

LAUDA Compact Low-temperature Thermostat

RKT 20 , RKT 20-D

to DIN 12 879

Operating Instructions

From Series D02
BEBARKT20
8/87

<u>Contents</u>	<u>Page</u>
1. Brief operating instructions	1
2. Table of Data	3
3. Basic construction	5
4. Safety systems	5
5. Bath liquids and tubing	6
6. Unpacking, assembly and setting up	8
7. Connecting external systems	8
8. Starting up	10
9. Cooling circuit: construction and maintenance	11
10. Safety circuit	13
11. Maintenance	14

Enclosures

Accessories

Circuit diagram

Summary of the range of LAUDA Refrigerating Thermostats

Summary of the range of LAUDA Heating 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 outlets:

Without external circulation: link together the pump outlets with the insulated silicone tubing supplied (-60 to 100°C), or with the perbunan tubing (up to 120°C), viton or metal tubing. Note: do not use silicone tubing with silicone oils (SK Frigor, SK Super Frigor)!

With external circulation: connect tubing to the external system.

Secure tubing with clips to prevent it slipping off.

- o Use deionised water or LAUDA bath liquids only! (see Section 5). Fill the unit up to approx. 2 cm below the top plate.
- o Set up the unit so that there is free ventilation to the refrigerator (ventilation grill in the lower section).
- 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 in the mains switch lights up). The condensing unit starts up after approx. 1 min (depending on bath temperature and setpoint selected).
- o Over-temperature cut-out is fixed at 35°C (see Section 4). To release the safety circuit lock 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 up.
- 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 .
- o When the bath liquid has reached the set temperature, the green pilot lamp "cooling"  which indicates that the condensing unit is operating, switches off. Setpoint and actual bath temperature are identical in accordance with the accuracy of the temperature control.

- o For a rapid temperature change to higher temperatures the built-in 2 kW heater can be switched on with key  . The yellow LED  indicates the heater operation which switches off automatically when the set temperature is reached.
- o Safety

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

2. Table of Data

This thermostat meets the requirements of DIN 12 879

Temperature range:	-40 to 20°C										
Temperature setting:	digital, using potentiometer and numerical indication; resolution of indication 0.1°C, potentiometer approx. 0.2°C										
Reference thermometer:	built-in digital thermometer (LED display), 0.1°C resolution, absolute accuracy better than +/-0.2% of the indication +/-0.2°C. Max. indication 199.9°C										
Temperature probe/ Control action	Pt 500 platinum resistance thermometer / Off control										
Temperature control (at -10°C)	+/-0.5°C										
Heating load	automatic heater 2 kW										
Cooling rating (kW) eff.	<table border="0"> <tr><td>20°C</td><td>0.7</td></tr> <tr><td>0°C</td><td>0.6</td></tr> <tr><td>-20°C</td><td>0.35</td></tr> <tr><td>-30°C</td><td>0.15</td></tr> <tr><td>-40°C</td><td>0.05</td></tr> </table>	20°C	0.7	0°C	0.6	-20°C	0.35	-30°C	0.15	-40°C	0.05
20°C	0.7										
0°C	0.6										
-20°C	0.35										
-30°C	0.15										
-40°C	0.05										
Class to DIN 12 879	2										
Output against zero head (pump output) with olive 11 / 13 O	16 / 22 l/min										
RKT 20 (Simplexpumpen) max. head	0.5 bar										
RKT 20-D (Duplexpumpen) max. head suction	0.5 bar 0.33 bar										
Filling volume:	14 to 18 l										
Bath liquid 5 to 100°C below 5°C to -30°C	deionised water water/ethylene glycol mixture 1:1 for other bath liquids see Section 5										
Bath opening L x W / depth	300 x 175 / 200 mm										

Usable liquid depth	180 mm
Bench area (L x W) x Height	400 x 440 x 690 mm
Weight	52 kg
Power supply	220-240 V, 50 Hz Protection Class 1 to VDE 0100 2.6 kW
Interference suppression	Grade N
Ref.No	RKT 20 LCK 118 RKT 20-D LCK 134

3. Basic construction

The RKT 20 is a bath/circulating thermostat. Its condensing unit is designed to give optimum cooling within the operating range of the unit of 20 to -40°C.

