



# Operating Instructions

## **TRISON**

High-power ultrasonic bath

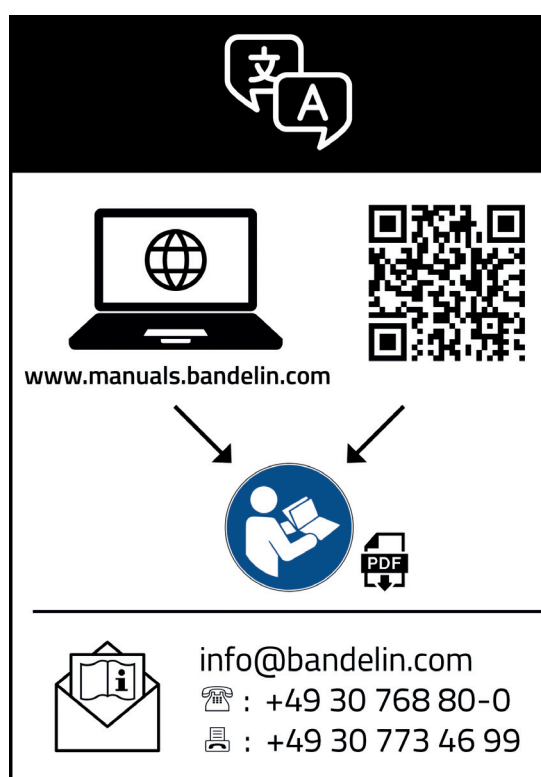


**Valid for:**

TRISON 4000 Si/Xi R/L

SONOBOARD TRISON R/L

Software version from 2.0.0, image version 2.0.1



© 2023

**BANDELIN** *electronic* GmbH & Co. KG, Heinrichstraße 3 – 4, Germany, 12207 Berlin,

Phone: +49 30 76880-0, Fax: +49 30 7734699, [info@bandelin.com](mailto:info@bandelin.com)

Certified in accordance with ISO 9001 and ISO 13485

The product names da Vinci, da Vinci Xi and da Vinci Si, as well as da Vinci EndoWrist, are trademarks or registered trademarks of Intuitive Surgical or their respective owners

# Table of contents

<b>1</b>	<b>About this operating manual</b>	<b>5</b>
<b>2</b>	<b>Safety</b>	<b>6</b>
2.1	Using the ultrasonic bath	6
2.2	Reporting obligation in the event of serious incidents	7
2.3	Prevention of cross-contamination and infection	7
2.4	Keep away from children	8
2.5	Danger of electric shock	8
2.6	Damage to health due to ultrasonic noise	8
2.7	Hazards due to high temperature	8
2.8	Danger from ultrasound	9
2.9	Danger from agents used	9
2.10	Disposing of sonication fluid	10
2.11	Erosion of the oscillating tank	10
2.12	Interference with wireless communication	11
<b>3</b>	<b>Design and function</b>	<b>12</b>
3.1	Overview	12
3.2	Oscillating tank with ultrasound generator	13
3.3	TRISON Base control unit	13
3.4	TRISON Lift	14
3.5	TRISON Twist	14
3.6	TRISON Rack	16
3.7	Temperature sensor	16
3.8	Xi spacer	17
3.9	Symbols and buttons	17
<b>4</b>	<b>Preparation for operation</b>	<b>18</b>
4.1	Rinsing out the ultrasonic oscillating tank	18
4.2	Switching the ultrasonic bath on and off	18
4.3	Changing settings on the TRISON Base	18
4.4	Attaching and removing the TRISON Lift	19
4.5	Attaching and removing the TRISON Twist	20
<b>5</b>	<b>Operation</b>	<b>21</b>
5.1	Preparing for ultrasonic cleaning	21
5.1.1	Sonication fluid	21

5.1.2	Pour in the sonication fluid .....	22
5.1.3	Degas the sonication fluid .....	23
5.1.4	Checking the adapters for MIS instruments .....	23
5.2	Cleaning instruments .....	25
5.2.1	Cleaning the Si instruments .....	25
5.2.2	Cleaning the Xi instruments .....	26
5.2.3	Cleaning rinsable MIS instruments .....	27
5.2.4	Cleaning standard instruments .....	29
5.3	After the ultrasonic cleaning .....	30
5.3.1	Empty the oscillating tank .....	30
5.3.2	Rinsing the ultrasonic bath .....	30
5.3.3	Disinfecting the ultrasonic bath .....	31
5.3.4	Cleaning and disinfecting the TRISON Lift, TRISON Twist and TRISON Rack .....	31
5.3.5	Rinsing the filter .....	32
5.3.6	Saving of logs .....	32
5.4	Troubleshooting a malfunction .....	34
<b>6</b>	<b>Maintenance .....</b>	<b>37</b>
6.1	Cleaning and maintenance of the ultrasonic bath .....	37
6.2	Tests .....	38
6.3	Replacing the adapter seals .....	40
6.4	Performing the foil test .....	41
6.5	Repair .....	44
6.6	Maintenance .....	45
<b>7</b>	<b>Disposal .....</b>	<b>46</b>
<b>8</b>	<b>Device information .....</b>	<b>47</b>
8.1	Technical data .....	47
8.2	Ambient conditions .....	50
8.3	CE conformity .....	50
<b>9</b>	<b>Accessories .....</b>	<b>51</b>
<b>10</b>	<b>Process diagram .....</b>	<b>53</b>
<b>11</b>	<b>Maintenance lists .....</b>	<b>54</b>

# 1 About this operating manual

This operating manual contains important and useful information for safe and efficient use of the ultrasonic bath.

- Please read this operating manual before using the ultrasonic bath.
- In particular, please observe chapter **2 Safety**.
- If you pass on this ultrasonic bath, include this operating manual.
- Contact your specialist dealer or BANDELIN if you have any questions that are not answered in this operating manual. You will find information on our service department in chapter **6.5 Repair**.

Illustrations are examples and not to scale.

## 2 Safety

### 2.1 Using the ultrasonic bath

The TRISON ultrasonic bath uses the physical effect 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 pursuant to Regulation (EU) 2017/745.

EMDN nomenclature: V0799

Cleaning is conducted using water and an agent suitable for use with ultrasound. The use of the TRISON ultrasonic bath is indicated for

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

Instruments may not be placed on the bottom of the oscillating tank. They must be inserted into the sonication fluid with a TRISON Twist, in a TRISON Rack or an insert basket with basket holder. An overview of suitable accessories can be found in chapter **9 Accessories**.  
The TRISON ultrasonic bath may not be operated while unattended.

#### Intended purpose

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

Purpose (cleaning goal)	Required accessories
Sonication and simultaneous, alternating suction and pressure rinsing of the instrument shafts while the instrument tools of the da Vinci Si robotic instruments move	TRISON Twist Si Right variant or left variant
Sonication and simultaneous, alternating suction and pressure rinsing of the instrument shafts while the instrument tools of the da Vinci Xi robotic instruments move	TRISON Twist Xi Right variant or left variant
Cleaning of the da Vinci Xi EndoWrist Staplers 45	Additional Xi spacer
Sonication and simultaneous suction rinsing of the instrument shafts of MIS instruments with outer diameters of 3 to 10 mm	TRISON Rack Right variant or left variant
Sonication of standard instruments	Insert basket and basket holder Right variant or left variant

### **Contraindications/exclusions**

- Lenses, camera systems, light cables, mirrors, or objects made of or containing elastic materials (e.g. catheters, respiratory system functional parts, flexible endoscopes) are not suitable for sonication, or are only suitable under certain conditions. The specifications of the respective manufacturer provide information on suitability for ultrasonic cleaning.
- The TRISON ultrasonic bath is not suitable for cleaning or disinfecting contact lenses.
- Flammable liquids may not be sonicated in the TRISON ultrasonic bath.
- Indirect sonication in the TRISON ultrasonic bath is not permitted.

### **Possible side effects/restrictions**

- Ultrasound does not disinfect. However, processes such as chemical disinfection may be accelerated in the ultrasonic bath.
- Cavitation erosion can cause surfaces to be mechanically corroded and their coatings to dissolve.

### **User group**

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

Operating the ultrasonic bath does not pose a risk to pregnant women.

## **2.2 Reporting obligation in the event of serious incidents**

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

## **2.3 Prevention of cross-contamination and infection**

To avoid cross-contamination, regularly clean and disinfect the surfaces of the ultrasonic bath with a surface disinfectant that has at least bactericidal, yeasticidal and limited virucidal properties. Process accessories such as holders, carriers or baskets in a cleaning and disinfection device.

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

## 2.4 Keep away from children

Children cannot see the dangers related to the ultrasonic bath. Therefore, keep children away from the ultrasonic bath.

## 2.5 Danger 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 wetness. Keep the surface and the touchscreen clean and dry.
- Only transport the ultrasonic bath in empty condition.
- Do not spray the ultrasonic bath, do not immerse it in water or expose it to splash water.
- Only connect the ultrasonic bath to a power outlet with a grounded socket.
- If you notice a defect in the ultrasonic bath, disconnect the mains plug immediately. Do not connect a defective ultrasonic bath to the mains.
- Repairs should only be carried out by the manufacturer. See chapter **6.5 Repair**.
- Position the ultrasonic bath so that it is easy to unplug the mains connection.

## 2.6 Damage to health due to ultrasonic noise

Some people may find the typical ultrasonic noise produced during processing very unpleasant. Damage to health can result if you remain within a radius of 2 m for long periods.

