

Operating Instructions

Immersion thermostats

T and B

Compact thermostats

M 3, M 12, M 20, M 25

Series T and B

to DIN 12 879

From Series P 02

04/92

YAE0006

Immersion thermostats T and B
Compact thermostats M 3, M 12, M 20, M 25 T and B

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



1. Brief operating instructions

- 1.1 Even if these brief instructions are sufficient for you, be sure to read the information below, in particular Section 4 "Safety system and remarks".
- 1.2 Check thermostat and accessories during unpacking for possible transport damage and, if necessary, notify carrier or post office.
- 1.3 Assemble unit according to Section 6 and add items as appropriate.
- 1.4 Connect the tubing at the pump outlets on the thermostats M 3 ... M 25. Remove the plastic screw from the pressure nipple of the pump.

Without external circulation: link together the pump outlets with the perbunan tubing supplied.

With external circulation: connect tubing to the external system.

Secure tubing with clips to prevent it slipping off.

- 1.5 When operating in the ambient temperature range connect external cooling according to Section 8.
- 1.6 Use only deionised water or water-glycol-mixture (see Section 5). Fill the unit up to approx. 2 cm below the top plate.
- 1.7 Check the supply voltage against the data on the rating label. Connect the cable to the supply.
- 1.8 Switch on the unit with the mains switch (green lamp lights up).
- 1.9 Select the required temperature. At B-units the set point is indicated by pressing . Select the desired temperature by turning the knob . Loosen the fixing device first.
- 1.10 Overtemperature cut out to be adjusted at rotary switch  above the set point. If the red fault lamp lights up, press the rotary switch  "reset".
- 1.11 When operating with an external system ensure that the level inside the thermostat does not drop too much when the external system is being filled with the bath liquid.
- 1.12 When the bath liquid has reached the set point the yellow indicating lamp "heating"  begins to flash. Check the operating temperature on the reference thermometer (T) or digital display (B) and readjust the setpoint if necessary.

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1.13 Safety

The thermostat is a Class I W unit. It must only be operated with non-inflammable liquids (see also Section 5).

1.14 Important Note

Parts of bath cover may heat up to more than 60°C at higher operating temperatures! Pump outflow and return are at the operating temperature.

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2. Table of Data according to DIN 58966

2.1 Common technical data

		T	B
Operating temperature range (with external cooling)	(°C)	-20...100	
Ambient temperature range	(°C)	5...40	
Temperature setting/resolution	(°C)	analog/0,3	digital setting with 10turn-potentiometer, and numeric indication; displ. res. 0,1°C, pot. approx. 0,03°C
Temperature indication/resolution	(°C)	reference- thermometer 0...100/0,5	incorporated digital- thermometer; 0,1°C resolution, absolute accuracy better 0,5 % of range
Temperature sensor/control action		PTC/P	PTC/PID
Temperature control (at 70°C)	(±°C)	0 05	0,01
Heater capacity	(kW)	1,5	
Safety class according to DIN 12879		1 W (adjustable)	
Flow rate, max.	(l/min)	8	
Discharge pressure, max.	(bar)	0,15	
Power supply	(V;Hz)	230; 50/60 Protection degree I to VDE 0100	
Total power consumption	(kW)	1,6	
Interference suppression		according to VDE 0875	

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2.2 Immersion thermostats

Filling volume	(l)	for vessels up to 50 l
Operating temperature range	(°C)	23...100 dep. on bath capacity and insulation
- with mains water cooling	(°C)	20...100
Minimum bath depth	(mm)	160
Immersion depth	(mm)	min. 100
Overall dimensions (WxDxH)	(mm)	105 x 130 x 300
Weight, net	(kg)	3,5
Cat. No. 230 V; 50/60 Hz		LCE 015 LCE 017

