

Operating instructions

Compact Low-temperature thermostats
RL 14 CB

Gültig ab Serie Z01
12/01
YACE0070

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Safety notes

Before you operate the unit please read carefully all the instructions and safety notes.

If you have any questions please phone us!

Follow the instructions on setting up, operation etc. This is the only way to avoid incorrect operation of unit and to ensure full warranty protection.



- Transport the unit with care.
- Unit and its internal parts can be damaged
 - by dropping
 - by shock.
- Unit should only be operated by technically qualified personnel!
- Never operate the unit without bath liquid!
- Do not start up the unit if
 - it is damaged or leaking,
 - the supply cable is damaged.
- Switch off the unit and pull out the mains plug
 - for servicing or repair
 - before moving the unit.
- Drain the bath before moving the unit!
- Have the unit serviced or repaired only by properly qualified personnel!

**The Operating Instructions include additional safety notes which are identified by a triangle with an exclamation mark. Carefully read the instructions and follow them accurately!
Disregarding the instructions may have serious consequences, such as damage to the unit, damage to property or injury to personnel!**

We reserve the right to make technical alterations!

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1. Brief operating instructions

Even if you find these brief instructions initially sufficient please read the following sections, especially section 4: „Safety devices and warning notes“.

For safe operation of the equipment it is essential that the information in these operating instructions is observed.

Check thermostat and accessories during unpacking for any transport damage and if necessary inform the carrier or the postal authority.

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

Fit the hoses to the pump connections:

Without external system: for improved circulation within the bath remove the closing plugs from the two pump connections, fit the tubing nipples and link them together with Perbunan tubing (120°C max.) or a metal hose.

With external system: make the hose connections to the external system.

Secure hoses with hose clips against slipping off.

Use only LAUDA bath liquids (Section 5). Fill the unit up to about 2cm below the cover plate.

Check the supply voltage against the details on the label. Insert the mains plug.

Switch on the unit with the mains switch (green lamp lights up). The internal bath temperature is indicated at the digital display.

After a longer standstill period of the refrigeration unit it can take up to approx. 20 minutes - depending on ambient temperature and type of the unit - until the nominal cooling capacity is available.

When connecting up an external system, ensure that the level in the thermostat does not fall more than permitted.

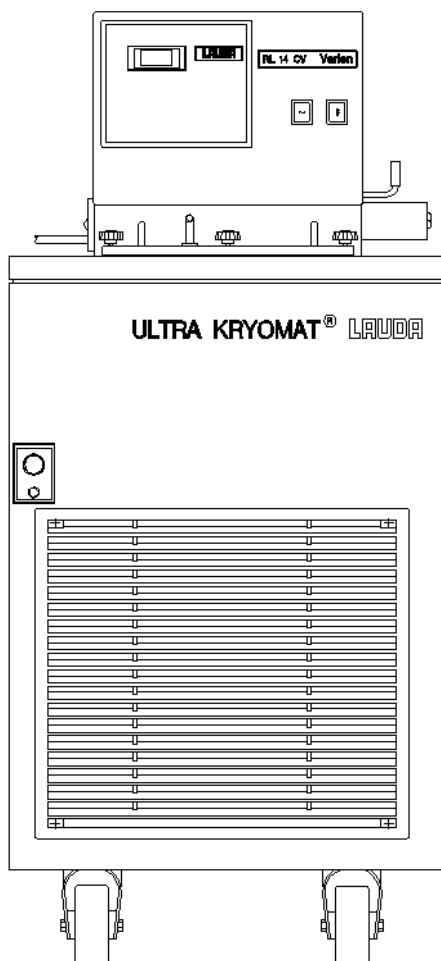
Operational safety

The thermostat must only be used with inflammable liquids or only with those flammable bath liquids whose flashpoint is more than 25°C above the operating temperature. Otherwise there is danger of an explosive atmosphere.

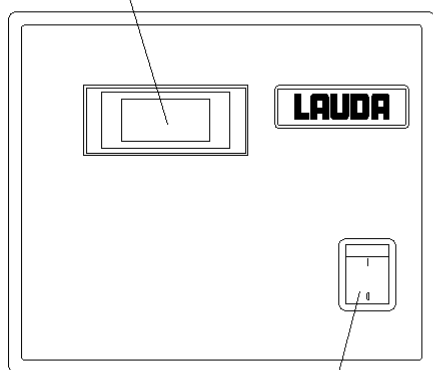


The outflow and return pipes of the pumps reach the operating temperature. Don't touch at low temperatures!
The pump only starts to run when the 2nd stage of the cooling unit starts that means when the liquid cooling is effective.

