

# Operating instructions

## **TRISON**

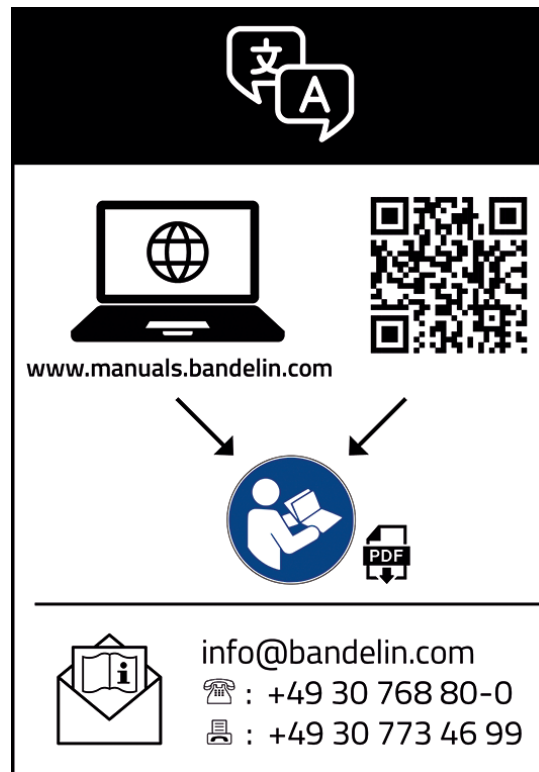
High-performance ultrasonic bath



**Valid for:**

TRISON 4000.2

SONOBOARD TRISON R/L



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Certified to ISO 9001 and ISO 13485

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# 1 About these operating instructions

These operating instructions contain information that is necessary and useful in order to use the device safely and efficiently.

- Read these operating instructions before using the device.
- Pay particular attention to chapter **2 Safety**.
- If you pass on this device, provide these operating instructions with it.
- Contact your dealer or BANDELIN if any questions are not answered in these operating instructions. Notes on service can be found in chapter **6.6 Repairs**.

In the event that the translation cannot be understood, the German original version of BANDELIN must be followed.

BANDELIN assumes no responsibility or liability for damage caused by improper handling or use.

Illustrations are exemplary and not to scale. Decorations not included with delivery.

## 2 Safety

### 2.1 Using the device

The TRISON ultrasonic bath uses the physical action of high-performance ultrasound in aqueous liquids to clean rinsable and non-rinsable medical instruments.

The TRISON ultrasonic bath is a Class I medical device per Regulation (EU) 2017/745.

EMDN nomenclature: Z12011302

Cleaning is carried out with water and an ultrasound-compatible agent.

Use of the TRISON ultrasonic bath is indicated for:

- support for manual pre-cleaning in the context of the mechanical reprocessing of medical devices; and as
- support for manual pre-cleaning and cleaning in the context of the manual reprocessing of medical devices.

Instruments must not be placed on the bottom of the oscillating tank. They must be placed in the sonication fluid with a TRISON Twist, in a TRISON Rack, or in an insert basket with a basket holder. An overview of approved accessories can be found in chapter **9 Approved accessories**.

The TRISON ultrasonic bath must not be operated unattended.

#### General information

The TRISON ultrasonic bath uses the physical action of high-performance ultrasound in aqueous liquids to clean rinsable and non-rinsable medical instruments.

The TRISON ultrasonic bath is a Class I medical device per Regulation (EU) 2017/745.

EMDN nomenclature: Code V0799

Cleaning is carried out with water and an ultrasound-compatible agent.

#### Indication

Use of the TRISON is indicated for:

- support for manual pre-cleaning in the context of the mechanical reprocessing of medical devices; and as
- support for manual pre-cleaning and cleaning in the context of the manual reprocessing of medical devices.

### Purpose of the ultrasonic bath

The TRISON ultrasonic bath can be used for the following purposes:

- a) Sonication and alternating pressure rinsing of the instrument shafts and suction rinsing of the instrument heads, with movement of the instrument tools, for robotics instruments in the da Vinci Si series  
Required accessories: TRISON Twist Si (TT 4000 da Vinci Si right-hand variant or left-hand variant; REF 7820 or 7920)
- b) Sonication and alternating pressure rinsing of the instrument shafts and suction rinsing of the instrument heads, with movement of the instrument tools, for robotics instruments in the da Vinci Xi series  
Required accessories: TRISON Twist Xi (TT 4000 da Vinci Xi right-hand variant or left-hand variant; REF 7821 or 7921).  
When cleaning the da Vinci Xi EndoWrist Stapler 45, a TX 4000 Xi spacer (REF 7763) is also necessary.
- c) Sonication and simultaneous suction rinsing of the instrument shafts of MIS instruments with external diameters of 3 to 10 mm  
Required accessories: TRISON Rack TR 3001 (right-hand variant or left-hand variant; REF 7631 or 7731)
- d) Sonication of standard instruments  
Required accessories: insert basket (REF 688) and basket holder (right-hand variant or left-hand variant; REF 7761 or 7661)
- e) Sonication and alternating pressure rinsing of the instrument shafts and suction rinsing of the instrument heads, with movement of the instrument tools, for robotics instruments in the Hugo RAS system  
Required accessories: TRISON Twist TT 4000 Hugo (right-hand variant or left-hand variant; REF 7892 or 7890)
- f) Sonication and alternating pressure rinsing of the instrument shafts and suction rinsing of the instrument heads of robotics instruments in the Versius Surgical Robotic System  
Required accessories: SLS 4000 Versius hose set (REF 33641) and TRISON Rack TR 4000 (REF 7632)
- g) Sonication and alternating pressure rinsing of the instrument shafts and suction rinsing of the instrument heads, with movement of the instrument tools, for instruments in the hinotori robotics series  
Required accessories: TRISON Twist TT 4000 hinotori (right-hand variant or left-hand variant; REF 7891 or 7893)
- h) The TRISON DU 4000 dosing unit is used for automated dosing of the disinfectant and/or detergent and water into the oscillating tank of the TRISON 4000.2 (REF 7899)
- i) Sonication and alternating pressure rinsing of the instrument shafts and suction rinsing of the instrument heads of robotics instruments in the da Vinci Single Port SP series  
Required accessories: SLS 4000 da Vinci SP hose set (REF 33645) and TRISON Rack TR 4000 (REF 7632)

- j) Sonication and alternating pressure rinsing of the instrument shafts and suction rinsing of the instrument heads of Toumai robotics instruments  
Required accessories: SLS 4000 Toumai hose set (REF 33644) and TRISON Rack TR 4000 (REF 7632)
- k) Sonication and alternating pressure rinsing of the instrument shafts and suction rinsing of the instrument heads of da Vinci 5 robotics instruments  
Required accessories: SLS 4000 da Vinci 5 hose set (REF 33646) and TRISON Rack TR 4000 (REF 7632)

### **The purpose of TRISON accessories**

The purpose of the TRISON accessories is:

- TRISON Lift TL 4000 (REF 7930): pivoting the TRISON Twist for placement and positioning during the ultrasonic cleaning process in the TRISON ultrasonic bath to achieve purposes a) and b)
- TRISON Twist Si moving device (right-hand variant or left-hand variant; REF 7820 or 7920) with the TRISON ultrasonic bath: to achieve purpose a)
- TRISON Twist Xi moving device (REF 7821 right-hand variant or 7921 left-hand variant) with the TRISON ultrasonic bath: to achieve purpose b)
- TRISON Twist TT 4000 Hugo (right-hand variant or left-hand variant; REF 7892 or 7890) with the TRISON ultrasonic bath: to achieve purpose e)
- TRISON Twist TT 4000 hinotori (right-hand variant or left-hand variant; REF 7891 or 7893) with the TRISON ultrasonic bath: to achieve purpose g)
- TX 4000 Xi spacer (REF 7763): positioning a da Vinci Xi EndoWrist Stapler 45 in the TRISON ultrasonic bath to achieve purpose b)
- TRISON Rack TR 3001 (right-hand variant or left-hand variant; REF 7631 or 7731): holder for MIS instruments during ultrasonic cleaning with the TRISON ultrasonic bath, to achieve purpose c)
- Insert basket (REF 688) and basket carrier (right-hand variant or left-hand variant; REF 7761 or 7661): support for ultrasonic cleaning by receiving/positioning the objects to be cleaned in the TRISON ultrasonic bath, to achieve purpose d)
- Adapter (REF 3350, 3351, 3359, 7770) and adapter seal (REF 3353, 3354, 3355, 3361): rinsing during ultrasonic cleaning of MIS instruments in the TRISON rack with the TRISON ultrasonic bath, to achieve purpose c)
- Silicone knob mat (REF 3313): support for ultrasonic cleaning by receiving/positioning the objects to be cleaned to achieve purpose d)
- Hose set with couplings for the Versius Surgical Robotic System (REF 33641): connection of Versius Surgical Robotic System robotics instruments to the TRISON to achieve purpose f)
- TRISON Rack TR 4000 (REF 7632): support for ultrasonic cleaning by receiving/positioning the objects e) and f) to be cleaned

- SLS 4000 da Vinci SP hose set with couplings (REF 33645): connection of da Vinci Single Port SP robotics instruments to the TRISON to achieve purpose i)
- SLS 4000 Toumai hose set with couplings (REF 33644): connection of Microport robotics instruments from the manufacturer Microport to the TRISON to achieve purpose j)
- SLS 4000 da Vinci 5 hose set with couplings (REF 33646): connection of da Vinci robotics instruments from the manufacturer Intuitive to the TRISON to achieve purpose k)

### **Contraindications/exclusions**

- Optics, camera systems, electrical cables, mirrors or objects made of or with elastic materials (e.g., catheters, respiratory system functional parts, flexible endoscopes) are not suitable for sonication, or are only suitable to a limited extent. The information provided by the relevant manufacturer provides information about suitability for ultrasonic cleaning.
- The TRISON ultrasonic bath is not suitable for cleaning and disinfecting contact lenses.
- The sonication of flammable liquids is not permitted in the TRISON ultrasonic bath.
- Indirect sonication is not permitted in the TRISON ultrasonic bath.

### **Possible side effects/limitations**

- Ultrasound does not disinfect. However, processes such as chemical disinfection can be accelerated in the ultrasonic bath.
- Surfaces can be mechanically attacked by cavitation erosion, and coatings can be dissolved.

### **Intended users**

The TRISON ultrasonic bath is intended for use in health facilities, e.g., in a Central Sterile Services department (CSSD). It is to be used by trained personnel.

Operation of the ultrasonic bath does not pose any danger to pregnant women.

## 2.2 Obligation to report serious incidents

Report serious incidents to BANDELIN electronic GmbH and Co. KG and the competent authority.

## 2.3 Avoidance of cross-contamination and infections

To avoid cross-contamination, regularly clean and disinfect the surfaces of the ultrasonic bath with a surface disinfectant that at least has bactericidal, levurocidal and limited virucidal properties. Regularly reprocess accessories such as hoses, basket holders and insert baskets in a cleaning disinfection device.

Disinfect the hoses regularly with the TRISON disinfection program.

At higher temperatures, vapours and aerosols contaminated with introduced impurities can rise from the ultrasonic bath. This can lead to infections and illnesses. Avoid bath temperatures above 40 °C. If necessary, use a lid, a suction device or protective equipment.

## 2.4 Keep out of reach of children

Children may not detect hazards emanating from the device. Therefore, keep the device away from children.

## 2.5 Risk of electric shock

The ultrasonic bath is an electrical device. Failure to follow safety rules can result in a life-threatening electric shock.

- Protect the ultrasonic bath from moisture and wet conditions. Keep the surface and touchscreen clean and dry.
- Only transport the ultrasonic bath when it is empty.
- Do not rinse the ultrasonic bath, immerse it in water, or expose it to splash water.
- Only connect the device to a grounded socket whose earthing contact matches the earthing contact of the mains connector.



### **WARNING**

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**Note for device with type E+F jack:**

Combination with socket type K (especially common in Denmark) is not permitted.

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- Ensure that it is watertight.  
No moisture may touch the generator or the mains connector of the generator.

- If you find a defect in the ultrasonic bath, unplug it immediately. Do not connect an ultrasonic bath to the mains if it is defective.
- Only have repairs carried out by authorised specialists or by the manufacturer. See chapter **6.6 Repairs**.
- Set up the ultrasonic bath so that the mains connection can be disconnected without difficulty.

## 2.6 Adverse health effects due to ultrasound noise

Ultrasound generates process-specific cavitation noises, which may be perceived very differently from person to person.

To reduce noise, we recommend that you only operate the device with the associated lid. In general, a sound level of 75 dB-AU is not exceeded.

If no other noise protection is available, we recommend wearing hearing protection in the event of prolonged exposure in the immediate vicinity (suitable options include, for example, earmuff hearing protectors or equivalent earplugs or otoplastics).

The exposure for the user depends on factors such as the installation site, the detergent, and the load of objects to be sonicated. Whether hearing protection is required in a specific case can only be determined by qualified personnel at the site.

The responsibility for the evaluation and implementation of appropriate protective measures lies with the operator.

## 2.7 Dangers due to high temperatures

The ultrasonic bath, the sonication fluid and the instruments may become hot during operation. Touching them may cause burns.

Ultrasound heats the sonication fluid even without additional heating. Very high temperatures can occur during prolonged operation of ultrasound.

- Observe the treatment times recommended by the manufacturer of the ultrasound agent. Do not leave the ultrasound on for longer than necessary.
- Do not touch the sonication fluid with your hand. Remove instruments using the TRISON Twist, the TRISON Rack, the insert basket or forceps.
- Allow instruments to cool before touching them.

Non-aqueous liquids can heat up many times faster than water. A possible flash point can be reached and exceeded after a very short period of sonication. In the case of fluids with high boiling points, the bath temperature can rise to over 120 °C due to the energy supply of the ultrasound. This can lead to fires and severe burns.

- The lid used must not completely seal the oscillating tank – steam must be able to escape.

## 2.8 Danger due to ultrasound

The strong ultrasound in the device destroys cell structures. If a body part is immersed in the sonication fluid during operation, this can lead to skin damage, but also to internal tissue damage. The periosteum of fingers can suffer damage.

