

Operating Instructions

LAUDA Compact Thermostats
CS 6, CS 6-D, CS 12, CS 12-D,
CS 20, CS 20-D, CSG
KS 6, KS 6-D, KS 20, KS 20-D, KSG
to DIN 12 879

08/89
YACE0004

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Enclosures

Accessories

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Summary of LAUDA Heating Thermostats and LAUDA

Low-temperature thermostats






1. Brief operating instructions

- o Check thermostat and accessories during unpacking for possible transport damage and, if necessary, notify carrier or post office.
- o Assemble unit according to Section 6 and add items as appropriate.
- o Connect the tubing at the pump connectors:

Without external circulation: Link together the pump connectors with the perbunan tubing supplied (up to 120°C), viton or metal tubing.

With external circulation: Connect tubing to the external system.

Secure tubing with clips to prevent it slipping off.

- o When operating in the ambient temperature range connect external cooling according to Section 8.
- o Use decalcified water only or LAUDA bath liquids (See section 5). Fill the unit up to approx. 2 cm below the top plate.
- o Check the supply voltage against the data on the rating label. Connect the cable to the supply.
- o Switch on the unit with the mains switch (green lamp lights up).
- o Overtemperature cut-out  has to be set according to bath temperature and bath liquid (see Section 4). To release the safety circuit lock-out it may be necessary to operate the reset button .
- o 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.
- o The digital thermometer shows the actual bath temperature.
- o To set the temperature press the button  , this changes the digital display from bath temperature to setpoint. Now select the desired temperature by turning the knob  . The fine adjustment +/-0.2°C is also effective and simplifies setting up through its greater resolution.
- o Under normal conditions, i.e. when no accessory units are connected to the thermostat, the three slide switches on the back of the unit should be in the bottom position (see Section 9).
- o When the bath liquid has reached the set temperature, the yellow pilot lamp "heating"  begins to lash. After the temperature has settled down, the digital thermometer indicates the selected bath temperature.

o Safety

The thermostat is a Class 2 unit. It must only be operated with liquids (see also Section 5) whose flash point is above 40°C. Inflammable liquids may only be used up to 5°C below the flash point, otherwise an explosive atmosphere may be created.

o Important note

Parts of the bath cover may heat up to 60°C or more at higher operating temperatures. The outflow and return tubes of the pump reach the bath temperature.

2. Table of Data

These thermostats meet the requirements of DIN 12879.

Type	CS 6 CS 6-D	CS 12 CS 12-D	CS 20 CS 20-D	CSG	KS 6 KS 6-D	KS 20* KS 20-D*	KSG
Temperature range (°C) without water cooling							
SIMPLEX	32...200	30...200	25...200	25...200	50...250	40...250	30...250
DUPLEX	30...200	35...200	30...200		57...250	47...250	
with water cooling		20...200			20...250		
Operating temperature range (with external cooling)		-30...250			-30...250		
Temperature setting	digital, using 10-turn potentiometer and numerical indication; resolution of indication 0.1°C, 10-turn potentiometer approx. 0.08°C; fine adjustment 0.01°C						
Indicating thermometer	built-in digital thermometer (LED-Display), 0.1°C resolution, absolute accuracy better than +/-0.2% of reading +/-0.2°C. Max. reading on CS 199.9°C						
Temperature probe/ Control action	Pt 500 platinum resistance thermometer/PID Xp ≈ 1.2°C...9°C, Tn1 ≈ 45 s, Tn2 ≈ 20 s, Tv ≈ 40 s						
Temperature control (at 70°C) (°C)	-/-0.01						
Heating load	automatic adjustment as required 0 ... 2 kW*						
Class to DIN 12 879	Class 2						
SIMPLEX							
Output against zero head (Pump output)							
with connector	∅11 mm	Pressure 11 l/min			Pressure 16 l/min		
with connector	∅13 mm	Pressure 15 l/min			Pressure 22 l/min		
Max. head	0.25 bar				0.5 bar		
DUPLEX							
Output against zero head (Pump output)							
with connector	∅11 mm	Pressure 10 l/min	Suction 8 l/min		Pressure 15 l/min,	Suction 11 l/min	
with connector	∅13 mm	Pressure 15 l/min	Suction 9 l/min		Pressure 20 l/min	Suction 15 l/min	
Max. head		Pressure 0.25 bar	Suction 0.25 bar		Pressure 0.5 bar	Suction 0.33 bar	
Capacity (l)	4 - 6	9 - 13	15 - 20	up to 50	6 - 7.5	14 - 18	up to 50
Bath liquid 5 to 100°C below 5°C	decalcified water water-monosthylene glycol mixture 1:1 (for other bath liquids see Section 5)						
Dimensions							
Bath opening (LxW) (mm)	150x130	300x175	300x350	----	150x130	300x175	----
Bath depth (mm)		160				200	
Bath width (mm)	----	----	----	310...550	----	----	310...550
Usable liquid depth (mm)			140			180	

LAUDA Compact Thermostats
Series C and K

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Type		CS 6 CS 6-D	CS 12 CS 12-D	CS 20 CS 20-D	CSG	KS 6 KS 6-D	KS 20* KS 20-D*	KSG
Overall dimensions								
Bench area (W x D)	(mm)	200x350	350x365	350x540	330x170	200x350	375x415	330x170
Height	(mm)		400		350		450	390
Weight	(kg)	12	15	19	8.5	13	18	9.5
Power supply	(V/Hz) (kW)	220 - 240 V / 50/60 Hz 2.2				220-240 V, 50 Hz/230 V, 60 Hz 2.2		
Protection Class I to VDE 0100								
Interference suppression								
N								
Ref.No.								
220-240 V, 50/60 Hz SIMPLEX DUPLEX		LCB 015 LCB 016	LCB 029 LCB 018	LCB 017 LCB 030	LCG 001 ----	----	----	----
220-240 V, 50 Hz SIMPLEX DUPLEX		----	----	----	----	LCB 119 LCB 120	LCB 121 LCB 122	LCG 102 ----
230V, 60 Hz SIMPLEX DUPLEX		----	----	----	----	LCB 219 LCB 220	LCB 221 LCB 222	LCG 202 ----
220 - 240 V, 50 Hz SIMPLEX DUPLEX		----	----	----	----	----	LCB 125 LCB 126	----
230 V, 60 Hz SIMPLEX DUPLEX		----	----	----	----	----	LCB 225 LCB 226	----

* can be equipped with heater of 3 kW

3. Basic construction

These operating instructions apply to 8 Compact liquid thermostats of different construction, Series CS and KS.

