



# Operating instructions

## Microcool

MC 250, MC 350, MC 600, MC 1200

Circulation chiller

LAUDA DR. R. WOBSE GMBH & CO. KG

Pfarrstrasse 41/43

97922 Lauda-Königshofen

Germany

Phone: +49 (0)9343 503-0

Fax: +49 (0)9343 503-222

E-Mail: [info@lauda.de](mailto:info@lauda.de)

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

Translation of the original operating instructions

YAWD0033, 5, en\_GB ©LAUDA 2013

To replace issues V5R7, V5R5, V4R13, V4R6, V3R20, V3R19, V3R17

15/10/2020

## Table of contents

<b>1</b>	<b>Safety.....</b>	<b>6</b>
1.1	General safety instructions.....	6
1.2	Intended Use.....	6
1.3	Foreseeable misuse.....	7
1.4	EMC classification.....	7
1.5	No modifications may be made to the device.....	7
1.6	Requirements for the heat transfer liquid.....	8
1.7	Materials.....	8
1.8	Requirements regarding the hoses.....	8
1.9	Application area.....	8
1.10	Personnel qualification.....	8
1.11	Personal protective equipment.....	9
1.12	Structure of warnings.....	9
<b>2</b>	<b>Unpacking.....</b>	<b>11</b>
<b>3</b>	<b>Device description.....</b>	<b>12</b>
3.1	Device types.....	12
3.2	Design of the circulation chiller.....	13
3.3	Operating elements.....	17
3.3.1	Mains power switch.....	17
3.3.2	Display buttons.....	18
3.4	Functional elements.....	19
3.4.1	LEDs for function display.....	19
3.4.2	Hydraulic circuit.....	19
3.4.3	Manometer.....	20
3.4.4	Level indicator.....	20
3.4.5	Cooling unit.....	20
3.4.6	Interfaces.....	21
3.5	Type plate.....	22
<b>4</b>	<b>Before starting up.....</b>	<b>23</b>
4.1	Device Placement.....	23
4.2	External consumer.....	24
4.2.1	Hoses.....	24
4.2.2	Connecting external consumer.....	25
4.3	RS 232 interface.....	26
4.3.1	Cable and interface test RS 232.....	26
4.4	Alarm output 12N.....	27
<b>5</b>	<b>Commissioning.....</b>	<b>29</b>

5.1	LAUDA heat transfer liquids.....	29
5.2	Establishing power supply.....	30
5.3	Switching on the device and filling with heat transfer liquid.....	30
5.4	Setting the pump pressure.....	32
<b>6</b>	<b>Operation.....</b>	<b>34</b>
6.1	Switching on the device.....	34
6.2	Default display and menu items.....	34
6.3	Screen displays.....	37
6.4	Specifying the setpoint temperature.....	37
6.5	Restricting temperature limit values.....	38
6.6	Configuring timer.....	39
6.7	RS 232 interface.....	41
6.7.1	Configuring RS 232 interface.....	41
6.7.2	Protocol.....	41
6.7.3	Write commands.....	42
6.7.4	Read commands.....	43
6.7.5	Error messages.....	43
6.8	Configuring alarm output.....	44
6.9	Inputting offset of the temperature sensor.....	44
6.10	Restoring the factory settings.....	45
<b>7</b>	<b>Maintenance.....</b>	<b>46</b>
7.1	General safety instructions.....	46
7.2	Maintenance intervals.....	46
7.3	Cleaning the device.....	47
7.4	Cleaning air-cooled condenser.....	47
7.5	Checking heat transfer liquid.....	47
<b>8</b>	<b>Faults.....</b>	<b>48</b>
8.1	Alarms, errors and warnings.....	48
8.2	Alarms overview.....	49
8.3	Warnings overview.....	49
<b>9</b>	<b>Decommissioning.....</b>	<b>50</b>
9.1	Draining the device.....	50
<b>10</b>	<b>Disposal.....</b>	<b>51</b>
10.1	Disposing of refrigerant.....	51
10.2	Device disposal.....	51
10.3	Disposing of packaging.....	51
<b>11</b>	<b>Technical Data.....</b>	<b>52</b>
11.1	General data.....	52
11.2	Cooling unit.....	53

11.3	Refrigerant and filling quantity.....	53
11.4	Hydraulic circuit.....	54
11.5	Voltage-dependent data.....	54
<b>12</b>	<b>General.....</b>	<b>55</b>
12.1	Copyright.....	55
12.2	Technical changes.....	55
12.3	LAUDA contact.....	55
<b>13</b>	<b>Index.....</b>	<b>56</b>

# 1 Safety

## 1.1 General safety instructions

- The devices must only be operated for the intended purpose under the conditions stated in this operating manual. Any other operating mode is considered to be non-intended use and can impair the protection provided by the device.
- The devices are not designed for use under medical conditions in accordance with DIN EN 60601-1 or IEC 601-1!
- The operating manual is a constituent part of the device. The information in this operating manual must therefore be available in the immediate vicinity of the device. Also take care to keep this copy of the operating manual.



*If you lose this operating manual, contact the LAUDA Constant Temperature Equipment service department. The contact details can be found in ↗ Chapter 12.3 'LAUDA contact' on page 55.*

Use of the device results in hazards from high or low temperatures, fire and from the use of electrical energy. The hazards of the device must be eliminated as much as possible by the design in accordance with the appropriate standards. Residual hazards are reduced using any of the following measures:

- If relevant, there are safety fittings for the device. These devices are essential for the safety of the device. Their functionality must be ensured by carrying out the appropriate maintenance activities.  
The safety fittings of the device are described in this "Safety" chapter.
- If relevant, there are warning symbols on the device. These symbols must always be observed.  
The warning symbols on the device are described in this "Safety" chapter.
- There are safety instructions in this operating manual. These instructions must always be observed.
- There are additional specific requirements for the staff and for the personal protective equipment.  
These requirements are described in this "Safety" chapter.



*An overview of the authorised personnel and the protective equipment can be found in ↗ Chapter 1.10 'Personnel qualification' on page 8 and ↗ Chapter 1.11 'Personal protective equipment' on page 9.*



*Further information about the general structure of safety instructions can be found in ↗ Chapter 1.12 'Structure of warnings' on page 9.*

## 1.2 Intended Use

### Intended use

The present device is exclusively permitted to be used for tempering and delivering non-flammable heat transfer liquids in a closed circuit.

## Non-intended use

The following applications are considered to be non-intended:

- in potentially explosive areas
- for tempering foodstuffs
- with a glass reactor without overpressure protection

## 1.3 Foreseeable misuse

Misuse of the device must always be prevented.

Among other things, the following uses are considered to be foreseeable misuse:

- Operation of the device without heat transfer liquid
- Incorrect connection of hoses
- Setting the device up on a tabletop surface, only permitted for MC 250 and MC 350
- Setting an incorrect pump pressure

## 1.4 EMC classification

Tab. 1: Classification in accordance with EMC requirements

Device	Interference immunity	Emission class	Customer power supply
Microcool	Type 2 in accordance with DIN EN 61326-1	Emission class B in accordance with CISPR 11	only for EU Domestic connection value $\geq 100$ A
Microcool	Type 2 in accordance with DIN EN 61326-1	Emission class B in accordance with CISPR 11	for rest of the world (outside EU) Unrestricted

## Instructions for Class A digital device, USA

"This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC (Federal Communication Commission) Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense."

## 1.5 No modifications may be made to the device

Any modification of the device by the user is prohibited. The consequences of any such modifications are not covered by the product warranty or customer service. Service work is only permitted to be carried out by the LAUDA Constant Temperature Equipment service department or one of the service partners authorised by LAUDA.

## 1.6 Requirements for the heat transfer liquid

- Heat transfer liquids are used for temperature control. Only LAUDA heat transfer liquids are approved for use in the device. LAUDA heat transfer liquids are tested and approved by LAUDA DR. R. WOBSE GMBH & CO. KG
- In each case, the heat transfer liquids cover a specific temperature range. This temperature range must match the temperature range of your application.
- The use of heat transfer liquids can cause hazards arising from high and low temperatures, and fire, if certain temperature thresholds are exceeded or if the temperature falls below the threshold value, or if the container breaks and there is a reaction with the heat transfer liquid.
- The safety data sheet specifies the hazards and appropriate safety measures for handling the heat transfer liquid. The safety data sheet of the heat transfer liquid must therefore be consulted for the intended use of the device.

## 1.7 Materials

All parts coming into contact with the heat transfer liquid are made of high quality materials suitable for the operating temperature. Stainless steel and temperature-resistant plastics are used.

## 1.8 Requirements regarding the hoses

Only LAUDA hoses must be used for the external hydraulic circuit. LAUDA hoses are hoses approved by LAUDA DR. R. WOBSE GMBH & CO. KG. Particular attention must be paid to the permissible temperature range and the maximum permissible pressure when selecting suitable hoses for the application.

## 1.9 Application area

The device is exclusively permitted to be used in the following areas.

- Commercial area
- Indoor use, no outdoor installation

## 1.10 Personnel qualification

### Operating personnel

Operating personnel are employees that have been instructed by technical staff in the intended use of the device according to the operating manual.



## 1.11 Personal protective equipment

### Protective clothing

Protective clothing is required for certain activities. This protective clothing must comply with the legal requirements for personal protective equipment. Protective clothing should have long sleeves. Safety footwear is additionally required.

### Protective gloves

CE protective gloves are required for certain activities. These protective gloves must comply with the legal requirements for personal protective equipment of the European Union.


### Protective goggles

Protective goggles are required for certain activities. These protective goggles must comply with the legal requirements for personal protective equipment of the European Union.

## 1.12 Structure of warnings


### Danger

- A warning of the type "Danger" indicates an **imminently hazardous** situation.
- This will result in **death** or **severe, irreversible injuries** if the warning is disregarded.

