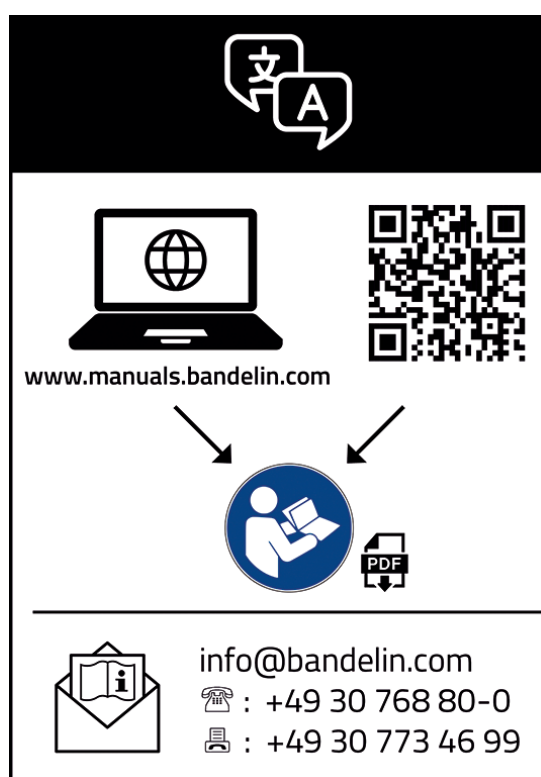


Operating instructions

SONOCOOL

High-performance ultrasonic baths





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Certified to ISO 9001 and ISO 13485

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1 About these operating instructions

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

- Read these operating instructions before using the device.
- Pay particular attention to 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 device

The device is intended for use in laboratories and facilities for industrial and scientific research. With the device, it is possible to use the catalytic effect of ultrasound in processes that require simultaneous cooling. The cooling function protects heat-sensitive samples, and process sequences can be designed faster and more effectively than with conventional methods.

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.



WARNING

Note for unit with type E+F jack:

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

- If you discover a defect in the device, unplug it immediately. Do not connect a faulty device to the mains.
- Only have repairs carried out 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 typical ultrasonic noise produced during a procedure can be perceived as very unpleasant. Remaining within a radius of 2 m for a long period of time may cause you to suffer damage to your health.

- Wear suitable hearing protection.
- Use a lid to reduce noise. The device can also be used in a sound-proof box.

2.5 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 beings to ultrasound.

2.6 Danger due to refrigerant

The integrated cooling unit contains a combustible refrigerant.

If the refrigerant circuit is damaged, the mains plug must be unplugged immediately and the installation site must be well ventilated. Send the device to the manufacturer for repair.

For flawless operation, observe the following instructions:

- Refrigerant information:
R-290; quantity: 90 g, highly flammable
- Never cover or close the supply and exhaust air openings.
- To protect the cooling unit, the compressor is only started after a rest period of two minutes.

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 safety glasses 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.
- In the event of dangerous vapours, use an extraction system.
- Observe the information on the label and in the safety data sheet for the agent.
- Keep agents away from children and untrained persons.

Non-aqueous fluids can heat up many times faster than water. A possible flashpoint can be reached, and exceeded, after a very short period of sonication. In the case of fluids with high boiling points, the bath temperature can rise to over 120 °C due to the energy 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.
- You can sonicate small amounts of combustible liquids in sample vessels indirectly. Before exposing combustible liquids to sonication, familiarise yourself with the necessary safety measures and applicable regulations when handling these liquids.

2.8 Disposing of sonication liquid

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 liquid must be neutralised before disposal. 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. An overview of approved accessories can be found in chapter **9 Approved accessories**.

2.10 Preventing damage to the device

- Only use aggressive agents in inset beakers or insert baskets. When working with aggressive agents, avoid splashes that get into the contact liquid or onto the stainless-steel surface. Replace contaminated sonication liquid immediately. Clean contaminated surfaces and wipe them dry.
- Do not operate the device without sonication liquid in the oscillating tank. 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.

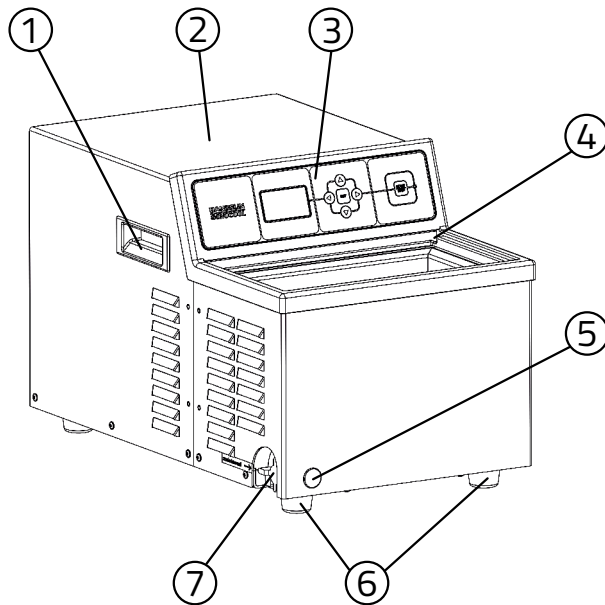
The device complies with the requirements for Class B devices according to EN 55011.

