LAUDA

Operating Instructions

Immersion thermostat
Compact thermostats
Medico thermostat
Series MS
to DIN 12 879

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YAEE0002

LAUDA DR. R. WOBSER GMBH & CO. KG
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Summary of LAUDA Heating Thermostats and LAUDA Low-temperature thermostats

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1. Brief operating instructions

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

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

1.3 Connect the tubing at the pump connectors on the thermostats MS 3, MS 12, MS 20 and MS 6:

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

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

1.4 When operating in the ambient temperature range connect external cooling according to Section 8.

1.5 Use decalcified water only (see Section 5). Fill the unit up to approx. 2 cm below the top plate.

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

1.7 Switch on the unit with the mains switch (green lamp lights up).

1.8 When operating with an external system ensure that the level inside the thermostat does not drop too much when the external system is being filled with the bath liquid.

1.9 The digital thermometer shows the actual bath temperature.

1.10 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 . For this operation the selector switch has to be set on . When operating with a fixed temperature (25, 35, 37 or 56°C) set the selector switch to this value. If necessary adjust with a small screwdriver.

1.11 When the bath liquid has reached the set temperature, the yellow pilot lamp "heating" begins to flash. After the temperature has settled down, the digital thermometer indicates the selected bath temperature.

1.12 Safety
The thermostat is a Class 1 W unit. It must only be operated with non-inflammable liquids (see also Section 5).

1.13 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.

		Immersion thermostat MS	Compact thermostat MS 3	Medico thermostat MS 6
Temperature range without cooling	(°C)	23 ... 100	30 ... 100	24 ... 100
water-cooled	(°C)	20 ... 100	20 ... 100	20 ... 100
Operating temperature range (with external cooling)	(°C)		-20 ... 100	
Temperature setting		digital, using 10-turn potentiometer and numerical indication; resolution of indication 0.1°C, potentiometer approx. 0.03°C.		
Fixed temperatures	(°C)		25, 35, 37, 56	
Indicating thermometer		built-in digital thermometer, 0.1°C resolution, absolute accuracy better than 0.3% of range.		
Temperature probe/ control action		Pt 500 platinum resistance thermometer/PID		
Temperature control (at 70°C)			+/-0.01°C	
Heating load		automatic adjustment as required		
	(kW)	0 ... 1	0 ... 1	0 ... 1
Class to DIN 12 879			Class 1 W (with R 35 and TS 35 - 200: Class 3)	
Flow rate (pump output)/ Discharge pressure		8 l/min against zero head / 0.15 bar (1.5 m WS)		
Capacity	(l)	up to 50	2.5 ... 3.5	4 ... 6
Bath liquid				
5 to 100°C			decalcified water	
below 5°C			water-monoethylene glycol mixture 1 : 1	
Dimensions Bath opening/depth	(mm)	---	120x105/x160	120x285/x150
Usable liquid depth	(mm)	min. 100	140	130

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		Immersion thermostat MS	Compact thermostat MS 3	Medico thermostat MS 6
Overall dimensions (W x D x H)	(mm)	105x130x300	160x265x360	145x440x315
Weight	(kg)	3.5	7.0	4.0
Power supply	(V/Hz)	220 - 240 V / 50/60 Hz Protection Class 1 to VDE 0100		
	(kW)	1.2	1.2	1.2
Interference suppression			N	
Ref.No. 220-240V, 50/60 Hz		LCE 005	LCB 012	LCM 004

