

Operating Instructions

LABOCOOL

LC 400 laboratory chiller





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1 About these operating instructions

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

- Read these operating instructions before using the device.
- Pay particular attention to Chapter 2 **Safety**.
- If you pass 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 **6.6 Repairs**.

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

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

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

2 Safety

2.1 Using the device

The LABOCOOL laboratory chiller is used to cool aqueous fluids in open ultrasonic baths. The LABOCOOL laboratory chiller is suitable for ultrasonic baths or other vessels with an outlet at the base.

The device is intended for commercial application and is designed for unobserved continuous operation.

The target group for use is trained specialists in laboratories or research institutions.

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

Please note for devices with type E+F sockets:

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 any defective device to the mains.
- Only have repairs carried out by qualified personnel or by the manufacturer. See chapter **6.6 Repairs**.
- Position the device in such a way that it is possible to disconnect the mains connection at any time without difficulty.

2.4 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.

2.5 Disposal of the contact liquid

Dispose of the contact liquid according to the instructions of the manufacturers of the ultrasonic agents used. The recommended ultrasonic agents 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 contact liquid must be neutralised before disposal.

Observe local sewage regulations.

2.6 Preventing damage to the device

- Do not expose laboratory chillers to direct sunlight and do not place them near sources of heat.
- Do not place laboratory chillers in environments containing saline air.
- Do not operate the device without liquid

2.7 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.

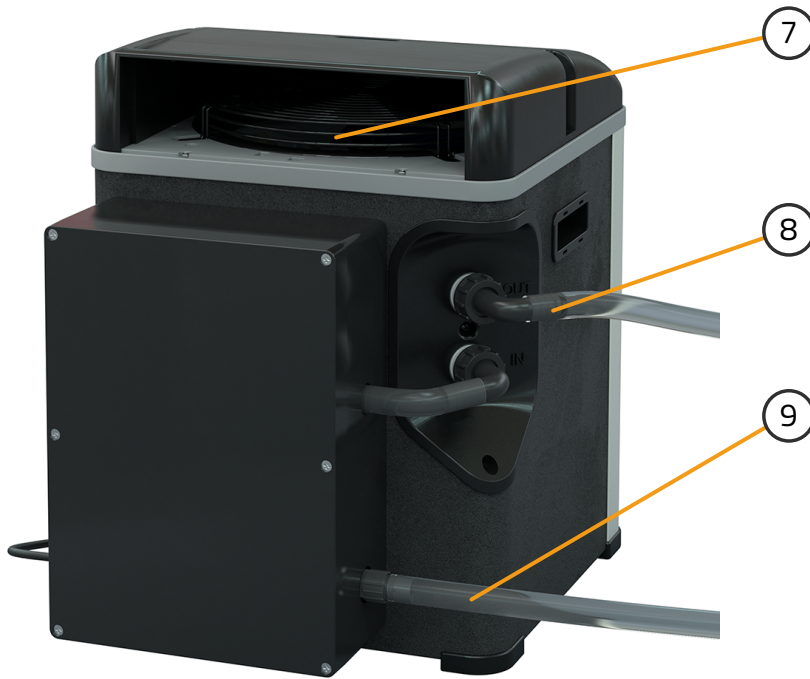
2.8 Safety stickers on the device

- 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 **6.6 Repairs**.