2.12 Safety stickers on the device

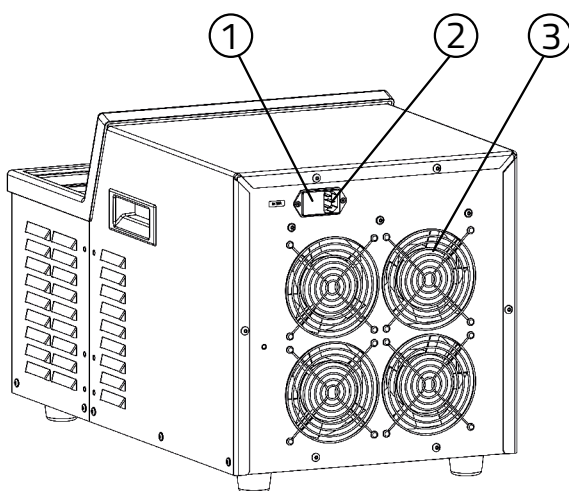
- Observe all safety stickers on the device.
- Keep the safety stickers in a readable state. Do not remove them. Replace them when they are no longer legible. Please contact our customer service for this. See chapter **6.4 Repairs**.

3 Construction and function

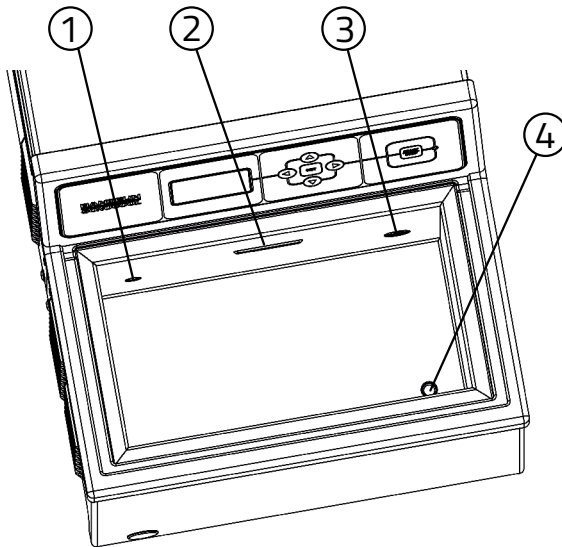
3.1 Construction



- 1 Handles
- 2 Housing
- 3 Control panel
- 4 Receptacle for glass lid
- 5 Cover cap (before drain nozzle)
- 6 Device feet
- 7 Stopcock (closed position labelled)

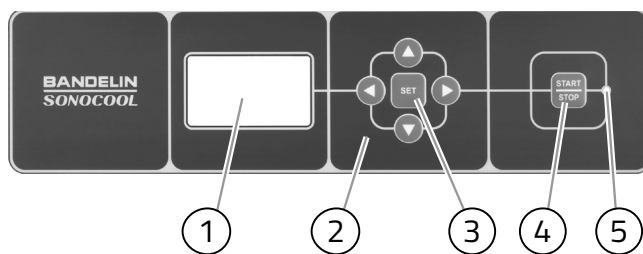


- 1 Mains switch
- 2 IEC power connector with fuse holder
- 3 Fan

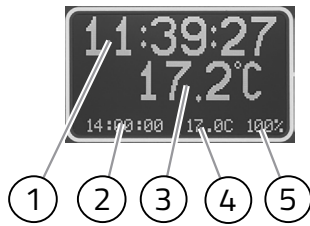


- 1 Inlet in the tank
- 2 Filling level mark
- 3 Electronic level sensor
- 4 Drain in the tank

3.2 Control panel



- 1 LC display
- 2 Arrow keys (up, down, left and right)
- 3 SET key
- 4 START/STOP key
- 5 Status LED
 - **GREEN:** the device works correctly.
 - **YELLOW:** warning. However, the device can still be operated.
 - **RED:** error (error number). The device cannot be started.



