

Operating instructions

SONOREX TECHNIK

High-performance ultrasonic baths and rinsing baths



Valid for:

RM 112 /U /H /UH

RM 182 /U /H /UH

RM 212 /U /H /UH

RM 112 U-ST /H-ST /UH-ST

RM 182 U-ST /H-ST /UH-ST

RM 212 U-ST /H-ST /UH-ST

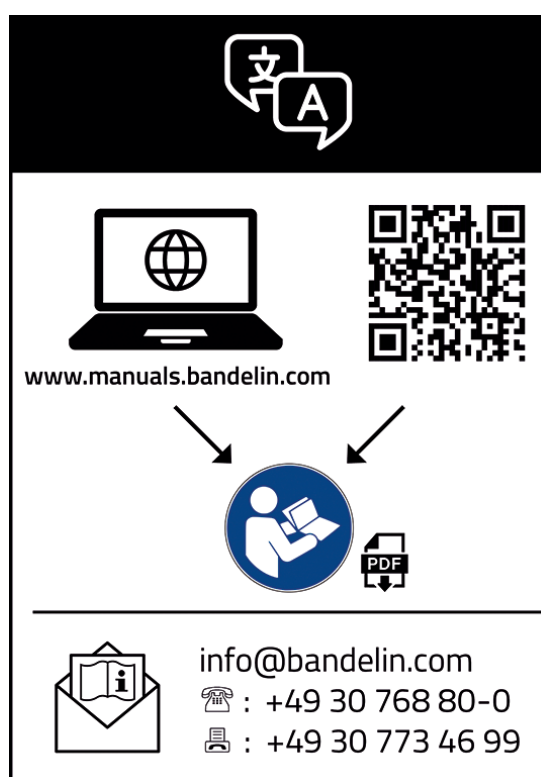


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1 About these operating instructions

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 Section **2 Safety**.
- If you pass this device on to someone else, provide these operating instructions with it.
- Should these operating instructions leave any questions unanswered, please contact your specialist dealer or BANDELIN. Notes on service can be found in Section **6.4 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 unit

The devices are intended for the sonication of aqueous liquids. The sonication of non-aqueous or flammable liquids is not permitted. The devices work on the basis of low-frequency ultrasound and are versatile. The main application is the gentle intensive cleaning of objects of various shapes, types and sizes.

A solution of water and a special preparation for ultrasound application is used as the sonication fluid. Refer to Section **5.2 Sonication fluid** for information on the sonication liquid. Objects to be sonicated must not be placed on the bottom of the oscillating tank. They must be placed in an insert basket or other suitable container in the sonication fluid. An overview of suitable accessories can be found in chapter **9 Accessories**.

Do not operate the device unattended.

2.2 Keep out of reach of children.

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

2.3 Risk of electric shock

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

- Never let the device become wet. Keep the surface and operating elements clean and dry.
- Only transport the device when it is empty.
- Only empty the device when it is switched off.
- Do not shower the device or expose it to splash water.
- Disconnect the device from the mains before any cleaning or maintenance.
- Only connect the device to a socket with an earthed protective contact that matches the protective contact of the mains connector.
- If you discover a defect in the device, unplug it immediately. Do not connect any defective device to the mains.
- Only have repairs carried out by qualified personnel or by the manufacturer. See Section **6.4 Repairs**.
- Position the device in such a way that it is possible to disconnect the mains connection at any time without difficulty.

2.4 Damage to health due to ultrasonic noise

The ultrasound noise typical of a procedure can be perceived as very unpleasant. If you stay within a radius of 5 m for a long period, you may suffer damage to your health.

- Wear suitable hearing protection.
- Use a lid to reduce noise.

2.5 Danger due to high temperatures

The device, the sonication liquid and the objects to be sonicated may become hot during operation. Touching them may cause burns. The temperature can be set at up to 80 °C. Ultrasound heats the sonication fluid even without additional heating. Very high temperatures can occur during prolonged operation of ultrasound. In the case of a device that has heating, the set temperature can be significantly exceeded by the energy of the ultrasound.

- Observe the treatment times recommended by the manufacturer of the ultrasonic specimen. Do not leave the ultrasound on for longer than necessary.
- Do not reach into the sonication fluid by hand. Remove objects to be sonicated using the insert basket or forceps.
- Allow the sonication items to cool before touching them.
- When lifting by the handles, your hands may touch the edge of the tank, which can be very hot.

In the case of fluids with high boiling points, the bath temperature can rise to over 120 °C due to the energy supplied by the ultrasound. This can lead to fires and severe burns.

- Do not use combustible, explosive or non-aqueous fluids (e.g., petrol, solvent) or mixtures with combustible liquids (e.g., alcoholic solutions) directly in the stainless-steel oscillating tank.
- The cover used must not completely seal the oscillating tank – steam must be able to escape.

2.6 Danger due to ultrasound

The strong ultrasound in the unit 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 fingers' periosteum can become damaged.

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

2.7 Danger due to the agents used

The 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 goggles when handling hazardous agents.
- Do not ingest the agents, and avoid bringing them into contact with eyes or skin. Avoid bending over very close to the device in order to avoid vapours coming into contact with your eyes or inhaling the vapours.
- Place a cover on the device during operation. In the event of dangerous vapours, use an extraction system.
- Observe the information on the label and in the safety data sheet of the agent.
- Keep agents away from children and untrained persons.

2.8 Disposing of sonication fluid

Dispose of the sonication liquid according to the instructions of the manufacturers of the ultrasonic specimens used. The recommended ultrasonic specimens of the TICKOPUR 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.

2.9 Erosion of the oscillating tank

The surface of the oscillating tank is subject to erosion. How quickly this erosion takes place depends on how the device is used. The erosion leads to leakage points in the oscillating tray. This allows bath liquid to enter the interior of the device. Moisture on electrical components can cause an electric shock or fire.

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

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

- Replace sonication fluid which has visible soiling contamination from particles.
- Only use demineralised water (aqua purificata) with an ultrasound-compatible specimen.
- Do not use chemicals that contain or release chloride ions in the ultrasonic oscillating tank. This is the case with some disinfectants, household cleaners and dishwashing detergents. Chloride ions cause corrosion on stainless steel.
- Only use the device with accessories that are suitable for the device and the objects to be sonicated, e.g., a basket. Do not place any objects to be sonicated directly on the bottom of the oscillating tank.

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

An overview of suitable accessories can be found in Chapter **9 Accessories**.