- Do not touch the sonication fluid during operation.
- Never expose living things to ultrasound.

## 2.9 Danger due to agents used

Agents used in the device can be toxic or corrosive. They can irritate eyes, skin and mucous membranes. The vapours and aerosols can also be dangerous.

- Wear gloves and safety glasses when handling dangerous agents.
- Do not ingest the agents and do not bring them into contact with eyes or skin. Do not bend over very close to the device, so as to avoid vapours coming into contact with your eyes or you inhaling the vapours.
- Place a lid on the device during operation. In the event of dangerous fumes, use a suction device.
- Observe the information on the label and in the safety data sheet for the agent.
- Keep the agents away from children and untrained persons.

## 2.10 Disposal of the sonication fluid

Dispose of the sonication fluid according to the instructions of the manufacturers of the ultrasonic agents used. The recommended ultrasonic agents of the TICKOPUR, TICKOMED and STAMMOPUR product series from DR. H. STAMM GmbH are biodegradable in accordance with the provisions of Regulation (EC) No. 648/2004 (Detergents Regulation). If necessary, the sonication fluid must be neutralised before disposal.

Depending on the type of contamination, substances hazardous to water, e.g., oils or heavy metal compounds, may have been introduced into the sonication fluid during cleaning. If the limit values for these substances are exceeded, the sonication fluid must be treated or disposed of as hazardous waste.

Observe local sewage regulations.

## 2.11 Erosion of the oscillating tank

The surface of the oscillating tank is subject to erosion. How quickly this erosion takes place depends on the use of the ultrasonic bath. The erosion leads to leakage points in the oscillating tank. Bath fluid can thus enter the interior of the ultrasonic bath. Moisture on electrical components can cause an electric shock or fire.

- Do not use the ultrasonic bath again if you notice a leak. Disconnect the mains plug immediately. Empty the oscillating tank.

You can extend the lifespan of the oscillating tank by observing the following instructions:

- Replace sonication fluid that is visibly contaminated by particles.
- Only use demineralised water with an ultrasound-compatible agent.
- Do not use chemicals that contain or release chloride ions in the oscillating tank. This is the case with some disinfectants, household cleaners and dishwashing detergents. Chloride ions cause corrosion of stainless steel.
- Only use the ultrasonic bath with accessories that are suitable for the ultrasonic bath and the instruments. Do not place instruments directly on the bottom of the oscillating tank. An overview of approved accessories can be found in chapter **9 Approved accessories**.

## 2.12 Interference with wireless communication

The device may interfere with other wireless communication devices in close proximity, such as:

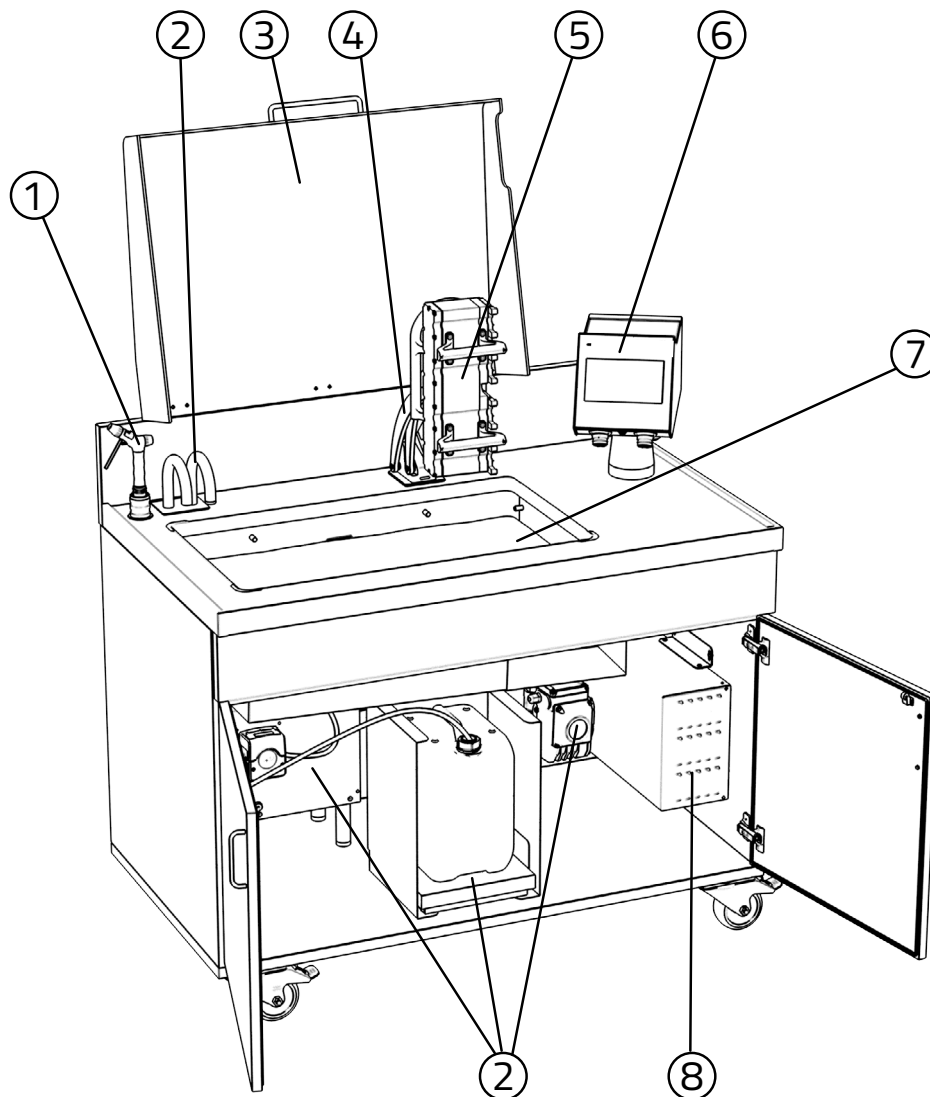
- mobile phones;
- WLAN devices; and
- Bluetooth devices.

If a wireless device malfunctions, increase its distance from the device.

The device complies with the requirements for Class B devices according to EN 55011.

## 3 Construction and function

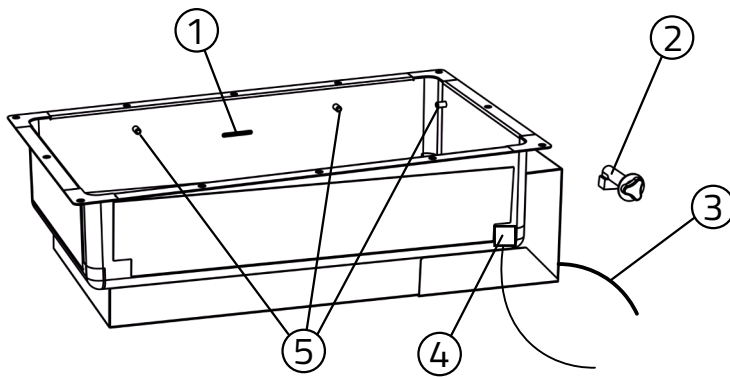
### 3.1 Overview



TRISON ultrasonic bath installed in the SONOBOARD function cabinet (function cabinet optional)

- 1 Cleaning gun (optional)
- 2 Dosing unit (optional)
- 3 Hinged lid (optional)
- 4 TRISON Lift pivot-mounted arm (optional)
- 5 Moving device TRISON Twist (optional)
- 6 TRISON Base control unit
- 7 Oscillating tank
- 8 Ultrasonic generator

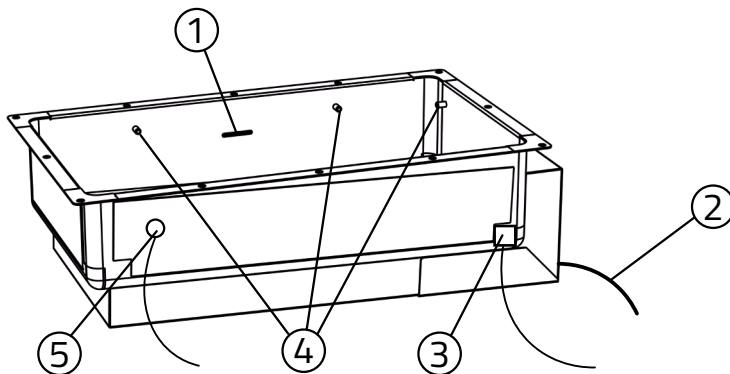
## 3.2 Oscillating tank TE 4000



Oscillating tank

- 1 Fill level marking
- 2 Turning knob of the outlet
- 3 HF cable
- 4 Temperature sensor
- 5 Basket mounts

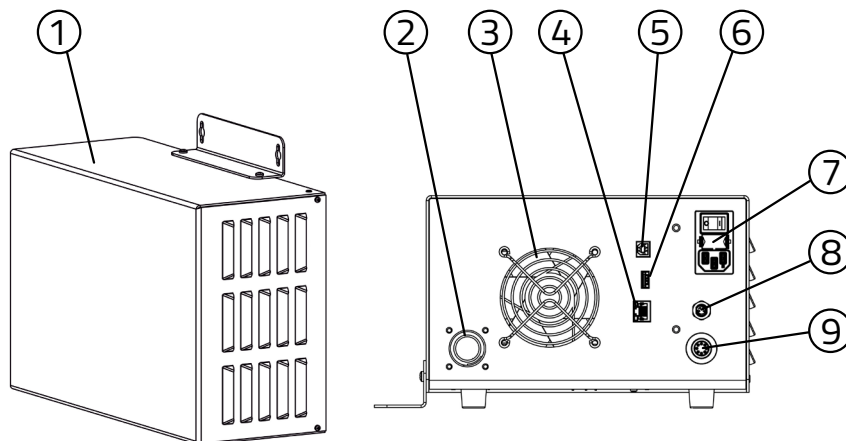
## 3.3 Oscillating tank TE 4000 DU



Oscillating tank

- 1 Fill level marking
- 2 HF cable
- 3 Temperature sensor
- 4 Basket holders
- 5 Level sensor

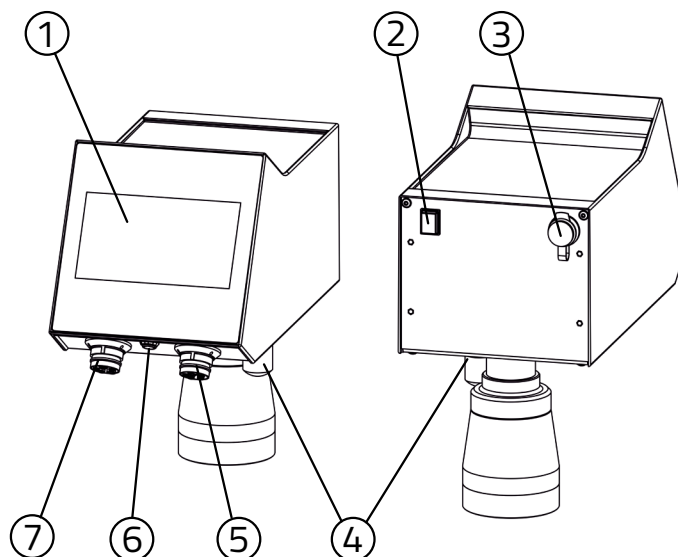
### 3.4 Ultrasonic generator GT 4000



TRISON generator including rear view

- 1 Generator
- 2 HF connection socket
- 3 Fans
- 4 Ethernet interface
- 5 USB B interface
- 6 USB A interface (for TRISON Base)
- 7 Recessed socket with fuse holder and on/off switch
- 8 Connection for temperature sensor
- 9 Connection for TRISON Base

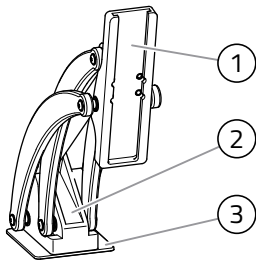
### 3.5 TRISON Base control unit TB 4000.2



TRISON Base

- 1 Touchscreen
- 2 Power switch
- 3 USB A interface
- 4 Filter
- 5 Right coupling connection
- 6 Connection for Twist
- 7 Left coupling connection

### 3.6 TRISON Lift TL 4000

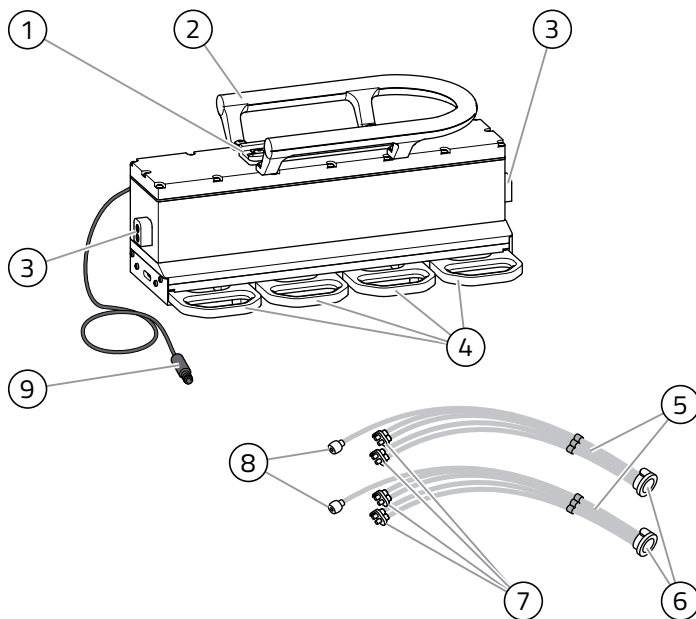


TRISON Lift (optional)

- 1 Connector for attaching a TRISON Twist
- 2 Base
- 3 Base plate for attachment to the work plate

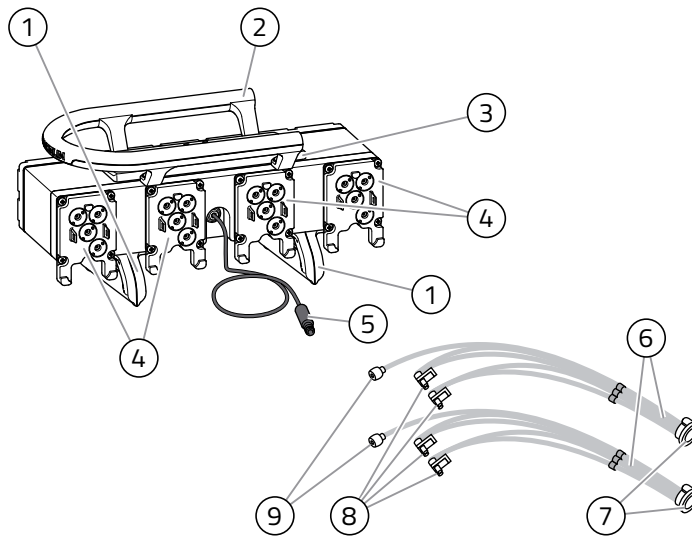
The TRISON Lift can be used to swivel the TRISON Twist moving device up and down to clean robotic instruments. The TRISON Lift is mounted on the work surface behind the oscillating tank.