Bath/circulation thermostats CS 6, CS 12 and CS 20

With SIMPLEX pump for thermostating inside the bath and in closed external systems up to 200°C operating temperature.

Bath/circulation thermostats CS 6-D, CS 12-D and CS 20-D

With DUPLEX pump for thermostating inside the bath and in closed and open external systems up to 200°C operating temperature.

Bridge thermostat CSG

Mounted on a bath bridge with telescopic rods for universal application on baths with a width of 310 to 550 mm and a capacity of up to 50 l.

Bath/circulation thermostat KS 6 and KS 20

With more powerful SIMPLEX pump and extended temperature range up to 250°C.

Bath/circulation thermostats KS 6-D and KS 20-D

With more powerful DUPLEX pump and temperature range up to 250°C.

Bridge thermostat KSG

As type CSG, but with more powerful circulating pump and extended temperature range up to 250°C.

On all units the metal parts in contact with the bath liquid are made of chrome nickel steel. DUPLEX pumps have a suction and a pressure stage with level control.

The units (except for the types CSG and KSG) consist of the bath and control assembly, and pump assembly which can be separated from each other (see Section 12).

The control assembly contains the complete electronics with digital display for actual temperature and setpoint, PID controller with triac packet-switching relay, temperature probe, heater, cooling coil, safety system and pump. All units have at the back a multi-function socket with inputs for programmer and accessory units and with outputs for recorder, fault signal etc. (see Sections 9 and 10). The main data of the thermostats are summarised in Section 2.

4. Safety system

4.1 The DIN specification 12 879 for laboratory thermostats entitled "Liquid Thermostats, General and Safety Requirements" has been in operation since 1 May 1979. This specification lays down the safety devices required and divides thermostats into different safety classes.

4.2 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.

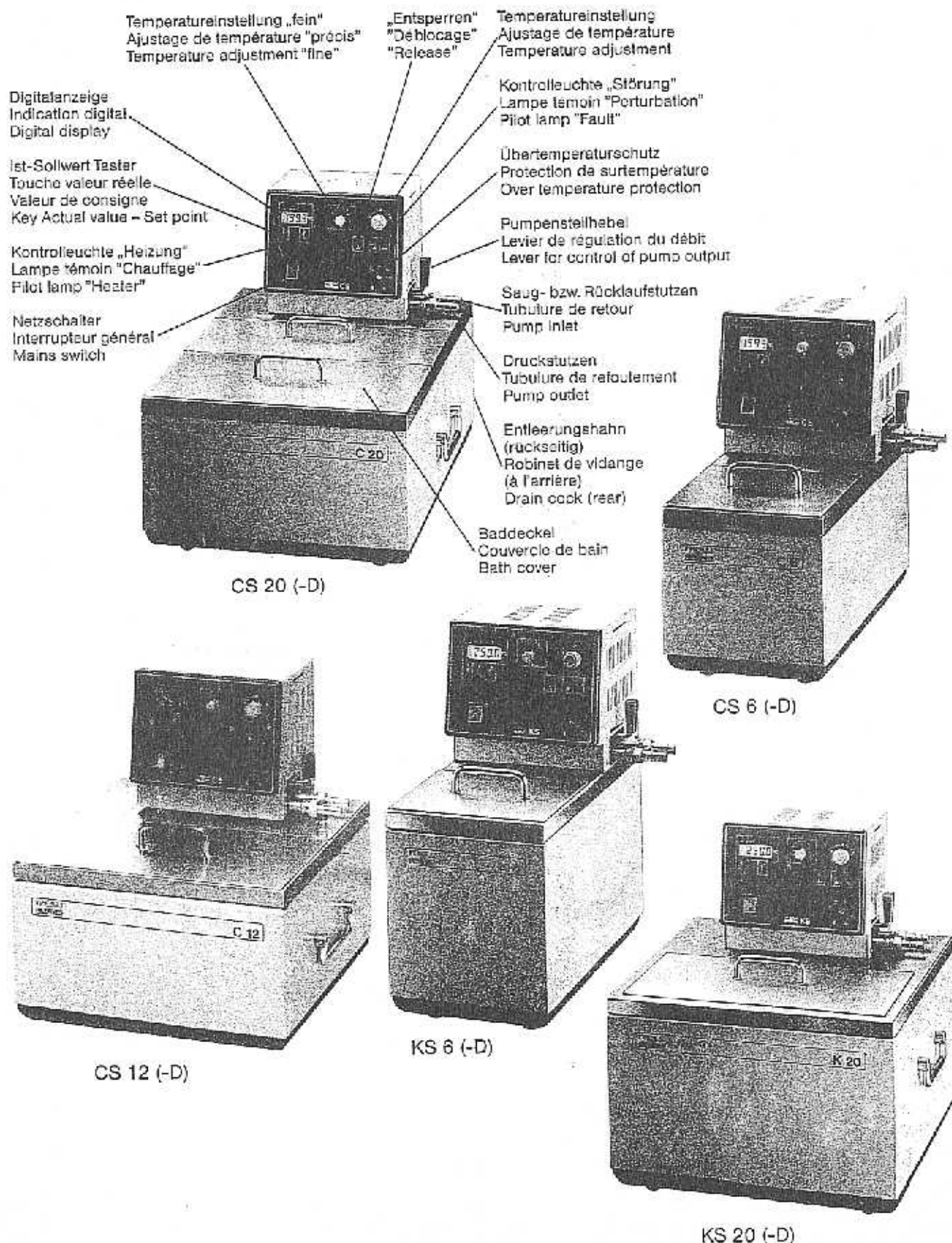
4.3 The units Series CS and KS as described in these Operating Instructions are to Class 2. Class 2 requires

- o a temperature limiter as overtemperature protection which switches off the thermostat on all poles of the supply when an adjustable switch-off temperature is exceeded;
- o a level limiter as low-level protection which switches off the thermostat on all poles of the supply when the liquid volume falls below a minimum value;
- o only those bath liquids may be used whose flashpoint is above 40°C. The operating temperature must not be higher than 5°C below the flashpoint. Non-inflammable liquids can, of course, be used.