2.10 Preventing damage to the device

- Only use aggressive agents in inset beakers or insert tubs. When working with aggressive agents, avoid splashes that get into the contact liquid or onto the stainless steel surface. Replace contaminated sonication fluid immediately. Clean surfaces and wipe them dry.
- When using strongly acidic agents, the ball of the ball valve can be affected. The ball valve will start to leak. If the use of strongly acidic detergents cannot be avoided, use a stainless steel ball valve.
- Do not operate the device without sonication fluid in the oscillating tank. Make sure that the heating is switched off when the oscillating tank is empty. The fill level must be at or just above the filling level mark.

2.11 Interference with wireless communication

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

- mobile phones;
- Wi-Fi devices
- 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.

2.12 Safety stickers on the device

- Observe all safety stickers on the device.
- Keep the safety stickers in a readable state. Do not remove them. Replace them when they are no longer legible. Please contact our customer service for this. See chapter **6.4 Repairs**.

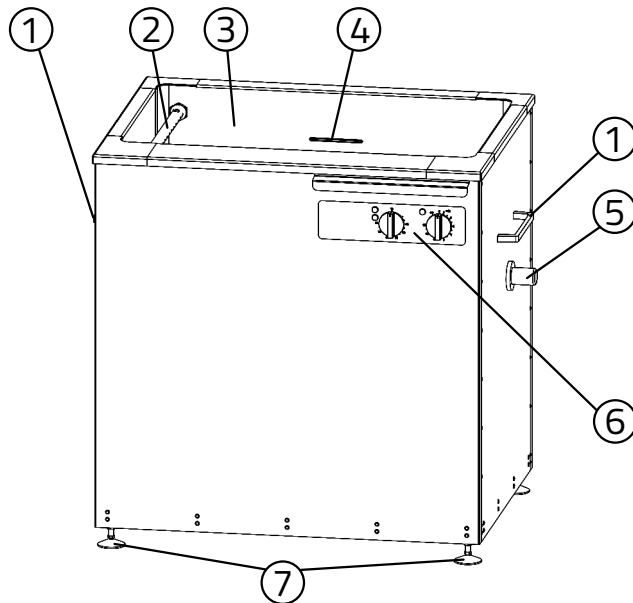
2.13 Not overloading accessories

Observe the specified load capacity or load capacity of the respective accessory used.

- Accessories can be baskets and receptacles.
- The corresponding information can be found in the appendix or in the dimension sheet. If you do not have this information, please contact the manufacturer.

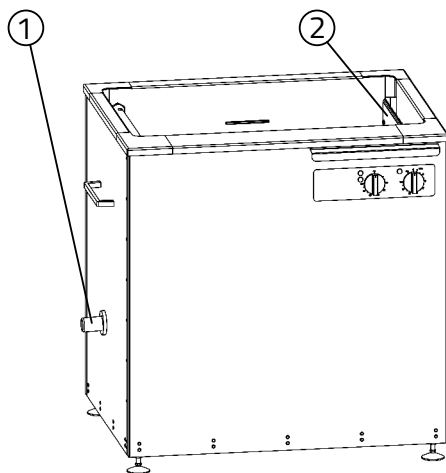
3 Construction and function

3.1 Construction



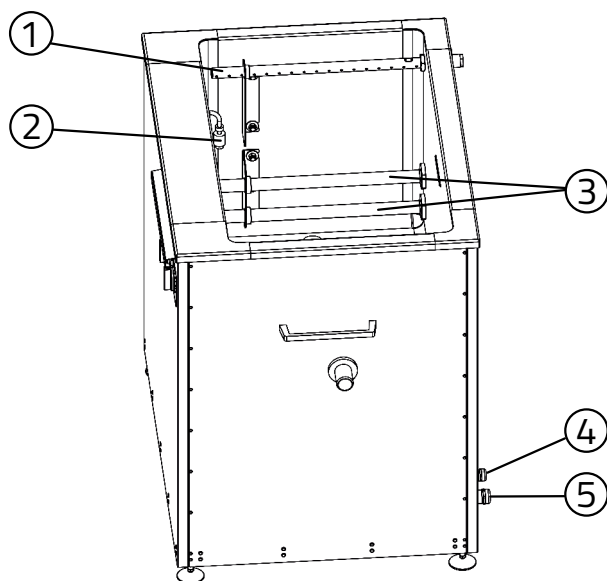
Device overview

- 1 Handles
- 2 Sprinkle tube
- 3 Tank
- 4 Filling level mark
- 5 Connector socket – outlet
- 6 Control panel
- 7 Device feet



Device overview

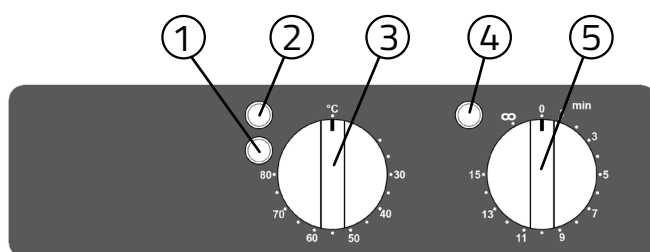
- 1 Connector socket – outlet
- 2 Overflow gutter



Device overview

- 1 Sprinkle tube
- 2 Float switch
- 3 Heating cartridges
- 4 Connection – ST interface for...-ST devices
- 5 Connection – Mains cable

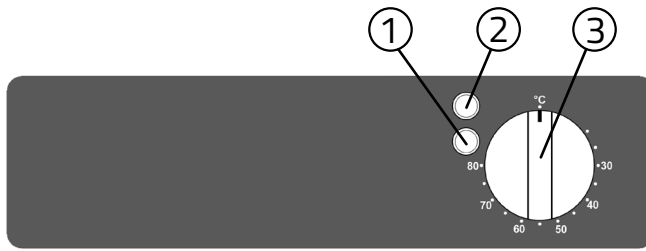
3.2 Control panel



Operating elements for all devices with ultrasound (U) and heating (H)
 Types: RM... UH



Operating elements for all devices with ultrasound (U) only
 Types: RM... U



Operating elements for all devices with heating (H) only or devices with interface (ST) and heating (H)
Types: RM... H or RM... UH-ST or RM... H-ST



The operating elements for all devices without ultrasound and without heating as well as devices with ultrasound only and with interface (ST) are omitted

Types: RM... or RM... U-ST

- 1 Yellow indicator lamp, for models with heating (H)
Lit up means: heating is switched on
- 2 White pilot lamp, for models with heating (H)
 - Lit up means: heating is switched on
 - Lit up means: heating control active
- 3 Turning knob for adjusting the heating temperature
- 4 Green indicator lamp, for models with ultrasound (U)
Lit up means: ultrasound is switched on
- 5 Turning knob for adjusting the ultrasound duration

3.3 Function

The device uses cavitation triggered by low-frequency ultrasound.