### 3.7 TRISON Twist TT 4000



TRISON Twist TT 4000 Si for Si instruments (optional)

- 1 Connector for attachment to the TRISON Lift
- 2 Handle
- 3 Holders for the oscillating tank
- 4 Sliding handles
- 5 Hose sets
- 6 Hose couplings
- 7 Rinsing plug
- 8 Return hoses
- 9 Connectors for connecting to the TRISON Base

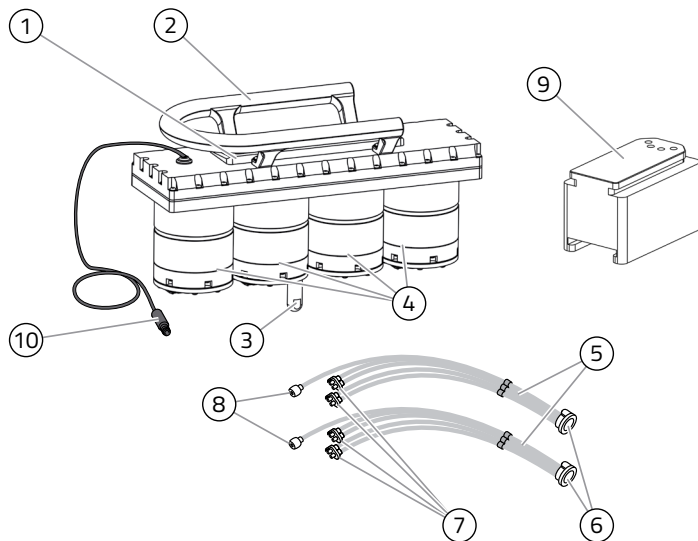


TRISON Twist TT 4000 Xi for Xi instruments (optional)

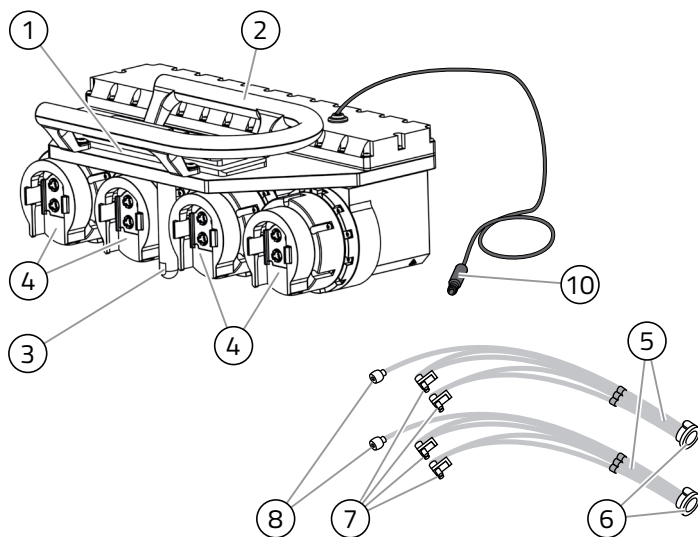
- 1 Feet
- 2 Handle
- 3 Connector for attachment to the TRISON lift
- 4 Holders
- 5 Jack for connecting to the TRISON Base
- 6 Hose sets
- 7 Hose couplings
- 8 Rinsing plug
- 9 Return hoses

The TRISON Twist is used to clean up to four robotic instruments at the same time or an Xi Stapler instrument. The TRISON Twist is available as a left or right variant; see chapter **9 Approved accessories**.

During the process, the instrument tips are moved so that even hard-to-reach hinges and cavities are cleaned. Instruments that are not rinsable will be displayed on the touchscreen after cleaning.



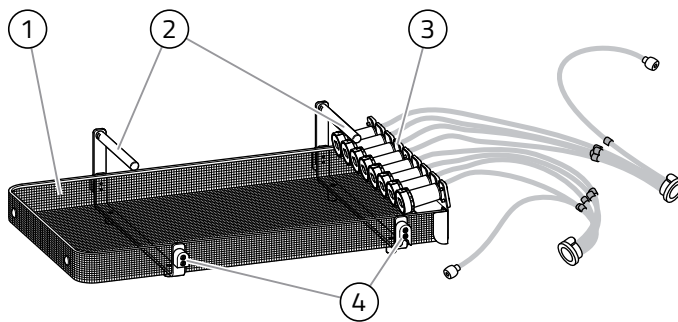
TRISON Twist TT 4000 hinotori for hinotori instruments (optional)



TRISON Twist TT 4000 Hugo for Hugo RAS instruments (optional)

- 1 Connector for attachment to the TRISON Lift
- 2 Handle
- 3 Attachment stamp
- 4 Holders
- 5 Hose sets
- 6 Hose couplings
- 7 Rinsing plug
- 8 Return hoses
- 9 Elevation piece
- 10 Jack for connecting to the TRISON Base

### 3.8 TRISON Rack TR 3001

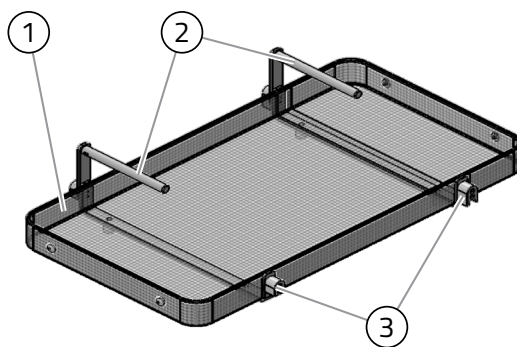


TRISON Rack (optional)

- 1 Basket tray
- 2 Handles
- 3 Comb bars for 8 adapters
- 4 Holders for the oscillating tank

The TRISON Rack is used to clean up to 8 rinsable MIS instruments at the same time. The TRISON rack is available as a left or right variant; see chapter **9 Approved accessories**. The instruments are connected to the corresponding adapters, rinsed from the inside and individually checked for flow. Instruments that are not rinsable will be displayed on the touchscreen after cleaning.

### 3.9 TRISON Rack TR 4000

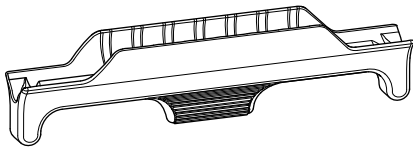


TRISON Rack (optional)

- 1 Basket tray
- 2 Handles
- 3 Holders for the oscillating tank

The TRISON Rack is used to support ultrasonic cleaning; see chapter **9 Approved accessories**.

### 3.10 TX 4000 Xi spacer

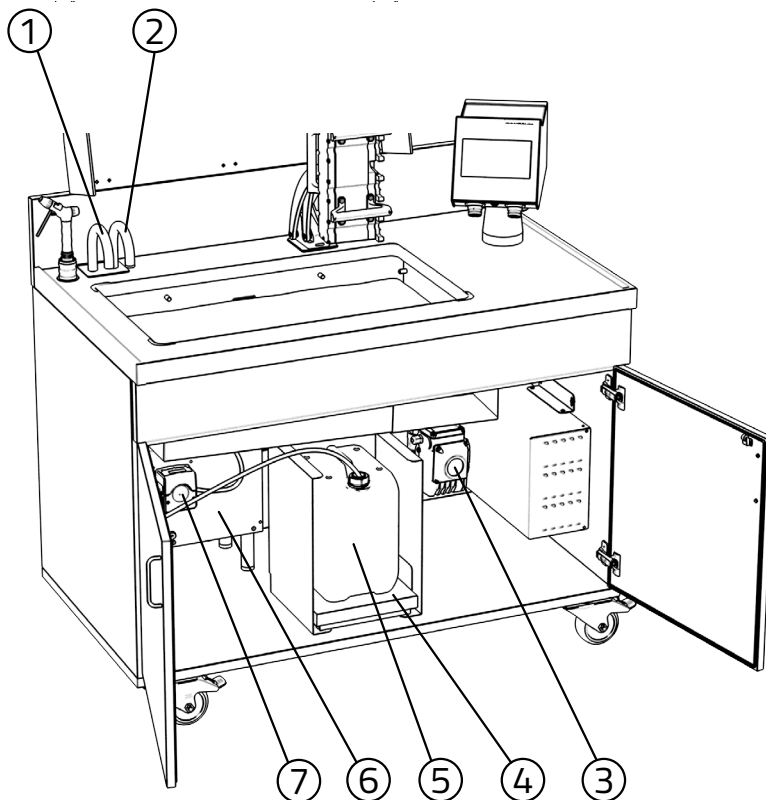


Spacer (optional)

The spacer is clipped to the TRISON Twist TT 4000 Xi for cleaning Xi Staplers.

### 3.11 TRISON DU 4000 automatic dosing unit

The TRISON can be optionally augmented by a DU 4000 automatic dosing unit. The dosing unit is set up by the authorised installer with admin rights for use by the user. The necessary steps are described in the assembly instructions.

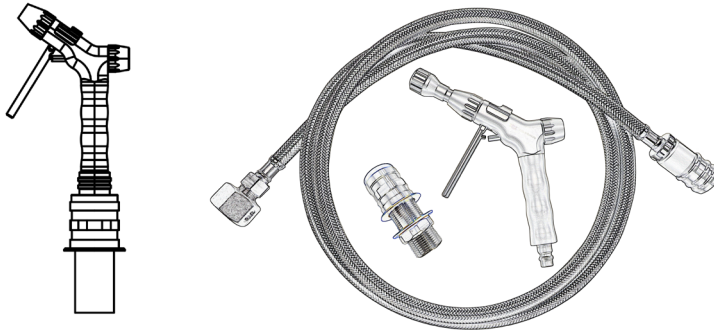


Automatic dosing unit (optional)

- 1 Water inlet into the oscillating tank
- 2 Agent inlet into the oscillating tank
- 3 Discharge valve for the oscillating tank
- 4 Scale
- 5 Containers with agent
- 6 Automatic filling unit
- 7 Peristaltic pump

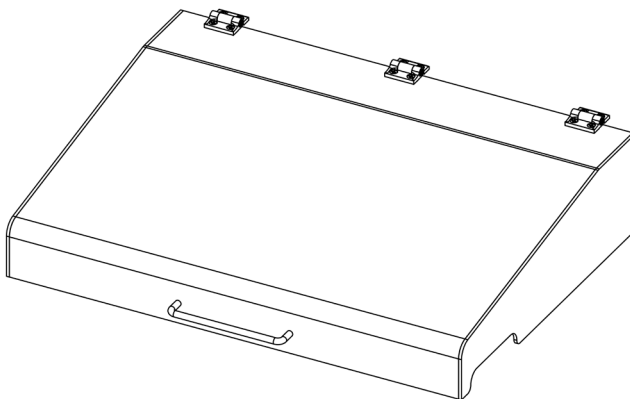
### 3.12 RP 5 cleaning gun

The cleaning gun can optionally be mounted on the work plate and is intended for rinsing the oscillating tank and for rinsing the instruments. Observe the manufacturer's instructions.



### 3.13 D 4000 K - R hinged lid

The hinged lid can optionally be mounted on the Sonoboard. Adjustments by the furniture manufacturer may be required for installation on the TRISON built-in device.



## 3.14 Icons and buttons



Home screen



Next/OK



Back



Cancel



Start



Help button – Tap to get more information about the current screen



Shortcut button – All can be selected at the same time by tapping



Ultrasound active



Flow rate during treatment



Instrument channel currently being rinsed



Temperature during cleaning



Remaining time during treatment



Selection inactive or off – if a key is highlighted in grey, it is inactive



Selection active or ON – if a key is highlighted in blue, it is active



Green: Instrument is unobstructed, cleaning is complete.  
Red: Instrument is clogged, cleaning must be repeated.

## 4 Preparing for operation

### 4.1 Presettings (initial commissioning)

After switching on the TRISON Base for the first time, you will be automatically guided through the menus for the presettings.

Here you can set your preferences, which will then be saved automatically.

The following menus are passed through:

- Language
  - Here, you can select one of the displayed languages for your device.
- Time/date
  - Please set the current time and date.
- Institution
  - In the rows shown, you can enter, for example, your company or institution name and address. To do this, select a row and click on "Edit". The information entered is listed in the process logs.
- Programme selection
  - By default, all programmes are selected (highlighted in blue). You can deselect individual programmes here, which an operator cannot then execute.
- Time-setting function
  - In the relevant submenus, you can enter the desired process times, which are then used in the ongoing programme.
    - Robotics
    - Soaking
    - MIS
    - Rinsing
    - Disinfection
- Temperatures
  - Minimum and maximum temperatures can be defined here.
- Documentation
  - By pressing the switch, you can deactivate or activate documentation.
- Network
  - The network settings can be entered here. By default, DHCP is preset. Please have this checked by your administrator if necessary.
- Exit
  - Finally, you will be informed that the presets have been completed and you will now automatically leave the menu.

## 4.2 Rinsing the oscillating tank

Thoroughly rinse the device's oscillating tank with water before using for the first time. When using the automatic dosing unit, the emptying process must be started.

## 4.3 Switching the ultrasonic bath on and off

### Switching the ultrasonic bath on

To use for the first time, switch the ultrasonic bath on using the on/off switch on the back of the generator.

Then switch on the display with the mains switch on the back of the TRISON Base.

After a few seconds, the home screen will appear on the touchscreen.

If the home screen has not appeared after a long time, see **5.5 Troubleshooting**.