- Wear suitable ear protection.
- Use a lid to reduce noise. The ultrasonic bath can also be used inside a soundproof box.

## 2.7 Hazards due to high temperature

The ultrasonic bath, sonication fluid and instruments can become hot during operation. Contact with these products may cause burns.

Ultrasound energy warms up the sonication fluid even without additional heating. Prolonged ultrasound operation can lead to very high temperatures.

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

Non-aqueous fluids can heat up many times faster than water. A possible flashpoint can be reached or exceeded after a very short sonication time. In the case of high-boiling liquids,



the bath temperature can rise to over 120 °C due to the energy input of the ultrasound. This can lead to fires and severe burns.

## 2.8 Danger from ultrasound

High ultrasonic levels like those reached in the ultrasonic bath destroy cell structures. If part of the body is immersed in the sonication fluid during operation, this can cause damage to skin and also damage to internal tissue. The periosteum of finger bones can be damaged.

- Do not reach into the sonication fluid during operation.
- Never sonicate living creatures.

## 2.9 Danger from agents used

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

- Wear gloves and protective goggles when handling dangerous agents.
- Do not ingest the agents and do not allow them to come into contact with eyes or skin. Do not lean closely over the ultrasonic bath otherwise vapours could come into contact with your eyes and you could breathe in vapours.
- Place a lid on the ultrasonic bath during operation. Use an extraction system if there are dangerous vapours.
- Note the information on the label and on the safety data sheet for the agent.
- Keep the agents out of the reach of children and of persons who have not been instructed.

## 2.10 Disposing of sonication fluid

Dispose of the sonication fluid according to the information provided by the manufacturer of the ultrasound agents used. The recommended ultrasound agents from the TICKOPUR, TICKOMED and STAMMOPUR product ranges from DR. H. STAMM GmbH are biodegradable according to the articles of Regulation (EC) no. 648/2004 (Detergents Regulation). If necessary, the sonication fluid needs to be neutralised before disposal.

During cleaning, water-polluting substances, e.g. oils or heavy-metal compounds, can contaminate the sonication fluid depending on the type of soiling. If the limit value for these substances is exceeded, the sonication fluid must be reprocessed or disposed of as special waste.

Observe the local waste water 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 in the oscillating tank. Bath liquid can thus penetrate into the interior of the ultrasonic bath. Moisture on electrical components can cause an electric shock or fire.

- Do not use the ultrasonic bath any longer 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 any sonication fluid that is visibly contaminated with particles.
- Only use demineralised water (DI water) with an ultrasound-compatible preparation.
- 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 will corrode stainless steel.
- Only use the ultrasonic bath with accessories that are suited for the ultrasonic bath and instruments. Do not place any instruments directly on the bottom of the oscillating tank. An overview of suitable accessories can be found in chapter **9 Accessories**.

## 2.12 Interference with wireless communication

The ultrasonic bath can cause interference in nearby wireless communication devices, e.g.:

- Mobile phones
- WiFi devices
- Bluetooth devices.

If interference with the functions of a wireless device occurs, increase its distance from the ultrasonic bath.

The ultrasonic bath meets the requirements for Class B devices according to EN 55011.

## 3 Design and function

### 3.1 Overview

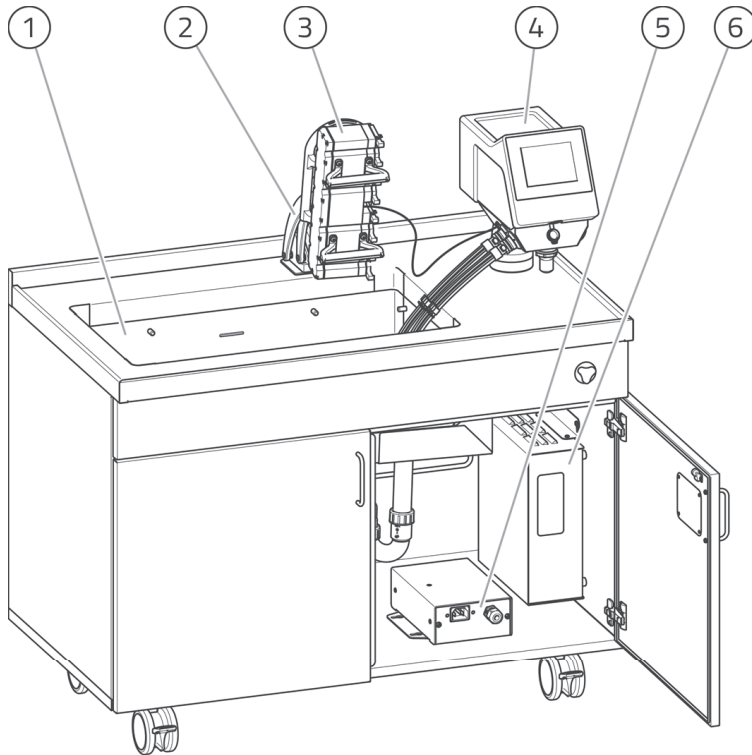


Fig. 1 TRISON ultrasonic bath installed in the SONOBOARD functional cabinet (functional cabinet is optional)

- 1 Oscillating tank
- 2 TRISON Lift pivot-mounted arm
- 3 TRISON Twist moving device
- 4 TRISON Base control unit
- 5 Mains supply switch
- 6 Ultrasound generator

## 3.2 Oscillating tank with ultrasound generator

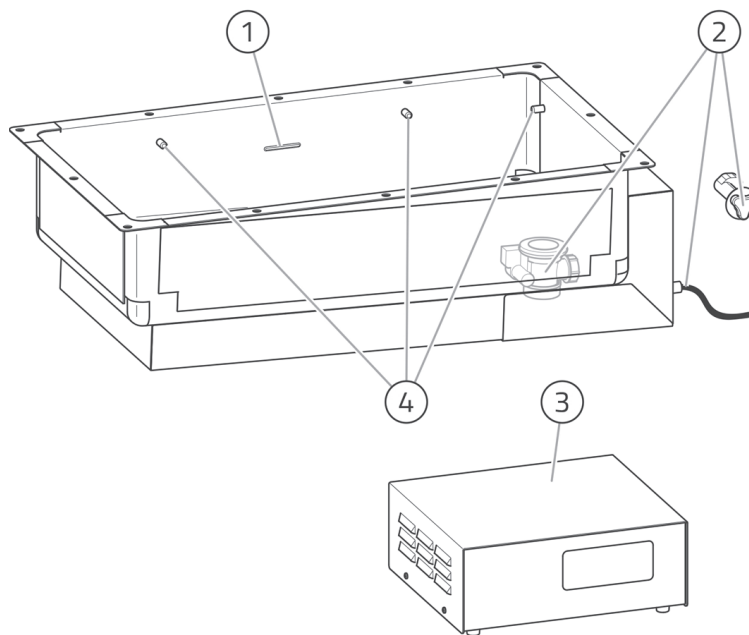


Fig. 2 Oscillating tank with ultrasound generator

- 1 Filling level mark
- 2 Outlet
- 3 Ultrasound generator
- 4 basket mounts

## 3.3 TRISON Base control unit

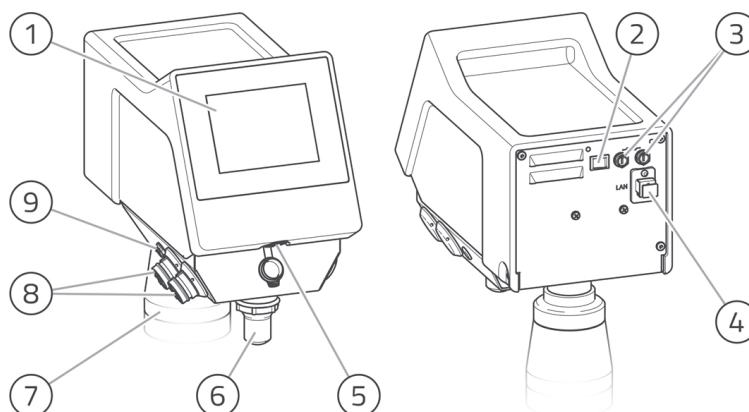


Fig. 3 TRISON Base

- 1 Touchscreen
- 2 Mains switch
- 3 Fuses
- 4 Ethernet interface
- 5 USB interface
- 6 Filter
- 7 Rotary base
- 8 Connections for hose couplings
- 9 Connection for the TRISON Twist or temperature sensor

### 3.4 TRISON Lift

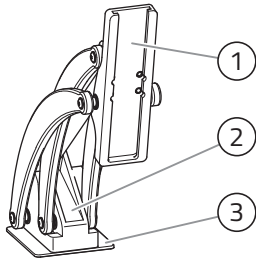


Fig. 4 TRISON Lift (optional)

- 1 Connector for attachment of a TRISON Twist
- 2 Foot element
- 3 Foot plate for attachment to the work plate

With the TRISON Lift, the TRISON Twist moving device can be swung up and down for cleaning robotic instruments. The TRISON Lift is mounted behind the oscillating tank on the work surface.