- 1 Runtime: current (remaining) runtime for the ultrasonic operation. If [START/STOP] has not yet been pressed, the time corresponds to the target runtime.
- 2 Target runtime: default value for the duration of the ultrasonic operation, in the format hh:mm:ss
- 3 Actual temperature: current temperature in the oscillating tank
- 4 Target temperature: default value for the temperature in the oscillating tank in °C
- 5 Power specification: default value for the ultrasonic power during sonication in %

3.3 Function

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. At higher ambient pressure around the bubbles, they collapse very quickly. This creates strong local micro-currents on the surfaces of the sonicated objects. The device uses SweepTec®, a technology in which the ultrasonic frequency often changes by the level of the operating frequency. The optimal operating frequency depends on the load, fill level, temperature and type of sonication fluid. The operating frequency can deviate significantly from the nominal frequency. SweepTec® creates a particularly homogeneous ultrasonic field in the bath volume to ensure optimal results at all times.

4 Preparation for operation

4.1 Scope of delivery

Set for pathology (Code no.: 3500031), comprising:

Device with integrated cooling unit (Code no.: 350003)

- 1 Sample holder PH 255-11
- 1 Lid D 255 G
- 20 Inset beaker SD 01.2
- 1 Drain hose $\frac{1}{4}$ "
- 1 Mains cable
- 1 TICKOPUR TR 3 (1 l)
- 1 Operating instructions

Other accessories depending on the order – see delivery note.

Set for laboratory (Code no.: 3500032), comprising:

Device with integrated cooling unit (Code no.: 350003)

- 1 Insert basket K 5 SC
- 1 Lid D 255 G
- 1 Drain hose $\frac{1}{4}$ "
- 1 Mains cable
- 1 TICKOPUR TR 3 (1 l)
- 1 Operating instructions

Other accessories depending on the order – see delivery note.

4.2 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 bottom of the device must not be impeded by objects.
- Observe minimum distances for supply and exhaust air. At least 5 cm at the side and at least 10 cm for the rear wall.

- A water connection for filling the device should be located nearby. A basin for draining or pouring out the sonication liquid must be on hand.
- Install the supplied maintenance sticker in the visible area.
Mark the next maintenance date, which corresponds to the delivery date plus 2 years.

4.3 Performing a functional test

Requirement

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

Procedure

1. Connect the mains cable to the device at the back and then plug the mains plug into an grounded socket.
2. Press the toggle switch on the rear of the device to position I to turn on the device.
3. Briefly switch on the ultrasound. To do this, press the Start/Stop button. After 1 to 2 seconds, press the Start/Stop button again to switch off the ultrasound.

Result

» When the ultrasound is switched on, you will clearly hear a noise.

4.4 Rinsing the oscillating 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

Indirectly sonicate samples in inset beakers or other sample vessels, depending on the application. Position the samples with the help of sample holders or attach them with spring clamps in the K 5 SC insert basket.

5.2 Contact or sonication liquid

Use a solution made of water and a special ultrasonic agent as the contact or sonication liquid. Drinking water or demineralised water can be used for the 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 agent used must be cavitation conducive, biodegradable, easy to dispose of, gentle on materials, and long-lasting. BANDELIN recommends ultrasonic agents in the TICKOPUR product series from DR. H. STAMM GmbH.

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

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

5-l ready-to-use solution, 2%

Agent:

$$\frac{5 \text{ l} \times 2 \%}{100 \%} = 0,1 \text{ l}$$

Quantity of water:

$$5 \text{ l} - 0,1 \text{ l} = 4,9 \text{ l}$$

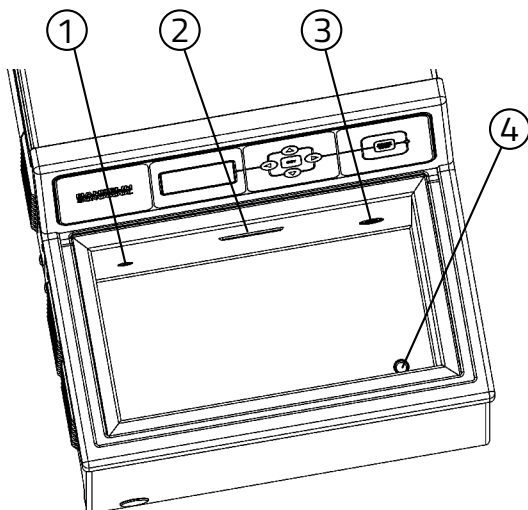
5.3 Pouring in sonication liquid

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.



- 1 Inlet in the tank
- 2 Filling level mark
- 3 Electronic level sensor
- 4 Drain in the tank

Requirements

- Stopcock must be closed.
- Ultrasound must be switched off.

Procedure

1. Fill 1/4 of the oscillating tank with water. The maximum filling temperature of 25 °C should not be exceeded.
2. Dose the agent for the contact liquid into the oscillating tank.
3. Fill up to the filling level mark with water. Take account of the displacement due to the inset beakers or sample vessels and avoid foaming.
4. Ensure that the inset beakers or sample vessels are adequately filled (risk of floating).

Result

- » The device is ready to be switched on.