Important Note

Even with Class 2 units the user is only protected against hazards from excess temperature and low level.

Other hazards may arise from the type of products 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.



5. Bath liquids and tubing

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 ... 100°C

Use decalcified water. Remember to make up losses through evaporation at elevated temperatures. Losses may be reduced by using suitable bath covers (see Accessories).

Temperatures close to zero and below:

Use water-monoethylene glycol mixture, preferably Glycoshell P 300, in the ratio 1:1.

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

Prolonged operation at elevated temperatures results in a decreasing proportion of water in the mixture which gradually approaches the properties of pure glycol and thus 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.

<u>Operating range 20 to 180°C</u> (synthetic heat transfer liquid)	<u>Ultra-Therm 330 SCB</u>	LZB 007
Viscosity at 20°C	34 mm ² /sec	
Flashpoint	190°C	
Boiling point	390°C	
<u>Operating range 50 to 290°C</u> (silicone oil)	<u>Ultra-Therm SW 300 N</u>	LZB 008
Viscosity at 20°C	260 mm ² /sec	
at 100°C	21 mm ² /sec	
Flashpoint	305°C	

5.2 Tubing (continuous lengths)

Ref.No.

Perbunan tubing, uninsulated

RKJ 011

9 mm int. dia. Application range 0 ... 120°C
For all above mentioned bath liquids.

Perbunan tubing, insulated

LZS 004

9 mm int. dia. Ext. dia. approx. 30 mm
Application range -60 ... 120°C.
Particularly suitable for low-temperature.

Perbunan tubing

RKJ 012

11 mm int. dia.

Secure tubing with clips to prevent it slipping off.

Metal tubing (single insulation)

Application range 0 ... 350°C

Metal tubing MC 50 (50 cm long)
Metal tubing MC 100 (100 cm long)
Metal tubing MC 150 (150 cm long)
Metal tubing MC 200 (200 cm long)

LZM 040
LZM 041
LZM 042
LZM 043

Metal tubing (multiple insulation)

Application range 0 ... 350°C

Metal tubing MC 50 S (50 cm long)
Metal tubing MC 100 S (100 cm long)
Metal tubing MC 150 S (150 cm long)
Metal tubing MC 200 S (200 cm long)

LZM 046
LZM 047
LZM 048
LZM 049

Metal tubing connection for linking together the pump
connectors (insulated) MC 18
Application range 0 ... 350°C

LZM 044

Highly flexible thermally insulated stainless steel (V2A) metal tubing with
M 16x1 mm. Internal dia. 10 mm. This tubing offers maximum safety,
especially above 100°C.

Further details on thermostat liquids and tubing are contained in our
special Information Bulletin.

6. Unpacking, assembly and setting up

- 6.1 The units are packed carefully to prevent transport damage. If, however, the unit should arrive damaged, the carrier or the railway authorities have to be informed so that it can be inspected.

<u>Standard accessories</u>	<u>Ref.No.</u>	
1 Bath cover	HDQ 041	on CS 6, CS 6-D
1 Bath cover	HDQ 044	on CS 12, CS 12-D
2 Bath covers and	HDQ 039 HDQ 040	on CS 20, CS 20-D
1 Bath cover	HDQ 042	on KS 6, KS 6-D
1 Bath cover	HDQ 039	on KS 20, KS 20-D
4 Connectors 13 dia. (fitted)	HKD 026	
2 Connectors 11 dia.	HKD 025	
1m Perbunan tubing 11 mm i.d.	RKJ 012	
Operating Instructions		

- 6.2 The units are best set up so that the narrow side is to the front . Close the drain cock.
Pull out the telescopic rods of the Bridge Thermostats CSG or KSG as far as necessary to place the thermostat safely over the edge of the bath. If no external circulation is required the pump connectors must be linked together with a piece of tubing. We recommend to use the metal tubing connection MC 18 (Ref.No LZM 044) which is the best and safest solution. The pump output control lever should be open to improve the circulation inside the bath.

7. Connecting external systems

- 7.1 If the thermostat is connected to closed external systems, liquid must be added after the unit is switched on until the bath level remains at the correct height (approx. 2 cm below the cover). For suitable tubing material refer to Section 5. 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!
- 7.2 When thermostating open external systems (bath vessel) the tubes are placed into the external bath vessel (protect them against slipping out), preferably on opposite sides. The suction tube should have a notch cut into it at the end so that it does not suck itself to the side or the bottom of the bath. Before switching on the unit the bath is filled with liquid to the required height. If thermostat and external bath are not at the same level, the connecting tubing must be vented after switching off the thermostat by pulling them out of the liquid, otherwise the thermostat may flood.

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

Protect the tubing with clips to prevent it slipping off or use stainless steel tubing with screw fittings.

7.3 Circulating pumps

Essentially there are two different types: SIMPLEX pumps, e.g. on CS 6, CS 12, CS 20, CSG, KS 6, KS 20, KSG, and DUPLEX pumps, e.g. on CS 6-D, CS 12-D, CS 20-D, KS 6-D, KS 20-D.

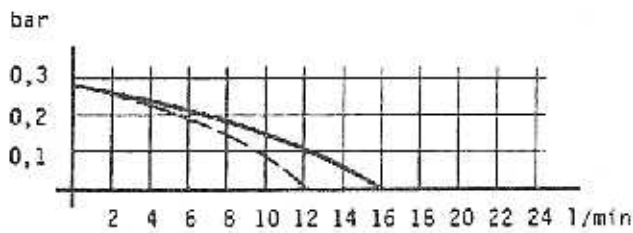
SIMPLEX pumps are used for operation with closed external circulating systems. They require that the external system is pressure-tight.

DUPLEX pumps are used mainly with open external systems, e.g. open baths. They differ from SIMPLEX pumps by having a pressure and a suction stage as well as a float for level control. The DUPLEX pump automatically maintains a constant level in the thermostat independently of the level in the external bath. The open bath is filled with liquid until a level is reached in the thermostat at which the pressure and suction stages have identical output. If the level difference between open external bath and thermostat bath exceeds 0.5 m there is a possibility that the control range of the level control is insufficient. A tubing clip is then used to restrict one of the tubes, the suction tube if the external level is higher, or the discharge tube if the external level is lower, until the thermostat reaches a constant level at which the pump float is within its control range.