### 3.5 TRISON Twist

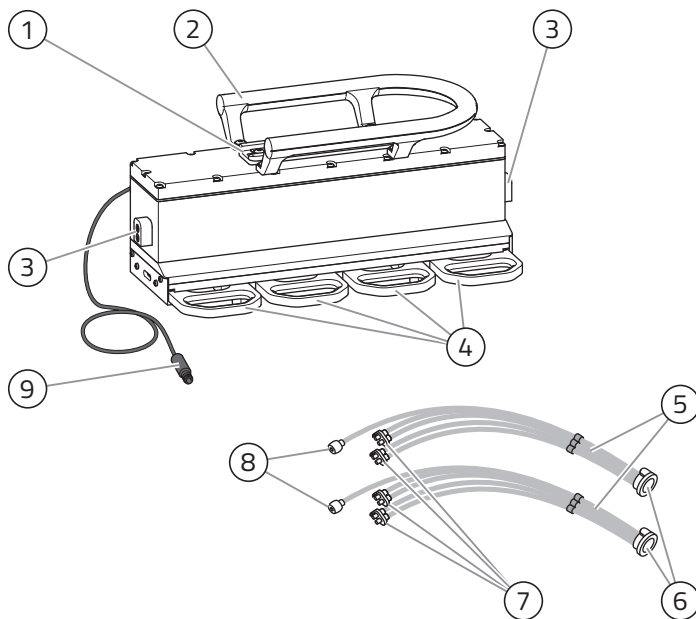


Fig. 5 TRISON Twist TT 4000 Si for Si instruments (optional)

- 1 Connector for attachment to the TRISON Lift
- 2 Hand grip
- 3 Support for the oscillating tank
- 4 Push handles
- 5 Hose sets
- 6 Hose couplings
- 7 Rinsing plug
- 8 Return hoses
- 9 Plug for connection to the TRISON Base

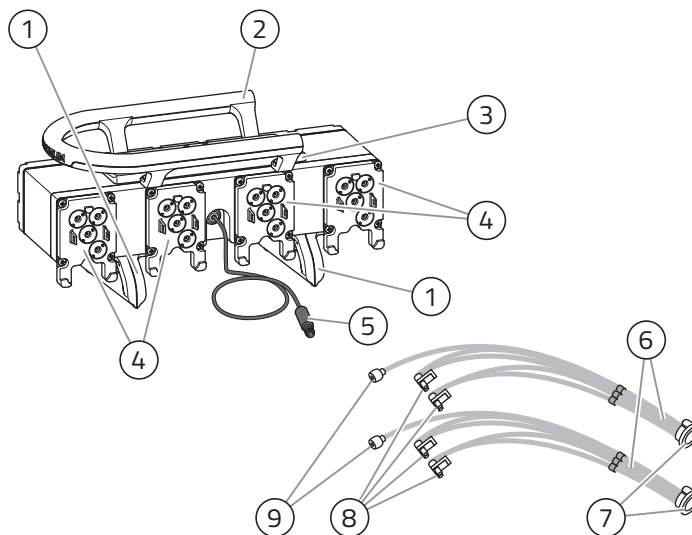


Fig. 6 TRISON Twist TT 4000 Xi for Xi instruments (optional)

- 1 Feet
- 2 Hand grip
- 3 Connector for attachment to the TRISON Lift
- 4 Mounts
- 5 Plug for connection 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 simultaneously or one Xi stapler instrument. The TRISON Twist is available as a left- or right-hand variant, see chapter **9 Accessories**.

During the first 30 minutes of the cleaning process, the instruments are filled with the sonication fluid to dissolve and decompose organic residues. During rinsing, the instrument tips are moved to allow for the cleaning of hard-to-reach joints and cavities. Instruments that are not rinsable are displayed on the touchscreen after cleaning.

### 3.6 TRISON Rack

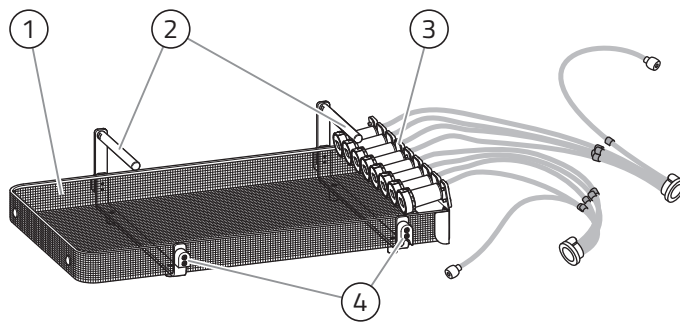


Fig. 7 TRISON Rack (optional)

- 1 Basket
- 2 Hand grips
- 3 Comb bar for 8 adapters
- 4 Support for the oscillating tank

The TRISON Rack is used to clean up to 8 rinsable MIS instruments simultaneously. The TRISON Rack is available as a left- or right-hand variant, see chapter **9 Accessories**. The instruments are connected to the corresponding adapters, rinsed from the inside and individually checked for flow. Instruments that are not rinsable are displayed on the touchscreen after cleaning.

### 3.7 Temperature sensor

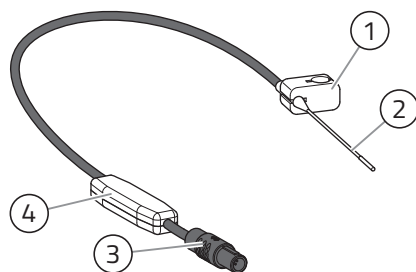


Fig. 8 Temperature sensor (optional)

- 1 Fastening clamp
- 2 Immersion sensor
- 3 Plug for connection to the TRISON Base
- 4 LED display



#### Information

**The plug on the temperature sensor may not be immersed in liquid.**

– If the plug has come into contact with liquid, allow it to dry completely before connecting it.

The plug can be blown out with compressed air.



The temperature sensor is used to monitor the temperature during cleaning of standard instruments.

Meaning of the LED displays:

- Green, steady light: Bath temperature OK
- Red, steady light: Bath temperature too low
- Red, flashing: Bath temperature too high
- Orange, flashing: Immersion sensor not immersed

### 3.8 Xi spacer

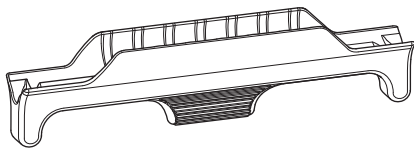












Fig. 9 Xi spacer (optional)

The Xi spacer is clipped to the TRISON Twist TT 4000 Xi, for cleaning of Xi staplers.

### 3.9 Symbols and buttons

	Startup screen
	Next/OK
	Back
	Cancel
START 	Start
	Flow rate during cleaning
	Temperature during cleaning
<b>Kanal</b>	Instrument channel currently being rinsed
	Ultrasound active
	Instrument is clogged, cleaning must be repeated.
	Instrument is unobstructed, cleaning is complete.

## 4 Preparation for operation

### 4.1 Rinsing out the ultrasonic oscillating tank

Rinse the ultrasonic oscillating tank thoroughly with water before using it for the first time.

### 4.2 Switching the ultrasonic bath on and off

#### Switching on the ultrasonic bath

Switch on the ultrasonic bath using the mains switch on the back of the TRISON Base. After a few seconds, the startup screen appears on the touchscreen.

If there is no network connection during the start-up process, a message appears briefly on the screen. After about 10 seconds, the ultrasonic bath restarts automatically without a network connection.

If the startup screen does not appear after a long period of time, see **5.4 Störung beseitigen**.

#### Switching off the ultrasonic bath

Switch off the ultrasonic bath using the mains switch on the back of the TRISON Base.

After switching off the ultrasonic bath, wait at least 10 seconds before switching it on again.

### 4.3 Changing settings on the TRISON Base

#### Adjusting the screen brightness

From the startup screen select "Settings", then "User", and then "Brightness" to adjust the screen brightness.

#### Setting the date and time

From the startup screen select "Settings", then "System", and then "Time/Date" to set the time and date.



#### Information

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

### Changing settings for the cleaning of robotic instruments

Robotic instruments have a pre-set soaking time of 30 minutes and a cleaning time of 30 minutes. You can switch off the soaking time and reduce the cleaning time to 15 minutes.

1. On the startup screen, tap "Settings".
2. Tap on "System".
3. Tap "Robotics runtime".
4. Enter the password "1983" when prompted.
5. Select the soaking and cleaning time for the robotics program.

### Changing settings for the cleaning of MIS instruments

For MIS instruments, a cleaning time of 15 minutes and a filling volume of 35 litres are pre-set. The filling volume conforms to the TE 3000 oscillating tank. You can adjust the cleaning time and the filling volume.

1. On the startup screen, tap "Settings".
2. Tap on "User".
3. Tap "Process data".
4. Select the cleaning time and filling volume for the MIS program.

## 4.4 Attaching and removing the TRISON Lift

Push the foot element of the TRISON Lift backwards into the foot guide, until the TRISON Lift engages.

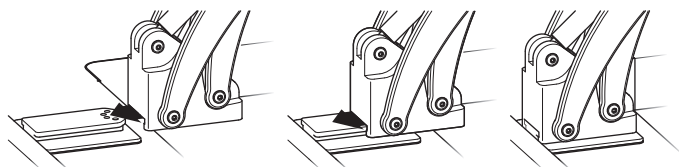


Fig. 10 Attaching the TRISON Lift

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

## 4.5 Attaching and removing the TRISON Twist

### Attaching the TRISON Twist

#### NOTICE

- The plug of the TRISON Twist is not waterproof. Make sure that it does not come into contact with the sonication fluid. If the plug has come into contact with liquid, allow it to dry completely before connecting it. The plug can be blown out with compressed air.
- Do not twist the plug or insert it forcefully. Any damage could lead to a short circuit!

