LAUDA

Operating Instructions

Immersion thermostat A 100

Bath thermostats/Circulation thermostats
A 103, A 106 T, A 112 T, A 120 T

Shaking thermostat A 120 S

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from series Z 01
01/01 E
YAEE0014

Safety notes

Before you operate 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 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 should only be operated by technically qualified personnel!
- Never operate the equipment without bath 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!
- Have the equipment serviced or repaired only by properly qualified personnel!

The Operating Instructions include additional safety notes which are identified by a triangle with an exclamation mark. Read the instructions carefully 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!

Contents

Page

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.

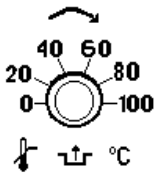
1. Brief operating instructions

- This brief instruction shall give you the possibility to operate the equipment quickly.
- For safe operation of the equipment it is absolutely necessary to read carefully all the instructions and safety notes!
- Parts of the bath cover may heat up to more than 70 °C at higher operating temperatures. Danger of burning injuries!

1. Assemble unit and add items as appropriate (⩾ Section 5.).
Take care of the hose connections (⩾ Section 5.1. and 5.4.).

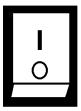
2. Fill the unit with corresponding liquid (⩾ Section 5.3.).
The units are designed for operation with non-flammable liquids to EN 61010-2-010.
→ Take care of the level of the bath liquid! (⩾ Section 5.2.)

3. Connect the equipment only to a socket with a protective earth (PE) connection.
Compare the information on the rating label with the supply details.

4. 

Set the overtemperature cut-out point to a value clearly above ambient temperature (⩾ Section 6.5.1.).

5. (Only A 120 S)
Assemble the items on the tray and hang it in the shaking basket.
The shaking stroke can be adjusted with an Allan key (⩾ Section 6.4.).
Adjust the shaking speed (also possible during the operation).

6. 

Switch on at the mains switch.

2. Control and functional elements

Reference thermometer

Pilot lamp ”Heater””

Pilot lamp ”Fault””

Temperature adjustment

Overtemperature adjustment and push button ”Reset”

Mains switch

Pump set
(≥ Section 10. Accessories)

Clamping bracket
(≥ Section 10. Accessories)

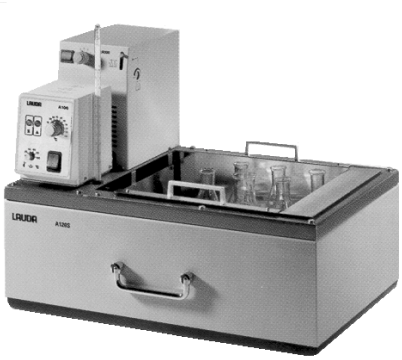
Heater

Jet nozzle

Pump chamber

A 106 T

A 120 T



A 120 S

3. Unit description

3.1. Unit types

The immersion thermostat A 100 has a device for fixing the thermostat to the LAUDA bath vessels (clamping bracket) 006 T, 012 T, and 020 T.

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

Example: Control unit A 100 and bath 006 T produces Thermostat A 106 T.

The letter “T“ (for "Transparent") refers to the baths made of polycarbonate or acrylic glass.

The type designation of the shaking thermostat consists of the control unit A 100, the type of the bath 020 (stainless steel) and the letter “S“ for “Shaking thermostat“.

3.2. Pump

All units are supplied with a pressure pump. The pumps are driven by a split pole motor.

The pump chamber of immersion thermostats is rotatable in a restricted way to reach an optimal circulation and the pump has an outlet with a rotatable jet nozzle.

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

Pump characteristics (⩾ Section 9. Technical data)

3.3. Temperature indication, control, and safety circuit

The units are provided with a potentiometer for analogue temperature setting (resolution approx. 0,3 °C).
The actual bath temperature is indicated on a reference thermometer (glass) with a resolution of 0,5 °C.

The thermostats are provided with an adjustable overtemperature limiter avoiding the operation of the heater in case of an insufficient bath level.The pump motor is provided with a temperature protector which avoids an overtemperature of the motor. Both functions will switch off heater and pump.

With a P-controller the heating capacity is electronically controlled by a zero voltage packed switching triac.

3.4. Shaking basket (A 120 S only)

The shaking basket is driven by a d.c. motor, whose speed can be electronically adjusted for selecting the desired shaking speed. The electronics contain an overload protection and a device, which automatically moves the tray into a defined standstill position when changing the shaking stroke.
Trays with different contents can be inserted (⩥ Section 10. Accessories).

3.5. Materials

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

4. 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.

