

# **Operating instructions**

**Variocool**

**VC 600, VC 1200 (W), VC 2000 (W), VC 3000 (W),  
VC 5000 (W), VC 7000 (W), VC 10000 (W)**

**Circulation chiller**

LAUDA DR. R. WOBSE GMBH & CO. KG

P.O. Box 1251

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: [www.lauda.de](http://www.lauda.de)

Translation of the original operating instructions

YAWD0032 V02 Revision46 13 February 2013 ©LAUDA 2013

## Table of contents

<b>1</b>	<b>Safety.....</b>	<b>7</b>
1.1	General safety instructions.....	7
1.2	Intended use.....	8
1.3	Foreseeable misuse.....	8
1.4	Modifications to the device.....	8
1.5	Heat transfer liquid.....	8
1.6	Hoses.....	9
1.7	Application area.....	9
1.8	Personnel qualification.....	9
1.9	Personal protective equipment.....	10
1.10	Warning symbols of the device.....	10
1.11	Structure of safety instructions.....	10
<b>2</b>	<b>Unpacking.....</b>	<b>12</b>
<b>3</b>	<b>Design and function.....</b>	<b>13</b>
3.1	Machine types.....	13
3.2	Design of the device.....	14
3.3	Controls.....	16
3.3.1	Mains power switch.....	16
3.3.2	Screen buttons.....	16
3.4	Function elements.....	16
3.4.1	Hydraulic circuit.....	16
3.4.2	Manometer.....	17
3.4.3	Refrigeration unit.....	17
3.4.4	Interfaces.....	18
3.5	Serial number.....	19
<b>4</b>	<b>Before commissioning.....</b>	<b>20</b>
4.1	EMC classification.....	20
4.2	Placement.....	20
4.3	External consumer.....	21
4.3.1	Tempering hoses and hose clamps.....	21
4.3.2	Connecting external consumers.....	23
4.4	Cooling water.....	24
4.4.1	Cooling water requirements.....	24
4.4.2	Connecting cooling water.....	25
4.5	Interfaces.....	26
4.5.1	Install USB driver.....	26

## Table of contents

---

4.5.2	Create USB connection.....	28
4.5.3	Alarm output 12N.....	31
4.5.4	RS 232/485 module.....	32
4.5.5	Analog module.....	35
4.5.6	Contact module LRZ 914.....	37
4.5.7	Contact module LRZ 915.....	39
<b>5</b>	<b>Commissioning.....</b>	<b>40</b>
5.1	LAUDA heat transfer liquids.....	40
5.2	Establishing power supply.....	41
5.3	Setting pump pressure.....	41
5.4	Filling the device.....	42
<b>6</b>	<b>Operation.....</b>	<b>45</b>
6.1	Operating modes.....	45
6.2	Menu structure overview.....	46
6.3	Switching on the machine.....	48
6.4	Screen displays.....	48
6.4.1	Basic window.....	48
6.4.2	Menu window.....	50
6.4.3	Input window.....	51
6.5	Defining temperature limit values.....	52
6.6	Defining the target temperature value.....	53
6.7	Activating and deactivating standby.....	53
6.8	Restoring the factory settings.....	54
6.9	External control.....	55
6.9.1	Activating the external control.....	55
6.9.2	Defining the set-point offset.....	56
6.10	Control timer.....	57
6.10.1	Program example.....	57
6.10.2	Selecting a program.....	60
6.10.3	Creating a program.....	60
6.10.4	Starting, interrupting and finishing a program.....	62
6.10.5	Defining program sequences.....	63
6.11	Control parameter.....	64
6.11.1	Calling the control menu.....	64
6.11.2	Overview of internal control parameters.....	64
6.11.3	Adjusting internal control parameters.....	65
6.12	Interfaces.....	65
6.12.1	Read commands for serial interfaces.....	65