### Requirements

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

### Procedure

1. Hold the TRISON Twist plug firmly and make sure that it does not come into contact with the sonication fluid.
2. Grip the handle of the TRISON Twist and push it downward into the TRISON Lift guide, until the TRISON Twist engages.
3. Connect the plug of the TRISON Twist to the TRISON Base.

### Removing the TRISON Twist

### Requirements

- All instruments have been removed from the TRISON Twist.
- The hose couplings on the TRISON Base have been removed.

### Procedure

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

## 5 Operation

### 5.1 Preparing for ultrasonic cleaning

#### 5.1.1 Sonication fluid

A solution of water and a special ultrasound preparation is used as the sonication fluid. Drinking water or demineralised water (DI water) can be used as water. Water without additives is not suited for sonication. Use of demineralised water without an ultrasound preparation will lead 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 ultrasound preparation used must be cavitation-conductive, biodegradable, easy to dispose of, gentle to materials, and long-lasting. BANDELIN recommends the use of an enzymatic ultrasound preparation according to the specifications of the instrument manufacturer, for cleaning of the robotic instruments. For the cleaning of rinsable MIS instruments, BANDELIN recommends use of the ultrasound preparations STAMMOPUR DR 8 and STAMMOPUR R by DR. H. STAMM GmbH.

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

Follow the dosing instructions provided by the manufacturer of the ultrasound preparation. You can calculate the quantities yourself, analogously to the following example.

35 l ready-to-use solution, 2.5%

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

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

You can also find the dosage in the following table:

Work con- tents	Dosage				
	Water + concentrate				
[l]	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

## 5.1.2 Pour in the sonication fluid



### CAUTION

#### Risk of scalding

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

### NOTICE

#### Damage to the ultrasonic bath caused by condensation

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

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

### NOTICE

#### Damage to the oscillating tank

If using a powder preparation, do not add it directly to the oscillating tank.

- Mix a powder preparation in another container before adding it to the oscillating tank.
- Add the preparation to the oscillating tank only when it is completely dissolved.

## Requirements

- The outlet must be closed.
- The ultrasonic bath must be turned off.

## Procedure

1. Fill 1/3 of the oscillating tank with water.
2. Dose the preparation into the oscillating tank. See chapter **5.1.1 Sonication fluid**.
3. Fill with water up to the filling level mark; avoid foam formation when doing so.

### 5.1.3 Degas the sonication fluid

Freshly-filled sonication fluid or fluid that has remained in the oscillating tank for a long period of time must be degassed prior to use. Degassing of the sonication fluid increases the ultrasound effect.

#### Procedure

1. Cover the oscillating tank with the lid, if available.
2. Select the "Degassing" program on the TRISON Base.
3. Fill the oscillating tank if needed, see chapter 5.1.2 **Pour in the sonication fluid**.
4. Tap "START" to start degassing.



#### Information

During degassing, the ultrasound noise becomes quieter. This means that the ultrasound effect increases.

### 5.1.4 Checking the adapters for MIS instruments

#### Checking the adapters for MIS instruments

The seals in MIS instrument adapters are subject to wear due to opening, closing and the effect of ultrasound. Therefore, check the tightness of the adapters before each cleaning of MIS instruments.

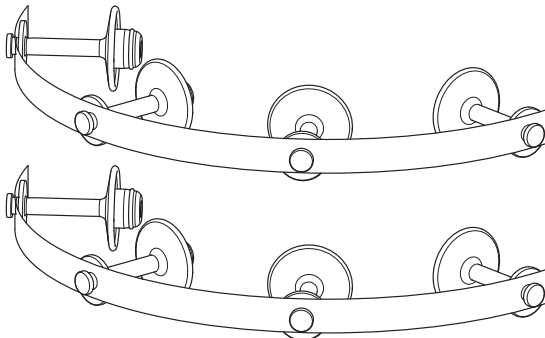


Fig. 11 Adapter testing strips

#### 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 the rotation ring of the adapter and allow the rotation ring to spring back. It will rotate slightly toward the left. Repeat this step until the adapter seal is fully open.

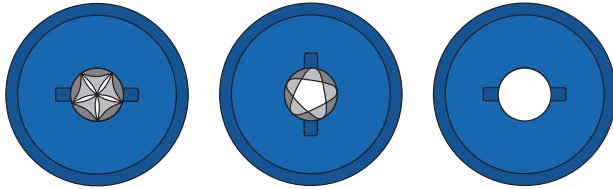


Fig. 12 Adapter seal fully closed, partially closed and fully open

2. Insert all test plugs into the adapter openings.

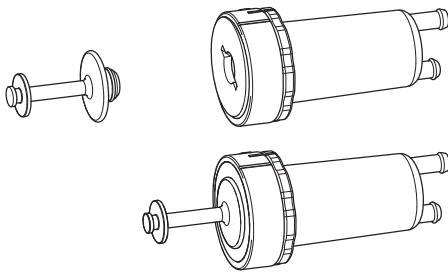


Fig. 13 Inserting the adapter test plug

3. Insert the adapters back into 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 correctly.
6. On the touchscreen, select the rinsing channels to be tested.
7. Tap "START" to start the adapter check.

## Results

- » The test status with progress bars is displayed on the touchscreen.



## 5.2 Cleaning instruments

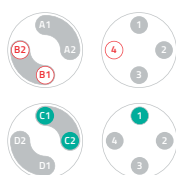
### 5.2.1 Cleaning the Si instruments

#### Requirements

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

#### Procedure

1. Grip the TRISON Twist by the handle and swivel it upwards.
2. If necessary, open a push handle and place an Si instrument onto the mount on the TRISON Twist.  
Close the push handle to fixate the Si instrument.
3. Insert the rinsing plugs into the Si instruments. Press the plugs firmly into place.
4. Grasp the TRISON Twist by the handle and swivel it downwards so that the Si instruments are completely immersed in the sonication fluid.
5. Connect both hose couplings to the TRISON Base. Make sure that the hose couplings engage correctly.
6. Place the ends of the two return hoses loosely in the sonication fluid.
7. Connect the plug of the TRISON Twist to the TRISON Base.
8. Select the "Robotics" cleaning program on the TRISON Base.
9. Select the smallest diameter of the connected instruments on the touchscreen.
10. Select the rinsing channels of the connected instruments on the touchscreen.
11. Tap "START" to start the cleaning program.
  - » Cleaning starts with a soaking phase without ultrasound and without instrument movement. A progress bar is displayed on the touchscreen.
  - » After the cleaning process has finished, information on all instruments is displayed. Check on the display whether the instruments have been rinsed or are clogged, see below.
12. As soon as cleaning is complete, grip the TRISON Twist by the handle and swivel it upwards.
13. Remove the robotic instruments and rinse them with water to remove the remaining sonication fluid.



Instrument is clogged, cleaning must be repeated.

Instrument is unobstructed, cleaning is complete.

## 5.2.2 Cleaning the Xi instruments

### Requirements

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

### Procedure

1. Grip the TRISON Twist by the handle and swivel it upwards.
2. Carefully insert the Xi instruments into the TRISON Twist mounts.
3. Grasp the TRISON Twist by the handle and swivel it downwards without immersing the Xi instruments in the sonication fluid.
4. Insert the rinsing plugs into the Xi instruments and press them firmly.
5. Grasp the TRISON Twist by the handle and swivel it downwards so that the Xi instruments are completely immersed in the sonication fluid. When cleaning the Xi staplers, the TRISON Twist must stand on the feet of the spacer.
6. Connect both hose couplings to the TRISON Base. Make sure that the hose couplings engage correctly.
7. Place the ends of the two return hoses loosely in the sonication fluid.
8. Connect the plug of the TRISON Twist to the TRISON Base.
9. Select the "Robotics" cleaning program on the TRISON Base.
10. Select the smallest diameter of the connected instruments on the touchscreen.
11. Select the rinsing channels of the connected instruments on the touchscreen.
12. Tap "START" to start the cleaning program.
  - » Cleaning starts with a soaking phase without ultrasound and without instrument movement. A progress bar is displayed on the touchscreen.
  - » After the cleaning process has finished, information on all instruments is displayed. Check on the display whether the instruments have been rinsed or are clogged, see below.
  - » Stapler instruments are stiffer than other robotic instruments, so the shaft or distal end of the Xi stapler moves only to a limited extent during cleaning
13. As soon as cleaning is complete, grip the TRISON Twist by the handle and swivel it upwards.
14. Remove the robotic instruments and rinse them with water to remove the remaining sonication fluid.



Instrument is clogged, cleaning must be repeated.



Instrument is unobstructed, cleaning is complete.

**i** Information

Xi staplers can also be cleaned on the TRISON Twist TT 4000 Xi. This requires the Xi spacer which must be ordered separately, see chapter **9 Accessories**. Click the spacer firmly 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 middle mounts of the TRISON Twist.

## 5.2.3 Cleaning rinsable MIS instruments

### Requirements

- The adapters have been tested for tightness, see chapter **5.1.4 Checking the adapters for MIS instruments**.
- The oscillating tank is filled.
- The sonication fluid is degassed.

### Procedure

1. Check that the adapter seals are fully open. If an adapter seal is not fully open, pull the rotation ring of the adapter and allow the rotation ring to spring back. It will rotate slightly toward the left. Repeat this step until the adapter seal is fully open.