### Switching off the ultrasonic bath

The on/off switch on the generator can remain permanently switched on. It is sufficient to switch the mains switch on or off on the back of the TRISON Base when operation is ongoing.

For longer periods of non-use, we recommend that you also switch off the mains switch on the generator.

## 4.4 Changing settings on the TRISON Base

### Adjusting the screen brightness

1. On the home screen, select "Settings".
2. Select "System".
3. Select "Brightness".
4. Select the desired brightness with the "+" or "-" buttons.

### Setting the date and time

1. On the home screen, select "Settings".
2. Select "System".
3. Select "Time/date".
4. Set the desired details.



### Information

The time does not automatically adjust to daylight saving time. At the start and end of the daylight saving time period, you must reset daylight saving time.

### Changing the settings for the cleaning of robotics instruments

For robotic instruments, a soaking time of 0 minutes and a cleaning time of 15 minutes are preset. The soaking and cleaning times can be changed.

1. On the home screen, select "Settings".
2. Select "Process data".
3. Enter the password "Bandelin" when prompted.
4. Select "Time".
5. Select the soaking and cleaning time for the robotics programme.

### Changing the settings for the cleaning of MIS instruments

For MIS instruments, a cleaning time of 15 minutes is preset. You can adjust the cleaning time.

1. On the home screen, select "Settings".
2. Select "Process data".
3. Enter the password "Bandelin" when prompted.
4. Select "Time".
5. Select the cleaning time for the MIS programme.

### Changing the settings for cleaning standard instruments and for rinsing and disinfection programmes

You can adjust the times.

1. On the home screen, select "Settings".
2. Select "Process data".
3. Enter the password "Bandelin" when prompted.
4. Select "Time".
5. Select the times.

### Selecting the language

1. On the home screen, select "Settings".
2. Select "System".
3. Select "Language".
4. Select the desired language by clicking on it.

### Selecting key tones

1. On the home screen, select "Settings".
2. Select "System".
3. Select "Option".
4. Here, you can switch the key tones on or off or enter the service menu (password-protected).

## 4.5 Changing the settings of the TRISON DU 4000 dosing unit

- On the home screen, select "Settings" and "Process data"
- Enter the password "Bandelin".
- Select "Dosing unit"

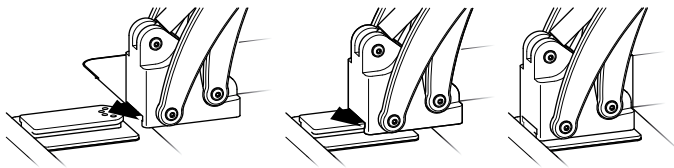
The following parameters can be set:

Description	Factory setting	Description
Tank size	35.0 l	This corresponds to the total amount of water and detergent supplied when starting the "Initial filling" process. In the TE 4000 oscillating tank, the filling mark is placed at the height of 35 l.
Concentration	1%	This corresponds to the desired concentration of the detergent in the ultrasonic bath.
Refilling	1.0 l	This corresponds to the total amount of water and detergent supplied when starting the "Refill" process
Supply quantity	5%	This amount of water is supplied after the start of the process, before the cleaning agent is dosed. The preset supply quantity refers to 5% of the tank size. When using foaming detergents, the supply quantity can be set to 100% to avoid foaming behaviour by first supplying the water and then the detergent.
Flow resolution	370 pulse/l	This corresponds to the resolution of the volume flow meter for the amount of water and is calibrated in the factory.
Pump resolution	333 steps/ml	This corresponds to the characteristics of the pump for the cleaning concentrate and is only taken into account for monitoring purposes.
Drainspeed	30.00 l/min	This corresponds to the drain speed when the outlet valve is open. The flow rate depends on the building installation and can be set in the device according to local conditions.
Rinsing	2.0 l	This corresponds to the amount of tap water that flows in the "Empty" or "Water change" programmes when the outlet valve is open in order to rinse the bottom of the oscillating tank.

Description	Factory setting	Description
Degassing	Start automatically	After completion of the filling, the "Degassing" process starts automatically. This can be deactivated on request.
Lid contact	Do not use	When connecting a lid contact to the interface of the TRISON DU 4000, the function can be activated. When the lid is opened, the ultrasound process is paused, and it is aborted once the lid has been opened for a long time.
Levelsensor	Use	Level monitoring by means of the level sensor can be deactivated.
Detergent	Detergents are stored	Additional entries for detergents can be created. (The density of the detergent is required for this.)

## 4.6 Attaching and removing the TRISON Lift

Slide the base of the TRISON Lift backwards in the guide of the base plate until the TRISON Lift clicks into place.



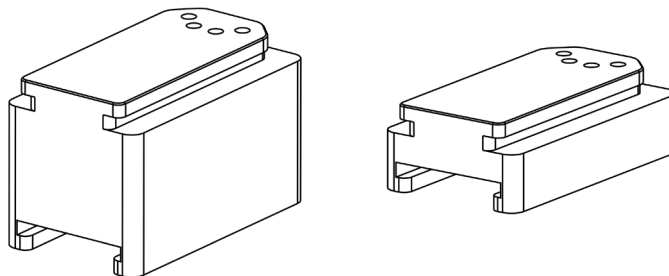
Attaching the TRISON Lift

Do not remove the TRISON Lift before the TRISON Twist has been removed. Pull the base on the base plate forward until the TRISON Lift can be removed.

### Elevation pieces

With the TT 4000 hinotori, the supplied elevation piece must first be pushed onto the base plate.

The scope of delivery of the TRISON Lift includes a further elevation piece, which can be mounted if necessary to ensure correct lowering into the oscillating tank. (The use of the elevation piece depends on the thickness of the work plate)



## 4.7 Attaching and removing the TRISON Twist

### Attaching the TRISON Twist

#### WARNING

- The jack of the TRISON Twist is not waterproof. Make sure that it does not come into contact with the sonication fluid. If the jack does come into contact with liquid, allow the jack to dry completely before plugging it in. You can blast the jack with compressed air.
- Do not twist or force the jack. This can lead to damage to the jack and consequential damage to the electronics.

### Requirements

- The TRISON Lift is mounted.
- There are no instruments on the TRISON Twist.

### Procedure

1. Hold the jack of the TRISON Twist firmly and make sure that it does not come into contact with the sonication fluid.
2. Grasp the handle of the TRISON Twist and slide it down in the guide of the TRISON Lift until the TRISON Twist snaps into place.
3. Connect the jack of the TRISON Twist to the TRISON Base.

### Removing the TRISON Twist

### Requirements

- All instruments on the TRISON Twist have been removed.

### Procedure

1. Disconnect the jack of the TRISON Twist from the TRISON Base. Hold the plug firmly and make sure that it does not come into contact with the sonication fluid.
2. Grasp the handle of the TRISON Twist and pull it upwards in the guide of the TRISON Lift until the TRISON Twist can be removed.

## 5 Operation

### 5.1 Preparing for ultrasonic cleaning

#### 5.1.1 Sonication fluid

A solution made of water and a special ultrasonic agent is used as the sonication fluid. Drinking water or fully demineralised water (aqua purificata) can be used as water. Water without any additive is unsuitable for sonication. Use of demineralised water without an ultrasonic agent leads to increased erosion of the oscillating tank.

Do not leave the instruments in the sonication fluid for too long after cleaning. This can damage the instruments.

The ultrasonic agent used must be cavitation conducive, biodegradable, easy to dispose of, material protecting and long-lasting.

BANDELIN recommends the use of the ultrasonic agents STAMMOPUR DR 8 and STAMMOPUR R from DR. H. STAMM GmbH for cleaning.

- Telephone advice: +49 30 76880-280
- Website: [www.dr-stamm.de](http://www.dr-stamm.de)

Observe the instructions of the manufacturer of the ultrasonic agent regarding dosing. You can calculate the quantities yourself analogously to the following example.

35 l of ready-to-use solution, 2.5%

Calculation of the agent: 
$$\frac{35 \text{ l} \times 2,5 \%}{100 \%} = 0,875 \text{ l}$$

Calculation of the water quantity:  $35 \text{ l} - 0,875 \text{ l} = 34,125 \text{ l}$

You can also see the dosage in the following table:

Operating volume [l]	Dosage Water + agent				
	1%	2%	3%	5%	10%
35.0	34.65 l + 0.35 l	34.3 l + 0.7 l	33.95 l + 1.05 l	33.25 l + 1.75 l	31.5 l + 3.5 l



#### Information

With the optional DU 4000 dosing unit, the quantities are automatically calculated and dosed. The settings are explained in chapter **4.5 Changing the settings of the TRISON DU 4000 dosing unit**.

## 5.1.2 Filling with sonication fluid



### CAUTION

#### Risk of scalding

- Do not fill the oscillating tank with hot water.
- Maximum filling temperature: 50 °C.

### WARNING

#### Damage to the ultrasonic bath due to condensate

At high humidity, condensation forms on the outside of the oscillating tank when it is filled with cold water.

- Do not fill the oscillating tank with cold water at high humidity.

### WARNING

#### Damage to the oscillating tank

If you are using a powdered agent, do not put it directly into the oscillating tank.

- Mix any powdered agent in another container before putting it into the oscillating tank.
- Do not place the agent in the oscillating tank until it is completely dissolved.

### WARNING

#### Damage to the device

Too low a filling level leads to damage to the ultrasonic bath.

## Manual filling without the TRISON DU 4000 dosing unit

### Requirements

- The outlet must be enclosed.
- The ultrasonic bath is not active.

### Procedure

1. Fill the oscillating tank 1/3 with water.
2. Dose the agent into the oscillating tank. See chapter **5.1.1 Sonication fluid**.
3. Fill with water up to the level mark, avoiding foaming.

## **Filling with the TRISON DU 4000 dosing unit**

### **Procedure**

1. Switch on the device
2. Select "Preparation"
3. Select "Filling"
4. Select "Initial filling"
5. Press "Start" to start the filling process

The amount of water and agent stored in the settings will be poured in. The settings are explained in chapter **4.5 Changing the settings of the TRISON DU 4000 dosing unit**.

## **Refilling with the TRISON DU 4000 dosing unit**

1. Switch on the device
2. Select "Preparation"
3. Select "Filling"
4. Select "Refill"
5. Press "Start" to start refilling

The amount of water and agent stored in the settings will be refilled.

### 5.1.3 Degassing the sonication fluid

Sonication fluid that has been freshly poured in or that has remained in the oscillating tank for a long time must be degassed before use. Degassing the sonication fluid increases the effect of the ultrasound.

#### Procedure

1. Cover the oscillating tank with the lid, if there is one.
2. Select the "Degassing" programme on the TRISON Base.
3. Fill the oscillating tank if necessary; see chapter **5.1.2 Filling with sonication fluid**.
4. Select "START" to start degassing.

#### Information

During degassing, the ultrasonic noise becomes quieter. This means that the ultrasound effect is increasing.

#### Information

With the optional DU 4000 dosing unit, the sonication fluid is automatically degassed if the automatic degassing is activated in the settings; see chapter **4.5 Changing the settings of the TRISON DU 4000 dosing unit**.

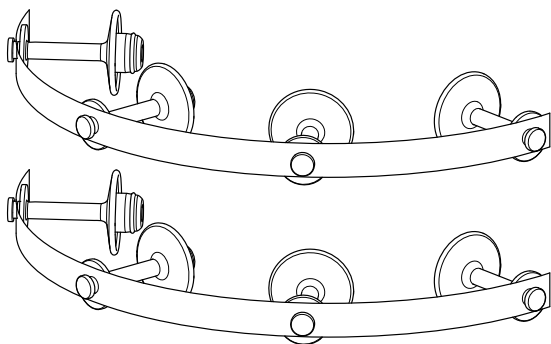
### 5.1.4 Testing adapters for MIS instruments

The adapter test is only to be carried out when using the TRISON Rack.

To perform, select "Tests" and then "Adapter test". Follow the instructions on the subsequent screens.

#### Testing adapters for MIS instruments

The seals in the adapters for MIS instruments are subject to wear as a result of opening, closing and the influence of ultrasound. Therefore, check the tightness of the adapters before each cleaning process for MIS instruments.



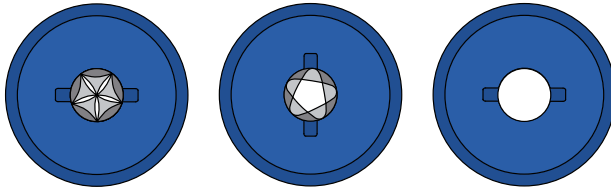
Adapter test tapes

## Requirement

- The oscillating tank is filled.

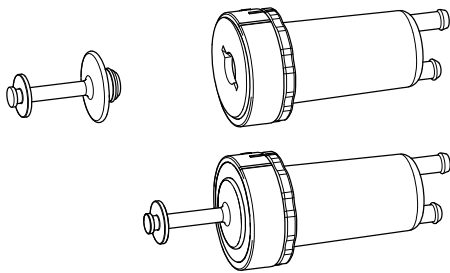
## Procedure

1. Remove the adapters from the TRISON Rack. Check that the adapter seals are fully open. If an adapter seal is not fully open, pull on the swivel of the adapter and let the swivel snap back. It will turn slightly to the left in the process. Repeat this step until the adapter seal is fully open.



Adapter seal fully closed, partially closed and fully open

2. Insert all test plugs into the adapter openings.



Inserting the adapter test plug

3. Place the adapters back in the TRISON Rack.
4. Place the TRISON Rack in the oscillating tank so that the adapters are completely immersed in the sonication fluid.
5. Connect the two hose couplings to the TRISON Base. Make sure that the hose couplings engage properly.
6. Select the rinsing pipes to be checked on the touchscreen.
7. Select "START" to start the adapter check.

## Result

- » The check status, with progress bar, is displayed on the touchscreen.

## 5.2 Cleaning instruments

### 5.2.1 Cleaning robotic instruments

All da Vinci Xi, da Vinci Si, da Vinci Single Port, da Vinci 5, Versius, Toumai, Hinotori and Hugo instruments are grouped under robotics instruments.

#### Requirements

- The TRISON Lift and the TRISON Twist TT 4000 are mounted.
- The oscillating tank is filled.
- The sonication fluid has been degassed.