5.4 Switching the device on and off

Switching the device on

Before switching the device on, leave it at its place of operation for 2 hours so that it can adapt to the climatic conditions.

Switch on the device using the toggle switch on the back.

- » The LC display will start to light up. An initialisation will be carried out automatically.
- » The device is then in standby mode and is ready for operation.
- » The status LED lights up, and the last used default values for runtime, temperature and ultrasonic power are displayed.
(Values upon initial activation: target temperature 17 °C, target runtime 00:10:00 hh:mm:ss, target power 100%).

Switching the device off

Switch off the device using the toggle switch on the back.

5.5 Setting parameters

Press the SET key to activate the editing mode.

Press the left or right arrow keys to switch between the individual parameters. Pressing the up or down arrow keys allows the settings values to be changed. The relevant parameter position that can be edited is shown inversely. Any changes made will be active immediately. Depending on the operating mode from which you access the editing mode, different operating parameters can be changed:

Standby mode: target runtime, target temperature and target power

Active mode: target temperature and target power

Pause mode: remaining runtime (without changing the target runtime!), target temperature and target power

5.5.1 Operating modes

Standby mode – the device's default state

The runtime (shown inversely) and the actual temperature are displayed in the upper area of the display, and the target values for time, temperature and power are shown in the bottom line. The cooling is activated, and the ultrasound is switched off.

Editing mode – menu for changing the operating parameters

The selected parameter, with its currently valid value, is displayed in the upper area of the display. All valid target values are shown in the bottom line.

Active mode – ultrasound is activated

The remaining runtime is shown without inversion and runs as a countdown every second. The actual temperature is displayed below. All valid target values are shown in the bottom line.

Pause mode – interruption of active mode

The remaining time is shown inversely (dark font on a light background). The process can then be continued. The display corresponds to that in standby mode, with the lettering "p-a-u-s-e" appearing in the penultimate line.

5.5.2 Temperature setting

You can change the temperature to a value between 4 and 40 °C at any time in edit mode.

Notes:

- If the actual temperature exceeds the value of the target temperature by more than 1 K, the device switches off the ultrasound for safety reasons (ultrasound energy heats the liquid.). Ultrasound cannot be activated if the limit value is exceeded before the start. The status LED flashes red.
- The device automatically activates the ultrasound when the actual temperature is within the specified tolerance range again.
- The set time will only continue to count down when the ultrasound is active.
- If the setpoint for the temperature is higher than the actual temperature, only a warning is issued; ultrasound can be started. The status LED lights up yellow.
- At a target temperature below 15 °C, the ultrasound may temporarily switch off under ambient conditions starting at about 20 °C. This can be avoided by a reduced ultrasound power setting.

5.5.3 Time setting

The target runtime can only be changed from standby mode; it cannot be changed during operation (active mode), because the ultrasound continues to be active in edit mode. Only the remaining runtime can be edited from pause mode. However, this setting does not change the default runtime (stored value in standby mode).
Setting limits: 00:00:10 – 99:59:59 [hh:mm:ss]

5.5.4 Power setting

The power can be changed at any time in edit mode.
Setting values: 25%, 50%, 75% and 100%

5.5.5 Activating/deactivating ultrasound

Press the START/STOP key to switch on the ultrasound. The display shows a countdown of the remaining time.

Pressing the START/STOP key again interrupts the ultrasound emission (pause mode).

Ultrasonic operation is continued if the START/STOP key is pressed again. Pressing the SET key for 2 s cancels the process from pause mode and resets the display values (return to standby mode).

Once the set time has elapsed, the device will stop. The time display is set to "00:00:00", and a short beep is emitted. The device is in standby mode again.

5.6 Degassing the sonication liquid

Sonication liquid 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 liquid increases the effect of the ultrasound.

- Remove all accessories from the oscillating tank.
- Put on the oscillating tank's lid.
- Start the ultrasound.
 - The internal pump will start conveying
 - The cooling runs automatically according to the target temperature.
- At the inlet (in the tank), the contact liquid must visibly flow into the tank.
- Set the degassing time (10 min) and activate the ultrasound.

Information

If cooling is not desired, it can be temporarily deactivated by regulating the target temperature, e.g., by setting a value of 30 °C. Ultrasound is switched on separately.

Information

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

5.7 Introducing objects to be sonicated

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

- Before each sonication process, check whether the contact liquid is contaminated. If there is visible soiling/contamination, replace it.
- The contact liquid must be degassed.
- Use approved accessories, such as inset beakers or a basket. Do not place anything directly on the tank bottom.
- The ultrasound must be switched off while items are being added.
- Check the filling level. Inset beakers or sample vessels for indirect sonication must be immersed at least 2 cm into the contact liquid.
- Remove any air bubbles under inset beakers. The ultrasound is only effective where liquid is in contact with the objects to be sonicated or the inset beaker.