2. Control and functional elements

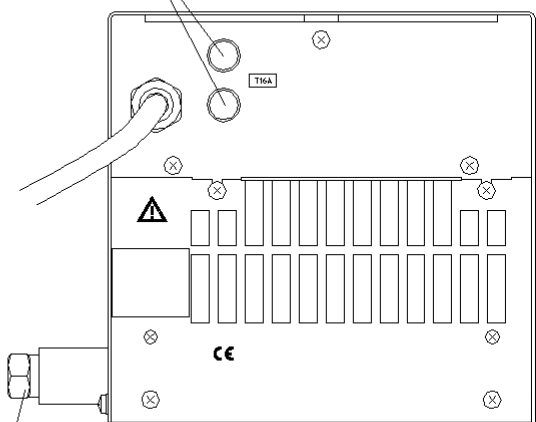


LED-Anzeige
LED-Display
Indication LED



Netzschalter
Mains switch
Interrupteur general

Sicherung
Fuse
Fusible



Pumpenstutzen
Pump nozzles
Tubulures de pompe

3. General construction and technical description

3.1. Operating principle

Laboratory thermostat operate with liquids (operating medium, heat transfer oil) which serve for energy transfer to the product to be thermostated.

The thermostated products can be immersed in the thermostatic bath (bath thermostat), or placed in an external open bath whose liquid is circulated by the pump of the thermostat.

When operating as circulator the thermostatic liquid is pumped through an external heat exchanger arranged by the user in which a product is being thermostated.

The unit is a low-temperature thermostat that does not have any temperature control. After switch-on and pre-cooling it works with maximum cooling capacity.

The bath cover is designed to connect nitrogen for overlaying.

3.2 Materials

All materials in contact with the bath liquid are made from high-grade stainless steel or materials of similar anti-corrosion properties.

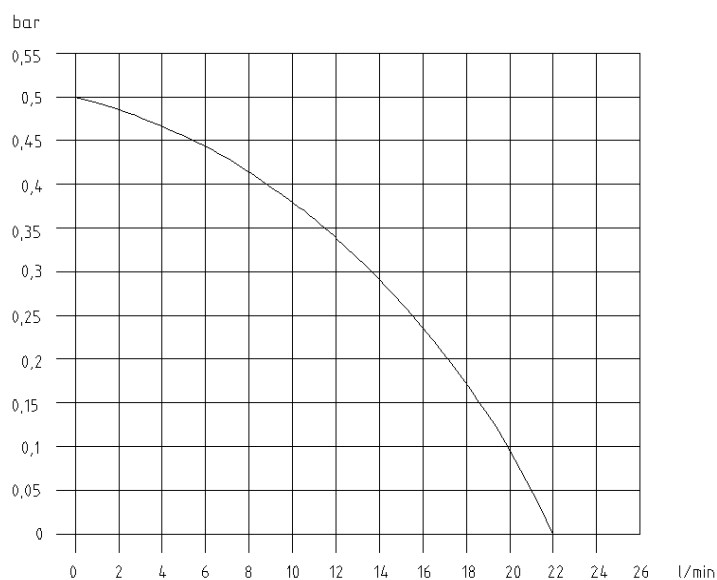
3.3 Pump

The units are equipped with a centrifugal pressure pump. This can be used to operate closed external systems (reactors).

The pump is driven by external runner motors.

The pumps operate perfectly up to a viscosity of approx. 30mm²/s, with the pump output decreasing rapidly with increasing viscosity.