The unit is supplied with a powerful pressure pump (SIMPLEX) which circulates the bath liquid inside the bath as well as through closed external systems.

All metal parts in contact with the bath liquid are made of chrome nickel steel. The unit consists of a bath and condensing unit assembly and the control and pump assembly which can be separated from each other (see Section 11).

The control unit contains the complete electronics with digital display of setpoint and actual value, controller with triac circuit for the condensing unit, temperature probe, heater, safety circuits and pump. The Table of Data on page 3 lists the main technical data of the unit.

The RKT 20-D corresponds to the RKT 20, but is supplied with a pressure/suction pump with automatic level control (DUPLEX).

4. Safety systems

The DIN specification 12879 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.

4.1 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 as a circulation thermostat, failure of the tubing can cause discharge of hot liquid and endanger persons and materials.

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.

3. The thermostats RKT 20 and RKT 20-D as described in these Operating Instructions are to Class 2, they are protected against overtemperature and low level.
Class 2 requires:
- o a temperature limiter as overtemperature protection which switches off the thermostat on all poles of the line supply when an adjustable switch-off temperature is exceeded.
 - o a liquid level limiter as low-level protection which switches off the thermostat on all poles of the line supply when the liquid level falls below a setting adjustable between the minimum and the maximum filling volume.
 - o only those bath liquids can 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 the user is only protected against hazards resulting 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 range of the unit.

5.1 Bath liquids

Operating range 5 ... 100°C

Use deionised water only.

Temperatures close to zero and below:

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

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

	Ref.No.
<u>Operating range -60 to 50°C Ultra-Therm SK Frigor (Silicone oil)</u>	LZB 002
Viscosity at 20°C 3 mm ² /sec	
Flashpoint 70°C	
5.2 <u>Tubing</u> (continuous lengths)	
<u>Silicone tubing, uninsulated</u>	RKJ 016
8 mm int. dia. Application range -30 to 100°C. Suitable for water and water-glycol mixture.	
<u>Silicone tubing, insulated</u>	LZS 001
8 mm int. dia.; With foam rubber insulation, external dia. approx. 30 mm. Application range -60 to 100°C. Use as for uninsulated silicone tubing.	
<u>Silicone tubing, uninsulated</u>	RKJ 059
11 mm internal dia. Application range -30 to 100°C. For water and water-glycol mixture.	
<u>Silicone tubing, insulated</u>	LZS 007
11 mm internal dia. With foam rubber insulation, external dia. approx. 35 mm. Use as for uninsulated silicone tubing. Application range -60 to 100°C.	
<u>Perbunan tubing, uninsulated</u>	RKJ 012
11 mm internal dia. Application range 0 to 120°C.	
<u>Note: silicone tubing must not be used with silicone oils!!</u>	
<u>Secure tubing with clips to prevent it slipping off.</u>	
<u>Metal tubing (single insulation)</u>	
Application range -60 to 150°C	
Metal tubing MK 50 (50 cm long)	LZM 052
Metal tubing MK 100 (100 cm long)	LZM 053
Metal tubing MK 150 (150 cm long)	LZM 054
Metal tubing MK 200 (200 cm long)	LZM 055
<u>Metal tubing pump connector for linking together the pump connectors (insulated)</u>	
Application range -50 to 150°C	LZM 045

Highly flexible, thermally insulated stainless steel tubing (V2A) with M 16 x 1 mm connecting threads. Internal dia. 10 mm. This tubing offers maximum security especially for temperatures above 100°C.

Further information 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.

Standard accessories

1 Bath cover	HDQ	039
2 Olives 13 O (fitted)	HKO	026
2 Olives 11 O	HKO	025
1 m Silicone tubing, insulated 11 mm int.dia Operating Instructions	LZS	007

The unit is best set up so that the narrow side is to the front and the ventilation to the condensing unit (grill in the lower part) is not obstructed. Close the drain cock.

If no external circulation is required the pump connectors are linked together with a piece of tubing; the adjusting lever flow rate 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 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 tubes must be vented after switching off the Thermostat by pulling them out of the liquid in order to prevent flooding.

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

7.3 Circulating pumps

Essentially there are two different types: SIMPLEX pumps, e.g. on RKT 20 and DUPLEX pumps, e.g. on RKT 20-D.