	6.12.2	Write commands of serial interfaces.....	68
	6.12.3	Error messages of serial interfaces.....	70
	6.12.4	LabView.....	70
<b>7</b>	<b>Maintenance</b> .....		<b>71</b>
	7.1	General safety instructions.....	71
	7.2	Maintenance intervals.....	71
	7.3	Cleaning the machine.....	72
	7.4	Cleaning air-cooled condenser.....	72
	7.5	Cleaning the water filter.....	73
	7.6	Decalcification of the cooling water circuit.....	73
	7.7	Checking the heat transfer liquid.....	74
<b>8</b>	<b>Faults</b> .....		<b>76</b>
	8.1	Alarms, errors and warnings.....	76
	8.2	Invoking device status.....	76
	8.3	Alarm codes.....	77
	8.4	Low level alarm.....	78
	8.5	Warnings .....	78
	8.5.1	Warnings - control system.....	78
	8.5.2	Warnings – safety system.....	80
	8.5.3	Warnings – Smartcool.....	81
	8.5.4	Warnings – analog module – serial interface – contact module.....	82
	8.5.5	Warnings - Pt100/LiBus module.....	83
<b>9</b>	<b>Decommissioning</b> .....		<b>85</b>
	9.1	Draining the machine.....	85
	9.2	Condenser draining.....	86
<b>10</b>	<b>Disposal</b> .....		<b>87</b>
	10.1	Refrigerant (disposal).....	87
	10.2	Device disposal.....	87
	10.3	Disposing of packaging.....	87
<b>11</b>	<b>Technical data</b> .....		<b>88</b>
	11.1	General data.....	88
	11.2	Refrigeration unit.....	91
	11.3	Hydraulic circuit.....	92
	11.4	Order numbers.....	92
<b>12</b>	<b>General</b> .....		<b>94</b>
	12.1	Copyright.....	94
	12.2	Technical changes.....	94
	12.3	Warranty conditions.....	94

## Table of contents

---

12.4	Contact LAUDA Service Constant Temperature Equipment.....	94
12.5	EC conformity.....	95
<b>13</b>	<b>Index.....</b>	<b>96</b>

# 1 Safety

## 1.1 General safety instructions

- The equipment must only be operated for the intended use under the conditions stated in this operating manual. Any other operating mode is considered to be not-intended and can impair the protection intended by the device.
- The operating manual is part of the device. The information in this operating manual must therefore be available in close vicinity to the device. Also store this copy of the operating manual carefully.



If you lose this operating manual, contact the LAUDA Constant Temperature Equipment service. The contact details can be found in [Chapter 12.4 'Contact LAUDA Service Constant Temperature Equipment'](#) on page 94.

Use of the device can result in hazards from high or low temperatures, fire and through the application of electrical energy. The dangers of the device are to be eliminated as much as possible by the design in accordance with the appropriate standards. Residual hazards are reduced with one of the following measures:

- If relevant, there are safety devices for the device. These devices are essential for the safety of the device. Their operability must be ensured with appropriate maintenance activities.  
The safety devices of the machine are described in this chapter "Safety".
- 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 chapter "Safety".
- There are safety instructions in this operating manual. These instructions must always be observed.
- There are additional specific requirements for the personnel and for the personal protective equipment.  
These requirements are described in this chapter "Safety".



An overview of the authorised personnel and the protective equipment can be found in [Chapter 1.8 'Personnel qualification'](#) on page 9 and [Chapter 1.9 'Personal protective equipment'](#) on page 10.



Further information about the general structure of safety instructions can be found in [Chapter 1.11 'Structure of safety instructions'](#) on page 10.

### 1.2 Intended use

#### Intended use

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

#### Not-intended use

The following applications are considered to be not-intended:

- Medical applications
- In potentially explosive areas
- For tempering foodstuffs
- With a glass reactor without overpressure protection

### 1.3 Foreseeable misuse

Misuse of the device must be prevented in any case.

The following applications are considered to be foreseeable misuse:

- Operation of the device without heat transfer liquid
- Incorrect connection of hoses
- Set-up on table-like surfaces
- Setting an incorrect pump pressure

### 1.4 Modifications to the device

Any technical modifications to the machine are prohibited. Service works may be carried out only by the LAUDA Constant Temperature Devices service or one of the service partners authorized by LAUDA.

### 1.5 Heat transfer liquid

- Heat transfer liquids are used for the tempering. Only LAUDA heat transfer liquids are approved for the device. LAUDA heat transfer liquids are heat transfer liquids that have been tested and approved by the company 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 from high or low temperatures and fire if certain temperature thresholds are exceeded or fallen short of or if the container breaks and there is a reaction with the transfer liquid .  
The heat transfer liquid safety data sheet specifies all possible hazards and appropriate safety measures for handling the liquid. The safety data sheet must therefore be consulted for the intended use of the device.
- The machine is exclusively designed for non-flammable heat transfer liquids in Class I according to DIN 12876-1.

