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LAUDA

Operating Instructions

LAUDA Compact
Low-temperature Thermostats
RMT 6, RMT 6-DS, RMT 20 and RMT 25
to DIN 12 879

YACE0002
From series D 50
05/89 E

LAUDA DR. R. WOBSER GMBH & CO. KG
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Contents		Page
1.	Brief operating instructions	1
2.	Table of data	2
3.	Basic construction	4
4.	Safety systems	5
5.	Bath liquids and tubing	6
6.	Unpacking, assembly and setting up	7
7.	Connecting external systems	7
8.	Starting up	8
9.	Cooling circuit: construction and maintenance	10
10.	Operation of the safety circuit	12
11.	Maintenance	13

Enclosures

Accessories

Spares

Circuit diagram

Summary of LAUDA Heating Thermostats and LAUDA Low-temperature thermostats

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1. Brief operating instructions

- Check thermostat and accessories during unpacking for possible transport damage and, if necessary, notify carrier or post office.

- Assemble unit according to Section 6 and add items as appropriate.

- Connect the tubing at the pump connectors:

  Without external circulation: Link together the pump connectors with the insulated silicone tubing supplied.

  With external circulation: Connect tubing to the external system. Secure tubing with clips to prevent it slipping off.

- Use decalcified water only (above 5°C) or water-glycol mixture (below 5°C) (See section 5). Fill the unit up to approx. 2 cm below the top plate.

- Check the supply voltage against the data on the rating label. Connect the cable to the supply.

- Adjust the required set temperature.

- Operation without refrigeration unit (temperature above 30°C)
  mains switch (green) I (ON) (green lamp lights up)
  switch "cooling" O (OFF)

- Operation with refrigeration unit (temperature below 30°C)
  mains switch (green) I (ON)
  switch "cooling" I (ON)

- 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.

- When the bath liquid has reached the set temperature, the yellow pilot lamp "heating" begins to flash. Check the operating temperature on the reference thermometer. If necessary adjust the temperature setting accordingly.

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

- 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.

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2. Table of Data

These thermostats meet the requirements of DIN 12 879.

Type		RMT 6	RMT 6-DS	RMT 20	RMT 25
Temperature range	(°C)		-15 ... 100		
Temperature setting/ Resolution			analogue / 0.3°C		
Temperature indication			Standard reference thermometer ET 032: -30/100°C, 0.5°C division		
Temperature sensor/ control action			PTC / proportional		
Temperature control (at -10°C)	(°C)		±0.1		
Heating load	(kW)		automatic adjustment as required 0 ... 1		
Cooling rating eff.					
20°C	(kW)		0.2	0.23	0.25
0°C			0.14	0.15	0.20
-10°C			0.08	0.10	0.16
-15°C			0.05	0.06	0.13
Class to DIN 12 879			Class 1 W (with R 35 and TS 35-200 Class 3)		
Flow rate Pressure/Suction (against zero head)	(l/min)	8/-	8/5	8/-	8/-
Discharge Pressure/Suction	(bar)	0.15/-	0.17/0.15	0.15/-	0,15/-
Capacity	(l)	4-6	4-6	14-20	19-25
Bath liquid -30 to 100°C			water-monoethylene glycol mixture 1:1		
Dimensions					
Bath opening (WxD)	(mm)		150x130	300x350	300x350
Bath depth	(mm)		160	160	200
Usable liquid depth	(mm)	140	140	140	180

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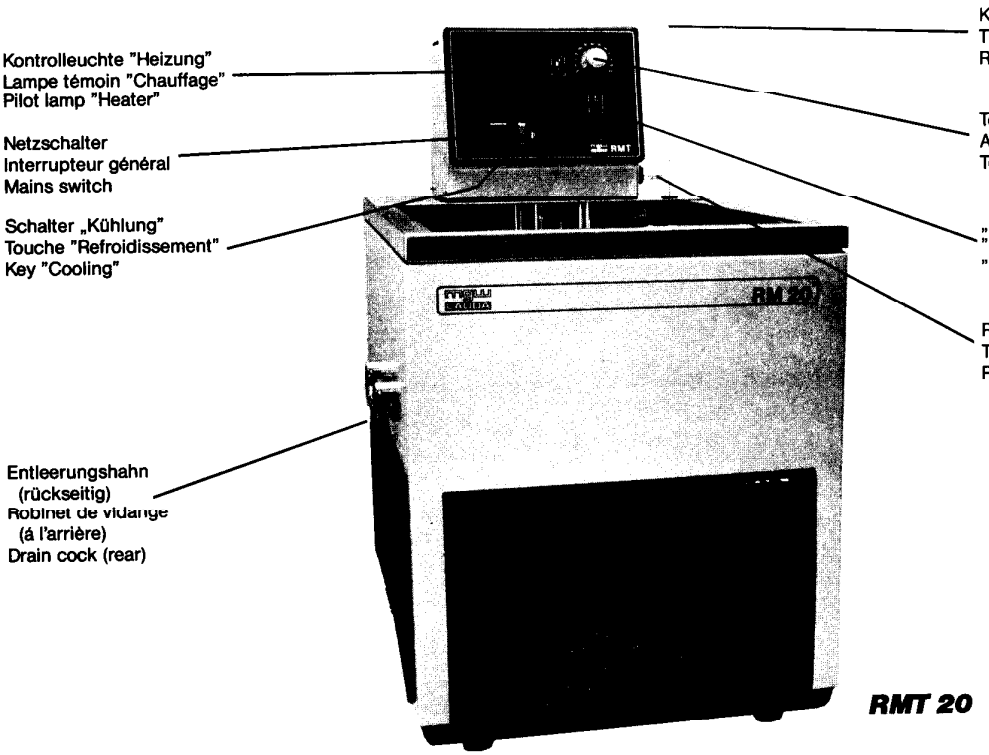
Type		RMT 6	RMT 6-DS	RMT 20	RMT 25
Overall dimensions (W x D x H)	(mm)	200x350x 575		350x540x 630	350x540x 670
Weight	(kg)	24	24	34	36
Power supply	(V/Hz)	220 - 240 V / 50 Hz , 230 V, 60 Hz Protection Class I to VDE 0100			
	(kW)	1.3	1.3	1.3	1.3
Interference suppression		according to VDE 0875			
Ref.No.					
220-240 V. 50 Hz		LCK 109	LCK 136	LCK 112	LCK 124
230V. 60 Hz		LCK 209	LCK 236	LCK 212	LCK 224

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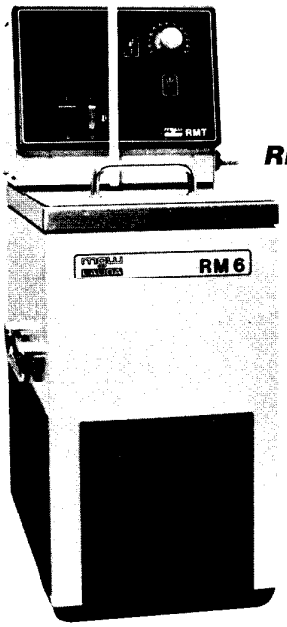
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Compact-Kältethermostate, Reihe RMT
Thermostats compacts de réfrigération, Série RMT
Compact-Low-Temperature Thermostats, Series RMT

LAUDA



RMT 20



RMT 6

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3. Basic construction

These operating instructions apply to 4 Compact Low-temperature thermostats of different construction, Series RMT:

Compact Low-temperature thermostat RMT 6

Compact bath/circulation thermostat with large bath opening for thermostating inside the bath.