Pump characteristic

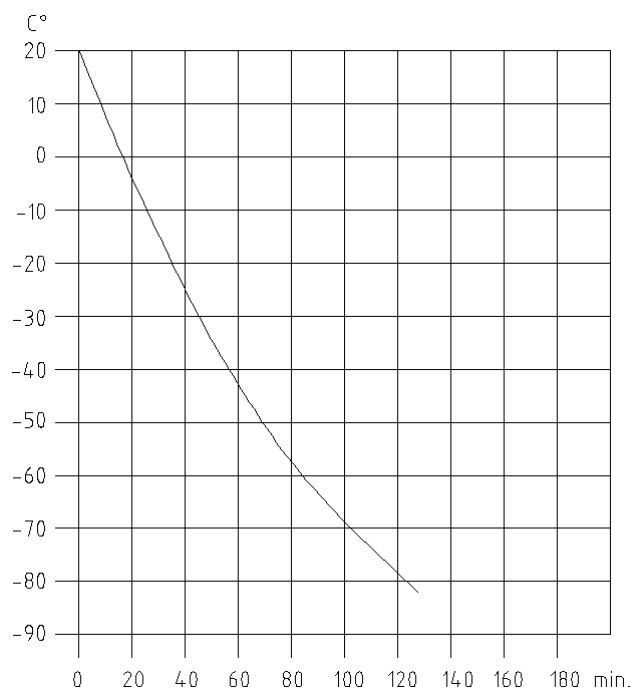


3.4 Refrigeration system

The refrigeration system consists of a two-circuit cascade with electronic starting control of the low-temperature stage. The condensation and motor heat is dissipated through a fan-cooled finned tube condenser. Fresh air is drawn in at the front, heated and discharged at the back and the sides. To ensure problem-free air circulation the ventilation openings must not be restricted.

The compressors are fitted with a temperature monitor which responds to the compressor temperature and its current take-up. The cooling system is additionally protected against excessive pressure by a pressure monitor.

Refrigeration diagram



4. Operational safety and warning notes

4.1. General information

The thermostat must only be used with inflammable liquids or only with those flammable bath liquids whose flammable flashpoint is more than 25°C above the operating temperature (EN 61010).



The units must only be used according to the descriptions indicated in the operating instructions. This also means that they must only be used by qualified staff being well informed. The units must not be used for applications in the medical field according to EN 60601-1 or IEC 601-1!

4.2 Warning notes

4.2.1 Temperatures

The flow and return pipes of the pumps reach the operating temperature. Don't touch at low temperatures!

4.2.2 Mains connections

Connect the unit only to mains sockets with protective earth contact (PE)!

4.2.3 Fume extraction

Depending on the bath liquid used and the operating method there is a possibility that toxic vapours may be produced. In the case it is necessary to provide appropriate fume extraction. Pull out the mains plug before cleaning the bath with solvents. Provide appropriate fume extraction. Before starting up the unit it is absolutely essential to ensure that the bath contains no explosive mixture. If necessary purge it with nitrogen!

5. Bath liquids and hose connections

The operating ranges specified for the bath liquids are for general information only and may be restricted through the operating temperature range or safety requirements specified in the appropriate standards (see section 4.1).

5.1. Bath liquids

Operating temperature range -85°C...40°C

Ultra-Therm XLT
(Silicone oil)

Cat. no. LZB 013

viscosity at 20°C	1,5 mm ² /s
viscosity at -70°C	11 mm ² /s
flash-point	52°C

Operating temperature range -95°C...0°C

Ethanol

boiling point	78°C
viscosity at 20°C	1,5 mm ² /s
flash-point	> 56°C
freezing point	-114°C



For operating at temperatures below -60°C ethanol is normally used. However, due to the fact its flash-point is at 12°C the use of ethanol is not according to EN 61010.

5.2. Hose connections

5.2.2. Perbunan tubings

Perbunan tubing, insulated
11mm int. diameter, 9mm insulation
Temperature range -60to 120°C.
Particularly suitable for low-temperature operation.

Cat. no. LZS 008

5.2.3. Silicone tubing

Silicone tubing, insulated

11mm int. diameter, 9mm insulation
Application as for uninsulated Silicone tubing
Temperature range -60 to 100°C.

Cat. no. LZS 007

Silicone tubing, strongly insulated (Zellcoror)

11mm int. diameter, with foam rubber insulation;
approx. 55mm ext. diameter
Application as for uninsulated Silicone tubing
Temperature range -130 to 100°C.

Cat. no. LZS 009



Do not use Silicone tubing in conjunction with Silicone oils!

5.2.3 Metal hose connection (one layer)

Temperature range -90°C...150°C

Metal hose	MK 50	(50cm long)	Cat. no. LZM 052
Metal hose	MK 100	(100cm long)	Cat. no. LZM 053
Metal hose	MK 150	(150cm long)	Cat. no. LZM 054
Metal hose	MK 200	(200cm long)	Cat. no. LZM 055

Metal hose connection, to link pump outlets together (insulated) Cat. no. LZM 045

temperature range -90°C...150°C
in case of lower temperature an additional insulation is necessary

Highly flexible, thermally insulated stainless steel (V2A) metal hoses with M16x1mm connecting thread; int. diam. 10mm; hoses can be found in our special publication.

6. Unpacking, assembly and setting up

6.1. Unpacking

Goods are packed carefully, largely preventing transport damage. If unexpectedly some damage is visible on the equipment, the carrier or the postal authority has to be informed so that it can be inspected.

