LAUDA

Operating instructions

ECOLINE ★ STAREDITION

Immersion thermostat E 100
Bath/ Circulation thermostats
E 106 T, E 112 T, E 115 T, E 120 T,
E 103, E 111, E 119, E 125, E 140

YAEE0012
Valid from series 04-0001
from software version 4.0
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Prefixed safety notes

Before operating the equipment please read carefully all the instructions and safety notes. If you have any questions please phone us!

Follow the instructions on setting up, operation etc. This is the only way to avoid incorrect operation of the equipment and to ensure full warranty protection.

- Transport the equipment with care!
- Equipment and its internal parts can be damaged:
  - by dropping,
  - by shock.
- Equipment must only be operated by technically qualified personnel!
- Never operate the equipment without the heat transfer liquid!
- Do not start up the equipment if
  - it is damaged or leaking,
  - the supply cable is damaged.
- Switch off the equipment and pull out the mains plug for:
  - servicing or repair,
  - before moving the equipment!
- Drain the bath before moving the equipment!
- The device may not be technically changed!
- Have the equipment serviced or repaired by properly qualified personnel only!

The Operating Instructions include additional safety notes which are identified by a triangle with an exclamation mark. Carefully read the instructions and follow them accurately! Disregarding the instructions may have serious consequences, such as damage to the equipment, damage to property or injury to personnel.

We reserve the right to make technical alterations!

Explanation of signs:

	Danger:	This sign is used where there may be injury to personnel if a recommendation is not followed accurately or is disregarded.
	Note:	Here special attention is drawn to some aspect. May include reference to danger.
	Reference:	Refers to other information in different sections.

Contents

1 Safety notes

1.1 General safety notes

A laboratory thermostat is intended for heating and pumping liquids according to the needs of the user. This leads to hazards by high temperatures, fire, and the general hazards by the use of electrical energy.

The user is largely protected through the application of the appropriate standard specifications.

Additional hazards may arise from the type of material being thermostated, e.g. by exceeding or undercutting certain temperature levels or through breaking of the container and reaction with the heat transfer liquid.
It is not possible to cover all possibilities; they remain largely within the responsibility and the judgement of the user.

The unit must only be used as intended and as described in these Operating Instructions. This includes operation by suitably instructed qualified personnel.

The units are not designed for use under medical conditions according to DIN EN 60601-1 or IEC 601-1!

Classes of the EMC standard EN 61326-1 (VDE 0843-20-1:2006-10):

Class A: Operation only on networks without connected domestic areas.
Class B: Equipment for operation on networks with connected domestic areas.

Valid for Europe:
The device according to EMC (electromagnetic compatibility) requirements DIN EN 61326-1 (⇨ 10).

Use restriction
To EMC standard DIN EN 61326-1:
Class A devices must not be operated in power networks with connected domestic areas!

Valid for the USA:
Instructions for Class A digital devices
“This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC (Federal Communication Commission) Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.”
“This device complies with Part 15 of the FCC (Federal Communication Commission) Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.”

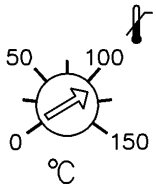
Valid for Canada:
“This Class A digital apparatus complies with Canadian ICES-003” (ICES = Interference Causing Equipment Standards).
« Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada ».

1.2 Other safety notes

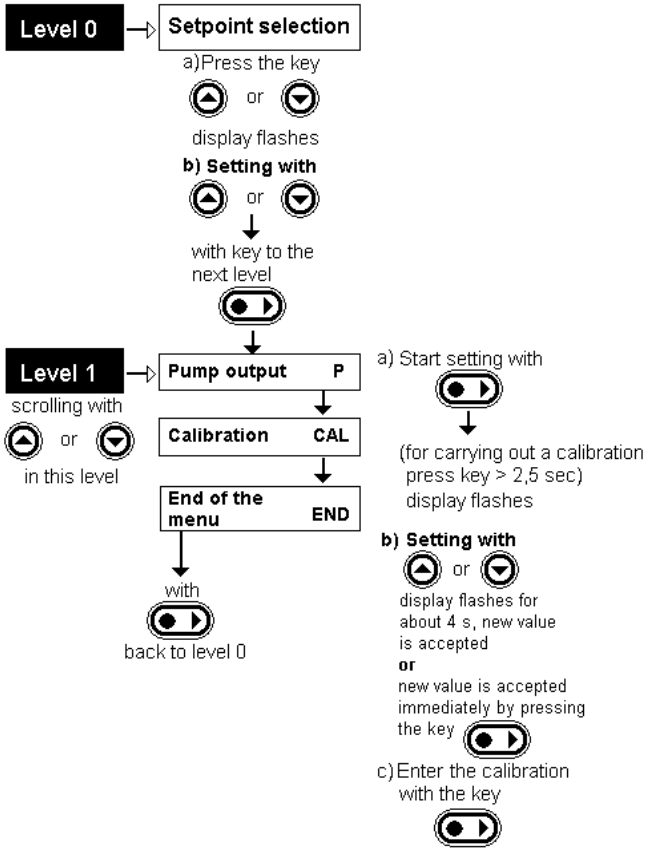
- Check the device carefully for shipping damage before putting into operation. The device should not be put into operation if shipping damage has been found.
- Connect the unit to a grounded mains power socket.
- Parts of the bath cover may reach surface temperatures above 70 °C when operating at higher temperatures. Take care when touching it! Danger of burns!
- Use suitable hoses (⇨ Section 6.3).
- Protect tubing with hose clips against slipping off. Prevent kinking of tubing!
- Check tubing from time to time for possible material defects.
- Heat transfer tubing and other hot parts must not come into contact with the supply cable!
- When using the thermostat as circulation thermostat, failure of tubing may lead to leaking of hot liquid and become a danger to personnel and objects.
- When no external consumer is connected to the thermostat the pump outflow connection must be closed (use closing plugs) or linked to the return.
- Don’t change the pump connections with the connections of the cooling coil!
- Allow for expansion of the heat transfer liquid at elevated temperatures
- Depending on the heat transfer liquid used and the mode of operation it is possible for toxic vapours to be produced. Ensure appropriate ventilation!
- Immersion thermostats have to be fixed carefully at the bath vessels!
- Only use bath vessels which are appropriate for the intended operating temperatures!
- When changing the heat transfer liquid from water to oil, for temperatures above 100 °C, carefully remove all traces of water, also from tubing and from the external consumer, otherwise → danger of burns through delayed boiling!
- The cooling coil with the cooling water has only to be used for operating temperatures below 100 °C. At higher temperatures→ danger of hot vapour to be produced!
- Always pull out the mains plug before cleaning, maintenance or moving the thermostat!
- Repairs on the control unit and the refrigeration system must be carried out by properly qualified personnel only!
- Values for temperature control and indicating accuracy apply under normal conditions according to DIN 12876. High-frequency electromagnetic fields may under special conditions lead to unfavourable values. This does not affect the safety.

2 Brief operating instructions

This brief instruction shall give you the possibility to operate the unit quickly. For safe operation of the unit, it is absolutely necessary to read carefully all the instructions and safety notes!

1. Assemble unit and add items as appropriate (⇨ Section 6).
   Take care of the hose tubing connections (⇨ Section 6.1 and 6.4).
2. Fill the unit with corresponding heat transfer liquid (⇨ Section 6.3).
   The units are designed for operation with non-flammable and flammable liquids to DIN EN 61010-2-010. → Take care of the level of the heat transfer liquid! (⇨ Section 6.2.)
3. Connect the unit only to a socket with a protective earth (PE) connection.
   Compare the information on the rating label with the supply details.
4. 