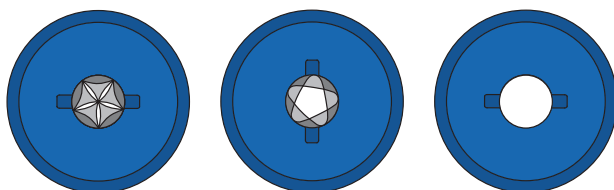


Fig. 14 Adapter seal fully closed, partially closed and fully open

2. Carefully slide the closed MIS instruments into the adapters so that the movable instrument tip is fully visible in the inspection glass. Make sure to insert the instruments straight so as not to damage the adapter seals.

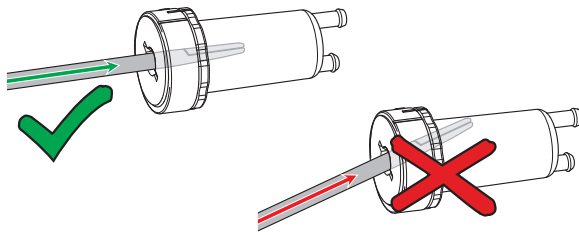


Fig. 15 Pushing the MIS instrument into the adapter

3. Close the adapter seals by turning the outer rotation ring by three notches in a clockwise direction.

You will hear a snapping sound every time you click into a notch.

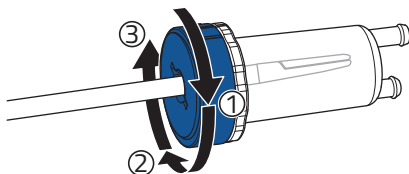
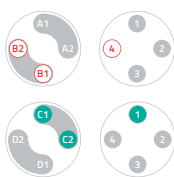


Fig. 16 Closing the adapter seal

**Attention!** Turn the outer rotation ring by only three notches in a clockwise direction. If the rotation ring is turned too far, the adapter seal may be 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 correctly.
7. Place the ends of the two return hoses loosely in the sonication fluid.
8. Select the "MIC" cleaning program on the TRISON Base.
9. Select the rinsing channels of the connected instruments on the touchscreen.
10. Tap "START" to start the cleaning program.
  - » The cleaning process starts. A progress bar is displayed on the touchscreen.
  - » After the cleaning process has finished, information on all instruments is displayed. Check on the display whether the instruments have been rinsed or are clogged, see below.
11. As soon as cleaning is complete, remove the TRISON Rack from the sonication fluid.
12. Open the adapter seals by pulling the rotation ring of the adapter three times and allowing the rotation ring to spring back.
13. Close the instrument tips. Remove the MIS instruments from the adapters. Rinse the instruments with water to remove sonication fluid residues.



Instrument is clogged, cleaning must be repeated.

Instrument is unobstructed, cleaning is complete.

## 5.2.4 Cleaning standard instruments

### Requirements

- The basket holder is inserted in the oscillating tank.
- The insert basket for standard instruments is ready for use.
- The oscillating tank is filled.
- The sonication fluid is degassed.

### Procedure

1. Distribute the instruments in the insert basket. Make sure that the instruments are open and disassembled if necessary. Place the more heavily soiled side facing down.
2. Place the insert basket on the basket holder in the oscillating tank so that the instruments are immersed in the sonication fluid.
3. If necessary, connect the temperature sensor to the TRISON Base. Secure the temperature sensor to a basket mount on the oscillating tank using the fastening clamp.
4. Select the "Standard" cleaning program on the TRISON Base.
5. Select the sonication time on the touchscreen.
6. Tap "START" to start the cleaning program.
  - » The cleaning process starts. A progress bar is displayed on the touchscreen.
7. As soon as the cleaning is finished, remove the insert basket from the sonication fluid.
8. Rinse the instruments with water to remove sonication fluid residues.

## 5.3 After the ultrasonic cleaning

### 5.3.1 Empty the oscillating tank

Dirt on the bottom of the oscillating tank reduces the ultrasound output. Empty and clean the oscillating tank if the sonication fluid is visibly dirty.

Also, observe the specifications of the manufacturer of the ultrasound preparation regarding the service life of the sonication fluid.

Replace used sonication fluid completely. Do not freshen the fluid by topping it up.

#### Procedure

1. Select "Care" and then "Empty" on the TRISON Base touchscreen.
2. Open the outlet.
3. Tap "START" to start emptying.
4. Connect both hose couplings to the TRISON Base and loosely place the rinsing plugs or the adapters and the ends of the return hoses into the oscillating tank.
5. Next, rinse the oscillating tank thoroughly with water, see chapter **5.3.2 Rinsing the ultrasonic bath**.

### 5.3.2 Rinsing the ultrasonic bath



#### Information

If an ultrasonic preparation without disinfecting properties was used for cleaning, you must disinfect the ultrasonic bath and not only rinse it with water, see chapter **5.3.3 Disinfecting the ultrasonic bath**

#### Procedure

1. Close the outlet.
2. Place the TRISON Twist or the TRISON Rack in the oscillating tank.
3. Select "Care" and then "Rinse" on the TRISON Base touchscreen.
4. Fill the oscillating tank with water.
5. Connect both hose couplings to the TRISON Base and loosely place the rinsing plugs or the adapters and the ends of the return hoses into the oscillating tank.
6. Tap "Continue" to start the rinsing process.
7. Empty the oscillating tank completely after rinsing, see chapter **5.3.1 Empty the oscillating tank**.

### 5.3.3 Disinfecting the ultrasonic bath

If an ultrasonic preparation without disinfecting properties was used for cleaning, you must disinfect the ultrasonic bath instead of only rinsing it with water.

#### Procedure

1. Close the outlet.
2. Place the TRISON Twist or the TRISON Rack in the oscillating tank.
3. Select "Care" and then "Disinfect" on the TRISON Base touchscreen.
4. Fill the oscillating tank with water and a suitable preparation for disinfection.
5. Connect both hose couplings to the TRISON Base and loosely place the rinsing plugs or adapters and the ends of the return hoses into the oscillating tank.
6. Select a treatment time and tap "START" to start the process.
7. Empty the oscillating tank completely after disinfection, see chapter **5.3.1 Empty the oscillating tank**.
8. Rinse the ultrasonic bath with water, see chapter **5.3.2 Rinsing the ultrasonic bath**.

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

Clean and disinfect the TRISON Lift, the TRISON Twist and the TRISON Rack regularly. To do so, you can place them in the oscillating tank when you clean and disinfect the oscillating tank, see chapter **5.3.2 Rinsing the ultrasonic bath** and chapter **5.3.3 Disinfecting the ultrasonic bath**.

### 5.3.5 Rinsing the filter

The filter is backflushable and can be reused.

After cleaning the robotic instruments or MIS instruments, the filter must be rinsed daily and checked for damage. If it is damaged, it must be replaced.

#### Requirements

- The ultrasonic bath is not active.

#### Procedure

1. Unscrew the transparent filter housing at the bottom on the TRISON Base, and rinse it with water.
2. Remove the filter.
3. Discard or clean the filter by rinsing the contamination 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 can be damaged.
5. Check that the sealing ring is present in the filter housing, and screw on the filter housing.

### 5.3.6 Saving of logs

After each cleaning cycle is completed, a log that summarises important information regarding the cleaning process is created. It is stored in the internal memory, where up to 50 logs can be managed and saved.

The logs can be transferred to a computer using a USB stick or an existing Ethernet connection.



## Retrieving logs via the USB interface

### Procedure

1. From the startup screen select "Settings", then "Users" and then "Documentation". The number of internally stored logs is shown in the upper left corner of the touchscreen.
2. Open the USB interface below the touchscreen and insert a USB stick.
  - » The detected hardware is displayed at the top right of the touchscreen.
3. Tap the grey USB button to transfer the logs to the USB stick.
  - » The logs are automatically deleted from the internal memory of the TRISON Base.
4. Once the logs have been transferred, remove the USB stick and close the USB interface.

## Retrieving logs via the Ethernet interface

### Requirements

- The Ethernet cable has been plugged in before the TRISON Base is switched on. Otherwise, the IP address will not be available.

### Procedure

1. From the startup screen select "Settings", then "System", and then "Information" to view the IP address.
  - » If no IP address is displayed, switch off the ultrasonic bath, check the network connection, and switch the ultrasonic bath back on, see **4.2 Switching the ultrasonic bath on and off**.
2. On a computer, enter the IP address in the browser and confirm with Enter.
  - » All logs stored internally on the TRISON Base are displayed.
3. Right-click on "view" to save the log under "Save As" on the computer or other data carrier.
  - » The logs are not automatically deleted from the internal memory of the TRISON Base.
4. Click "delete" to delete the logs from the internal memory of the TRISON Base.