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		Immersion thermostat MS/2	Compact thermostat MS 12	Compact thermostat MS 20
Temperature range				
without cooling	(°C)	23 ... 100	25 ... 100	24 ... 100
water-cooled	(°C)	20 ... 100	20 ... 100	20 ... 100
Operating temperature range (with external cooling)	(°C)		-20 ... 100	
Temperature setting		digital, using 10-turn potentiometer and numerical indication; resolution of indication 0.1°C, potentiometer approx. 0.03°C.		
Fixed temperatures	(°C)		25, 35, 37, 56	
Indicating thermometer		built-in digital thermometer, 0.1°C resolution, absolute accuracy better than 0.3% of range.		
Temperature probe/ control action		Pt 500 platinum resistance thermometer/PID		
Temperature control (at 70°C)			+/-0.01°C	
Heating load		automatic adjustment as required		
	(kW)	0 ... 2	0 ... 2	0 ... 2
Class to DIN 12 879			Class 1 W (with R 35 and TS 35 - 200: Class 3)	
Flow rate (pump output)/ Discharge pressure			8 l/min against zero head / 0.15 bar (1.5 m WS)	
Capacity	(l)	up to 50	9 ... 13	14 ... 20
Bath liquid				
5 to 100°C			decalcified water	
below 5°C			water-monoethylene glycol mixture 1 : 1	
Dimensions				
Bath opening/depth	(mm)	---	300x175/x160	300x350/x160
Usable liquid depth	(mm)	min. 100	140	140

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		Immersion thermostat MS/2	Compact thermostat MS 12	Compact thermostat MS 20
Overall dimensions (W x D x H)	(mm)	105x130x300	350x365x360	350x540x360
Weight	(kg)	3.5	12.0	15.0
Power supply	(V/Hz)	220 - 240 V / 50/60 Hz Protection Class I to VDE 0100		
	(kW)	2.1	2.1	2.1
Interference suppression			N	
Ref.No. 220-240V, 50/60 Hz		LCE 007	LCB 028	LCB 014

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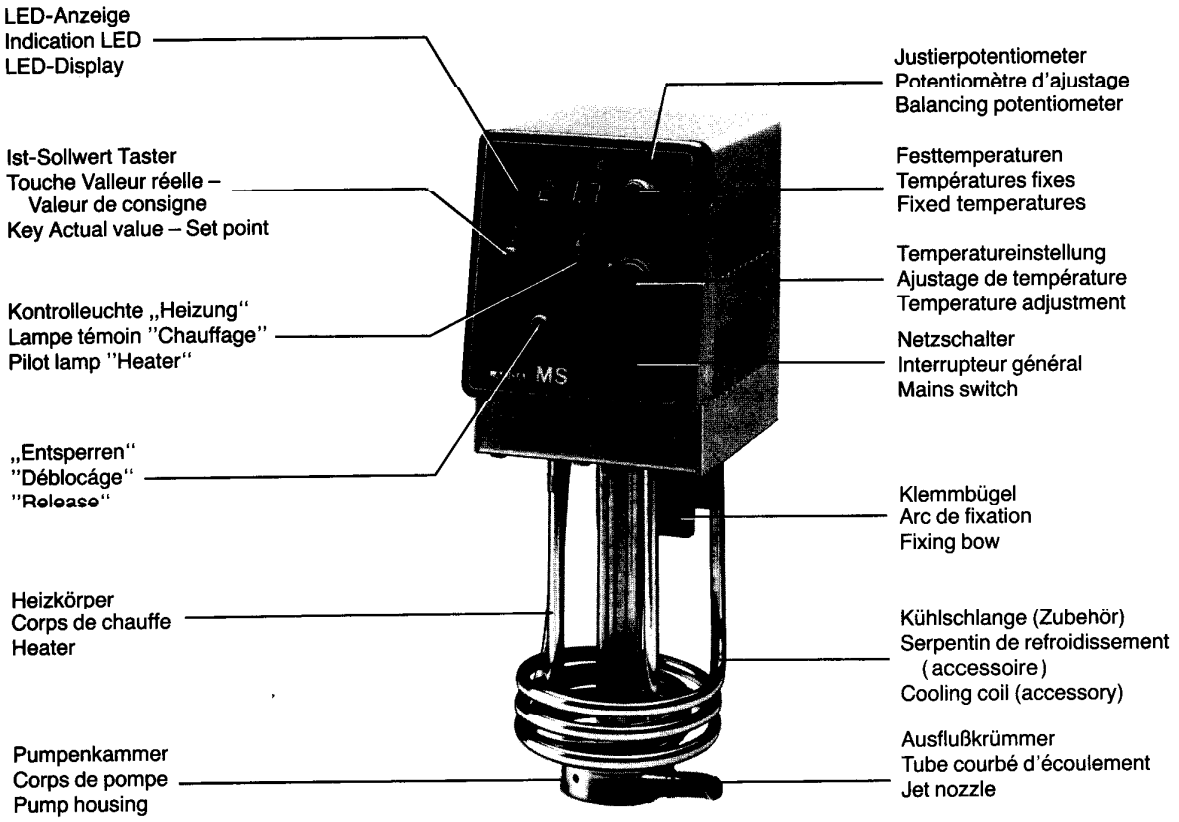