Piezoelectric transducers are located on the underside of the oscillating tank. The ultrasound generates strong pressure fluctuations in the sonication fluid. Cavitation bubbles are formed at the pressure minima. During their implosion, strong local micro-currents are created on the surface of the sonicated objects. This removes soiling from the surface of the items. Dirt particles are transported away, and fresh sonication liquid flows in.

4 Preparation for operation

4.1 Installation site requirements

The installation site of the device must meet the following conditions:

- The installation surface must be horizontal, firm and dry.
- The load-bearing capacity must be sufficient for the device together with the sonication liquid. For weight and operating volume, see section **8.1 Technical specifications**.
- Adequate ventilation must be ensured. The air supply under the device floor must not be impeded by objects.
- A water connection for filling the device should be located nearby. A basin for draining or pouring out the sonication liquid must be available.

Procedure

1. Remove all transport aids, such as pallets and transport locks.
2. Mount the supplied height-adjustable feet on the bottom of the device.
3. Align the device horizontally by adjusting the height-adjustable feet.

Result

» The device is set up.

4.2 Installing the ball valves

Install the supplied ball valves, the hose sockets, and the hoses in accordance with the enclosed installation instructions:

- 3-way ball valve at the outlet
- Ball valve at the overflow

4.3 Performing a functional test

The following function test can only be performed on devices without an interface. For a device with an interface, you first must have connected the interface. To do this, use the supplied control cable. A test is then performed via the controller connected to the interface.

Requirement

- The device must have adapted to the climatic conditions at the installation site for at least 2 hours.

Procedure

1. Make sure that the device is switched off.
If present, the turning knob for adjusting the ultrasound duration must be at "0".
If present, the turning knob for adjusting the heating temperature must be at "°C".
2. Only connect the mains cable to a socket with an earthed protective contact that matches the protective contact of the device plug.
3. Briefly switch on the ultrasound. To do this, turn the turning knob for the ultrasound duration to the right.
4. Lift the float switch for a maximum of 1 to 2 seconds – the ultrasound will be switched on.
5. Turn the turning knob to "0".

Result

- » When the ultrasound is switched on and the float switch is raised, you will clearly hear a noise.

If you did not hear any noise, contact the service team.

4.4 Rinsing the tank

Thoroughly rinse the device's tank with water before using it for the first time. To protect the surfaces during transport and storage, the device is provided with a grease-containing preservative. This preservative must be removed with a suitable cleaner before putting the device into service.

5 Operation

5.1 Ultrasonic operation

The sonication items are placed in the oscillating tank with suitable accessories, e.g., a basket, where they will be in direct contact with the sonication fluid.

For suitable accessories for sonication, see chapter **9 Accessories**.

5.2 Sonication fluid

A solution made of water and a special ultrasonic specimen 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 aqua purificata without an ultrasonic agent will result in increased erosion of the ultrasonic oscillating tank.

The ultrasonic specimen used must be cavitation conducive, biodegradable, easy to dispose of, gentle on materials, and long-lasting. BANDELIN recommends ultrasonic specimens from the TICKOPUR, TICKOMED and STAMMOPUR product series from DR. H. STAMM GmbH, see chapter **10 Appendix**.

- Telephone consultation: +49 30 76880-280
- Website: www.dr-stamm.de

Observe the instructions of the ultrasonic specimen's manufacturer regarding dosing. You can calculate the necessary amount of ultrasound agent and water yourself:

200 l of ready-to-use solution, 2%

Calculating the agent:

$$\frac{200 \text{ l} \times 2 \%}{100 \%} = 4 \text{ l}$$

Calculation of the water quantity:

$$200 \text{ l} - 4 \text{ l} = 196 \text{ l}$$

5.3 Sonication duration

NOTICE

Danger of damage to the objects to be sonicated

Excessive sonication can damage the surface of objects being sonicated.

- Choose the shortest possible sonication duration.

The optimal sonication duration depends on a number of factors:

- Type and concentration of the specimen
- Temperature of the sonication fluid
- Type of soiling contamination
- Type of sonication items, especially materials

Observe the specifications of the agent's manufacturer for the recommended sonication duration.

At the start, choose the shortest possible sonication duration to protect the sonication items and the oscillating tank. Check the result. Extend the sonication duration if the result is insufficient.

5.4 Filling with sonication fluid



CAUTION

Risk of scalding

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

NOTICE

Damage due to condensate in the device

At high humidity, condensate forms inside the device when cold water is poured in.

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

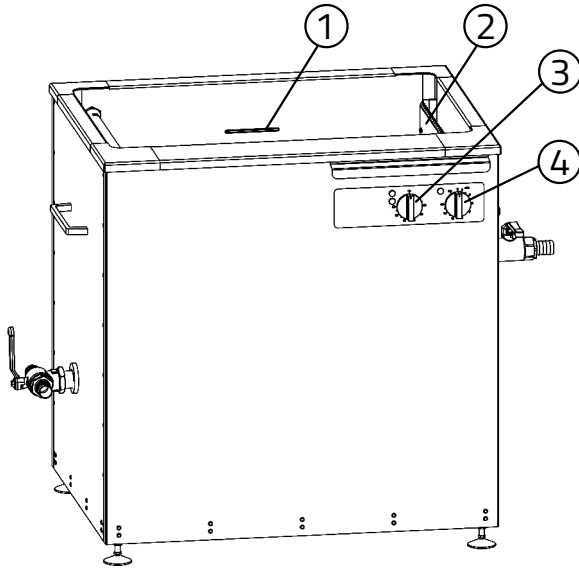
NOTICE

If you are using an agent in powder form, do not put it directly into the oscillating tank.

- Mix any powder agents in another container before placing them in the oscillating tank.
- Do not put the agent in the oscillating tank until it has dissolved completely.

NOTICE**Damage to the device**

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



Filling the oscillating tank

- 1 Filling level mark
- 2 Overflow gutter
- 3 Turning knob for adjusting the heating temperature
- 4 Turning knob for adjusting the ultrasound duration

Requirements

- The 3-way ball valve must be closed.
- The ball valve at the overflow must be closed.
- The ultrasound and heating must be switched off.

Procedure

1. Fill 1/3 of the oscillating tank with water.
2. Dose the specimen into the oscillating tank.
3. Fill up to the filling level mark with water, avoiding foaming.

Result

- » The device is ready to be switched on.

5.5 Switching the sonication on and off

Requirements

- The oscillating tank has been filled.
- The mains plug is plugged into a wall socket with a protective ground contact.

Procedure

1. If present, place the cover on the device.
2. Rotate the turning knob for the ultrasound duration to the desired duration or to the ∞ symbol for continuous operation.
 - » The ultrasound is switched on. The ultrasonic noise can be heard.
 - » The green indicator lamp lights up.
 - » If the turning knob is not set to ∞ , it will move slowly in the anti-clockwise direction, indicating the remaining sonication duration. As soon as it reaches "0", the ultrasound will switch off.
3. To switch off sonication, rotate the turning knob for the ultrasound duration to "0".
 - » The green indicator lamp will go out.