To perform, select "Robotics" and then "Guided start" or "Quick start".

#### Procedure

1. Check whether both hose couplings are connected to the TRISON Base. Make sure that the hose couplings engage properly.
2. Loosely place the ends of the two return hoses in the sonication fluid.
3. Connect the jack of the TRISON Twist to the TRISON Base.
4. Grab the TRISON Twist by the handle and swivel it upwards.
5. Carefully insert the robotics instruments into the holders of the TRISON Twist.
6. Grip the TRISON Twist by the handle and swivel it downwards, without causing the robotics instruments to dip into the sonication fluid.
7. Insert the rinsing plugs into the robotics instruments and press them on firmly.
8. Grip the TRISON Twist by the handle and swivel it downwards so that the robotics instruments are completely immersed in the sonication fluid. When cleaning Xi Staplers, the TRISON Twist must be on the feet of the spacer.
9. Select the "Robotics" cleaning programme on the TRISON Base.
10. Select the smallest diameter of the connected instruments on the touchscreen.
11. Select the rinsing pipes of the connected instruments on the touchscreen.
12. Select "START" to start the cleaning programme.
  - » Depending on the presetting, cleaning begins with a soaking phase without ultrasound and without movement of the instruments. A progress bar is displayed on the touchscreen.
  - » After cleaning, information about all instruments will appear. Check on the display whether the instruments have been rinsed or are clogged; see below.
  - » Stapler instruments are slower moving than other robotic instruments, which means that the shaft or distal end of the Xi Stapler moves only to a limited extent during cleaning.

13. Once the cleaning is finished, grip the TRISON Twist by the handle and swivel it upwards.
14. Remove the robotics instruments and rinse them with water to remove the residues of the sonication fluid.



Green: Instrument is unobstructed, cleaning is complete.

Red: Instrument is clogged, cleaning must be repeated.



#### Information

Xi Staplers can also be cleaned on the TRISON Twist TT 4000 Xi. For this, the TX 4000 Xi spacer is required, which must be ordered separately; see chapter **9 Approved accessories**. Click the spacer onto the feet of the TRISON Twist. Due to the larger dimensions, only one Xi Stapler can be cleaned at a time. The Xi Stapler must be connected to one of the TRISON Twist's central holders.



#### Information

Leave the hose sets attached to the Base after the cleaning process. Remove the hoses only for cleaning purposes or when changing the types of instrument being cleaned.

## 5.2.2 Cleaning rinsable MIS instruments

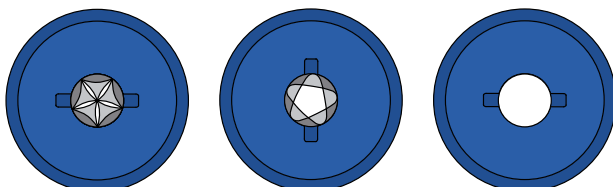
### Requirements

- The adapters have been checked for leaks; see chapter **5.1.4 Testing adapters for MIS instruments**.
- The oscillating tank is filled.
- The sonication fluid has been degassed.

To perform, select "MIS" and then "Guided Start" or "Quick Start"

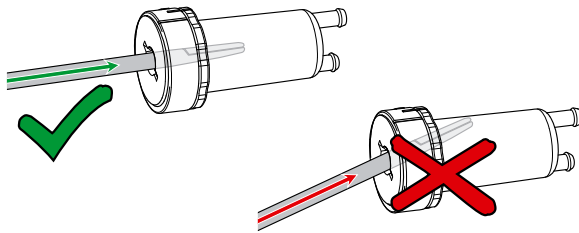
### Procedure

1. Check whether the adapter seals are completely open. If an adapter seal is not fully open, pull on the swivel of the adapter and let the swivel snap back. It will turn slightly to the left in the process. Repeat this step until the adapter seal is fully open.



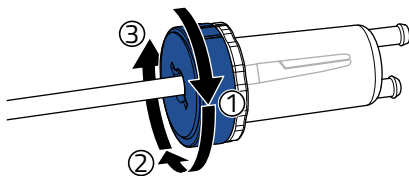
Adapter seal fully closed, partially closed and fully open

2. Carefully slide the closed MIS instruments into the adapters so that the movable instrument tips are completely visible in the sight glass. Be sure to insert the instruments straight so as not to damage the adapter seals.



Sliding the MIS instrument into the adapter

3. Close the adapter seals by turning the outer swivel three notches clockwise.
  - » A click can be heard at every notch.



Closing the adapter seal

**Notice!** Only turn the outer swivel clockwise by three notches. If the swivel is rotated too far, the adapter seal may get damaged.

4. Open the instrument tips.
5. Place the TRISON Rack in the oscillating tank so that the instruments are completely immersed in the sonication fluid.
6. Connect both hose couplings to the TRISON Base. Make sure that the hose couplings engage properly.
7. Loosely place the ends of the two return hoses in the sonication fluid.
8. Select the "MIS" cleaning programme on the TRISON Base.
9. Select the rinsing pipes of the connected instruments on the touchscreen.
10. Select "START" to start the cleaning programme.
  - » Cleaning begins. A progress bar is displayed on the touchscreen.
  - » After cleaning, information about all instruments will appear.  
Check on the display whether the instruments have been rinsed or are clogged; see below.
11. Once the cleaning is finished, remove the TRISON Rack from the sonication fluid.
12. Open the adapter seals by pulling three times on the swivel of the adapter and letting the swivel snap back.

13. Close the instrument tips. Remove the MIS instruments from the adapters. Rinse the instruments with water to remove the residues of the sonication fluid.



Green: Instrument is unobstructed, cleaning is complete.

Red: Instrument is clogged, cleaning must be repeated.

### 5.2.3 Cleaning standard instruments

#### Requirements

- The basket holder is inserted into the oscillating tank.
- The insert basket for standard instruments is ready.
- The oscillating tank is filled.
- The sonication fluid has been degassed.

To perform, select "Standard" and then select "Guided Start" or "Quick Start"

#### Procedure

1. Distribute the instruments in the insert basket.  
Do not overload the insert basket.  
Make sure that the instruments are open and disassembled if applicable. Place the dirtier side downwards.
2. Place the insert basket on the basket holder in the oscillating tank so that the instruments are immersed in the sonication fluid.
3. Select the "Standard" cleaning programme on the TRISON Base.
4. Select the duration of sonication on the touchscreen.
5. Select "START" to start the cleaning programme.  
» Cleaning begins. A progress bar is displayed on the touchscreen.
6. Once the cleaning is finished, remove the insert basket from the sonication fluid.
7. Rinse the instruments with water to remove the residues of the sonication fluid.

## 5.3 After ultrasonic cleaning

### 5.3.1 Emptying the oscillating tank

Dirt on the bottom of the oscillating tank reduces the ultrasonic power. Empty and clean the oscillating tank if there is any visible contamination of the sonication fluid.

Please also note the information provided by the manufacturer of the ultrasonic agent regarding the service life of the sonication fluid.

Fully replace used sonication fluid.

#### Manual emptying without the TRISON DU 4000 dosing unit

##### Procedure

1. Open the outlet.
2. Then rinse the oscillating tank thoroughly with water.

#### Automated emptying with the TRISON DU 4000 dosing unit

##### Procedure

1. Switch on the device.
2. Select "Preparation"
3. Select "Emptying"
4. Press "Start" to start emptying.
5. Complete the emptying process by pressing "Stop".

#### Automated water change with the TRISON DU 4000 dosing unit

##### Procedure

1. Switch on the device.
2. Select "Preparation"
3. Select "Filling"
4. Select "Water change"
5. Press "Start" to start the water change.

The sonication fluid located in the oscillating tank will be drained off. The oscillating tank will be rinsed with the rinsing quantity selected in the settings and then refilled with sonication fluid.

If automatic degassing is activated in the settings, automatically degassing will take place after filling.

### 5.3.2 Cleaning and disinfecting the TRISON Lift, TRISON Twist and TRISON Rack

Regularly clean and disinfect the TRISON Lift, the TRISON Twist and the TRISON Rack with a suitable surface disinfectant.

### 5.3.3 Storing logs

If the log function is activated, a log will be created after each completed cleaning, which summarises the cleaning process. It is managed and stored in the internal memory. The logs can be transferred to a computer with a USB stick or using an existing Ethernet connection.

If the log feature is disabled, no logs will be saved.

#### Retrieving logs via the USB interface

##### Procedure

1. On the home screen, select "Settings", then "Documentation".
2. Open the USB interface on the back of the TRISON Base and insert a USB stick.
  - » The detected hardware will be displayed at the top left.
3. Select "Send log" to transfer the log file to the USB stick.
  - » The log file is given the name shown above. If you want to change it, you can tap on it and enter your desired name using the keyboard.
4. Once the log file has been transferred, remove the USB stick and close the USB interface.
  - » After successful transfer, the log file can be deleted from the internal memory of the TRISON Base by selecting "Delete".

## Send logs via email

### Procedure

1. On the home screen, select "Settings", then "System", then "Email settings".
2. Enter your email sender information from your email provider as well as the desired destination address.
3. Activate the "Send logs" setting to have the log file automatically sent to the entered email address after each cleaning process.
4. Enter the desired interval after which the device status should be sent to the email address entered.

## 5.4 Change the canister for the TRISON DU 4000

With the optional DU 4000 dosing unit, operation changes and is expanded by the "Preparation" menu item.

For proper functioning of the scale, the empty weight of your container for your agent must be determined before starting using a scale in your facility.

This and the density of your agent must be entered when you change the canister.

The values for commercially available products are already stored and can be selected directly with the agent name.

After storing the values, the scale detects the amount of liquid and determines how many fillings the contents are sufficient for.



### Information

When changing the container, the procedure must be repeated.



### WARNING

#### Health hazards

- Observe the safety instructions specified by the manufacturer of the detergent concerning wearing suitable personal protective equipment.

The contents of the canister are monitored with the integrated weighing function and displayed in litres and percentages at the start of a filling process.

At a high canister fill level, the canister content is highlighted in green. If the fill level has dropped to such an extent that fewer than 5 dosing processes are possible, the canister is highlighted in yellow.

If the canister content is only sufficient for 2 dosing processes, the canister colour changes to red, and the touch panel for a canister change appears.

If less than one dosing process is possible, a warning message appears with the request to replace the canisters.

If the required supply of agent has not been reached after completion of the dosing process despite a sufficient canister content, the missing quantity will appear on the final screen in a red display field.

The canister change can be started from the process screen or in the control menu under "Preparation".

### **Procedure**

1. On the home screen, select "Preparations" and then "Canister change".
2. Remove the empty canister and clean the scale platform if necessary.
3. Place the new canister on the scale and install the hose line.
4. Wait for calibration of the scale.
5. Start the dosing pump to fill the hose until cleaning agent emerges from the outlet.
6. If necessary, wait while the basin is rinsed
7. Select the detergent from the list for selection or enter the density and the canister weight in the input field.  
The canister empty weight is only used for fill level monitoring and has no influence on the dosing accuracy.
8. Confirm the entry to complete the canister change.

## 5.5 Troubleshooting

### 5.5.1 Malfunctions

Error	Possible causes	Troubleshooting
Too little ultrasound effect, loud noises	▪ Sonication fluid contains gases	▪ Degas the sonication fluid; see chapter <b>5.1.3 Degassing the sonication fluid.</b>
	▪ Oscillating system or ultrasonic generator defective	▪ For error analysis, perform a foil test; see chapter <b>12 Performing a foil test.</b>
		▪ Contact the manufacturer; see chapter <b>6.6 Repairs.</b>
Uneven sounds	▪ Non-ideal filling level in the oscillating tank	▪ Slightly change the filling level of the sonication fluid in the oscillating tank. Pay attention to the minimum filling level and correct dosing of the agent.
		▪ Wait until the sonication fluid stops moving.
TRISON Base cannot be switched on (touchscreen remains dark)	▪ TRISON ultrasonic bath not connected properly	▪ Check the mains connection.
	▪ Power switch switched off	▪ Switch on the power switch.
	▪ Fuses defective	▪ Replace the fuses; see chapter <b>8.1 Technical specifications.</b>
Touchscreen not responding	▪ Touchscreen defective	▪ Contact the manufacturer; see chapter <b>6.6 Repairs.</b>
TRISON Base permanently displays the Welcomescreen	▪ TRISON Base was switched off and on again too quickly	▪ Switch off the TRISON Base and switch it on again after at least 10 seconds.
Progress bar is not progressing	▪ Software or hardware defective	▪ Switch off the TRISON Base and switch it on again after at least 10 seconds.
		▪ Contact the manufacturer; see chapter <b>6.6 Repairs.</b>

Error	Possible causes	Troubleshooting
Repeats negative process result on the same channel or on all channels	<ul style="list-style-type: none"> <li>▪ Instruments not covered with sufficient sonication fluid</li> </ul>	<ul style="list-style-type: none"> <li>▪ Fill up to the filling level mark with water and a suitable ultrasonic agent; see chapter <b>5.1.2 Filling with sonication fluid</b>.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Hose couplings not connected correctly</li> </ul>	<ul style="list-style-type: none"> <li>▪ Loosen and reconnect the hose couplings.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Hose set clogged, rinsing circuit of the TRISON Base clogged</li> </ul>	<ul style="list-style-type: none"> <li>▪ Connect instruments to other positions. If the result is negative again, the instrument is clogged.</li> <li>▪ Use a new hose set; see chapter <b>9 Approved accessories</b>.</li> <li>▪ Contact the manufacturer; see chapter <b>6.6 Repairs</b>.</li> </ul>
Insufficient cleaning result	<ul style="list-style-type: none"> <li>▪ Sonication fluid not degassed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Degas the sonication fluid; see chapter <b>5.1.3 Degassing the sonication fluid</b>.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Unsuitable detergent</li> </ul>	<ul style="list-style-type: none"> <li>▪ Repeat the cleaning with a suitable detergent.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Instruments stored in a contaminated state for too long</li> </ul>	<ul style="list-style-type: none"> <li>▪ Clean robotics instruments or MIS instruments again; for standard instruments, extend the duration of sonication.</li> </ul>