Standard accessories:

Reference thermometer (glass):

- ET 031 0...100 °C	on all types
1 Bath cover HDQ 078	on unit A 103
1 clamp	on the immersion thermostat
Closing plugs	on all bath/circulation thermostats and the shaking thermostat
Allan key (5 mm)	shaking thermostat
Warning label 	on units A 100, A 103, A 106 T, A 120 S
Operating instructions	on all types

5. Preparations

5.1. Assembly and setting up

a) Immersion thermostat

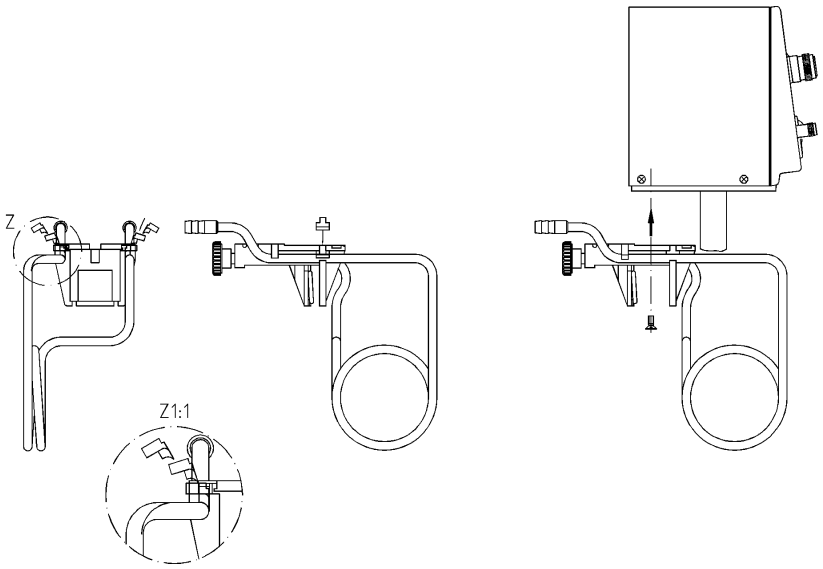
- Fix the clamp at the bottom of the control head by means of the two screws. Use an adapter for baths with sloping sides. Remove the O-Ring from the clamp and let the adapter snap in with the help of the two noses of the clamp.
- Hang the thermostat into the bath to be thermostated (bath vessels ⩥ Section 10. Accessories).
- Push the reference thermometer into the spring mounting at the left side of the unit.

- Heater must not get into contact with the sides of the bath (baths made of plastics)!
- Do not cover the ventilation openings at the back of the unit.
- Keep clear distance of at least 20 cm.

- Turn the pump chamber so that the jet nozzle faces diagonal into the bath. Turn the nozzle downwards to obtain a smooth liquid surface.

Operation with cooling coil (⩥ Section 10. Accessories)

- Place the cooling coil around (see ill.) the clamp and fix it with the clips.
- Then continue as described above.



Operation with fixing rod (≥ Section 10. Accessories)

-In order to screw the fixing rod into the threaded hole at the back insert a screwdriver into the cross hole and tighten up.

Operation with external circuit (≥ Section 5.4.)

- 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 bath liquid! Pull out mains plug immediately!

b) Bath/Circulation Thermostats

- Place the unit on a flat surface, the control panel facing the operator.

- Do not cover the ventilation openings at the back.

- Keep a clear distance of at least 20 cm.

- Insert the reference thermometer into the holder in the cover plate.

- Put the control unit with the bath bridge on the bath.

- The circulation of the bath can be improved by pulling off the pipe bend from the pump chamber after having removed the small fixing spring.
  Turn the pump chamber so that the pressure outlet faces the opposite corner.

Operation with external circuit (Circulation thermostat) (≥ Section 5.4.)

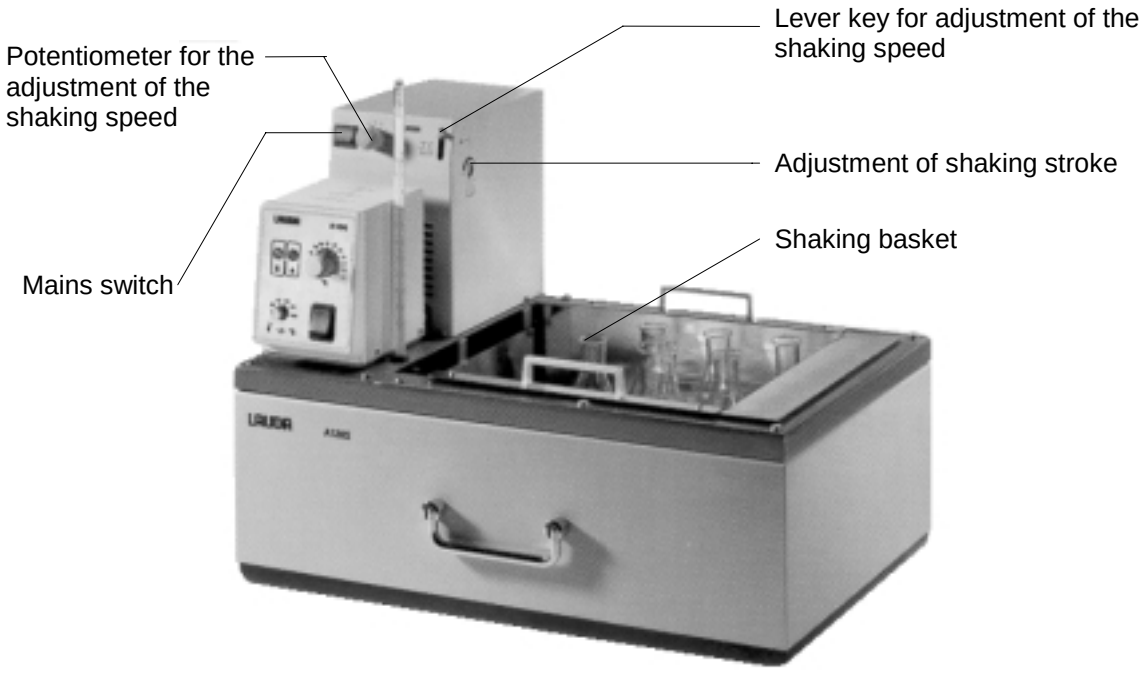
c) Shaking thermostat

- Place the unit on a flat surface, the control panel facing the operator.