 <b>DANGER!</b> Type and source	
	Consequences in the event of non-compliance
	<ul style="list-style-type: none"> <li>● Measure 1</li> <li>● Measure...</li> </ul>


### Warning

- A warning of the type "Warning" indicates a **potentially hazardous** situation.
- This can result in **death** or **severe, irreversible injuries** if the warning is disregarded.

 <b>WARNING!</b> Type and source	
	Consequences in the event of non-compliance
	<ul style="list-style-type: none"> <li>● Measure 1</li> <li>● Measure...</li> </ul>


Caution

- A warning of the type "Caution" indicates a **potentially hazardous** situation.
- This can result in **minor, reversible injuries** if the warning is disregarded.

<div> <b>CAUTION!</b> Type and source</div>	
	Consequences in the event of non-compliance
	<ul style="list-style-type: none"><li>● Measure 1</li><li>● Measure...</li></ul>

Notice

A "notice" warns about possible property or environmental damage.

<div> <b>NOTICE!</b> Type and source</div>	
	Consequences in the event of non-compliance
	<ul style="list-style-type: none"><li>● Measure 1</li><li>● Measure...</li></ul>

## 2 Unpacking

**DANGER!**

Transport damage

**Electric shock**

- Inspect the device for transport damage before commissioning.
- Never put the device into operation if you have discovered any transport damage.

Personnel:  Operating personnel

1. Unpack the device.

*Keep the original packaging of the device for later transport.*

2. Inspect the device and the accessories immediately after delivery for completeness and transport damage.

*If there is unexpected damage to the device or accessories, inform the carrier immediately so that a damage report is produced and a check of the transport damage can be made. Also inform LAUDA Service Constant Temperature Equipment immediately. Contact details can be found in Chapter 12.3 'LAUDA contact' on page 55.*

Tab. 2: Accessories included as standard

Device type	Designation	Quantity	Catalogue number
MC 600, MC 1200	¾" hose nozzle with ¾" screw cap	2	EOA 004
All devices	Operating manual	1	--

## 3 Device description

### 3.1 Device types

The type designation of the equipment is composed of the following elements.

Component	Description
MC	Microcool
<Number>, e.g. 600	Specification of the cooling capacity in watts

#### Available device types

Device type	Description
MC 250	Air-cooled tabletop device with a cooling capacity of 250 watts
MC 350	Air-cooled tabletop device with a cooling capacity of 350 watts
MC 600	Air-cooled floor-standing device with a cooling capacity of 600 watts. The pump pressure can be adjusted using a bypass adjustment wheel.
MC 1200	Air-cooled floor-standing device with a cooling capacity of 1200 watts. The pump pressure can be adjusted using a bypass adjustment wheel.

## 3.2 Design of the circulation chiller

Note:

Some of the illustrations show devices in different housing designs. This has no influence on the operation.

Front side MC 250, MC 350



Fig. 1: Overview of the front side

- 1 Filler nozzle with cover
- 2 Level indicator
- 3 Control panel
- 4 Front panel with ventilation openings
- 5 Four support feet

## Rear side MC 250, MC 350

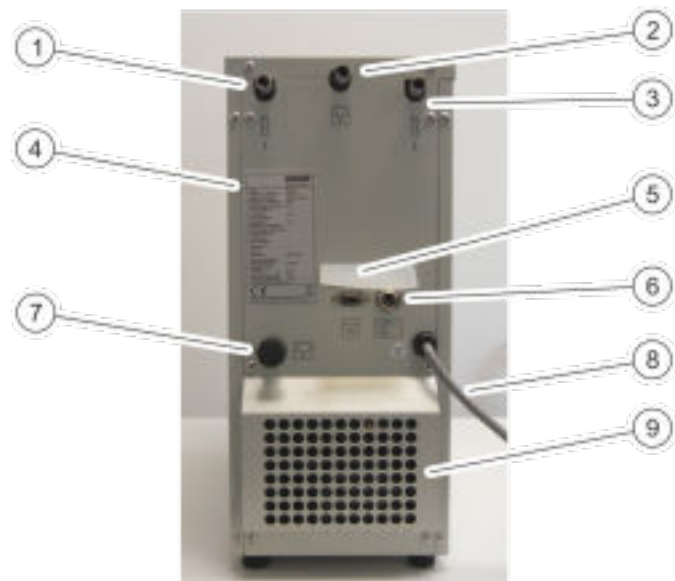


Fig. 2: Overview of the rear side

- 1 Pump connection, outlet
- 2 Overflow connection
- 3 Pump connection, inlet
- 4 Type plate
- 5 RS 232 interface
- 6 Alarm output
- 7 Drain plug
- 8 Mains cable
- 9 Ventilation openings

## Front side MC 600, MC 1200



Fig. 3: Overview of the front side

- 1 Filler nozzle with cover
- 2 Level indicator
- 3 Control panel
- 4 Manometer
- 5 Front panel with ventilation openings
- 6 Four castors with locking brakes

## Rear side MC 600, MC 1200

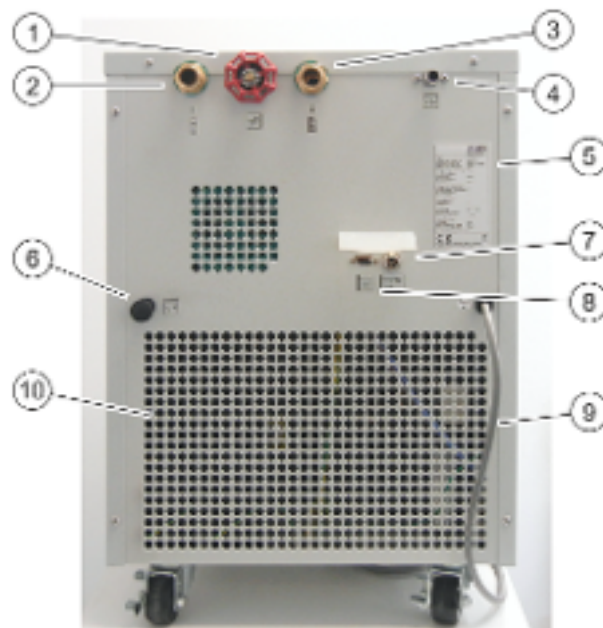


Fig. 4: Overview of the rear side

- 1 Bypass adjustment wheel
- 2 Pump connection, inlet
- 3 Pump connection, outlet
- 4 Overflow connection
- 5 Type plate
- 6 Drain plug
- 7 Alarm output
- 8 RS 232 interface
- 9 Mains cable
- 10 Ventilation openings



## Control panel

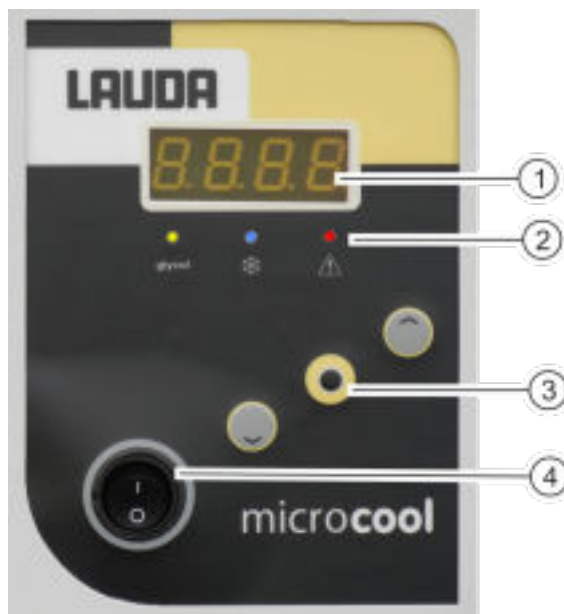


Fig. 5: Control panel

- 1 Display
- 2 LEDs
- 3 Display buttons
- 4 Mains switch

## 3.3 Operating elements

### 3.3.1 Mains power switch

The mains power switch can be put in the following positions:

- In position [I], the device is switched on.
- In position [O], the device is switched off.

### 3.3.2 Display buttons

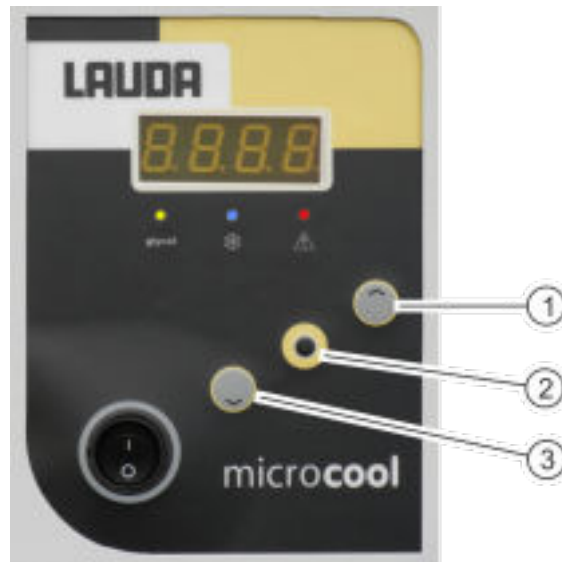


Fig. 6: Display buttons

- 1 UP arrow button
- 2 ENTER button
- 3 DOWN arrow button

Functions in the display of the device can be controlled using the display buttons.

- A selection in the display can be confirmed with the ENTER button.
- The UP and DOWN arrow buttons can be used to navigate in the display.

