

# LAUDA

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## Operating Instructions

LAUDA Circulating Cooling Units  
UKT 1000, UKT 1000 P  
UKT 1500, UKT 1500 W  
UKT 1500 P, UKT 1500 WP

From Series P030  
03/93 E  
YAWE0012

LAUDA DR. R. WOBSEY GMBH & CO. KG  
Postfach 1251, D-97912 Lauda-Königshofen  
Tel. (09343) 503-0, Fax (09343) 503222

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Accessories





Circuit and pipe diagram

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1. Brief operating instructions

Even if you find these short instructions sufficient please read and observe the following sections, especially Section 4: "Safety features and notes".

- 1.1 Check circulating cooling unit and accessories during unpacking for any transport damage and, if necessary, inform the carrier so that it can be inspected.
- 1.2 Assemble the unit according to Section 6 and add extra items as appropriate.
- 1.3 Water-cooled units (marked "W" in the type designation) must be connected to the mains water supply with the hoses supplied. See Section 6.  
With air-cooled units the spacing of the grills from any object which might obstruct the free air flow must be at least 0.5 m.
- 1.4 With the pump nozzles open, fill the bath up to the upper marking of the level indicator. In order to do so open the flap in the cover. Underneath the filler lid is located. Check that the drain cock (at UKT 1500 located behind the right side panel (spanner 12 a/f)) is closed.
- 1.5 Fitting the tubing to the pump connections:  
Make tubing connections to the external system. Secure tubing connections with clips against slipping off.  
On the UKT 1000 P and UKT 1500 P only use tubing suitable for the heating liquid and for at least 6 bar operating pressure.
- 1.6 Check the supply voltage against the details on the label. Insert the mains plug.
- 1.7 On water-cooled units turn on the water tap.
- 1.8 Check that the tubing connections have been made in accordance with Section 1.5! Switch on the main switch (I). The temperature indication on the controller shows the actual bath temperature.
- 1.9 The selected operating temperature is indicated by pressing the key . Selection is made with potentiometer . Unlock the locking device first.
- 1.10  indicates whether the compressor is running, i.e. whether the unit is cooling or not.
- 1.11  indicates insufficient level, overload of the pump motor, or the compressor's switching off via the pressure switch of the refrigerating circuit.

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2. Data table

	UKT 1000	UKT 1000 P	UKT 1500 UKT 1500 W	UKT 1500 P UKT 1500 WP
Operating temperature range (°C)	-25 to 40			
Condenser cooling	air (controlled fan speed)/ water (controlled flow rate)			
Ambient temperature range (°C)	0 to 40			
Temperature measurement (outflow)/resolution/accuracy	Pt 500, green digital 7-segment-LED-display / 0.1°C / Class A to DIN IEC 751 ± 0.2°C in operating temperature range			
Temperature setting/resolution	10-turn potentiometer with digital indication / 0.1°C, can be locked manually			
Temperature control (±°C)	better than 1.0			
Control	compressor on-off, with stop time control			
Cooling capacity (effective, with ethanol at 20°C ambient temperature) (kW)				
	at 20°C	1.0	50 Hz 1.8	60 Hz 1.5
	0°C	0.7	1.25	1.1
	-25°C	0.15	0.25	0.4
Safety features	level indication, level sensor against pump running dry. Adjustable alarm contact against overtemperature and low temperature with LED indication and neutral contact (24 V; 0.2 A)			
Flow rate at pressure head 0 (l/min)	20	25	20	25
Maximum discharge pressure (bar)	0.5	3.5	0.5	3.5
Pump connections	M 16 x 1		10 mm int. dia.	
Pressure indication range/resolution (bar)	-----	digital 0...7/0.1	-----	digital 0...7/0.1
Capacity (l)	12 ... 20		15 ... 25	

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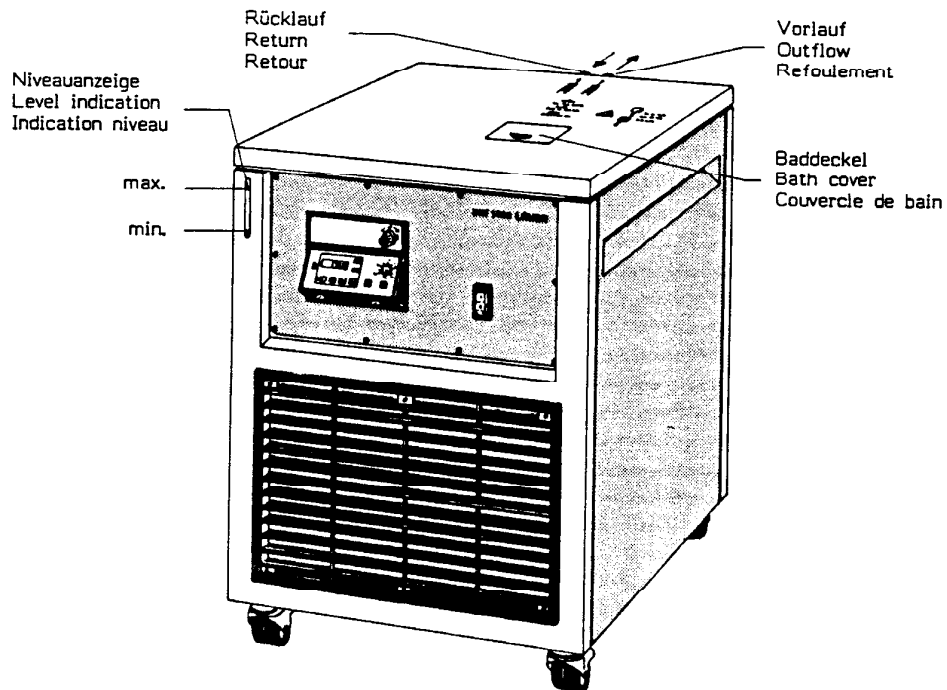
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	UKT 1000	UKT 1000 P	UKT 1500 UKT 1500 W	UKT 1500 P UKT 1500 WP
Overall dimensions				
Floor area (WxD) x height (mm)	380 x 640 x 610		550 x 735 x 750	
Weight (kg)	75		117	
Protection to DIN 40050			IP 32; Controls IP 54	
Power supply (V; Hz)			220 - 240 V; 50 Hz / 230 V; 60 Hz Protection Class 1 to VDE 0100	
Total power consumption (kW)	1.0	1.2	1.3 1.2	1.5 1.4
Interference suppression			suppressed to VDE 0875	
Ref. No.				
Air-cooled				
220-240 V; 50 Hz	LWM 107	LWM 108	LWG 110	LWG 112
230 V; 60 Hz	LWM 207	LWM 208	LWG 210	LWG 212
Water-cooled				
220-240 V; 50 Hz	----	----	LWG 111	LWG 113
230 V; 60 Hz	----	----	LWC 211	LWG 213
<u>Extra-functions:</u>				
Standard	MF/RT	MF/RT/DR	MF/RT	MF/RT/DR
Options:			FB	
<u>Details of extra functions:</u>				
MF =	Multifunction output on terminals.			
RT =	Return flow temperature measurement, Pt 500 mounted inside the unit.			
FB =	Remote control. Control unit including mains			
DR =	Digital pressure indication			