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

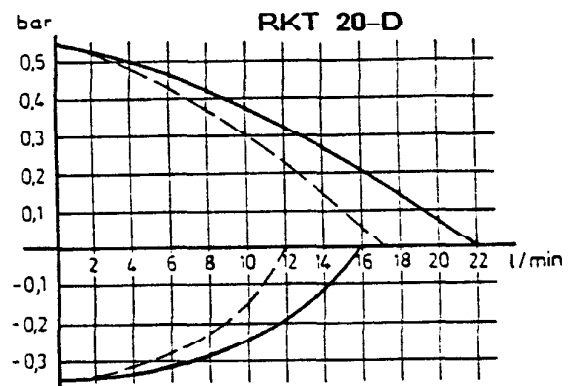
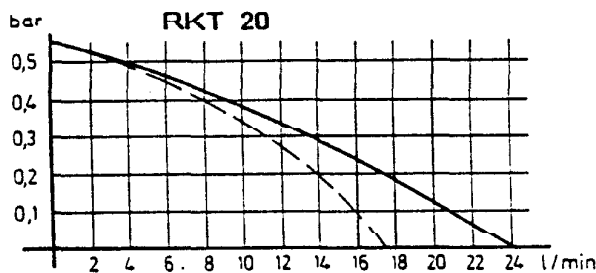
DUPLEX pumps are used mainly with open external systems, e.g. bath vessels. They differ from SIMPLEX pumps by having a pressure and a suction stage as well as a float for level control. The DUPLEX pump automatically maintains a constant level in the Thermostat independently of the level in the open external 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 flow rates. 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 pressure 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).

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 an overload cut-out which is embedded in the motor winding.

The pumps can operated with liquids whose viscosity does not exceed approx. 15 mm²/sec.

Performance diagrams



———— Olive Ø 13 mm
- - - - - Olive Ø 11 mm

8. Starting up



8.1 Filling


The unit is filled with suitable bath liquid depending on the operating temperature, as discussed in Section 5. The liquid volume is indicated on page 3 (Table of Data). The thermostat should never be filled more than 2 cm below the cover. 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 during starting up, using the pump.

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

8.3 Ensure that the pump connectors are linked together when there is **no external system** (Use metal tubing pump connector Ref.No.: LZM 045).

8.4. Switch on the mains switch. The green lamp lights up. The digital thermometer shows the actual bath temperature. The fan of the condensing unit starts up immediately. If the bath temperature is above the selected setpoint the condensing unit starts up after approx. 1 min and cools the bath down to the selected setpoint. The temperature is then controlled to an accuracy better than $\pm 0.5^{\circ}\text{C}$ by switching the condensing compressor on and off.

Press button  , this shows the selected setpoint on the digital display. Select the desired temperature by turning the knob  . When the condensing compressor is switched on the pilot lamp "Cooling" is alight. An electronic delay circuit ensures that the maximum permitted switching frequency of the compressor is not exceeded..

If a rapid temperature change to higher temperatures is required the 2 kW heater is switched on by pressing key  . The heater switches off automatically when the set temperature is reached.

9. Cooling Circuit

9.1 Construction

The condensing unit consists essentially of a hermetically sealed compressor. Heat of condensation and motor heat are dissipated through a finned condenser with fan cooling. The fresh air is drawn in at the front of the unit, heated and discharged to the back and to the side. In order to ensure effective air circulation the ventilation openings must not be obstructed. The cooling circuit is shown schematically on page 12.

The compressor runs virtually without noise and vibration free. It is charged with a special oil and requires no maintenance. The coolant is R 502.