   Using a screwdriver, set the overtemperature cut-out point to a value clearly above ambient temperature (⇨ Section 7.5.1).
5. Switch on at the mains switch  .
6. Setting of the functions



3 Control and functional elements

4 Unit description

4.1 Environmental conditions

The operation of the thermostats is only allowed under the following conditions as specified in DIN EN 61010-1:2001 and DIN EN 61010-2-010:2003:

- Indoor use.
- Altitude up to 2000 m above sea level.
- Foundation must be dense, even, non-slippery and non-flammable.
- Keep clear distance (⇨ Chapter 6.1 Assembly and setting up).
- Ambient temperature range (⇨ Chapter 10).
  Use only within this range for an undisturbed operation.
- Mains supply voltage fluctuations (⇨ Chapter 10).
- Relative humidity (⇨ 10).
- Transient over voltage according to Installation Categories (Over voltage Categories) II
- Pollution degree: 2.

4.2 Unit description

The immersion thermostat E 100 has a device for fixing the immersion thermostat to the bath vessel (clamping bracket). An adapter is supplied for the deep-drawn LAUDA baths 003, 011, 019 and 025.

The type designation of the Ecoline bath/ circulation thermostats consists of the control unit E 100 and the type of bath.

Example: Control unit E 100 and bath 003 produces Thermostat Type E 103.

The letter T (for “Transparent”) refers to the baths made of polycarbonate. Type E 103 is supplied with bath cover. For other baths made of stainless steel bath covers are available as accessory.
(⇨ Section 9).

4.3 Pump

All units are supplied with a pressure pump with vario drive. The pump has an outlet with a rotatable bend (Immersion Thermostat) which is connected to the pump nipple for external thermostating circuits (bath/circulation thermostats). An additional outlet provides circulation inside the bath. By turning the setting knob it is possible to choose between both outlets or to divide the flows.

The pump chamber of immersion thermostats is rotatable in a restricted way to reach an optimal circulation. The pump operates up to cinematic viscosities of 150 mm²/s during heating up. To get an optimum accuracy of control a viscosity of <30 mm²/s is recommended.

One of five pump output steps can be selected using the operating menu.
On small bath thermostats (e.g. E 103 or E 106 T) and with operation as bath thermostat it is advisable to use output step 1. The advantage is a low heat generation while having a uniform circulation that means, that the unit can work without cooling down to just above ambient temperature.

When operating as circulation thermostat with an external circuit it is preferable to use a larger flow setting in order to ensure a small temperature difference, especially at higher temperatures and in conjunction with oil as the heat transfer liquid.

The pump pressure outlet can be closed off without causing any damage to the pump.

Pump characteristics (⇨ Section 10 Technical Data).

4.4 Materials

All parts which come into contact with the heat transfer liquid are made from high-grade materials appropriate to the operating temperature. These are rust-free stainless steel, the plastics PPS, polycarbonate (bath 006 T, 012 T, 015 T, 020 T) and fluoride rubber.

4.5 Temperature indication, control, and safety circuit

The unit is provided with a 7-segment LCD-Display (3 ½ places) with additional symbols for indicating bath temperature and settings as well as operating states.
The set point is input and additional adjustments can be made using either two or three keys.

A Pt100 temperature probe is used for measuring the actual temperature and for control. A second Pt100 serves as temperature probe for the safety circuit (overtemperature protection) which is independent of the control function.

A low-level cut-out switches off the heating on both poles in order to prevent dry operation of the heater. The pump is switched off through the electronics. The setting of the overtemperature cut-out is adjusted with a tool on a potentiometer and is always limited to 5 °C above the operating temperature range.

All settings and fault messages are stored in the memory on supply failure or when the mains switch is set to OFF.

The tubular heater is controlled from a modified PID controller through a triac circuit specially designed to be unaffected by supply variations and interference.

5 Unpacking

After the unit and accessories have been unpacked they have to be examined for possible transport damage. If there is any damage visible on the unit, the forwarding agent or the post office has to be notified so that the shipment can be examined.
Please also inform the LAUDA Service Constant Temperature Equipment (Contact ⇨ 8.5).

Standard accessories:

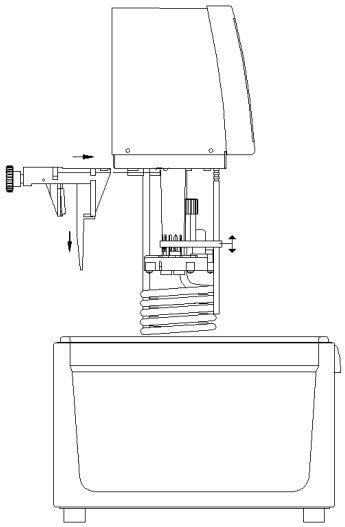
Article number	Quantity	Designation	suitable for
UD 425	1	Clamp complete	immersion thermostat E 100
HDQ 078	1	Bath cover FBH 604	E 103 only
---	1	Pump set with cooling coil	for bath/ circulation thermostats
UD 435	1	Closing plugs	for bath/ circulation thermostats
EZB 260	1	Warning label “HOT” 	for all thermostats
YAEE0012	1	Operating Instructions (this document)	on all immersion and Bath/Circulation thermostats

6 Preparations

6.1 Assembly and setting up

a) Immersion Thermostat

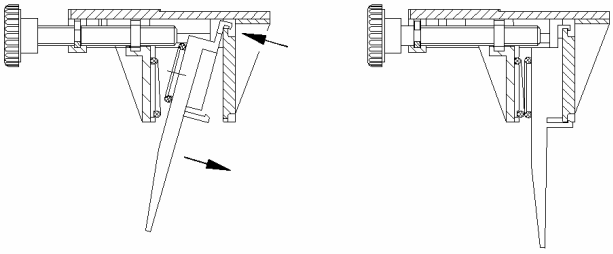
Hang the thermostat into the bath which is to be thermostated.
(Baths (⇨ Section 9) Accessories)



- In baths made of plastic the heater must not have contact to the sides of the bath!
- Do not cover the ventilation opening at the back of the unit.
- Keep clear distance of at least 20 cm.

Adjustment of the pump chamber

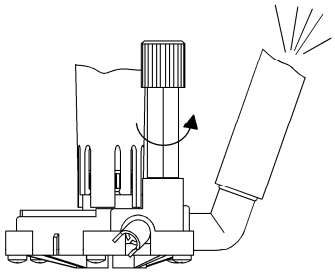
- The fixation of the temperature probe has to be moved upwards approx. 15 mm.
- Adjust the pump chamber.
- Move the fixation of the temperature probe downwards again (see ill. on the left).



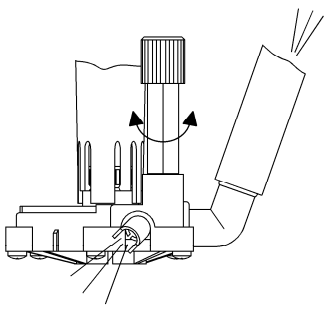
- For all LAUDA baths (plastic and deep-drawn baths), please fix the adapter (standard accessory) on the clamping bracket.
- Turn the jet nozzle to face diagonally into the bath. The outflow for the bath circulation can then be closed.
- Turn the setting knob to the left (see. ill. 1).