## 3.4 Functional elements

### 3.4.1 LEDs for function display

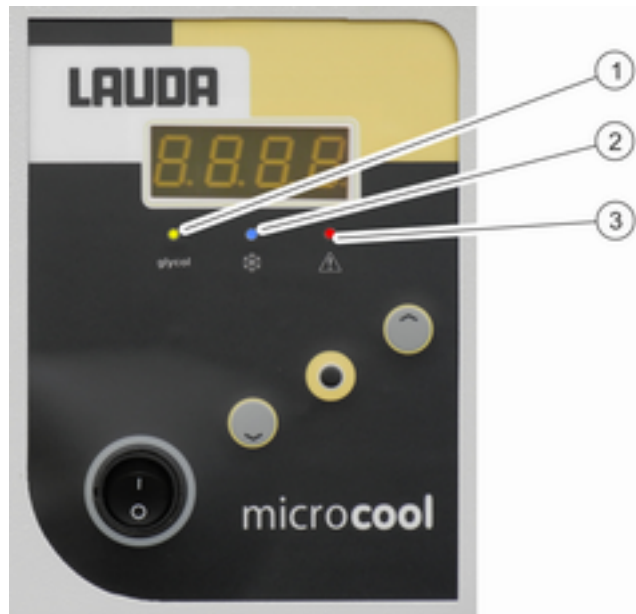


Fig. 7: LEDs

- 1 Yellow LED
- 2 Blue refrigeration LED
- 3 Red error LED

Each device has three LEDs with the following functions:

- The yellow glycol LED lights if Kryo 30 is necessary as heat transfer liquid.
- The blue refrigeration LED indicates whether the refrigeration unit is active.
- The red error LED lights in the event of device faults.

### 3.4.2 Hydraulic circuit

#### Hydraulic circuit

The hydraulic circuit designates the circuit through which the heat transfer liquid flows.

The circuit basically consists of the following components:

- internal storage bath with heat transfer liquid
- pump for conveying the heat transfer liquid into the external consumer via the pump connections
- Starting with MC 600, devices are equipped with an adjustable bypass to be able to adapt the pump pressure to the requirements of the external consumer.

#### Pump

The devices are equipped with a magnetically coupled pressure pump.



Further information about the technical data of the pump and the pump characteristic curve can be found in Chapter 11.4 'Hydraulic circuit' on page 54.

### 3.4.3 Manometer



Fig. 8: Manometer

### 3.4.4 Level indicator

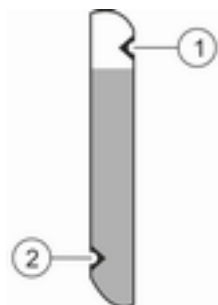


Fig. 9: Level indicator

### 3.4.5 Cooling unit

The device types with bypass have a manometer for reading the set pump pressure. The pump pressure is regulated using the bypass adjustment wheel on the rear side.

The fill level of the heat transfer liquid in the circuit can be read using the level indicator.

- The top arrow indicates the maximum liquid level of the machine.
  - The bottom arrow indicates the minimum liquid level of the machine.
- 1 Maximum level
  - 2 Minimum level

The cooling unit includes the following components:

- Compressor  
A hermetically sealed compressor is used in the cooling unit. The compressor is equipped with overload protection, which trips on the compressor temperature and compressor current consumption.
- Condenser  
In air-cooled condensers, the condensation heat is discharged to the environment. The fresh air is sucked in through the front of the device using a fan, heated and discharged on the rear of the device.
- Evaporator  
In the internal bath, heat is discharged using a pipe coil evaporator.



*Technical information for the cooling unit can be found in  
 ↳ Chapter 11.2 'Cooling unit' on page 53.*

### 3.4.6 Interfaces

Note the following:

- The equipment connected to the low voltage inputs and low voltage outputs must have be safely separated from dangerous voltages according to DIN EN 61140. For example, using double or reinforced insulation according to DIN EN 60730-1 or DIN 60950-1.

#### RS 232 interface

Specific functions of the device such as the set temperature can be controlled with the RS 232 interface using a PC. Thus, custom programs for controlling the device can be developed.



*Further information about the connection and configuration can be found in ↳ Chapter 4.3.1 'Cable and interface test RS 232' on page 26 and ↳ Chapter 6.7.1 'Configuring RS 232 interface' on page 41.*

#### Alarm output

Changeover contact which switches in the event of a device fault. For example, faults can be registered on a system.



*Using the display, it can be set in which fault situations a signal is output via the interface.*

3.5 Type plate

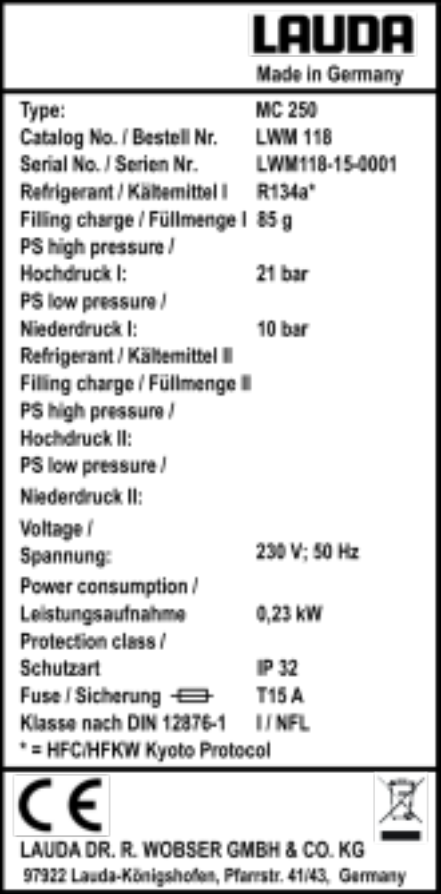


Fig. 10: Type plate

The type plate information is explained in detail in the following table. Certain information is dependent on installed device options. This information is noted with an appropriate suffix.

Description	Description
Type	Device type
Catalogue No.	Catalogue number of the device
Serial No.	Serial number of the device
Refrigerant I	Designation of the refrigerant used in stage 1 of the refrigerating machine
Fill quantity I	Fill quantity of the refrigerant
PS high pressure I	maximum permitted operating pressure on the refrigerant high-pressure side
PS low pressure I	maximum permitted operating pressure on the refrigerant low-pressure side
Voltage	Device may only be operated at this distribution voltage and frequency
Power consumption	Maximum power consumption of the device during operation
Type of protection	IP protection rating of the device
Fuse	Fuse used in the device
Class according to DIN 12876-1	German standard for electrical laboratory equipment

## 4 Before starting up

### 4.1 Device Placement

Very specific placement conditions are applicable to the devices. These placement conditions are mainly specified in the technical data for the device.



*Further information about the technical data can be found at*  
 ➔ Chapter 11.1 'General data' on page 52.

Additional placement conditions are described below.

- Irritant vapours can be produced, depending on the heat transfer liquid used and the operating mode. Ensure adequate extraction of these vapours.
- Observe the requirements of the device for electromagnetic compatibility (EMC).
- Do not cover the ventilation openings.



*Further information about EMC requirements can be found at*  
 ➔ Chapter 1.4 'EMC classification' on page 7.



**WARNING!**  
 Rolling away, falling over of the device

Impact, crushing

- Do not tilt the device.
- Place the device on a level, non-slip surface with sufficient load bearing capacity.
- Engage the castor brake when setting up the device.
- Do not place any heavy parts on the device.

1. Place the device at a suitable location in the room.
  - Place tabletop devices on a suitable table. Support the device for this by reaching under the device.
  - Place floor-standing equipment on a suitable base.



*Floor-standing equipment can be moved. Release the locking brakes of the castors for this by pressing the [Off] lever downwards.*



*Several devices can be positioned next to each other.*

2. Lock the castors of the device for floor-standing equipment. Press the [On] lever downwards to lock.

## 4.2 External consumer

### 4.2.1 Hoses



#### CAUTION!

Discharge of heat transfer liquid during operation caused by use of unsuitable hoses

Frostbite

- Use hoses with temperature resistance that is appropriate for the operating temperature range of the device.



#### CAUTION!

Contact with cold hoses

Frostbite

- Use insulated hoses for temperatures below 0 °C.



The hoses specified below can be used for all heat transfer liquids that are approved for the devices.



Further information about the pump connections of the individual devices can be found in [Chapter 11.4 'Hydraulic circuit'](#) on page 54.

### Approved tubes, adapters and hose clips

Tab. 3: Hoses, not insulated

Type	Hose nozzle	Maximum permissible pressure	Clear width Ø in mm	External diameter in mm	Temperature range in °C	Catalogue number
EPDM hose	10 mm	Devices with maximum pump pressure of < 1 bar	9	11	10 – 90	RKJ 111
EPDM hose	½" (13 mm)	Devices with maximum pump pressure of < 1 bar	12	14	10 – 90	RKJ 112
Rubber hose with fabric reinforcement	½" (13 mm)	Up to 10 bar	13 (½")	19	-40 – 100	RKJ 031
Rubber hose with fabric reinforcement	¾" (19 mm)	Up to 10 bar	19 (¾")	27	-40 – 100	RKJ 032



Tab. 4: Hoses, insulated at the factory

Type	Pump connections	Application area	Clear width Ø in mm	Insulation thickness in mm	Temperature range in °C	Catalogue number
EPDM hose, insulated	Hose nozzle 13 mm, M16 x 1	Devices with maximum pump pressure of < 1 bar	12	9	-35 – 90	LZS 021

Tab. 5: Insulated hoses for subsequent insulation, length 1 m

Insulation catalogue number	Temperature range in °C	Clear width Ø in mm	Wall thickness in mm	Suitable for hose
RKJ 058	-50 – 105	19	17.5	RKJ 112
RKJ 024	-50 – 110	16	8	RKJ 112
RKJ 009	-50 – 110	23	8.5	RKJ 031
RKJ 013	-50 – 110	29	8.5	RKJ 032

Tab. 6: Adapter, suitable for MC 600 and MC 1200

Designation	Description	Catalogue number
Threaded hose connection	¾" union nut, ½" hose nozzle	LWZ 016
Threaded hose connection	¾" union nut, 10 mm hose nozzle	LWZ 040

Tab. 7: Hose clips

Material	Ø from to in mm	Catalogue number
Stainless steel	10 – 16	EZS 012
Stainless steel	12 – 22	EZS 013
Stainless steel	20 – 32	EZS 015

#### 4.2.2 Connecting external consumer



**CAUTION!**  
Discharge of heat transfer liquid during operation caused by open consumer

Frostbite

- Only use hydraulically closed consumers.