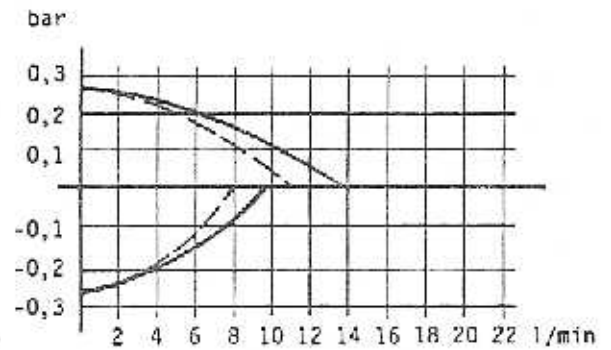
DUPLEX pumps can of course also be used with closed external systems. There they offer the advantage that the liquid flows through the external system virtually without pressure (important with thin-walled glass vessels). When operating with closed systems or as a bath thermostat the bath should be filled to the highest level (to 2 cm below the cover).

Performance diagrams

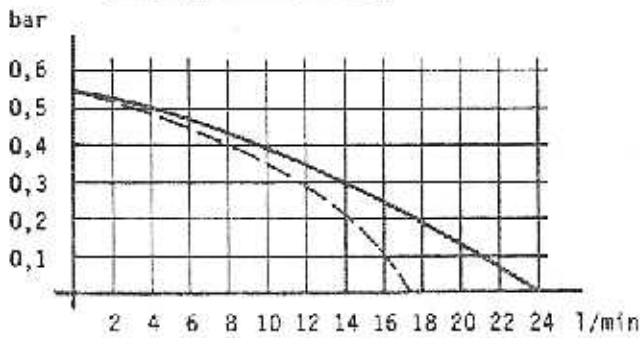
CS 6, CS 12, CS 20, CSG



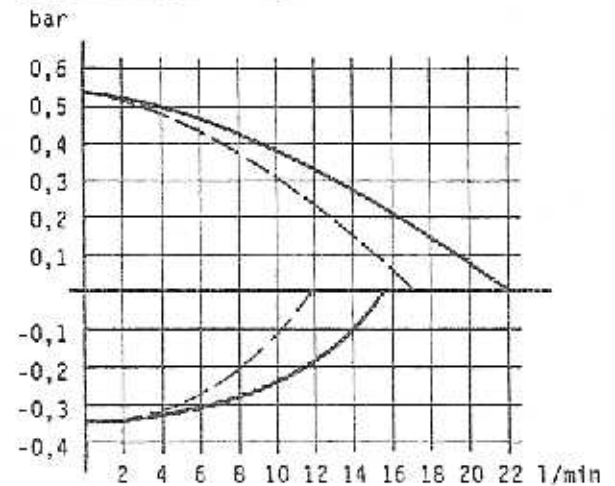
CS 6-D, CS 12-D, CS 20-D



KS 6, KS 20, KSG



KS 6-D, KS 20-D



- connector 13 mm int. dia.
- - - - - connector 11 mm int. dia.


Measured according to DIN 58 966

All LAUDA circulating pumps are fitted with a lever to permit continuous adjustment of the flow rate (pump output) through the external system from zero up to the maximum. All driving motors are fitted with overload protection which is embedded in the motor winding. The pumps can operate with liquids whose viscosity does not exceed approx. 150 mm²/sec.

8. Cooling the thermostat

Due to the frictional heat generated by the circulating pump, thermostating without cooling is only possible for temperatures well above ambient temperature (see Table of Data, Operating temperature range, lower limit). Cooling is required for lower temperatures. The following cooling methods are available:

8.1 Mains water cooling

Down to about 15°C depending on water temperature. The thermostats are fitted with a cooling coil (at the back ) which is connected by tubing to the water tap and the drain. Keep the flow rate as low as possible, this saves water and improves temperature control. If required, the cooling coil connectors can be replaced by the pump connectors 11 mm int. dia.

8.2 Flow-through cooler DLK 5, DLK 15 and DLK 30

Suitable for 10°C (DLK 5), -15°C (DLK 15) and -30°C (DLK 30). More accurate temperature control than with water cooling. Insulated tubing for connecting pump inlet and outlet connectors to the connectors of the flow-through cooler. If the thermostat is connected to a closed external system, the flow-through cooler is placed in the return circuit from the external system to the thermostat. It is essential to use water-glycol mixture (ratio 1:1) in the thermostat.

8.3 LAUDA Small Low-temperature Thermostat

It is, of course, possible to use any of the small low-temperature thermostats for thermostat cooling. This rather expensive solution is only recommended if a small low-temperature thermostat is already available in the laboratory.

9. Starting up


9.1 Filling

The unit is filled with suitable bath liquid depending on the operating temperature, as discussed in Section 5. The liquid volume is indicated in Section 2, Table of Data. The thermostats should never be filled higher than 2 cm below the cover.

When using thermostat oil (e.g. Ultra-Therm 330 SCB) the level should be slightly lower to allow the expansion of the bath liquid. The liquid must obviously not be below the minimum level, otherwise the unit is switched off by the low-level cut-out (see Safety system). The same applies when an external system is filled by the pump during starting up.

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 connectors are linked together when there is no external system (metal tubing connection MC 16).

9.4 Switch on the mains switch. The green pilot lamp lights up. The digital display indicates the actual bath temperature. Set the overtemperature switch-off point \uparrow a little higher than the desired operating temperature. When operating at temperatures below ambient temperature the overtemperature switch-off point must of course first be set above ambient temperature until setpoint is obtained. Then the overtemperature switch-off point may be set slightly above the desired operating temperature (minimum approx. 0°C), as described in Section 10. The reset key  "Release" may have to be operated if the unit has been switched off through a fault.

The three slide switches on the back of the unit should normally (if no accessory unit is connected) be in the bottom position. The Xp selector (proportional range) is moved to position 1 only if there are excessive fluctuations in the temperature control due to low thermal capacity or excessively high viscosity.

You can further optimize the control parameter by changing the position of the Xp potentiometer which is located next to the Xp switch. At the factory the unit is set to a middle Xp position. On CS 6 and KS 6 units the Xp is approx. 4 and on CS 20, CSG, KS 20 and KSG units approx. Xp 2. Most common applications do not require a different adjustment. The proportional range Xp and the integral part (Tn) of the PID controller are both switched over by the Xp switch.