- Do not cover the ventilation openings at the back.
- Keep a clear distance of at least 20 cm.

- Insert the reference thermometer into the holder in the cover plate.
- Assemble the items on the tray and hang it in the basket.
- The locking pins must snap in.

- When operating as bath thermostat without external circuit the pump pressure outlet has to be closed off (use closing plugs) or linked to the return.
- At bath temperatures above 70 °C the label supplied must be fixed on the bath in a clearly visible position!



5.2. Filling and emptying

- The units are designed for operation with non-flammable liquids according to EN 61010-2-010!
- When starting up the unit, the tubular heater has to be covered with liquid!

Filling

- Maximum level of 20mm below bath bridge.
- Optimum operation at 20-40mm below bath bridge.
- Operation is possible down to 70mm below bath bridge.

Emptying

a) Immersion thermostat

- Switch off the thermostat, pull out the mains plug!
- Unscrew the immersion thermostat.
- Drain the bath.

b) Bath/Circulation thermostats

- Switch off the thermostat, pull out the mains plug!
- Take off the control unit with the bath bridge.
- Drain the bath.

c) Shaking thermostat

- Switch off the thermostat, pull out the mains plug!
- Open the drain cock and drain the bath.
  → Use a tubing!

Observe the appropriate regulation when disposing of used thermostating liquid.

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

5.3. Bath liquids and hose connections

Bath liquids

LAUDA Designation	Working temperature range	Chemical designation	Viscosity (kin)	Viscosity (kin) at temperature	Ref. No.
Ultratherm	from °C to °C		at 20 °C	mm²/s	
Water	+ 5 to + 90	deionised water ①	--	--	--
G 100 ②	-10 to + 90*	monoethylene glycol/water	4 mm²/s	50 at -25 °C	**LZB 009**

* with additional cooling

☞ ① - At higher temperatures → Evaporation losses → Use bath covers (≥ Section 10. Accessories). Distilled water or fully deionised water should only be used with the addition of 0,1g sodium carbonate/liter water, otherwise → danger of corrosion!

② - Water content falls after prolonged operation at higher temperatures → mixture becomes flammable (flash point 128 °C). → check mixture ratio with a densiometer.

DIN Safety data sheets are available on request.

Hose connections

Tubing type	Int. dia. mm	Temperature range °C	Application	Ref. No.
Perbunan tubing, uninsulated	9	0 to 120	for all bath liquids	**RKJ 011**
Perbunan tubing, insulated	8	-60 to 120	for all bath liquids	**LZS 004**
Silicone tubing, insulated	9	-60 to 100	for all bath liquids	**LZS 001**
Silicone tubing, uninsulated	4	0 to 120	for all bath liquids	**RKJ 041**

- Silicone oil causes pronounced swelling of Silicone rubber → never use Silicone oil with Silicone tubing!
- Protect tubing with hose clips against slipping off.

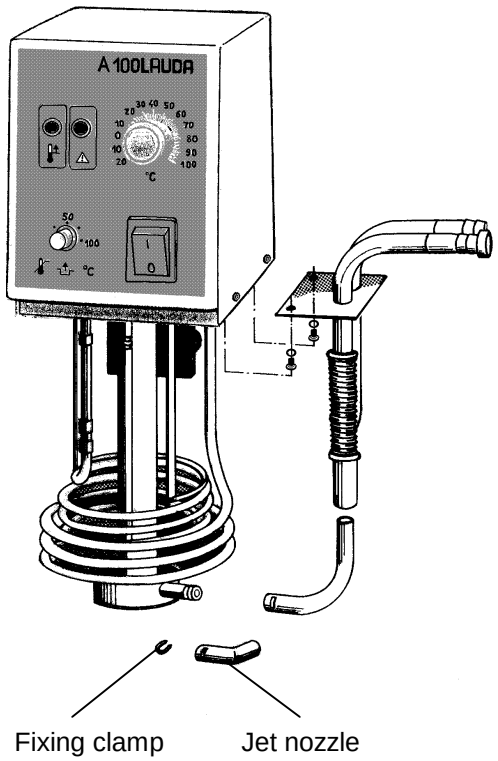
5.4. Connection of external circuits

a) Immersion thermostat

- Push 9 mm int. dia. tubing (≥ Section 5.3.) directly onto the jet nozzle and connect it to the external circuit.
- Hang the return tubing into the bath and fix it!

We recommend to use the pump set (≥ Section 10. Accessories); **In this case**:

- Remove the small fixing spring in order to take off the jet nozzle.
- Fix the pump connectors with screws M4.
- Mount the connection bend (≥ Section 10.) onto the tubing and fix it with the fixing spring.
  (Use reducing fittings for tubing with 4 mm int. dia., ≥ Section 10. Accessories).



b) Bath/Circulation thermostat, Shaking thermostat

- Link 9 mm int. dia. tubing (⩥ Section 5.3.) with the pump connector.
- Pressure connection always in front, return connection always at the back (Use reducing fittings for tubing with 4 mm int. dia.).