Information

- You can rotate the turning knob in both directions.
- You can extend, shorten or switch off sonication at any time.
- The time switch only works when the device is connected to the mains voltage. Without mains voltage, it is difficult to feel when the turning knob locks into place.

5.6 Switching the heating on and off



WARNING

Risk of scalding

During heating, steam bubbles can rise explosively under certain conditions (retardation of boiling).

- Occasionally stir the sonication liquid during heating, or switch on the ultrasound.
- The lid used must not completely seal the oscillating tank – steam must be able to escape.

Warm sonication fluid intensifies the effect of the ultrasound. Experience has shown that the best result is achieved at a temperature of 50 to 60 °C. This can reduce the duration of the sonication. At higher temperatures, the effect of the ultrasound again decreases. Ultrasound also warms the sonication fluid. During continuous operation, especially when the oscillating tank is covered, the temperature of the sonication fluid can rise above the set value. That is why you should check the temperature during sonication of temperature-sensitive items.

- Observe the specifications of the agent's manufacturer for the optimal temperature.
- It is optimal to do preheating while degassing the sonication fluid. See Chapter **5.7 Degassing the sonication liquid**.
- To preheat, remove the basket or other accessories from the oscillating tank. Put on the oscillating tank's cover, if available.

Switch on the heating by adjusting the turning knob to the desired temperature.

- The yellow and white pilot lamps will light up.
- Once the target temperature has been reached, the yellow pilot lamp will go out.



Information

To achieve a shorter heating time and a homogeneous temperature distribution of the sonication fluid in the ultrasonic bath, switch on the ultrasound during the preheating phase. See section **5.5 Switching the sonication on and off**.



Information

The heating operates independently of the ultrasound.

5.7 Degassing the sonication liquid

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.

- Put on the oscillating tank's cover, if available.
- To degas, switch on the ultrasound. The degassing time is 30 minutes.



Information

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

5.8 Adding sonication items



WARNING

Overloading

Do not overload baskets or accessories. Movement of heavy baskets may cause physical damage.

To achieve a good result, observe the following instructions when adding objects to be sonicated:

- Before each sonication process, check to ensure that the sonication fluid is not contaminated. If there is visible soiling contamination, replace the sonication fluid.
- The sonication fluid must be degassed. See section **5.7 Degassing the sonication liquid**.
- The sonication fluid must be preheated to the desired temperature before you add items.
- Use suitable accessories, such as a basket. Do not place items directly on the bottom of the oscillating tank. See chapter **9 Accessories**.
- Spread out the items. Do not stack them. Sensitive items must not touch other items.
- The ultrasound must be switched off while adding items.
- Check the filling level. Sonication items must be completely covered with liquid.
- Remove air bubbles from cavities. Rotate the objects accordingly. The ultrasound only will only have an effect where the liquid is in contact with the sonication item.
- Place the more contaminated side downwards. Place items with joints (e.g., scissors, tongs) in an open state so that the sonication fluid is able to optimally cover the entire surface.

5.9 Removing objects to be sonicated



WARNING

Risk of burns

The sonication liquid, the objects to be sonicated, the surface of the device, and the accessories can be very hot.

- Do not touch the surface of the device or accessories such as the cover. Do not reach into the sonication liquid.
- Allow the objects to be sonicated to cool before touching them.

Switch off the ultrasound before removing objects to be sonicated.

Do not remove sonication items by hand. Carefully remove, e.g., the insert basket containing the sonication items, and place it on a flat surface.

Rinse the sonication items with clear water.

Do not leave objects to be sonicated in the sonication fluid for too long.
That can damage the items.

5.10 Emptying the oscillating tank



WARNING

Danger of electric shock

- Make sure that no liquid can enter the housing.



CAUTION

Hot sonication fluid and oscillating tank

There is a risk of scalding when lifting the device to empty it.

- Allow the device to cool before lifting it.

Soiling contamination on the bottom of the oscillating tank reduces the ultrasound's performance. If the sonication fluid has visible soiling contamination, empty and clean the oscillating tank.

Observe the information provided by the manufacturer of the agent on the service life of the sonication liquid.

Fully replace used sonication fluid. Do not replenish it by topping it up.

Procedure

1. Switch off the ultrasound. If present, turn off the heating. If you need to move the ultrasonic bath to empty it, disconnect the mains plug.
2. Open the 3-way ball valve and empty the oscillating tank.
3. Thoroughly rinse out the oscillating tank.
4. Wipe the ultrasonic bath dry with a soft cloth.
5. If necessary, disinfect the ultrasonic bath with a suitable surface disinfectant.



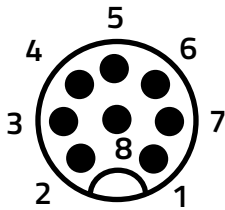
Information

- Rinsing trays with heating can also become hot.

5.11 Remote control

The ultrasonic/rinsing baths with the additional designation "...-ST" are equipped with an interface (potential-free contacts) for control and monitoring by an external controller.

The connection is made via an M12 socket using an M12 sensor/actuator cable connection. All inputs are PNP (negative reference terminal) connected and galvanically isolated from the ultrasonic generator.



M12 socket, 8-pin

The prerequisite for using the remote control is that:

- the control cable is connected to the remote control socket of the ultrasonic/rinsing bath;
- the interface is connected to the external controller;
- desired temperature is set (only for models with heating).

The ultrasound will be continuously switched on when a contact is activated. When the contact for the heating function is activated, the liquid in the tank will be heated until the temperature set on the thermostat of the ultrasonic bath has been reached. The activity of the heating and the state of the level sensor are output as a potential-free contact at the interface.