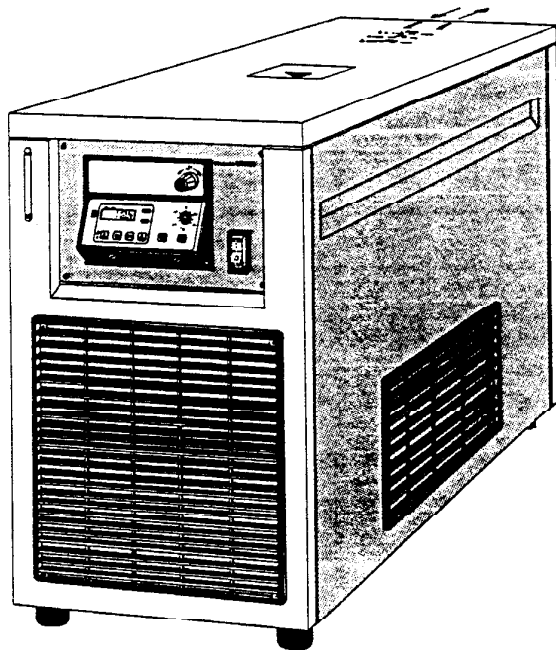
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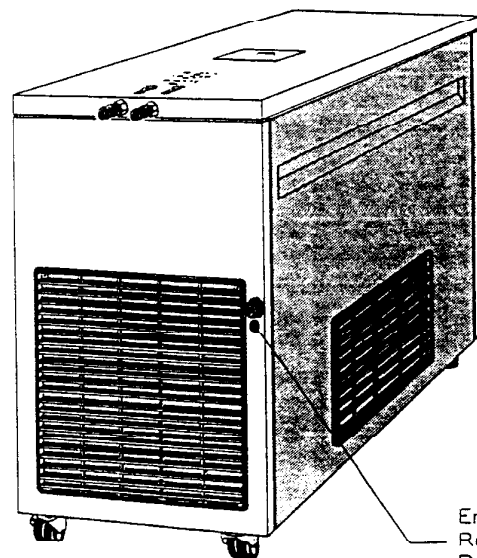
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UKT 1500, UKT 1500 W, UKT 1500 P, UKT 1500 WP



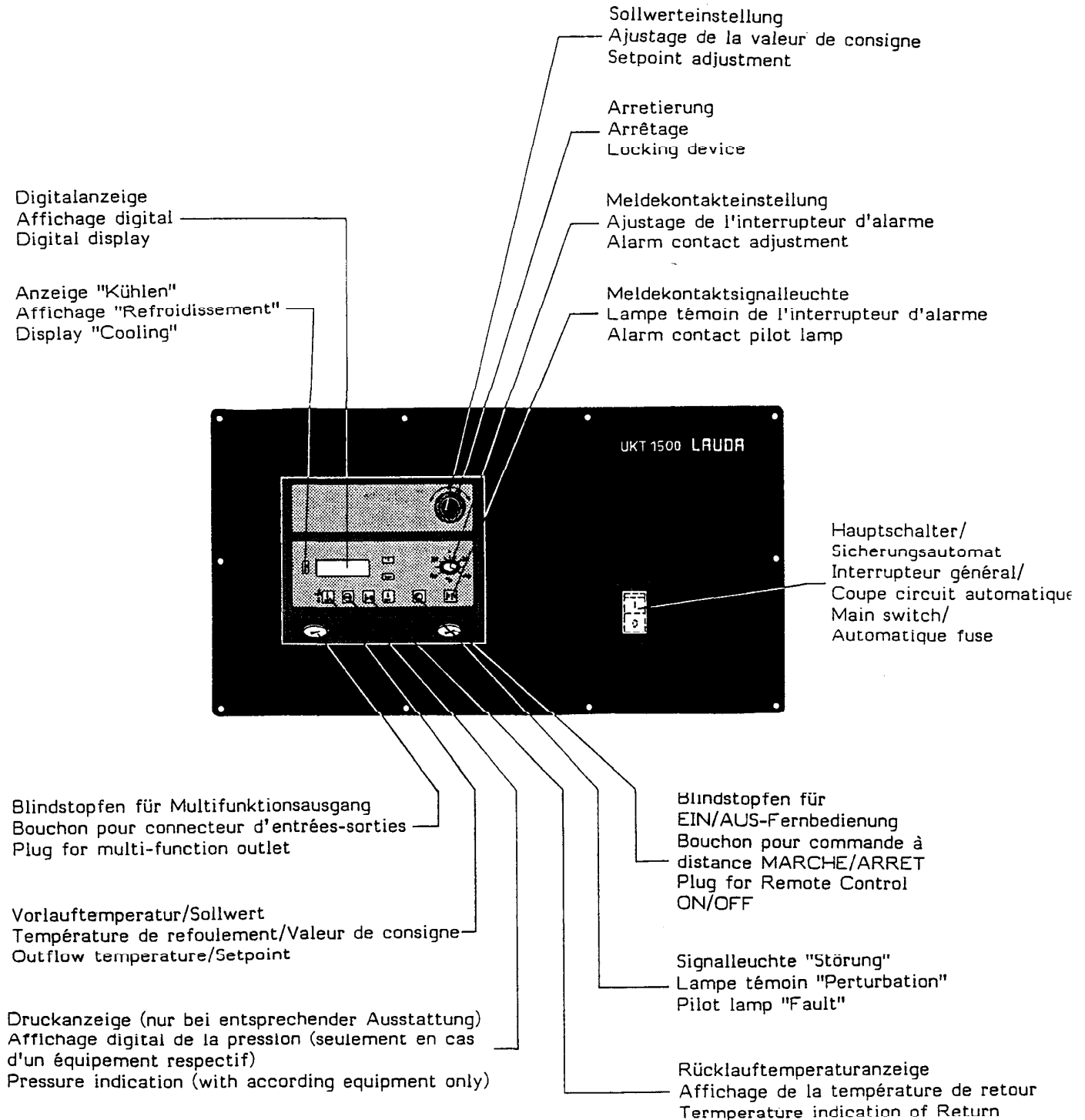
Vorderansicht  
 Vue avant  
 Front view