The following value combinations are possible:

Xp switch position	Potentiometer setting	
	1	5
1	Xp = 1.5°C Tn = 45 sec	Xp = 9°C Tn = 45 s
2	Xp = 1.2°C Tn = 20 sec	Xp = 6.5°C Tn = 20 sec

11. Multi-function output

15-pin connector 30 S at the back with multiple function.

- Contact 1: Recorder connection for bath temperature, correct sign; 10 mV/°C; $R_i = 100 \text{ Ohm}$; recorder input resistance $\cong 1 \text{ MOhm}$ (0 V contact 3).
- Contact 2: Used in conjunction with external controller R 22.
- Contact 3: 0 V reference potential for measuring signals.
- Contact 4: Programmer or external setpoint input 10 mV/°C, added to the selected setpoint. Sum is indicated as the setpoint, $R_i = 24.6 \text{ kOhm}$ (0 V contact 3).
- Contact 5: 18 V, if fault light flashes, i.e. operating temperature is more than 5°C above setpoint. $R_i \approx 1 \text{ kOhm}$ (0 V contact 12).
- Contact 6: Setpoint output 10 mV/°C, $R_i \approx 100 \text{ Ohm}$. Load resistance $\cong 10 \text{ kOhm}$ (0 V contact 3).
- Contact 7: +12 supply, max. additional load 50 mA (0 V contact 12).
- Contact 8: 9 V reference voltage for external setpoint, $R_i \approx 1 \text{ kOhm}$, max. load 1 mA (0 V contact 3)
- Contact 9: Actuating output, for accessory units only (0 V contact 12).
- Contact 10: -12 V supply voltage, max additional load 30 mA (0 V contact 12)
- Contact 11: Spare
- Contact 12: 0 V load reference potential
- Contact 13: 18 V, if fault lamp shows red continuously, i.e. safety circuit to DIN 12879 is activated. Max. load 20 mA (0 V contact 12)
- Contact 14: Spare
- Contact 15: Used in conjunction with external controller R 22.

In case of a fault the signals at this connector can readily be used for an initial fault diagnosis.

Ref.No.

15-pole mating connector
Case for above

EQM 030
EGG 017

12. Maintenance

LAUDA thermostats are designed for continuous operation. They require no regular maintenance. Contaminated bath liquid should be discharged through the drain cock and replaced by fresh liquid. If the instrument should become defective through a fault in the control unit or the pump it is recommended that this part should be removed by a qualified person and returned to the factory.

The following procedure should be used:

Important Note: Before opening up the unit pull out the line supply plug.

Remove the cover after taking off the 4 screws at the side. The control unit together with the pump can now be separated from the bath balance after releasing the 4 nuts M 4 which are accessible from the right and left between the pump assembly chassis and the intermediate floor of the control unit.

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

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LAUDA Compact Thermostats
Series C and K

Accessories for LAUDA Compact Thermostats Series CS and KS

Type	Ref.No.
<u>External Controller R 22</u> To indicate the temperature at an external point (consumer) and to control the temperature according to this point. Probe for the above Pt 100 to DIN 43760.	LRT 910
<u>Programmer PM 351-1</u> Microprocessor controlled programmer with up to 50 program segments and a program range of 350°C for unrestricted individual programming of temperature courses.	LRP 012
<u>LAUDA digital thermometers</u> For a temperature range of -200 ... 800°C with 0.1 or 0.01°C resolution. Pt 100 as measure probe.	
<u>LAUDA flow-through cooler</u> For cooling thermostats, particularly when operating below the normal temperature range.	DLK 5 LFD 001 DLK 15 LFD 102 DLK 30 LFD 103
<u>Stainless steel racks</u> for test tubes, centrifuge tubes, etc.	
Bath C 12, up to 2 racks Bath C 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 K 20. up to 2 racks RE 13 same as RD 13 RE 18/1 same as RD 18/1 RE 18/2 same as RD 18/2 RE 30 same as RD 30	UG 070 UG 071 UG 072 UG 073
Bath C 6, 1 rack RF 18/1 for 20 tubes 14 - 18 dia., 80 mm immersion RF 18/2 for 20 tubes 14 - 18 dia., 110 mm immersion	UG 074 UG 075

LAUDA Compact Thermostats
Series C and K

Bath K 6, 1 rack

RG 18/1 for 20 tubes 14 - 18 dia., 80 mm immersion UG 076

RG 18/2 for 20 tubes 14 - 18 dia., 110 mm immersion UG 077

Details on other racks available on request.