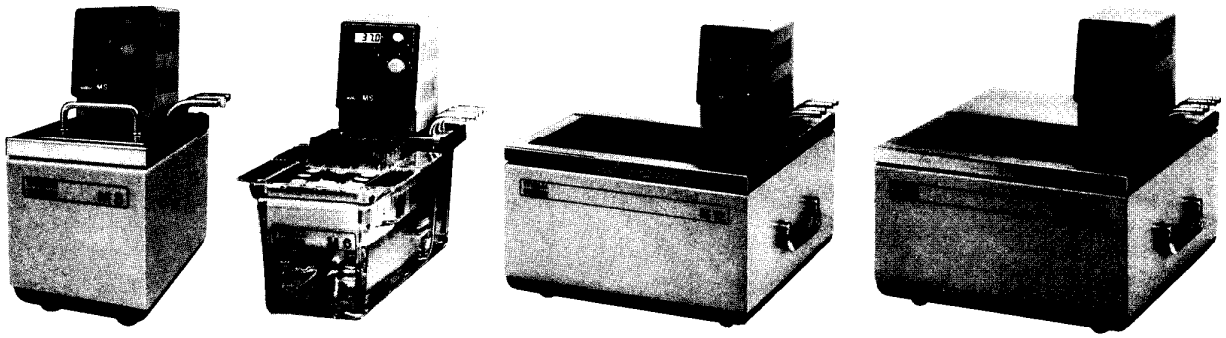

MS 3 **MS 6** **MS 12** **MS 20**

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3. Basic construction

These operating instructions apply to 6 liquid thermostats of different construction, Series MS:

Immersion thermostat MS and MS/2

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

Compact thermostats, Types MS 3, MS 12 and MS 20

Combined bath/circulation thermostats with different bath volumes.

Medico thermostat MS 6

Bath/circulation thermostat for the clinical laboratory with transparent Makrolon tank.

The common feature of all six models is the thermostat unit MS containing the electronics as well as the circulation pump. Built-in digital thermometer with 0.1°C resolution and digital temperature setting using 10-turn potentiometer and numerical indication. Adjustable range -20 to +100°C and 4 fixed temperature settings. Solid state proportional PID controller with packet switching triac. 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 and pump on all poles.

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

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

- o non-inflammable bath liquids, i.e. preferably water; for operation close to zero the non-inflammable water-monoethylene glycol mixture can be used (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.

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 limit 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).

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		

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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 RKJ 011

9 mm int. dia. Application range 0 ... 120°C
For water and water-glycol mixtures.

Silicone tubing, uninsulated RKJ 016

8 mm int. dia. Application range -30 ... 120°C.
For water and water-glycol mixtures.

Silicone tubing, uninsulated RKJ 041

4 mm int. dia. Application range -30 ... 120°C.
For water and water-glycol mixtures.

Pump reducing fitting for tubing 4 mm int. dia. HKO 018

Secure tubing with clips to prevent it slipping off.

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

Immersion thermostat MS and MS/2:

Fixing bow (fitted), Operating Instructions

Compact thermostats MS 3, MS 12 and MS 20:

Bath cover (MS 3 only)
1 m Perbunan tubing
Operating Instructions

Medico thermostat MS 6:

2 Reducers
Operating Instructions

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6.2 Assembly and setting up

The thermostat is suspended into the bath to be thermostated (see Accessories for suitable baths) and the clamping screw is tightened. If required the clamping protection can be pulled off, turned 180°C and pushed on again, so that the thermostat can be secured vertically when the bath has sloping sides.