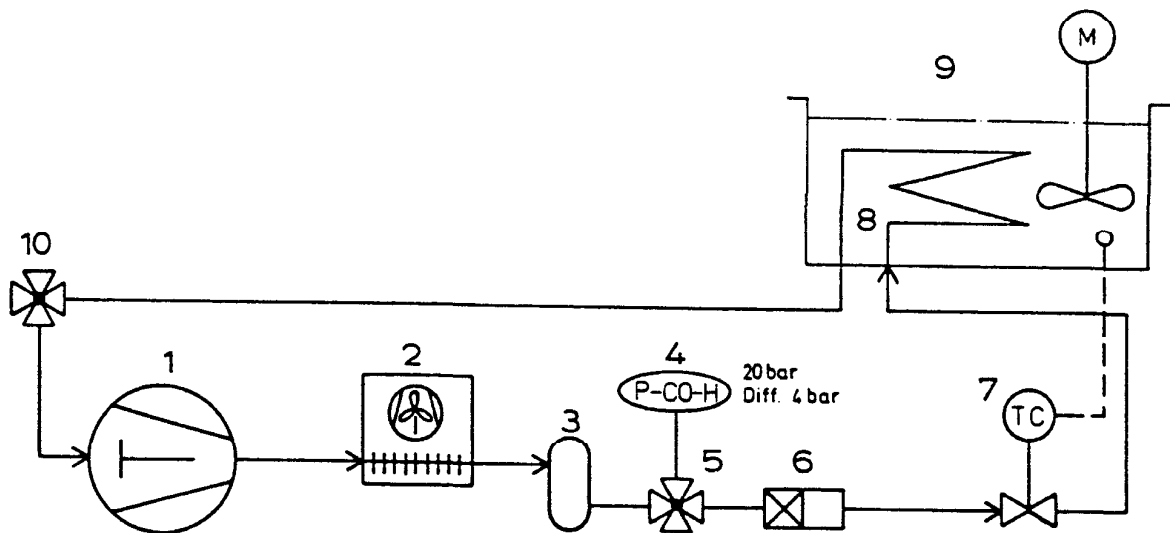
9.2 Maintenance

The condensing unit operates to a large extent without maintenance. If the unit operates under dusty conditions we recommend that the condenser of the condensing unit is cleaned every 4 to 6 months. This is done best with compressed air or nitrogen which is blown into the ventilation openings for a few minutes. If necessary unscrew the ventilation grill.

9.3 Overloading the condensing unit

The driving motor of the condensing unit is protected against overload by a double-action bimetal switch (KLIXON). The overload switch responds both to the capsule temperature and to the current taken by the compressor motor. With insufficient ventilation the housing temperature rises and with it the condensation pressure. Both effects lead to overload of the driving motor and cause the thermostat to switch off. The unit switches on again automatically as soon as the compressor housing has cooled down.

On the RKT 20 units a pressure limiter is fitted in the coolant circuit in order to switch off the condensing unit if the pressure is too high.





Schema Kältekreislauf / Diagram Cooling Circuit / Schéma Circuit Frigorifique

Nr./No./N°	Teil/Part/Pièce
1	Kompressor/Compressor/Compresseur
2	Kondensator/Capacitor/Condensateur
3	Sammler/Receiver/Réservoir
4	Überdruckschalter/Over-pressure switch/Disjoncteur de surpression
5	Druckabsperrentil/Shut-off valve of pressure/Scoupe de arrêt de pression
6	Trockner/Drier/Déshydrateur
7	Expansionsventil/Expansion valve/Vanne d'expansion
8	Verdampferschlange/Evaporator coil/Serpentin évaporateur
9	Flüssigkeitsbad/Liquid bath/Bain liquide
10	Saugabsperrentil/Suction shut-off valve/Vanne d'arrêt d'aspiration

10. Safety circuit

Safety circuit to DIN 12 879 Class 2.

The unit is protected against low level by a float switch set permanently to minimum level, and against over-temperature by a cut-out which is fixed at 35°C. When the safety cut-out operates the red lamp  lights up continuously and an audible warning signal is produced. The pump, heater and condensing unit are cut off from the supply on all poles. The cut-off is maintained after the fault has been rectified and after the mains supply has been switched off. By operating the reset key  the unit can be brought back into operation after the fault has been rectified.

The low-level cut-out and the over-temperature cut-out should be checked from time to time for correct operation. The low-level cut-out can be tested simply by switching the unit on briefly before filling it while the operator is present. It is essential to ensure that there is no explosive mixture in the bath which could catch fire at the heater in case the low-level cut-out circuit does not operate correctly and the heating is switched on. The unit must immediately switch to "Fault" (audible signal, red lamp on).

The over-temperature cut-out can only be checked by heating up the bath filled with water to above 35°C using an additional heater. At approx. 35°C the unit switches to "Fault". Then the "Reset" button has to be operated until the bath temperature has cooled down to below 32°C. After the "Fault" has been rectified the "Reset" button must be operated while the unit is switched on.