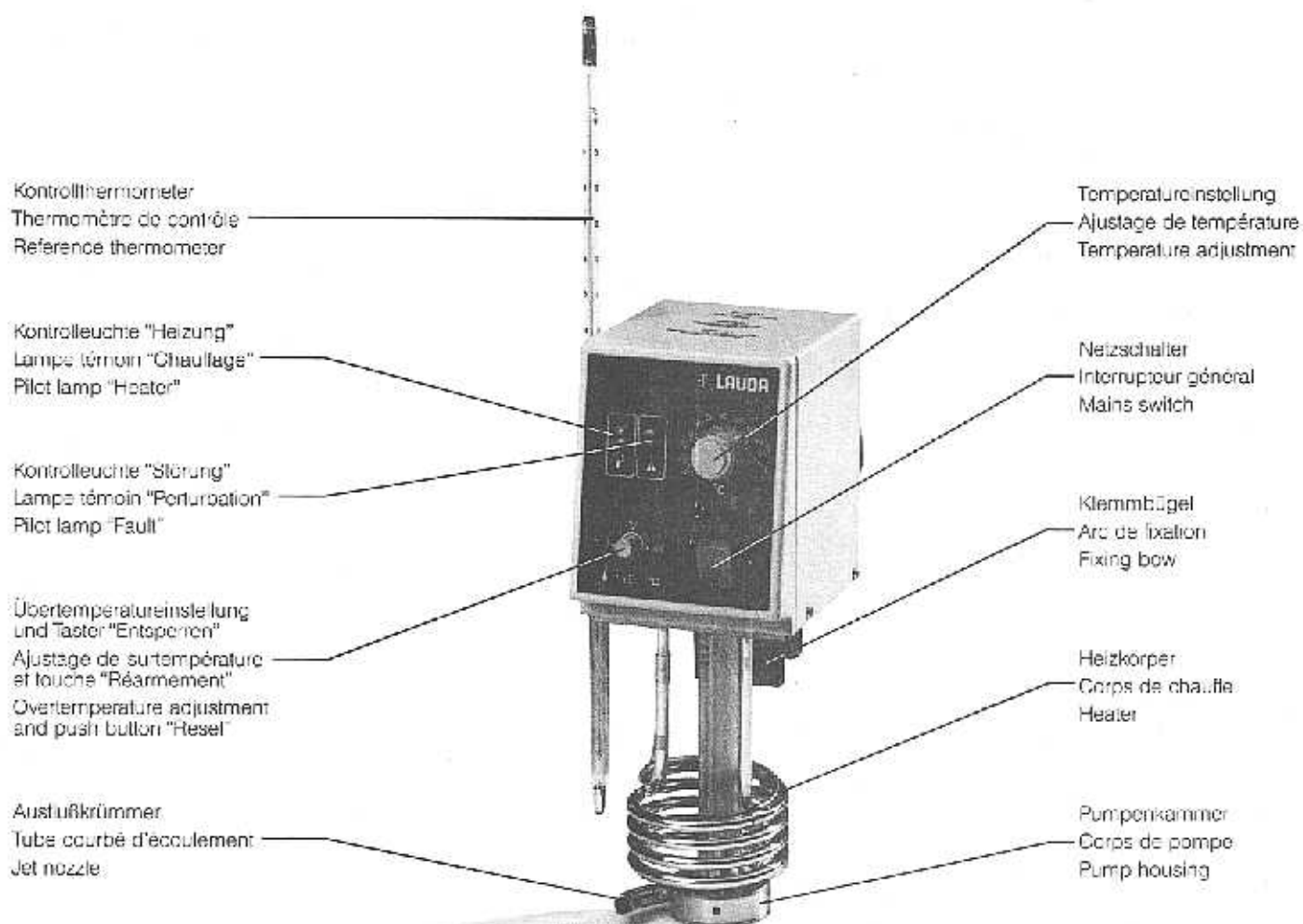
2.3 Compact thermostats

		M 3	M 12	M 20	M 25
Operating temperature range	(°C)	30...100	25...100	25...100	25...100
- with mains water cooling	(°C)		20...100		
Pump connectors			Olives 10 Ø		
Filling volume	(ltr)	2,5...3,5	9...13	14...20	20...26
Bath opening (W x D)	(mm)	120 x 105	300 x 175	300 x 350	300 x 350
Depth of bath	(mm)	160	160	160	200
Usable liquid depth	(mm)	140	140	140	180
Height to upper edge	(mm)	210	210	210	250
Overall dimensions (WxDxH)	(mm)	160 x 265 x 360	350 x 365 x 360	350 x 540 x 360	350 x 540 x 400
Weight, net	(kg)	7	12	15	16
Cat. No. 230 V; 50/60 Hz		M 3 T LCB 040	M 12 T LCB 043	M 20 T LCB 046	M 25 T LCB 049
		M 3 B LCB 041	M 12 B LCB 044	M 20 B LCB 047	M 25 B LCB 050