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

5.5. 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:	→ mount the cooling coil (⩥ Section 5.1.).
Bath/Circulation thermostats:	→ fitted with cooling coil, as standard.
Shaking thermostat:	→ fitted with cooling coil, as standard.

Cooling can be affected as follows:

1. down to 20 °C	Mains water → keep the water consumption as low as possible!
2. down to -20 °C	Through-flow cooler DLK 10/DLK 20 (depending on bath size and temperature ⩥ Section 10. Accessories) → use water/glycol mixture (ratio 1:1).

☞ - Use insulated Silicone tubing.

- When thermostating an external system the equipment must be arranged in the following order:
thermostat → external consumer→ through-flow cooler → thermostat.

6. Starting up

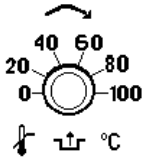
6.1. Connection to the supply

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

Model according to EMC directive EN 61326-1 Class B (industrial and domestic areas), if the nominal current of the current feeding point is >100 A. Otherwise only according to class A (industrial areas only).*

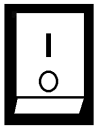
- Connect the equipment only to a socket with a protective earth (PE) connection.
- No warranty in case the thermostat is connected to a wrong supply!
- Without external circuit, ensure that the pressure outlet is closed or linked to the return!
- Ensure that the equipment is filled in accordance with Section 5.2.!

6.2. Switching on



- Set the overtemperature cut-out point to a value clearly above ambient temperature (≥ Section 6.5.1.).

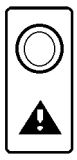
- Adjust max. 65 °C at A 112 T and A 120 T!



- Switch on at the mains switch. The green light for "Supply ON" lights up.

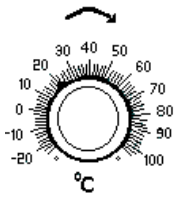
- Indication of the current bath temperature on the reference thermometer.

- If necessary add more bath liquid to compensate for the volume which is needed for filling the external circuit.
  If the pilot lamp ”Fault” lights up
  → Adjust the overtemperature cut-out point at a higher temperature, then reset by pressing the turning knob (Overtemperature adjustment and ”Reset” button).

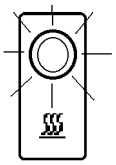


* Notice only valid for EU countries!

6.3. Setpoint selection



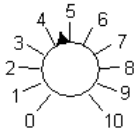
- Adjust the desired setpoint with the button for the temperature adjustment (resolution approx. 0,3 °C).



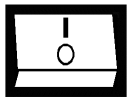
- When the setpoint is reached the pilot lamp for ”Heater” flashes.

- Check at the reference thermometer if the bath temperature corresponds to the selected setpoint → re-adjust setpoint if necessary.

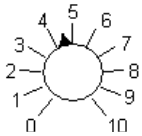
6.4. Shaking operation (A 120 S only)



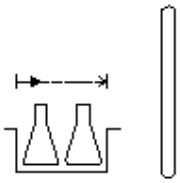
- Turn the potentiometer for the adjustment of the shaking speed to the left.



- Switch mains switch of shaker on "I".

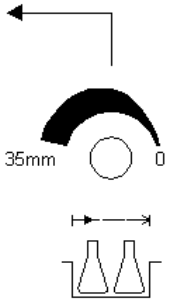


- Increase shaking speed to the desired value by turning the potentiometer to the right.



- The shaking stroke can be adjusted with the lever key during the operation of the shaking thermostat.

  In order to do so, press lever key so that the adjustment screw on the side of the housing can be reached.



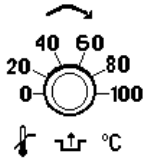
Shaking drive moves slowly to its adjustment position and stops after several seconds.

- Turn to the left with the Allan key (5mm ≥ standard accessories) → Shaking stroke increases (Adjustment range 0...35 mm).

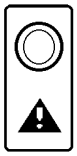
6.5. Warning and safety functions

6.5.1. Overtemperature protection and testing

☞ **-** The units are designed for operation with **non-flammable** liquids to EN 61010-2-010.

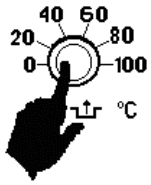


- Set the overtemperature cut-out point. Recommended setting: 5 °C above required bath temperature.



- When bath temperature raises above overtemperature cut-out point the pilot lamp for ”Fault” flashes.

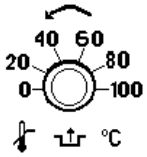
- The heater and the pump are switched off.



- Wait until the heater has cooled down under the cut-out point, rectify the fault (liquid level too low, faulty control, failure of tubing);
then

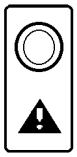
- reset with the key.

☞ - Before the unit is run unattended for longer periods **the overtemperature protection should be tested:**

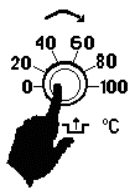


- Turn the setting knob to the left.

- The unit must switch off approximately at the bath temperature.



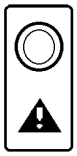
- The red pilot lamp for ”Fault” flashes.