5.8 Removing objects to be sonicated

Switch off the ultrasound before removing the inset beakers or sample vessels.

5.9 Emptying the oscillating tank

Soiling/contamination on the bottom of the oscillating tank reduces the ultrasonic power. If the contact liquid has visible soiling/contamination, empty and clean the oscillating tank. Fully replace used sonication liquid. Do not replenish it by topping it up.

Procedure

1. Switch off the ultrasound.
2. Connect the drain hose to the drain nozzle.
3. Hold the drain hose in a suitable vessel or in the drain.
4. Open the stopcock by turning it clockwise to the upper position.
5. Thoroughly rinse out the oscillating tank.
6. Wipe the device dry with a soft cloth.
7. If necessary, disinfect the device with a suitable surface disinfectant.

5.9.1 Renewing/replacing the contact liquid

NOTICE

Damage to the internal cooling unit

At high pressure, the hose connections and the internal piping in the cooling unit may be damaged.

- Compressed air must not be blown through the hose lines.

To replace the contact liquid, empty the device as described below and then refill it. After filling, switch it on for about 5 minutes (without ultrasound). The integrated pump will start working automatically and will rinse the device.

Repeat emptying, filling and rinsing two to three times.

Procedure

1. Turn the device off.
2. Remove the cap from the drain nozzle and push the supplied ¼" drain hose onto the drain nozzle.
3. Position the drain hose in a suitable vessel or in the drain.
4. Open the stopcock by turning it clockwise to the upper position.
5. Empty the device as far as possible. If necessary, tilt the device slightly over the longitudinal side in the direction of the drain nozzle.
6. After emptying, close the stopcock again. If necessary, remove the hose and cover the drain nozzle with the cap.
7. To ensure the hygienic condition of the device, rinse the oscillating tank thoroughly after emptying.
8. Wipe the device dry with a soft cloth.
9. If necessary, disinfect the device with a suitable surface disinfectant.

Information

- For transport, the device must be emptied as far as possible. After emptying, close the stopcock to avoid unintentional liquid leakage.
- Complete emptying of the device is not possible. A small amount of the contact liquid always remains in the integrated heat exchanger.

5.10 Troubleshooting

Overview of error messages issued on the display:

Error number	Troubleshooting
002	"Contact liquid" temperature sensor defective. The device interrupts all activities, and ultrasound can no longer be started. The status LED lights up red. Contact the manufacturer.
003	"Coolant" temperature sensor defective. The device interrupts all activities, and ultrasound can no longer be started. The status LED lights up red. Contact the manufacturer.
004	"Oscillating tank" temperature sensor defective. The device interrupts all activities, and ultrasound can no longer be started. The status LED lights up red. Contact the manufacturer.
010	The temperature of the liquid is too low. No error. The liquid is additionally heated by the ultrasonic input.
011	The temperature of the liquid is too high; ultrasound cannot be started, or the device switches off for safety reasons. Wait until the cooling has cooled the liquid sufficiently (target temperature tolerance range is +1 K).
012	Coolant temperature critically elevated. The device interrupts all activities until the temperature is back in the normal range. The status LED lights up red. Wait. The last action is then automatically resumed.
013	1. Tank temperature critical. The device interrupts all activities until the temperature is back in the normal range. The status LED lights up red. Wait. 2. After filling, an air bubble may have formed in the device, which impedes the cooling circuit. Empty and refill.
014	Filling level critically below the filling level mark, or distilled water without additives is used as the liquid. The device interrupts all activities, and ultrasound can no longer be started. The status LED lights up red. Fill up the liquid (water + concentrate in the prescribed amount) to the filling level mark and continue the process using the START/STOP key.
027	Error message appears after the device is turned on. The device can still be used, but only at an ultrasonic power of 100%. Turn the device off and on again. If the error occurs repeatedly, contact the manufacturer.

Overview of other error messages:

Error	Possible causes	Troubleshooting
Device cannot be switched on (display remains dark)	Device connected to the mains?	Connect the device to the power supply.
	Mains switch actuated correctly?	Check that the mains switch is in position "I".
	Fuses defective?	Replace the fuses
No characters readable on the display, even though the device is switched on?	Defective display?	Contact the manufacturer.
Flashing warning sign	Error message?	See the list of error messages on the display for this.
Keys do not respond	Key not actuated correctly?	Testing option: a beep when the key is pressed.
	Maximum or minimum setting value reached?	Set the parameters only within the specified parameter limits.
	Key is defective?	Contact the manufacturer.
Repeated error message Error 013	Flow in the oscillating tank blocked?	Check the inlet and outlet and remove any blockages. If necessary, the device must be rinsed.
	Circulation pump defective?	Check whether circulation of the water in the bath is detectable. If not, contact the manufacturer.
Insufficient result	Degassing not carried out?	Always carry out degassing during preparation.
	Insufficient sample reagent used?	Use the appropriate reagent.
	Incorrect ultrasonic power set?	Increase the power.
	Ultrasonic generator defective?	Testing option: no crackling can be heard after the START/STOP key is pressed, but the time runs continuously. Contact the manufacturer.
	Not sonicated for long enough?	Continue/repeat the process.