**CAUTION!**  
Bursting of the external hydraulic circuit due to overpressure

Impact, cutting, frostbite

- Lay hoses so that they do not kink.

Note the following:

- Temperature control tubes: Always use the largest possible diameters and shortest possible tube lengths in the external liquid circuit.  
If the temperature control tube diameter is too small, a temperature drop between device and external consumer occurs due to flow rate too low. In this case, increase or lower the temperature accordingly.
- Secure the temperature control tubes with hose clamps.
- If the external consumer is at a higher level than the device, emptying of the external volume can occur if the pump is stopped and there is ingress of air in the external liquid circuit even for closed circuits. In this case, there is the risk of the device overflowing.
- In the event of hose rupture, cold liquid can escape and become a danger for persons and material.

### 4.3 RS 232 interface

#### 4.3.1 Cable and interface test RS 232

Computer					Thermostat		
Signal	9-pin Sub-D female connector		25-pin Sub-D female connector		9-pin Sub-D female connector		Signal
	with hardware handshake	without hardware handshake	with hardware handshake	without hardware handshake	with hardware handshake	without hardware handshake	
RxD	2	2	3	3	2	2	TxD
TxD	3	3	2	2	3	3	RxD
DTR	4		20		4		DSR
Signal Ground	5	5	7	7	5	5	Signal Ground
DSR	6		6		6		DTR
RTS	7		4		7		CTS
CTS	8		5		8		RTS

Note the following:

- With hardware handshake: Use a straight-through and not a null modem cable for connecting a thermostat to the PC. The RS 232-interface can be connected directly with the PC using a straight-through cable.
- Without hardware handshake: Set the corresponding operating mode on the PC. Use shielded connection cables. Connect shield to connector case. The cables must be galvanically isolated from the rest of the electronics. Do not connect unassigned pins.
- The RS 232-interface can be easily checked on a connected PC with the Microsoft Windows operating system.  
For Windows® 3.11 using the "Terminal" program.  
For Windows® 95/98/NT/XP using the "HyperTerminal" program.

"HyperTerminal" is no longer part of the operating system for the Windows Vista, Windows 7 and Windows 8 operating systems.

- The RS 232-interface can be addressed using the LAUDA Win-therm Plus control and programming software (catalogue number LDSM2002).
- Freeware terminal programs can be found on the World Wide Web. These programs provide similar functions to those of "HyperTerminal" (for example PuTTY). Search request "serial port terminal program".

## 4.4 Alarm output 12N

Available functions

Function	Description
Alarm output	--
Alarm and standby	for on-site return flow protection

- maximum 30 V DC; 0.2 A

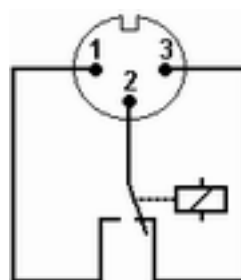


Fig. 11: Flange connector (front) in idle state

- 1 Normally open contact
- 2 Centre
- 3 Normally closed contact

Front view of the flange connector or of the coupling socket on the solder side

#### Idle state

- The alarm output is in resting state:
  - When the device is switched off,
  - after switching on if a fault is already evident at that time (e.g. level too low)
  - and during normal operations when a fault occurs.
- Pins 1 and 2 are open.
- Pins 3 and 2 are closed.

#### GO state

- The alarm output is in a sound state when no faults occur.
- Pins 1 and 2 are closed.
- Pins 3 and 2 are open.



*Information on the settings for the alarm output can be found in*  
🔗 Chapter 6.8 'Configuring alarm output' on page 44.

#### Note the following:

- The equipment connected to the low voltage inputs and low voltage outputs must have be safely separated from dangerous voltages according to DIN EN 61140. For example, using double or reinforced insulation according to DIN EN 60730-1 or DIN 60950-1.
- Only use shielded connection cables. Connect shield to connector case. Cover unused plug connections with protective caps.

## 5 Commissioning

### 5.1 LAUDA heat transfer liquids

Note the following:

- The heat transfer liquids each cover a recommended temperature range and must be suitable for the temperature range of your application.
- At the lower limit of the temperature range, the heat transfer liquid becomes more viscous and influences temperature stability, pump power and cooling capacity. The formation of vapours and odours increases in the upper range. Therefore, only use all of the temperature range if required. Particularly with Aqua 90 (water), ice forms which can result in destruction of the device.
- Never use contaminated or degenerated heat transfer liquid.
- You can request the safety data sheets of the heat transfer liquid at any time if required.

Tab. 8: Approved heat transfer liquids

LAUDA designation	Chemical characterisation	Temperature range in °C	Viscosity (kin) in mm <sup>2</sup> /s (at 20 °C)	Viscosity (kin) in mm <sup>2</sup> /s for temperature	Container size		
					Catalogue number		
					5 l	10 l	20 l
Kryo 30	Monoethylene glycol and water mixture	-30 – 90	4	50 at -25 °C	LZB 109	LZB 209	LZB 309
Aqua 90	decalcified water	5 – 90	1	---	LZB 120	LZB 220	LZB 320

Note the following for Kryo 30:

- The water content is reduced during long operation at higher temperatures and the mixture becomes flammable (flash point 119 °C). Check the mixture ratio using a hydrometer.

#### Heat transfer liquid water

- The alkaline earth ions content (hardness) of the water must be between 0.71 mmol/l and 1.42 mmol/l (equivalent to 4.0 and 8.0 °dH). Harder water results in lime deposits in the device.
- The pH value of the water must be between 6.0 and 8.5.
- Distilled, deionised, demineralised (DM) water or seawater must not be used due to the corrosive properties. Ultra-pure water and distillates are suitable as medium after addition of 0.1 g soda (Na<sub>2</sub>CO<sub>3</sub>, sodium carbonate) per litre of water.
- Any chlorine content in the water must be strictly avoided. Do not add any chlorine to the water. Chlorine is contained, for example, in cleaning agents and disinfectants.
- The water must be free of impurities. Water containing iron is unsuitable due to rust formation and untreated river water is unsuitable due to algae formation.
- The addition of ammonia is not permitted.

5.2 Establishing power supply

Personnel: ■ Operating personnel

!

NOTICE!  
Use of unauthorised mains voltage or mains frequency

	Device damage
	<ul style="list-style-type: none"><li>● Compare the rating plate with available mains voltage and mains frequency.</li></ul>

Note the following:

- The mains plug of the device provides a mains power disconnection component. The mains plug must be easily recognisable and easily accessible.
- Only connect the device to an earthed (PE) power socket.

Note for on-site electrical installation:

- The devices must be fused with a circuit breaker of max. 16 amperes.
- Exception: Devices with 13 ampere UK plugs.

5.3 Switching on the device and filling with heat transfer liquid

Filling mode

The device has a software program (starting from and including software version 1.46) that supports the operator for filling the constant temperature equipment. If the fill level is too low, the Fill mode is started immediately after switching on the device. *FILL* is shown on the display and the level indicator is illuminated. The pump and the cooling unit are not started.

Personnel: ■ Operating personnel

Protective equipment: ■ Protective goggles  
■ Protective clothing  
■ Protective gloves

!

NOTICE!  
Overheating of the pump

	Device damage
	<ul style="list-style-type: none"><li>● Never operate device without heat transfer liquid.</li></ul>



**DANGER!**  
Use of incorrect heat transfer liquid

Fire

- Select a heat transfer liquid with a temperature range 20 K above the temperature range of the application.



**WARNING!**  
Overflow of heat transfer liquid

Electric shock

- Do not overfill the machine. Note the level indicator and the thermal volume expansion of the heat transfer liquid.



**WARNING!**  
Spraying of heat transfer liquid

Electric shock

- Do not spray any heat transfer liquid. Use a funnel for filling.

You have already connected the external consumer as described in chapters  
 ↳ Chapter 4.2.1 'Hoses' on page 24 and ↳ Chapter 4.2.2 'Connecting external consumer' on page 25.



*When using pressure-sensitive consumers, note chapter ↳ Chapter 5.4 'Setting the pump pressure' on page 32.*

1. Close the drain plug. For this, turn the plug clockwise as far as the stop.
2. Turn the bypass adjustment wheel anti-clockwise as far as it will go.
3. Attach a suitable hose to the overflow connection of the device.



*The permitted hose diameter for the overflow must be complied with. Further information about the suitable hose diameter can be found in the technical data ↳ Chapter 11.4 'Hydraulic circuit' on page 54.*

4. Insert this hose into a suitable canister to collect overflowing heat transfer liquid.



*Running dry of the consumer can also occur in a closed thermostatic circuit with consumer at a higher level in the case of stopped pump and ingress of air into the temperature control circuit (for example, a not completely closed or defective bleed valve). Match the size of the overflow container to this if possible.*

Fill level sufficient

5. Switch on the device using the mains power switch.
  - ▶ A signal tone sounds. The software version is shown on the display. The actual temperature is shown on the display afterwards.  
**The constant temperature equipment starts operation;** the pump is started.  
Depending on the specified setpoint temperature, the cooling unit is started after 2 minutes at the earliest. The blue LED lights if the cooling unit is active.