Thermostate Typenreihe T

Thermostats Série T

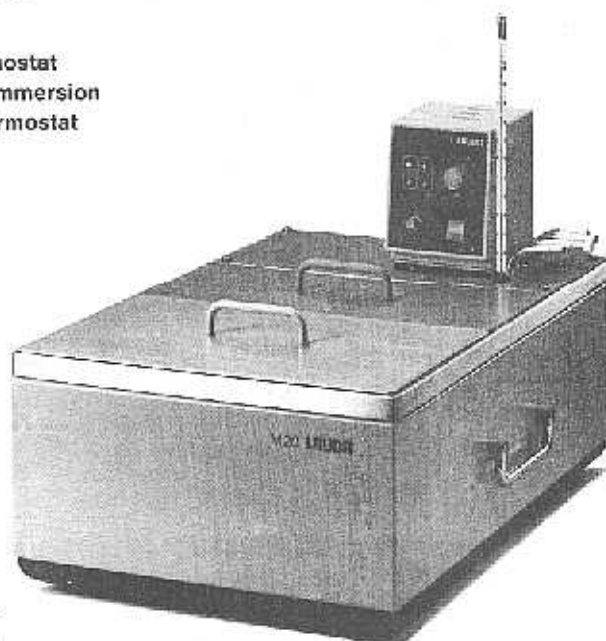
Thermostats Serie T



Einhängethermostat
Thermostat à immersion
Immersion thermostat

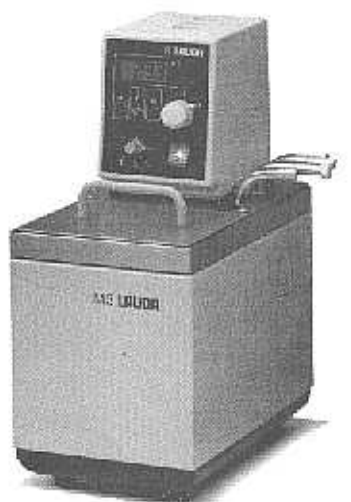
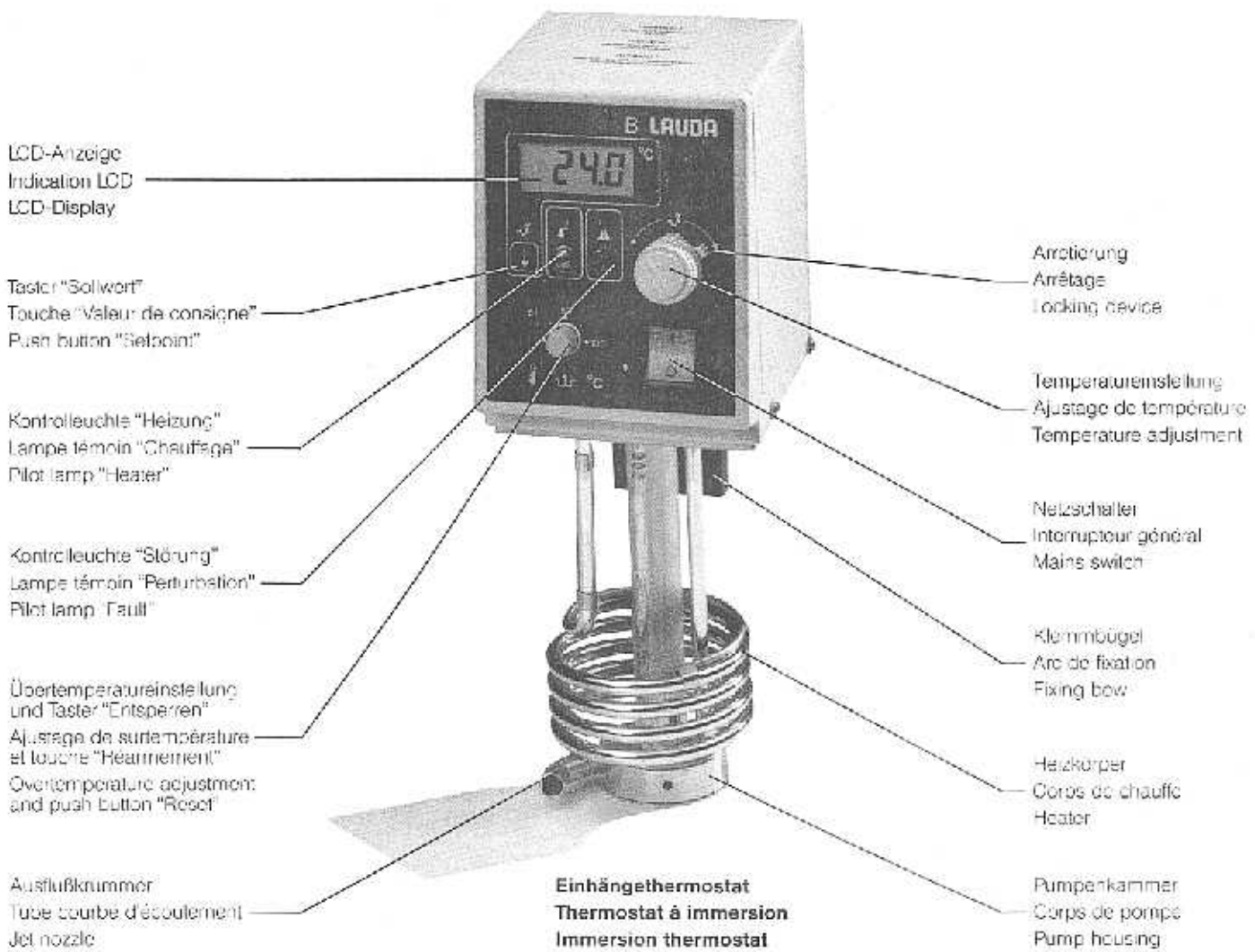