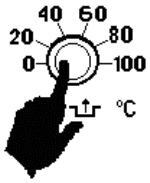
- Re-adjust the overtemperature cut-out point to a value above bath temperature and reset by pressing the button.

- If the unit does not switch off when testing the overtemperature protection, switch off the equipment immediately and pull out the mains plug!
- Have the equipment checked by the LAUDA service or the local service organisation!

6.5.2. Low-level protection and testing



1. If the liquid level drops so far, that the tubular heater is no longer covered with liquid and heating starts the red pilot lamp for ”Fault” flashes .
   Heater and pump are switched off.
   (Protection against operation in case of an insufficient bath level).



2. Refill the bath (⩾ Section 5.2.) or rectify the fault (failure of tubing etc.).

3. Reset with the button.

- If there is any irregularity when testing the safety devices, switch off the equipment immediately and pull out the mains plug!
- Have the equipment checked by the LAUDA service or the local service organisation!
- The heater surface can reach temperatures up to 250 °C when there is not enough liquid in the bath → Danger of burning injuries. Use only non-flammable liquids, otherwise→ Danger of fire!

6.5.3. Pump motor monitoring

- In case of pump motor overload or a blockage, heater and pump are switched off.

- Red pilot lamp for ”Fault” flashes.

- After motor has cooled down the thermostat starts up again automatically.

7. Safety notes

7.1. General safety notes

A laboratory thermostat is intended for heating and pumping liquids. This leads to hazards due to high temperatures, fire, and the general hazards caused by the use of electric energy.

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

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

The equipment 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 EN 60601-1 or IEC 601-1 !

7.2. Other safety notes

- Connect the unit only to a socket with protective earth (PE) connection.
- Use suitable hoses ⩥ Section 5.3.
- Protect tubing with hose clips against slipping off. Prevent kinking of tubing!
- Check tubing from time to time for possible material fatigue!
- 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, a danger to personnel and objects.
- When no external circuit is connected to the thermostat the pressure connection must be closed off (use closing plugs) or linked to the return.
- Don’t change the pump connections with the connections of the cooling coil.
- The units are designed for operation with non-flammable liquids to EN 61010-2-010.
- Depending on the bath liquid used and the mode of operation it is possible for toxic vapours to be produced. Ensure appropriate ventilation!

- The immersion thermostat has to be fixed carefully at the bath vessel!
- Only use bath vessels which are appropriate for the intended operating temperatures.
- Always pull out the mains plug before cleaning, maintenance or moving the thermostat!
- Repairs on the control unit must only be carried out by properly qualified personnel!
- Values for temperature control and indicating accuracy apply under normal conditions according to DIN 58966. High-frequency electromagnetic fields may under special conditions lead to unfavourable values. This does not affect safety.

8. MAINTENANCE

8.1. Cleaning

Before cleaning the unit, pull out the mains plug!

The unit can be cleaned with water with the addition of a few drops of a 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 contact the manufacturer.

8.2. Maintenance and repair

Before any maintenance and repair work pull out the mains plug!

Repairs on the control unit must only be carried out by properly qualified personnel!

LAUDA thermostats are largely maintenance-free. If the thermostating liquid becomes dirty it has to be replaced (⩥ Section 5.2.).

- If a fuse blows (→ supply indication not alight) fit only fuses as specified (at Immersion thermostat, Bath/Circulation thermostats F8A, size 5 x 20 → fuses are accessible from the outside)
- Additional for shaking thermostats : → (fuses F0,5A, size 5 x 20)
  → Take off the cover of the thermostat and remove the screws.

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

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

8.3. Ordering spares

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

We shall always be happy to deal with queries and to receive suggestions and criticism.

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9. Technical data (to DIN 58966)

Common technical data

		A 100
Ambient temperature range	°C	5 to 40
Setting resolution	°C	0,3
Temperature indication		analogue
Indication accuracy		0...100 °C→0,5/ 0...70 °C→ 0,5
Temperature control	± °C	0,05
Pump type		pressure pump
Max. flow rate	l/min	8
Max. discharge pressure	bar	0,15
Safety features ①		NFL
Mains power supply ②	V; Hz	230;50/60; protection class 1 to VDE 0106

① NFL: only with non-flammable liquids
② other mains power supplies on demand

Immersion thermostats

		A 100
Working temperature range	°C	25 to 100
" with water cooling	°C	20 to 100
Operating temperature range ①	°C	-20 to 100
Heater power	kW	1,5
Bath depth ②	mm	min. 160
Usable depth ②	mm	min. 100
Overall size (W x D)	mm	105x130
Height	mm	300
Weight	kg	3
Power consumption	kW	1,6
Ref. no.		**LCE 0225**

① with additional cooling
② bath vessels ⩾ Section 10. Accessories

Units to EU–Directive 89/336/EWG (EMC) and 73/23/EWG (low-voltage) with CE– mark.

Units of different power supplies may have different heating capacities as well as different values for power consumption (see type label).

We reserve the right to make technical alterations!