3 Construction and function

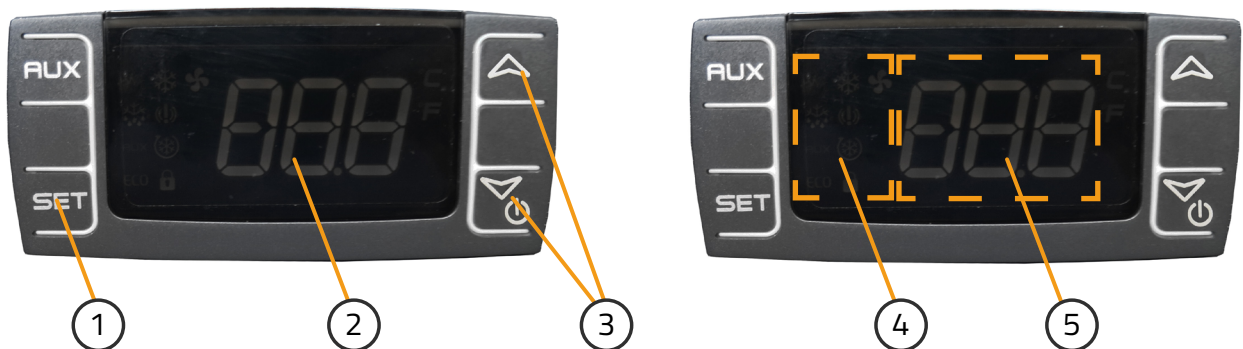
3.1 Construction





- 1 Cover for the exhaust air opening (rotatable cover)
- 2 Handles, opening for transport (both sides)
- 3 Display, with control panel for setting the target temperature
- 4 Supply air opening, with filter
- 5 Main switch
- 6 Mains cable
- 7 Exhaust air opening
- 8 Inlet hose
- 9 Drain hose




3.2 Control panel



- 1 Display
- 2 Arrow keys [▲], [▼] and On/Off
- 3 [SET] key
- 4 Display area - status and error messages
- 5 Display area - temperature

3.3 Status and error messages

LED display area – status and error messages

	LED	Explanation
	Lights up	Device in cooling mode
	Flashes	Device ready for cooling
	On	Alarm condition

3.4 Function

With the integrated centrifugal pump, the bath liquid heated by the ultrasonic bath is conveyed into a circuit through the LABOCOOL laboratory chiller and cooled to the desired temperature. The integrated temperature controller allows the target temperature to be set and the actual temperature to be displayed. The heated exhaust air is discharged on the upper part of the device, either on the front or back or on one of the lateral surfaces of the device.

The LABOCOOL laboratory chiller is operated via buttons on the front in on-table mode.

3.5 Damage due to condensation

WARNING

Damage to a cooled appliance due to condensation

- Devices - e.g. ultrasonic baths - may only be cooled to such an extent that no condensation occurs. Condensation would damage electronics and materials used in the device. The (cooling) temperature at which condensation occurs depends on the humidity and temperature in the environment of the cooled device. Therefore, ensure the temperature does not fall below the temperatures shown in the table.
For lower cooling temperatures, you need special devices approved for cooling use with condensation.

relative air humidity Ambient temperature											
	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%
20 °C	2.9 °C	5.1 °C	7.0 °C	8.7 °C	10.3 °C	11.7 °C	13.0 °C	14.2 °C	15.4 °C	16.4 °C	17.4 °C
22 °C	4.6 °C	6.8 °C	8.8 °C	10.5 °C	12.1 °C	13.5 °C	14.9 °C	16.1 °C	17.3 °C	18.4 °C	19.4 °C
24 °C	6.3 °C	8.6 °C	10.6 °C	12.3 °C	13.9 °C	15.4 °C	16.8 °C	18 °C	19.2 °C	20.3 °C	21.3 °C
26 °C	8.1 °C	10.3 °C	12.4 °C	14.1 °C	15.8 °C	17.3 °C	18.6 °C	19.9 °C	21.1 °C	22.2 °C	23.3 °C
28 °C	9.8 °C	12.1 °C	14.1 °C	16.0 °C	17.6 °C	19.1 °C	20.5 °C	21.8 °C	23 °C	24.2 °C	25.2 °C
30 °C	11.5 °C	13.9 °C	15.9 °C	17.8 °C	19.4 °C	21.0 °C	22.4 °C	23.7 °C	24.9 °C	26.1 °C	27.2 °C
32 °C	13.3 °C	15.6 °C	17.7 °C	19.6 °C	21.3 °C	22.8 °C	24.3 °C	25.6 °C	26.8 °C	28.0 °C	29.1 °C
34 °C	15 °C	17.4 °C	19.5 °C	21.4 °C	23.1 °C	24.7 °C	26.1 °C	27.5 °C	28.8 °C	29.9 °C	31.1 °C
36 °C	16.7 °C	19.1 °C	21.3 °C	23.2 °C	24.9 °C	26.5 °C	28.0 °C	29.4 °C	30.7 °C	31.9 °C	33.0 °C

Permissible cooling temperature depending on room temperature and relative humidity.

4 Preparation for operation

After unpacking, check the laboratory chiller and the accessories for any transport damage and to ensure they are complete. If you discover any damage or defects, report this/these immediately in writing to the shipping carrier and the supplier.

Allow the device to adapt to the climatic conditions at the installation site for at least 2 hours.