M 3 T

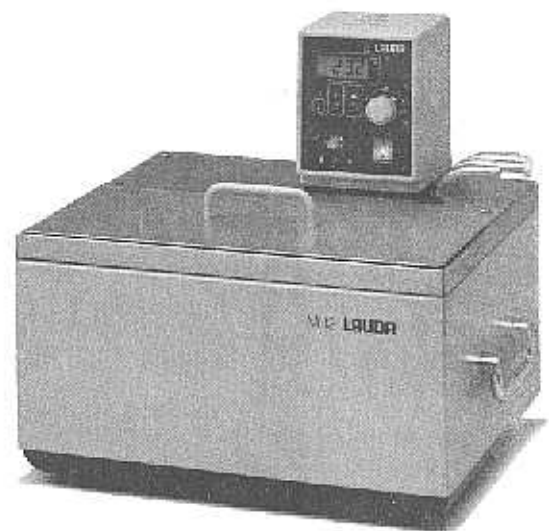


M 12 T
M 20 T
M 25 T
(Baddeckel Zubehör auf Wunsch)
(Couvercle de bain accessoire en option)
(Bath cover optional accessory)

Thermostate Typenreihe B
 Thermostats Série B
 Thermostats Serie B



M 3 B



M 12 B
 M 20 B
 M 25 B
 (Baddeckel Zubehör auf Wunsch)
 (Couvercle de bain accessoire en option)
 (Bath cover optional accessory)

Immersion thermostats T and B
 Compact thermostats M 3, M 12, M 20, M 25 T and B

3. Basic construction and technical description

3.1 These operating instructions is meant for 10 liquid thermostats of different construction, Series M:

Immersion thermostats T and B

Compact immersion thermostat supplied with screw clamp so that the thermostat can be fitted to any bath.

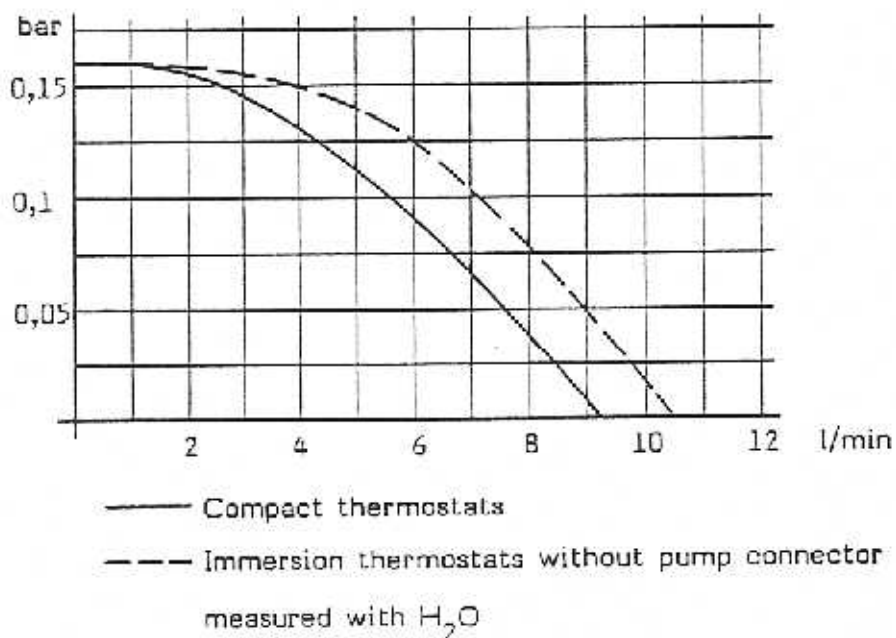
Compact thermostats, Types M 3 T, M 12 T, M 20 T, M 25 T, M 3 B, M 12 B, M 20 B, M 25 B

Combined bath/circulation thermostats with different bath volumes of 3 ... 25 l and bath depths of 160 and 200 mm.

3.2 The units are fitted with a submerged centrifugal pump with jets for circulation of the bath medium and for circulation to closed external systems. The pumps are driven by a split pole motor with traversing shaft, bearingless within the bath.

The pressure nipple of the pump can be closed without damage to the pump.

Performance diagram T and B 230 V, 50 Hz



3.3 T-units have a P-Controller and a setpoint potentiometer having an analogue temperature setting. The bath temperature (actual temperature) is indicated by the reference thermometer (glass).

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B-units have a PID-Controller, temperature setting is done by 10-turn-potentiometer. During setting the set point is digitally indicated. Actual bath temperature is indicated on the liquid cristal display (LCD).
At both types T and B the heating capacity is electronically controlled by a zero voltage packet switching triac.
We use a tubular heater with a heating capacity of 1,5 kW and a max. surface capacity of approx. 7 W/cm².