Bath/Circulation thermostats/Shaking thermostat

		A 103	A 106 T	A 112 T	A 120 T	A 120 S
Working temperature range	°C	30 to 100	25 to 100	25 to 60	25 to 60	25 to 100
" with water cooling	°C	20 to 100	20 to 100	20 to 60	20 to 60	20 to 100
Operating temperature range ①	°C	-20 to 100	-20 to 100	-20 to 60	-20 to 60	-20 to 100
Heater power	kW	1.5				
Pump connections	mm	nipples 13 mm dia.				
Bath volume	l	2,5 to 3,5	5 to 7	9 to 13	14 to 20	14 to 20
Bath vessel		stainless steel	polycarbonate	acrylic glass	acrylic glass	stainless steel
Bath opening (W x D) ②	mm	135x105 ②	130x285 ②	300x175	300x350	-
Shaking basket (W x D)		---	--	--	--	280x270
Depth of shaking basket		---	--	--	--	160
Bath depth	mm	150	160	160	160	--
Usable depth	mm	130	140	140	140	130
Height top edge of bath	mm	178	170	208	208	210
Overall size (W x D)	mm	168x271	145x435	316x330	316x506	350x540
Height	mm	338	310	350	350	415
Weight	kg	6	4	7	8	26
Power consumption	kW	1.6	1.6	1.6	1.6	1.7
Ref. no.		**LCB 0703**	**LCM 0095**	**LCD 0270**	**LCD 0271**	**LCS 0081**

① with additional cooling

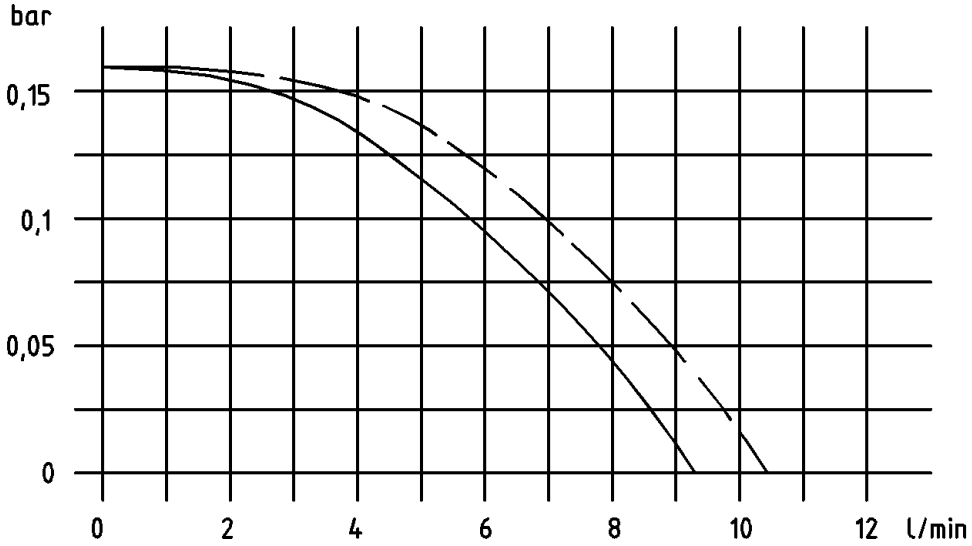
② measured at top edge of bath, slightly reduced downwards.

Units to EU–Directive 89/336/EWG (EMC) and 73/23/EWG (low-voltage) with CE–mark.

Units of different power supplies may have different heating capacities as well as different values for power consumption (see type label).

We reserve the right to make technical alterations!

Pump characteristics:



compactthermostat

Immersion thermostat without pump connector

Measured with H_2O

10. Accessories

Immersion thermostat

Accessories	Ref. No.
Pump set (cooling coil; pump: pressure and return connection, 2 pump reducing fittings, connection nozzle, spring, fixing rod)	**LCZ 0639**

Bath	Materials	Max. Temp. (°C)	Volume (l)	Inner dimensions (W x D x H)	Ref. No.
003	deep drawn stainless steel	150	2.5 to 3.5	135x240x150 *	**LCZ 0620**
006 T	polycarbonate	100	5 to 7	130x420x160 *	**LCZ 0628**
012 T	acrylic glass	60	9 to 13	300x315x160	**LCZ 0629**
020 T	acrylic glass	60	14 to 20	300x490x160	**LCZ 0631**
020	stainless steel, insulated	200	13 to 20	300x480x160	**LCZ 0626**

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

Type of thermostat	Designation	Capacity of trays	test tubes Ø mm	Immersion depth mm	Materials	Ref. No.
A 103	RN 13/1 RN 18/3 RN 18/4 RN 30/1	15 tubes 11 tubes 11 tubes 4 tubes	10/13 14/18 14/18 24/30	80 80 110 110	stainless steel	**UE 033** **UE 034** **UE 035** **UE 036**
A 106 T	RK 100	20 tubes	14/18	70	poly-carbonate	**UE 022**
A 106 T	RK 160	20 tubes	14/18	100	poly-carbonate	**UE 020**
A 112 T (2 trays max.)/ A 120 T (4 trays max.)	RD 13 RD 18/1 RD 18/2 RD 30	56 tubes 33 tubes 33 tubes 14 tubes	10/13 14/18 14/18 24/30	80 80 110 110	stainless steel	**UG 066** **UG 067** **UG 068** **UG 069**
A 112 T (1x)/ A 120 T (2x)	rising platform, 8 steps	--	dimensions: 140 x 250	--	stainless steel	**LCZ 0635**