Compact Low-temperature thermostat RMT 6-DS

Compact bath/circulation thermostat with a combined pressure-suction pump for thermostating open and closed external systems.

Compact Low-temperature thermostat RMT 20

Bath/circulation thermostats with large bath opening for thermostating of large items or a large number of items inside the bath.

Compact Low-temperature thermostat RMT 25

Bath/circulation thermostat with large bath opening and a bath depth of 200 mm (RMT 20: 160 mm).

The common feature of all three models is the thermostat unit RMT containing the electronics as well as the circulation pump, together with the appropriate cooling systems. Within the range where heat has to be removed from the bath, the temperature control operates by running the refrigeration unit continuously while the heater maintains the bath temperature at the required setting through controlled heating pulses using a solid-state proportional PID controller with a packet switching triac relay. The Data table (see Section 2) contains the main technical data of the thermostats.

If the heater overheats through loss of liquid, a temperature limiter switches off heater, pump, electronics and refrigeration unit on all poles.

Warning: The heater surface may reach temperatures up to 250°C, especially with complete loss of liquid!

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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 RMT as described in these Operating Instructions are to Class 1 W. They are only suitable for

- o non-inflammable bath liquids, i.e. preferably water; and the non-inflammable water-monoethylene glycol mixture (see Section 5).

Important note

Even with Class 1 W 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.

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5. Bath liquids and tubing

According to Section 4, only non-inflammable liquids may be used.

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

5.1 Bath liquids

Operating range 5 ... 100°C

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

Operating range -30 ... 100°C

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		

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, i.e. against the original mixture, or with a hydrometer.

5.2 Tubing (continuous lengths)

	Ref.No.
Perbunan tubing, uninsulated 9 mm int. dia. Application range 0 ... 100°C For water and water-glycol mixtures.	RKJ 011
Silicone tubing, uninsulated 8 mm int. dia. Application range -30 ... 120°C. For water and water-glycol mixtures.	RKJ 016
Silicone tubing, insulated 8 mm int. dia. With foam rubber insulation. External dia. approx. 30 mm. Use as for uninsulated silicone tubing.	LZS 001
Silicone tubing, uninsulated 4 mm int. dia. Use as for silicone tubing 8 mm int.dia.	RKJ 041
Pump reducing fitting for tubing 4 mm int. dia.	HKO 018

Secure tubing with clips to prevent it slipping off.

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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 be informed so that it can be inspected.

Standard accessories

Reference thermometer ET 032: -30/100°C
1 m Silicone tubing, insulated, 8 mm int.dia.
1 Bath cover (RMT 6 only)
Operating Instructions

6.2 Assembly and setting up

The units are set up to suit the application. Ensure that the ventilation openings to the refrigeration unit are not obstructed. Insert the Reference thermometer into the according mounting in the coverplate.

If no external circulation is required the pump connectors must be linked together with the silicone tubing supplied. First the yellow cap must be re moved; it is only intended to prevent the thermostat contents being pumped out unintentionally and is not suitable as a permanent closure. Outflow tube always at the front, return tube or suction tube at the back. When connecting up an external system proceed according to Section 7.

7. Connecting external systems

For operation above 10°C use uninsulated perbunan tubing (Ref.No RKJ 011); for operation below 10°C the insulated silicone tubing (Ref.No. LZS 001) is recommended. When operating with photometers, refractometers, etc. which have connectors for 4 mm int. dia. tubing, the reducing fittings (Ref.No. HKO 018) are screwed onto the connectors. Suitable silicone tubing is Ref.No RKJ 041. An adequate flow rate is required to ensure reliable thermostating of the external apparatus. Where the flow cross section is severely restricted there may be a temperature drop between bath and external system due to the low flow rate. In that case the bath temperature has to be suitably increased or decreased.

When starting up the thermostat ensure that the liquid level does not drop too much. Top up with liquid until the correct level is reached.

Secure the tubing with clips to prevent it slipping off.

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The units RMT 6-DS are fitted with a combined pressure-suction pump. The powerful circulating pump permits the thermostating of closed external systems at higher pump rates, and in particular the thermostating of open external systems.
There are two possibilities for maintaining a constant level when connecting open systems:

1. The suction pipe in the external bath has to be fastened in such a way that its end is positioned at the required liquid level. When reducing the pump capacity of the pressure stage by using a pipe clamp at the connection pressure nozzle-external bath, the flow rate of the pressure stage will drop slightly below the flow rate of the suction stage. That can be noticed when the suction pipe sucks in air.

2. A better and more professional solution is the application of a LAUDA Level Controller (Ref. No. LPZ 901) which provides level control with float, screw nozzle for external bath and possiblility for manual ventilation.

Note: When thermostat and external bath are not set up at the same level the connecting pipes must be ventilated in order to prevent the bath to overflow when the pump is switched off.

8. Starting up

Before starting up allow the unit to stand for at least half an hour in its normal operating position so that any oil which may have run out of the compressor during transport can flow back.

o Filling

Fill the unit with decalcified water or water-glycol mixture according to Section 5. The capacity is indicated in Section 2 (Table of Data). Generally the thermostats should never be filled higher than 2 cm below the cover.

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

The Low-temperature thermostat RMT 20 and RMT 25 can be covered with a flat bath cover (see Accessories) or with a gable cover even when there is glassware or other items in the bath (see Accessories in the annex). This is advisable especially at higher temperatures.

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

o Ensure that the pump connectors are linked together when there is no external system.

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o Adjust the required temperature at the temperature adjustment button.

o Operation **without** refrigeration unit (temperatures above 30°C)

mains switch (green)	I (ON) (green lamp lights up)
switch "cooling"	0 (OFF)

During start-up the yellow lamp "heating" is either on or off continuously, depending whether the required temperature is above or below the initial tempearature. When the set bath temperature has been reached, the yellow lamp "heating" begins to flash. The set temperature is controlled to an accuracy of better than +/-0.1°C.

Check on the reference thermometer that the bath temperature agrees with the selected setpoint. If necessary adjust the temperature setting accordingly.

When changing rapidly from a high to a low temperature the refrigeration unit can also be switched on in the heating range.

o Operation **with** refrigeration unit (temperature below 30°C)

mains switch (green)	I (ON) (green lamp lights up)
switch "cooling"	I (OFF) (yellow lamp lights up)

The thermostat is switched off with the mains switch.
The switch "cooling" can remain on.