Standard accessories

1 Bath cover	Cat. no. HDQ 103
2 nipples 13mm dia.	Cat. no. HKO 026
2 screw caps	Cat. no. HKM 032
2 Closing plugs	Cat. no. HKN 065
Operating instructions	

6.2. Setting up

Set up the unit conveniently so that the control panel is towards the front and ensure that the air circulation for the refrigeration system through the grille in the lower part of the unit is not restricted (a minimum spacing of 50cm is recommended).

Close the drain cock at the back of the bath!

7. Connection of external systems

7.1 Closed external circuits

Remove the closing plugs by releasing the threaded rings (19mm a/f) from the flow and return connections and replace them by the tubing nipples (13mm dia.) supplied. Outlet nipple (outlet) at the front, return nipple at the back.

If the thermostat is connected to closed external circuits, additional liquid must be poured in after the thermostat is switched on until the level in the bath remains at the correct height (approx. 2cm below top plate).

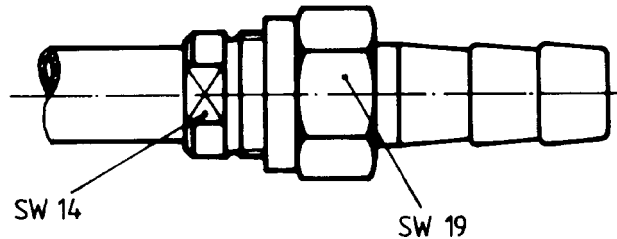
For suitable tubing materials see Section 5.

With external systems at a high level it may happen even in closed circuits that the external volume drains down and the thermostat tank overflows if the pump is stopped and air enters the thermostated system!

Always ensure the maximum possible flow area in the external circuit (nipples, tubing, system). This results in a larger flow and therefore improved thermostatic control.



Always protect tubing with hose clips against slipping off, or use stainless steel hoses with screwed connections. When tightening the threaded rings (19mm a/f) at the tubing connections, hold the threaded nipple with a spanner (14mm a/f) stainless steel hoses with screwed connections.



8. Starting up

8.1 Filling

Fill the unit with bath liquid to suit the operating temperature, see Section 5. The filling volume is given under Technical data. In general the thermostat must be filled no higher than 2cm below the cover plate.

8.2 Connection to supply

Connect the unit only to mains sockets with protective earth contact (PE). Compare the details on the label with the mains voltage.

Switch the unit with the mains switch. The green signal lamp lights up.

Depending on the previous situation/application the low temperature stage only starts working approx. 10s to 20min after having switched on the refrigeration. The actual bath temperature is indicated at the digital display.

To make the bath close we recommend to screw down the bath cover. Using the connector for nitrogen overlay the air space above the bath liquid can be overlaid with dry nitrogen. Flow of approx. 0,25l/min is sufficient. This prevents from humidity.

When operating without nitrogen overlay close the connector.

9. Maintenance

9.1 Safety notes in case of repairs

Always pull out the mains plug during all repair and cleaning operations! Repairs on the control unit with cover removed must only be carried out by a qualified electrician.

9.2 Repairs

LAUDA thermostats are largely free from maintenance. Dirty thermostatic liquid should be removed through the drain cock and replaced. If the unit should become faulty it is advisable to return only the faulty module.

The control unit can readily be removed after removing the cover, releasing 2 screws (2 turns) behind the front panel and disconnecting the electrical connections.

The module with pump, heater, temperature probe etc. can also be easily separated from the bath.

There are fuses T 16 A (6,3x32) for the complete unit. The fuses being accessible is located at the back side. In the control unit there is an additional fuse F 0,2 A (5x20).

9.3 Maintenance of the refrigeration system

The refrigeration system operates largely without maintenance. If the unit is being operated in a dusty atmosphere we recommend cleaning of the refrigeration system condenser at intervals of 4 to 6 months. This best done with compressed air or nitrogen by blowing for few minutes into the ventilation openings. If necessary unscrew the front grills.

Repair and disposal of refrigerant

The high-temperature stage of the unit is filled with CFC-free refrigerant R 404 A; ist low-temperature stage is filled with CFC-free refrigerant TP 5 R 3. Repair and disposal only by a refrigeration specialist (frigorist).

9.4 Cleaning

The unit can be cleaned using a cloth moistened with water with the addition of a few drops of a (domestic) detergent. No water must find ist way into the control unit.

The user is responsible for any necessary decontamination if dangerous materials have been spilled on or inside the unit. This applies in particular if the unit is removed for a different use, for repair, storage etc.

This method of cleaning or decontamination is determined by the expertise of the user himself. If the user has any doubts on whether this may damage the unit he can contact the manufacturer.

9.5 Spares ordering

When ordering spares please specify the equipment type and number on the label. This avoids queries and prevents the supply of incorrect goods.