3.4 Safety devices

The units are equipped with an adjustable temperature limiter avoiding the dry run of the heater. The pump motor is equipped with a temperature protector, which avoids an overtemperature of the motor winding. Both functions will switch off heater and pump on all poles. Also the temperature indication is switched off. The red fault lamp lights.

4. Safety devices and warning

- 4.1 The DIN specification 12879 for laboratory thermostats entitled: "Liquid Thermostats. General and Safety Requirements" lays down the safety devices required and divides thermostats into different safety classes.

Why can it be dangerous to operate a thermostat?

1. Thermostats are fitted with heaters which provide the necessary heating energy for the thermostatic liquid. If the temperature control fails, or if the liquid level is too low, the heater may reach a temperature which in combination with inflammable thermostatic liquids can cause a fire in the laboratory.
2. When using the thermostat with external circulation, failure of the tubing can cause discharge of hot liquid and endanger persons and material.

The classification of thermostats depends on:

- o whether non-inflammable or inflammable thermostatic liquids are used;
- o whether the thermostat is operated under supervision or unsupervised.

The units Series T and B as described in these Operating Instructions are to Class 1 W. They are suitable only for

- o non-inflammable bath liquids, i.e. preferably water; for operation close to zero the non-inflammable water/ethylene glycol mixture can be used (see Section 5).

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Important Note

Even with Class I W units the user is only protected against hazards from excess temperature and low level.

Further hazards may arise from the type of product being thermostated, e.g. a shift above or below certain temperature levels or breaking of the container followed by reaction with the thermostatic liquid etc. It is impossible to provide protection against all possible cases and they remain largely within the decision and responsibility of the user.

4.2 Warning

At overtemperature of the heater caused by run dry the heater and pump are switched off by the temperature limiter on all poles.

Attention, the heater surface may reach temperatures up to +250°C (especially if the thermostat runs completely dry) !

Parts of the bath cover may heat up to more than 60°C at higher operating temperatures. Pump outflow and return reach at the operating temperature. The immersion thermostats have to be fixed carefully at the bath vessel, so that they may not fall into the bath. In that case first pull out the mains plug before further actions are taken !

Only use bath vessels, which are suitable for the desired operating temperatures. Switch-off point of the overtemperature protection when using vessels of acrylic glass e.g. is +60°C.

5. Bath liquids and tubing

According to Section 4, only non-flammable liquids can be used.

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

5.1 Bath liquids

Operating range 5 to 90°C

Use deionised water. Make up evaporation losses at higher temperatures. Losses may be reduced by using suitable bath covers (see Accessories).

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Temperatures close to zero and below:

Water/ethylene glycol mixture, preferably Glycoshell P 300, in ratio 1:1.

Operating range	-30 to 100°C	
Boiling point	110°C	Ultra-Therm G 100
Viscosity at 20°C	4 mm ² /sec	Cat.-No. LZB 009
Non-inflammable		

When working for extended periods at higher temperatures the proportion of water drops slowly. The mixture then approaches the properties of pure glycol and therefore becomes inflammable (flashpoint 128°C). The mixture ratio must therefore be checked from time to time, e.g. against the original mixture, or with a hydrometer.

5.2 Tubing (continuous lengths)

Perbunan tubing

Cat.No. RKJ 011

9 mm internal dia. Application range up to 120°C.
For water and water/glycol mixtures.

Silicone tubing (per metre)

Cat.No. RKJ 041

4 mm internal dia. Application range up to 120 °C.
For water and water/glycol mixtures.

Secure tubing with clips to prevent it slipping off.

6. Unpacking, assembly and setting up

- 6.1 Goods are packed carefully to prevent transport damage. If the unit should arrive damaged the carrier or the post office has to be informed so that it can be inspected.

Standard accessories

Immersion thermostats T and B

Reference thermometer ET 031:0/100°C (T only)
Clamping bracket (fitted),
Operating Instructions

Compact thermostats M 3 T, M 12 T, M 20 T, M 25 T, M 3 B, M 12 B, M 20 B, M 25 B

Reference thermometer ET 031:0/100°C (T only)
Bath cover (M 3 only)
1 m Perbunan tubing
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6.2 Assembly and setting up

Immersion thermostats T and B

At type T push the reference thermometer into the spring mounting at the side. The thermostat is suspended into the bath to be thermostated (for suitable baths see accessories) and the clamping screw is tightened. If required the clamping element can be pulled off, turned through 180° and pushed on again, so that the thermostat can be secured vertically when the bath has sloping sides.

If the accessory set (Cat. No. LCZ 050) is ordered the immersion thermostat can also be secured to a laboratory stand. Screw the fixing rod into the threaded hole at the back (insert a screwdriver into the hole and tighten up).

The pump housing is turned so that the jet nozzle faces the centre of the bath. Turn the nozzle downwards to obtain a smooth liquid surface.