Rückansicht  
 Vue arrière  
 Rear view

Entleerungshahn  
 Robinet de vidange  
 Drain cock

UKT 1000, UKT 1000 P



### 3. General construction and technical description

#### 3.1 Type selection

The circulating cooling units UKT 1000 and UKT 1000 P are compact bench or floor-standing cooling units with air-cooled condenser.

The circulating cooling units Class UKT 1500 are compact floor-standing cooling units. The models UKT 1500 and UKT 1500 P differ through a more powerful pump (on units with a P in the type designation). Both pump variations are available as air-cooled or water-cooled units (indicated by a W after the type designation).

#### 3.2 Construction

##### UKT 1000:

In the lower part of the unit the refrigeration system is mounted with the pump located behind it. The liquid tank is mounted on top. All components are installed in an enamelled sheet steel case whose side walls can easily be removed in case of servicing. There are castors in the back of the unit so that the unit can easily be moved around the laboratory by lifting the front part.

##### UKT 1500:

The refrigeration system and the pump are installed inside the lower part of the unit. The liquid tank is mounted on top.

A frame of steel sections forms the support which is covered by 4 panels. The unit is mounted on 4 castors, of which the front ones can be locked.

The front and back panels are fitted with large ventilation grills which provide heat dissipation, especially on the air-cooled units.

The sides have recesses which allow the units to be placed side-by-side. The electronics for the indication of temperature and pump output with the controller and the compressor control electronics are located in a control box behind the front panel. Most of the indications and controls are arranged on this front panel.

#### 3.3 Thermostatic bath

The bath tank made of high-grade stainless steel is insulated with polyurethane foam in accordance with the operating temperature range. All parts in contact with the bath liquid are made of high-grade stainless steel, copper or plastic (PVC) which can withstand the operating temperature range, or fibre-reinforced rubber.

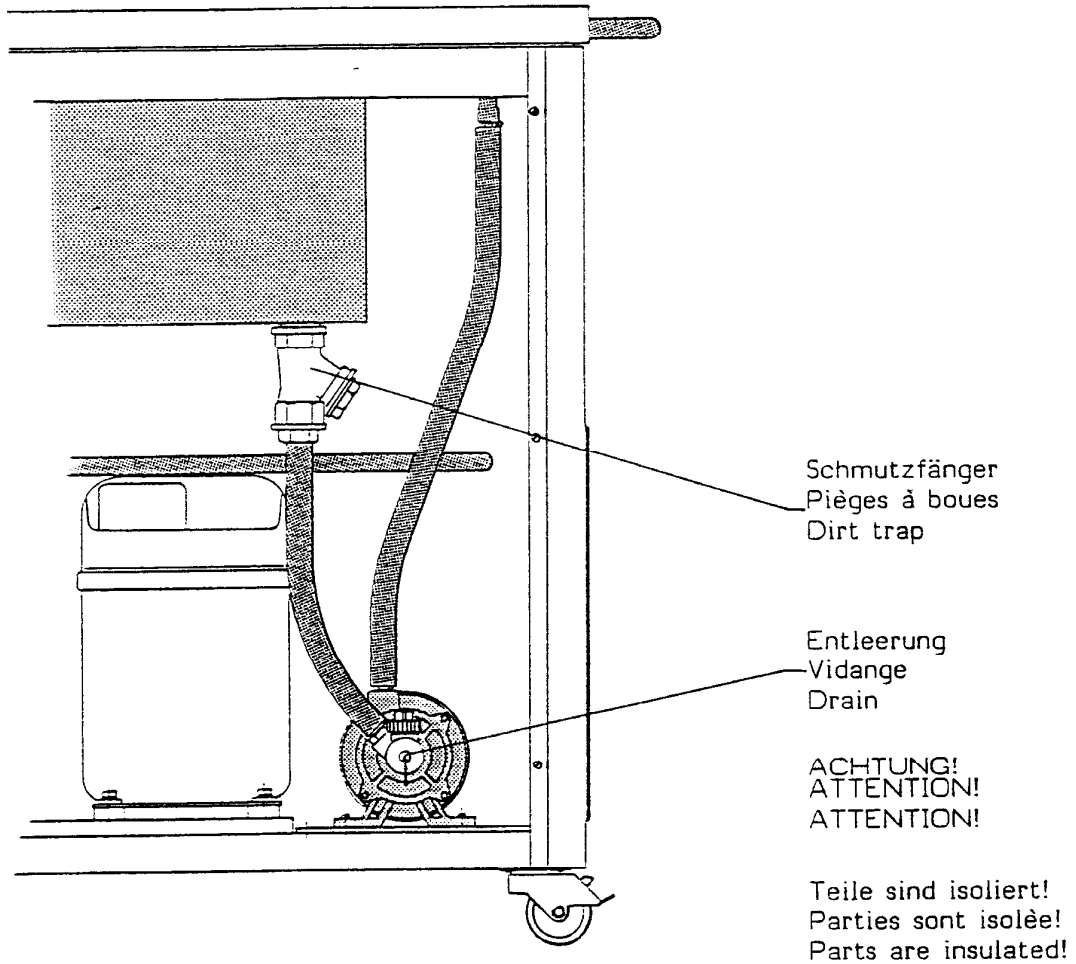
UKT 1000: The bath drain cock is located at the back of the unit.