Fill level too low (Low Level)

6. Switch on the device using the mains power switch.
  - ▶ A signal tone sounds. The software version is shown on the display. *FILL* is shown on the display afterwards. In the case of low Level, the pump and the cooling unit are not started.  
Fill the device with heat transfer liquid.
7. Carefully pull up the cover of the filler nozzle; do not turn.
8. Fill the heat transfer liquid into the filler nozzle carefully. Monitor the level indicator. Fill the device up to the maximum fill level.



*If necessary, use a funnel for the filling.*



*The level indicator must not be above the maximum fill level.*

Fill level drops

9. Press the **Enter button** when the fill level is at its maximum or sufficient.
  - ▶ The pump starts. The actual temperature is shown on the display. The fill level drops as the consumer is being filled.
10. Top up the heat transfer liquid carefully as the consumer is now being filled. If the fill level drops too far, the device automatically goes into the FILL mode and the pump and cooling unit are switched off. Continue with the filling until operation without problems is possible. Monitor the level indicator for this.
11. Press the cover carefully into the filler nozzle.

## 5.4 Setting the pump pressure

For devices with a bypass (MC 600 and MC 1200), the pump pressure can be set using a control valve on the rear side of the device. Individual setting of the pump pressure is possible with this when using pressure-sensitive external consumers.



Personnel:  Operating personnel



**CAUTION!**  
Bursting of the external consumer

Scalding, impact, cutting

- A bypass regulator is provided to set the pump pressure (starting from MC 600).
- For consumers with a maximum permissible operating pressure below the maximum pressure of the pump, use a safety valve for protection. This safety valve must be installed in the outlet of the device.


1. To increase the pressure in the consumer, turn the bypass adjustment wheel clockwise until the desired (< permitted) pressure for the external consumer has been reached.



*Monitor the display on the manometer for this.*

## 6 Operation


### 6.1 Switching on the device

	<b>NOTICE!</b> Overheating of the pump
	Device damage
	● Never operate device without heat transfer liquid.

Personnel:  Operating personnel

1. Switch on the device using the mains power switch.
  - ▶ A signal tone sounds. The software version is shown on the display. The actual temperature is shown on the display afterwards.  
**The temperature control device starts operation;** the pump is started.  
Depending on the specified setpoint temperature, the refrigerant unit is started after 2 minutes at the earliest. The blue LED lights if the refrigerant unit is active.
2. Depending on the size of the consumer, heat transfer liquid must be refilled if necessary. Monitor the level indicator for this.



*Further information about refilling heat transfer liquid can be found in  Chapter 5.3 'Switching on the device and filling with heat transfer liquid' on page 30.*

### 6.2 Default display and menu items

1. Press the ENTER button to reach the menu items from the default display of the actual temperature.



*If no button has been pressed for longer than 4 seconds, you exit from the menu item or input window.*

2. Scroll from menu item to menu item using the arrow buttons.
3. Press the ENTER button at the selected menu item.
  - ▶ The display flashes.
4. The value or the setting can be changed using the arrow buttons.

5. The changed value or setting is applied immediately by pressing the ENTER button.



*If no button has been pressed for longer than 4 seconds, changed values or settings are applied automatically and you exit from the menu item or input window.*

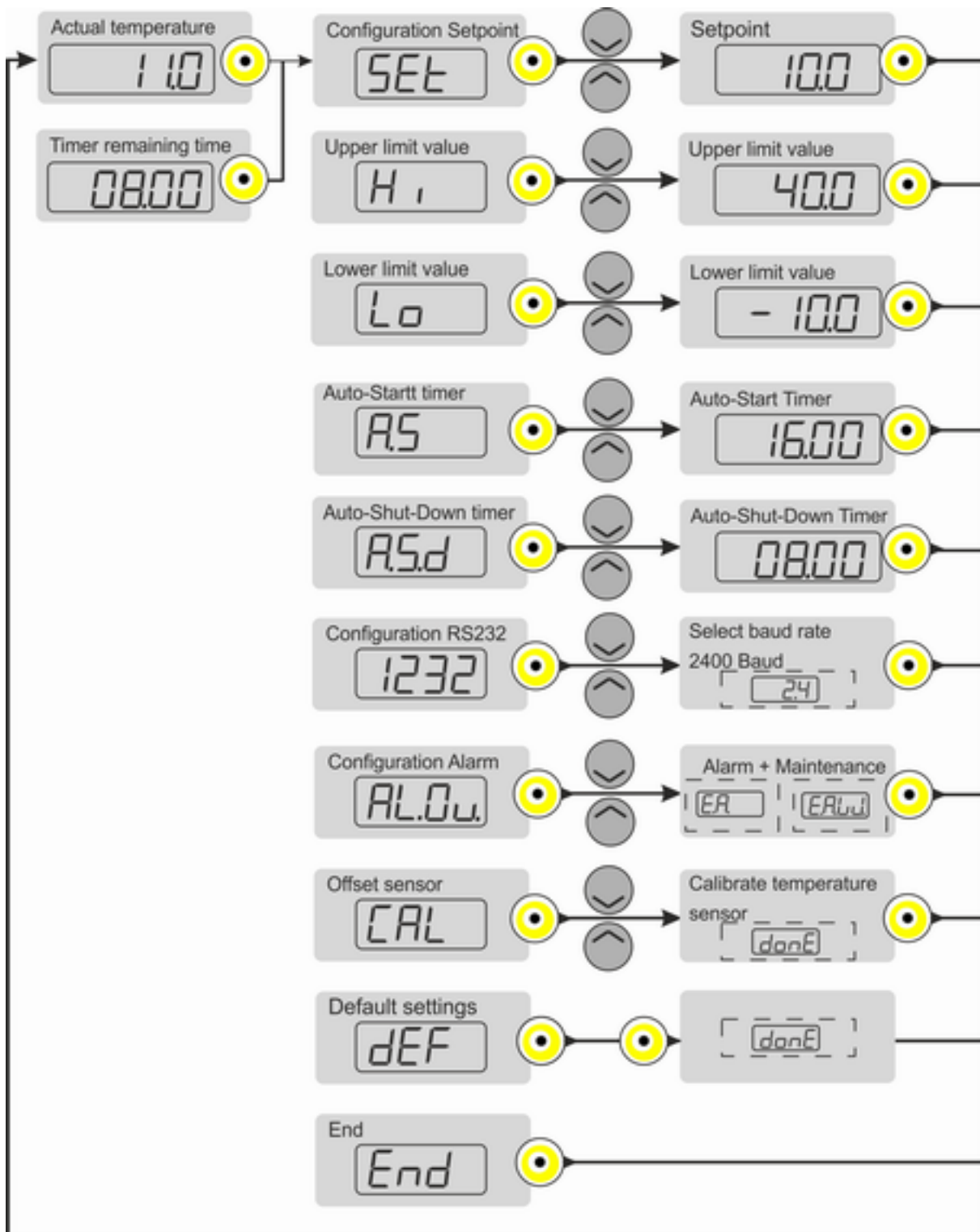


Fig. 12: Menu

## 6.3 Screen displays

### Default display

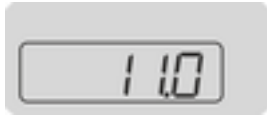


Fig. 13: Default display

The default display is the indication shown in the screen if no other operations such as configuring settings are being performed. The actual temperature of the machine is shown in the default display.

### Menu

The machine menu with possible settings can be invoked using the ENTER button.



Further information about the menu structure and the menu navigation can be found in Chapter 6.2 'Default display and menu items' on page 34.

### Editing display

The display flashes when a menu item in the screen has been selected. The setting can now be made. The value entered is applied when the setting is confirmed.

## 6.4 Specifying the setpoint temperature

### Relationship between temperature setpoint and temperature limit values

You specify a setpoint for the temperature control. This value specifies to which temperature the heat transfer liquid will be cooled. The upper and lower temperature limit values of the device have been set to the default values 45.0 °C and 5.0 °C. The temperature limits define the temperature range of your application, i.e. in which range any temperature control can take place. A warning is output by the device if the temperature is outside the limits. This range is necessary so that no unnecessary warnings are output during transient conditions of the temperature regulation. The default values can be limited subsequently depending on the heat transfer liquid.

For operation of the device with Aqua 90, the temperature setpoint must not be set smaller than 5 °C. Also use the lower temperature limit value  $L_o$  'Lower temperature limit value' on page 38 and set this to 3 °C so that a warning is output for lower temperatures.

The yellow LED on the device lights if any temperature setpoint or actual temperature is less than 5 °C. It warns about incorrect use of the heat transfer liquid and consequential damage to the device.



If the device is operated with liquid temperatures below 5 °C, Kryo 30 (glycol / water) must be used in the device as heat transfer liquid.

Personnel: ☒ Operating personnel

1. Select the menu item for specifying the temperature setpoint.



Fig. 14: Setpoint input

- Specify the setpoint.



*If the entered setpoint is outside the specified temperature limit values, the value cannot be adopted. Editing mode is active. An audible signal is also output. You can input the setpoint again.*

- Confirm with the ENTER button.

## 6.5 Restricting temperature limit values

The range of the temperature limit values must be restricted for safety reasons. These two values depend on the heat transfer liquid used. The default settings of 45.0 °C and 5.0 °C stored in the device cannot be changed.

Practical temperature limit values are:

Aqua 90 - Set the range to the values 42 °C and 3 °C.

Kryo 30 (water / glycol) - Set the range to the values 42 °C and -12 °C.



*By adjusting the temperature limit values, the configurable setpoint range is automatically limited to as 2 °C below the upper temperature limit and 2 °C above the lower temperature limit.*

### Upper temperature limit value

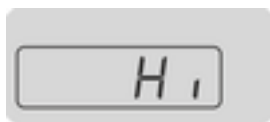


Fig. 15: Upper limit value

Personnel: ☒ Operating personnel

- Select the menu item for the upper temperature limit value.
- Confirm with the ENTER button.
- Specify the upper limit value.