Compact thermostats M 3 T, M 12 T, M 20 T, M 25 T, M 3 B, M 12 B, M 20 B, M 25 B

The units are best set up so that the narrow side is to the front. Insert the reference thermometer with mounting into the cover at types T.

If M 12, M 20 or M 25 has no external system connected to it, the circulation can be greatly improved by pulling off the pipe bend from the pump housing after having removed the small fixing spring and turning the pump housing so that the nozzle faces the opposite corner. If this is not required, the pump nipples are linked together with the Perbunan tubing supplied. Remove the plastic screws.

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7. Connecting external systems

7.1 Immersion thermostats

The 9 mm i.d. Perbunan tubing (Cat.No. RKJ 011) is pushed directly onto the outlet bend and connected to the external system, the return tubing can be hung into the bath.

Attention: Put weights on the tubing ends or fix !

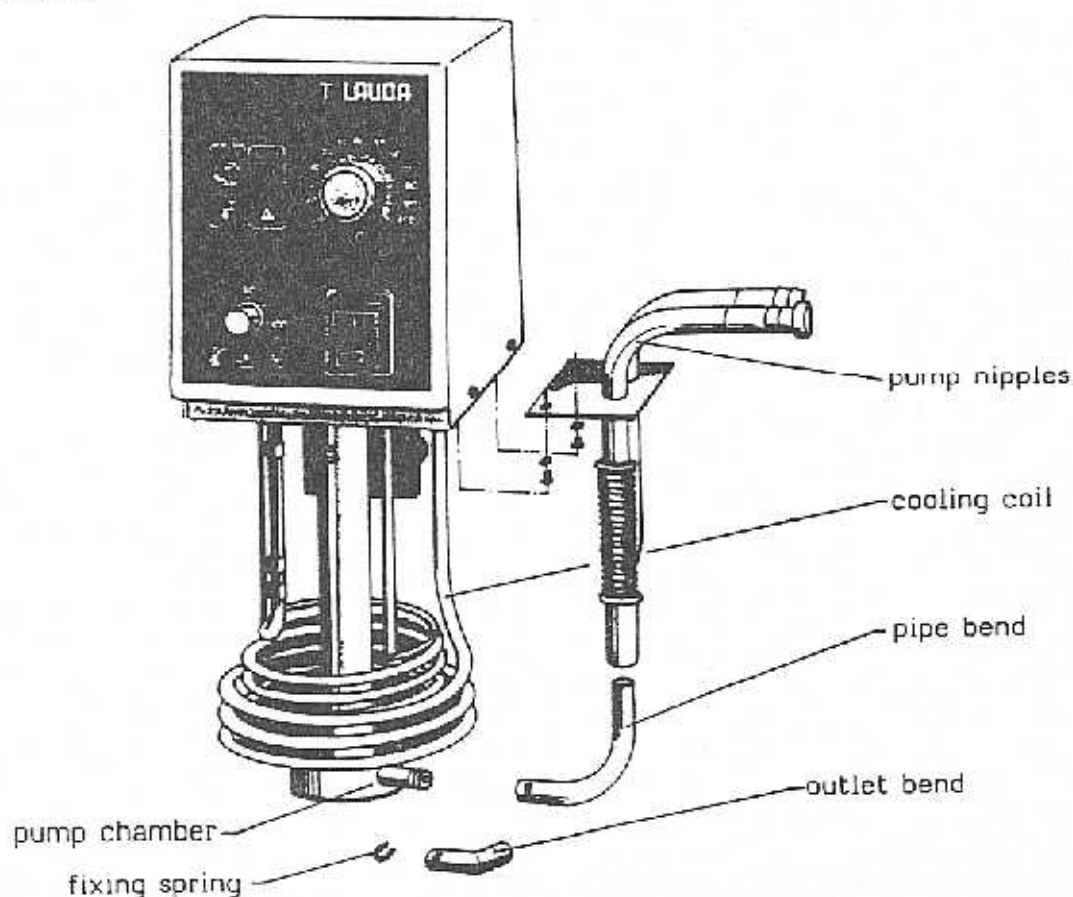
A better solution to thermostat external consumers would be to use the pump nipples of the accessory kit.

Mounting of the pump nipples:

Pull-off mains plug ! Remove outlet bend by removing small fixing spring first. Fix the pump nipples at the right side of the thermostat with supplied screws M 4.

Put the delivered pipe bend into metal corrugated tubing and the nipple at the pump chamber into the cut-end ! Pump chamber is turnable in order to adjust correct position. Let snap the fixing spring.

When connecting with photometers, refractometers, etc. which have nipples for 4 mm i.d. tubing the reducer fitting of the accessory set is screwed on the nipples.