11. Maintenance

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

The following procedure should be used:

Important: Pull out the mains plug! Take off the cover after removing the four screws at the side. Remove the push-on connector for the condensing unit line on the right. Control unit and pump can now be separated from the bath after releasing the four M 4 screws which are accessible on the left and right between the pump assembly case and the division shelf of the control unit.

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

MESSGERÄTE - WERK LAUDA

Dr. R. Wobser KG

P.O. Box 12 51

D - 6970 Lauda - Königshofen

Phone: 09343 - 503-0
Telex: 689 523 mgwla d
Telefax: 09343 - 503222

Accessories for LAUDA Compact Low-temperature thermostat RKT

<u>Type</u>	<u>Ref.No</u>
-------------	---------------

LAUDA digital thermometer

for the temperature range -200 to 800°C
 with a resolution of 0.1°C or 0.01°C respectively
 Pt 100 as temperature probe

Stainless steel racks

for test tubes, centrifuge tubes etc.

Bath RK 20, up to 2 racks max.

RE 13	for 56 tubes 10 O to 13 O, 80 mm immersion	UG	070
RE 18/1	for 27 tubes 14 O to 18 O, 80 mm immersion	UG	071
RE 18/2	for 27 tubes 14 O to 18 O, 110 mm immersion	UG	072
RE 30	for 12 tubes 24 O to 30 O, 110 mm immersion	UG	073

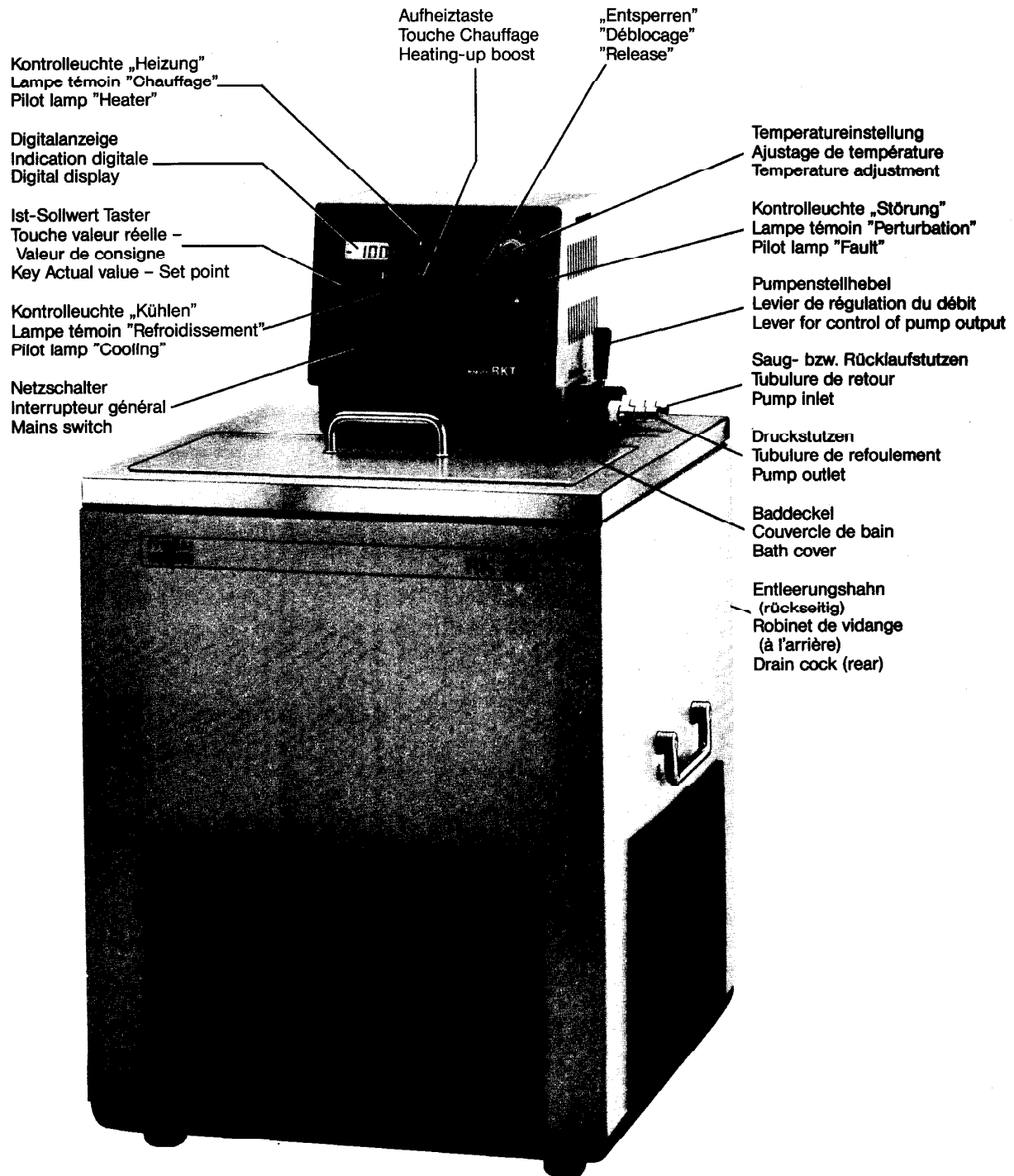
Details on other racks available on request!