4.1 Scope of delivery

Set comprising:

1× laboratory chiller, including connection set

Connection set comprising:

- 1 × inflow nozzle
- 1 × hose, 3 m (cut to size)
- 1 × 3-way ball valve with 2 hose sockets
- 1 × adapter with nut (for ¼" outlet)
- 1 × sealing tape
- 1 × tool
- 1 Operating instructions

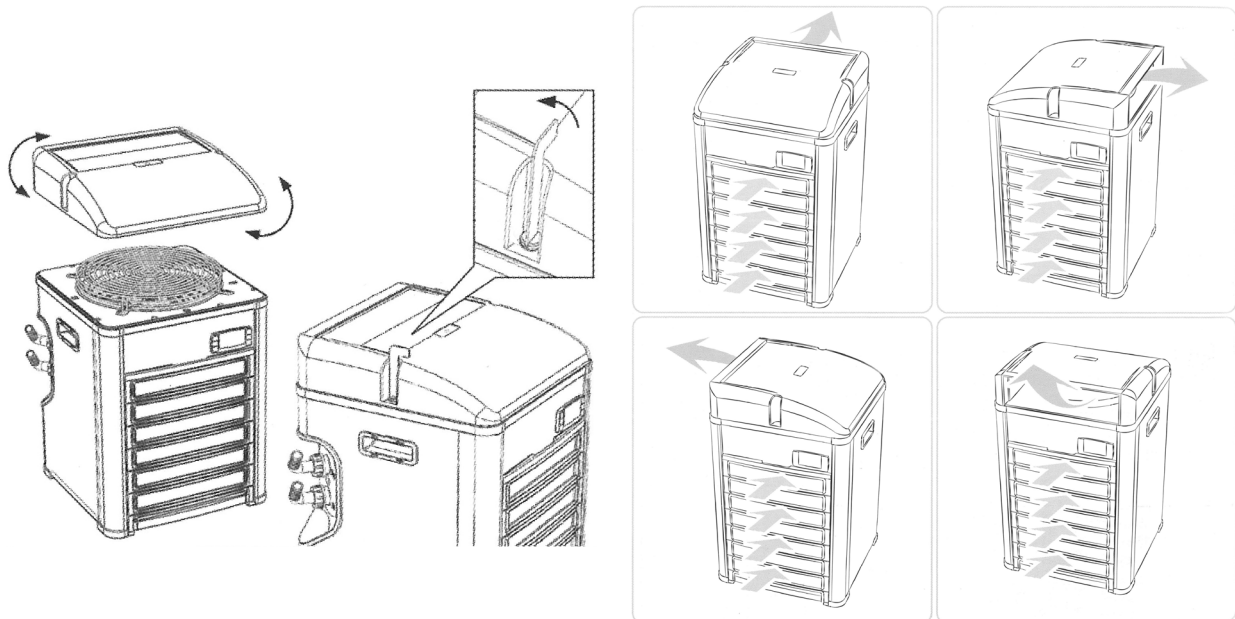


Other accessories depending on the order – see delivery note.

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 contact liquid and the device to be connected. For the weight, see chapter **8.1 Technical data**.
- Adequate ventilation must be ensured. The air supply 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 the contact liquid must be available.
- The cover can be loosened with the supplied tool and, if desired, turned and put back. This allows the operator to choose the direction of the air flow. Operation without a cover is not permitted.



4.3 Installation

The laboratory chiller can be placed next to or under the ultrasonic bath to be connected. In any case, it should be noted that the drain hose from the connected ultrasonic bath to the inlet of the laboratory chiller has a gradient, and the liquid can flow into the laboratory chiller on its own.

The inlet of the laboratory chiller may be located up to one metre below the outlet, so the chiller can also be placed under the work surface.