Connection assignment:

Contact no.	Designation	Function	Features
1	24 V supply voltage	24 V supply	Output 24 VDC max. 0.4 A, overload protected
2	Ground	Earth	-
3	Heating activation	Activates heating until the temperature set on the device is reached	Input 24 V approx. 30 mA
4	Ultrasound activation	Activates the ultrasound	Input 24 V approx. 30 mA
5	Input message: heating active	Closes contact with no. 6 when heating is active	Max. 24 VDC / 2 A
6	Output message: heating active	Closes contact with no. 5 when heating is active	Max. 24 VDC / 2 A
7	Input message, filling level available	Closes contact with 8 if filling level is available.	Max. 24 VDC / 2 A
8	Output message: filling level available	Closes contact with 7 if filling level is available.	Max. 24 VDC / 2 A

Contact number/colour:

Contact no.	Colour
1	WH
2	BN
3	GN
4	YE
5	GY
6	PK
7	BU
8	RD



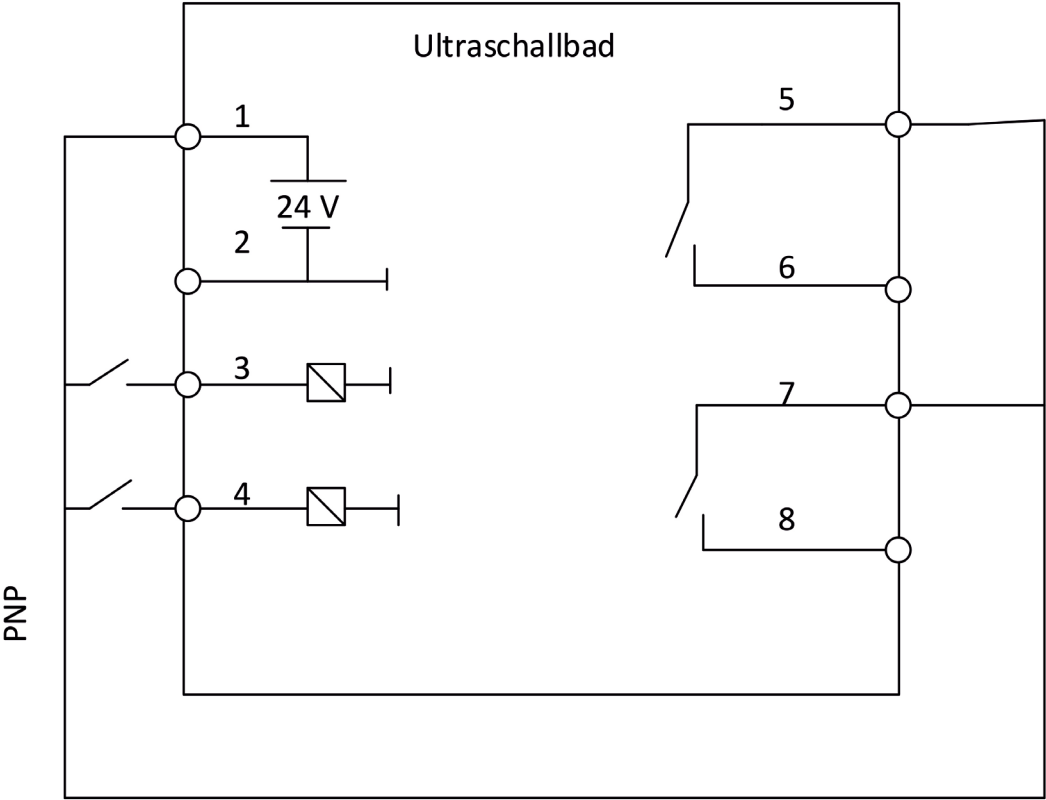
5.11.1 Example applications

Activation via relay of a PLC or robot controller

With this connection variant, the internal 24 V supply of the ultrasonic bath is used to activate the ultrasound and the heating. The activity of the heating and the minimum filling level are output with a 24 V voltage.

Contact no.	Designation	Connection to the controller
1	24 V supply voltage	Connection at the input of relay 1 and relay 2
2	Ground	Connection to the negative pole of the controller
3	Heating activation	Connection to the output of relay 1
4	Ultrasound activation	Connection to the output of relay 2
5	Input message, heating active	Connection to contact no. 2 of the ultrasound bath
6	Output message, heating active	Connection to the 24 V digital input of the controller
7	Input message, filling level available	Connection to contact no. 1 of the ultrasound bath
8	Output message, filling level available	Connection to the 24 V digital input of the controller

Circuit diagram:

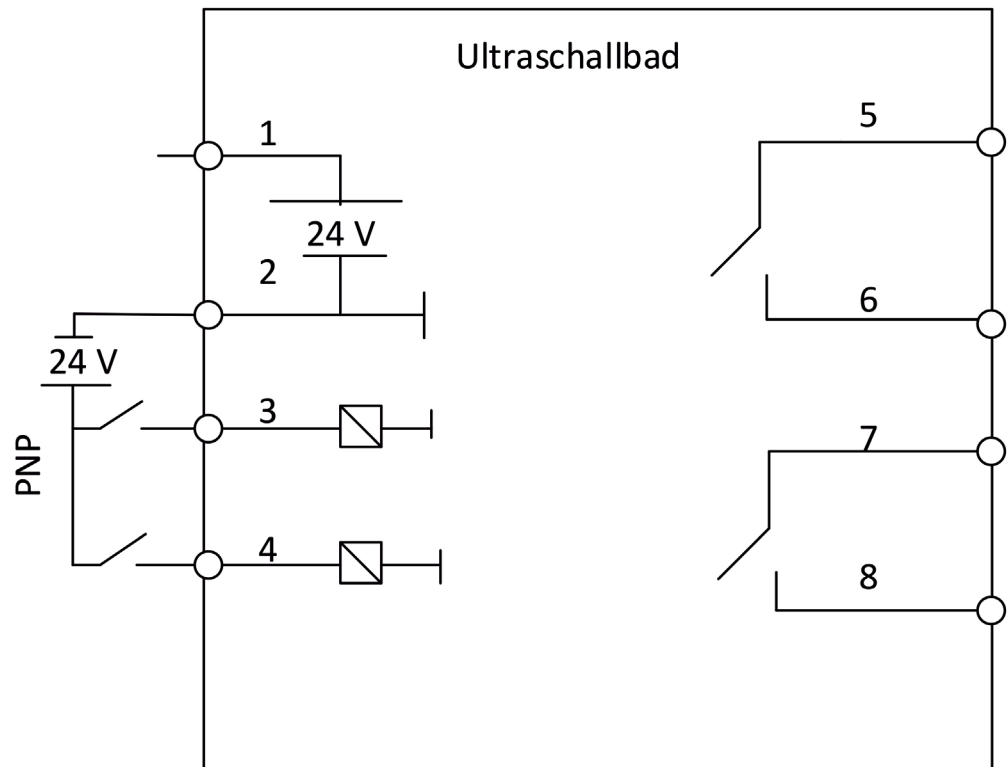


Activation via control voltage from a PLC or robot controller

With this connection variant, an external 24 V supply to the control unit is used to activate the ultrasound and the heating. The activity of the heating and the minimum filling level are signalled with relay contacts.