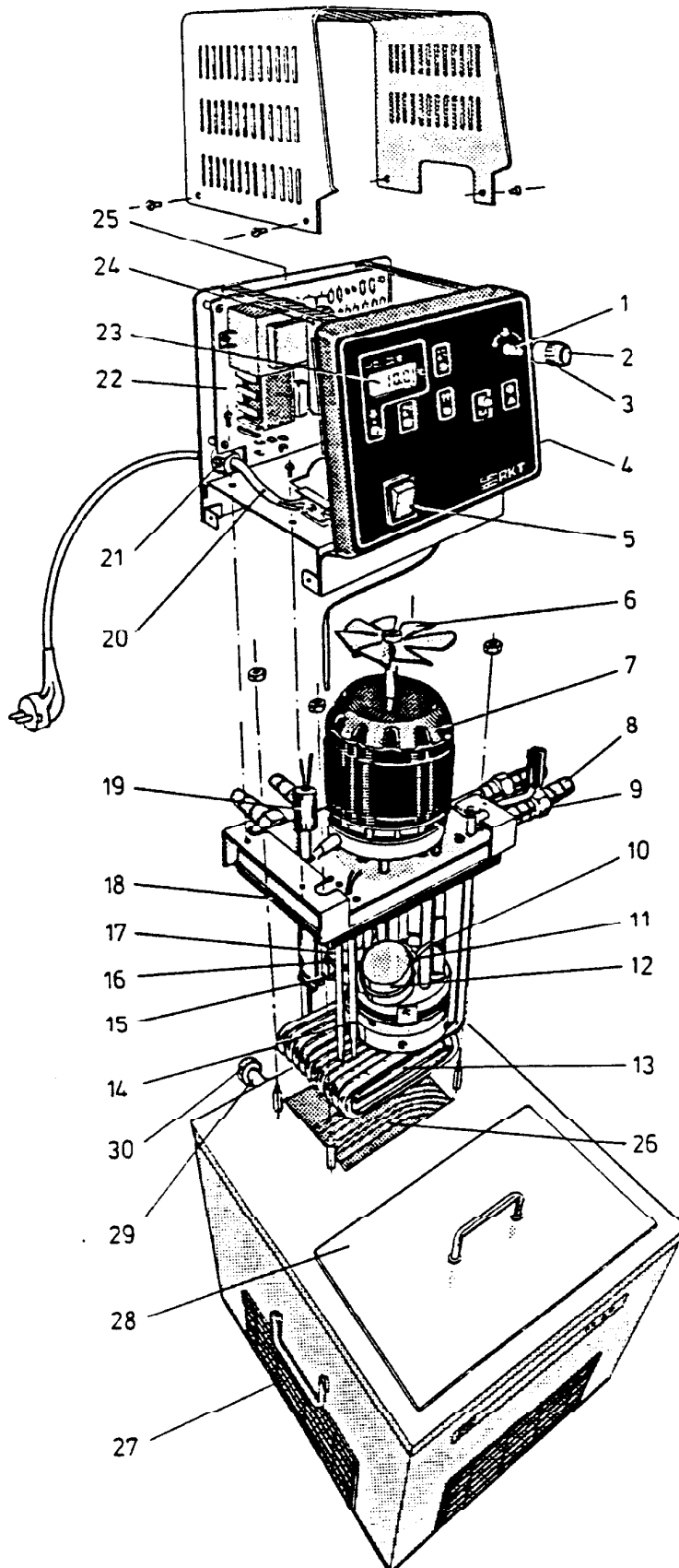
Rising floor for subsequent mounting	LCZ 012
--------------------------------------	---------