UKT 1500: The bath drain cock is accessible behind the right side panel.

A dirt trap is fitted at the tank outlet (towards the pump suction) whose screen can be removed for cleaning (at UKT 1500 only).

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UKT 1500, UKT 1500 W, UKT 1500 P, UKT 1500 WP

3.4 Circulating pump

The units are fitted with a free-standing normal suction pump and the units Type P with a side channel pump with sliding ring seal. This pumps the bath liquid through the outflow connection on the back of the unit through the pressure-tight external system. The return flow connection leads back into the bath.

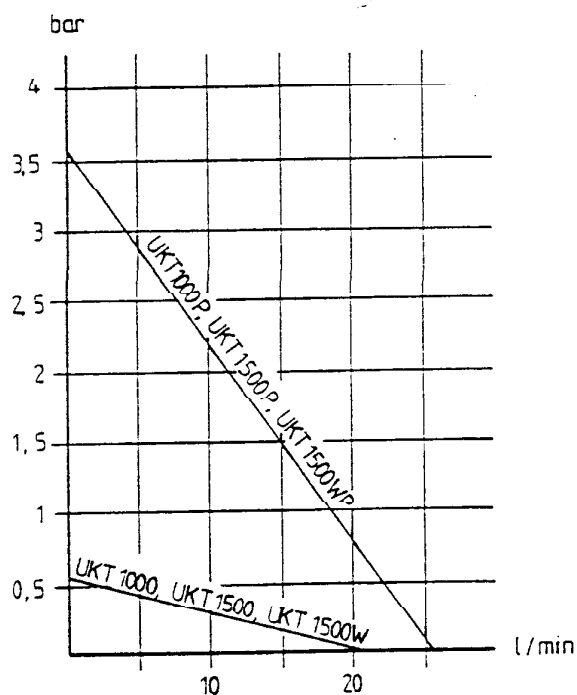
Caution:

With a restricted or closed circuit it is possible for pressures up to 5 bar to build up with Type P (glass!).

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### Performance diagram



## 3.5 Refrigeration system

- 3.5.1 The refrigeration system removes heat from the bath liquid through the evaporator mounted in the bath. The units operate with compressor cooling.

The refrigeration circuits are charged ready for operation with partly halogenated safety refrigerant R 22 and special low-temperature oil and require no maintenance. The compressors are hermetically sealed units.

- 3.5.2 The heat of condensation and the heat losses of the motor are removed through a finned condenser cooled by a powerful fan. The fan speed is electronically controlled in accordance with the loading of the cooling circuit. Fresh air is drawn in at the front of the unit and discharged at the back. The air flow must never be restricted; the spacing between the ventilation grills and any obstructing objects (e.g. walls) must therefore be at least 0.5 m. The units should also not be operated close to sources of heat (such as heating radiators etc.).

The ratings specified in the technical data are based on 20°C ambient temperature. Higher temperatures result in reduced performance. Above 40°C the refrigerator can switch off automatically when overloaded. The heat dissipated to the air includes both the heat removed from the bath and the power supplied through the mains supply.


3.5.3 Water-cooled version

The heat of condensation and the heat losses of the motor are removed through a water-cooled countercurrent heat exchanger. The connections for inlet (from water tap) and outlet (drain) are located at the back of the unit below the back panel. Viewed from the rear of the unit inlet is located on the left side and outlet to the drain on the right side. The cooling water rate is matched to the requirement via the condensation pressure. It ranges between 20 and 250 l/h. The water temperature should not exceed 25°C. The cooling water pressure must be at least 3 bar.

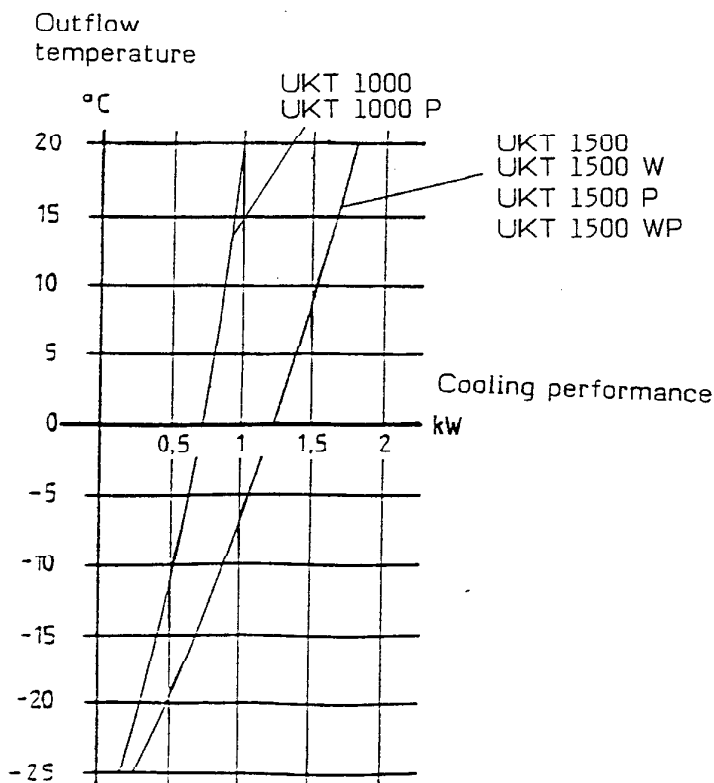
3.5.4 Safety devices of the refrigeration system

3.5.4.1 The compressor is fitted with a temperature cut-out which responds to the compressor temperature and the current loading.