Contact no.	Designation	Connection to the controller
1	24-V supply voltage	-
2	Ground	Connection to the negative pole of the controller
3	Heating activation	Connection to the 24 V output of relay 1
4	Ultrasound activation	Connection to 24 V output of relay 2
5	Input message, heating active	Connection to the positive pole of the controller
6	Output message, heating active	Connection to the digital input of the controller
7	Input message, filling level available	Connection to the positive pole of the controller
8	Output message, filling level available	Connection to the digital input of the controller

Circuit diagram:

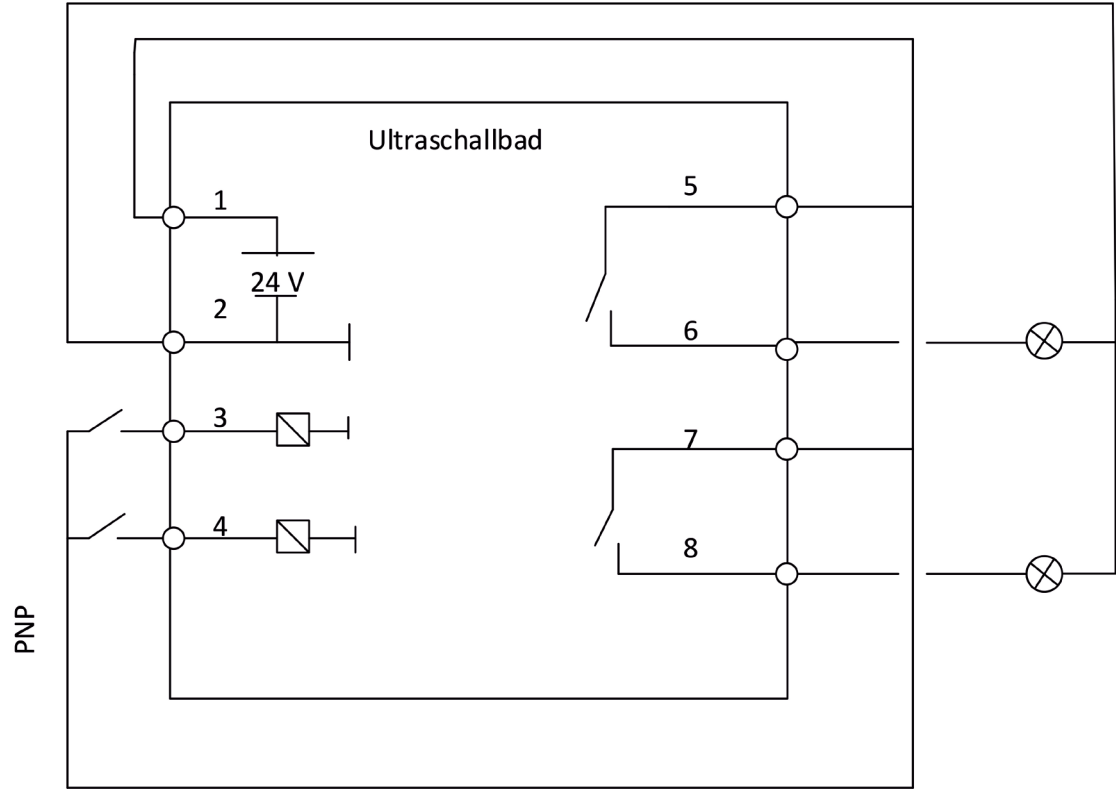


Activation via manual switch and display via signal lamp

With this connection variant, the control voltage of the ultrasonic bath is used to activate the ultrasound and the heating. If the minimum filling level is not reached, the heating and the ultrasound are automatically switched off.

Contact no.	Designation	Connection to the controller
1	24-V supply voltage	Connection to no. 5 and no. 7
2	Ground	Connection to the negative poles of the signal lamps
3	Heating activation	Connection to the output of manual switch 1
4	Ultrasound activation	Connection to the output of manual switch 2
5	Input message, heating active	Connection to no. 1
6	Output message, heating active	Connection to the positive pole of the signal lamp for the heater
7	Input message, filling level available	Connection to no. 1
8	Output message, filling level available	Connection to the positive pole of the signal lamp for the filling level

Circuit diagram:



5.12 Troubleshooting

Error	Possible causes	Troubleshooting
Too little ultrasound effect, loud noises	<ul style="list-style-type: none"> ▪ Sonication fluid contains gases 	<ul style="list-style-type: none"> ▪ Degas the sonication liquid. See section 5.7 Degassing the sonication liquid.
	<ul style="list-style-type: none"> ▪ There are too many objects to be sonicated in the oscillating tank. 	<ul style="list-style-type: none"> ▪ Reduce the number of objects to be sonicated.
Uneven sounds	<ul style="list-style-type: none"> ▪ Incorrect filling level in the oscillating tank. 	<ul style="list-style-type: none"> ▪ Slightly change the fill level of the sonication fluid in the oscillating tank Pay attention to the minimum filling level and correct dosing of the specimen.
		<ul style="list-style-type: none"> ▪ Vary the position of the objects to be sonicated.
Heating is not working	<ul style="list-style-type: none"> ▪ Heating is defective. 	<ul style="list-style-type: none"> ▪ Repair the heating. Or send to the manufacturer for repair.
Ultrasound and heating do not work	<ul style="list-style-type: none"> ▪ Float switch is defective. 	<ul style="list-style-type: none"> ▪ Check the float switch; see section 6.3 Tests.

for ST devices

Error	Possible causes	Troubleshooting
Heating cannot be controlled	Thermostat is set too low on the device	Switch on the thermostat
	Jack not inserted	Check the jack connection
Ultrasound cannot be controlled	Jack not inserted.	Check the jack connection.

6 Maintenance

6.1 Servicing

The device is maintenance-free.

Function tests can be performed for regular checks (see section **6.3 Tests**.)

6.2 Cleaning and care of the device

Cleaning the housing

- Wipe the housing with a damp cloth. Wipe it dry with a soft cloth.
- Do not use abrasive cleaning agents; only use care products free from abrasive additives.
- If necessary, disinfect the housing 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 ultrasound effect. Please therefore observe the following information:

- Rinse the oscillating tank thoroughly with water after each use. Wipe it dry with a soft cloth.
- Remove edges and residues with a stainless steel cleaning product free from 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. Please therefore avoid leaving 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.

6.3 Tests

NOTICE

Damage to the device

- Only carry out the tests listed in the following section on the filled device.

If one of the tests does not lead to the desired result, contact the servicing team. See section **6.4 Repairs**.

Check the control lamps

Check the function of the control lamps.

- Briefly switch on the ultrasound.
 - » The green indicator lamp will remain on as long as the ultrasound is switched on.
- Briefly switch on the heater with the turning knob to above 30 °C.
 - » The white and yellow indicator lamps will remain on as long as the heating is switched on.

Check the power of the ultrasound and the heating

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

Procedure

1. Fill the tank with water.
2. Switch on and off the ultrasound and, if available, the heating, one after the other. Take the power reading.
3. Compare the readings with the technical specifications. See section **8.1 Technical specifications**.