If the accessory kit (Ref.No. LCZ 007) is ordered the immersion thermostat can also be secured to a laboratory stand. Screw the fixing rod into the threaded hole at the back (insert a screwdriver into the hole and tighten up).

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

Compact thermostats MS 3, MS 12 and MS 20

The units are best set up so that the narrow side is to the front.

If Type MS 12 or MS 20 has no external system connected to it, the circulation can be greatly improved by pulling off the tubing connecting the jet nozzle to the outflow connector and turning pump housing so that the nozzle faces the opposite corner. If this is not required, the pump connectors must be linked together with the Perbunan tubing supplied.

Medico thermostat MS 6

The bath bridge is placed on the Makrolon tank.

7. Connecting external systems

7.1 Immersion thermostat

The 9 mm int. dia. Perbunan tubing (Ref.No. RKJ 011) is pushed directly onto the jet nozzle and connected to the external system, the return tubing can be hung into the bath. It is more convenient, however, to use the outlet-inlet connection of the accessory kit. The connector set can either be fitted on the left or on the right side as required. The connection to the inlet connector is made with tubing. When operating with photometers, refractometers, etc. which have connectors for 4 mm int. dia. tubing, the reducers of the accessory kit are screwed onto the connectors.

7.2 Compact thermostats MS 3, MS 12, MS 20 and Medico thermostat MS 6

The tubing is connected to the pump connectors. Outlet connection always at the front, inlet connection at the back. If necessary use reducers. 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.

Secure the tubing with clips to prevent it slipping off.

8. Cooling the thermostats

Due to the very low frictional heat generated by the pump it is possible to work without cooling down to just above ambient temperature (approx. 3 to 10°C) (see Table of Data, Section 2). Additional cooling is required for lower temperatures. A cooling coil is fitted to the Compact thermostats MS 3, MS 12, MS 20 and the Medico thermostat MS 6 for this purpose. On Immersion thermostats the cooling coil of the accessory kit must be screwed to the fixing bow.

Cooling can be effected as follows:

Down to +20°C

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

Down to -20°C

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

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

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

Thermostat - External System - Flow-through cooler - Thermostat

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9. Starting up

9.1 Filling

Fill the unit with 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 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 baths MS 12 or MS 20 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 (MS 20). This is advisable especially at higher temperatures.

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

9.3 Ensure that the pump connectors are linked together on MS 3, MS 12, MS 20 and MS 6 when there is no external system (for exception see Section 6).

9.4 Switch on the mains switch. The green lamp lights up. The digital display indicates the actual bath temperature. Set selector switch to and fixed temperatures (24, 35, 37 and 56°C) to . Press key , the setpoint now appears on the digital display. Select the desired temperature by turning the knob (10-turn potentiometer). Then release the key, and the display shows the actual bath temperature again.

The fixed temperatures can be selected directly irrespective of the setting of rotary knob . The fixed temperatures can be readjusted by inserting a small screwdriver into the opening above the selector switch. Pressing the key also displays the fixed temperatures.

When the set temperature has been reached the yellow pilot lamp "heating" begins to flash. After the unit has settled down the digital thermometer indicates the selected temperature.

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10. Operation of the safety circuit

10.1 The following three faults could occur:

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

2. The liquid level drops too much during operation, especially at high temperatures. The same fault may be caused by failure of the tubing and liquid being pumped out of the thermostat.

3. Failure of the control system, resulting in continuous heating. The liquid eventually reaches the boiling point and evaporates.

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.

10.2 Operation of the safety circuit switches off the thermostat on all poles (heater and pump); 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

1. the temperature probe on the heater has cooled down to below 60°C.

2. the fault has been corrected (liquid level too low, faulty control circuit, burst tubing).

3. 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 MS is removed and returned to the works. Pull out the mains plug and remove the cover.