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7.2 Compact thermostats M 3 T, M 12 T, M 20 T, M 25 T, M 3 B, M 12 B, M 20 B, M 25 B

The tubing is connected to the standard pump nipples. Pressure nipple always at the front, return nipple at the back. If necessary, use reducer fittings. An adequate flow rate is required to ensure reliable thermostating of the external apparatus. Where the flow cross-section is severely restricted there may be a temperature drop between bath and external system due to the low flow rate. In that case the bath temperature has to be suitably increased.

With external systems placed higher than the thermostat, entry of air in the thermostatic circuit while the pump is stopped may cause the external volume to drain resulting in flooding of the thermostatic bath !

Always ensure maximum flow in the external circulation (connectors, tubing, external system). This produces a larger flow rate and therefore improves thermostating.

Secure the tubing with clips to prevent it slipping off.

8. Cooling the thermostats

Due to the very low frictional heat generated by the pump it is possible to work without cooling down to just above ambient temperature (approx. 3 to 10°C) (see Technical Data). Additional cooling is required for lower temperatures. A cooling coil is fitted to the Compact thermostats for this purpose. On the Immersion thermostat the cooling coil of the accessory set must be screwed to the clamp.

Cooling can be effected as follows:

Down to 20°C

Mains water; keep the water consumption as low as possible.

Down to -20°C

Use flow-through cooler DLK 5/DLK 15/DLK 30 depending on tank size and temperature. It is essential to work with a water/glycol mixture (ratio 1:1)!

Insulated Silicone tubing (Cat.No. LZS 001) must be used for linking the inlet and outlet nipples of the pump to the connectors of the flow-through cooler.

When thermostating an external system the equipment must be arranged in the following order:

Thermostat - external system - flow-through cooler - thermostat.

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9. Starting up

9.1 Filling


Fill the unit with deionised water or water/glycol mixture according to Section 5. The liquid volume is indicated in the Table of Data. The thermostats should never be filled higher than 2 cm below the cover.



While the thermostat is in use the heater must always be covered with liquid! When it is connected up to an external system, check during starting up that the liquid level in the thermostat does not drop too low due to filling up the external system. If necessary, top up with liquid until the correct level is reached.

The bathes M 12, M 20 or M 25 can be covered with a flat cover (see accessories) or with a gable cover even when there is glassware or other items in the bath (M 20, M 25). This is advisable especially at higher temperatures.

9.2 Connect the unit only to a grounded socket. Check the details on the rating label against the supply voltage.

9.3 Ensure that the pump outlets are linked together when there is no external system (for exception see Section 6).

9.4 Switch on the mains switch. The green lamp lights up. If the red fault lamp lights up, see section 10.2.
At B-types the digital display shows the actual bath temperature. The yellow lamp "heating"  is on continuously. When the set bath temperature has been reached, the yellow lamp "heating" begins to flash. If the operating temperature is below the actual temperature, the yellow lamp "heating" only begins to flash after temperature is cooled down to set value.
Check on the reference thermometer (T-models) resp. digital display (B-models) that the bath temperature agrees with the selected setpoint. If necessary adjust the setpoint.

9.5 Select the required temperature setpoint at the temperature knob.
At B-types press key , the set value now is indicated on the display. The set value is adjusted at a 10-turn precision-potentiometer . The rotary knob includes a locking device by which an unintentional modification of the set value is avoided. Unlocking to left upper side, after adjustment of the set value lock to right lower side.

10. Operation of the safety circuit

10.1 The following faults could occur:

1. The thermostat is started up without bath liquid or with the liquid level too low (heater partly uncovered).

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2. The liquid level drops too much during operation, especially at high temperatures. The same fault may be caused by failure of the tubing and liquid being pumped out of the thermostat.
3. Failure of the control system resulting in continuous heating. The liquid eventually reaches the boiling point and evaporates.
4. Failure of the control system or switch-off point is adjusted too low. Liquid is heated above switch-off point.

If any of the above faults occur, the safety circuit comes into operation. A built-in temperature probe measures the surface temperature of the heater and switches off the thermostat if a certain limiting temperature is exceeded. According to DIN 12879 this type of protection is called over-temperature protection.

Since the heater surface can reach very high temperatures up to 250°C, especially when the thermostat runs completely dry, only water or a water/glycol mixture may be used in the thermostat; otherwise it is impossible to prevent a fire under all circumstances despite the use of a safety system.

10.2 Operation of the safety circuit switches off the thermostat on all poles (heater and pump) and the red fault lamp "Fault" lights up. The thermostat can only be restarted after

- o the temperature probe on the heater has cooled down to below the adjusted switch-off temperature
- o the fault has been corrected (liquid level too low, faulty control circuit, burst tubing)
- o the reset button  has been pushed in

This ensures that the thermostat cannot start up again automatically, for example through a reduction in the temperature which could suggest that the fault has been rectified.