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9. Cooling circuit

o Construction

The refrigeration 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 10

At temperatures below 30°C the refrigeration unit runs continuously to remove a certain amount of heat from the bath, while the heater operates against this with an output which is automatically adjusted by the control system. The compressor runs virtually noiselessly and vibration-free. It is charged with a special oil and requires no maintenance. The refrigerant used is Freon 12 (R 12).

o Maintenance

The refrigeration unit operates to a large extent without maintenance. If the unit operates under dusty conditions we recommend that the refrigerator condenser 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.

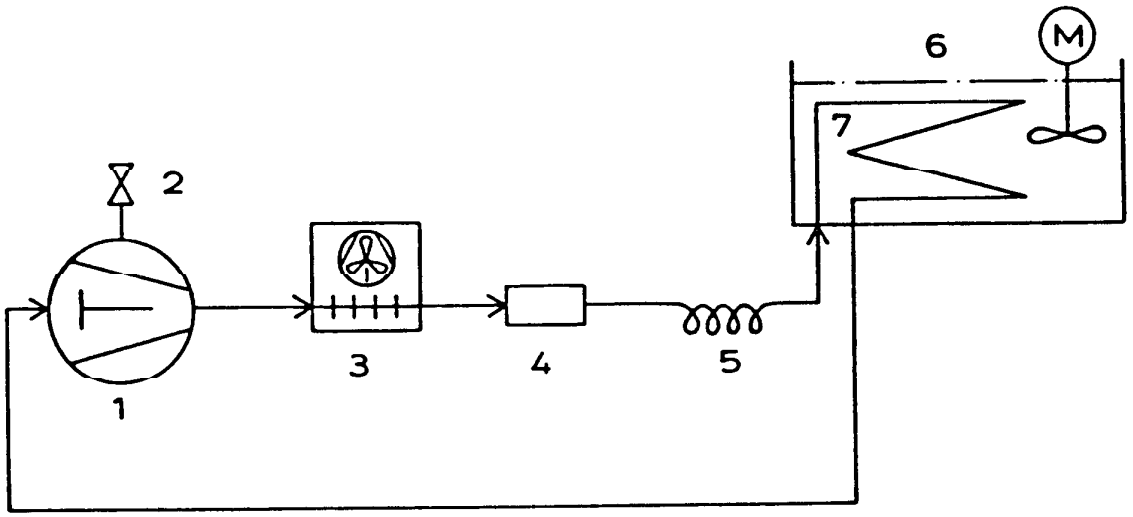
o Overloading the refrigeration unit

The driving motor of the compressor 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 on the driving motor and cause the thermostat to be switched off. The unit switches on again automatically as soon as the compressor housing has cooled down.
The refrigeration unit can of course also be used at higher temperatures to produce rapid cooling. The KLIXON cut-out may switch the compressor on and off several times.

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Schema Kältekreislauf/Schéma circuit de réfrigération/Diagram cooling circuit



Nr.	Teil/Pièce/Part
1	Kompressor/Compresseur/Compressor
2	Füllventil/Vanne de remplissage/Feed valve
3	Kondensator/Condensateur/Condenser
4	Trockner/Secheur/Drier
5	Kapillarrohr/Tube capillaire/Capillary tube
6	Verdampferschlange/Evaporateur à serpentins/Evaporator coil
7	Flüssigkeitsbad Thermostat/Bain pour liquide du thermostat/ Liquid bath Thermostat

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10. Operation of the safety circuit

- The following three faults could occur:
  - The thermostat is started up without bath liquid or with the liquid level too low (heater partly uncovered).
  - The liquid level drops too much during operation, especially at high temperatures. The same fault may be caused by failure of the tubing and liquid being pumped out of the thermostat.
  - Failure of the control system, resulting in continuous heating. The liquid eventually reaches the boiling point and evaporates.

  If any of the above faults occur, the safety circuit comes into operation. A built-in temperature probe measures the surface temperature of the heater and switches off the thermostat if a certain limiting temperature is exceeded. According to DIN 12 879 this type of protection is called over-temperature protection. Since the heater surface can reach very high temperatures, up to 250°C, especially when the thermostat runs completely dry, only water or water-glycol mixture may be used in the thermostat; otherwise it is impossible to prevent a fire under all circumstances despite the use of a safety system.

- Operation of the safety circuit switches off the thermostat on all poles (heater, pump, electronics and refrigeration unit); the reset button "Release" ⏏ jumps out approx. 3 mm. Additionally the release of the safety circuit can be recognized when the LED-Display is out of action while the unit is switched on (green lamp lightened). The thermostat can only be restarted after
  - the temperature probe on the heater has cooled down to below 60°C.
  - the fault has been corrected (liquid level too low, faulty control circuit, burst tubing).
  - the reset button has been pushed in (press hard!).

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

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11. Maintenance

LAUDA thermostats are designed for continuous operation. They require no regular maintenance. Contaminated bath liquid should be drained out through the drain cock and replaced with fresh liquid. If the unit should become defective it is recommended that the thermostat unit is removed and returned to the works. Pull out the mains plug and remove the cover.

If you should have any questions concerning technical problems, the order of spare parts or the order of additional service material please add type designation and serial number.

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

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Compact Low-temperature Thermostats
RMT 6, RMT 6-DS, and RMT 20

LAUDA

Accessories for Compact Low-temperature Thermostats

Type		Ref.No.
Reference thermometers		
0/70°C	graduation 0.5°C	ET 030
0/100°C	graduation 0.5°C	ET 031
-30/100°C	graduation 0.5°C	ET 032
Reference thermometer case		HKF 036
Stainless steel racks for RM 20 for test tubes, centrifuge tubes, etc. Bath RM 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
Stainless steel racks for RM 25 for test tubes, centrifuge tubes, etc. Bath RM 25, up to 4 racks		
RE 13	same as RD 13	UG 070
RE 18/1	same as RD 18/1	UG 071
RE 18/2	same as RD 18/2	UG 072
RE 30	same as RD 30	UG 073
Bath cover (flat), stainless steel, for Types RM 20 and RM 25 2 parts		LCZ 009
Rising platform to be mounted subsequently on RM 20 and RM 25 Bench area 250 x 160 mm, height continuously adjustable RM 20: max. 2 platforms		LCZ 012
Gable cover, stainless steel, for Types RM 20 and RM 25		LCZ 011
Stainless steel racks for RM 6		
RF 18/1	for 20 tubes 14 - 18 dia., 80 mm immersion	UG 074
RF 18/2	for 20 tubes 14 - 18 dia., 110 mm immersion	UG 075
Tubing (continuous lengths)		
Silicone tubing,	8 mm int. dia.	RKJ 016
Silicone tubing,	4 mm int. dia.	RKJ 041
Silicone tubing,	insulated, 8 mm int. dia.	LZS 001
Perbunan tubing,	9 mm int. dia.	RKJ 011
Reducing fitting for pump, for tubing 4 mm int. dia.		HKO 018
Level controller, (RMT 6-DS only) for the thermostating of open external systems		LPZ 901