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

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Accessories for Immersion / Compact / Medico 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
Accessory kit for Immersion thermostats MT and MS consisting of:		LCZ 007
Cooling coil		
Outlet-inlet connection		
2 pump reducers for tubing 4 mm int.dia.		
Rod for laboratory stand, 100 mm		

Bath vessels
for Immersion thermostats MT and MS

Type	Material	Bath opening/ depth (mm)	Capacity (litres)	Ref.No.
M 12	Stainless steel	300 x 315/160	12	LCZ 026
M 20	Stainless steel	300 x 490/160	20	LCZ 027
M 25	Stainless steel	300 x 490/200	25	LCZ 028
M 40	Stainless steel	300 x 750/200	40	LCZ 029
M 6	Makrolon	125 x 405/145	6	EU 056

Stainless steel racks: for test tubes, centrifuge tubes etc.

Bath M 12 up to 2 racks
Bath M 20 up to 4 racks

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

Makrolon racks

Bath M 3, up to 1 rack
Bath M 6, up to 2 racks

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

Details on other racks on request!

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Type		Ref.No.
Bath cover (flat), stainless steel		
for Type M 12	1 part	LCZ 030
for Type M 20	2 parts	LCZ 009
Gable cover, stainless steel		
for Type M 20		LCZ 011
Tubing (per metre)		
Perbunan tubing,	9 mm int. dia.	RKJ 011
Silicone tubing,	4 mm int. dia.	RKJ 037
Reducer for pump		
for tubing 4 mm int. dia.		HKO 018
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 Immersion thermostat and M 6		UD 048
Retrofit bow for M 3, M 12, M 20		UD 049
Rising platform to be mounted subsequently		LCZ 012
Bench area 250 x 160 mm, height continuously adjustable		
Bath M 12:	max. 1 platform	
Bath M 20:	max. 2 platforms	
Flow-through cooler:		
DLK 5		LFD 001
DLK 15		LFD 102
DLK 30		LFD 103

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Ersatzteile / Pièces détachées / Spare parts
MS, MS/2, MS 3, MS 6, MS 12, MS 20

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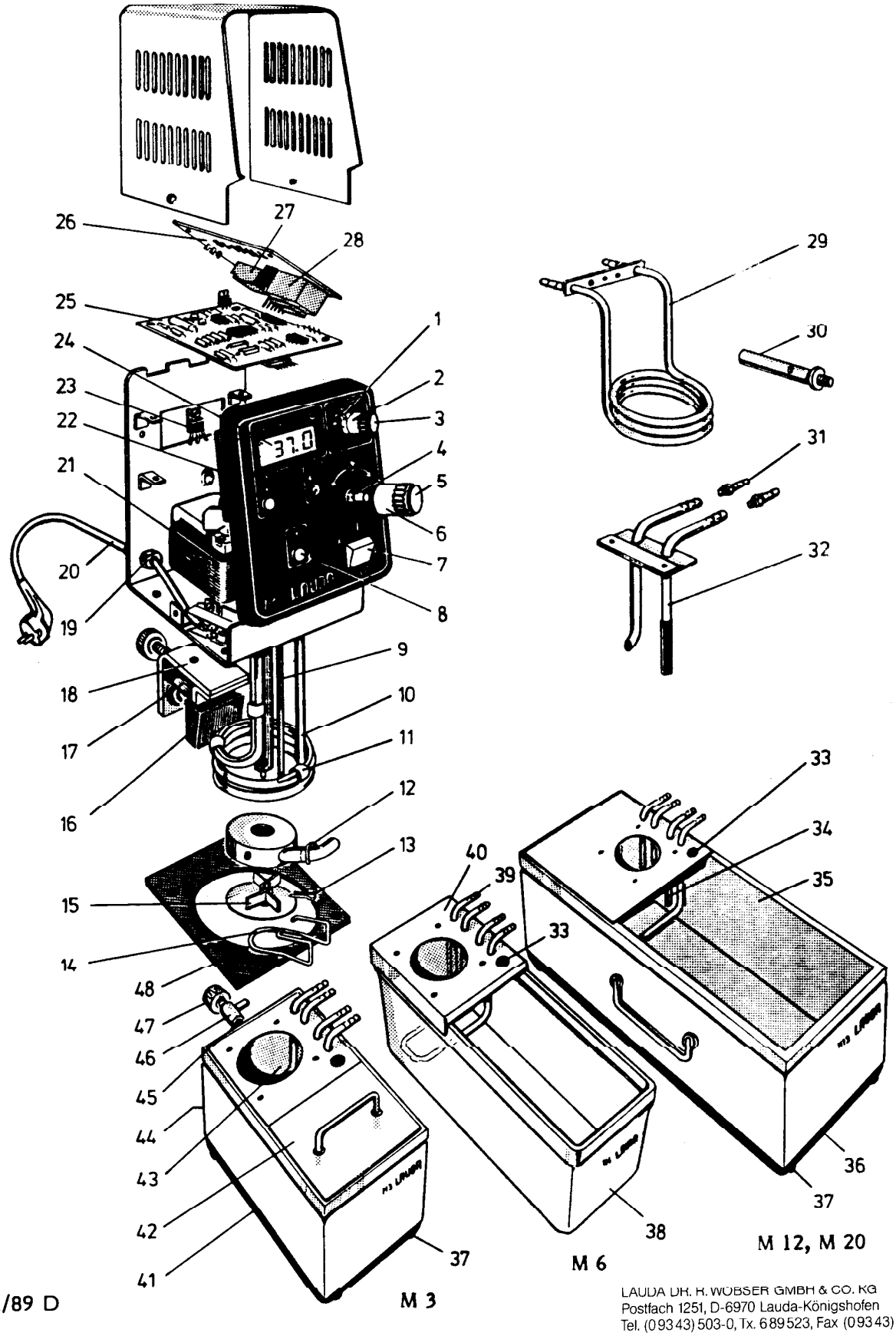