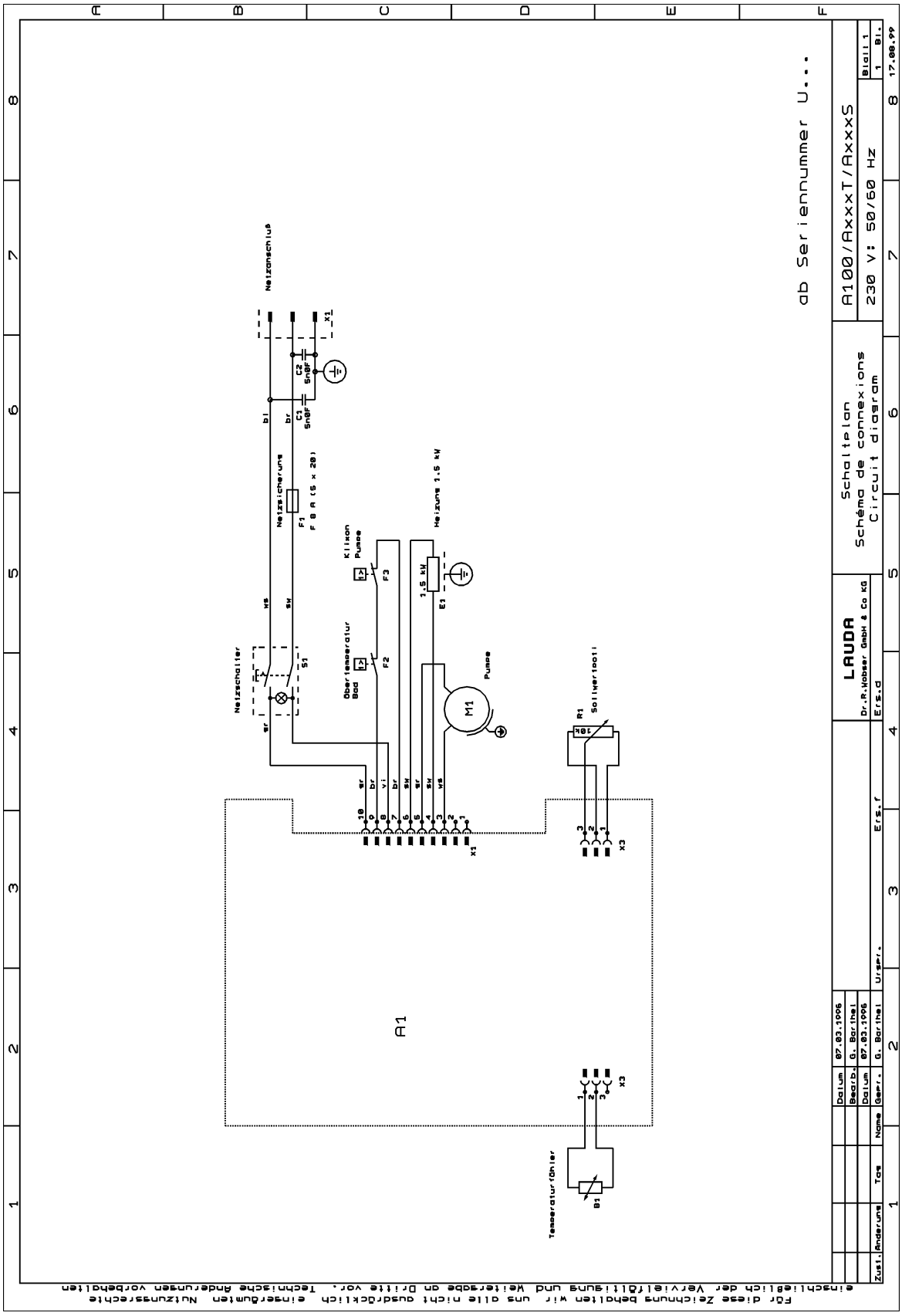
Shaking thermostat

Accessories	Size of recipients Ø test tubes	Materials	Immersion depth	Ref. No.
Tray for 20 Erlenmeyer flasks	50ml	stainless steel		UG 078
Tray for 14 Erlenmeyer flasks	100ml	"		UG 079
Tray for 9 Erlenmeyer flasks	200/250/300ml	"		UG 080
Tray for 5 Erlenmeyer flasks	500ml	"		UG 081
Tray for 99 test tubes	Ø 14...18mm	"	110mm	UG 082
Tray for 99 test tubes	Ø 14...18mm	"	80mm	UG 083
Gable cover/stainless steel		"		LCZ 010