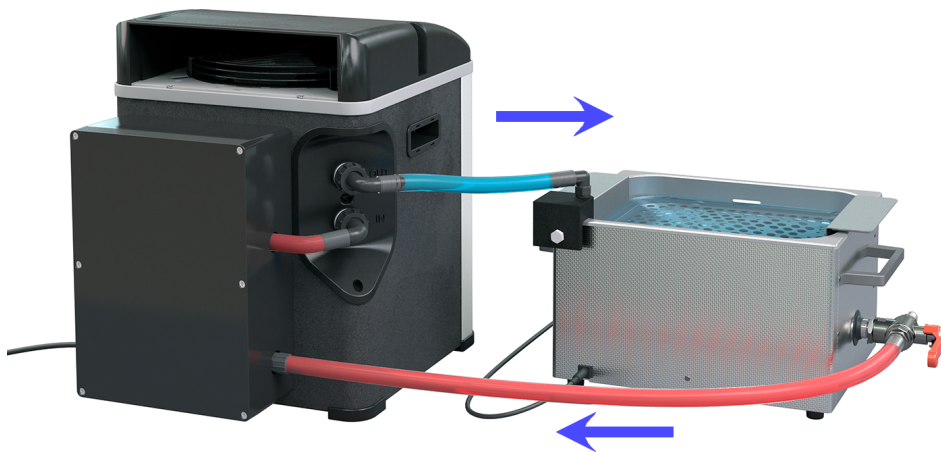
4.4 Assembly

For proper function, the following instructions must be observed during assembly.

4.4.1 Assembly for an ultrasonic device

This assembly is possible with the accessories included in the scope of delivery.

Rear view:



WARNING

No self-priming pump

The inlet of the laboratory chiller must be installed below the liquid level.

NOTICE

Sealing capacity of the sealing tape

Do not screw the adapter on up to the stop or unscrew it by turning it anti-clockwise as this will cause loss of the the sealing ability of the sealing tape.

Assembly of the ultrasonic bath outlet

- Replace the existing ball valve at the outlet of the ultrasonic bath with the 3-way ball valve with hose sockets.
- Remove the old sealing tape.
- Wrap several layers of sealing tape around the external thread.
- First fix the nut with the adapter at the $\frac{1}{4}$ " outlet to the drain pipe with sealing tape.
- Unscrew the 3-way ball valve and fix it with the lock nut.
- Likewise, wrap the hose sockets with sealing tape and screw them into the 3-way ball valve.

- Cut the hose to the appropriate length and connect it between the laboratory chiller and the 3-way ball valve.
The hose must not have kinks in it.

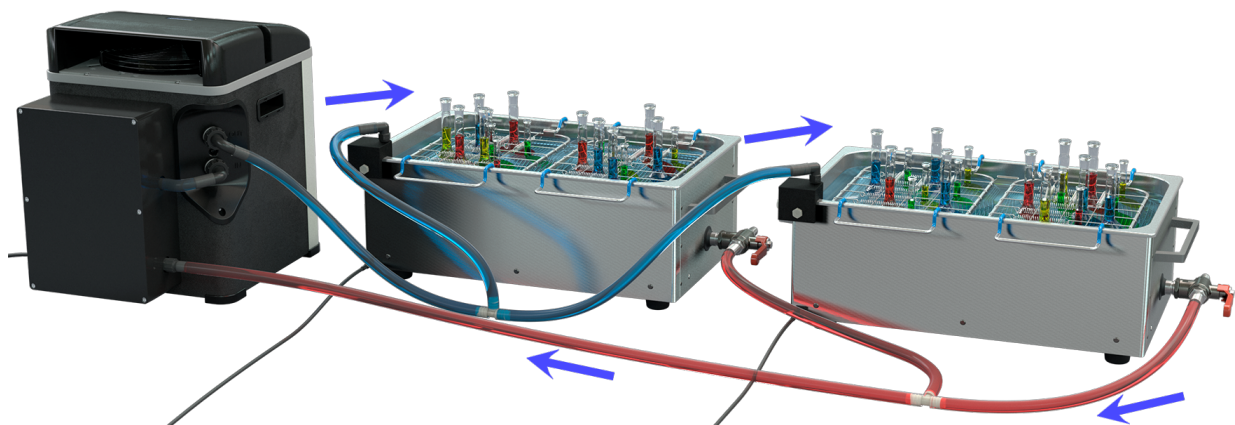
Assembly of the ultrasonic bath inlet

- Place the inflow nozzle on one corner of the ultrasonic bath and fix it in place with the screws.
- Cut the hose to the appropriate length and connect it between the laboratory chiller and the inflow nozzle.
The hose must not have kinks in it.

4.4.2 Assembly for two ultrasound devices

For this assembly, you must order the extension kit 1.

Rear view:



Expansion kit 1:



WARNING

No self-priming pump

The inlet of the laboratory chiller must be installed below the liquid level.

The fill level of both ultrasound devices must be at the same level.