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Compact Low-temperature Thermostats
RMT 6, RMT 6-DS, and RMT 20

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Special racks for Type RM 6, Makrolon

Type	Description	Ref.No
Boehringer Mannheim Monotest	8 Monotest 2 Monotest 10 6 square cells	UE 001
Geigy	8 Centrifuge or conical tubes, 100 x 16/17 mm 16 Uhlenhut tubes, 100 x 9 x 10 mm	UE 021
Test tubes, 160 mm	20 test tubes 160 x 16/17 mm	UE 020
Test tubes, 100 mm	20 test tubes or centrifuge tubes 100 x 16/17 mm	UE 022
Haemolysis tubes	13 int.dia. (30 tubes)	UE 023
Eppendorf tubes (up to 1)	74 tubes	UG 085
Cuvette test Dr.B. Lange		UE 005

UNIPROTECT R 35 — LRS 002

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

Immersion probe TS 35-200 — US 014

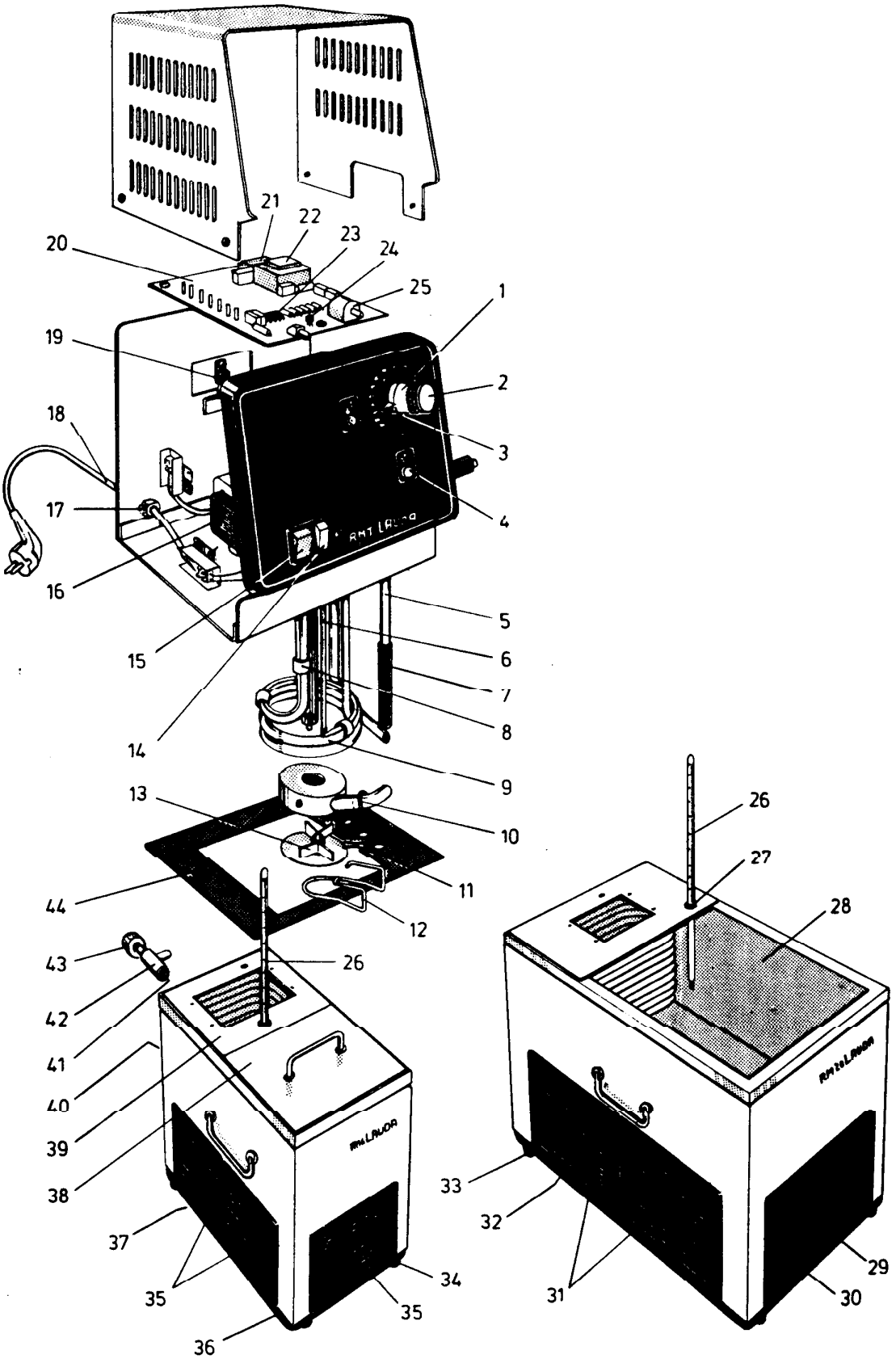
Fixing bow for TS 35-200 — UD 049

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Ersatzteile / Pièces détachées / Spare parts
RMT 6, RMT 6-DS, RMT 20 and RMT 25

LAUDA



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Ersatzteile / Pièces détachées / Spare parts
RMT 6, RMT 6-DS, RMT 20 and RMT 25