Usable area 250 x 160 mm, continuous height adjustment

Cart	LCZ 036
------	---------

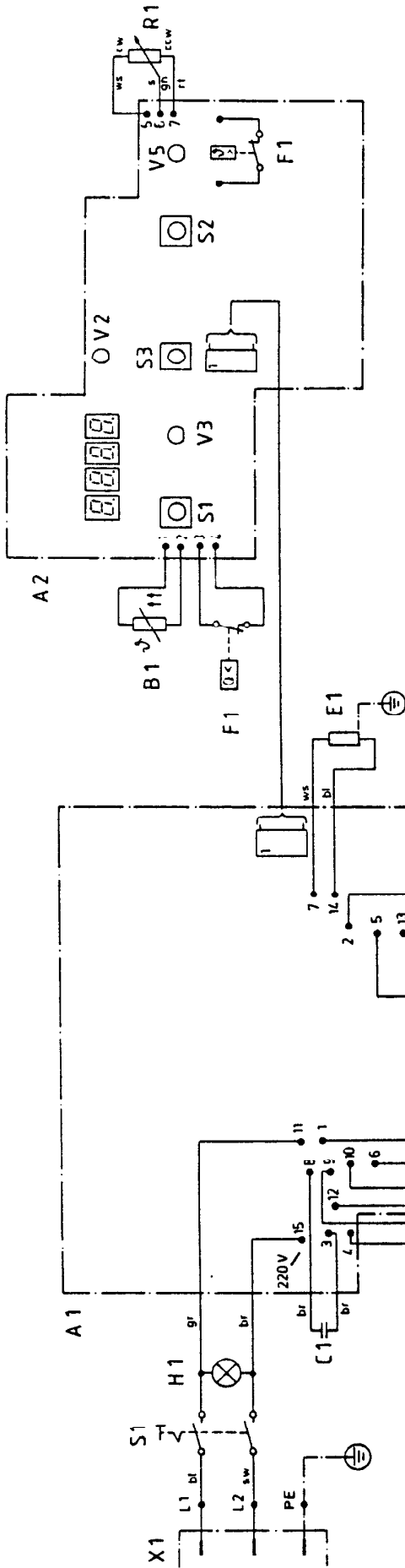
Height adjustable for RM 20-, RC, RK and RL-units;
 on castors;
 cover of the unit can be adjusted to the height of the
 laboratory bench.