Adjustments of the pump outflows (⇨ Section 6.4)

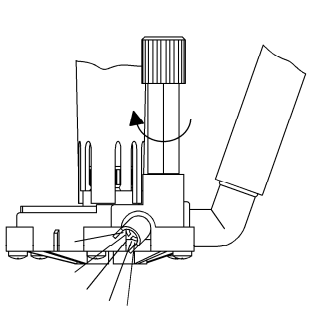
ill. 1: Setting knob turned anticlockwise



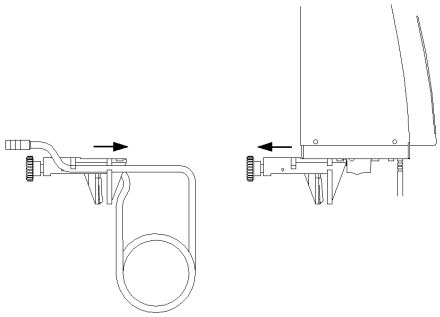
ill. 2: Setting knob medium position



ill. 3.: Setting knob turned clockwise

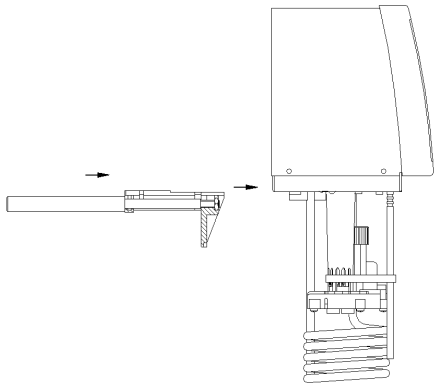


Operation with cooling coil (⇨ Section 9)



- Pull the clamping bracket to the back for fixing the cooling coil while releasing it with a screwdriver.
- Push the cooling coil on the clamping bracket.
- Install the clamping bracket again.

Operation with fixing rod (⇨ Section 9)

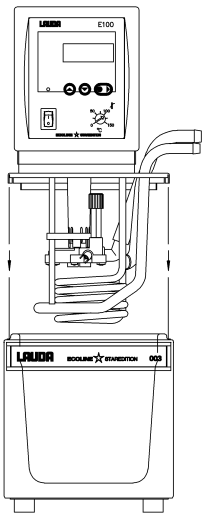


- Pull the clamping bracket to the back while releasing it with a screwdriver.
- Install the fixing rod together with the clamping bracket.

Operation with external consumer (⇨ Section 6.4)

- The immersion thermostats have to be fixed carefully at the bath, for they must not fall into the bath.
- In that case don't touch the heat transfer liquid! Pull out mains plug immediately!

b) Bath/ Circulation thermostats



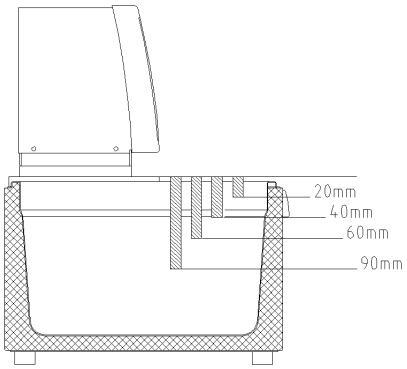
- Place the unit on a flat surface.
- Do not cover the ventilation openings at the back.
- Keep a clear distance of at least 20 cm.
- Put the control unit with the bath bridge on the bath.
- When operating without an external consumer (bath thermostat) the setting knob has to be turned so that the flow comes out of the outlet for bath circulation. (⇨ Section 6.1, ill. 3)

Operation with external consumer (⇨ Section 6.4)

- When operating as bath thermostat without external consumer the pump outflow connection has to be closed (use closing plugs) or linked to the pump return.
- At bath temperature above 70 °C the label  supplied must be affixed on the bath in a clearly visible position.

6.2 Filling and emptying

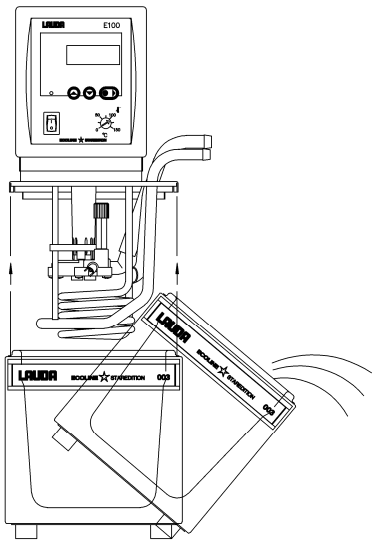
Filling



- Fill baths up to a maximum level of 20 mm below the bath bridge.
- Optimum operation at 20-40 mm below the bath bridge.
- Operation is possible down to 60 mm below the bath bridge.
- The low-level cut-out operates at approx. 90 mm below the bath bridge.

- With the use of heat transfer liquids note that they expand on heating (approx. 10 %/100 °K).
- When operating with an external consumer the total expansion takes place in the bath.

Emptying



- Switch off the thermostat, pull out the mains plug!

a) Immersion thermostat

- Unscrew the immersion thermostat.
- Drain the bath.

b) Bath/Circulation thermostat

- Take off the control unit with the bath bridge.
- Drain the bath.

- The units are designed for operation with non-flammable and flammable liquids to DIN EN 61010-2-010! Flammable liquids can be operated up to no more than 25 °C below the fire point (⇨ Section 6.3).
- Observe the appropriate regulation when disposing used heat transfer liquid.
- When connecting an external consumer take care that the level of the heat transfer liquid does not drop too much → fill in heat transfer liquid if necessary.

- Do not drain the heat transfer liquid when it is hot or very cold (below 0 °C)!

6.3 Heat transfer liquids and hose connections

Heat transfer liquids

LAUDA Designation	Working temperature range	Chemical Designation	Viscosity (kin)	Viscosity (kin) at Temperature	Fire point	Size Catalogue number		
	from °C to °C		mm²/s at 20 °C	mm²/s	°C	5 L	10 L	20 L
Aqua 90 ①	5...90	decalcified water	1	--	--	LZB 120	LZB 220	LZB 320
Kryo 30 ②	-30...90	Mono-ethylene glycol/water	4	50 at -25 °C	--	LZB 109	LZB 209	LZB 309
Kryo 51	-50...120	Silicone oil	5	34 at -50 °C	> 160	LZB 121	LZB 221	LZB 321
Kryo 20	-20...180	Silicone oil	11	28 at -20 °C	> 230	LZB 116	LZB 216	LZB 316
Ultra 350 ③	30...200	synthetic heat transfer liquid	47	28 at 30 °C	≧ 240	LZB 107	LZB 207	LZB 307
Therm 200	60...200	Silicone oil	54	28 at 60 °C	≧ 362	LZB 117	LZB 217	LZB 317

① At higher temperatures → evaporation losses → use bath cover (⇨ Section 9). Distilled water or fully deionised water must only be used with the addition of 0.1 g sodium carbonate (Na_2CO_3)/litre water, otherwise → danger of corrosion!

② Water content falls after prolonged operation at higher temperatures → Mixture becomes flammable (flash point 128 °C) → Check the mixture ratio with a densimeter.

③ Do not use in conjunction with EPDM tubing!

– When selecting heat transfer liquids it should be noted that performance must be expected to worsen at the lower limit of the operating temperature range due to increasing viscosity. The full operating range should only be utilised if really necessary.

– The operating ranges of the heat transfer liquids and tubing represent general data which may be limited by the operating temperature range of the unit.

– Silicone oil causes pronounced swelling of Silicone rubber → never uses Silicone oil with Silicone tubing!

Safety data sheets are available on request!