WARNING

Sealing capacity of the sealing tape

Do not screw the adapter on up to the stop or unscrew it by turning it anti-clockwise as this will cause loss of the the sealing ability of the sealing tape.

The supplied 3-way ball valve with the reducer is only required if the ultrasonic device to be connected has a $\frac{3}{4}$ " outlet.

Assembly of the ultrasonic bath outlet

- Replace the existing ball valves at the outlet of the ultrasonic baths with the 3-way ball valves with hose sockets.
- Remove the old sealing tape.
- Wrap several layers of sealing tape around the external thread.
- For 1/4" outlets, first fix the nuts with the adapters by means of sealing tape on the drain pipes.
- Unscrew the 3-way ball valves and fix them with the lock nut.
- Likewise, wrap the hose sockets with sealing tape and screw them into the ball valves.
- Cut the hose to the appropriate lengths and connect it between the laboratory chiller, the T-hose connector and the 3-way ball valves.
The hose must not have kinks in it.

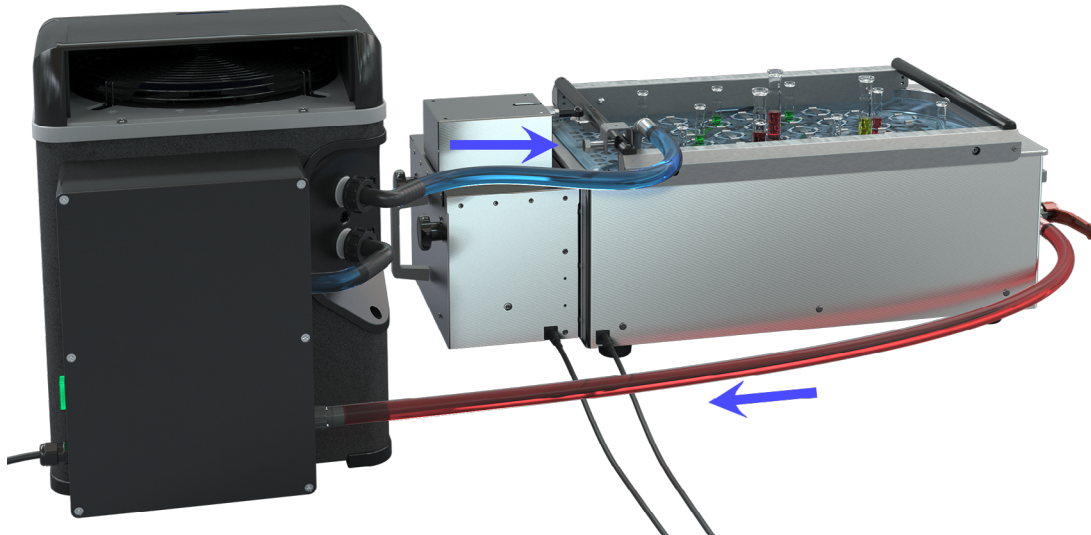
Assembly of the ultrasonic bath inlet

- Place the inlet nozzles on one corner of the ultrasonic baths and fix them in place with the screws.
- Cut the hose to the appropriate length and use it to connect the laboratory chiller to the T-hose connector and the latter to the inlet nozzles.
The hose must not have kinks in it.

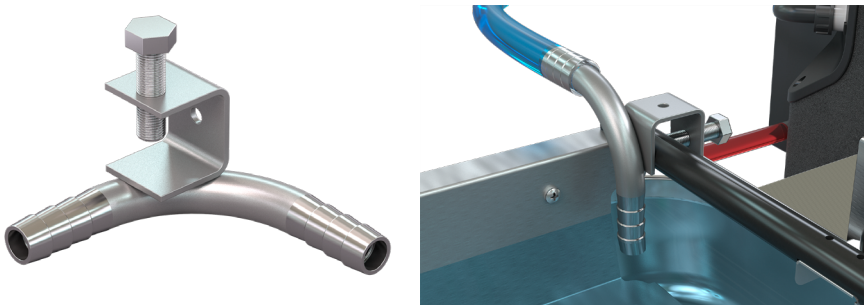
4.4.3 Assembly for an ultrasonic device with Sonoshake

For this assembly, you must order extension kit 2.

Rear view:



Extension kit 2:



WARNING

No self-priming pump

The inlet of the laboratory chiller must be installed below the liquid level.

NOTICE

Sealing capacity of the sealing tape

Do not screw the adapter on up to the stop or unscrew it by turning it anti-clockwise, because this will cause the sealing ability of the sealing tape to be lost.