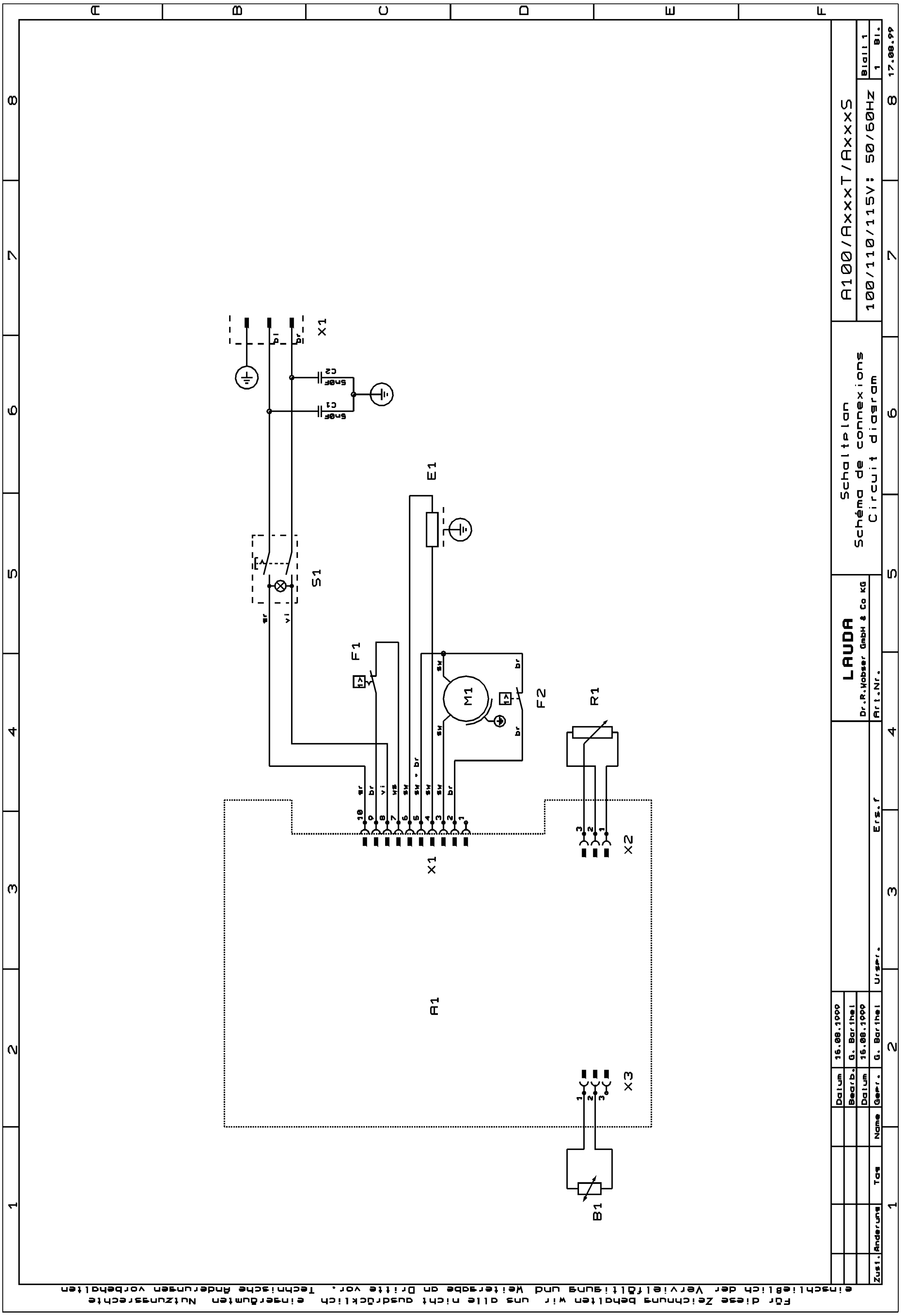
For all types

Accessories	Ref. No.
Pump reducing fittings for tube with int. dia. 4 mm	**HKO 018**
Reference thermometer made of glass (0/100 °C, graduation 0,5 °C)	**ET 031**
Reference thermometer holder	**HKF 036**
Through-flow cooler DLK 10 down to - 10 °C	**LFD 005**
Through-flow cooler DLK 20 down to - 30 °C	**LFD 106**

CIRCUIT DIAGRAM



LAUDA


Schaltplan
Schéma de connexions
Circuit diagram
A100/AxxxT/AxxxS
100/110/115V; 50/60Hz
LAUDA
Dr.R.Wobser GmbH & Co KG
X1
S1
F1
F2
M1
E1
R1
B1
X2
X3
A1
Für diese Zeichnung behalten wir uns alle nicht ausdrücklich eingeräumten Nutzungsrechte
einschließlich der Vervielfältigung und Weitergabe an Dritte vor. Technische Änderungen vorbehalten

CIRCUIT DIAGRAM

230V; 50/60Hz		**from serie X01**
Part No.	**Designation**	**Ref.-No.**
A 1	Printed circuit board „Control / Indication“	UL 387
B 1	PTC – Temperature probe	US 050
E 1	Heater 1,5kW	EH 152
F 1	Mains fuse F 8 A	EEF 021
F 2	Overtemperature limiter	ETS 040
F 3	Klixon Pump	-----
M 1	Pump motor	EM 039
R 1	Setpoint potentiometer 10kOhm	UD 305
S 1	Mains switch	EST 032
X 1	Mains connection / Mains cable	EKN 001

230V; 50/60Hz ◆ 115V;60Hz		**from serie X01**
Part No.	**Designation**	**Ref.-No.**
A 1	Printed circuit board „Control / Indication“	UL 402
B 1	PTC – Temperature probe	US 050
E 1	Heater 1,5kW	EH 092
F 1	Mains fuse F 8 A	----------
F 2	Overtemperature limiter	ETS 024
F 3	Klixon Pump	----------
M 1	Pump motor	EM 030
R 1	Setpoint potentiometer 10kOhm	----------
S 1	Mains switch	EST 084
X 1	Mains connection / Mains cable	EKN 003

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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