LAUDA Service Centre
Tel: (+49) (0) 9343/ 503-121

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

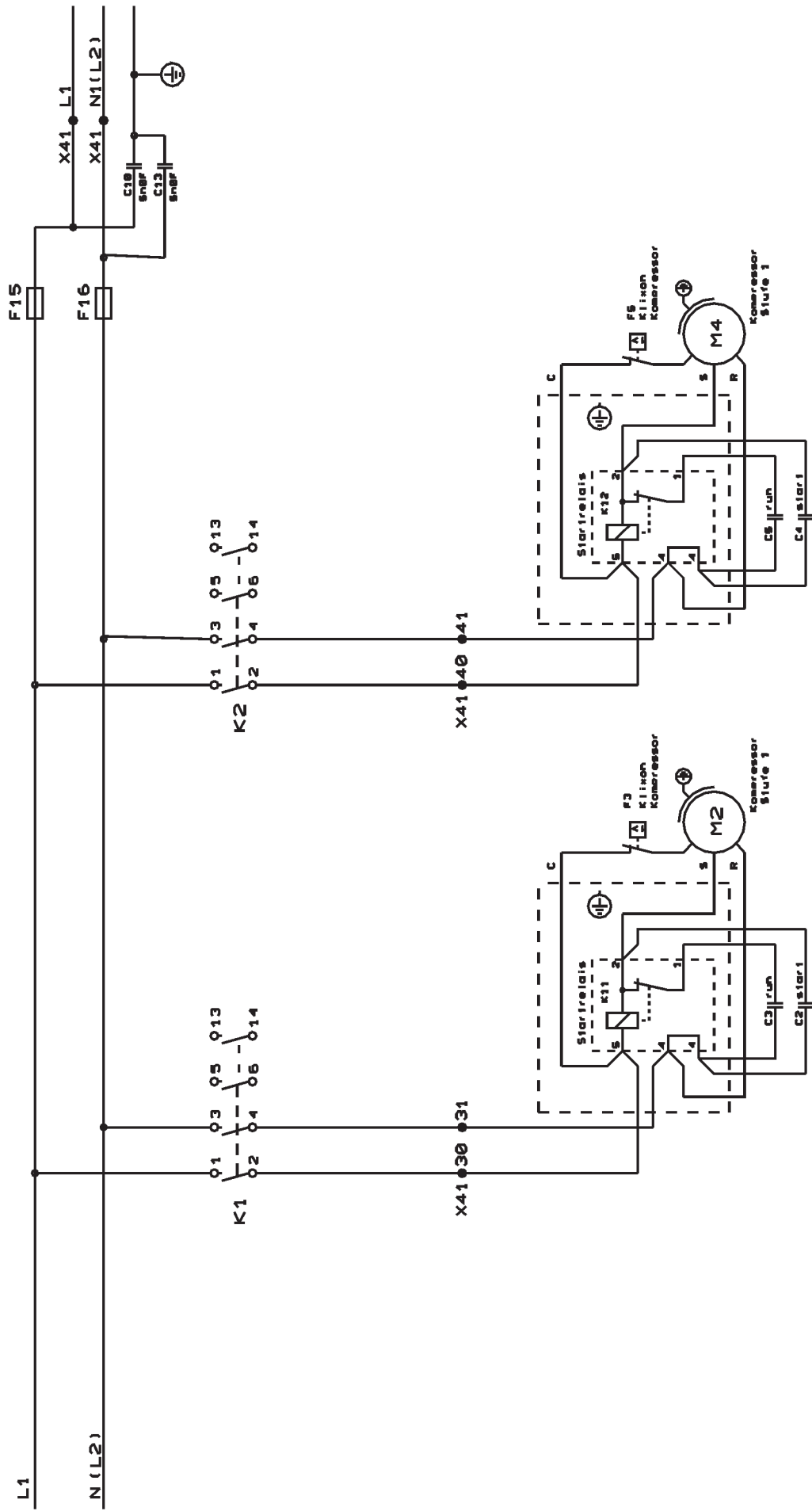
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Internet <http://www.lauda.de>

10. Technical Data

		RL 14 CB
Operating temperature range	(°C)	bis -80
Ambient temperature range	(°C)	5...35
Temperature measurement		digital with red LED, 1°C resolution
Temperature probe		Pt 100 Klasse B DIN IEC 751
Cooling capacity at:	(kW)	
20°C		1,00
-50°C		0,50
-70°C		0,35
-80°C		0,20
Pump output against zero head	(l/min)	22
Pump pressure max.	(bar)	0,5
Filling volume	(l)	9...14
Bath opening (WxD)	(mm)	250x175
Bath depth	(mm)	180
Usable liquid depth	(mm)	140
Overall size (WxDxH)	(mm)	550x735x1220
Weight	(kg)	185
Power supply		208V; 60Hz
Loading	(kW)	2,6
Cat.-No..		
208V, 60Hz		LUK 836

Units conform to EU Guideline 89/336/EWG (EMC) and 73/23/EWG (low-voltage) and carry the CE mark (50Hz units).