3.5.4.2 The cooling circuit is protected against excessive condensation pressures by a pressure switch. When activated a red fault LED on the control panel lights up. In most cases this fault condition arises through insufficient condenser cooling, i.e. insufficient or missing cooling water supply or contaminated finned condenser on air-cooled units.

The green lamp  in the control panel lights up when the refrigeration compressor is running.

Cooling performance diagrams



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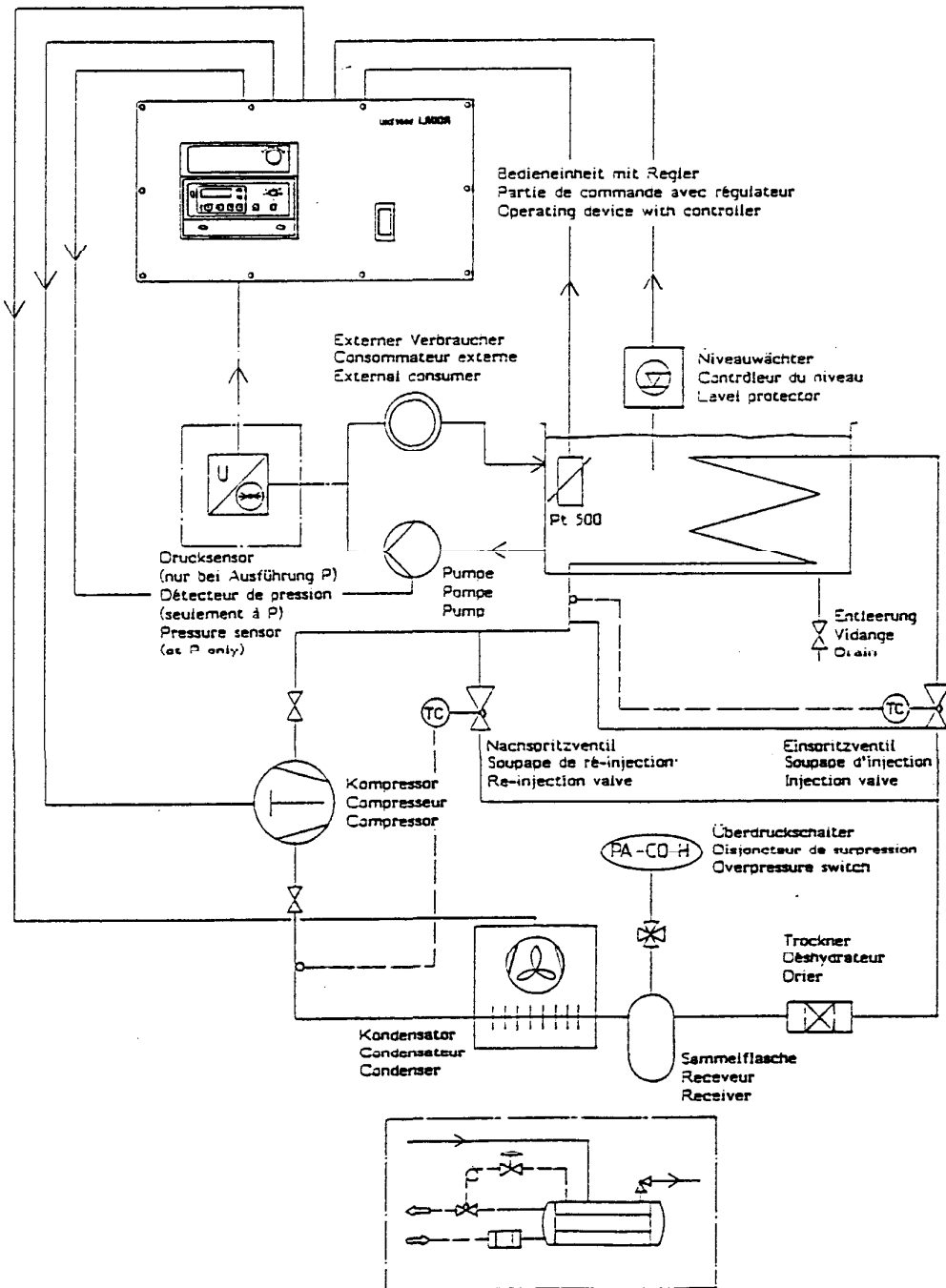
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**Note:** Empty the condenser on water-cooled units if there is danger of frost (e.g. transport in winter)! Heat the bath liquid to approx. 20°C. Remove water hose from the mains supply. Set the setpoint for example to -20°C and blow compressed air into the water inlet hose (on the left side seen from the back) as soon as the compressor starts up.

Arrange the outflow hose as low as possible so that the unit can be emptied completely. Then switch off the unit immediately.



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Cooling and temperature control circuit diagram




Bündelrohrkondensator ( nur bei Ausführung W )  
 Tubulaire condensateur ( seulement à W )  
 Tube bundle condenser ( at W only )

### 3.6 Control

The units operate with a Pt 500 conforming to 5 times DIN IEC 751 to sense the bath temperature. The bath temperature is indicated digitally with a resolution of 0.1°C. The setpoint is selected on a precision 10-turn-potentiometer with locking device. Simultaneously the key  must be pressed to indicate the setpoint. The value from the programmer input (setpoint, see description of multifunction output) is added to the selected setpoint. The sum can be displayed by operating the key .

The comparison between setpoint and actual value is followed by an on-off controller which switches the compressor through a triac.  
A stop monitoring circuit ensures a minimum stopping period of approx. 1 min.

### 3.7 Pressure measurement (UKT 1000 P, UKT 1500 P and UKT 1500 WP only)

A pressure sensor is connected to the pump outlet which senses the pressure built up in the remaining thermostating circuit. It is indicated in bar by operating the key . The pressure measurement provides information on the liquid flow rate (see pump characteristic 3.4) and shows changes in the external thermostating circuit.