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Ersatzteile / Pièces détachées / Spare parts
MS, MS/2, MS 3, MS 6, MS 12, MS 20

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		Bestell.-Nr. / No. Réf. / Ref. No.	
1	Zeiger/Aiguille/Pointer	EZD	048
2	Kappe/Calotte/Cap	EZD	047
3	Drehknopf/Bouton rotatif/Rotary knob	EZD	046
4	Potentiometer/Potentiomètre/Potentiometer 1 kOhm	EWD	042
5	Kappe/Calotte/Cover	EZD	051
6	Drehknopf/Bouton rotatif/Rotary knob	EZD	050
7	Hauptschalter/Interrupteur général/Main switch	EST	054
8	Temperaturbegrenzer/Limiteur de température/Temperature limiter		
	MS, MS 3, MS 6	US	025
	MS/2, MS 12, MS 20	US	029
9	Temperaturfühler Pt 500/Sonde de température Pt 500/ Temperature probe Pt 500	ETP	021
10	Heizkörper/Corps de chauffe/Heater 220-240 V		
	MS, MS 3, MS 6 - 1 kW	UH	088
	MS/2, MS 12, MS 20 - 2 kW	UH	120
11	Klemme/Pince/Clamp	HIB	012
12	Feder/Ressort/Spring	HI	012
13	Splint/Goupille/Split pin	DIS	003
14	Spange/Agrafe/Clip	HI	014
15	Rührpropeller/Hélice/Stirrer	HX	102
16	Klemmschutz/Protection pour pince/Clamp protection	EDK	006
17	Distanzstück/Douille d'écartement/Distance piece	EDK	007
18	Klemmbügel/Arc de fixation/Fixing bow	UD	065
19	Zugentlastung/Protection pour câble/Cable tension relief	EKZ	009
20	Netzkabel mit Stecker/Câble secteur avec fiche/Mains cable with plug		
	MS, MS 3, MS 6	EKN	009
	MS/2, MS 12, MS 20	EKN	001
21	Motor/Moteur/Motor 220-240V	EM	039
22	Leiterplatte "A/D-Wandler"/Circuit imprimé "A/D-Convertisseur"/Printed circuit board "A/D-Converter"	UL	200
23	Triac/Triac/Triac	EYY	008
24	Leiterplatte "LED-Anzeige"/Circuit imprimé "Indication LED"/Printed circuit board "LED-Display"	UL	194
25	Leiterplatte "Regelung"/Circuit imprimé "Régulation"/ Printed circuit board "Control"	UL	229
26	Leiterplatte "Netz"/Circuit imprimé "Secteur"/Printed circuit board "Mains"	UL	230
27	Zündübertrager/Translateur d'allumage/Ignition transducer BV 282 - 1 - 00054	EIZ	005
28	Transformator/Transformateur/Transformer 220V BV 23275	EIT	072
29	Kühlschlange/Serpentin de réfrigération/Cooling coil	UO	036
30	Stativstab/Tige de statif/Rod for stand	HSD	022
31	Reduzierolive/Olive réductrice/Reducing fittings	HKO	018
32	Druck- und Rücklaufstutzen/Tubulures de refoulement et de retour/Outlet-Inlet connection	UO	011
33	Blindtülle/Douille d'obturation/Rubber piece	EZV	016