Technical changes reserved!



Kompressor (Stufe I)

Kompressor (Stufe II)

Datum	14.01.1999
Bearb.	B. Schwaib
Datum	
Name	
Titel	
Urspr.	

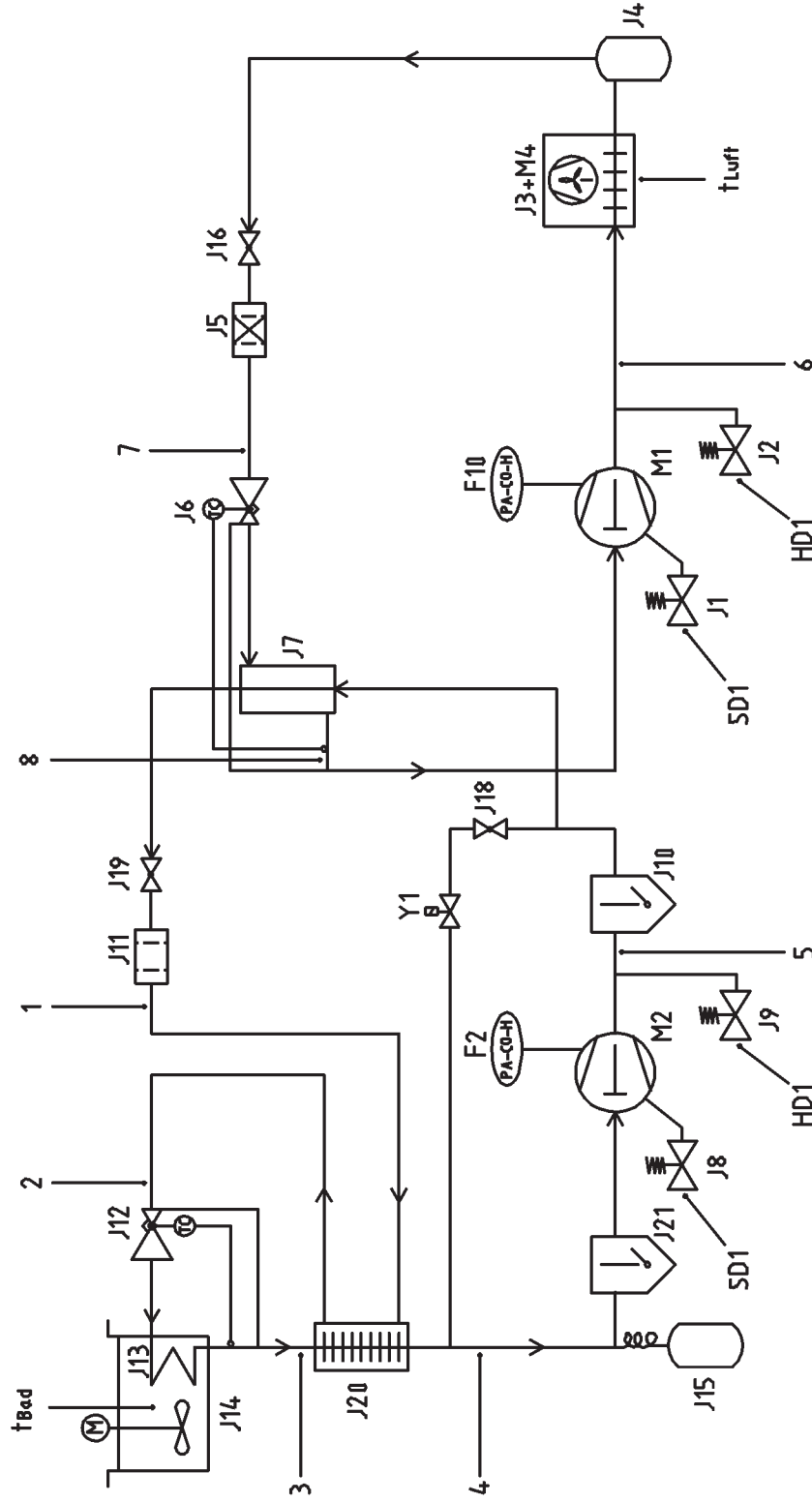
LAUDA
Dr.-R. Huber GmbH & Co KG
Prf.-Nr.