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	Bestellnummer/N° de reference/Reference number	RMT 6 LCK 109	RMT 20 LCK 112	RMT 25 LCK 124
1	Drehknopf/Bouton rotatif/Rotary knob	EZD	049	
2	Kappe/Calotte/Cap	EZD	051	
3	Mutterabdeckung/Couverture d'écrou/Nut covering	EZD	052	
4	Temperaturbegrenzer/Limiteur de température/Temperature limiter	US	026	
5	Druck- und Rücklaufstutzen/Tubulures de refoulement et de retour/Outflow-Return tubes	UO	040	
6	Temperatur-Fühler Pt/Sonde de température Pt/Temperature probe Pt	ETP	023	
7	Perbunanschlauch/Tuyau Perbunan/Perbunan tubing	HOF	005	
8	Klemme/Pince/Clamp	HIB	012	
9	Heizkörper/Corps de chauffe/Heater 220-240 V, 50-60 Hz	UH	089	
10	Feder/Ressort/Spring	HI	012	
11	Splint/Goupille/Splint pin	DIS	003	
12	Spange/Agrafe/Clip	HI	014	
13	Rührpropeller/Hélice/Stirrer	HX	102	
14	Schalter/Interrupteur/Switch	EST	056	
15	Netzschalter/Interrupteur secteur/Mains switch	EST	032	
16	Motor/Moteur/Motor 220-240 V, 50-60 Hz	EM	039	
17	Zugentlastung/Protection pour câble/Cable tension relief	EKZ	009	
18	Netzkabel mit Schukostecker/Câble secteur avec fiche à contact de protection/Mains cable with earthed plug	EKN	009	
19	Triac/Triac/Triac	EYY	008	
20	Leiterplatte "Regelung"/Circuit imprimé "Régulation"/Printed circuit board "Control"	UL	190	
21	Zündübertrager/Translateur d'allumage/Ignition transducer	EIZ	005	
22	Transformator/Transformateur/Transformer	EIT	068	
23	Nullpunktschalter/Commutation de tension nulle/Zero switching triac	EYI	049	
24	Transistor/Transistor/Transistor	EYT	003	
25	Potentiometer/Potentiomètre/Potentiometer	EWD	043	
26	Kontrollthermometer/Thermomètre de contrôle/Reference thermometer -30/100°C	ET	032	
27	Thermometerhalter/Fixation de thermomètre/Thermometer holder	HKF	036	
	Feder/Ressort/Spring	HI	019	
28	Temperiereinheit kompl. (Innenkessel, Badbrücke, Verdampfer, Kapillare und Isolierung/Unité de thermostatisation compl. (Cuve interieure, Pont du bain, Evaporateur, Capillaire et Isolation)/Thermostatic unit compl. (Inner vessel, Bath bridge, Evaporator, Capillary and insulation)			
	RM 20	UU	043	
	RM 25	UU	051	
29	Gitter/Grille/Grill	HGW	133	
30	Bodenwanne/Fond de la cuve/Bath bottom	HGB	134	
31	Gitter/Grille/Grill	HGW	132	
32	Kälteaggregat/Groupe frigorifique/Refrigeration unit			
	RM 20	EMK	042	
	RM 25	EMK	050	
33	Gummifuß/Pied en caoutchouc/Rubber butt	EZG	005	
34	Gummifuß/Pied en caoutchouc/Rubber butt	EZG	009	
35	Gitter/Grille/Grill	HGW	131	
36	Bodenwanne/Fond de la cuve/Bath bottom	HGB	152	
37	Kälteaggregat/Groupe frigorifique/Refrigeration unit	EMK	041	
38	Baddeckel/Couvercle de bain/Bath cover	HDQ	041	
39	Temperiereinheit kompl. (Innenkessel, Badbrücke, Verdampfer, Kapillare und Isolierung/Unité de thermostatisation compl. (Cuve interieure, Pont du bain, Evaporateur, Capillaire et Isolation)/Thermostatic unit compl. (Inner vessel, Bath bridge, Evaporator, Capillary and insulation)	UU	042	
		UU	042	
40	Gummitülle/Douille en caoutchouc/Rubber piece	EDT	007	
41	O-Ring/Joint Torique/O-Ring	EDO	018	
42	Entleerungshahn kompl./Robinet de vidange compl./Drain cock compl.	UD	070	
43	Drehknopf/Bouton rotatif/Rotary knob	EZD	001	
44	Dichtung/Joint/Gasket	EDF	042	

ab Serie/à partir de n° de série/as from serial number D 50

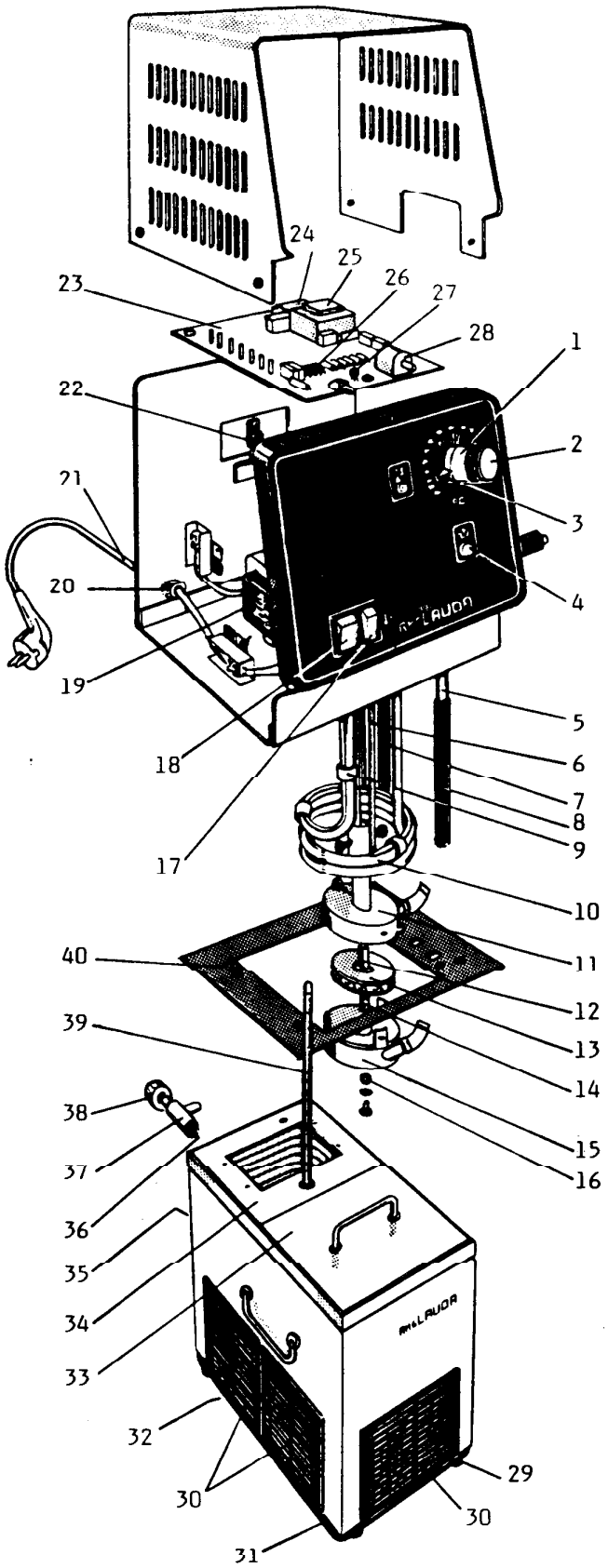
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Ersatzteile / Pièces détachées / Spare parts
RMT 6, RMT 6-DS, RMT 20 and RMT 25