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Ersatzteile / Pièces détachées / Spare parts
MS, MS/2, MS 3, MS 6, MS 12, MS 20

LAUDA

34	Perbunanschlauch/Tuyau Perbunan/Perbunan tubing	HOF	005
35	Temperiereinheit kompl. (Innenkessel, Badbrücke, Pumpenstutzen mit Kühlschlange)/Unité de thermostatisation compl. (Cuve interieure, Pont du bain, Tubulures avec serpentin de réfrigération/Thermostatic unit compl. (Inner vessel, Bath bridge, Pump connector with cooling coil)		
	M 20	UU	041
	M 12	UU	054
36	Bodenwanne/Fond de la cuve/Bath bottom		
	M 20	HGB	105
	M 12	HGB	134
37	Gummifuß/Pied en caoutchouc/Rubber butt	EZG	009
38	Badgefäß/Cuve de bain/Bath vessel	EU	056
39	Pumpenstutzen mit Kühlschlange/Tubulure avec serpentin de réfrigération/Pump connector with cooling coil	UO	038
40	Badbrücke/Pont du bain/Bath bridge	HPB	038
41	Bodenwanne/Fond de la cuve/Bath bottom	HGB	100
42	Einfülldeckel/Couvercle de remplissage/Filling cover	HDQ	038
43	Temperiereinheit kompl. (Innenkessel, Badbrücke, Pumpenstutzen mit Kühlschlange)/Unité de thermostatisation compl. (Cuve intérieure, Pont du bain, Tubulures avec serpentin de réfrigération)/ Thermostatic unit compl. (Inner vessel, Bath bridge, Pump connector with cooling coil)	UU	040
44	Gummitülle/Douille en caoutchouc/Rubber piece	EDT	007
45	O-Ring/Joint Torique/O-Ring	EDO	018
46	Entleerungshahn kompl. /Robinet de vidange compl./Drain cock compl.	UD	070
47	Drehknopf/Bouton rotatif/Rotary knob	EZD	001
48	Dichtung/Joint/Gasket	EDF	047