The measured values may not deviate from the values in the technical specifications by more than $\pm 20\%$.

Checking the float switch

The float switch is located in the tank and is therefore a wear part. It must be checked at regular intervals to ensure it is functioning and impervious.

When the tank is filled, the floating body must float up to the upper stop (upper ring).

A check can be carried out in the empty tank as follows:

Procedure

1. Fill a sufficiently large cup with water.
2. Slide the cup over the floating body from below.

Result

- » The floating body floats up – part OK.
- » The float body remains attached to the lower stop ring – part must be replaced. Contact the manufacturer.

6.4 Repairs

During the warranty period, contact your specialist dealer or the manufacturer.
Only have repairs carried out by qualified personnel or by the manufacturer.
The manufacturer assumes no liability for unauthorised interventions on the device.



WARNING

Health hazard due to contaminated device

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

If the device needs to be repaired, send it to the manufacturer.
Clean and decontaminate the device and the accessories before shipment.
The "Certificate of decontamination" serves the occupational safety and health of our employees in accordance with the German "Infection Protection Act" (Infektionsschutzgesetz) and the Accident Insurance Regulations (UUV) of the employers' liability insurance associations.
Before being returned for inspection/repair, the device and accessories must be cleaned in accordance with the applicable laws and regulations and, if necessary, disinfected with a surface disinfectant that is listed by the VAH (Association of Applied Hygiene).
Please understand that we can only start the work if this certificate is completed in full.
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 unit to the following address:

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

+49 30 76880-2674
service@bandelin.com

7 Disposal



WARNING

Health hazard due to contaminated device

- 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 oscillating elements contain sintered ceramics made of lead zirconium titanate.

- 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

Electrical specifications, general

Mains supply	400 V 3NPE (± 10%) 50/60 Hz
Protection class	I
Degree of protection	IP 32
Ultrasonic frequency	40 kHz (optional 25 kHz)
Remote control connection	only for...-ST devices

Electrical specifications and weights for bath size RM 112

Type	Ultrasonic peak power/ultrasonic nominal power	Heating power	Heating system fuses	Generator fuses	Weight
	[W]	[W]			[kg]
RM 112 UH	4000/1000	4800	T12A	F8A	74
RM 112 H	–	4800	T12A	–	62
RM 112 U	4000/1000	–	–	F8A	69
RM 112	–	–	–	–	57

Dimensions for bath size RM 112

Type	Internal dimensions (L × W × H)	Con- tents	Filling- volume	Oper- ating volume	Inlet and outlet/ sprinkle tube	Overflow- gutter- outlet
	[mm]	[l]	[l]	[l]		
RM 112 UH	600 × 450 × 450/470	145	130	115	G 1 / G 1/2	G 1
RM 112 H	600 × 450 × 450/470	145	130	115	G 1 / G 1/2	G 1
RM 112 U	600 × 450 × 450/470	145	130	115	G 1 / G 1/2	G 1
RM 112	600 × 450 × 450/470	145	130	115	G 1 / G 1/2	G 1

Electrical specifications and weights for bath size RM 182

Type	Ultrasonic peak power/ultrasonic nominal power	Heating power	Heating system fuses	Generator fuses	Weight
	[W]	[W]			[kg]
RM 182 UH	2× 4000/2× 1000	7200	T12A	F8A	138
RM 182 H	–	7200	T12A	–	118
RM 182 U	2× 4000/2× 1000	–	–	F8A	130
RM 182	–	–	–	–	110

Dimensions for bath size RM 182

Type	Internal dimensions (L × W × H)	Con- tents	Filling volume	Operat- ing vol- ume	Inlet and outlet/ sprinkle tube	Overflow- gutter- outlet
	[mm]	[l]	[l]	[l]		
RM 182 UH	1000 × 500 × 400/420	225	200	170	G 1 / G 1/2	G 1
RM 182 H	1000 × 500 × 400/420	225	200	170	G 1 / G 1/2	G 1
RM 182 U	1000 × 500 × 400/420	225	200	170	G 1 / G 1/2	G 1
RM 182	1000 × 500 × 400/420	225	200	170	G 1 / G 1/2	G 1

Electrical specifications and weights for bath size RM 212

Type	Ultrasonic peak power/ultrasonic nominal power	Heating power	Heating system fuses	Generator fuses	Weight
	[W]	[W]			[kg]
RM 212 UH	2× 4000/2× 1000	7200	T12A	F8A	112
RM 212 H	–	7200	T12A	–	92
RM 212 U	2× 4000/2× 1000	–	–	F8A	104
RM 212	–	–	–	–	84

Dimensions for bath size RM 212

Type	Internal dimensions (L × W × H)	Con- tents	Filling volume	Operat- ing vol- ume	Inlet and outlet/ sprinkle tube	Overflow- gutter- outlet
	[mm]	[l]	[l]	[l]		
RM 212 UH	750 × 650 × 500/520	285	260	230	G 1 / G 1/2	G 1
RM 212 H	750 × 650 × 500/520	285	260	230	G 1 / G 1/2	G 1
RM 212 U	750 × 650 × 500/520	285	260	230	G 1 / G 1/2	G 1
RM 212	750 × 650 × 500/520	285	260	230	G 1 / G 1/2	G 1

8.2 Ambient conditions

Overvoltage category:	II
Degree of soiling/contamination:	1
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
For indoor operation only	

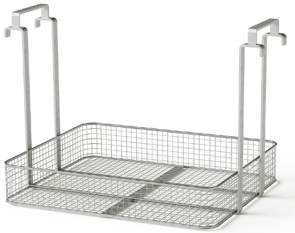



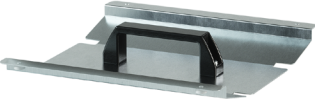

8.3 CE conformity

The device meets the CE marking criteria of the European Union:



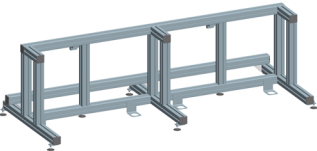

- 2014/35/EC – Low Voltage Directive
- 2014/30/EU – EMC Guideline
- 2011/65/EU – RoHS Directive

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




9 Accessories

	<p>Insert baskets MK ... made of stainless steel Takes loads of up to 20 kg</p>
	<p>Insert baskets MK ... S made of stainless steel Takes loads of up to 40 kg</p>
	<p>Insert baskets MK ... B made of stainless steel Takes loads of up to 20 kg For use with lifting device MB</p>
	<p>Insert baskets MK ... BS made of stainless steel Takes loads of up to 40 kg For use with lifting device MB</p>
	<p>Lid MD... made of stainless steel</p>
	<p>Drop plate TB ... made from stainless steel between 2 tanks</p>