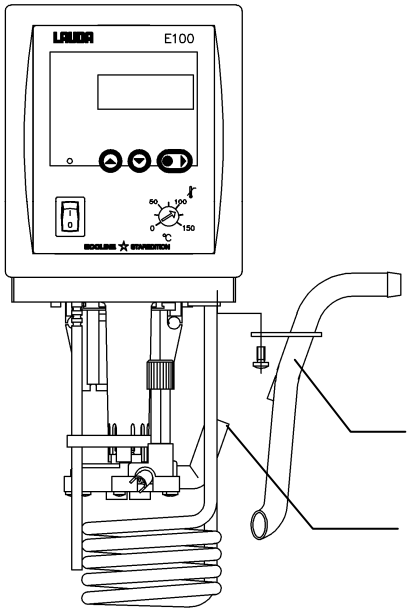
Hose connections

Tubing type	Int. diameter Ø mm	Temperature range °C	Application	Catalogue number
EPDM-tubing, non-insulated	12	10...120	for all heat transfer liquids except for Ultra 350 and mineral oils	**RKJ 112**
EPDM-tubing, insulated	12 external diameter approx. 35 mm	-60...120	for all heat transfer liquids except for Ultra 350 and mineral oils	**LZS 021**
EPDM-tubing insulated	12 external diameter approx. 55 mm	-100...120	for all heat transfer liquids except for Ultra 350 and mineral oils	**LZS 022**
Silicone tubing, non-insulated	11	10...100	water, water/glycol mixture	**RKJ 059**
Silicone tubing insulated	11 external diameter approx. 35 mm	-60...100	water, water/glycol mixture	**LZS 007**
Viton	11	10...200	for all heat transfer liquids	**RKJ 091**
Viton insulated	11 external diameter approx. 32 mm	-60...150	for all heat transfer liquids	**LZS 018**

- EPDM-tube, not for Ultra 350 and not for mineral oils!
- Silicone oil causes pronounced swelling of Silicone rubber → never uses Silicone oil with Silicone tubing!
- Protect tubing with hose clips against slipping off.

6.4 Connection of external circuits

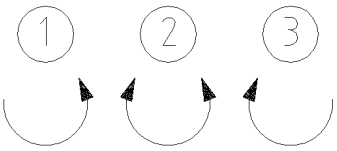
a) Immersion thermostat

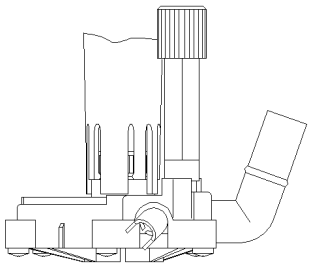


External pump set

Jet nozzle

- Push 11-12 mm internal diameter tubing (⇨ Section 6.3) directly onto the jet nozzle and connect it to the external consumer.
- Hang the return tubing into the bath and fix it!
- We recommend to use the external pump set (⇨ Section 9)
  i**n this case**
- Screw on the external pump set.
- Install the connecting tube.

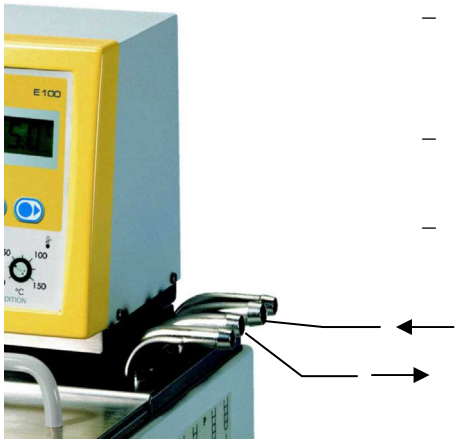




- Using the setting knob at the pump outflows, divide up the pump flow in accordance to the thermostating task (⇨ Section 6.1).
- Position ① → maximum flow in the external circuit, the setting knob is turned anticlockwise.
- Position ②→ flow passes through pump outflow and outlet for bath circulation, the setting knob is in medium position.
- Position ③ → external circuit is closed and the outlet for bath circulation fully open, the setting knob is turned clockwise.

- Operate the setting knob only when the bath contents are near ambient temperature.
- When no tubing is connected, close the pump outflow connection with closing plugs even in position ③.

b) Circulation thermostat



- When used as circulation thermostat, care for shortest hose connections with largest inner diameter as possible. This gives the best flow.
- Connect 11-12 mm internal diameter tubing (⇨ Section 6.3) to pump connector.
- Pump connections:
  – return to bath
  – pump outflow
  (⇨ labelling housing)

- If the cross-section of the tubing is too small → temperature drop between bath and external system due to low flow rate. Increase the bath temperature appropriately.
- Always ensure the maximum possible flow cross-section in the external circuit!

- When the external consumer is placed at a higher level than the thermostat, the pump is stopped and air penetrates into the thermostating circuit the external heat transfer liquid may drain down into the bath even with a closed system → danger of flooding the thermostat!
- Protect tubing with hose clips against slipping off!
- When no external consumer is connected to the thermostat, the pump outflow connection must be closed (use closing plugs) or linked to the return!

6.5 Cooling the thermostats

At bath temperatures down to just above ambient temperature (approx. 2 – 10 °C) it is possible to work without cooling. Additional cooling is required for lower temperatures.

Immersion thermostat: → attach the cooling coil (⇨ Section 6.1).

Bath/ Circulation thermostats: → fitted with cooling coil, as standard.

Cooling possibilities:

1. down to 20 °C — Mains water → keep the water consumption as low as possible!
2. down to –40 °C — flow-through cooler DLK 10/ DLK 25/ DLK 45 (depending on bath size and temperature, (⇨ Section 10 → use water-glycol mixture (ratio 1:1).

- Use insulated tubing!
- When thermostating an external system the equipment must be arranged in the following order: thermostat → external circuit → flow-through cooler → thermostat.

7 Starting up

7.1 Connection to the supply

Compare the supply voltage against the data on the rating label.

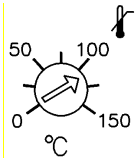
Model according to EMC directive DIN EN 61326-1 Class (⇨ 10).

- Connect the unit only to a grounded mains power socket (PE).
- No warranty when the thermostat is connected to a wrong supply!
- Please make sure that your mains plug is equipped with at least the following safety fuses.

Power supply	Fuse protection
230 V	16 A
208 V	15 A
115 V	15 A

- Without external circuit ensure that the pump pressure outflow is closed or linked to the pump return.
- Ensure that the unit is filled in accordance with Section 6.2!

7.2 Switching on

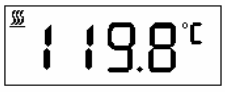


- Using a screwdriver set the overtemperature switch-off point to a value clearly above ambient temperature.

- Switch on at the mains switch. The green LED for “Supply ON” lights up.

0.25 sec

- A tone sounds for approx. 0.25 sec.
- The unit self-test starts up. All display segments and symbols light up for approx. 1 sec. Then the software version is indicated (VER x.x) for approx. 1 sec.



- Display shows the actual bath temperature. The pump starts up. The values which were active before switching off are entered.

- If necessary add more heat transfer liquid to replace the amount pumped out to the external consumer.
- If the pump does not purge the system immediately. The unit may switch off again although it is filled sufficiently (only when starting up for the first time).

– A double signal tone sounds.

– The display for low level **LLL** appears.

– The fault triangle is flashing.

– Press the key. If necessary repeat several times.

– Also press the key if the unit had switched off under a fault condition.

7.3 Set point selection

or

– Shortly press one of these keys → adjusted set point appears for approx. 4 sec.

– °C is flashing, in contrast to the actual value.

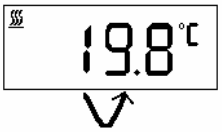
or

During the 4 sec. start to set the required set point using the keys.