Assembly of the ultrasonic bath outlet

- Replace the existing ball valve at the outlet of the ultrasonic bath with the 3-way ball valve with hose sockets.
- Remove the old sealing tape.
- Wrap several layers of sealing tape around the external thread.
- At 1/4" outlet, first fix the nut with the adapter to the drain pipe with sealing tape.
- Unscrew the 3-way ball valve and fix it with the lock nut.
- Likewise, wrap the hose sockets with sealing tape and screw them into the 3-way ball valve.
- Cut the hose to the appropriate length and connect it between the laboratory chiller and the 3-way ball valve.
The hose must not have kinks in it.
- Fix the outlet at the edge of the ultrasonic bath with the screw. Connect the hose to the laboratory chiller.

Assembly of the ultrasonic bath inlet

- Place the inflow nozzle on one corner on the roller carriage of the Sonoshake and fix it in place with the screw.
- Cut the hose to the appropriate length and connect it to the laboratory chiller and inflow nozzle.
The hose must not have kinks in it.

5 Operation

5.1 Putting into service

For optimal transmission of ultrasound between the sound-emitting surface and the reaction vessels, the ultrasonic bath must be filled with a contact liquid consisting of normal municipal or purified water and a surfactant-containing agent, e.g., TICKOPUR TR 3.

Requirements

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

Procedure

1. Connect the laboratory chiller to the earthed socket.
2. Connect the laboratory chiller to the inlets and outlets of the ultrasonic bath via the hoses. See notes in chapter **4.4 Assembly**.

Result

- » The device is ready to be switched on.

5.2 Switching the device on and off

Switching the device on

Switch on the laboratory chiller at the main switch on the side.

- » After switching on, the display must light up.
- » The last selected target temperature is stored and will be available when the device is switched on again.

Switching the device off

Switch off the laboratory chiller at the main switch on the rear.



Information

- To protect the cooling unit, the compressor is only started after a rest period of two minutes.
- The On/Off button on the display is used to switch off the cooling function. The pump will remain switched on. "Off" will be shown on the display. To switch the device on or off, the button must be pressed for a longer time.
- If no key is pressed for 30 seconds, all settings will be saved, and the laboratory chiller will be ready for operation.

5.3 Pouring in the contact liquid

Requirements

- The device must be properly connected.

Procedure

1. Dose the specimen for the contact liquid in a container together with water.
2. Fill the ultrasonic bath. The liquid must not be contaminated.
3. Refill the liquid until the desired level is reached.
4. Switch on the laboratory chiller at the main switch - the pump starts immediately. It is necessary to fill the ultrasonic bath during putting into service.
During operation, the level must be checked at regular intervals.

Result

- » You can now use the ultrasonic bath.

5.4 Setting the temperature

Requirements

- The device must have been switched on at the main switch.

Procedure

1. Press the "SET" button for 3 seconds. The current setpoint will be displayed, and the °C temperature unit symbol begins to flash.
2. Use the ▲ and buttons ▼ to set the target temperature in the range of 5 - 30 °C.
3. Confirm the set value by pressing the "SET" button.

Result

- » The laboratory chiller will begin to cool depending on the selected temperature.

5.5 Notes on sonication

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 contamination, replace the contact liquid.
- Only use accessories approved by the manufacturer.
- Allow the ultrasound to be switched off while inserting or removing sample vessels.
- Remove air bubbles under the sample vessels. The ultrasound only acts where liquid has contact with the object of sonication or the sample vessel.

5.6 Troubleshooting

Overview of error messages issued:

Error	Possible causes	Troubleshooting
The display does not switch on.	No power supply.	Check that the plug is fully inserted into the socket.
Inadequate water cooling.	Insufficient water flow	Check the filling level, the hose lines and the function of the integrated pump.
	Exhaust air from the ventilation grille is at room temperature.	Defective cooling compressor. Contact the supplier to repair the device.
The message "HA2" (overheating) appears on the display.	Air filter dirty	Clean the air filter.
	Ambient temperature too high	Restore the necessary maximum permissible ambient temperature (38 °C).
The message "P1" appears on the display.	Water temperature sensor defective	Contact the supplier to repair the device.
The message "P2" appears on the display.	Overheating temperature sensor defective	Contact the supplier to repair the device.
The message "HA" appears on the display.	High water temperature	Check the filling level and the hose lines.
		Check that the cooling function is switched on.
The displayed temperature is not the actual one.	The water is not circulating properly in the circuit.	Check the filling level, the hose lines and the function of the integrated pump.
	The lines are too long.	Shorten and insulate the lines as much as possible.

