff of technical specialists around the world. For any technical question, contact the nearest Tecan representative.

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).

10.1 Contacts

Please 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 <a href="mailto:helpdesk-
aus@tecan.com">helpdesk- aus@tecan.com
Austria	Tecan Austria GmbH Untersbergstrasse 1a 5082 Grödig Austria	Phone Fax E-mail	+43 6246 8933 256 +43 6246 72770 <a href="mailto:helpdesk-
at@tecan.com">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 <a href="mailto:helpdesk.benelux
@tecan.com">helpdesk.benelux @tecan.com

China	Tecan (Shanghai) Trading Co., Ltd. Room 1802, 1803, 1804 and Room 205, HongJia Tower, 388 Fushan Road, Pudong New Area, 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

Table 16: Customer Support contacts

Abbreviations

ASM

Application Software Manual

CE

Conformité Européenne

CGM

Common Gripper Module

CSA

Canadian Standard Association

EMC

Electromagnetic Compatibility

EN

European Norm

FCA

Flexible Channel Arm

FES

Finger Exchange System

FSE

Field Service Engineer

IEC

International Electrotechnical Commission

IQ

installation qualification

ISO

International Organization for Standardization

MALDI

Matrix Assisted Laser Desorption Ionization

MP

microplate

OM

Operating Manual

OQ

operating qualification

PC

personal computer

RoMa

robotic manipulator arm

SN

serial number

SPE

solid phase extraction

TecPrep 96

Tecan SPE Plate for Advanced Digest Application

Te-VacS

Tecan vacuum separator

WEEE

Waste Electrical and Electronic Equipment