Error	Possible causes	Troubleshooting
Does the ultrasound bath oscillate weakly or unevenly, or is the noise too loud?	Degassing not carried out?	Always carry out degassing during preparation.
	Uneven sounds?	No error. Slightly change the filling level; if necessary, take some samples.
Slight erosion phenomena at the tank bottom	Natural wear	Device OK.
Set temperature is not reached	Is the device heated externally (e.g., by direct sunlight)?	Set up the device separately.
	Room temperature too high?	Pay attention to the ambient conditions of the device
	Cooling unit defective?	Contact the manufacturer.
Flow is low or not present at all	Is there any clogging inside the device due to residues?	Rinse the pipe system inside thoroughly. If this does not lead to the desired success or the pump does not run, the device must be returned for repair.

6 Maintenance

6.1 Cleaning and caring for 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.

6.2 Testing

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 service team. See section **6.4 Repairs**.

Testing the LC display

Check the function of the pilot lamps.

- Turn the device on.
- Check whether the display lights up.

Cleaning the cooling system

The integrated cooling unit and the pump must be flushed at regular intervals to prevent possible deposits resulting from the circulating contact liquid. To do this, it is necessary to check whether the flow rate is around 3.5 l/min.

TICKOPUR TR 13 in a 5% dosage is recommended for the subsequent rinsing.

Procedure

1. Connect the hose to the drain nozzle.
2. Place an empty bucket under the outlet.
3. Fill the bucket with contact liquid and also provide one for refilling.
4. Turn on the device.
 - The pump must always be running during the check, the filling level of the tank must be above the inlet and the level sensor, and the tank must always be refilled.
5. Open the stopcock for 1 minute and top up the liquid constantly so that the level sensor is always in the liquid.
6. Close the stopcock.
7. Check the liquid in the empty bucket that was provided after 1 minute.
 - » Bucket contents after 1 minute at approx. 3.5 litres -> no rinsing necessary.
 - » Bucket contents after 1 minute clearly below 3 litres -> rinse as a matter of urgency.

Performing a rinse

Procedure

1. Drain the contact liquid.
2. Fill a bucket with 4.75 litres of lukewarm water and 250 ml of TICKOPUR TR 13.
3. Close the stopcock and pour in the prepared rinsing liquid.
 - The oscillating tank can be filled above the filling level mark, but the rinsing liquid may not fit completely into the tank due to the remaining contact liquid.
4. Set the bath temperature to 40 °C and let the device run for at least 1 hour so that the liquid heats up.
5. Drain the rinsing liquid.
6. Close the stopcock.
7. Fill several times with clear water.
8. Operate the device for 5 minutes (with or without cooling).
9. Drain the liquid
10. Fill the device with the appropriate contact liquid if you plan to put it into service again.
 - » If contaminants still come out of the hose system during rinsing, it is recommended that the hose be rinsed again.
 - » If the flow after several rinsing operations is still clearly below 3 litres/min., send the device in for early maintenance.

Checking the ultrasound

Procedure

1. Plug a commercially available wattmeter between the mains plug of the device and the socket.
2. Fill the device with liquid.
3. Turn on the device.
4. Switch the cooling off
 - Set the target temperature to 40 °C (maximum)
5. Switch on the ultrasound.
6. Compare the displayed measured value on the wattmeter with the technical specifications (tolerance +/- 20%).
7. Switch off the ultrasound.
8. Switch on the cooling.
 - The setting for the target temperature must be at least 1 Kelvin below the actual temperature
9. Turn the device off.

Checking the cooling

Procedure

1. Plug a commercially available wattmeter between the mains plug of the device and the socket.
2. Fill the device with liquid.
3. Power on the device while leaving the ultrasound switched off.
4. Switch on the cooling.
 - The setting for the target temperature must be at least 1 Kelvin below the actual temperature.
5. Read the displayed measured value on the wattmeter and note it down.
6. Wait until the cooling unit's 2-minute restart time has elapsed.
7. Read the displayed measured value on the wattmeter and note it down.
8. Calculate the difference between the two measured values.
9. Turn the device off.
 - » The measured value read with the cooling switched on must be approx. 100–200 W above the measured value read with the cooling switched off.

6.3 Servicing

6.3.1 Servicing by the manufacturer or qualified personnel

NOTICE

Damage to the device

- Servicing may only be carried out by the manufacturer or qualified personnel.