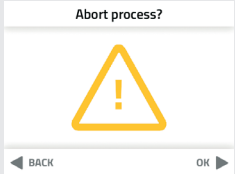
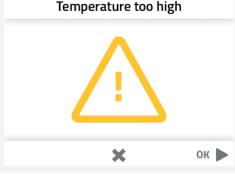
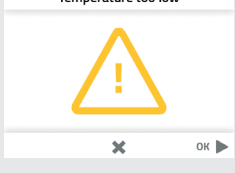
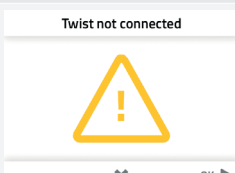
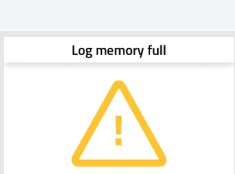
## 5.4 Troubleshooting a malfunction





### Malfunctions

Error	Possible causes	Troubleshooting
Insufficient ultra-sound effect, loud noises	<ul style="list-style-type: none"> <li>▪ Sonication fluid contains gases</li> </ul>	<ul style="list-style-type: none"> <li>▪ Degas the sonication fluid, see chapter <b>5.1.3 Degas the sonication fluid.</b></li> </ul>
	<ul style="list-style-type: none"> <li>▪ Oscillating system or ultra-sound generator defective</li> </ul>	<ul style="list-style-type: none"> <li>▪ Perform foil test, see chapter <b>6.4 Performing the foil test.</b></li> <li>▪ Contact manufacturer, see chapter <b>6.5 Repair.</b></li> </ul>
Uneven noises (wobbling)	<ul style="list-style-type: none"> <li>▪ Inadequate fill level in the oscillating tank</li> </ul>	<ul style="list-style-type: none"> <li>▪ Slightly change the fill level of the sonication fluid in the oscillating tank. In doing so, observe the minimum fill level and correct dosage of the preparation.</li> </ul>
		<ul style="list-style-type: none"> <li>▪ Wait until the sonication fluid no longer moves.</li> </ul>
TRISON Base cannot be switched on (touchscreen remains dark)	<ul style="list-style-type: none"> <li>▪ TRISON ultrasonic bath not connected correctly</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check the mains connection.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Mains switch is off</li> </ul>	<ul style="list-style-type: none"> <li>▪ Turn on the mains switch.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Fuses defective</li> </ul>	<ul style="list-style-type: none"> <li>▪ Replace fuses, see chapter <b>8.1 Technical data.</b></li> </ul>
Touchscreen does not respond	<ul style="list-style-type: none"> <li>▪ Touchscreen defective</li> </ul>	<ul style="list-style-type: none"> <li>▪ Contact manufacturer, see chapter <b>6.5 Repair.</b></li> </ul>
TRISON Base permanently displays the welcome screen	<ul style="list-style-type: none"> <li>▪ TRISON Base switched on and off too quickly</li> </ul>	<ul style="list-style-type: none"> <li>▪ Switch off TRISON Base and switch on again after at least 10 seconds.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ SD card defective</li> </ul>	<ul style="list-style-type: none"> <li>▪ Contact manufacturer, see chapter <b>6.5 Repair.</b></li> </ul>
Progress bar is not progressing	<ul style="list-style-type: none"> <li>▪ Software or hardware defective</li> </ul>	<ul style="list-style-type: none"> <li>▪ Switch off TRISON Base and switch on again after at least 10 seconds.</li> </ul>
		<ul style="list-style-type: none"> <li>▪ Contact manufacturer, see chapter <b>6.5 Repair.</b></li> </ul>
Negative process result repeatedly 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 with water up to filling level mark and top up with a suitable ultrasound preparation, see chapter <b>5.1.2 Pour in the 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 hose couplings and reconnect.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Hose set clogged, rinsing circuit of TRISON Base is 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> </ul>
		<ul style="list-style-type: none"> <li>▪ Use a new hose set, see chapter <b>9 Accessories.</b></li> </ul>
		<ul style="list-style-type: none"> <li>▪ Contact manufacturer, see chapter <b>6.5 Repair.</b></li> </ul>

Error	Possible causes	Troubleshooting
Unsatisfactory cleaning results	▪ Sonication fluid not degassed	▪ Degas the sonication fluid, see chapter 5.1.3 <b>Degas the sonication fluid.</b>
	▪ Unsuitable cleaning agent	▪ Repeat cleaning with a suitable cleaning agent.
	▪ Instruments stored for too long in contaminated state	▪ Clean robotic instruments or MIS instruments again, extend sonication time for standard instruments.

### Warning and error screens

Warning screen	Reasons	Measures
<p>Abort process?</p> 	Ongoing process was interrupted	<ul style="list-style-type: none"> <li>▪ BACK cancels the interruption</li> <li>▪ OK cancels the process. After cancelling, the startup screen is displayed.</li> </ul>
<p>Temperature too high</p> 	Temperature of the sonication fluid above 45 °C. Protein coagulates at this temperature.	<ul style="list-style-type: none"> <li>▪ Allow the sonication fluid to cool down or replace it</li> <li>▪ Abort cancels the process. After cancelling, the startup screen is displayed.</li> <li>▪ OK resumes the process.</li> </ul>
<p>Temperature too low</p> 	Temperature of the sonication fluid below 20 °C	<ul style="list-style-type: none"> <li>▪ Replace all or part of the sonication fluid</li> <li>▪ Degas the sonication fluid again, see 5.1.3 <b>Degas the sonication fluid.</b></li> <li>▪ Abort cancels the process. After cancelling, the startup screen is displayed.</li> <li>▪ OK resumes the process.</li> </ul>
<p>Twist not connected</p> 	The robotics program was started, but a TRISON Twist was not connected	<ul style="list-style-type: none"> <li>▪ Attach TRISON Twist, see 4.5 <b>Attaching and removing the TRISON Twist.</b></li> <li>▪ Abort cancels the process. After cancelling, the startup screen is displayed.</li> <li>▪ OK resumes the process without moving function.</li> </ul>
<p>Log memory full</p> 	Log memory full	<ul style="list-style-type: none"> <li>▪ Store and delete logs, see 5.3.6 <b>Saving of logs.</b> OK displays the "Documentation" screen.</li> <li>▪ Cancel closes the message. Logs are not saved. After cancelling, the startup screen is displayed.</li> </ul>

Warning screen	Reasons	Measures
<p>Maintenance required</p> 	Maintenance required by the manufacturer	<ul style="list-style-type: none"> <li>Contact the manufacturer, see <b>6.5 Repair</b>. OK displays the "Information" screen with contact data and information on the ultrasonic bath.</li> <li>Cancel closes the message. After cancelling, the startup screen is displayed.</li> </ul>
<p>Filter clogged</p> 	<ul style="list-style-type: none"> <li>Filter clogged or installed incorrectly</li> <li>Pressure sensor defective</li> </ul>	<ul style="list-style-type: none"> <li>Replace or rinse filter, check installation, see chapter <b>5.3.5 Rinsing the filter</b></li> <li>Contact the manufacturer, see <b>6.5 Repair</b></li> </ul>
<p>No air pressure</p> 	<ul style="list-style-type: none"> <li>Compressed air not connected</li> <li>Compressed air not set correctly</li> </ul>	<ul style="list-style-type: none"> <li>Check whether the coupling of the compressed air connection is correctly plugged in. Unplug the coupling and plug it in again</li> <li>Check air pressure, see <b>8.1 Technical data</b>.</li> </ul>
<p>Motorised switch defective</p> 	Motorised switch defective	Contact the manufacturer, see <b>6.5 Repair</b> .

## 6 Maintenance

### 6.1 Cleaning and maintenance of the ultrasonic bath

#### **Cleaning the TRISON Base, ultrasound generator and SONOBOARD**

- Wipe the surfaces with a damp cloth. Wipe dry with a soft cloth.
- Do not use abrasive cleaning agents, only care products without scouring additives.
- If necessary, disinfect the surfaces with a suitable surface disinfectant.

#### **Maintaining the oscillating tank**

Impurities in the oscillating tank accelerate their wear, can lead to corrosion and reduce the ultrasound effect.

Therefore, please observe the following instructions:

- Rinse the oscillating tank thoroughly with water after each use. Wipe dry with a soft cloth.
- Clean edges and remove residues with a stainless steel care product without abrasive additives.
- Do not use steel wool, scrapers or shavers 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.

## 6.2 Tests

### NOTICE

#### Damage to the ultrasonic bath

- Perform tests only on a filled ultrasonic bath.

If one of the tests does not produce the desired result, contact Service. See chapter **6.5 Repair**.

#### Checking the ultrasound performance

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 program on the TRISON Base. Tap "START" to start the ultrasound.
2. Read the power.
3. Switch the ultrasound off again.
4. Compare the values read with the technical data. See chapter **8.1 Technical data**.

The measured values may not deviate by more than 20 % from the values in the Technical Data.

#### Checking the ultrasound effect

Perform a foil test to check the effect of the ultrasound during commissioning and at regular intervals. A check every 3 months is recommended. See chapter **6.4 Performing the foil test**.

## Checking the rinsing and moving function

### NOTICE


#### Risk of damage to robotic instruments

- If testing 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 installed.
- The oscillating tank is filled with water.

### Procedure

1. If necessary, connect a robotic instrument to the TRISON Twist in order to better check the moving function.
2. Connect the two hose couplings to the TRISON Base. Make sure that the hose couplings engage correctly. Place the ends of the return hoses loosely in the sonication fluid.
3. Connect the plug of the TRISON Twist to the TRISON Base.
4. Select the "Robotics" cleaning program on the TRISON Base.
5. Select the diameter "8 mm" on the touchscreen.
6. Select all rinsing channels by tapping the symbol at the top of the touchscreen. 
7. START the cleaning program and skip the soaking phase by immediately tapping "START".
8. Check that there is no water leaking from the hoses.  
A flow of approximately 350 ml/min should be displayed on the touchscreen.
9. Check that the robotic instrument tip moves.  
If you have not connected a robotic instrument, check whether the four drivers on each mount of the TRISON Twist rotate.

## 6.3 Replacing the adapter seals

The adapter seals on the TRISON Rack must be replaced every four weeks or in the event of leaks, see chapter 5.1.4 **Checking the adapters for MIS instruments**.