Schaltplan
Schéma de connexions
Circuit diagram

RL14CV
208V±60Hz

Bild 2	8	11.12.1
3	7	
Bl.	6	

Teil-Nr. Part No. Pièce no.	Bezeichnung	Designation	Désignation	Bestell-Nr. Ref.-No. No.Ref
A 1	Leiterplatte „Netz“	Printed circuit board „Mains“	Circuit imprimé „Secteur“	UL 276
B 1	Pt 100 Fühler	Pt 100 Probe	Pt 100 Sonde	ETP 047
B 2	Fühler	Probe	Sonde	ETP 027
C 1	Motorkondensator	Motor condenser	Condensateur moteur	ECA 004
C 10	Y-Kondensator	Y-condenser	Y-Condensateur	ECF 023
C 13	Y-Kondensator	Y-condenser	Y-Condensateur	ECF 023
F 2	Überdruckschalter Stufe 1	Overpressure switch stage 1	Disjoncteur de surpression étage 1	ES 002
F 3	Übertemperaturschutz Verdichter Stufe 1	Overtemperature protection Compressor stage 1	Protection de surpression Compresseur étage 1	-----
F 4	Überdruckschalter Stufe 2	Overpressure switch stage 2	Disjoncteur de surpression étage 2	ES 002
F 5	Übertemperaturschutz Verdichter Stufe 2	Overtemperature protection Compressor stage 2	Protection de surpression Compresseur étage 2	-----
F 10	Steuersicherung	Fuse control	Contrôle fusible	EEF 002
F 15	Sicherung	Fuse	Fusible	EES 013
F 16	Sicherung	Fuse	Fusible	EES 013
M 1	Pumpenmotor	Pump motor	Moteur de pompe	UMW 059
M 2	Verdichter Stufe 1	Compressor stage 1	Compresseur étage 1	EMK 200
M 3	Ventilator	Fan	Ventilateur	-----
M 4	Verdichter Stufe 2	Compressor stage 2	Compresseur étage 2	EMK 200
N 1	Anzeige	Display	Affichage	EAO 098
S 1	Netzschalter	Mains switch	Interrupteur secteur	EST 032
T 1	Trafo	Trafo	Trafo	EIT 109
T 2	Trafo	Trafo	Trafo	EIT 125
X 1	Netzanschluss / Netzkabel	Mains connection / Mains cable	Branchement secteur / Câble de secteur	EKN 001



Kältemittel / Refrigerant / Refrigerant

1-8 Thermoelemente

Stufe 1 / Stage 1 / Etage 1: R404A 1,6Kg

t_{Bed}, t_{Luft}: PT100

Stufe 2 / Stage 2 / Etage 2: TP5R3/R290 700g/30g

HD...: Drucksensoren

1:15

Name		Name		Name	
WOBSE		WOBSE		WOBSE	
Date		Date		Date	
17.02.99		17.02.99		17.02.99	
Gepr.		Gepr.		Gepr.	
Firmbach		Firmbach		Firmbach	
Tag		Tag		Tag	
Name		Name		Name	
DR R. WOBSE		DR R. WOBSE		DR R. WOBSE	
GmbH & Co. KG		GmbH & Co. KG		GmbH & Co. KG	
Firmbach		Firmbach		Firmbach	
Pipe plan		Pipe plan		Pipe plan	
Rohrleitungsplan		Rohrleitungsplan		Rohrleitungsplan	
ab X01		ab X01		ab X01	
Blatt 1		Blatt 1		Blatt 1	
1		1		1	
BL		BL		BL	

Für diese Zeichnung behalten wir uns alle nicht ausdrücklich eingeräumten Nutzungsrechte einschließlich der Vervielfältigung und Weitergabe an Dritte vor. Technische Änderungen vorbehalten.