*The maximum value of the upper limit is 45 °C.*

- Confirm with the ENTER button.

### Lower temperature limit value

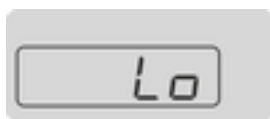


Fig. 16: Lower limit

Personnel: ☒ Operating personnel

- Select the menu item for the lower temperature limit value.
- Confirm with the ENTER button.
- Specify the lower limit value.



*The minimum value of the lower limit is 5 °C when using Aqua 90 and -15 °C when using Kryo 30.*

- Confirm with the ENTER button.

## 6.6 Configuring timer

The integrated timer can be used for switching the device on and off automatically. The timer can be viewed and configured during normal operation of the device.

### Special features of the timer

- The timer is configured using a number of hours and minutes in the format hh.mm. The first two digits represent the number of hours and the last two are the minutes. The timer can be set to a maximum of 99 hours and 59 minutes.
- The timer is only active while the machine is switched on. If the machine is switched off using the mains power switch during the running time of the timer, the timer is reset.

### Timer functions

- If the timer is active, the current actual temperature on the display is shown with a flashing decimal point.
- If the timer is invoked using the corresponding menu item, the remaining time, for example 05:30 is shown flashing. If the timer is not active, 00:00 is shown flashing.
- Once the time for Auto-Shut-Down has elapsed, the device is not switched off completely but switched to standby. Standby means all components of the device are switched off and only the display of the device is still supplied with power.

### Functions for automatic switching on - Auto-Start

- If Auto-Start of the timer is configured, the device switches to standby and Auto-Start is active immediately. If any Auto-Shut-Down is active, the Auto-Start is not active until after completion of the Auto-Shut-Down.
- If Auto-Start is active, the remaining time until the automatic start is shown on the display. An audible signal is also output during the complete last minute before starting the device.

### Configuring Auto-Shut-Down

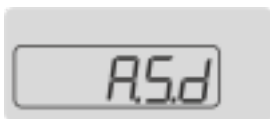


Fig. 17: Auto-Shut-Down

1. Select the menu item for specifying the Auto-Shut-Down.
2. Confirm with the OK button.
3. Specify the time until the device should be switched to standby.



*Wait for approx. 4 seconds if you would not like to apply the specified value. The screen automatically returns to the default display.*

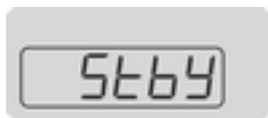


Fig. 18: Standby

## Configuring Auto-Start



Fig. 19: Auto-Start

4. Confirm with the OK button.



*The value must be confirmed within 4 seconds after the last input. Otherwise the screen returns to the default display.*

- The device will be switched to standby after the time entered. This is shown on the display as follows.

5. Auto-Start can now be configured before the expiry of Auto-Shut-Down to switch the device on again afterwards after a specified time. Otherwise you can start the device manually by pressing the ENTER button.



**CAUTION!**  
Automatic device start using the auto-start timer

Frostbite, risk of injury, device damage

- Before using the auto-start timer, ensure that all preparations for the intended use have been made.

1. Select the menu item for specifying the Auto-Start.
2. Confirm with the OK button.
3. Specify the time until the device should be switched on again.



*If no Auto-Shut-Down is configured for the device, the device is switched directly into standby with the confirmation.*



*Wait for approx. 4 seconds if you would not like to apply the specified value. The screen automatically returns to the default display.*

4. Confirm with the OK button.



*The value must be confirmed within 4 seconds after the last input. Otherwise the screen returns to the default display.*

## Displaying and editing remaining time

1. Select the menu item for the Auto-Shut-Down or Auto-Start.
2. Confirm with the OK button.
  - The remaining time is displayed.
3. You have the following options:
  - Wait approx. 4 seconds if you only want to display the remaining time. The default display is shown again.
  - To edit the remaining time, set the time accordingly. Confirm with the OK button.



## Reset

1. Select the menu item for the Auto-Shut-Down or Auto-Start.
2. Input 00.00.
3. Confirm with the OK button.



*The value must be confirmed within 4 seconds after the last input. Otherwise the screen returns to the default display.*

## Restart manually

If the device has been switched to standby using Auto-Shut-Down and no Auto-Start is configured, the device can be switched on again manually.

1. Press the ENTER button to switch the device on again.



*This function is only available if no Auto-Start is active.*

## 6.7 RS 232 interface

### 6.7.1 Configuring RS 232 interface

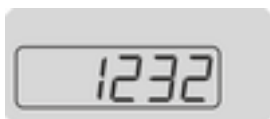


Fig. 20: RS 232 interface

The baud rate for the RS 232 interface can be configured using the display.

Personnel: ☐ Operating personnel

1. Select the menu item for configuration of the RS 232 interface.
2. Select the appropriate baud rate.

The following baud rates can be selected:

- ☐ 2.4
- ☐ 4.8
- ☐ 9.6
- ☐ 19.2



*The hundreds and thousands digits are not visible on the display.*

3. Confirm with the OK button.



*Your input is applied automatically after approx. 4 seconds.*

### 6.7.2 Protocol

#### RS 232 protocol

Note the following:

- ☐ The interface operates with 1 stop bit, no parity bit and 8 data bits.
- ☐ Selectable transmission speed: 2400, 4800, 9600 (factory setting) or 19200 baud.
- ☐ The RS 232 interface can be operated with or without hardware handshake (RTS/CTS).

- The command from the computer must be terminated with CR, CRLF or LFCR.
- The response from the thermostat is always terminated with CRLF.
- After every command sent to the thermostat, it is necessary to wait for a response before the next command can be sent. This way, the allocation of queries and responses is clear.

CR = Carriage Return (hex: 0D); LF = Line Feed (hex: 0A)

Tab. 9: Example for setpoint transfer of 30.5 °C to the thermostat.

Computer	Thermostat
"OUT_SP_00_30.5"CRLF	
	"OK"CRLF

### 6.7.3 Write commands

The write commands are data specifications to the thermostat.

Command	Meaning
OUT_SP_00_XXX.XX	Setpoint transfer with max. 3 digits before the decimal point and max. 2 digits afterwards
OUT_SP_04_XXX	[Hi] Upper limit of flow temperature
OUT_SP_05_XXX	[Lo] Lower limit of flow temperature
START	Switches on device (from standby)
STOP	Switches device to standby (pump, refrigeration unit off).

Note the following:

- For "\_", " " (space character) is also permitted.
- Response from the thermostat "OK" or "ERR\_X" in the case of an error.

#### Permitted data formats

-XXX.XX	-XXX.X	-XXX.	-XXX	XXX.XX	XXX.X	XXX.	XXX
-XX.XX	-XX.X	-XX.	-XX	XX.XX	XX.X	XX.	XX
-X.XX	-X.X	-X.	-X	X.XX	X.X	X.	X
-.XX	-.X	.XX	.X				

#### 6.7.4 Read commands

The following read commands are data requests to the thermostat.

Command	Meaning
IN_PV_00	Query of the bath temperature (outlet temperature)
IN_SP_00	Query of the temperature setpoint
IN_SP_04	Query of the outlet temperature limit Hi
IN_SP_05	Query of the outlet temperature limit Lo
TYPE	Query of the device type (response = "MC").
VERSION	Query of the software version number
STATUS	Query of the device status, 0 = OK, -1 = fault
STAT	Query for the fault diagnosis, response: XXXXXXXX; X = 0 no fault, X = 1 fault Character 1 = error Character 2 = not assigned Character 3 = not assigned Character 4 = not assigned Character 5 = low level Character 6 = not assigned Character 7 = not assigned

Note the following:

- For "\_", " " (space character) is also permitted.
- Unless otherwise specified for the command, the reply is always in fixed decimal format "XXX.XX" or "-XXX.XX" for negative values or "ERR\_X".

#### 6.7.5 Error messages

The error messages of the modules are described in the following.

Error	Description
ERR_2	Incorrect input (e.g. buffer overflow)
ERR_3	Incorrect command
ERR_5	Syntax error in the value
ERR_6	Impermissible value
ERR_32	The upper temperature limit is less than or equal to the lower temperature limit.

## 6.8 Configuring alarm output

In the case of an alarm or error, an electrical signal is output via the alarm output of the device as default. However, you can also configure that a signal will also be output in the case of a warning.

Personnel: ☒ Operating personnel



Fig. 21: Alarm output

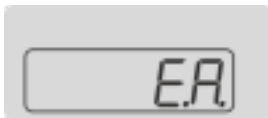


Fig. 22: Option error and alarm

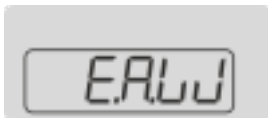


Fig. 23: Option with additional warning

1. Select the menu item for configuring the alarm output.

2. Select the following option for the output of an electrical signal for alarms and errors.

3. Select the following option for the additional output of an electrical signal for warnings.



*Wait for approx. 4 seconds if you would not like to apply the specified value. The screen automatically returns to the default display.*

4. Confirm with the ENTER button.



*The value must be confirmed within 4 seconds after the last input. Otherwise the screen returns to the default display.*

## 6.9 Inputting offset of the temperature sensor



*The calibration overwrites the factory calibration.*

If any temperature difference is discovered when checking the device with a reference thermometer, the offset (additive part of the characteristic curve) of the internal measurement chain can be adjusted using the CAL menu item.

A calibrated reference thermometer (e.g. from the LAUDA DigiCal series) with the required degree of accuracy is required. Otherwise the factory calibration should not be changed.