– Speeding the setting process by:

a) continuous pressing the keys **or**

b) pressing one key (holding it down) and shortly pressing the other key.



– Briefly releasing (1s) the key (s) and again pressing one of the keys moves the cursor one **place to the right.**

– Display flashes 4 sec → the new value is accepted automatically, **or**

– value is entered immediately with this key.

– For safety reasons the set point can only be adjusted up to 2 °C above the upper limit of the operating temperature range of the particular unit type.

7.4 Menu functions

– Switching from set point selection (level 0) to level 1 using the key

or

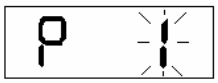
– Within one level it is possible to scroll using the keys.

– **In principle**, after each setting has been made it is entered automatically after approx. 4 sec **or**

– settings are entered immediately on operating this key.

7.4.1 Pump output

– Display shows **P** and actual pump output step **1...5**.



– Press the key → display flashes approx. 4 sec.

– During this time start to set the required step with the keys.
1 = low pump output
2 , 3 , 4 = medium pump output
5 = maximum pump output

– The pump responds immediately (can be heard).
(Setting is entered after approx. 4 sec (⇨ 7.4)).

– Move forward with key to “User calibration” **or**

– back with the key to the actual value display.

7.4.2 User calibration

– Remove the external consumers and switch the setting knob of the pump to right side (Position 3, ⇨ Section 6.4).

– A reference thermometer with necessary accuracy is required. Otherwise the factory calibration should not be altered. The reference thermometer has to be inserted far enough and long enough into the bath.

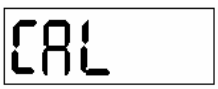
– It is not allowed to calibrate to more than ±3 °C. Multiple calibration to more than ±3 °C cause internal faults (after 2 min. **“EEE”** changing with **“1006”** or with **“16”**).

– **The factory calibration will be lost through overwriting. Please work carefully!!!**

and **1x**

– Directly from level 0 (actual value display), press key combination on the left **or**

– with key from pump output.



> 2.5 sec

1. The display shows **CAL**. To carry out a calibration, press the key longer than 2.5 sec.

2. The actual value appears and flashes approx. 4 sec.


or


3. Input the value indicated on the reference thermometer with one of the two keys.

4. The additive calibration must be entered with the key shown on the left.

5. Forward with key to **END, then**

6. with key to actual value display **or**

7. with key back to pump output.

Example

a) Insert a suitable thermometer into the bath (long enough and far enough).

b) Remove the external consumers and turn the setting knob of the pump outflows to the right side.

c) Set the set point to a temperature where you use to work (e.g. set the set point to 45 °C (⇨ Section 7.3)).

d) Wait until the actual bath temperature has reached the set point temperature of 45 °C and until the indication on the reference thermometer does not change any more.

e) Remove the reference thermometer, which shows e.g. 44.8 °C.

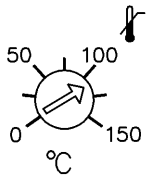
f) Select CAL on the display and go forward as mentioned under point 1-7. The actual bath temperature switches from 45 °C to 44.8 °C and the unit starts to heat up until the actual bath temperature has reached 45 °C (→ the reference thermometer should also indicate 45 °C).

7.5 Warning and safety functions

7.5.1 Overtemperature protection and testing

Every 6 month or before the unit is running unattended for longer periods this protection must be tested.

– The units are designed for operation with non-flammable and flammable liquids to DIN EN 61010-2-010!



– Set the overtemperature switch-off point. Recommended setting 5 °C above required bath temperature.

– Not higher than 25 °C below the fire point of the heat transfer liquid (⇨ Section 6.3).

– The actual switch-off point is indicated on the display, e.g. **110 °C**.

– The position of the potentiometer is decisive for the setting. The display is just a help for the setting.

– Setting is possible only up to an upper limit of the operating temperature range + 5 °C.

– When the bath temperature arises above the overtemperature switch-off point:

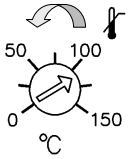
1. Double signal tone sounds.
2. The display shows the indication for overtemperature **ttt** the fault triangle is flashing.
   → heating is switched off on both poles,
   → pump is switched off by the electronics.

– Rectify the cause of the fault.

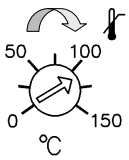
– Wait until the bath temperature has cooled down below the switch-off point or set the switch-off point at a higher value. When the display shows **ttt** (TEMP).

– reset with the key.

– Before the unit is run is running unattended for longer periods **overtemperature protection** should be tested. **Therefore:**



– Turn the potentiometer slowly anticlockwise.
→ The unit must switch off at the bath temperature.



– Step 1 - 2 (see above) must follow.

– Set the overtemperature switch-off point again above the bath temperature and wait until the indication **ttt** appears on the display, **then**

– reset with the key.

7.5.2 Low-level protection and testing

Every 6 month or before the unit is running unattended for longer periods this protection must be tested.

– Double signal tone sounds, if the heat transfer liquid falls so much that the heater is no longer covered with liquid completely.

1. The display shows **LLL** (low-level) and the fault triangle is flashing
   → heating is switched off on both poles,
   → pump is switched off by the electronics.

2. Top up the bath (⇨ Section 6.2) and reset with the key.

– If necessary repeat several times in case that the pump does not purge immediately.

– **Testing at regular intervals** by lowering the bath level. Place a hose on the pump connector and pump some of the heat transfer liquid into a suitable container.

– Step 1 - 2 must follow.

– Bath temperature during this test not below 0 °C or higher than 50 °C, otherwise danger of burn injuries!

– If there is any irregularity when testing the safety devices, switch off the unit immediately and pull out the mains plug!

– Have the unit checked by the **LAUDA Service Constant Temperature Equipment** or the local service organisation!!

7.5.3 Pump motor monitoring

– In case of pump motor overload or a blockage the heating and the pump are switched off.

– Double signal tone sounds.

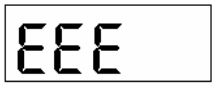
– The display shows **PPP** and the fault triangle is flashing.

– Rectify the cause of the fault, i.e. clean the pump or check the viscosity, **then**

– reset with key.

– If several faults appear simultaneously, they have to be reset individually.

7.5.4 Other error messages



– Other error messages shown on display **EEE** changes with error code, e.g. 4.

– In case of error messages please contact the LAUDA Service Constant Temperature Equipment or the service department of your LAUDA agent! (⇨ 8.3)

– If the fault report is repeated → pull out the mains plug and try whether the motor can be rotated by the fan blade inserting a screwdriver into the ventilation opening at the back of the unit.

– Error code 0 ...255 → microprocessor error.

– Error code 1000...1255 → slave processor error.

– Indication can be used for remote diagnosis.

– After rectifying the fault, reset with the key.

8 Maintenance

8.1 Cleaning

Before cleaning the unit, pull out the mains plug!

The unit can be cleaned with water adding a few drops of detergent (washing up liquid), using a moist cloth.

Water must not enter the control unit!