Rising platform to be mounted subsequently

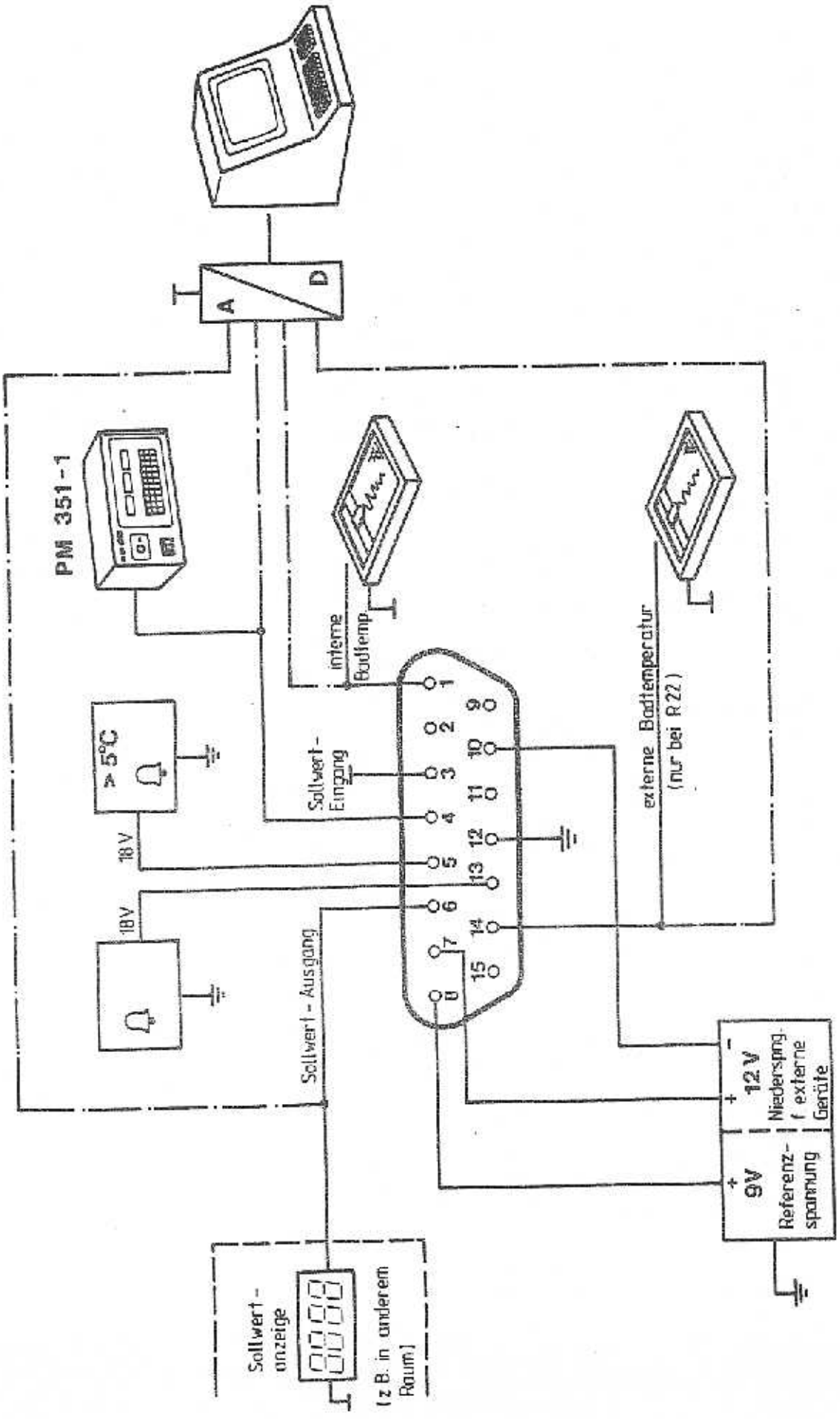
LCZ 012

Bench area 250 x 160 mm, height continuously adjustable

Bath C 12: max. 1 platform

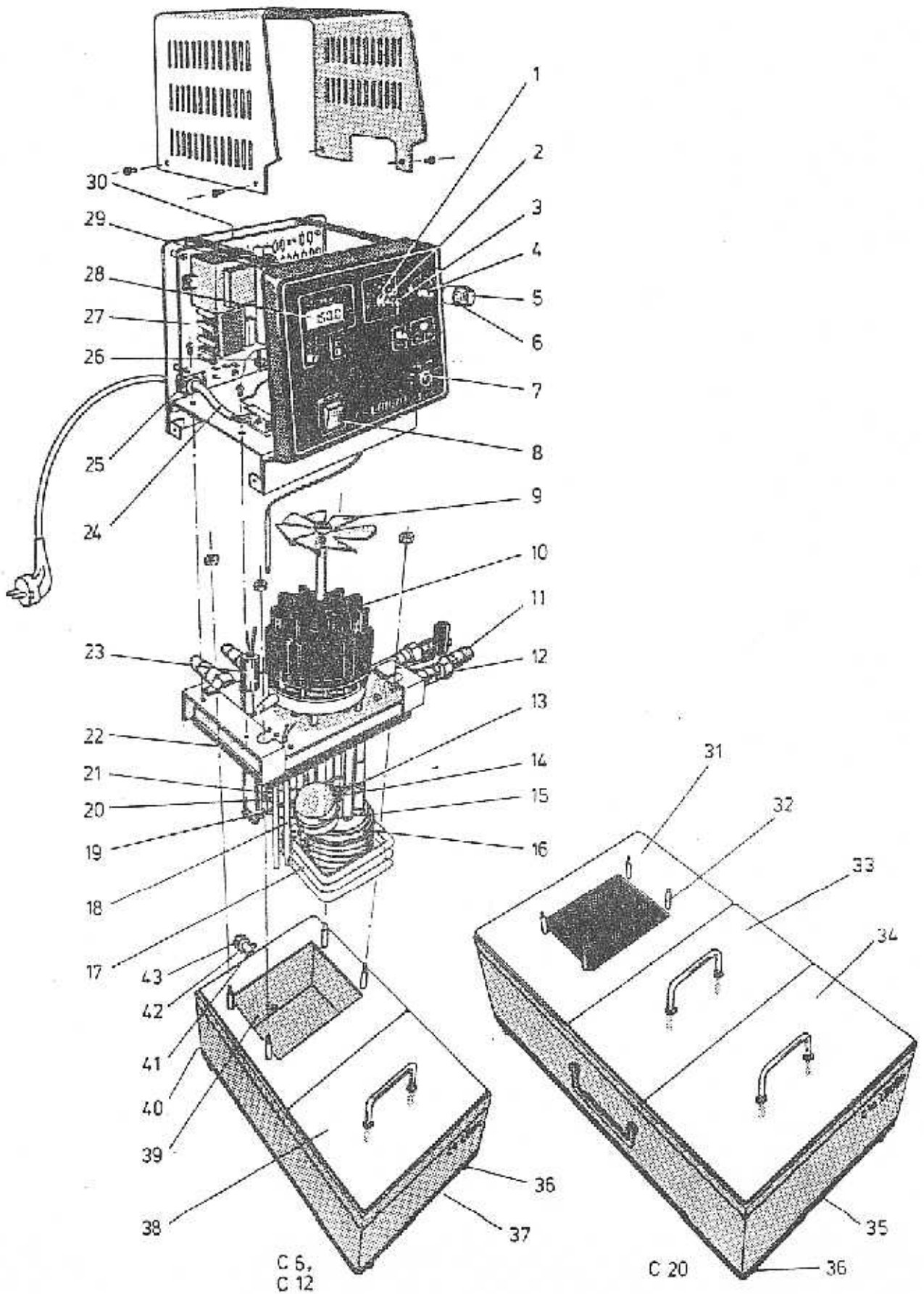
Bath C 20: max. 2 platforms

Bath K 20: max. 1 platform



Multifunktionsanschluß für Baureihe
 CS, KS, RCS, AKS, RLS und externes Regelrelais R22

Ersatzteile/Pièces détachées/Spare parts
 CS 6, CS 6-D, CS 12, CS 12-D, CS 20, CS 20-D