The reference thermometer must be installed in the flow of the device in accordance with the specifications in the calibration certificate.

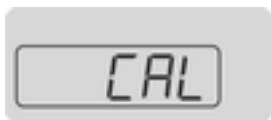


Fig. 24: Calibrating temperature sensor

Personnel: ☐ Operating personnel

1. Select the menu item CAL.
2. Enter the temperature value read from the reference thermometer at the device.
3. Keep the ENTER button pressed for approx. 3 seconds afterwards.
  - ▶ The display shows *donE*. The new value has been applied.

## 6.10 Restoring the factory settings



Fig. 25: Factory settings

Execute this menu item if you would like to restore the factory settings stored in the device.

- The range of the temperature limit values is reset to 45 °C and 5 °C.
- The timers are reset to 00.00.
- The signal output at the alarm output is reset to *alarms and faults*.
- The baud rate is reset to 9600 baud.

Personnel: ☐ Operating personnel

1. Select the menu item (dEF) for restoring the factory settings.
2. Confirm with the ENTER button.
3. Keep the ENTER button pressed for approx. 3 seconds afterwards.
  - ▶ The display shows *donE*. The factory settings have been restored.

## 7 Maintenance

### 7.1 General safety instructions



**DANGER!**  
Contact with live or moving parts

Electric shock, impact, cutting, crushing

- The device must be disconnected from the mains power supply before any maintenance work.
- Repairs must only be carried out by specialists.



**CAUTION!**  
Contact with hot / cold device parts, accessories and heat transfer liquid.

Burns, scalding, frostbite

- Ensure device parts, accessories and heat transfer liquid are at room temperature before touching them.

Also note the following:

- Before all maintenance work, you should ensure that decontamination of the device has been performed if it came into contact with hazardous materials.


### 7.2 Maintenance intervals

The maintenance intervals described in the following table must be complied with. The following maintenance work is mandatory before every longer unsupervised operation.

Interval	Maintenance work
Daily	Inspection of the drain plug by visual inspection from the outside
monthly	Inspection of the external hoses for material fatigue
	Cleaning of the condenser
Half-yearly	Inspection of the heat transfer liquid

### 7.3 Cleaning the device

Personnel: ☒ Operating personnel

	<b>WARNING!</b> Ingress of cleaning agents in the device
	Electric shock
	● Use a moist cloth for cleaning.

Also note the following:

- Only clean the control panel with water and detergent. Do not use acetone or solvents. The consequence would be permanent damage of the plastic surfaces.

### 7.4 Cleaning air-cooled condenser

Personnel: ☒ Operating personnel

1. Switch off the device.
2. Remove the front cover by holding underneath with both hands and pulling the grating to the front. Remove the front cover slowly and carefully to prevent damage.
3. Brush off or vacuum the condenser.
4. Replace the front cover carefully.

### 7.5 Checking heat transfer liquid

Contaminated heat transfer liquid must be replaced. Further use of the heat transfer liquid is only permitted with appropriate test results.

The heat transfer liquid must be checked according to DIN 51529.

## 8 Faults

### 8.1 Alarms, errors and warnings

Any alarms, error signals and warnings triggered on the device are shown on the display as 7-segment text.

#### Procedure in the event of alarms

Alarms can be cancelled using the ENTER button after rectification of the cause of the fault.

A list of alarms can be found in ➤ Chapter 8.2 'Alarms overview' on page 49.

#### Procedure in the event of warnings

Warnings can be cancelled using the ENTER button after rectification of the cause of the fault.

A list of warnings can be found in ➤ Chapter 8.3 'Warnings overview' on page 49.

#### Procedure in the event of errors

A two-tone signal is output if any error occurs. The red LED on the device also lights.

In the case of an error, switch off the device at the mains power switch. If the error occurs again after restarting the device, note the error code and contact LAUDA Service Constant Temperature Equipment. Contact details can be found in ➤ Chapter 12.3 'LAUDA contact' on page 55.






*Errors are symbolised with an E and a sequential three-digit number.*






## 8.2 Alarms overview

Alarms are relevant for safety. The components of the device such as the pump switch off. A two-tone signal is output by the device. The red LED on the device also lights.

Output on the display	Description
	In the event of a Low Level alarm, the fill level of the heat transfer liquid is below the minimum limit. The fault which caused this low fill level must be rectified to cancel the alarm. Heat transfer liquid must also be refilled.  Warnings are output before the alarm is emitted. The alarm is output after approx. 5 minutes.
	The pump is blocked for any pump alarm. This can be caused by unacceptably high viscosity of the heat transfer liquid or by foreign bodies in the circuit.
	The temperature of the electronics is higher than 75 °C.

## 8.3 Warnings overview

Warnings are not relevant for safety. The device continues running. A continuous tone is output for a short time by the device. Warnings are output periodically. You are therefore reminded in the event of an existing fault.

Indication on the display	Description
	In the event of a Low Level warning, the fill level of the heat transfer liquid is below the minimum limit.  The fault which caused this low fill level must be rectified to cancel the warning. Heat transfer liquid must also be refilled.  If this warning is ignored, a Low Level alarm will be output after approx. 5 minutes and the components of the device such as the pump will be switched off.
	The upper temperature limit has been exceeded for this warning.  The device fault must be rectified to remove this warning.
	The lower temperature limit has been undercut for this warning.  The device fault must be rectified to remove this warning.

## 9 Decommissioning

### 9.1 Draining the device

Personnel: ☐ Operating personnel



**WARNING!**  
Contact with cold heat transfer liquid

Frostbite

- Bring the heat transfer liquid to room temperature before draining.

Also note the following:

- Observe the regulations for disposal of the used heat transfer liquid.
1. Switch off the device.
  2. Let the device and the heat transfer liquid cool down or heat up to room temperature.
  3. Position a container with appropriate capacity directly under the drain plug.



*The heat transfer liquid discharges directly from the device when the drain plug is opened.*

4. Open the drain plug. Turn anticlockwise for this.

## 10 Disposal

### 10.1 Disposing of refrigerant

The refrigerant must be disposed of in accordance with Directive 2015/2067/EU in combination with 517/2014/EU.



**CAUTION!**  
Uncontrolled escape of refrigerant

Impact, cutting

- Do not dispose of any pressurised cooling circuit.
- Disposal must be performed by specialist personnel.



*Type and fill quantity of the refrigerant can be seen on the rating plate.*

### 10.2 Device disposal



The following applies in member states of the EU: The device must be disposed of in accordance with Directive 2012/19/EU (WEEE Waste of Electrical and Electronic Equipment).

### 10.3 Disposing of packaging

The packaging must be disposed of in accordance with EU Directive 94/62/EC.

## 11 Technical Data

### 11.1 General data



The device sound pressure level is below 70 dB. According to EC Directive 2006/42/EC, the sound pressure level of the devices is therefore not specified further.

Specification	Value	Unit
Placement	Indoor areas	
Placement height above sea level	Up to 2,000	m
Humidity	Maximum relative humidity 80% at 31 °C and up to 40 °C decreasing linearly to 50%	
Ambient temperature range	5 – 40	°C
IP type of protection	IP 32	
Degree of soiling	2	
Clearance from surroundings (front and rear sides)	40	cm
Overvoltage	Overvoltage category II and transient overvoltages according to category II	
Protection class for electrical operating equipment DIN EN 61 140 (VDE 0140-1)	1	
Classification according to DIN 12 876-1 (class designation / identification)	I/NFL	
Display	7-segment, LED	
Display resolution	0.1	°C
Adjustment resolution	0.1	°C
Temperature stability	±0.5	K
Storage temperature range	5 – 40	°C
Transport temperature range	-20 – 60	°C

	Working temperature range	Dimensions (W x D x H)	Weight
	°C	mm x mm x mm	kg
MC 250	-10 – 40	200 x 350 x 465	28
MC 350	-10 – 40	240 x 400 x 500	36
MC 600	-10 – 40	350 x 480 x 595	52
MC 1200	-10 – 40	450 x 550 x 650	64

## 11.2 Cooling unit

Tab. 10: Cooling capacity

	Unit	MC 250	MC 350	MC 600	MC 1200
Cooling capacity (for 20 °C)	kW	0.25	0.35	0.60	1.20
Cooling capacity (for 10 °C)	kW	0.20	0.28	0.50	1.05
Cooling capacity (for 0 °C)	kW	0.15	0.22	0.36	0.75
Cooling capacity (for -10 °C)	kW	0.09	0.16	0.15	0.40



The cooling capacity is measured for a specified temperature of the heat transfer liquid. These temperature values are shown in brackets. The ambient temperature for the measurement is 20 °C; ethanol was used as heat transfer liquid. The cooling water temperature is 15 °C and the cooling water differential pressure is 3 bar for the measurement of water-cooled devices.

## 11.3 Refrigerant and filling quantity

The device contains fluorinated greenhouse gases.