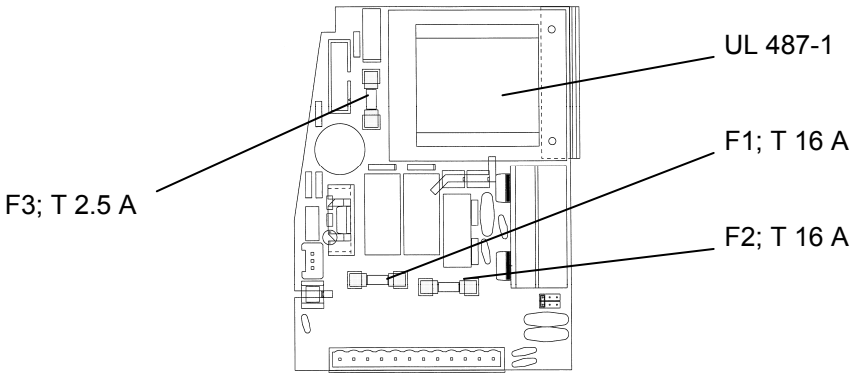
- Carry out appropriate detoxification if dangerous material has been spilled on or inside the unit.
- Method of cleaning and detoxification are decided by the special knowledge of the user. In case of doubt please contact the manufacturer.

8.2 Maintenance and repair

- Before any maintenance and repair work pull out the mains plug!
- Repair on the control unit must only be carried out by properly qualified personnel!

LAUDA thermostats are largely maintenance-free. If the heat carrier liquid becomes dirty it has to be replaced. (⇨ Section 8.4 and 6.2)

- If a fuse blows (→ supply indication not alight) fit only fuses as specified. (2 x T 16 A; 1 x T 2.5 A; size 5 x 20 → fuses are inside the unit).



Before sending us the unit, please contact our technical service. (⇨ Section 8.5)

If the equipment does have to be returned to the factory, it may only be necessary to dismantle the thermostat unit and return it.

- If the equipment has to be returned to the factory, please ensure that it is carefully and properly packed. LAUDA accepts no responsibility for damage due to unsatisfactory packing.

8.3 Service intervals according to VDI 3033

System part	Frequency	Comment
	Each time of putting into operation and then	
Complete device		
External condition of the device	Monthly	
Heat transfer liquid		
Analysis of the heat transfer liquid	(⇨ 8.4)	
Vessel with drain tap		
Sealing	Daily	External visual inspection
External hoses		
Material fatigue	Monthly	External visual inspection
Electronics		
Over temperature protection	Every 6 month or before the unit is running unattended for longer periods	(⇨ 7.5.1)
Low-level protection		(⇨ 7.5.2)

8.4 Testing the heat transfer liquid

If the heat transfer liquid becomes contaminated, it has to be replaced.

If required, the heat carrier should be checked for capability for use (e.g. when changing the method of operation), or at least half-yearly. Further use of the heat carrier is only permissible if the inspection indicates this.

The test of the heat transfer liquid should takes place according to DIN 51529;
Testing of mineral oils and related products - Testing and evaluation of used heat transfer fluids
Source: VDI 3033; DIN 51529.

8.5 Ordering spares

When ordering spares please quote instrument type and serial number from the rating label. This avoids queries and supply of incorrect items.

The serial number is combined like following, for example **LCB0691-09-0001**

LCB0691 = Catalogue number
09 = manufacturing year 2009
0001 = continuous numbering

Your contact for service and support:

LAUDA Service Constant Temperature Equipment
Phone: 0049 9343/ 503-236 (English and German)
Fax: 0049 9343/ 503-283
E-mail service@lauda.de

We are available any time for your queries, suggestions and criticism!

LAUDA DR. R. WOBSER GMBH & CO. KG
Post office box 1251
97912 Lauda-Koenigshofen
Germany
Phone: 0049 9343/ 503-0
Fax: 0049 9343/ 503-222
E-mail info@lauda.de
Internet http://www.lauda.de/

9 Accessories

Accessories for immersion thermostats

Accessories	Catalogue number
Cooling coil	HOK 064
External pump set (pressure and return connection)	LCZ 0638
Fixing rod	LCZ 0637

Bath vessels	Materials	Max. Temperature (°C)	Volume (L)	Inner size (W x D x H)	Catalogue number
006 T	polycarbonate	100	5 to 7	130 x 420 x 160 *	LCZ 0628
012 T	polycarbonate	100	9 to 13	300 x 315 x 160	LCZ 0629
015 T	polycarbonate	100	10 to 5	416 x 130 x 310	LCZ 0630
020 T	polycarbonate	100	14 to 20	300 x 490 x 160	LCZ 0631
003	deep-drawn stainless steel	150	2.5 to 3.5	135 x 240 x 150 *	LCZ 0620
011	deep-drawn stainless steel	150	9 to 12	300 x 329 x 150 *	LCZ 0621
019	deep-drawn stainless steel	150	12 to 18	300 x 505 x 150 *	LCZ 0622
025	deep-drawn stainless steel	150	19 to 25	300 x 505 x 200 *	LCZ 0623
006	stainless steel	200	3.5 to 5.5	150 x 260 x 160	LCZ 0624
012	stainless steel	200	8 to 13	300 x 305 x 160	LCZ 0625
020	stainless steel	200	13. to 20	300 x 480 x 160	LCZ 0626
026	stainless steel	200	19 to 26	300 x 480 x 200	LCZ 0627
040	stainless steel	200	30 to 40	300 x 750 x 200	LCZ 029

* Measured at top edge of bath, slightly reduced downwards.

Accessories for Bath/Circulation thermostats

Accessories	suitable for	Catalogue number
Bath cover	E 111	HDQ 079
Bath cover two parts	E 119, E 125	LCZ 0632
Bath cover three parts	E 140	LCZ 0654
Stainless steel gable cover	E 120 T	LCZ 011
Stainless steel gable cover	E 119, E 125	LCZ 0634
Cover plate	E 115 T	LSZ 0115
Setting platform 8 steps	E 103	LCZ 0645
Setting platform 8 steps	E 106 T	LCZ 0648
Setting platform 8 steps	E 112 T, E 111, E 120 T, E 119, E 125	LCZ 0635
Rising platform	E 112 T, E 120 T	LCZ 016
Through-flow cooler DLK 10 to -15 °C		LFD 010
Through-flow cooler DLK 25 to -30 °C		LFD 108
Through-flow cooler DLK 45 to -40 °C		LFD 109

For further information please contact us.

10 Technical Data and pump characteristics

The figures have been determined according to DIN 12876.

Common technical data

		E 100
Ambient temperature range	°C	5 to 40
Humidity		Maximum relative humidity 80 % for temperatures up to 31 °C, decreasing linearly to 50 % relative humidity at 40 °C.
Setting resolution	°C	0.1
Indication resolution	°C	0.1
Indication accuracy		±0.4 °C ± 0.5 % additive re-calibration from indicated value ②
Temperature stability	±K	0.02
Safety features ①	Class	III/ FL
Protection class		Protection class Ⅰ according to DIN EN 61140; VDE 0140-1:2007-03
EC Directives		The units are conformable to directives of the European Parliament and of the Council: 2004/108/EC electromagnetic compatibility and 2006/95/EC electrical equipment designed for use within certain voltage limits. The units carry the CE mark
Class according to EMC-standards DIN EN 61326-1 (⇨ 1.1) Notice valid for Europe for the USA and Canada		Class B Class A
Power consumption 230 V; 50/60 Hz 115 V; 60 Hz 100 V; 50/60 Hz	 kW	 1.6 1.4 1.1

① FL: suitable for flammable and non-flammable liquids; NFL: only suitable for non-flammable liquids
② (⇨ Section 1.2) last item

We reserve the right to make technical alterations!