Additional features

	<p>Lifting device MB... for one device, stationary</p> <p>The electrically operated lifting device with oscillation makes it easier to lower and lift out the basket of items. The cleaning effect is increased, and dissolved soiling is rinsed off.</p>
	<p>Lifting device MB... B for 2 to 4 devices, for moving</p> <p>The electrically operated lifting device with oscillation makes it easier to lower and lift out the basket of items. The cleaning effect is increased and dissolved soiling contamination is rinsed off.</p>
	<p>Tank rack WG...</p> <p>The tank racks for moving the lifting device are designed for 2 to 4 tanks.</p>
	<p>Cascade pipes KV...</p> <p>To improve the rinsing process, two rinsing tanks are connected to each other with the cascade pipes.</p>

Peripheral equipment

	<p>Filtration FA... By continuously filtering out the cleaned particles, the bath service life is extended, and the cleaning power is retained.</p>
	<p>Oil separator OX... Contaminants floating on the surface of the bath are passed via the overflow gutter into the oil separator and separated there via gravity.</p>
	<p>Tray dryer TO ... The objects to be cleaned are dried after rinsing to quickly remove the residual moisture.</p>

10 Appendix

Recommended specimens

The choice of one of the following concentrates will depend on the cleaning task in question and the degree of soiling.



TICKOPUR R 33

Universal cleaner with corrosion protection for the service, industry, technology and laboratory sectors, material protecting, mildly alkaline, pH 9.9 (1%), application 3–5%

Removes general soiling, drilling, grinding, polishing and lapping residues, oil- and grease-containing residues, soot, ink, etc.

From metal, glass, ceramic, plastic, rubber, windows, glasses, e-filters, respiratory masks (EXAM report no.: 5734/06), etc. Caution with tin and zinc.

TICKOPUR R 30

Neutral cleaner with corrosion protection, material protecting, neutral, pH 7, application 1–5%

Removes light drilling, grinding, polishing and lapping residues, dust, soot, oil- and grease-containing impurities, etc.

From metal, glass, ceramic, plastic, rubber, etc.

TICKOPUR TR 3

Special cleaner based on citric acid, material protecting, phosphate-free, with corrosion protection, mildly acidic, pH 3.0 (1%), application 5%

Removes mineral residues, flash rust, greases, oils, waxes, pigments, drilling, grinding, polishing and lapping residues, etc.

From metal, glass, ceramic, plastic, rubber, etc.

TICKOPUR R27

Special cleaner based on phosphoric acid, for decalcification and rust removal with corrosion protection, acidic, pH 1.9 (1%), application 5%

Removes strong mineral residues (lime, silicates, phosphates, cements, etc.), rust, temper colours, metal oxides, grease and oil films, etc.

From steel, stainless steel, precious metal, glass, ceramic, plastic, rubber. Not intended for light and non-ferrous metals, tin, zinc.

TICKOPUR TR 2

Special cleaner, demulsifying, based on phosphoric acid, material protecting, with corrosion protection, mildly acidic, pH 3.6 (1%), application 0.1–5%

Removes mineral residues, flash rust, greases, oils, waxes, pigments, drilling, grinding, polishing and lapping residues, etc.

From metal, glass, ceramic, plastic, rubber, etc. Caution with light metal, tin and zinc.

TICKOPUR TR 14

Flux remover, surfactant-free, non-foaming, material protecting, phosphate-free, alkaline, pH 10.7 (1%), application 10%

Removes resinous flux, solder pastes, ionic and non-ionic residues, drilling, grinding, polishing and lapping residues, fingerprints, greases, oils, etc.

From non-ferrous and light metals, steel, stainless steel, glass, ceramic, plastic, rubber, assembled and non-assembled PC boards, soldering frames, electronic components, assemblies, etc.

TICKOPUR R 32

Special cleaner, free of complexing agents, material protecting, with corrosion protection, mildly alkaline, pH 11.1 (1% in demineralised water), application 0.25–5 %

Removes distillation residues, organic and inorganic residues, oily and greasy soiling, etc.

From metal, including burnished metal, glass, ceramic, plastic, rubber, etc. Specially for electroplating, lasers, analytics. Prepare with demineralised water.

TICKOPUR R 36

Special cleaner, surfactant-free, for analysis and laser technology, for cleaning lamellae, material-protecting, non-foaming, mildly alkaline, pH 10 (1%), application 0.25–5%

Removes general soiling, oils, greases, distillation residues, organic and inorganic residues.

From steel, precious and light metal, ceramic, plastic, rubber, glass, optical glasses, vertical and horizontal lamellae. Caution with tin and zinc.

TICKOPUR TR 7

Universal cleaner, demulsifying, for rapid separation of oil and fat, mildly alkaline, pH 8.9 (1%), application 0.1–5%

Removes oils, greases, waxes, pigments, fluxes, solder pastes, drilling, grinding, polishing and lapping residues.

From steel, stainless steel, non-ferrous, precious and light metal, glass, ceramic, plastic, rubber, soldering frames.

TICKOPUR TR 13

Intensive cleaner, demulsifying against stubborn residues/contamination, phosphate and silicate-free, alkaline, pH 11.9 (1%), application 0.1–10%

Removes gumming, coking residues, soot, oils, greases, waxes, pigments, coloured coating, drilling, grinding, polishing and lapping residues, etc.

From steel, stainless steel, glass, ceramic, plastic, rubber. Not intended for light metal, tin, zinc. Non-ferrous metals can be weakened.

TICKOPUR RW 77

Special cleaner with ammonia, phosphate-free, mildly alkaline, pH 9.9 (1%), application 5–10%

Removes gumming, soot, greases, oils, waxes, pigments, coloured coating, silicone oil, flux, oxides on non-ferrous and precious metals.

Non-ferrous and precious metal, iron, steel, glass, ceramic, plastic, rubber, analysis sieves, PC boards in the service sector. Caution with light metals.

TICKOPUR R 60

Intensive cleaner, phosphate-free, strongly alkaline, pH 12.3 (1%), application 2–20%

Removes coking residues, gumming, soot, pigments, greases, oils, waxes, silicone oil, coating, drilling, grinding, polishing and lapping residues, etc.

From steel, stainless steel, glass, ceramic, plastic, rubber. Not intended for light metal, tin, zinc.

TICKOPUR KS 1

Universal corrosion protection for all ferrous metals, solvent-free, neutral, pH 7.4 (1%), application 0.2–2%

Suitable for all ferrous metals, e.g., grey cast iron, unprotected steels of different alloys.

Effective corrosion protection for indoor storage after cleaning with TICKOPUR products and subsequent aqueous rinsing. No oil or grease film is formed.

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