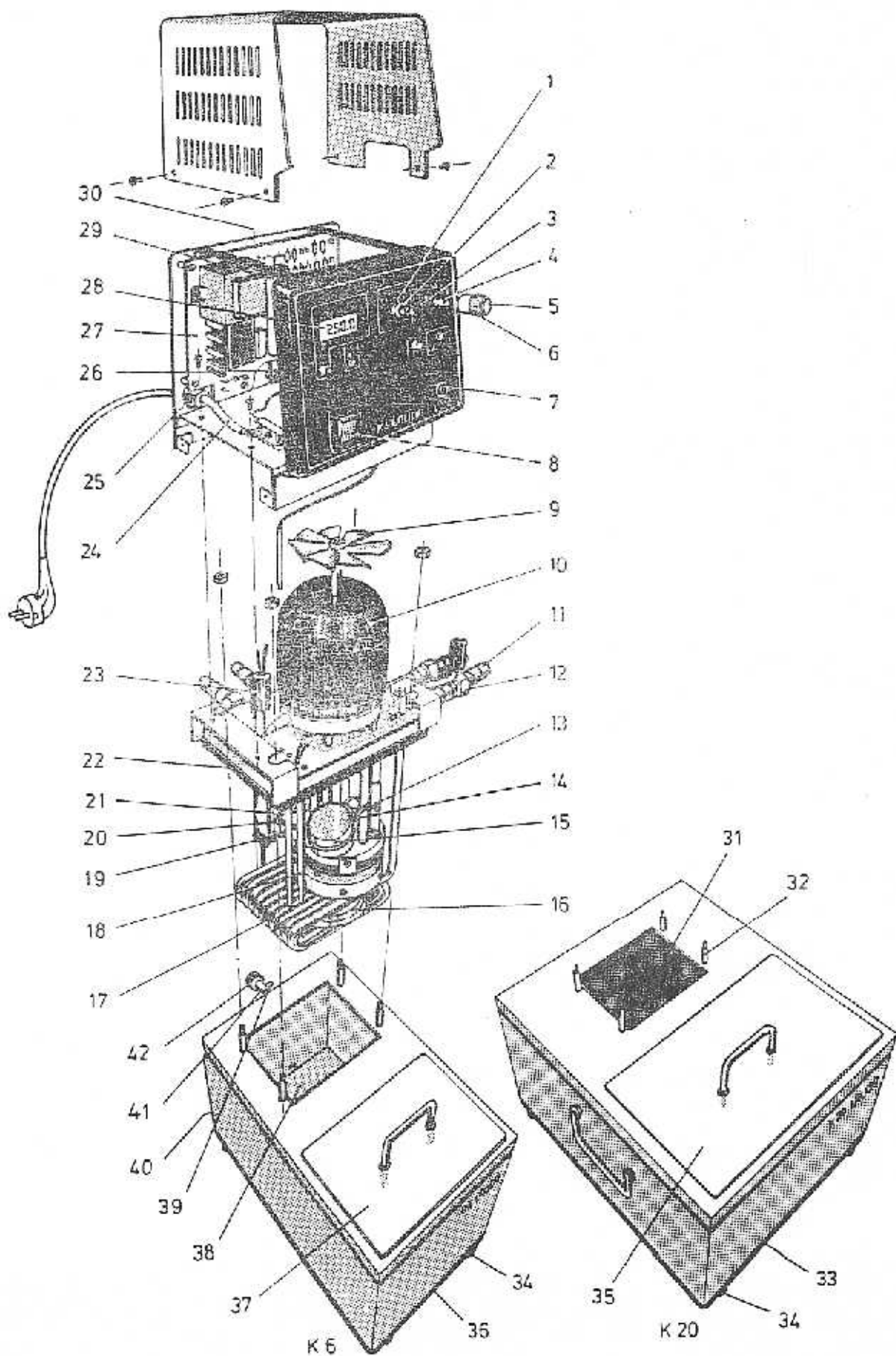


Ersatzteile/Pièces détachées/Spare parts
CS 6, CS 6-D, CS 12, CS 12-D, CS 20, CS 20-D

Bestell.-Nr. / No. Réf. / Ref. No.			
1	Zeiger/Aiguille/Pointer	EZD	048
2	Drehknopf/Bouton rotatif/Rotary knob	EZO	053
3	Kappe/Caïotte/Cap	EZO	047
4	Potentiometer/Potentiomètre/Potentiometer 1 kOhm	EWD	042
5	Kappe/Caïotte/Cap	EZO	051
6	Drehknopf/Bouton rotatif/Rotary knob	EZO	050
7	Temperaturbegrenzer/Limiteur de température/Temperature limiter	ETS	021
8	Hauptschalter/Interrupteur général/Main switch	EST	032
9	Lüfterflügel/Ailette de ventilateur/Wing fan	EMZ	004
10	Motor/Moteur/Motor 220-240 V	EM	046
11	Olive/Olive/Nipple Ø 13	HKD	026
	Olive/Olive/Nipple Ø 11	HKD	025
12	Überwurfmutter/Écrou à chapeau/Union nut	HKM	032
13*	Schwimmerhalter/Support de flotteur/Float holder	HI	021
14*	Klammer/Attache/Clamp	HI	001
15*	Schwimmer/Flotteur/Float	EZ	064
16	Heizkörper/Corps de chauffe/Heater 220-240 V	EH	090
17	Kühlschlange/Serpentin de refroidissement/Cooling coil	HOK	036
18	Temperaturfühler Pt 500/Sonde et température Pt 500/Temperature probe Pt 500	ETP	022
19	Schwimmerhalter/Support de flotteur/Float holder	HI	021
20	Klammer/Attache/Clamp	HI	001
21	Schwimmer/Flotteur/Float	EZ	064
22	Dichtung/Joint/Gasket	EDP	007
23	Niveauschutz/Protection de niveau/Level protection	US	024
24	Netzkabel mit Stecker/Câble secteur avec fiche/Main cable with plug	EKN	001
25	Zugentlastung/Décharge de traction/Tension relief	EKZ	014
26	Leiterplatte "Ausgang 30 S"/Circuit imprimé "Sortie 30 S"/Printed circuit "Output 30 S"	UL	198
27	Leiterplatte "Netz"/Circuit imprimé "Secteur"/Printed circuit "Mains" ab Serie E 70/à partir de la série E 70/from serie E 70	UL	195
		UL	228
28	Leiterplatte "LED-Anzeige"/Circuit imprimé "LED-Affichage"/Printed circuit "LED-Indication"	UL	196
29	Motorcondensator/Condensateur de moteur/Motor capacitor 1,5 µF	ECA	012
30	Triac/Triac/Triac	EYY	008
31	Temperiereinheit komplett: (Innenkessel, Deckplatte)/ Unité de thermostatisation compl.: (Cuve intérieure, Pont du bain)/ Thermostatic unit compl.: (Inner vessel, Bath bridge)	UU	044
32	Gewindebolzen/Tige fileté/Threaded bolt	HKB	192
33	Baddeckel, hinten/Couvercle de bain, arrière/Bath cover, back	HGG	040
34	Baddeckel, vorne/Couvercle de bain, avant/Bath cover, front	HGG	039
35	Bodenwanne/Fond de la cuve/Bath bottom	HGB	105
36	Gummifuß/Pied en caoutchouc/Rubber butt	EZG	009
37	Bodenwanne/Fond de la cuve/Bath bottom		
		C 6	HGB 101
		C 12	HGB 134
38	Baddeckel/Couvercle de bain/Bath cover		
		C 6	HGG 041
		C 12	HGG 044
39	Temperiereinheit komplett: (Innenkessel, Deckplatte)/ Unité de thermostatisation compl.: (Cuve intérieure, Pont du bain)/ Thermostatic unit compl.: (Inner vessel, Bath bridge)		
		C 6	UU 045
		C 12	UU 056
40	Gummitülle/Douille en caoutchouc/Rubber piece	EDT	007
41	O-Ring/O-Ring/Joint torique	EDO	018
42	Entleerungshahn kompl./Robinet de vidange compl./Drain cock compl.	UD	070
43	Drehknopf/Bouton rotatif/Rotary knob	EZO	001