## 5.5.2 Warning and error screens

### Warning and error screens

Warning screen	Causes	Measures
Cancel process?	Running process was cancelled	<ul style="list-style-type: none"> <li>▪ BACK undoes the cancel attempt</li> <li>▪ OK cancels the process. After cancelling, the home screen will be displayed.</li> </ul>
Temperature too high <i>E9: Temperature outside the permissible range! Please correct immediately.</i>	Temperature of the sonication fluid is above the set temperature. Protein coagulates at 45 °C.	<ul style="list-style-type: none"> <li>▪ Allow the sonication fluid to cool or replace it</li> <li>▪ Cancel aborts the process. After cancelling, the home screen will be displayed.</li> <li>▪ OK continues the process.</li> </ul>

Warning screen	Causes	Measures
Temperature too low <i>E9: Temperature outside the permissible range! Please correct immediately.</i>	Temperature of the sonication fluid is below the set temperature.	<ul style="list-style-type: none"> <li>Replace all or part of the sonication fluid</li> <li>Degas the sonication fluid again; see <b>5.1.3 Degassing the sonication fluid</b></li> <li>Cancel aborts the process. After cancelling, the home screen will be displayed.</li> <li>OK continues the process.</li> </ul>
Twist not detected <i>E16: TRISON Twist not connected Cleaning takes place only without movement.</i>	The robotics programme was started, but no TRISON Twist was connected	<ul style="list-style-type: none"> <li>Attach the TRISON Twist; see <b>4.7 Attaching and removing the TRISON Twist</b></li> <li>Cancel aborts the process. After cancelling, the home screen will be displayed.</li> <li>OK continues the process without the movement function.</li> </ul>
Maintenance required	Maintenance required from the manufacturer	<ul style="list-style-type: none"> <li>Contact the manufacturer; see <b>6.6 Repairs</b>. OK displays the "Information" screen, with contact details and information about the ultrasonic bath.</li> <li>Cancel closes the message. After cancelling, the home screen will be displayed.</li> </ul>
Filter clogged <i>E13: Pressure switch 1 triggered. Change the filter.</i>	<ul style="list-style-type: none"> <li>Filter clogged or not installed correctly</li> </ul>	<ul style="list-style-type: none"> <li>Replace or rinse the filter and check its installation; see chapter <b>6.3 Rinsing the filter</b>.</li> </ul>
	<ul style="list-style-type: none"> <li>Pressure sensor defective</li> </ul>	<ul style="list-style-type: none"> <li>Contact the manufacturer; see chapter <b>6.6 Repairs</b>.</li> </ul>

## Error codes

Error code	Text	Measures
E1:	No temperature sensor available!	Connect the temperature sensor to the generator.
E2:	Pressure switch 2 triggered!	Check the hose connections for kinks. Restart the device. If the message appears again, contact the manufacturer; see <b>6.6 Repairs</b> .
E9:	Temperature outside the permissible range! Please correct immediately	Correct the temperature of the bath liquid.

Error code	Text	Measures
E10:	Generator error Ultrasound inadequate	Check whether the plug connection between the generator and the oscillating tank is plugged in. Restart the device. If the message appears again, contact the manufacturer; see <b>6.6 Repairs</b> .
E13:	Pressure switch 1 triggered. Change the filter.	
E14:	Pressure switch 2 triggered!	
E16:	TRISON Twist not connected Cleaning takes place only without movement	Connect the TRISON Twist.
E17:	Linear motor valve A1 defective!	Restart the device. If the message appears again, contact the manufacturer; see <b>6.6 Repairs</b> .
E18:	Linear motor valve A2 defective!	
E19:	Linear motor valve B1 defective!	
E20:	Linear motor valve B2 defective!	
E21:	Linear motor valve C1 defective!	
E22:	Linear motor valve C2 defective!	
E23:	Linear motor valve D1 defective!	
E24:	Linear motor valve D2 defective!	
E25:	Linear motor valve P1, P2, S1 or S2 defective!	
E26:	Power board not reachable!	
E27:	Controller board not reachable!	
E28:	Channel selector board not reachable!	
E29:	Interface board not reachable!	
E31:	Fan in the generator not reachable!	
E32:	Log memory has reached the warning threshold	Transfer the logs to a USB stick and then delete the entries in the device. Alternatively, you can deactivate log recording in the device.
E33:	Log memory overflow	

Error code	Text	Measures
E 34	Water volume flow too low.	<ul style="list-style-type: none"> <li>▪ Check inlet</li> <li>▪ Check water pressure</li> <li>▪ Replace the volume flow sensor</li> </ul>
E 35	Unplanned water inflow.	Close the water supply inlet <ul style="list-style-type: none"> <li>▪ Check the solenoid valve</li> <li>▪ Replace the solenoid valve</li> </ul>
E 36	The ball valve does not open or close.	<ul style="list-style-type: none"> <li>▪ Check the jack</li> <li>▪ Replace the ball valve</li> </ul>
E 37	Scale unavailable	Check the jack connection.
E 38	Scale calibration error	Calibrate the scale with a 10-kg reference weight.
E 39	Agent dosage too low.	Check the contents of the container and, if necessary, change the container. Otherwise, check the hose line for kinks and the pump for functionality.
E 40	Tank level too low for this process.	The container content is not expected to be sufficient to achieve the desired concentration. Change the container.
E 41	Scale not calibrated. No automatic dosing possible!	Calibrate the scale with a 10-kg reference weight.
E 42	Canister weight invalid! Check the scales and canister!	Simulate a canister change, see chapter <b>5.4 Change the canister for the TRISON DU 4000</b> Or calibrate the scale with a 10 kg reference weight.
E 43	Insufficient fill level in the tray, please check!	Refill cleaning fluid up to the filling level mark.
E 44	Fill level too high, risk of overflow!	Drain cleaning fluid down to the filling level mark.

## 6 Maintenance

### 6.1 Cleaning, care and disinfection of the ultrasonic bath

#### **Cleaning the TRISON Base, Twist and SONOBOARD**

- Wet wipe the surfaces.
- Do not use abrasive cleaning agents, only care products without abrasive additives.
- If necessary, disinfect the surfaces with a suitable surface disinfectant.

#### **Caring for the oscillating tank**

Impurities in the oscillating tank accelerate its wear, can lead to corrosion, and reduce the ultrasonic effect. Please therefore observe the following instructions:

- Thoroughly rinse the oscillating tank with water after each use. To do this, use the RP 5 cleaning gun (order number 7934). Wipe dry with a soft cloth.
- Remove scum and residues with a stainless steel cleaning product without any abrasive additives.
- Do not use steel wool, scratches or scrapers to clean the oscillating tank.
- Metal parts and rust particles in the oscillating tank cause corrosion. Therefore, do not leave any metal parts in the oscillating tank. If rust stains are visible, remove them immediately with a soft cloth and a stainless steel cleaning product without abrasive additives.
- If necessary, disinfect the surfaces with a suitable surface disinfectant.

## 6.2 Maintaining the TRISON Base hose system

### Emptying the hoses

Before the device is put out of use for a long time, the hose system in the device must be emptied.

1. On the home screen, select "Care" and then "Empty Base".
2. Connect the rinsing hoses to the Base and place the hose ends in the empty oscillating tank.
3. Start the emptying programme.

### Rinsing the hoses

To clean the Base and the hose system, rinse the hoses with tap water.

1. On the home screen, select "Care" and then "Rinse".
2. Place a rinsing bucket (order number 7931144) with about one litre of tap water in the empty oscillating tank.
3. Connect the hoses to the Base and place the suction hoses in the rinsing bucket. Place the rinsing adapters in the oscillating tank.
4. Run the programme. The bucket should be empty after completion of the programme, so that the internal hose lines are also emptied.

### Disinfection of the hoses

To disinfect the Base and the hose system, rinse the hoses with liquid disinfectant.

1. On the home screen, select "Care" and then "Disinfect".
2. Place a rinsing bucket (order number 7931144) with disinfectant solution in the empty oscillating tank.
3. Connect the hoses to the Base and place the suction hoses in the rinsing bucket. Place the rinsing adapters in the oscillating tank.
4. Run the programme. The bucket should be empty after completion of the programme, so that the internal hose lines are also emptied.
5. Then rinse with tap water. Observe the instructions of the manufacturer of the disinfectant agent.

The exposure time specified by the manufacturer of the disinfectant can be taken into account when setting the duration of the disinfection programme. (For settings, see chapter **4.4 Changing settings on the TRISON Base**).

## 6.3 Rinsing the filter

The filter can be back-washed and reused.

After cleaning robotic instruments or MIS instruments, the filter must be rinsed daily and checked for damage. In the event of damage, it must be replaced.

### Requirements

- The ultrasonic bath is not active.

### Procedure

1. Unscrew the transparent filter housing at the bottom of the TRISON Base and rinse it with water.
2. Remove the filter.
3. Discard or clean the filter by rinsing out the dirt under running water.
4. Insert the new or cleaned filter with the opening facing upwards. Make sure that it is inserted straight. If the filter is inserted at an angle, it may get damaged.
5. Check whether the sealing ring is present in the filter housing and screw on the filter housing.

## 6.4 Tests

### WARNING

#### Damage to the ultrasonic bath

- Only perform tests on the filled ultrasonic bath.

If one of the tests does not lead to the desired result, contact the service team. See chapter **6.6 Repairs**.

#### Checking the power of the ultrasound

The power can be checked with a wattmeter between the mains plug of the ultrasonic bath and the socket.

#### Requirement

- The oscillating tank is filled with water.

#### Procedure

1. Select the "Standard" cleaning programme on the TRISON Base. Select "START" to start the ultrasound.
2. Take the power reading.
3. Stop the ultrasound again.
4. Compare the readings with the technical specifications. See chapter **8.1 Technical specifications**.

The measured values may deviate from the values in the technical specifications by a maximum of 20%.

#### Checking the ultrasound effect

Check the effect of the ultrasound with a foil test during initial putting into service and at regular intervals. Testing is recommended every 3 months. See chapter **12 Performing a foil test**.

## Checking the rinsing and moving function

### WARNING

#### Risk of damage to robotic instruments

- If you test the rinsing and moving function with a robotic instrument, do not touch the tip of the instrument.

### Requirements

- The TRISON Lift and a TRISON Twist are mounted.
- The oscillating tank is filled with water.

### Procedure

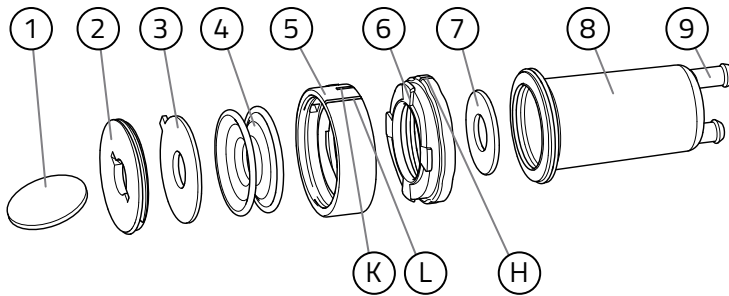
1. If necessary, connect a robotics instrument to the TRISON Twist to better check the movement function.
2. Connect the two hose couplings to the TRISON Base. Make sure that the hose couplings engage properly. Place the ends of the return hoses loosely in the sonication fluid.
3. Connect the jack of the TRISON Twist to the TRISON Base.
4. Select the "Robotics" cleaning programme on the TRISON Base.
5. Select the diameter "8 mm" on the touchscreen.
6. Select all rinsing pipes by selecting the icon at the top of the touchscreen.
7. Start the cleaning programme and skip the soaking phase by selecting "START" immediately.
8. Check whether a water leak is visible on the hoses.  
A flow rate of approximately 350 ml/min should be displayed on the touchscreen.
9. Check that the tip of the robotics instrument is moving.  
If you do not have a robotics instrument connected, check that the four drivers rotate on each holder of the TRISON Twist.



## 6.5 Changing the adapter seals

The adapter seals on the TRISON Rack must be replaced every four weeks and in the event of leakage; see chapter **5.1.4 Testing adapters for MIS instruments**.

To change the adapter seal, the adapter must be disassembled and then reassembled. The supplied assembly chip is required for this.



Individual parts of the adapter

- 1 Assembly chip
- 2 Clamping disc
- 3 Thrust washer
- 4 Adapter seal
- 5 Swivel
- 6 Retaining ring
- 7 Punched disc
- 8 Sight glass
- 9 Connector sockets for hose connection

### Removing the adapter seal

#### Procedure

1. Remove the adapter from the comb bar of the TRISON Rack and remove the hose from the sight glass (8).
2. Unscrew the clamping disc (2) with the assembly chip (1).
3. Remove the thrust washer (3).
4. Unscrew the swivel (5) and the retaining ring (6) together from the sight glass.
5. Pull out the defective adapter seal (4) from the swivel and the retaining ring.
6. Turn the swivel towards the retaining ring until the mark "L" on the swivel and the mark "H" on the retaining ring are opposite each other. Pull the swivel and the retaining ring apart.
7. Remove the punched disc (7) from the sight glass.

#### Result

» All individual parts can now be rinsed thoroughly with water.

## Fitting the adapter seal

### Procedure

1. Push the punched disc into the sight glass until it clicks into place.
2. Connect the swivel to the retaining ring. When the "H" mark on the retaining ring and the "L" mark on the swivel are facing each other, squeeze the swivel and the retaining ring together.
3. Insert the new adapter seal.  
To do this, insert the adapter seal halfway through the hole of the two rings (swivel and retaining ring). The adapter seal should sit loosely in this position and not tilt.
4. Now screw the two rings together with the adapter seal to the sight glass.
5. Rotate the swivel so that the "K" mark on the swivel is opposite the "H" mark on the retaining ring. Hold the retaining ring firmly together with the swivel so that they do not twist against each other. Insert the thrust washer and tighten the clamping disc with the assembly chip.
6. Insert the hose onto the sight glass. Replace the adapter into the comb bar of the TRISON Rack.

### Result

- » The TRISON Rack is ready for cleaning rinsable MIS instruments again.

## 6.6 Repairs

Contact the specialist dealer or the manufacturer during the warranty period.

Only have repairs carried out by qualified personnel authorised by the manufacturer or by the manufacturer itself.

The manufacturer assumes no liability for unauthorised interventions on the device.