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

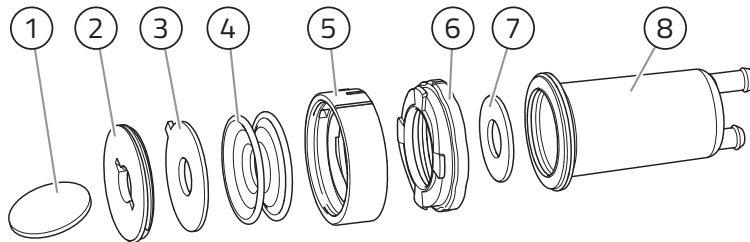


Fig. 17 Adapter components

- 1 Assembly chip
- 2 Clamping washer
- 3 Thrust washer
- 4 Adapter seal
- 5 Rotation ring
- 6 Retaining ring
- 7 Perforated disc
- 8 Inspection glass

### Removing the adapter seal

#### Procedure

1. Remove the adapter from the TRISON Rack and remove the hose from the inspection glass (8).
2. Use the assembly chip (1) to unscrew the clamping washer (2).
3. Remove the thrust washer (3).
4. Unscrew the rotation ring (5) and retaining ring (6) together from the inspection glass.
5. Pull the adapter seal (4) out of the rotation ring and retaining ring.
6. Turn the rotation ring against the retaining ring until the "L" mark on the rotation ring and the "H" mark on the retaining ring are aligned. Pull the rotation ring and retaining ring apart.
7. Remove the perforated disc (7) from the inspection glass.

#### Results

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



## Installing the adapter seal

### Procedure

1. Push the perforated disc into the inspection glass until it clicks into place.
2. Connect the rotation ring to the retaining ring. If the "H" mark on the retaining ring is aligned with the "L" mark on the rotation ring, press the rotation and retaining rings together.
3. Insert the new adapter seal.
4. Firmly screw the retaining and rotation rings and the adapter seal onto the inspection glass.
5. Turn the rotation ring so that the "K" mark on the rotation ring is opposite the "H" mark on the retaining ring. Insert the thrust washer and firmly screw the clamping washer to the assembly chip. In the process, hold the retaining and rotation rings firmly so that they do not twist against each other.
6. Place the hose on the inspection glass. Insert the adapter back into the TRISON Rack.

### Results

» The TRISON Rack is ready once again for the cleaning of rinsable MIS instruments.

## 6.4 Performing the foil test

Before the first use and at regular intervals, e.g. every 3 months, a foil test should be conducted. This serves to ensure the consistent effect of the ultrasound. The frequency with which these tests are carried out is your responsibility.

The foil test is a simple procedure to demonstrate the intensity and distribution of cavitation in an ultrasonic bath. It involves stretching aluminium foil over a foil test frame. This frame will be perforated or destroyed to a certain degree by cavitation, depending on the sonication time.

In order to compare the results, it is **important for the conditions of the foil test to always remain the same:**

- Filling the oscillating tank to the filling level mark,
- Temperature of the sonication fluid,
- Degassing time,
- Frame positioning,
- Foil type (brand, thickness),
- Sonication time,
- Type and concentration of the ultrasound preparation.

### Fluid for the foil test

In order to obtain a sufficiently strong cavitation effect, the foil test also requires the surface tension of the water used to be reduced using surfactant preparations.

We recommend the following ultrasound preparations:

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

If none of these products are available, a neutral or mildly alkaline product that does not destroy aluminium may be used. The product must be approved by the manufacturer for use in ultrasonic baths.

### Test results and documentation

Assuming constant test conditions, the test result is evaluated based on the perforated surfaces of the foils. The perforated surfaces of all foils should have approximately the same reach and distribution – they are never identical. Consistency of process validations, e.g. for the treatment of medical devices, can only be ensured through regular foil tests.

To document the test results, you can download a documentation template here:

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

Here you will also find an application video.

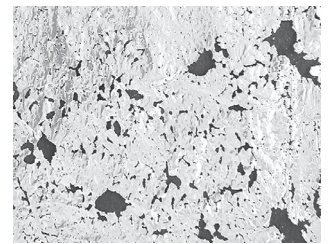
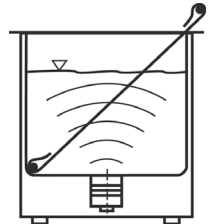
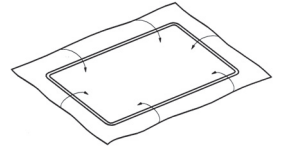
Foils can also be archived if done in a suitable manner (scanning, photos, etc.).

This allows foils to be compared at any time.



### Durchführung des Folientests

1. Fill the oscillating tank to the filling level mark with water and a suitable ultrasound preparation, in the concentration specified by the manufacturer.
2. Degas the sonication fluid.  
See chapter **5.1.3 Degas the sonication fluid**.
3. Stretch aluminium foil (household foil, 10µm to 25 µm thick) over the foil test frame. Depending on the tank size, it is possible that the frame will protrude outside the tank. Covering the part of the foil test frame that is covered by the sonication fluid will be enough.
4. Place the covered foil test frame diagonally in the centre of the oscillating tank. Fasten it if necessary.
5. Switch on the ultrasound. Sonicate the foil for at least one minute until visible perforations or holes are produced. With sturdier foils (thicker or coated ones), the sonication time may be up to 3 minutes.
6. Switch off the ultrasound. Remove the foil test frame. Remove the aluminium foil from the foil test frame and allow it to dry.
7. The foil must be perforated, see image. Else, we recommend having the device checked by the Service department at BANDELIN electronic GmbH & Co. KG: See chapter **6.5 Repair**.
8. Archive the foil with the test date and serial number of the ultrasonic bath. The foil test document template can also be completed and archived.
9. Rinse the oscillating tank thoroughly to remove any detached foil particles.



Suitable foil test frames can be ordered from BANDELIN electronic GmbH & Co. KG. The foil test frames are designed for a wide range of tank dimensions. Aluminium foil is also required to conduct the test, but it is not included in the scope of delivery.

Type	Order No.	for
FT 42	3224	TRISON (TE 3000)

## 6.5 Repair



### WARNING

#### Health risk due to contaminated ultrasonic bath

- Before shipping, decontaminate the ultrasonic bath if it has come into contact with hazardous substances.

If the ultrasonic bath needs to be repaired, send it to the manufacturer. Clean the ultrasonic bath before shipping.

Decontaminate the ultrasonic bath if it has come into contact with toxic, corrosive, radioactive or biologically hazardous substances. Also clean and decontaminate any accessories that you send in.

Download the "Certificate of Decontamination" form here:

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



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

Send the ultrasonic bath to the following address:

BANDELIN electronic GmbH & Co. KG  
Heinrichstr. 3-4  
12207 Berlin Germany  
+49 30 76880-13  
[service@bandelin.com](mailto:service@bandelin.com)

## 6.6 Maintenance

Perform maintenance according to the specified intervals. Document the performance of the maintenance.

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

Activity	daily	monthly	every 2 years
Flush the filter, see chapter <b>5.3.5 Rinsing the filter</b> .	x		
TRISON Rack: Replace adapter seals, see chapter <b>6.3 Replacing the adapter seals</b> .		x	
Replace hose sets, see chapter <b>9 Accessories</b> .			x
Maintenance of the ultrasonic bath: Contact the manufacturer, see chapter <b>6.5 Repair</b> .			x

## 7 Disposal



### WARNING

#### Health risk due to contaminated ultrasonic bath

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

Dispose of the ultrasonic bath properly as electronic waste if it can no longer be used. Do not dispose of the ultrasonic bath with household waste. Observe the locally applicable regulations for the disposal of electronic waste.

The TRISON Base contains a lithium-metal battery.

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

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



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

Also dispose of accessories properly in accordance with the material used.

## 8 Device information

### 8.1 Technical data

#### Ultrasound generator

Type:	GT 3000 M-C
Mains supply:	230 V~ ( $\pm 10\%$ ) 50/60 Hz
Ultrasonic peak power/ultrasonic nominal power:	3040 W/760 W
Current consumption:	3.3 A
Protection class:	I
Degree of protection:	IP 20
Ultrasonic frequency:	38 kHz
Fuses:	4 × F2A
Dimensions (length × width × height):	360 × 310 × 142 mm
Weight:	4 kg

#### Mains supply switch

Type:	NW 3000
Mains supply:	230 V~ ( $\pm 10\%$ ) 50/60 Hz
Power:	1.0 W
Current consumption:	0.005 A
Protection class:	I
Degree of protection:	IP 20
Fuse:	10 A
Connections:	<ul style="list-style-type: none"><li>▪ approx. 1.2 m cable with safety plug</li><li>▪ approx. 1.0 m cable with cold device socket for connection to the ultrasound generator</li><li>▪ approx. 1.4 m cable with flanged socket for connection to the TRISON Base</li></ul>
Dimensions (length × width × height):	220 × 60 × 145 mm 300 × 60 × 145 mm (with cable)
Weight:	1.1 kg

**Oscillating tank**

Type:	TE 3000
Material:	Stainless steel, welded
Internal dimensions (length × width × height, inclined tank bottom):	770 × 420 × 165 ... 190 mm
External dimensions (length × width × height, inclined 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

**TRISON Base control unit**

Type:	TB 4000 R/TB 4000 R/L
Power:	35 W
Current consumption:	0.2 A
Mains supply:	230 V~ (±10 %) 50/60 Hz
Compressed air connection:	Coupling plug: NW 7.2 (without connection hose) Input pressure: 5 ... 9 bar, ISO 8573-1 [7:4:4]
Cleaning pressure:	~ 1 bar
Temperature monitoring:	16 ... 45 °C
Fuses:	2 × fast acting 3.15 A 250 VAC 5 × 20 mm (d×l)
Interfaces:	USB, Ethernet RJ45
Protection class:	I
Degree of protection:	IP 22
Back-up battery:	3V lithium metal battery, CR2032
Dimensions with rotary base (length × width × height):	370 × 190 × 380 mm
Weight:	9.1 kg



### TRISON Twist moving device

Type:	TT 4000 Si R/TT 4000 Si L	TT 4000 Xi R/TT 4000 Xi L
Rotation speed:	approx. 6 rpm	approx. 6 rpm
Degree of protection:	IP 68*	IP 68*
Material:	Stainless steel, POM and PU**	
Dimensions (length × width × height):	405 × 205 × 190 mm	345 × 160 × 175 mm
Weight:	approx. 5 kg	approx. 4 kg

\* The mains connector is not waterproof and may not be submerged.