YRD 0003

Geräteliste Rohrleitungsplan
List of parts Pipe plan
Liste de pièces schéma de tubulures à partir

RL 14 CB

gültig ab Serie X..
at serial no.
à partir

Teil-Nr. Part No. Pièce no.	Bezeichnung	Designation	Désignation	Bestell-Nr. Ref.-No. No.Ref	
F 2	Überdruckschalter Stufe 1	Overpressure switch stage 1	Disjoncteur de surpression étage 1	ES 002	
F 4	Überdruckschalter Stufe 2	Overpressure switch stage 2	Disjoncteur de surpression étage 2	ES 002	
J 1	Kontrollventil Saugseite Stufe 1	Control valve suction stage 1	Vanne de contrôle aspiration étage 1	EV 038	
J 2	Kontrollventil Druckseite Stufe 1	Control valve pressure stage 1	Vanne de contrôle pression étage 1	EV 038	
J 3	Verflüssiger Stufe 1	Condenser stage 1	Condensateur étage 1	EOW 033	
J 4	Sammelflasche	Reservoir	Receveur	EOB 026	
J 5	Filtertrockner	Filter drier	Déshydrateur	EO 004	
J 6	Expansionsventil Stufe 1	Expansion valve stage 1	Vanne d'expansion étage 1	EVE 103 + EVZ 029	
J 7	Wärmetauscher Verdampfer Stufe 1 Verflüssiger Stufe 2	Heat evaporator Evaporator stage 1 Condenser stage 2	Evaporateur thermique Evaporateur étage 1 Condensateur étage 2	-----	
J 8	Kontrollventil Saugseite Stufe 2	Control valve suction stage 2	Vanne de contrôle aspiration étage 2	EV 038	
J 9	Kontrollventil Druckseite Stufe 2	Control valve pressure stage 2	Vanne de contrôle pression étage 2	EV 038	
J 10	Ölabscheider	Oil separator	Separateur d'huile	EO 013	
J 11	Filter	Filter	Filtre	EO 021	
J 12	Expansionsventil Stufe 2	Expansion valve stage 2	Vanne d'expansion étage 2	EVE 096	
J 13	Verdampfer	Evaporator	Evaporateur	-----	
J 14	Flüssigkeitsbad	Liquid bath	Bain de liquide	-----	
J 15	Druckausgleichsbehälter	Surge vessel	Réservoir d'égalisation de pression	EOB 026	
J 16	Absperrventil	Shut-off valve	Vanne d'arrêt	EVA 010	
J 17	Absperrventil	Shut-off valve	Vanne d'arrêt	EVA 010	
J 18	Absperrventil	Shut-off valve	Vanne d'arrêt	EVA 010	
J 19	Absperrventil	Shut-off valve	Vanne d'arrêt	EVA 010	
J 20	Wärmetauscher Verdampfer Stufe 1 Verflüssiger Stufe 2	Heat evaporator Evaporator stage 1 Condenser stage 2	Evaporateur thermique Evaporateur étage 1 Condensateur étage 2	-----	
J 21	Flüssigkeitsabscheider	Liquid separator	Separateur de liquide	EO 018	
M 1	Verdichter Stufe 1	Compressor stage 1	Compresseur étage 1	EMK 201	
M 2	Verdichter Stufe 2	Compressor stage 2	Compresseur étage 2	EMK 201	
M 4	Ventilator	Fan	Ventilateur	EML 023	
Y 1	Magnetventil Druckausgleich	Solenoid valve pressure compensation	Vanne solenoide compensation de pression	EVM 012	

An / To / A:

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Von / From / De :

Firma / Company / Entreprise: _____

Straße / Street / Rue: _____

Ort / City / Ville: _____

Tel.: _____

Fax: _____

Betreiber / Responsible person / Personne responsable: _____

Hiermit bestätigen wir, daß nachfolgend aufgeführtes LAUDA-Gerät (Daten vom Typenschild):

We herewith confirm that the following LAUDA-equipment (see label):

Par la présente nous confirmons que l'appareil LAUDA (voir plaque signalétique):

Typ / Type / Type :	Serien-Nr. / Serial no. / No. de série:

mit folgendem Medium betrieben wurde

was used with the below mentioned media

a été utilisé avec le liquide suivant

Darüber hinaus bestätigen wir, daß das oben aufgeführte Gerät sorgfältig gereinigt wurde, die Anschlüsse verschlossen sind, und sich weder giftige, aggressive, radioaktive noch andere gefährliche Medien in dem Gerät befinden.

Additionally we confirm that the above mentioned equipment has been cleaned, that all connectors are closed and that there are no poisonous, aggressive, radioactive or other dangerous media inside the equipment.

D'autre part, nous confirmons que l'appareil mentionné ci-dessus a été nettoyé correctement, que les tubulures sont fermées et qu'il n'y a aucun produit toxique, agressif, radioactif ou autre produit nocif ou dangereux dans la cuve.

Stempel Seal / Cachet.	Datum Date / Date	Betreiber Responsible person / Personne responsable

Formblatt / Form / Formulaire:

Unbedenk.doc

Erstellt / published / établi:

LSC

Änd.-Stand / config-level / Version:

0.1

Datum / date:

30.10.1998

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