* nur bei CS 6-D und CS 20-D/iquement en CS 6-D et CS 20-D/only on CS 6-D and CS 20-D

Ersatzteile/Pièces détachées/Spare parts
 KS 6, KS 6-D, KS 20, KS 20-D



Ersatzteile/Pièces détachées/Spare parts
 KS 6, KS 6-D, KS 20, KS 20-D

Bestell-Nr. / No. Réf. / Ref. No.		
1	Zeiger/Aiguille/Pointer	EZD 048
2	Drehknopf/Bouton rotatif/Rotary knob	EZD 053
3	Kappe/Calotte/Cap	EZD 047
4	Potentiometer/Potentiomètre/Potentiometer 1 kOhm	EWD 042
5	Kappe/Calotte/Cap	EZD 051
6	Drehknopf/Boton rotatif/Rotary knob	EZD 050
7	Temperaturbegrenzer/Limiteur de température/Temperature limiter	ETS 021
8	Hauptschalter/Interrupteur général/Main switch	EST 032
9	Lüfterflügel/Ailette de ventilateur/Wing fan	EMZ 004
10	Motor/Moteur/Motor 220-240 V	EM 047
11	Olive/Olive/Nipple \varnothing 13 Olive/Olive/Nipple \varnothing 11	HKO 026 HKO 025
12	Überwurfmutter/Ecrou à chapeau/Union nut	HKM 032
13*	Schwimmerhalter/Support de flotteur/Float holder	HI 021
14*	Klammer/Attache/Clamp	HI 001
15*	Schwimmer/Flotteur/Float	EZ 064
16	Kühlschlange/Serpentin de refroidissement/Cooling coil	HOK 037
17	Heizkörper/Corps de chauffe/Heater 220-240 V 2kW Heizkörper/Corps de chauffe/Heater 220-240 V 3 kW	EH 091 UH 133
18	Temperaturfühler Pt 500/Sonde et température Pt 500/Temperature probe Pt 500	ETP 022
19	Schwimmerhalter/Support de flotteur/Float holder	HI 021
20	Klammer/Attache/Clamp	HI 001
21	Schwimmer/Flotteur/Float	EZ 064
22	Dichtung/Joint/Gasket	EDP 007
23	Niveauschutz/Protection de niveau/Level protection	US 024
24	Netzkabel mit Stecker/Câble secteur avec fiche/Mains cable with plug	EKN 001
25	Zugentlastung/Décharge de traction/Tension relief	EKZ 014
26	Leiterplatte "Ausgang 30 S"/Circuit imprimé "Sortie 30 S"/Printed circuit "Output 30 S"	UL 198
27	Leiterplatte "Netz"/Circuit imprimé "Secteur"/Printed circuit "Mains" ab Serie E 70/à partir de la série E 70/from serie E 70	UL 195 UL 228
28	Leiterplatte "LED-Anzeige"/Circuit imprimé "LED-Affichage"/Printed circuit "LED-Indication"	UL 197
29	Motorcondensator/Condensateur de moteur/Motor capacitor 7 μ F	ECA 004
30	Triac/Triac/Triac	EYY 008
31	Temperiereinheit komplett (Innenkessel, Deckplatte)/ Unité de thermostatisation compl.: (Cuve intérieure, Pont du bain)/ Thermostatic unit compl.: (Inner vessel, Bath bridge)	UU 049
32	Gewindebolzen/Tige filetée/Threaded bolt	HKB 192
33	Bodenwanne/Fond de la cuve/Bath bottom	HGB 153
34	Gummifuß/Pied en caoutchouc/Rubber butt	EZG 009
35	Baddeckel/Couvercle de bain/Bath cover	HQG 039
36	Bodenwanne/Fond de la cuve/Bath bottom	HGB 101
37	Baddeckel/Couvercle de bain/Bath cover	HQG 042
38	Temperiereinheit komplett (Innenkessel, Deckplatte)/ Unité de thermostatisation compl.: (Cuve intérieure, Pont du bain)/ Thermostatic unit compl.: (Inner vessel, Bath bridge)	UU 048
39	O-Ring/O-Ring/Joint torique	EDO 018
40	Gummitülle/Douille en caoutchouc/Rubber piece	EDT 007
41	Entleerungshahn kompl./Robinet de vidange compl./Drain cock compl.	UD 070
42	Drehknopf/Bouton rotatif/Rotary knob	EZD 001

* nur bei KS 6-D und KS 20-D/iquement en KS 6-D et KS 20-D/only on KS 6-D and KS 20-D