\*\* Max. bath temperature 50 °C (no thermal disinfection or sterilisation)

### TRISON Lift pivot-mounted arm

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

\* Max. bath temperature 50 °C (no thermal disinfection or sterilisation)

### TRISON Rack special basket

Type:	TR 3001 R/TR 3001 L
Material:	Stainless steel and POM*
External dimensions (length × width × height):	640 × 405 × 150 mm
Weight:	3.1 kg
Max. load up to:	10 kg

\* Max. bath temperature 50 °C (no thermal disinfection or sterilisation)

### Temperature sensor

Type:	TM 4000
Material:	Stainless steel, POM and PUR*
Dimensions (length × width × height):	400 × 20 × 20 mm
Measuring range:	1 ... 60 °C
Voltage:	24 V
Current consumption:	1.2 mA
Power:	989 mW
Weight:	approx. 50 g
Degree of protection:	IP 68**

\* Max. bath temperature 50 °C (no thermal disinfection or sterilisation)

\*\* Only valid for the immersion sensor. The mains connector is not waterproof and may not be submerged.

### Xi spacer

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

\* Max. bath temperature 50 °C (no thermal disinfection or sterilisation)

### SONOBOARD functional 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

## 8.2 Ambient conditions

Überspannungskategorie:	II
Verschmutzungsgrad:	2
Zulässige Umgebungstemperatur:	5 ... 40 °C
Zulässige relative Feuchte bis 31 °C:	80 % (nicht kondensierend)
Zulässige relative Feuchte bis 40 °C:	50 % (nicht kondensierend)
Höhenlage:	< 2000 m über N. N.
Betrieb nur in Innenräumen	

## 8.3 CE conformity

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

- 2017/745/EU – MDR
- 2014/35/EU – Low Voltage Directive
- 2014/30/EU – EMC Directive
- 2011/65/EU RoHS Directive

A declaration of conformity can be requested from the manufacturer by providing the serial number.

## 9 Accessories

### **TRISON Twist TT 4000 Si R – Code No. 7820**

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

### **TRISON Twist TT 4000 Si L – Code No. 7920**

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

### **TRISON Twist TT 4000 Xi R – Code No. 7821**

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

### **TRISON Twist TT 4000 Xi L – Code No. 7921**

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

### **TRISON Lift TL 4000 – Code No. 7930**

Pivot arm for TRISON Twist

### **TRISON Rack TR 3001 R – Code No. 7631**

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

### **TRISON Rack TR 3001 L – Code No. 7731**

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

### **Silicone knob mat SM 1000 MC – Code No. 3313**

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

### **Silicone knob mat SM 29 – Code No. 178**

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

### **Insert basket K 29 EM – Code No. 688**

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

### **Basket holder KT 3000 Z R – Code No. 7761**

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

### **Basket holder KT 3000 Z L – Code No. 7661**

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

### **Lid D 4000 A-R – Code No. 7955**

made of plastic, suitable for right-hand TRISON Base

### **Lid D 4000 A-L – Code No. 7956**

made of plastic, suitable for left-hand TRISON Base

### **Temperature sensor TM 4000 – Code No. 7741**

for temperature monitoring when cleaning standard instruments

### **Xi spacer – Code No. 7763**

for cleaning of Xi staplers

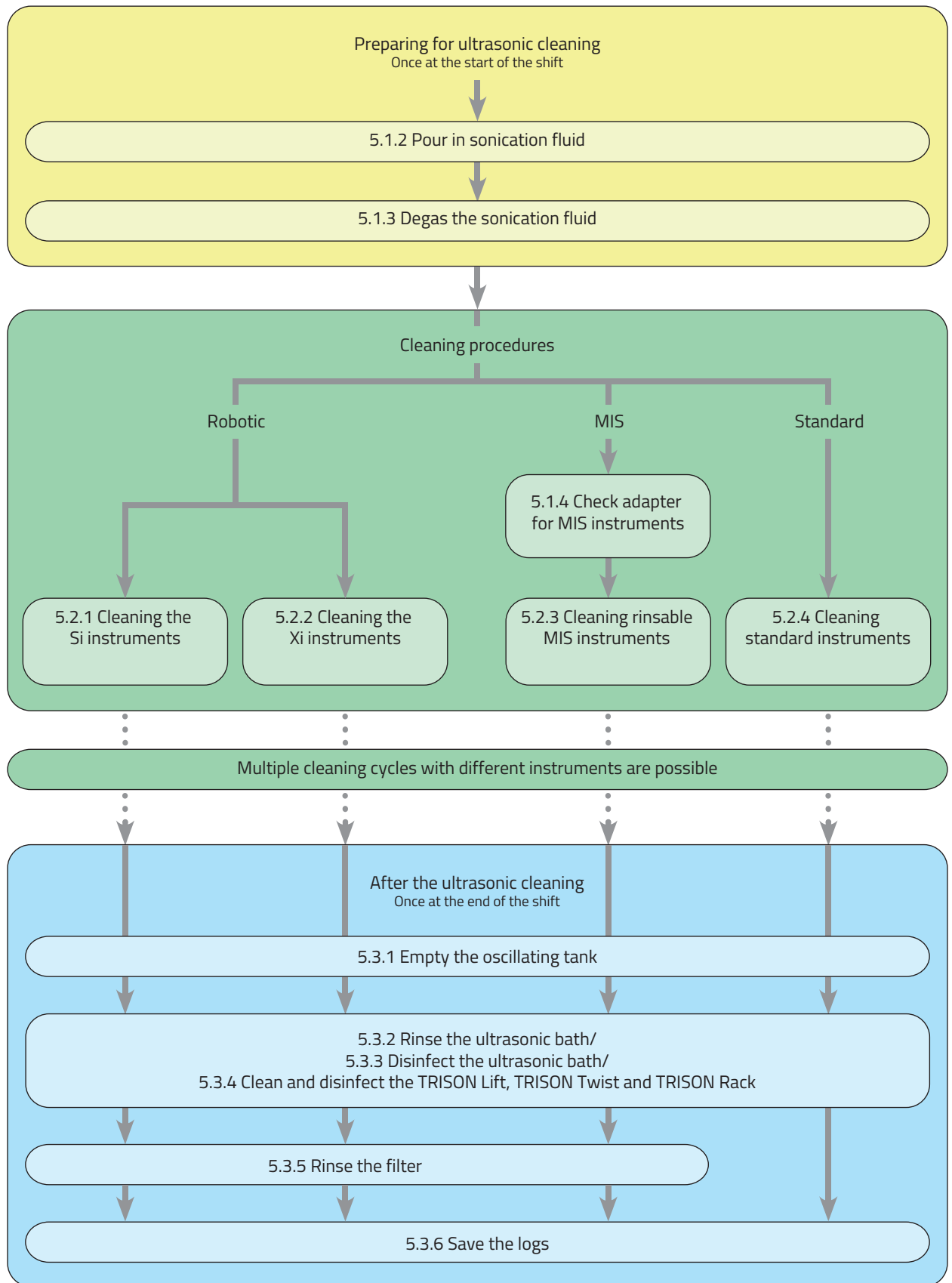
### **Foil test frame FT 42 – Code No. 3224**

made of stainless steel

**Consumable materials**

Description	Units	Code No.
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 000 TT, for TRISON Twist Xi	1 piece	3362
Hose set SLS 3000 TR, for TRISON Rack	1 piece	3364
Adapter test band APB 3000, for TRISON Rack	1 piece	7771

## 10 Process diagram



# 11 Maintenance lists

Maintenance list/daily

- Check the filter on the TRISON Base, rinse or replace if necessary

Date	Name	Signature

### Maintenance list/monthly

- Check adapter seals on the TRISON Rack and replace if necessary

Date	Name	Signature

### Maintenance list/every 2 years

- Maintenance of the ultrasonic bath by the manufacturer
- Replacing the hose set on the TRISON Twist and/or the TRISON Rack

Date	Name	Signature

**BANDELIN** *electronic* GmbH & Co. KG

Heinrichstraße 3 – 4

12207 Berlin

Germany

Phone: +49 30 76880-0

Fax: +49 30 7734699

[info@bandelin.com](mailto:info@bandelin.com)

[www.bandelin.com](http://www.bandelin.com)