6 Maintenance

In the event of improper or irregular disinfection of the laboratory chiller, microbiological contamination is possible due to the settlement of microorganisms, especially in the hoses, which can lead to cross-contamination. Therefore, the liquid circuit and the device surface must be regularly disinfected and cleaned.

6.1 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.

6.2 Rinsing the liquid circuit

During operation, the circuit for the contact liquid runs from the outlet of the ultrasonic bath via the pump to the cooling unit and, from there, back into the ultrasonic bath. For hygienic reasons, this circuit must be rinsed regularly.

- Fill the ultrasonic bath with liquid.
- Switch on the laboratory chiller. The pump will start conveying and will rinse the cooling unit.
- Allow the pump to run for at least 5 minutes.
- Switch off and empty the laboratory chiller.
- Repeat the described rinsing process at least twice.

6.3 Servicing

6.3.1 On-site servicing

WARNING

Damage to the device

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

Cleaning the filter

Filter cleaning must be carried out at least once a month or more frequently according to the dust load in the installation environment.

Requirements

- The device must have been switched off at the main switch.

Procedure

1. Open the supply air opening from above and remove the filter.
2. Clean the filter by washing it with warm water.
3. Replace the filter and close the supply air opening.

Result

- » The device is ready for use again.

WARNING

Damage to the device

- Do not use hard brushes or sharp objects, to avoid damaging the filter.

6.3.2 Maintenance kit

Scope of delivery - order number 7363:

- 1× pump (ready to install)
- 1 × hose, 3 m (cut to size)
- 4x cable ties



Pump

Requirements

- The device must have been switched off at the main switch.

Procedure

1. Disconnect the mains plug of the device.
2. Open the rear housing cover by loosening the 6 screws.
3. Remove the hoses from the pump. Liquid may leak out: if necessary, place a rag ready to mop it up.
4. Remove the electrical connections from the pump.
5. Unscrew the pump by loosening the 6 screws under the housing. To do this, tilt the laboratory chiller forward.
6. You can now remove the pump from the rear housing cover and replace it with the new one. Place the pump in the housing so that the horizontal connection protrudes far enough to reattach the hose.

The assembly of the new pump is carried out in the reverse order.

If necessary, the hoses can be renewed and fixed with cable ties.

6.4 Storage/safekeeping

If the laboratory chiller is not used for a long time, it must be disconnected from the mains and stored in a cool, dry place.

WARNING

Damage to the device

- Because of the residual liquid remaining in the cooling unit, frost-free conditions must be ensured during storage and transport.

6.5 Emptying the system

If the laboratory chiller needs to be sent to the manufacturer for repair or stored unused for a prolonged period of time, the system must be emptied.

- Disconnect the hoses and channel the liquid from the laboratory chiller into an outlet or bucket.
- To empty, tilt the laboratory chiller by a maximum of 90° so as to also remove the liquid from the cooling coils.

6.6 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 (UVV) 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.

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

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



8 Information about the device

8.1 Technical data

Type	LC 400
Weight, net	16.5 kg
Inlet	13-mm hose socket
Outlet	13-mm hose socket
Flow rate	Max. 600 l/h
Adjustable temperature range	5-30 °C
Cooling power	400 W
Temperature display	Yes
Refrigerant	R-290
Refrigerant quantity	90 g
Air volume flow	155 m ³ /h
Pump type	Centrifugal pump
Pump power	10 W
External dimensions L × W × H [mm]	410 × 320 × 420
Housing material	Metal, plastic
Degree of protection	IP 20
Mains supply	230 V~ (± 10%), 50 Hz
Power consumption	270 W
Current consumption	1.5 A
Leakage current	< 3.5 mA
Mains cable	1.3 m

8.2 Environmental conditions

Overvoltage category	II
Degree of contamination:	2
Permissible ambient temperature:	10 to 38 °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, with specification of the serial number.

9 Accessories

Expansion kit 1 – order number 3851

For connecting a second ultrasonic bath to the LC 400 laboratory chiller

Expansion kit 2 – order number 3852

For connection to the SA 1028 shaking device

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