### WARNING

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#### Health hazard due to contaminated equipment

- Decontaminate the device before shipment if it has come into contact with hazardous substances.
- 

Before returning for inspection/repair, the equipment and accessories must be cleaned in accordance with applicable laws and regulations and, if necessary, disinfected with a surface disinfectant that is listed by the VAH (Association for Applied Hygiene).

Please understand that we can only start work once this certificate is available to us, fully completed.

The "Certificate of decontamination" serves to ensure the occupational safety and health of our employees in accordance with the German "Infection Protection Act" (IfSchG) and the Accident Insurance Regulations (UUV) of the employers' liability insurance associations.

Download the "Certificate of decontamination" form here:

<https://www.bandelin.com/downloads>



Fill out the form and attach it so as to be clearly visible on the outside of the packaging. Acceptance will be refused without a completed form.

Send the device to the following address:

BANDELIN electronic GmbH & Co. KG  
Heinrichstr. 3–4  
12207 Berlin  
Germany

+49 30 76880-2674  
[service@bandelin.com](mailto:service@bandelin.com)

## 6.7 Maintenance

Carry out maintenance in line with the indicated intervals. Document the performance of maintenance.

The specified maintenance intervals assume daily use of the TRISON ultrasonic bath.

Activity	Daily	Monthly	Every 2 years
Rinse the filter; see chapter <b>6.3 Rinsing the filter</b> .	×		
Maintain the hose system; see chapter <b>6.2 Maintaining the TRISON Base hose system</b> .	×		
TRISON Rack: change adapter seals; see chapter <b>6.5 Changing the adapter seals</b> .		×	
Replace hose sets; see chapter <b>9 Approved accessories</b> .			×
Maintenance of the ultrasonic bath: contact the manufacturer; see chapter <b>6.6 Repairs</b> .			×
Replace the agent hose of the dosing unit.			×

## 7 Disposal



### WARNING

#### Health hazard due to contaminated equipment

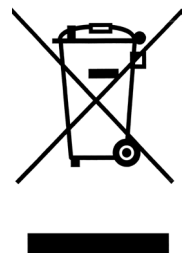
- Decontaminate the device before disposal if it has come into contact with hazardous substances.
- Also decontaminate accessories before disposal.

Dispose of the device properly as electrical waste if it can no longer be used. Do not dispose of the device in the household waste. Observe local regulations for the disposal of electrical waste.

The TRISON Base control unit contains a lithium metal battery.

The oscillating elements contain sintered ceramics made of lead titanium zirconium oxide.

- EC no. 235-727-4
- CAS no. 12626-81-2



This use is permitted in accordance with RoHS Directive 2011/65/EU, Annex III, Exception 7c. I.

Dispose of accessories as metal scrap or as plastic waste according to the material used.

## 8 Information about the device

### 8.1 Technical specifications

#### TRISON Base control unit

Type:	TB 4000.2
Rinsing pressure:	~ 1 bar
Temperature monitoring:	16 ... 45 °C
Protection class:	II
Degree of protection:	IP 32
Back-up battery:	3V lithium metal battery CR2032
External dimensions with swivel base (length x width x height):	370 x 200 x 360 mm
Weight:	9 kg
Connections:	2 lines for connection to the generator 1 x USB-A

#### Ultrasonic generator

Type:	GT 4000
Operating voltage:	230 V~ ( $\pm 10\%$ ) 50/60 Hz alternatively: 100–115 V ( $\pm 10\%$ ) 50/60 Hz
Ultrasonic peak power/ultrasonic nominal power:	3040 W/760 W
Current consumption:	at 230 V: 3.5 A at 100–115 V: 8.3 A
Fuses:	at 230 V: 2 x F 6.3 A; 5 x 20 mm (d x l) at 100–115 V: 2 x F 10 A; 5 x 20 mm (d x l)
Protection class:	I
Degree of protection:	IP 20
Ultrasonic frequency:	38 kHz
Dimensions (length x width x height):	400 x 260 x 170 mm
Weight:	6 kg
Connections:	1 x device socket for mains cable (IEC socket) 1 x HF connecting socket 1 x temperature sensor socket 1 x Ethernet 1 x USB-A 1 x USB-B

## Oscillating tank

Type:	TE 4000
Material:	Stainless steel, welded
Internal dimensions (Length × width × height, tilted tank bottom):	770 × 420 × 165 ... 190 mm
External dimensions (Length × width × height, tilted tank bottom):	900 × 480 × 245 ... 275 mm
Operating volume:	35.0 l
Protection class:	I
Degree of protection:	IP 20
Weight:	24.0 kg
Outlet:	G 1 ½
Connections:	2 lines for connection to the generator 1 × HF cable 1 × temperature sensor

## Oscillating tank

Type:	TE 4000 DU
Material:	Stainless steel, welded
Internal dimensions (Length × width × height, tilted tank bottom):	770 × 420 × 165 ... 190 mm
External dimensions (Length × width × height, tilted tank bottom):	900 × 480 × 245 ... 275 mm
Operating volume:	35.0 l
Protection class:	I
Degree of protection:	IP 20
Weight:	24.0 kg
Outlet:	G 1 ½
Connections:	3 lines for connection to the generator or the dosing unit 1 × HF cable 1 × temperature sensor 1 × level sensor
Fill level sensor:	Conductivity sensor (no deionised water, conductivity of the liquid > 20 µS/cm)

### **TRISON Twist TT 4000 Si moving device**

Type:	TT 4000 da Vinci Si-R / -L
Rotation speed:	approx. 6 rpm
Degree of protection:	IP 68*
Material:	stainless steel, POM and PU**
Dimensions (length x width x height):	405 × 205 × 190 mm
Weight:	approx. 5 kg

### **TRISON Twist TT 4000 Xi moving device**

Type:	TT 4000 da Vinci Xi-R / -L
Rotation speed:	approx. 6 rpm
Degree of protection:	IP 68*
Material:	stainless steel, POM and PU**
Dimensions (length x width x height):	345 × 160 × 175 mm
Weight:	approx. 4 kg

### **TRISON Twist TT 4000 hinotori moving device**

Type:	TT 4000 hinotori R / L
Rotation speed:	approx. 6 rpm
Degree of protection:	IP 68*
Material:	stainless steel, POM and PU**
Dimensions (length x width x height):	365 × 160 × 250 mm
Weight:	approx. 6 kg

### **TRISON Twist TT 4000 Hugo moving device**

Type:	TT 4000 Hugo R / L
Rotation speed:	approx. 6 rpm
Degree of protection:	IP 68*
Material:	stainless steel, POM and PU**
Dimensions (length x width x height):	380 × 245 × 160 mm
Weight:	approx. 7 kg

\* The jack is not waterproof and must not be submerged.

\*\* Max. bath temperature 50 °C (not suitable for thermal disinfection or sterilisation.)

**TRISON Lift pivot-mounted arm**

Type:	TL 4000
Material:	stainless steel, POM and PU*
Dimensions (length x width x height):	240 × 95 × 350 mm
Weight:	approx. 3.0 kg

**TRISON Rack TR 3001 special basket**

Type:	TR 3001 R/TR 3001 L
Material:	stainless steel and POM*
External dimensions (length x width x height):	640 × 405 × 150 mm
Weight:	3.1 kg
Max. load-bearing capacity:	10 kg

**TRISON Rack TR 4000 special basket**

Type:	TR 4000
Material:	stainless steel and POM*
External dimensions (length x width x height):	720 × 405 × 150 mm
Weight:	3.4 kg
Max. load-bearing capacity:	10 kg

**TX 4000 Xi spacer**

Material:	PUR*
Dimensions (length x width x height):	138 × 23 × 32 mm
Weight:	21 g

\* Max. bath temperature 50 °C (not suitable for thermal disinfection or sterilisation.)

### **SONOBOARD function cabinet**

Type:	FS 1200 TR/TL
Material:	stainless steel
External dimensions with rollers (length × width × height):	1200 × 700 × 930 mm
Weight complete with TRISON 4000:	180 kg

### **Automatic dosing unit**

Type:	TRISON DU 4000
Inlet:	3/4 inch
Outlet:	1/2 inch
Flow rate:	10–18 l/min
Max. admissible pressure:	10 bar
Pump type:	Peristaltic pump
Pump capacity:	11 W
Adjustable concentration:	0.5 ... 10%
Dosing accuracy:	0 ... 4%
Maximum canister capacity:	10 litres

## 8.2 Ambient conditions

Overvoltage category:	II
Degree of contamination:	2
Permissible ambient temperature:	5 ... 40 °C
Permissible relative humidity up to 31 °C:	80% (non-condensing)
Permissible relative humidity up to 40 °C:	50% (non-condensing)
Altitude:	< 2000 m above sea level
Only for indoor operation	

## 8.3 CE conformity

The device is a medical device and meets the CE marking criteria of the European Union:

- 2017 / 745 / EU - MDR
- 2011 / 65 / EU - RoHS Directive

The declaration of conformity can be requested from the manufacturer, stating the serial number.

## 9 Approved accessories

**TRISON Twist TT 4000 da Vinci Si-R – code number 7820**

Moving device for Si instruments, suitable for right-sided TRISON Base

**TRISON Twist TT 4000 da Vinci Si-L – code number 7920**

Moving device for Si instruments, suitable for left-sided TRISON Base

**TRISON Twist TT 4000 da Vinci Xi-R – code number 7821**

Moving device for Xi instruments, suitable for right-sided TRISON Base

**TRISON Twist TT 4000 da Vinci Xi-L – code number 7921**

Moving device for Xi instruments, suitable for left-sided TRISON Base

**TRISON Twist TT 4000 Hugo-R – code number 7890**

Moving device for Hugo instruments, suitable for right-sided TRISON Base

**TRISON Twist TT 4000 Hugo-L – code number 7892**

Moving device for Hugo instruments, suitable for left-sided TRISON Base

**TRISON Twist TT 4000 hinotoriR – code number 7891**

Moving device for hinotori instruments, suitable for right-sided TRISON Base

**TRISON Twist TT 4000 hinotoriL – code number 7893**

Moving device for hinotori instruments, suitable for left-sided TRISON Base

**TRISON Lift TL 4000 – code number 7930**

Pivot-mounted arm for TRISON Twist

**TRISON Rack TR 3001 R – order number 7631**

Special basket for MIS instruments with comb bar on the right, suitable for right-sided TRISON Base

**TRISON Rack TR 3001 L – order number 7731**

Special basket for MIS instruments with comb bar on the left, suitable for left-sided TRISON Base

**TRISON Rack TR 4000 – code number 7632**

Special basket for robotics instruments of the Versius® Surgical Robotic System type

**Silicone knob mat SM 1000 MC – code number 3313**

for gentle storage of sensitive instruments, permeable to ultrasound, suitable for TRISON Rack

**Silicone knob mat SM 29 – order number 178**

for gentle storage of sensitive instruments, permeable to ultrasound, suitable for insert basket K 29 EM

**Insert basket K 29 EM – order number 688**

made of stainless steel, mesh size 5 × 5 mm, for standard instruments

**Basket holder KT 3000 Z R – order number 7761**

made of stainless steel with handles, for insert basket K 29 EM, suitable for right-sided TRISON Base

**Basket holder KT 3000 Z L – order number 7661**

made of stainless steel with handles, for insert basket K 29 EM, suitable for left-sided TRISON Base

**Lid D 4000 A - R – code number 7955**

made of plastic, suitable for right-sided TRISON Base

**Lid D 4000 A - L – order number 7956**

made of plastic, suitable for left-sided TRISON Base

**Hinged lid D 4000 K - R – code number 7957**

made of plastic, suitable for right-sided TRISON Base

**Spacer TX 4000 Xi – code number 7763**

for cleaning Xi Staplers

**Foil test frame FT 42 – order number 3224**

made of stainless steel

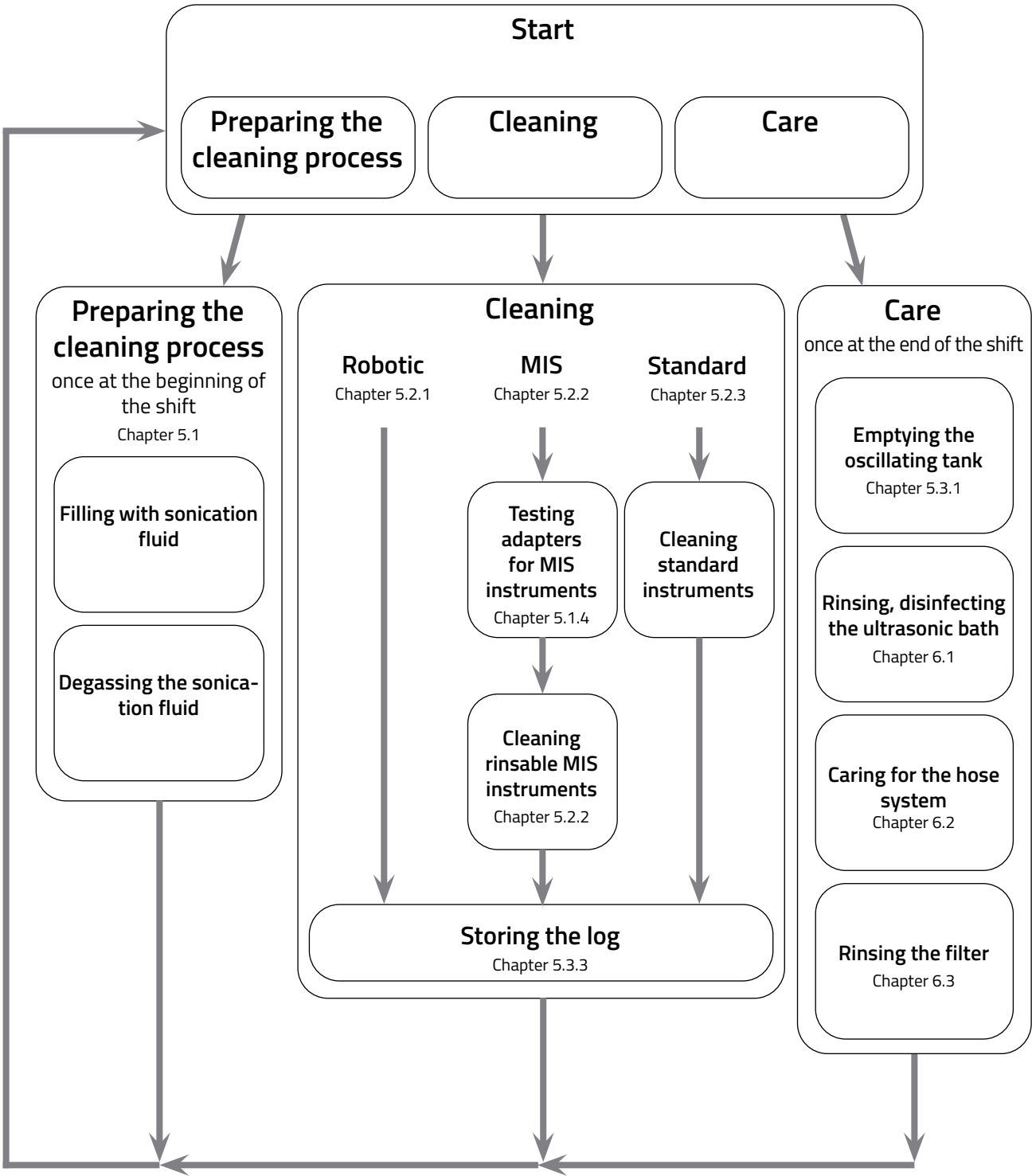
**Automatic dosing unit TRISON DU 4000 – code number 7899****Cleaning gun RP 5 – code number 7934****Rinsing bucket SE 2 – code number 7931144**