Teilebezeichnung/Designation		Best.Nr./Ref.N°/Ref.No.
1	Potentiometer/Potentiomètre/Potentiometer 10 kOhm	EWD 043
2	Kappe/Calotte/Cover	EZD 051
3	Drehknopf/Bouton rotatif/Rotary knob	EZD 050
4	Temperaturbegrenzer/Limiteur de température/Temperature limiter	ETS 020
5	Hauptschalter/Interrupteur général/Main switch	EST 037
6	Lüfterflügel/Ailette de ventilateur/Wing fan	EMZ 004
7	Motor/Moteur/Motor 220-240V, 50-60 Hz	EM 047
8	Olive/Olive/Olive \varnothing 13 \varnothing 11	HKO 026 HKO 025
9	Überwurfmutter/Ecrou à chapeau/Union nut	HKM 032
10	* Schwimmerhalter/Support de flotteur/Float holder	HI 021
11	* Klammer/Attache/Clamp	HI 001
12	* Schwimmer/Flotteur/Float	EZ 064
13	Heizkörper/Corps de chauffe/Heater 220-240V, 50-60 Hz	EH 091
14	Temperaturfühler Pt 500/Sonde de température Pt 500/Temperature probe Pt 500	ETP 022
15	Schwimmerhalter/Support de flotteur/Float holder	HI 022
16	Klammer/Attache/Clamp	HI 001
17	Schwimmer/Flotteur/Float	EZ 064
18	Dichtung/Joint/Gasket	EDP 007
19	Niveauschutz/Protection de niveau/Level protection	US 024
20	Netzkabel mit Schukostecker/Cable secteur avec fiche de protection/ Mains cable with earthed plug 220V	EKN 008
21	Zugentlastung/Protection pour câble/Cable tension relief	EKZ 014
22	Leiterplatte "Netz"/Circuit imprimé "Secteur"/Printed circuit board "Mains"	UL 226
23	Leiterplatte "LED-Anzeige"/Circuit imprimé "LED-Indication"/ Printed circuit board "LED-Indication"	UL 227
24	Motorkondensator/Condensateur de moteur/Motor capacitor 7 μ F	ECA 004
25	Triac/Triac/Triac	EYY 017
26	Temperiereinheit kompl. (Deckplatte, Innenkessel, Verdampfer und Isolierung)/ Unité de thermostatisation compl. (Couvercle, Cuve interieure, Evaporateur et Isolation)/ Thermostatic unit compl. (Cover plate, Inner vessel, Evaporator and Insulation)	UU 055
27	Kälteaggregat/Groupe frigorifique/Condensing unit Einspritzventil/Vanne d'injection/Injection valve	EMK 045 EV 040
28	Baddeckel/Couvercle de bain/Bath cover	HDG 039
29	Entleerungshahn/Robinet de vidange/Drain cock	UD 070
30	Drehknopf/Bouton rotatif/Rotary knob	EZD 001

* nur bei RKT 20-D/seulement au RKT 20-D/only on RKT 20-D



- A 1** Leiterplatte Netz UL 191 / UL 226
Circuit Imprime Secteur
Printed circuit Mains
- A 2** Leiterplatte LED-Anzeige UL 193+UL 194 / UL 227
Circuit Imprime Affichage LED
Printed circuit LED-Indication
- A 2 - F 1** Temperaturbegrenzer 35 °C
Limiteur de température
Temperature limiter
- A 2 - S 1** Taster: Istwert / Sollwert
Touche: Valeur réelle / Valeur de consigne
Key: Actual value / Setpoint
- A 2 - S 2** Taster: Entsperrten
Touche: Déblocage
Push button: Reset
- A 2 - S 3** Taster: Aufheizen
Touche: Chauffage
Push button: Heating up
- A 2 - V 2** LED-Anzeige Heizimpuls
Affichage LED Impulsion chauffage
LED-Indication Heating Impulse
- A 2 - V 3** LED-Anzeige Kühlen
Affichage LED Refroidissement
LED-Indication Cooling
- A 2 - V 5** LED-Anzeige Störung
Affichage LED Perturbation
LED-Indication Disturbance
- B 1** Temperaturfühler Pt 500
Sonde de température
Temperature probe
- C 1** Kondensator 7 µF
Condensateur
Capacitor
- E 1** Heizung ? kW
Chauffage
Heater
- F 1** Niveauschutz
Protection de niveau
Level protection
- F 2** Überdruckschalter
Disjoncteur de surpression
Overpressure switch
- F 3** Klixon
- F 4** Anlaufvorrichtung
Dispositif de démarrage
Starting device
- H 1** Lampe Netz
Lampe Secteur
Lamp Mains
- M 1** Pumpenmotor
Moteur de pompe
Pump motor
- M 2** Kompressor
Compresseur
Compressor
- M 3** Ventilator
Ventilateur
Fan
- R 1** Sollwerteneinstellung 10 k Ohm
Ajustage de la valeur de consigne
Setpoint adjustment
- S 1** Netzschalter
Interrupteur général
Mains switch
- V 1** Triac 25 A 600 V
- X 1** Netzanschluß
Branchement secteur
Mains connection

Zustand	Anfertigung	Datum	20.3.84	MESSGERÄTE - WERK LAUDA Dr. R. Wobker KG	Schaltplan Schéma de connexions Circuit diagram	KK1 70, RKT 20 - D	Fertig
		Erzob.	74				
		Gepr.	27.3.84				
		Form.					Serie D 07