Tab. 11: Devices with 230 V; 50 Hz

	Unit	MC 250	MC 350	MC 600	MC 1200
Refrigerant	---	R-134a	R-134a	R-134a	R-134a
Maximum filling weight	kg	0.085	0.095	0.295	0.575
GWP <sub>(100a)</sub> *	---	1430	1430	1430	1430
CO <sub>2</sub> equivalent	t	0.1	0.1	0.4	0.8

Tab. 12: Devices with 220 V; 60 Hz

	Unit	MC 250	MC 350	MC 600	MC 1200
Refrigerant	---	R-134a	R-134a	R-134a	R-134a
Maximum filling weight	kg	0.08	0.097	0.285	0.63
GWP <sub>(100a)</sub> *	---	1430	1430	1430	1430
CO <sub>2</sub> equivalent	t	0.1	0.1	0.4	0.9

Tab. 13: Devices with 115 V; 60 Hz

	Unit	MC 250	MC 350	MC 600	MC 1200
Refrigerant	---	R-134a	R-134a	R-134a	R-134a
Maximum filling weight	kg	0.08	0.095	0.225	0.585

	Unit	MC 250	MC 350	MC 600	MC 1200
GWP <sub>(100a)</sub> *	---	1430	1430	1430	1430
CO <sub>2</sub> equivalent	t	0.1	0.1	0.3	0.8

Tab. 14: Devices with 100 V; 50/60 Hz

	Unit	MC 250	MC 350	MC 600	MC 1200
Refrigerant	---	R-134a	R-134a	R-134a	R-134a
Maximum filling weight	kg	0.092	0.095	0.31	0.57
GWP <sub>(100a)</sub> *	---	1430	1430	1430	1430
CO <sub>2</sub> equivalent	t	0.1	0.1	0.4	0.8



Global Warming Potential (GWP), comparisons CO<sub>2</sub> = 1.0

\* Time horizon 100 years, in accordance with IPCC IV

#### 11.4 Hydraulic circuit

		MC 250	MC 350	MC 600	MC 1200
Fill capacity	l	2 – 4	4 – 7	4 – 8	7 – 14
Maximum flow rate	l/min (water 20 °C)	16	16	35	35
Maximum flow pressure	bar (water 20 °C)	0.35	0.35	1.30	1.30
Pump connection	(internal diameter in mm)	Hose nozzle ½" (10)	Hose nozzle ½" (10)	G ¾ (15), hose nozzle ¾"	G ¾ (15), hose nozzle ¾"
Drain tap	Connection	G ½"	G ½"	G ½"	G ½"
Overflow connection	(internal diameter in mm)	Hose nozzle ½" (10)	Hose nozzle ½" (10)	Hose nozzle 16 mm (12)	Hose nozzle 16 mm (12)

#### 11.5 Voltage-dependent data

Tab. 15: Power consumption

	MC 250	MC 350	MC 600	MC 1200
	kW	kW	kW	kW
230 V; 50 Hz	0.23	0.50	0.70	1.15
220 V; 60 Hz	0.23	0.50	0.70	1.15
115 V; 60 Hz	0.23	0.50	0.75	1.10
100 V; 50/60 Hz	0.23	0.50	0.75	1.10

## 12 General

### 12.1 Copyright

This manual is protected by copyright and is exclusively intended for the purchaser for internal use.

The transfer of this manual to third parties, reproductions of any type and form, whether in whole or in part, and the dissemination and/or communication of the contents are not authorised without the written permission of the manufacturer.

Infringements will result in legal action for damages. We reserve the right to assert further claims.

### 12.2 Technical changes

Manufacturer reserves right to make technical modifications.

### 12.3 LAUDA contact

Contact LAUDA Service Constant Temperature Equipment in the following cases:

- In the event of faults on the device
- For technical questions about the device
- For spare part orders

Contact our Sales Department for application-specific questions.

#### Contact details

LAUDA Service constant temperature equipment

Telephone: +49 (0)9343 503 350

Fax: +49 (0)9343 503 283

Email: [service@lauda.de](mailto:service@lauda.de)

## 13 Index

<b>A</b>	
Accessories	
Standard . . . . .	11
Air-cooled	
Cleaning condenser . . . . .	47
Alarm	
Codes . . . . .	49
Description . . . . .	48
Arrow buttons (position) . . . . .	18
<b>C</b>	
Calibration (actual temperature)	
Specifying . . . . .	44
Checking	
Heat transfer liquid . . . . .	47
Cleaning . . . . .	47
CO2 equivalent . . . . .	54
Code	
Alarms . . . . .	49
Conformity (EU) . . . . .	55
Copyright . . . . .	55
<b>D</b>	
Demineralised water . . . . .	29
Design	
Device . . . . .	14
Device	
Cleaning . . . . .	47
Design . . . . .	14
Disposal (packaging) . . . . .	51
Disposal (refrigerant) . . . . .	51
Draining . . . . .	50
Placement . . . . .	23
Unpacking . . . . .	11
Display buttons	
Operation . . . . .	18
Disposal	
Packaging . . . . .	51
Refrigerant . . . . .	51
Disposing of refrigerant . . . . .	51
DM water . . . . .	29
Draining	
Device . . . . .	50
<b>E</b>	
EMC . . . . .	7
ENTER button (position) . . . . .	18
Error	
Description . . . . .	48
Establishing power supply . . . . .	30
EU conformity . . . . .	55
External consumer	
Connecting . . . . .	25
<b>F</b>	
Factory settings	
Overview . . . . .	45
Restoring . . . . .	45
Fill level	
drops . . . . .	30
low . . . . .	30
Filling . . . . .	30
<b>G</b>	
GWP . . . . .	54
<b>H</b>	
Heat transfer liquid	
Checking . . . . .	47
Overview (approved) . . . . .	29
Removing . . . . .	50
Hydraulic circuit	
Description . . . . .	19
<b>I</b>	
Intended Use . . . . .	6
<b>L</b>	
LAUDA Service constant temperature equipment	
Address . . . . .	55
Contact . . . . .	55
LED, yellow . . . . .	37



## M

### Machine

Cleaning condenser (air-cooled) . . . . .	47
Filling . . . . .	30

Machinery Directive . . . . .	55
-------------------------------	----

Mains power (connection) . . . . .	30
------------------------------------	----

### Mains power switch

Operation . . . . .	17
---------------------	----

### Maintenance

Interval . . . . .	46
--------------------	----

### Manometer

Description . . . . .	20
-----------------------	----

## O

### Offset (actual temperature)

Calibration . . . . .	44
-----------------------	----

### Overflow connection

Hose . . . . .	30
----------------	----

Overflow tube . . . . .	30
-------------------------	----

## P

### Packaging

Disposal . . . . .	51
--------------------	----

Personal protective equipment (overview) . . . . .	9
--	---

Personnel qualification (overview) . . . . .	8
--	---

Placement (device) . . . . .	23
------------------------------	----

Placement location . . . . .	23
------------------------------	----

Protective equipment (personal, overview) . . . . .	9
---	---

### Pump pressure

setting . . . . .	32
-------------------	----

## R

### Refrigerant

Filling quantity . . . . .	54
----------------------------	----

Filling weight . . . . .	54
--------------------------	----

## S

### Safety instruction

General . . . . .	6
-------------------	---

Service (LAUDA, Constant Temperature Equipment) . . . . .	55
---	----

Specifying limit values (temperature) . . . . .	38
---	----

Specifying temperature limit values . . . . .	38
---	----

Specifying the setpoint . . . . .	37
-----------------------------------	----

Specifying the setpoint temperature . . . . .	37
---	----

## T

Type plate . . . . .	14, 22
----------------------	--------

## U

Unpacking . . . . .	11
---------------------	----

## W

### Warning

Description . . . . .	48
-----------------------	----

## Y

yellow LED . . . . .	37
----------------------	----



## EC DECLARATION OF CONFORMITY

**Manufacturer:** LAUDA DR. R. WOBSE GMBH & CO. KG  
Pfarrstrasse 41/43 97922 Lauda-Königshofen Germany

We hereby declare under our sole responsibility that the machines described below

**Product Line:** Microcool **Serial number:** from S190000001

**Types:** MC 250, MC 350, MC 600, MC 1200

comply with all relevant provisions of the EC Directives listed below due to their design and type of construction in the version brought on the market by us:

Machinery Directive	2006/42/EC
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

The equipment is not covered by the Pressure Equipment Directive 2014/68/EU, as the maximum classification of the equipment is Category 1 and it is covered by the Machinery Directive.

The protective objectives of the Machinery Directive with regard to electrical safety are complied with in accordance with Annex I Paragraph 1.5.1 in conformity with the Low Voltage Directive 2014/35/EU.

Applied harmonized standards:

- EN 12100:2011 (ISO 12100:2010)
- EN 61326-1:2013 (IEC 61326-1:2012)
- EN 378-2:2018
- EN 61010-1:2011 (IEC 61010-1:2010 + Cor.:2011)

Authorized representative for the composition of the technical documentation:

Dr. Jürgen Dirscherl, Director Research & Development



Lauda-Königshofen, 25.09.2019

---

Dr. Alexander Dinger, Head of Quality Management



## Product Returns and Clearance Declaration

### Product Returns

Would you like to return a LAUDA product you have purchased to LAUDA? For the return of goods, e.g. for repair or due to a complaint, you will need the approval of LAUDA in the form of a *Return Material Authorization (RMA)* or *processing number*. You can obtain the RMA number from our customer service department at +49 (0) 9343 503 350 or by email [service@lauda.de](mailto:service@lauda.de).

### Return address

LAUDA DR. R. WOBSE GMBH & CO. KG

Pfarrstrasse 41/43

97922 Lauda-Königshofen

Deutschland/Germany

Clearly label your shipment with the RMA number. Please also enclose this fully completed declaration.

RMA number	Product serial number
Customer/operator	Contact name
Contact email	Contact telephone
Zip code	Place
Street & house number	
Additional explanations	

### Clearance Declaration

The customer/operator hereby confirms that the product returned under the above-mentioned RMA number has been carefully emptied and cleaned, that any connections have been sealed to the farthest possible extent, and that there are no explosive, flammable, environmentally hazardous, biohazardous, toxic, radioactive or other hazardous substances in or on the product.

Place, date	Name in block letters	Signature





LAUDA DR. R. WOBSE GMBH & CO. KG  
Pfarrstrasse 41/43 • 97922 Lauda-Königshofen • Germany  
Phone: +49 (0)9343 503-0 • Fax: +49 (0)9343 503-222  
E-Mail: [info@lauda.de](mailto:info@lauda.de) • Internet: <https://www.lauda.de>