## Consumables

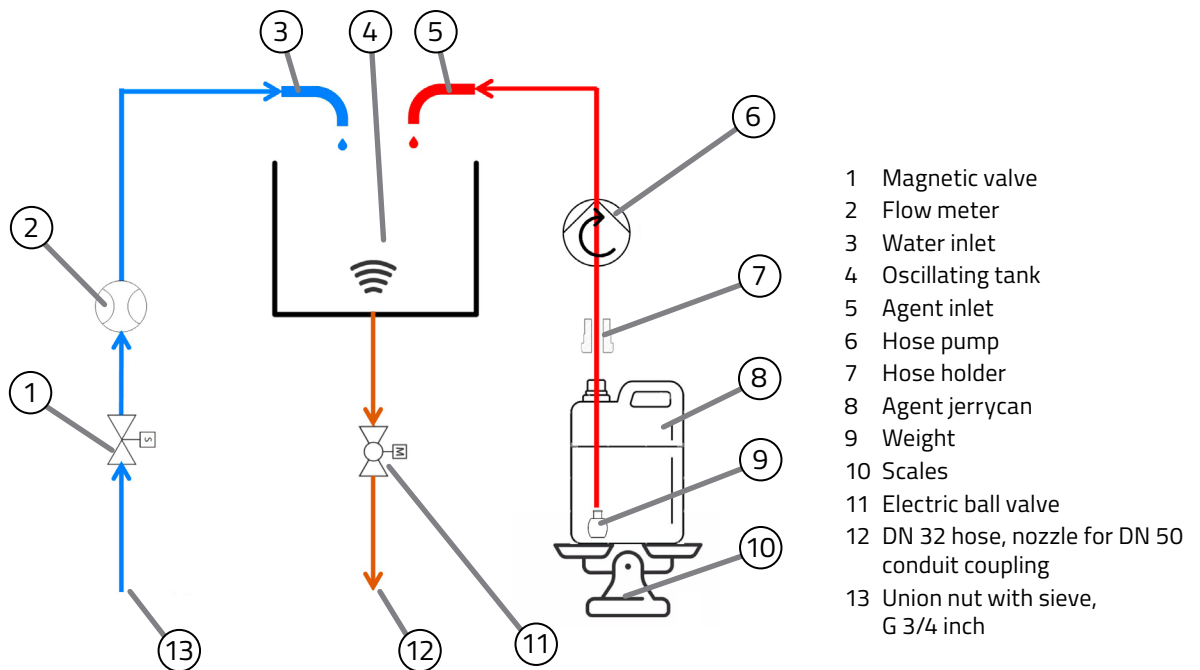
Description	Units	Code number
Filter EF 1001, for TRISON Base	30 pieces	3365
	100 pieces	3366
Adapter seals AD 1000, for TRISON Rack	8 pieces	3361
	24 pieces	3354
Adapter ADT 1000, for TRISON Rack	1 piece	7770
	8 pieces	3359
Hose set SLS 3000 TT, for TRISON Twist Si	1 piece	3363
Hose set SLS 4000 TT, for TRISON Twist Xi	1 piece	3362
Hose set SLS 3000 TR, for TRISON Rack TR 3001	1 piece	3364
Adapter testing strip APB 3000, for TRISON Rack	1 piece	7771
Hose set SLS 4000 Hugo, for TRISON Twist Hugo	1 piece	33642
Hose set SLS 4000 Versius, for TRISON Rack TR 4000	1 piece	33641
Hose set SLS 4000 hinotori, for TRISON Twist hinotori	1 piece	33643
Hose set SLS 4000 Toumai, for TRISON Rack TR 4000	1 piece	33644
Hose set SLS 4000 da Vinci SP, for TRISON Rack TR 4000	1 piece	33645
Hose set SLS 4000 da Vinci 5, for TRISON Rack TR 4000	1 piece	33646
Agent hose of the dosing unit	1 piece	78991

10     Diagrams

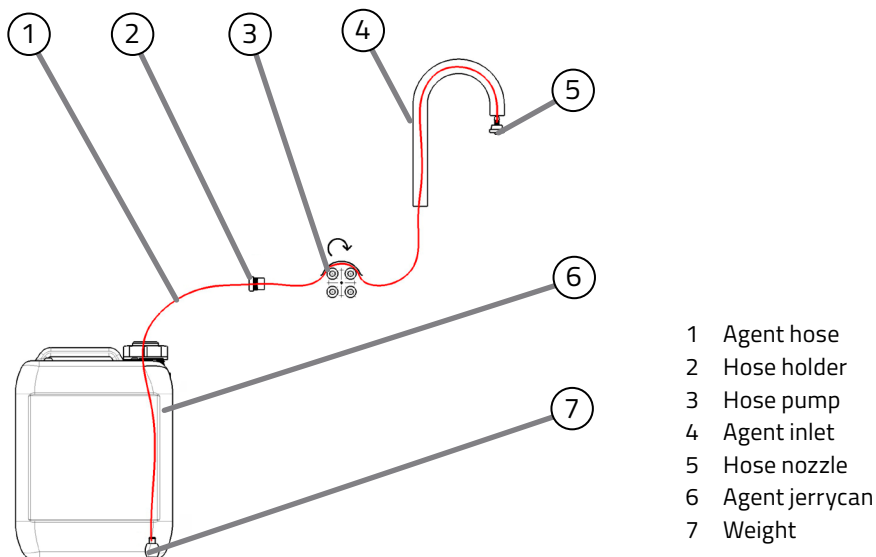
10.1    Process diagram



## 10.2 Diagram of the TRISON DU 4000 dosing unit



## 10.3 Diagram of the TRISON DU 4000 agent line



## 11 Maintenance lists

## Maintenance list/daily

- Check the filter on the TRISON Base and rinse or change it if necessary
- Maintain the hose system

[illegible]

### Maintenance list/monthly

- Check adapter seals on the TRISON Rack and replace every 4 weeks/as needed

Date	Name	Signature

### Maintenance list/every 2 years

- Maintenance of the ultrasonic bath by the manufacturer
- Replace the hose set on the TRISON Twist and/or TRISON Rack
- Replace the agent hose of the dosing unit.

Date	Name	Signature

## 12 Performing a foil test

### Information

**BANDELIN**  
 Ultraschall seit 1955

#### Foil test

##### Functional test for an ultrasonic bath

A foil test should be carried out before the first use and at regular intervals, e.g., every 3 months. This serves to ensure that the ultrasound has a consistent effect. You are responsible for how often this test is performed.

The foil test is a simple method for displaying the intensity and distribution of the cavitation in an ultrasonic bath. It is performed by inserting aluminium foil stretched over a foil test frame; for suitable foil test frames (FT) and foils (FL), see the table on page 4. Depending on the duration of sonication, the foil will be perforated or destroyed to a certain extent by cavitation.

In order to be able to compare results, it is **important that the conditions of the foil test are always the same:**

- The oscillating tank is filled up to the filling level mark
- Temperature of the sonication liquid
- The power setting on the ultrasonic bath is 100%
- Duration of degassing
- Positioning of the foil test frame
- Foil type (brand, thickness)
- Sonication duration
- Type and concentration of the ultrasound agent

##### Liquid for the foil test

In order to obtain sufficiently strong cavitation, the boundary surface tension of the water used must also be reduced for the foil test with the help of surfactant preparations.

We recommend the following ultrasound agents:

- TICKOPUR R 33
- TICKOPUR R 30
- TICKOPUR TR 7
- TICKOMED 1
- STAMMOPUR R
- STAMMOPUR DR 8

If none of these agents is available, a neutral or mildly alkaline agent that is not destructive to aluminium should be used. The agent must be approved by the manufacturer for use in the ultrasonic bath.

## Test result and documentation

While always maintaining the same test conditions, the test result must be assessed based on the perforated area of the foils. The perforated areas of the foils should always have approximately the same extent and distribution – they are never congruent. Through regular foil tests, it is possible to perform a constant process check, e.g., for reprocessing medical devices. An alternative is to measure the cavitation noise according to IEC TS 63001:2019.

You can download a documentation template here for documenting the test results:

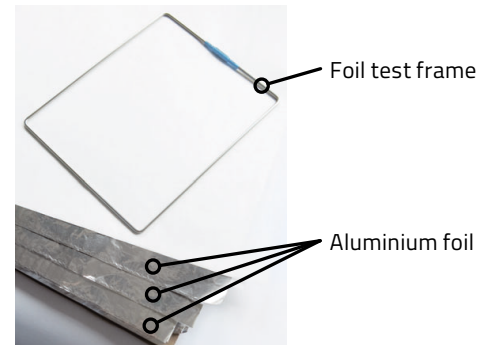
<https://bandelin.com/folientest/>

You will also find an application video there.

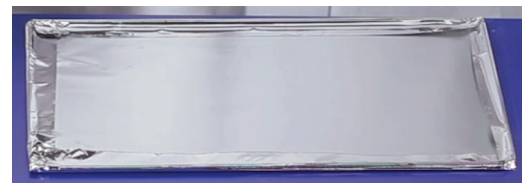
What's more, the foils can be archived in a suitable manner (scan, photo, etc.). This makes it possible to compare the foils at any time.



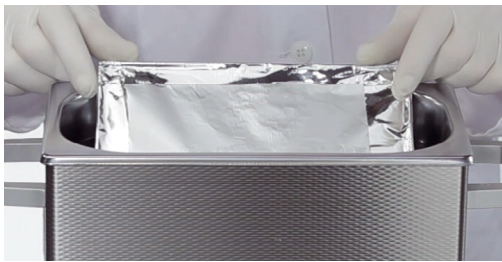
## Performing the foil test



1. Fill the oscillating tank with water and a suitable ultrasound agent in the dosage specified by the manufacturer up to the filling level mark.
2. Degas the sonication liquid.
3. Clamp the aluminium foil onto the foil test frame. We recommend using our foil blanks. As a substitute, you can also use commercially available aluminium foil (thickness of 10 µm to 25 µm). Depending on the size of the tank, the foil test frame may protrude. It is sufficient to cover the part of the foil test frame that is covered by the sonication liquid.



4. Place the covered foil test frame on a diagonal in the middle of the oscillating tank. If necessary, fix it in place.



5. Switch on the ultrasound. Sonicate the foil for at least 1 minute until visible perforation or pitting occurs. For more stable foils (thicker or coated), the duration of sonication may be up to 3 minutes. Make a note of the duration of your test.
6. Switch off the ultrasound. Take out the foil test frame. Remove the aluminium foil from the foil test frame and allow it to dry.
7. The foil must be perforated. If it is not, it is recommended that the device be checked by the service department of BANDELIN electronic GmbH & Co. KG.

8. Archive the foil with the test date and serial number of the ultrasonic bath, the previously selected conditions, and the duration. The documentation template for the foil test can additionally be filled in and archived.
9. Rinse out the oscillating tank thoroughly to remove any dissolved foil particles.

Suitable foil test frames and foils can be ordered from BANDELIN electronic GmbH & Co. KG.

The foil test frames and foils are designed for a wide range of tank dimensions; see the following table:

Foil test frames (PU = 1 piece)			Film (PU = 50 pieces)	
Type	Code no.	for	Type	Code no.
FT 1	3190	DT 31/H, DT 52/H, RK 31/H, RK 52/H		
FT 4	3074	DL 102 H, DL 255 H, DT 100 / H, DT 102 H /H-RC, DT 103, DT 106, DT 255 /H /H-RC, RK 100 /H, RK 102 H, RK 103, RK 106, RK 255 /H SC 255.2 ST 102 H, ST 103 H, ST 255 H	FL 4	71004
FT 6	3222	DL 156 BH, DT 156 /BH, ST 156 BH		
FT 14	3084	BactoSonic 14.2 DL 510 H, DL 512 H, DL 514 BH, DT 510 /H /H-RC, DT 512 H, DT 514 H /BH / BH-RC, DT 510 F, RK 510 /H, RK 512 H, RK 514 /H /BH, RM 16.2 U /UH /ST ST 510 H, ST 514 H /BH ZE 514/...DT,	FL 14	71014
FT 36	3673	DT 1028 F, ZE 1031/1032/ ...DT		
FT 37	3674	DT 1058 M, ZE 1058/1059/ ...DT		
FT 38	3672	MC 1001/E		
FT 40	3094	DL 1028 H, DT 1028 /H /CH, RK 170 H, RK 1028 /H /C / CH, RK 1040, RM 40.2 U /UH /ST ST 170 H, ST 1028 H / CH	FL 40	71040
FT 42	3224	TRISON (TE 3000 / TE 4000)		
FT 45	3204	DT 1050 CH, RK 1050/CH, RM 75.2 U/UH/ST ST 1050 CH	FL 45	71045

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