LAUDA

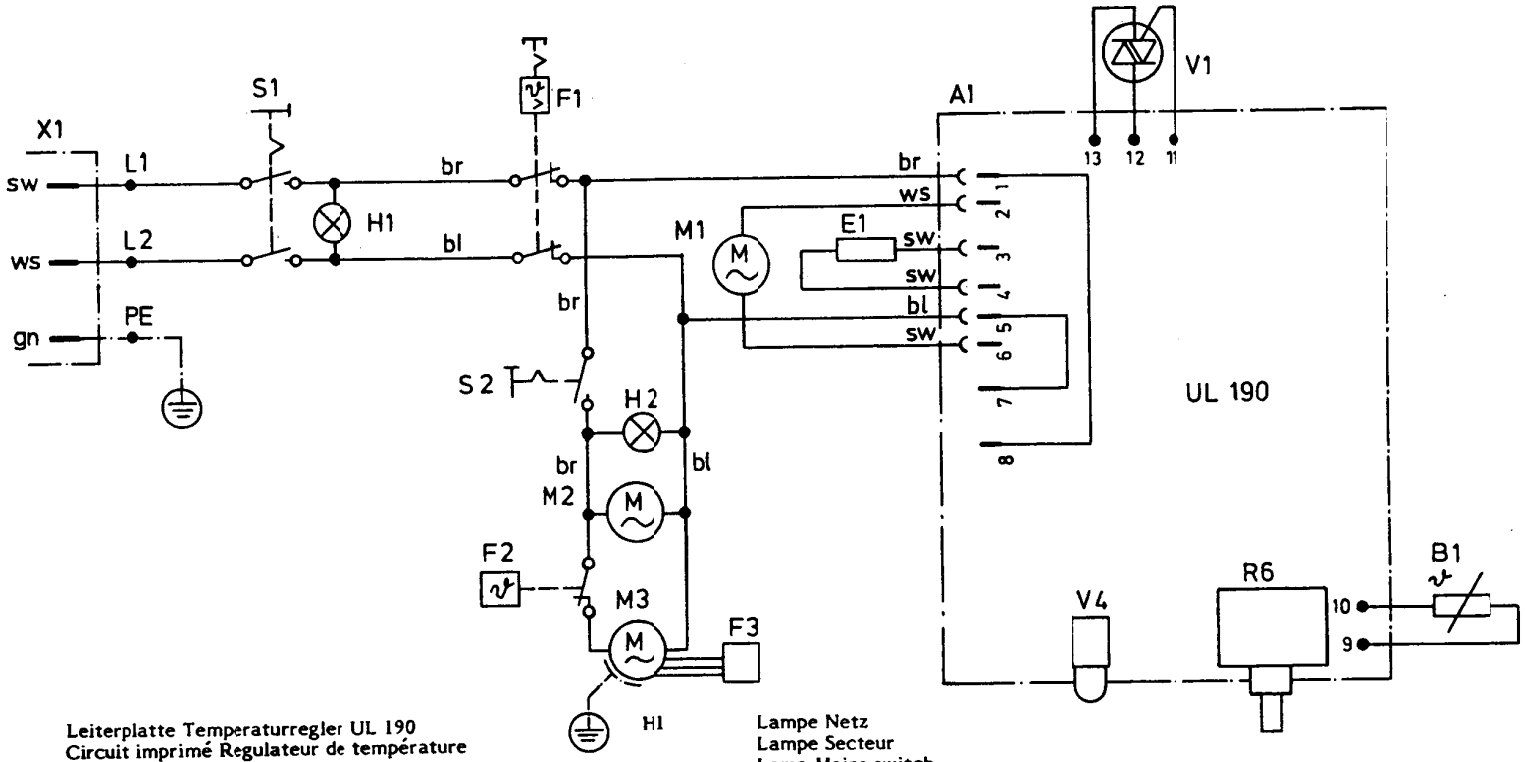
	Bestellnummer/N° de reference/Reference number	RMT 6-DS LCK 136
1	Drehknopf/Bouton rotatif/Rotary knob	EZD 049
2	Kappe/Calotte/Cap	EZD 051
3	Mutterabdeckung/Couverture d'écrou/Nut covering	EZD 052
4	Temperaturbegrenzer/Limiteur de température/Temperature limiter	US 026
5	Druck- und Rücklaufstutzen/Tubulures de refoulement et de retour/Outflow-Return tubes	UO 064
6	Temperatur-Fühler Pt/Sonde de température Pt/Temperature probe Pt	ETP 023
7	Perbunanschlauch/Tuyau Perbunan/Perbunan tubing 130 mm	HOF 012
8	Perbunanschlauch/Tuyau Perbunan/Perbunan tubing 140 mm	HOF 013
9	Klemme/Pince/Clamp	HIB 012
10	Heizkörper/Corps de chauffe/Heater 220-240 V, 50-60 Hz	UH 089
11	Pumpenunterteil kompl./Partie inférieure de la pompe compl./Pump, lower part compl.	UD 152
12	Hülse I/Douille I/Bushing I 9 mm	HO 332
13	Laufrad, Saug kompl./Roue de roulement, aspiration compl./Suction impeller compl. Ausführung/Modèle/Model 50 Hz Ausführung/Modèle/Model 60 Hz	 HQL 024 HQL 026
14	Hülse II/Douille II/Bushing II 5 mm	HO 333
15	Druckkammer kompl./Chambre de pression compl./Pressure chamber	
	Ausführung/Modèle/Model 50 Hz	UD 153
	Ausführung/Modèle/Model 60 Hz	UD 154
16	Kappe/Calotte/Cap	HKB 318
17	Schalter/Interrupteur/Switch	EST 036
18	Netzschalter/Interrupteur secteur/Mains switch	EST 032
19	Motor/Moteur/Motor 220-240 V, 50-60 Hz Ausführung/Modèle/Model 50 Hz Ausführung/Modèle/Model 60 Hz	 EM 091 EM 092
20	Zugentlastung/Protection pour câble/Cable tension relief	EKZ 009
21	Netzkabel mit Schukostecker/Câble secteur avec fiche à contact de protection/Mains cable with earthed plug	EKN 009
22	Triac/Triac/Triac	EVV 009
23	Leiterplatte "Regelung"/Circuit imprimé "Régulation"/Printed circuit board "Control"	UL 190
24	Zündübertrager/Translateur d'allumage/Ignition transducer	EIZ 005
25	Transformator/Transformateur/Transformer	EIT 068
26	Nullpunktschalter/Commutation de tension nulle/Zero switching triac	EYI 049
27	Transistor/Transistor/Transistor	EYT 003
28	Potentiometer/Potentiomètre/Potentiometer	EWD 043
29	Gummifuß/Pied en caoutchouc/Rubber butt	EZG 005
30	Gitter/Grille/Grill	HGW 131
31	Bodenwanne/Fond de la cuve/Bath bottom	HGB 152
32	Kälteaggregat/Groupe frigorifique/Refrigeration unit	EMK 041
33	Baddeckel/Couvercle de bain/Bath cover	HDG 041
34	Temperiereinheit kompl. (Innenkessel, Badbrücke, Verdampfer, Kapillare und Isolierung/Unité de thermostatisation compl. (Cuve interieure, Pont du bain, Evaporateur, Capillaire et Isolation)/Thermostatic unit compl. (Inner vessel, Bath bridge, Evaporator, Capillary and Insulation)	UU 042
35	Gummitülle/Douille en caoutchouc/Rubber piece	EDT 007
36	O-Ring/Joint Torique/O-Ring	EDO 018
37	Entleerungshahn kompl./Robinet de vidange compl./Drain cock compl.	UD 070
38	Drehknopf/Bouton rotatif/Rotary knob	EZD 001
39	Kontrollthermometer/Thermomètre de contrôl/Reference thermometer -30/100°C	ET 032
40	Dichtung/Joint/Gasket	EDF 042