Immersion thermostat

		E 100
Operating temperature range ①	°C	20 to 150
" with water cooling	°C	20 to 150
Operating temperature range ②	°C	-20 to 150
Heater power 230 V; 50/60 Hz 115 V; 60 Hz 100 V; 50/60 Hz		1.5 1.3 1.0
Pump type		pressure pump with choice of 5 output steps
Maximum discharge pressure ③	bar	0.4
Maximum flow rate③	L/min	20
Pump connections	mm	nipples 13 mm diameter
Bath depth ④	mm	minimum 150
Usable depth ④	mm	minimum 100
Overall size (W x D)	mm	125 x 133
Height (H)	mm	315
Weight	kg	2.9
Catalogue number **230 V ±10 %; 50/60 Hz** **115 V ±10 %; 60 Hz** **100 V ±10 %; 50/60 Hz**		 **LCE 0221** **LCE 4221** **LCE 6221**

① at pump output step 1

② with additional cooling

③ at pump output step 5

④ baths (⇨ Section 9) Accessories

We reserve the right to make technical alterations!

Bath/ Circulation thermostats

		E 103	E 111	E 119	E 125	E 140
Operating temperature range ①	°C	20 to 150				
" with water cooling	°C	20 to 150				
Operating temperature range ②	°C	-20 to 150				
Heater power 230 V; 50/60 Hz	kW	1.5				
115 V; 60 Hz		1.3				
100 V; 50/60 Hz		1.0				
Pump type		pressure pump with choice of 5 output steps				
Maximum discharge pressure ③	bar	0.4				
Maximum flow rate ③	L/min	17				
Pump connections	mm	nipples 13 mm diameter				
Maximum bath volume	L	2.5 to 3.5	9 to 12	12 to 18	19 to 25	40
Bath		deep-drawn inner vessel, steel casing painted				
Bath opening (W x D)	mm	135 x 105	300 x 190	300 x 365	300 x 365	300 x 613
Bath depth ④	mm	150	150	150	200	200
Usable depth ④	mm	130	130	130	180	180
Height top edge of bath	mm	178	178	178	228	260
Overall size (W x D)	mm	168 x 271	331 x 360	331 x 536	331 x 536	350 x 803
Height	mm	349	349	349	399	421
Weight	kg	5.5	7.6	9.5	10	21
Catalogue number						
230 V ±10 %; 50/60 Hz		**LCB 0691**	**LCB 0693**	**LCB 0697**	**LCB 0695**	**LCB 0706**
115 V ±10 %; 60 Hz		**LCB 4691**	**LCB 4693**	**LCB 4697**	**LCB 4695**	**------**
100 V ±10 %; 50/60 Hz		**LCB 6691**	**LCB 6693**	**LCB 6697**	**LCB 6695**	**------**

		E 106 T	E 112 T	E 115 T	E 120 T
Operating temperature range ①	°C	20 to 100			
" with water cooling	°C	20 to 100			
Operating temperature range ②	°C	-20 to 100			
Heater power 230 V; 50/60 Hz	kW	1.5			
115 V; 60 Hz		1.3			
100 V; 50/60 Hz		1.0			
Pump type		pressure pump with choice of 5 output steps			
Maximum discharge pressure ③	bar	0.4			
Maximum flow rate ③	L/min	17			
Pump connections	mm	nipples 13 mm diameter			
Maximum bath volume	L	5 to 7	9 to 13	10 to 15	14 to 20
Bath		polycarbonate			
Bath opening (W x D)	mm	130 x 285	300 x 175	275 x 130	300 x 350
Bath depth ④	mm	160	160	310	160
Usable depth ④	mm	140	140	290	140
Height top edge of bath	mm	170	208	356	208
Overall size (W x D)	mm	145 x 435	316 x 330	428 x 142	316 x 506
Height	mm	330	369	517	369
Weight	kg	4.3	7	6,5	8
Catalogue number					
230 V ±10 %; 50/60 Hz		**LCM 0091**	**LCD 0261**	**LCD 0263**	**LCD 0265**
115 V ±10 %; 60 Hz		**LCM 4091**	**LCD 4261**	**LCD 4263**	**LCD 4265**
100 V ±10 %; 50/60 Hz		**LCM 6091**	**LCD 6261**	**LCD 6263**	**LCD 6265**

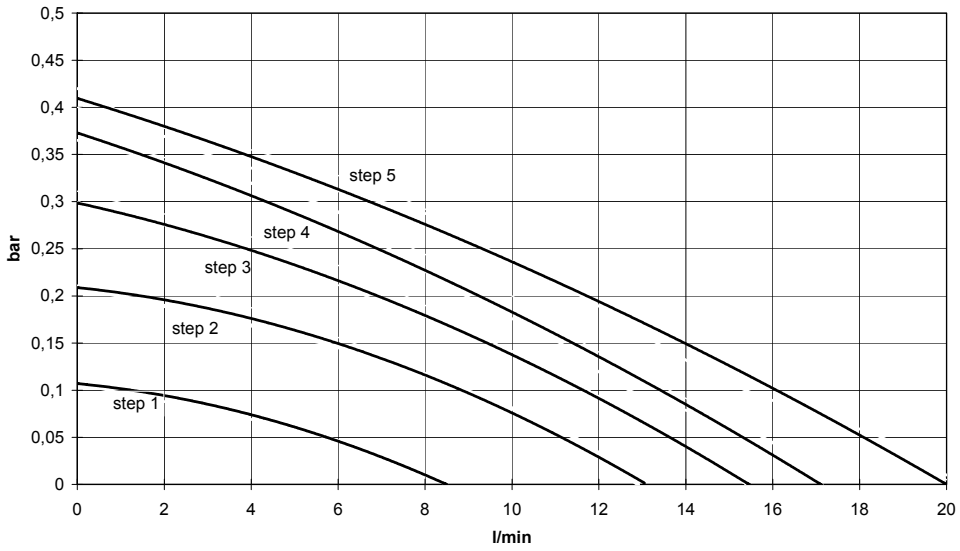
① at pump output step 1
② with additional cooling
③ at pump output step 5
④ Measured at top edge of bath, slightly reduced downwards

We reserve the right to make technical alterations!

Pump characteristics:

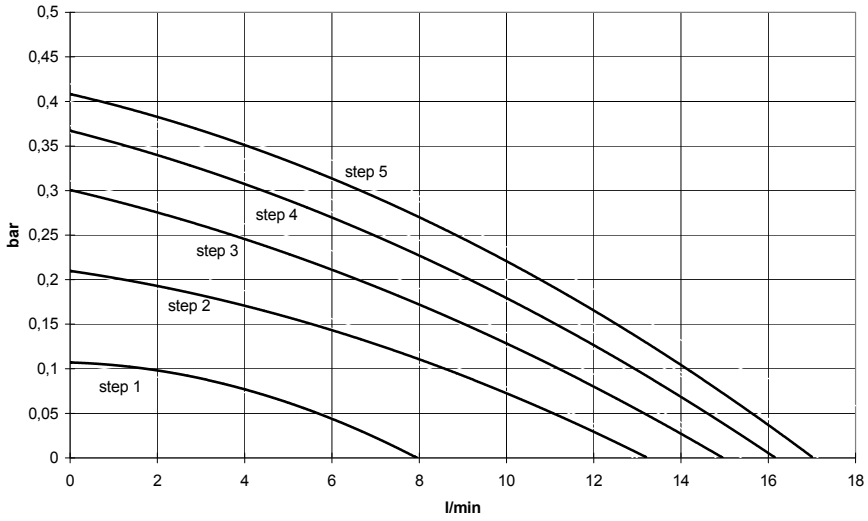
Immersion thermostats

measured with water

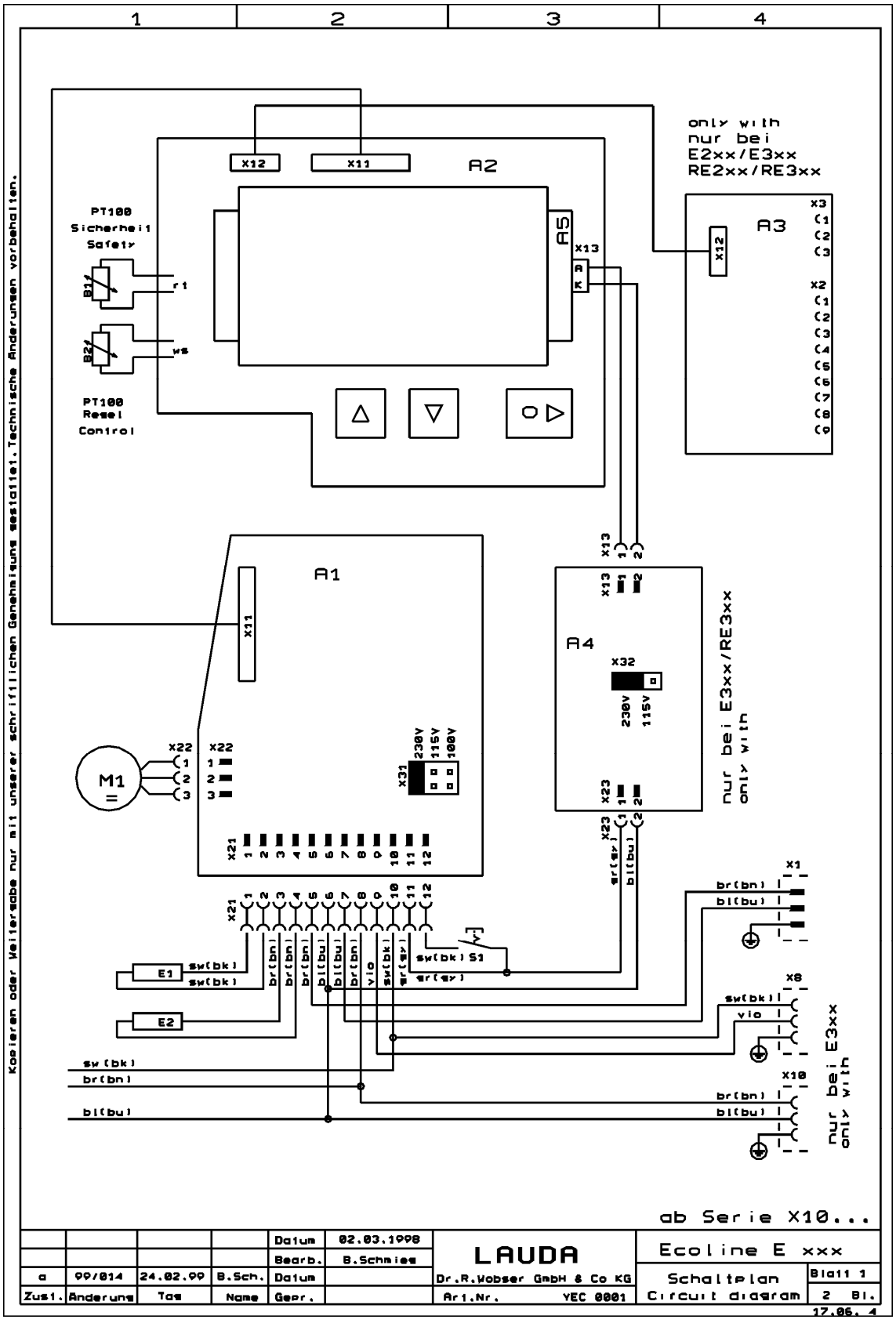


Bath/ Circulation thermostats

measured with water



11 Circuit diagram



230 V; 50 Hz ◆ 230 V; 50/60 Hz ◆ [230 V; 60 Hz] from serial number: 04-0001

		E 1xx
A 1	Printed circuit board “Mains”	UL 487-1
A 2	Printed circuit board “Display”	ULB 488-1A
A 3	Printed circuit board serial interface RS 232/ RS 485	----------
A 4	Printed circuit board Mains LED-Backlight	---------
A 5	Printed circuit board Display LED-Backlight	---------
B 1	Pt100 probe safety circuit	ETP 057
B 2	Pt100 probe actual value	
E 1	Heater 1.5 kW	EH 168
E 2	Heater 2.25 kW	----------
M 1	Pump motor	EM 109
S 1	Mains switch	EST 101
U 3	SSR (BRT22H) Y 1 output A1	---------
X 1	Mains connection	EKN 001
X 2	Lock screw	---------
X 8	Connection socket Cooling (Stakei 2)	---------
X 10	Connection socket Cooling unit (Stakei 200)	---------
X 13	Housing 2pol.	---------
X 21	Plug strip terminal 12pol.	EQF 079
X 23	Line up terminal 2pol.	---------

115 V; 60 Hz ◆ [100 V; 50/60 Hz] from serial number: 04-0001

		E 1xx
A 1	Printed circuit board “Mains”	UL 499
A 2	Printed circuit board “Display”	UL 488-1A
A 3	Printed circuit board serial interface RS 232/ RS 485	----------
A 4	Printed circuit board Mains LED-Backlight	---------
A 5	Printed circuit board Display LED-Backlight	---------
B 1	Pt100 probe safety circuit	ETP 057
B 2	Pt100 probe actual value	
E 1	Heater 1.3 kW at 115 V 1.0 kW at 100 V	EH 171
M 1	Pump motor	EM 109
S 1	Mains switch	EST 101
U 3	SSR (BRT22H) Y 1 output A1	---------
X 1	Mains connection	EKN 003
X 2	Lock screw	---------
X 8	Connection socket Cooling (Stakei 2)	---------
X 10	Connection socket Cooling unit (Stakei 200)	---------
X 13	Housing 2pol.	---------
X 21	Plug strip terminal 12pol.	EQF 079
X 23	Line up terminal 2pol.	---------

BESTÄTIGUNG / CONFIRMATION / CONFIRMATION

An / To / A:
LAUDA Dr. R. Wobser • LAUDA Service Center • Fax: +49 (0) 9343 - 503-222

Von / From / De :

Firma / Company / Entreprise: _____

Straße / Street / Rue: _____

Ort / City / Ville: _____

Tel.: _____

Fax: _____

Betreiber / Responsible person / Personne responsable: _____

Hiermit bestätigen wir, daß nachfolgend aufgeführtes LAUDA-Gerät (Daten vom Typenschild):
We herewith confirm that the following LAUDA-equipment (see label):
Par la présente nous confirmons que l'appareil LAUDA (voir plaque signalétique):

Typ / Type / Type :	**Serien-Nr. / Serial no. / No. de série:**

mit folgendem Medium betrieben wurde
was used with the below mentioned media
a été utilisé avec le liquide suivant

_____

_____

_____

_____

Darüber hinaus bestätigen wir, daß das oben aufgeführte Gerät sorgfältig gereinigt wurde, die Anschlüsse verschlossen sind, und sich weder giftige, aggressive, radioaktive noch andere gefährliche Medien in dem Gerät befinden.

Additionally we confirm that the above mentioned equipment has been cleaned, that all connectors are closed and that there are no poisonous, aggressive, radioactive or other dangerous media inside the equipment.

D'autre part, nous confirmons que l'appareil mentionné ci-dessus a été nettoyé correctement, que les tubulures sont fermées et qu'il n'y a aucun produit toxique, agressif, radioactif ou autre produit nocif ou dangeureux dans la cuve.

Stempel **Seal / Cachet.**	**Datum** **Date / Date**	**Betreiber** **Responsible person / Personne responsable**

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