04/89 D

ab / à partir / from **series G 80**

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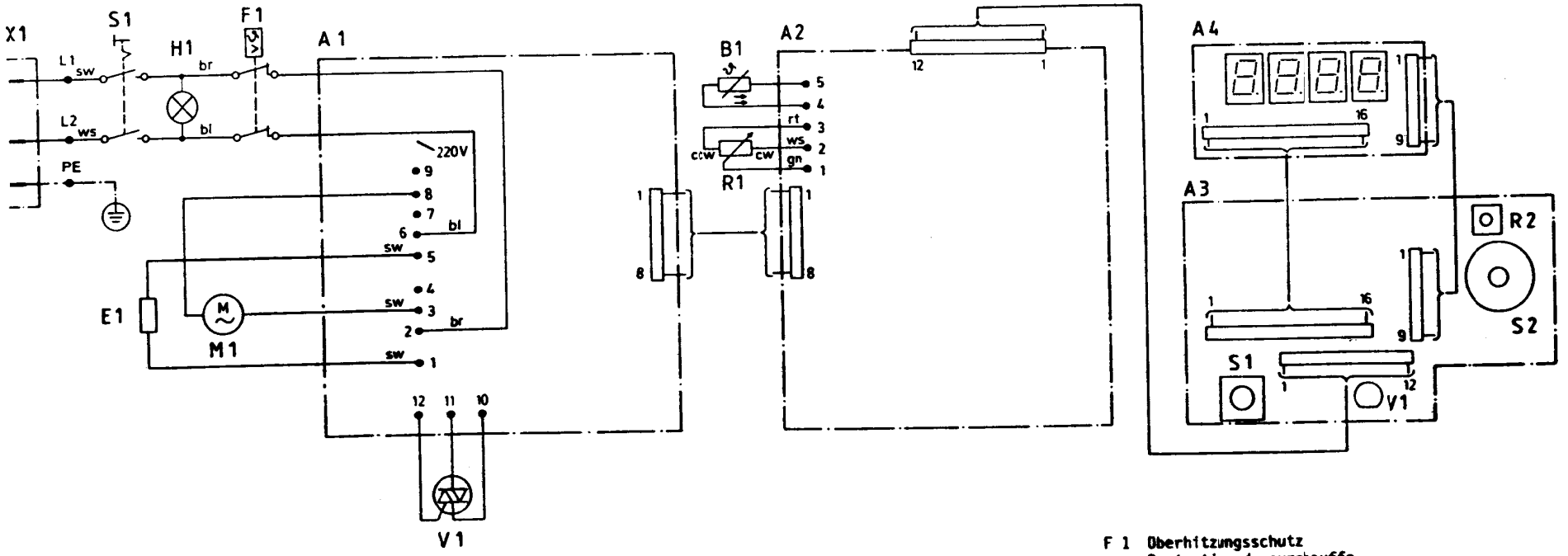

A 1 Leiterplatte Netz UL 199 / UL 230
Circuit imprimé Secteur
Printed circuit Mains

A 2 Leiterplatte Regelung UL 201 / UL 229
Circuit imprimé Réglage
Printed circuit Control

A 3 Leiterplatte A/D-Wandler UL 200
Circuit imprimé Convertisseur A/D
Printed circuit A/D-Converter

A 3 - R 2 Justierpotentiometer 100 Ohm
Potentiomètre d'ajustage
Balancing potentiometer

A 3 - S 1 Taster Istwert/ Sollwert
Touche Valeur réelle/Valeur de la consigne
Key Actual value/ Setpoint

A 3 - S 2 Schalter Festtemperaturen
Interrupteur températures fixes
Switch fixed temperatures

A 3 - V 1 LED-Anzeige Heizung
Affichage LED Chauffage
LED-Indication Heating

A 4 Leiterplatte LED-Anzeige UL 194
Circuit imprimé Affichage LED
Printed circuit LED-Indication

B 1 Temperaturfühler Pt 500
Sonde de température
Temperature probe

E 1 Heizung 1 kW / 2 kW *
Chauffage
Heater

F 1 Überhitzungsschutz
Protection de surchauffe
Thermal cutout

H 1 Lampe Netz
Lampe Secteur
Lamp Mains

M 1 Pumpenmotor
Moteur de pompe
Pump motor

R 1 Sollwerteinstellurg 1 kOhm
Ajustage de la valeur de consigne
Setpoint adjustment

S 1 Netzschalter
Interrupteur général
Mains switch

V 1 Triac 15 A 700 V

X 1 Netzanschluß
Branchement secteur
Mains connection

* ab/à partir/from Serie G 80
bei/pour//for MS/2, MS 12, MS 20

					Datum	20.3.84		LAUDA Dr. R. Wobser GmbH & Co. KG	Schaltplan Schéma de connexions Circuit diagram	MS, MS/2, MS 3, MS 6, MS 12, MS 20	
					Bearb.					220-240 V 50/60 Hz	ab/à partir/from Serie D 50
					Gepr.	27.3.84					Blatt
Zustand	Änderung	Datum	Name	Norm.		Urspr.	Ers. f.	Ers. d.			

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

Please ask for our special leaflets.

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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: **RM 1** 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

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

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)

Please ask for our special leaflets!

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