The device must be serviced every 2 years by the manufacturer or qualified personnel. During servicing, the full functionality of the device and safety-relevant properties are checked. If the servicing is carried out by the manufacturer, this includes, in particular, calibration of the performance parameters, replacement of internal components, such as hoses, and the safety inspection.

Maintenance kit/scope of delivery

Maintenance kit (Code no. 350003100):

- 1 T hose connector
- 3 L hose connector
- 1 cooling water pipe
- 1 Insulating hose 12/9 mm, 2 m long (must be cut to length by you yourself)
- 2 Hose clamps
- 1 Insulating hose 22/9 mm, 0.3 m long
- 35 Cable ties
- 1 TICKOPUR TR 13, 2 litres
- 1 TICKOMED 1, 1 litre

Supplied documents

- TICKOPUR TR 13 safety data sheet
- TICKOMED 1 safety data sheet
- TICKOPUR TR 13 product information
- TICKOMED 1 product information

Required tools

- Supplied maintenance kit
- Phillips screwdriver
- Disposable gloves
- Hose cutting pliers, or, alternatively, a knife
- Side cutters

Customer service/manufacturer

Before starting maintenance, it is important to check the scope of delivery. If you are unsure about anything, please contact the manufacturer.

Carrying out servicing

Disinfect the device before any servicing. At a minimum, this must consist of surface disinfection with disinfectant wipes, but it can also be carried out thoroughly with a disinfecting rinse using a VAH-listed instrument disinfectant (follow the manufacturer's instructions). Wear protective work clothing (e.g., disposable gloves) until disinfection is complete.

Focus areas of disinfection

- Oscillating tank
- Pump
- Cooling unit
- Outlet
- Hoses inside

If you replace any components during servicing, please note that individual parts and assemblies that have already been used in the device, e.g. hoses, seals, pump parts, are potentially contaminated and must therefore be disposed of after completion of the servicing work.

6.3.2 Visual inspection

During the visual inspection, inspect the device for damage.

The following parts must be subjected to a visual inspection:

- Check the casing, plastic frame and generator for dents, cracks, damaged rivets or screws, or other damage.
- Check the mains cable for damage to the insulation or chafing.
- Check the display and front label for scratches and chipping.
- Check the device for dents and cavitation damage and check the condition of the filling level mark.
- Check the outlet for conspicuous traces of liquid.

Send the device to the manufacturer in the event of any defects or damage.

6.3.3 Functional check

Operate the device without any accessories in order to check all components for function. If the pump is defective, replace it completely and order it separately. (Code no.: 3500160).

6.3.4 Pre-cleaning

- Clean the device with TICKOPUR TR 13 (10% = 4.5 l water + 500 ml TR 13).
- Turn the device on.
- Operate the device for 1 h without cooling (set the target temperature to 40 °C; cooling cannot be switched off otherwise).
- Empty the device and rinse it with clear water.



Information

Flow test

While the liquid is draining, a flow test can be carried out, which involves collecting the liquid that is draining for 1 minute while the pump is running. If necessary, fresh water must be refilled into the device so that the sensor is always covered by liquid. A container with a capacity of at least 5 litres should be used to collect the liquid. After 1 minute, there should be at least 3.5 litres of liquid in the container.

6.3.5 Replacing components

- Replace all hoses, incl. the moulded hose of the internal rinsing circuit.
- Disassemble the functional pump according to the manufacturer's instructions and clean it thoroughly. If the pump is defective, install a new pump.

Cleaning the pump

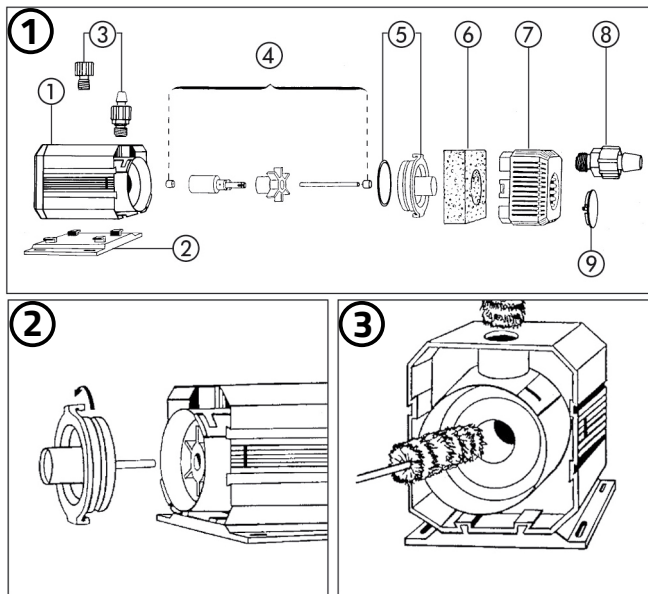


DANGER

Risk of crushing

During maintenance work, there is a risk of fingers getting crushed due to high magnetic forces.