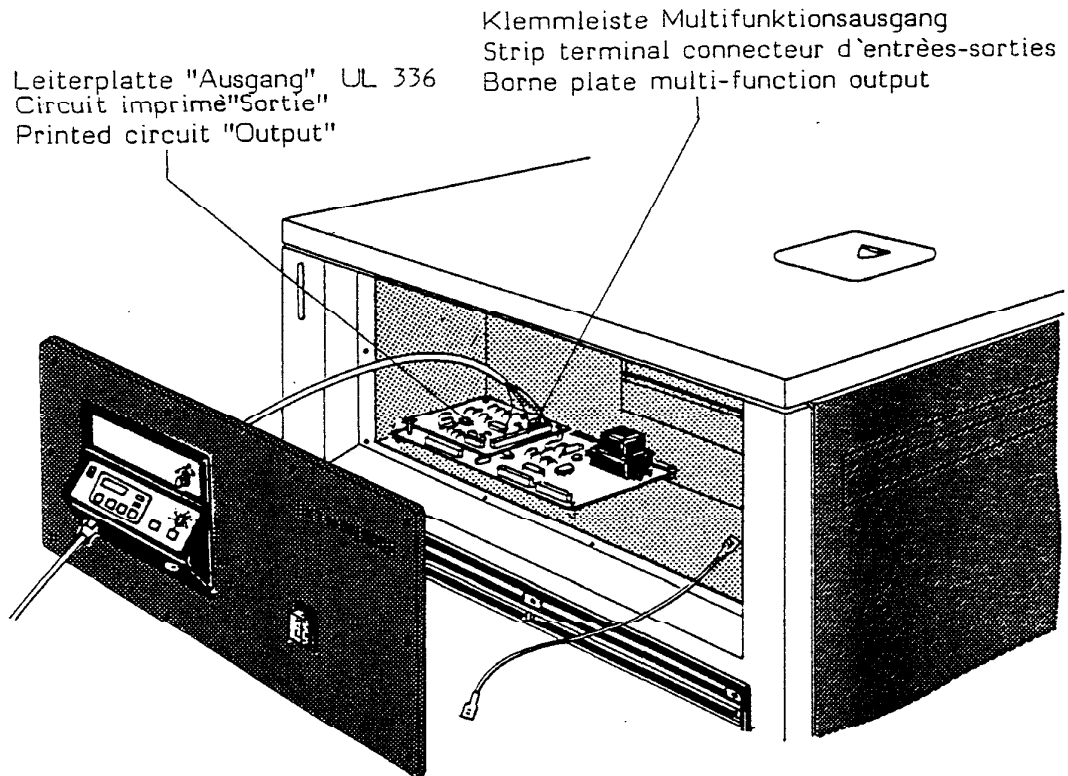
### 3.8 Multifunction output

As the unit described is designed to protection grade IP 54 the multifunction output is arranged on terminals in the control box. The external connections must be made through appropriate cable glands.






**Note:** Connections in the control unit must only be made with the mains plug removed and only by a qualified electrician.

UKT 1000, UKT 1000 P,  
 UKT 1500, UKT 1500 W, UKT 1500 P, UKT 1500 WP


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- Terminal 1: Control deviation 100 mV/°C approx. for service purposes only  
(0 V terminal 5)
- Terminal 2: spare
- Terminal 3: Setpoint output 10 mV/°C,  $R_i \approx 100 \text{ Ohm}$  approx.; load resistance  $\geq 10 \text{ kOhm}$  min. (0 V terminal 5)
- Terminal 4: -12 V supply, max. additional load 20 mA  
(0 V terminal 7)
- Terminal 5: 0 V reference potential for measurement signals
- Terminal 6: +12 V supply, max. additional load 20 mA
- Terminal 7: 0 V load reference potential
- Terminal 8: Reference output 10 V + 0.1 V;  $R_i = 1 \text{ kOhm}$ ;  
load resistance  $\geq 10 \text{ kOhm}$  min. (0 V terminal 5)
- Terminal 9: +18 V un stabilised, additional load 20 mA max.
- Terminal 10: Recorder connection for (int.) outflow temperature,  
correct sign 10 mV/°C;  $R_i = 100 \text{ Ohm}$ ; internal recorder  
resistance  $\geq 1 \text{ MOhm}$  min. (0 V terminal 5)

- Terminal 11: Recorder connection for return flow temperature (  ), correct sign 10 mV/°C;  $R_i \approx 100 \text{ Ohm}$ ; internal recorder resistance  $\geq 1 \text{ MOhm min.}$  (0 V terminal 5).
- Terminal 12: 12 V when red LED  alight;  $R_i \approx 10 \text{ kOhm}$ ;  $I \text{ max } 1 \text{ mA}$  (0 V terminal 7)
- Terminal 13/14: Neutral contact closed when red LED  alight; 24 V max. 0.2 A (SELV)
- Terminal 15: Recorder connection for outflow pressure signal (  ), correct sign 10 mV/bar;  $R_i \approx 10 \text{ Ohm}$ ; internal recorder resistance  $\geq 1 \text{ MOhm min.}$  (0 V terminal 5)
- Terminal 16: Programmer or external setpoint input 10 mV/°C; added to setpoint selected internally. Sum is displayed by pressing key  ;  $R_i = 24 \text{ kOhm}$  (0 V terminal 5)


### 3.9 Return flow temperature measurement RT

The units are fitted with return flow temperature measurement. In that case a Pt 500 resistance thermometer is fitted into the return flow pipe at the bath inlet. After operating the key  the return flow temperature is indicated on the display. See also 3.8, terminal 11.

### 3.10 Remote operation\*FB (option)

On the version for remote operation the control unit is arranged outside the unit in a separate bench housing which also includes a mains switch for the remote operation of the unit. The green mains switch remains on the unit itself. The connection between unit and remote control is made with two separate cables for mains voltage and low voltage.