- 10.3 The safety system should be checked in regular intervals. At unsupervised operation we recommend a daily check, particularly as this is simple. Unit under normal operation (above 20°C). Turn overtemperature knob to the left until unit switches off (see 10.2). The switch-off temperature should be approximately the same as bath temperature. If unit does not operate properly, please shut-down immediately and contact a specialist.
- 10.4 In case of overload or blocking of the pump motor the complete unit is switched off and the red fault lamp lights up. After motor has cooled down, unit is starting again automatically.

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11. Maintenance

LAUDA thermostats operate largely without maintenance. Contaminated bath liquid should be drained out through the drain cock and replaced with fresh liquid. If the unit should become defective it is recommended that the thermostat unit should be removed and that you contact your next service department (sales office). Remove the cover plate.

Clean the units with a cloth, wetted with water and some drops of tensids (Washing-up liquid). No water must enter the control part.
The mains fuses at the back side are accessible from outside. If one fuse acts, the green lamp in the mains switch will be off. Insert only fuses as indicated (F 8 A, size 5 x 20).

Safety remarks in case of repair

Before repair or cleaning is done, pull out the mains plug. Repairs at the control part should only be executed by an electrician.

Note for the electrician: All indication and control circuits are on unprotected mains supply circuit.

Spare parts order

In case of spare parts requirement, please always indicate type and serial no. as indicated on the type label. This avoids further questions and wrong deliveries.

We shall always be happy to deal with queries, suggestions and complaints.

LAUDA DR. R. WOBSE
GMBH & CO. KG

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Accessories for Immersion/Compact/Medico thermostats

Reference thermometer

0/70°C, graduated 0.5°C ET 030
 0/100°C, graduated 0.5°C ET 031
 -30/100°C, graduated 0.5°C ET 032

Reference thermometer holder HKF 036

Accessory set

for Immersion thermostats T and B LCZ 050
 consisting of:

- Cooling coil
- Pressure and return nipples
- 2 pump reducer fittings for tubing 4 mm i.d.
- Tube for linking
- Spring
- Mounting rod

Bath tanks

for Immersion thermostats T and B

Type	Material	Bath opening/ depth (mm)	Capacity litres	
M 3	Stainless steel	300 x 315/160	3.5	LCZ 025
M 12	Stainless steel	300 x 315/160	13	LCZ 026
M 20	Stainless steel	300 x 490/160	20	LCZ 027
M 25	Stainless steel	300 x 490/200	25	LCZ 028
M 40	Stainless steel	300 x 750/200	40	LCZ 029
MA 6	Mekrolon max. 100°C	125 x 430/160	7	LCZ 046
MD 12	Acrylic glass max. 60°C	300 x 315/160 300 x 490/160	13	LCZ 047
MD 20	Acrylic glass max. 60°C	300 x 315/160 300 x 490/160	20	LCZ 049

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Stainless steel racks

for test tubes, centrifuge tubes etc.

Bath M 12 up to 2 racks

Bath M 20 up to 4 racks

RD 13	for 56 tubes 10-13 dia.,	80 mm immersion	UG 066
RD 18/1	for 33 tubes 14-18 dia.,	80 mm immersion	UG 067
RD 18/2	for 33 tubes 14-18 dia.,	110 mm immersion	UG 068
RD 30	for 14 tubes 24-30 dia.,	110 mm immersion	UG 069

Bath M 25 up to 4 racks

RE 13	for 56 tubes 10-13 dia.,	80 mm immersion	UG 070
RE 18/1	for 33 tubes 14-18 dia.,	80 mm immersion	UG 071
RE 18/2	for 33 tubes 14-18 dia.,	110 mm immersion	UG 072
RE 30	for 14 tubes 24-30 dia.,	110 mm immersion	UG 073

Makrolon racks

Bath M 3, 1 rack

Bath M 6 up to 2 racks

for 20 tubes 14 - 17 dia.,	70 mm immersion	UE 022
for 20 tubes 14 - 17 dia.,	100 mm immersion	UE 020

Details on other racks on request.

Bath cover, (flat), stainless steel

for Model M 12, one part

LCZ 030

for Model M 20, 2 parts

LCZ 009

Gable cover, stainless steel

for Model M 20

LCZ 011

Tubing (by the metres)

Perbunan tubing, 9 mm i.d.

RKJ 011

Silicone tubing, 4 mm i.d.

RKJ 041

Reducer fitting for pump

for tubing 4 mm i.d.

HKO 018

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UNIPROTECT R 35

LRS 002

Universal over-temperature and low-level protection.
Retrofitting with R 35 provides every thermostat with
protection to Class 3 DIN 12 879. Accessories required:
Immersion probe TS 35-200 and special holder

Immersion probe TS 35-200

US 014

Retrofit bracket for M 3, M 12, M 20, M 25

UD 049

Rising floor (for retrofitting)

LCZ 012

Usable area 250 x 160 mm, continuous height adjustment

Bath M 12: 1 floor can be fitted
Bath M 20: 2 floors can be fitted
Bath M 25: 2 floors can be fitted