1. Remove the pump.
2. Unlock the pump cover (Figure 2 – sketch below) and remove the pump parts according to the drawing (Figure 1 – sketch below).
3. Clean the pump (Figure 3 – sketch below) with a cleaning brush and under running water.
4. Then reassemble the pump.
5. Check the function and delivery rate of the pump. If the flow rate of the pump is less than 3.5 litres/min, clean the pump or replace it (Code no.: 3500160).



- Rinse the device with TICKOMED 1 (3% = 4.85 l water + 150 ml TICKOMED 1).
- Turn the device on.
- Operate the device for 1 h without cooling (set the target temperature to 40 °C so that the cooling is not activated).
- Empty the device and rinse it with clear water.
- Repeat the cleaning process until no more impurities are visible and the liquid remains clear.
- Empty the device and rinse it thoroughly with clean water with the pump activated, so that the hoses are also rinsed with water and any particles that may have entered the circuit are removed.

6.3.6 Replacing the fuses

The device is protected by 2 microfuses, which respond in the event of faults or overload. If one or both fuses have tripped, the device is no longer functional (the LC display remains dark). As a rule, the device is defective and must be given to the manufacturer for repair. It is not necessary to open the device to change the fuse. The fuses (2 x microfuses 5 × 20 mm, T4A) are accommodated in a slot in the mains plug, which is located on the back of the device.

6.3.7 Determining the software version and report data

The system data is used exclusively for service purposes. If necessary, it must be sent to the authorised qualified personnel or the manufacturer.

Procedure

1. In standby mode, press and hold the up arrow key. A submenu will appear with different, current temperature values of the device (service menu).
2. Press the up arrow key once to open another submenu with system data (e.g., serial number and software version).
3. Press the up arrow key again to open a third submenu with the settings data of the ultrasonic generator (FH1).

The service menu can be exited at any time with the START/STOP key.

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

Please understand that we can only start work once this certificate is fully completed.

Download the "Certificate of decontamination" form here:

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

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



Send the device to the following address:

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

+49 30 76880-2674
service@bandelin.com

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.

Do not discharge the refrigerant in areas where there is a risk of an explosive mixture of gas/air forming.

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

Type:	SC 255.2
Oscillating tank, inside:	280 × 150 × 150 mm (L × W × D)
External dimensions:	360 × 605 × 385 mm (L × W × H)
Housing:	Aluminium, lacquered
Oscillating tank:	Stainless steel (1.4404), 2 mm, welded
Working filling quantity:	5 litres (Contact liquid ~4 litres in the tank + 1 litre in the cooling unit)
Adjustable bath temperature:	4 ... 40 °C (at 20 °C environment)
Refrigerant:	R-290
Refrigerant quantity:	0.09 kg
Cooling power:	200 W
Ultrasonic power:	180 W, adjustable in 4 levels
Power setting:	25%, 50%, 75%, 100%
Ultrasonic frequency:	35 kHz
Countdown operation:	up to 100 h
Emptying:	Front left, concealed
Current consumption:	1.9 A
Nominal voltage:	230 V~ (± 10%), 50 Hz
Protection class:	Class I
Weight (net):	29 kg
Degree of protection:	IP 2X according to IEC 60529

8.2 Ambient conditions

Overvoltage category:	II
Degree of contamination:	2
Permissible ambient temperature:	5... 35 °C
Permissible relative humidity 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

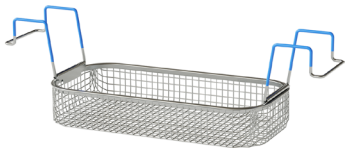

The device meets the CE marking criteria of the European Union:

- 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 Approved accessories

	Lid D 255 G, code no. 3515
	Sample holder PH 255-1 – code no. 3519
	Sample holder PH 255-2 – code no. 3518
	Sample holder PH 255-11 – code no. 3512
	Inset beaker SD 01.2 – code no. 3517 PU = 10 pieces
	Implant box IB 18 – code no. 3283 PU = 5 pieces Silicone seal DI 18 - 32830, Replacement; PU 5 pieces
	Glass beaker SD 06 – code no. 330 With lid PU = 1 piece

	<p>Insert basket K 5 SC – order number 302701 Made from stainless steel</p>
	<p>Spring clamps EK... Made of stainless steel, for laboratory flasks. Prevents floating. For screwing into insert baskets.</p> <ul style="list-style-type: none"> EK 10 – 10 ml, max. Ø 31 mm EK 25 – 25 ml, max. Ø 42 mm EK 50 – 50 ml, max. Ø 52 mm EK 100 – 100 ml, max. Ø 65 mm EK 250 – 250 ml, max. Ø 85 mm

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