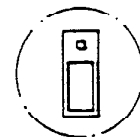
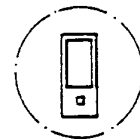
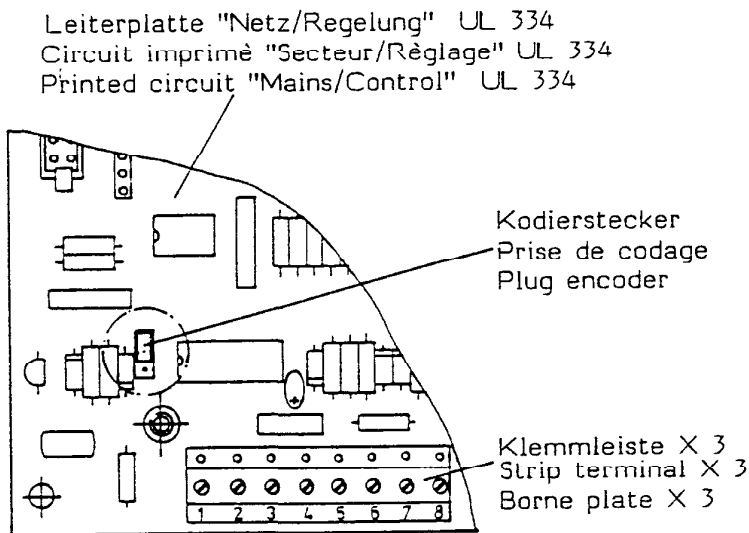
## 4. Safety features and notes

- 4.1 The red LED  (see 3.8, terminal 13/14) lights up in case of the following fault conditions.
- 4.1.1 The units are fitted with a level cut-out. When the liquid level drops below the minimum level the refrigeration compressor and the pump are switched off.
- 4.1.2 The circulating pump is fitted with a winding temperature cut-out which switches off compressor and pump in case of a pump overload. It is reset automatically after cooling down.
- 4.1.3 The overpressure cut-out of the refrigeration system switches off the refrigeration compressor only !

- 4.2 The complete unit is protected by a 2-pole thermal safety cut-out which is incorporated into the mains switch.
- 4.3 A signal contact which can be adjusted with a screwdriver within the operating temperature range, indicates via a yellow LED when the selected temperature has been exceeded. At the same time the neutral contact (signal contact 24 V; 0.2 A SELV) is closed. This contact is located in the control unit on the main circuit board A 2 connector X 3 contact 1/2.

The direction of the signal contact function can be reversed by setting the plug encoder near the contacts to the other position - LED is alight and the neutral contact closes when the temperature falls below the set limit.

Übertemperaturmeldung  
 Indication pour surtempérature  
 Overtemperature indication



Untertemperaturmeldung  
 Indication pour  
 température insuffisante  
 Undertemperature indication

- 4.4 The control unit is designed to Protection Class IP 54. In order to safeguard this condition, the cables must be introduced into the unit through appropriate cable glands.
- 4.5 Important!

Any work performed in the control unit must only be executed by a qualified electrician and after the main switch has been switched off!

## 5. Bath liquids and tubing connections

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

### 5.1 Bath liquids

Operating range 5-90°C

Use decalcified water. Make up losses through evaporation at elevated temperatures.

Temperatures close to zero and below:

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

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

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 against the original mixture, e.g. with a hydrometer.

For special applications we offer silicone oils.

### 5.2 Tubing (continuous lengths)

Rubber tubing with fabric reinforcement  
1/2", uninsulated  
-40 to 100°C. For water, water-glycol  
mixture, alcohols and silicone oils  
Operating pressure 10 bar max.

Ref. No. RKJ 031

Insulation tubing

(22 mm int. dia; 9 mm thick)  
in length of 2 m for insulating 1/2" rubber tubing

Ref. No. RKJ 009

Perbunan tubing, uninsulated

11 mm internal dia., application range 0 to 120°C.

Ref. No. RKJ 012

Not suitable for UKT 1500 P and UKT 1500 WP!

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Perbunan tubing, insulated  
11 mm internal dia. With foam insulation.  
Ext. dia. approx. 35 mm. Application range  
-60 to 120°C. For water, water-glycol mixture,  
alcohols and silicone oils.

Ref. No. LZS 008

Not suitable for UKT 1500 P and UKT 1500 WP!

Secure tubing with clips to prevent it from slipping off!

For further information on thermostatic liquids and tubing please refer to our special Information Bulletin.

## 6. Unpacking, assembly and setting up

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

### Standard accessories:

1 Bath cover for filler opening	EZU	070
2 Olives 13 dia.	HKO	026
2 Cable glands PG 11 with reinforcement	EKV	042
1 Square spanner (not for UKT 1000 (P))	EZ	127
2 water hoses, 1/2", each 5 m long, with quick-release coupling (only with water-cooled units)		

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- 6.2 The units are best set up so that the control unit faces to the front and the air flow to the refrigerator (grills in the lower part) is not obstructed. With air-cooled units keep a minimum spacing of 0.5 m between ventilation grills and any obstructing object, e.g. walls (see 3.5.2).  
With water-cooled units (indicated by a W in the type designation) make the tube connections to water tap and drain (see 3.5.3)

Secure tubing with clips to prevent it from slipping off!

Check that the drain cock behind the right side panel is closed (spanner 12 a/f).

## 7. Filling and connection of external systems

### 7.1 Filling up

Fill the unit with bath liquid depending on the operating temperature according to Section 5. For venting the pump during initial filling the pump nozzle must be open, otherwise the pump may be damaged.

Filler opening is located underneath the flap in the cover.

For initial start-up fill the bath, if possible, to the upper marking of the level indicator. Top up, if required, after charging an external system.

### 7.2 Link the pump connections on the back of the unit to the external system. Only pressure-tight systems may be connected.

Attention: Pressures of up to 5 bar may occur on units Type P if the return flow is accidentally closed.

Apparatus made of glass normally only withstand very much lower pressures!  
(see accessories: "Overflow valve").

For suitable tubing material please refer to Section 5. With a high-level external system, entry of air into the thermostatic circuit while the pump is stopped may cause the external volume to drain down even with a closed circuit, resulting in flooding of the thermostatic bath!

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





Secure the tubing with clips to prevent it from slipping off!