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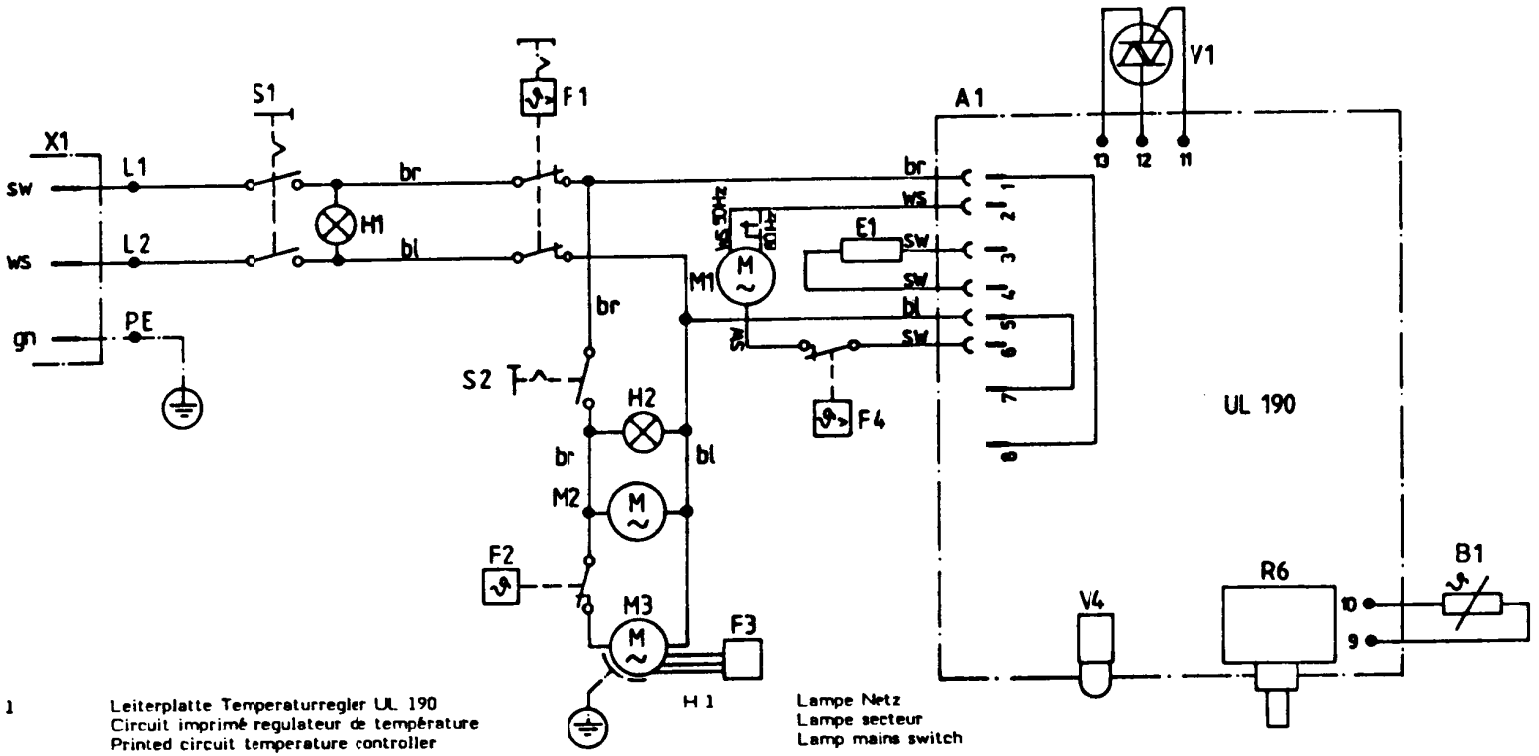
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A1	Leiterplatte Temperaturregler UL 190 Circuit imprimé Regulateur de température Printed circuit Temperature controller
B1	Temperaturfühler PTC Sonde de température Temperature probe
E1	Heizung 1 kW Chauffage Heater
F1	Überhitzungsschutz Protection de surchauffe Thermal cutout
F2	Klixon Klixon Klixon
F3	Anlaufvorrichtung Dispositif de démarrage Starting device
H1	Lampe Netz Lampe Secteur Lamp Mains switch
H2	Lampe Kühlung Lampe Refroidissement Lamp Cooling
M1	Pumpenmotor Moteur de pompe Motor pump
M2	Ventilator Ventilateur Fan
M3	Kompressor Compresseur Compressor
R6 (UL 190)	Potentiometer Temperatureinstellung 10 K Potentiomet e Ajustage de la température otentiometer Temperature adjustment
S1	Netzschalter Inte:ru teur général Ma:ns witch
S2	Schalter Kühlung Interrupteur Refroidissement Switch Cooli :g
V1	Triac A / 700 V Triac Triac
V4 (UL 190)	LED-Anzeige Heizung Affichage LED Chauffage LED-Indication Heater
X1	Netzanschluß Branchement Secteur Mairs connection

				Datum	10 5.83		LAUDA Dr. R. Wobser GmbH&Co. KG	Schaltplan Schéma de connexions Circuit diagram	RMT 6, RMT 20, RMT 25	
				Bearb.						
				Gepr.					220-240V; 50-60Hz	ab/à partir/from Serie D 50
Zustand	Änderung	Datum	Name	Norm		Ursy	Ers.f.	Ers.d.		

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A 1	Leiterplatte Temperaturregler UL 190 Circuit imprimé regulateur de température Printed circuit temperature controller	H 1	Lampe Netz Lampe secteur Lamp mains switch
B 1	Temperaturfühler PTC Sonde de température Temperature probe	H 2	Lampe Kühlung Lampe refroidissement Lamp cooling
E 1	Heizung 1kW Chauffage Heater	M 1	Pumpenmotor Moteur de pompe Motor pump
F 1, F 4	Überhitzungsschutz Protection de surchauffe Thermal cutout	M 2	Ventilator Ventilateur Fan
F 2	Klixon Klixon Klixon	M 3	Kompressor Compresseur Compressor
F 3	Anlaufvorrichtung Dispositif de démarrage Starting device	R 6 (UL 190)	Potentiometer Temperatureinstellung 10K Poteniomètre ajustage de la température Potentiometer temperature adjustment

S 1	Netzschalter Interrupteur général Mains switch	
S 2	Schalter Kühlung Interrupteur refroidissement Switch cooling	
V 1	Triac 15A/700V Triac Triac	
V 4 (UL 190)	LED-Anzeige Heizung Affichage LED Chauffage LED-Indication Heater	
X 1	Netzanschluß Branchement secteur Mains connection	

				Datum	16.1.89		LAUDA Dr. R. Wobser GmbH & Co. KG	Schaltplan Schéma de connexions Circuit diagram	RMT 6 - DS		
				Bearb.	Kn-Ob				220-240V; 50Hz / 230V; 60Hz		Blatt
				Gepr.							Bl
Zustand	Änderung	Datum	Name	Norm		Ursprung	Ers. f.	Ers. d.			

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Summary of the range of LAUDA Heating Thermostats to DIN 12879

LAUDA

Compact thermostats

Series M Operating temperature range -20 to 100°C (with external cooling). Immersion thermostat and bath/circulation thermostats, Series MT and MS. With Simplex pump, 8 l/min, 0,15 bar. Solid-state proportional temperature control, **MS** with built-in digital thermometer and digital setpoint selection through 10-turn potentiometer and digital indication. Class 1 W.

o	MT, MT/2, MS, MS/2	Immersion thermostats
o	MT 3 and MS 3	Bath volume 2,5 to 3,5 l
o	MT 12 and MS 12	Bath volume 9 to 13 l
o	MT 20 and MS 20	Bath volume 14 to 20 l
o	MT 20 S and MS 20 S	Shaking thermostats
o	Medico thermostats MT 6 and MS 6	Bath volume 4 to 6 l

Series C Operating temperature range -30 to 200°C (with external cooling). Bath/circulation thermostats, choice of powerful pressure pump (15 l/min) or pressure/suction pump (9 l/min) with adjustment lever. Digital thermometer and digital setpoint selection through 10-turn potentiometer and digital indication. Multi-function output for programmer, recorder etc. Heating load 2 kW.
Temperature control +/-0,01°C. Class 2.

o	CS 6	Bath volume 4 to 6 l
o	CS 20	Bath volume 15 to 20 l
o	CSG	Bridge thermostat
o	CSD 15, CSD 20 and CSD 30	Compact Clear-view thermostats (temp. range -20 to 200°C)

Series K Operating temperature range -30 to 250°C (with external cooling). Digital thermometer up to 250°C with 0,1°C resolution. Very powerful pressure pump (22 l/min) or pressure/suction pump (15 l/min).

o	KS 6	Bath volume 6 to 7,5 l
o	KS 20	Bath volume 14 to 18 l
o	KSG	Bridge thermostat

Otherwise as Series **C**.

KP 20 with microprocessor control and built-in programmer. Otherwise as thermostats Series KS.

Ultra-Thermostats - the modular thermostat system

Common features:
The most perfect solution to every thermostating problem in the laboratory up to 300°C. Comprehensive modular construction. Complete separation between basic equipment (bath and pump) and electronic control unit R 400 with digital indication and setting of the temperature. Can be extended with Module EXT, for external control, and with Module MV, for controlled tap water cooling. Complies with the strictest safety requirements to DIN Class 3. Available as:

- o Bath/circulation thermostats circular and rectangular design
- o High-temperature thermostats
- o Clear-view thermostats
- o Bridge thermostats
- o Calibrating thermostats

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Summary of the range of LAUDA Refrigerated Thermostats to DIN 12879

LAUDA

Compact low temperature thermostats

Series RM

Range -15 to 100°C. SIMPLEX pump 8 l/min - 0.15 bar; Class 1 W. Economy series: **RMT** with electronic proportional controller and analog temperature setting; temperature control +/-0.1°C. **RMS** with built-in digital thermometer and digital set-point selection through 10-turn potentiometer and digital indication; PID controller; temperature control +/-0.01°C; **RMT 6-DS** and **RMS 6-DS** with pressure-suction-pump (8/5 l/min; 0,17/0,15 bar).

o	RMT 6 (DS) and RMS 6 (DS)	Bath volume 4 - 6 l (DS = pressure-suction pump for thermostating open external systems with constant level control)
o	RMT 20 and RMS 20	Bath volume 14 - 20 l
o	RMT 25 and RMS 25	Bath volume 19 - 25 l

Series RC

Operating temperature range -30 to 150°C. Bath/circulation thermostats with LAUDA Proportional cooling and automatic refrigerator switching, resulting in maximum energy saving. Choice of powerful pressure pump (15 l/min) or pressure/suction pump (9 l/min) with adjustment lever. Digital thermometer and digital setpoint selection through 10-turn potentiometer and digital indication. Multi-function output for programmer, recorder etc. Heating power 2 kW. Temperature control +/-0.02°C. Class 2.

o	RCS 6 and RCS 6-D	Bath volume 4 - 6 l
o	RCS 5 and RCS 5-D (lower form)	Bath volume 4 - 6 l
o	RCS 20 and RCS 20-D	Bath volume 10 - 14 l
o	RCS 25	Bath volume 19 - 25 l

Series RK

Bath volume 14 - 18 l. RKS operating temperature range -40 to 150°C. Increased cooling capacity combined with very powerful pressure pump (22 l/min) or pressure/-suction pump (15 l/min). Temperature control +/-0.02°C. Other data as RCS. **RKP 20** with microprocessor control and built-in programmer. Otherwise as RKS. **RKT 20** very rugged and powerful low-temperature thermostat. Operating temperature range -40 to 20°C. Automatic heating-up system. Temperature control +/-0,5°C.

Series RL

Operating temperature range -75 to 100°C. Compact 2 stage low-temperature aggregate with proportional cooling. Control, pump capacity etc. as RCS. Bath volume 4 - 6 l.

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Summary of the range of LAUDA Refrigerated Thermostats to DIN 12879

LAUDA

Floor mounted Ultra-Kryomat^{R}

Removable digital Controller R 410 which can be extended with Module EXT for external control. Proportional cooling.

Series RUL

Very compact. Temperature control +/-0,02...0,05°C. Simplex or Duplex pump. Bath volume 9 - 14 l. Heater power 1,2 kW

RUL 40 and RUL 40-D	-40 to 100°C. Cooling capacity at 0°C 1 0 kW
RUL 80 and RUL 80-D	-80 to 100°C. Cooling capacity at 0°C 0,8 kW

Series RUK

With higher cooling capacity. Temperature control +/-0,02 ..0,05°C. Simplex or Duplex pump, air or water (W) cooled. Bath volume 19 - 27 l. Heater power 2 kW.

RUK 50 (W) and RUK 50-D (W-D)	-50 to 100°C. Cooling cap. 2,2 kW (W 2,5 kW)
RUK 60 W and RUK 60 W-D	-60 to 100°C. Cooling cap. 2,1 kW
RUK 90 (W) and RUK 90-D (W-D)	-90 to 100°C. Cooling cap 2,0 kW (W 2.0 kW)

Series RUK/S

With extra-large cooling capacity and very powerful pump 50 l/min. Air or water (W) cooled. Bath volume 19 - 27 l.

RUK 40 S and RUK 40 SW	-40 to 100°C. Cooling cap. 3,9 kW (SW 4,8 kW)
RUK 90 S and RUK 90 SW	-90 to 100°C Cooling cap. 3.6 kW (SW 3,6 kW)

K 120 without digital controller R 410. Range -125 to 20°C. Temperature control +/-0,1...0,8°C. Cooling capacity 2,1 kW. Heater power 1,0 kW. Pump 12 l/min.

LAUDA Circulation cooling units

Series UKT

Various models with different size, cooling capacity, pump output and options available.

UKT 350, UKT 600 (P) - UKT 1500 (W)/(WP), UKS 1500 (W)/(WP)/(WPH) - UKT 3000 (W), UKT 6000 (W), UKS 3000 (W)/(H)/(WH), UKS 6000 (W)/(H)/(WH)

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