## 8. Starting up

### 8.1 The unit must only be connected to a grounded line supply. Check the line voltage and frequency against the data on the unit! Open the water tap in case of water-cooled units!


### 8.2 Switch on the main switch on the right side of the control panel (I). The green digital display indicates the actual outflow temperature.

### 8.3 If there is no flow of bath liquid despite sufficient liquid level the pump cannot fill with liquid due to a build-up of air. Venting the external system at its highest point will rectify this fault condition!

8.4 Unlock the locking device of the setpoint selector  by turning it anticlockwise to the top. Operate the key  and keep it pressed; now the setpoint is displayed. The setpoint can now be selected by turning the knob . Then release the key and tighten the locking device by turning it in clockwise direction. Depending on the temperature selected the compressor starts up (possibly after a delay). The cooling lamp  at the control unit then lights up. The unit now controls the selected temperature by switching the compressor on and off.

8.5 On units type "P" the pressure which builds up at the external system can be indicated by pressing the key  (see Section 3.7 and 3.8).

#### 8.6 Operation with programmer

A programmer Type PM 351 or an external setpoint selector can be connected to the terminals of the multifunction output (see Section 3.8) so that the setpoint of the circulating cooling unit can be varied according to a preset program. This requires that the energy balance (heating, cooling, load) of the circulating cooling unit matches the requirements of the program (heating rate, cooling rate, operating temperatures). The programmer output or setpoint selector output is set to 0 Volt. Adjust the unit setpoint to the lowest temperature of the program; this value is entered as value A when programming the programmer. Do not change the unit setpoint any more. Operation of the key  indicates the current setpoint on the digital display which is provided by the programmer and according which the unit is operating. For further details refer to the Operating Instructions for the PM 351.

#### 8.7. Operation with Interface RS 232 (V24) R 61/2 (MF necessary)

If a computer can be connected to the Interface RS 232 C (V24) R 61 with A/D-converter and D/A-converter, it is possible to transfer 3 signals of 10mV-scale from the multifunction output of the circulating cooler to the computer and to transmit one value as setpoint value from the computer to the circulating cooler. Error signal can also be determined.

Depending on type and kind of equipment of the circulating cooler the below mentioned actual value signals are available (see 3.8 Multifunction output):

1. Setpoint output (terminal 3)
2. Outflow temperature (terminal 10)
3. Return flow temperature (terminal 11)
4. Outflow pressure (terminal 15)
5. External temperature (terminal 2)

If required, the R 61-inputs IN 1 (brown), IN 2 (red) and IN 3 (white) can be connected to 3 signals of those 5 ones mentioned above.

Programming and automatic processing of ramp segments as well as programmable relay contacts possible.

## 9. Maintenance

- 9.1 LAUDA circulating cooling units operate largely without maintenance. Contaminated bath liquid should be drained through the drain cock and replaced by fresh liquid.

The refrigerating system operates largely without maintenance.

On air-cooled units the finned condenser of the refrigerator must be cleaned in regular time intervals, e.g. every 6 months, depending on the amount of dust. In order to do so, the ventilation grill mounted at the front may have to be unscrewed. Then remove the dust on the finned condenser located behind it via an appropriate method, e.g. blow compressed air or nitrogen into the ventilation grill for several minutes.

- 9.2 In case of reduced pump output the dirt trap (see Section 3.3) can be unscrewed and cleaned after removing the right side panel and the insulation.

- 9.3 On water-cooled units a dirt trap is located in the cooling water inlet which must be cleaned in case of faults in the system.

- 9.4 The outside of the units can be cleaned using a damp cloth, wetted with water and some drops of a tenside (wash-up liquid).

### 9.5 Safety notes in case of repair

Always unplug mains supply before performing any maintenance procedures or repairs. Repairs on the unit must only be performed by a qualified electrician!

### 9.6 Notes on Repair and Disposal

The refrigerating circuit is filled with partly halogenated refrigerant R 22. Repair on the circuit as well as disposal of the R 22 by qualified technician only.

### 9.7 Order of spare parts

When ordering spare parts, please always state the type designation and unit number as indicated on the unit label. We rely on your cooperation as this prevents unnecessary delays due to further inquiries or wrong deliveries.

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

LAUDA Circulating Cooling Units  
 UKT 1000, UKT 1000 P,  
 UKT 1500, UKT 1500 W, UKT 1500 P, UKT 1500 WP

Accessories for LAUDA Circulating Coolers

<u>Type</u>	<u>Ref.No.</u>
<u>LAUDA Temperature Programmer PM 351-1</u>	LRP 012
Microprocessor-controlled programmer with up to 50 different temperature/time coordinates and a program range of 350°C for unrestricted individual programming of temperature courses. Programmable control of permissible variation. External controllable start, stop and reset function.	
<u>Connecting cable to the strip terminal multifunction output to PM 351-1</u>	UK 178
<u>Step programmer PS 2</u>	LRP 111
Using a timer with 7-Day-program one can automatically switch between two different temperatures within the operating temperature range of the circulating cooler.	
<u>RS 232 C Interface R 61/2</u>	LRT 013
If a computer can be connected to the Interface RS 232C (V 24) with A/D and D/A converter, it is possible to transfer signals from the multifunction output of the circulating cooler to the computer and to transmit one value as setpoint from the computer to the circulating cooler. Error signal can also be determined. Programming and automatic processing of ramp segments as well as programmable relay contacts possible.	
<u>Connecting cable to strip terminal of the multifunction output of the circulating cooler suitable for PS 2 and R 61.</u>	UK 179
<u>Four-way receiver and distributor for return and outlet connection of pump, can be operated separately.</u>	
M 16 x 1 / 1/2" tube	LWZ 009
<u>Overflow valve for pressure limitation and improved circulation in the circulating cooler in consumers with high flow resistance.</u>	
Break pressure for bypass adjustable. Suitable for series UKT 1000 P, 1500 P and UKT 1500 WP.	
Adjustment range	1.5 - 2.5 bar
Adjustment range	1.0 - 1.5 bar
	LWZ 008
	LWZ 011