### 1.6 Hoses

Only LAUDA hoses may be used for the external hydraulics circuit. LAUDA hoses are hoses that are approved by LAUDA DR. R. WOBSE GMBH & CO. KG. In the selection of hoses that are suitable for the application, the permissible temperature range and the maximum permissible pressure must be particularly observed.

### 1.7 Application area

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

- Commercial area
- Interior use
- At altitudes of up to 2,000 m
- Ambient temperatures from 5 to 40 °C
- Maximum relative atmospheric humidity 80 % at temperatures up to 31 °C, decreasing linearly by up to 50 % of the relative atmospheric humidity at 40 °C
- Mains voltage fluctuations up to +/- 10% of the rated voltage
- Transient surge voltages up to the values of overvoltage category II
- Temporary surge voltages that occur in the mains supply
- Contamination level 2
- IP protection rating IP 32

### 1.8 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.

#### **Qualified operating personnel**

Specific activities are only permitted to be performed by qualified operating personnel.

- The qualified operating personnel have been instructed about the intended use of the machine.
- The qualified operating personnel must be able to assess the work assigned to them and recognise possible dangers based on their knowledge and experience.
- Minors are only permitted to perform activities on the machine under the supervision of adults.

### Specialist

Specific activities on the device must be carried out by technical staff. Technical staff is personnel that can evaluate functions and risks of the device and the application based on their training, skills and experience.

## 1.9 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.

## 1.10 Warning symbols of the device

### Hot




The warning symbol "Hot" is attached to the devices. This notice warns about hot surfaces on the device. These surfaces may not be touched during operation. To be able to touch these surfaces during other life cycles such as e.g. during maintenance, they must be cooled down to room temperature.

## 1.11 Structure of safety instructions


### Danger

- A safety instruction of the type "Danger" indicates an **immediately hazardous situation**.
- If the safety instruction is disregarded, this results in **death or severe, irreversible injuries**.

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


## Warning

- A safety instruction of the type "Warning" indicates a **potentially hazardous situation**.
- If the safety instruction is disregarded, this can result in **death** or **severe, irreversible injuries**.

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


## Caution

- A safety instruction of the type "Caution" indicates a **potentially hazardous situation**.
- If the safety instruction is disregarded, this can result in **minor, reversible injuries**.

 <b>CAUTION!</b> Type and source	
	Consequences in the case 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.

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

## 2 Unpacking

Personnel: ■ Operating personnel

1. Unpack the machine.



Keep the original packaging of your device for later transport.

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



If there is unexpected damage to the machine 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 the LAUDA Constant Temperature Equipment service immediately. The contact details can be found in *Chapter 12.4 'Contact LAUDA Service Constant Temperature Equipment' on page 94.*

### Standard accessories

Machine type	Description	Quantity	Order number
VC 600	Connector	2	HKO 026
VC 600	Screw cap M 16 x 1 for connector 13 mm	2	HKM 032
VC 1200 (W) to VC 5000 (W)	$\frac{3}{4}$ " connector with $\frac{3}{4}$ " screw cap	2	EOA 004
VC 7000 (W) and VC 10000 (W)	1" connector with $1\frac{1}{4}$ " screw cap	2	EOA 003
All equipment	Operating manual	1	

### 3 Design and function

#### 3.1 Machine types

The type designation of the equipment is composed of the following integral parts.

Integral part	Description
VC	Variocool
<number>, e.g. 5000	Specification of the cooling capacity in Watts [W]
W	Machine with water cooling  This specification in the machine type is optional. It identifies water-cooled equipment.

- All devices are intended for set-up standing on a floor. The devices have castors with locking brakes.
- Starting with VC 1200 (W), devices are equipped with a bypass to adjust pump pressure.
- The devices can optionally be equipped with a heater to heat transfer liquids.

### 3.2 Design of the device



Fig. 1: Overview of the front side

- 1 Filler nozzle with cover
- 2 Control panel
- 3 Pressure gauge (only for devices with bypass)
- 4 Mains power switch
- 5 Alarm output (interface 12N)
- 6 Front panel (removable without tools) with ventilation openings
- 7 Ventilation openings (both sides)
- 8 Four castors (front castors with locking brakes)

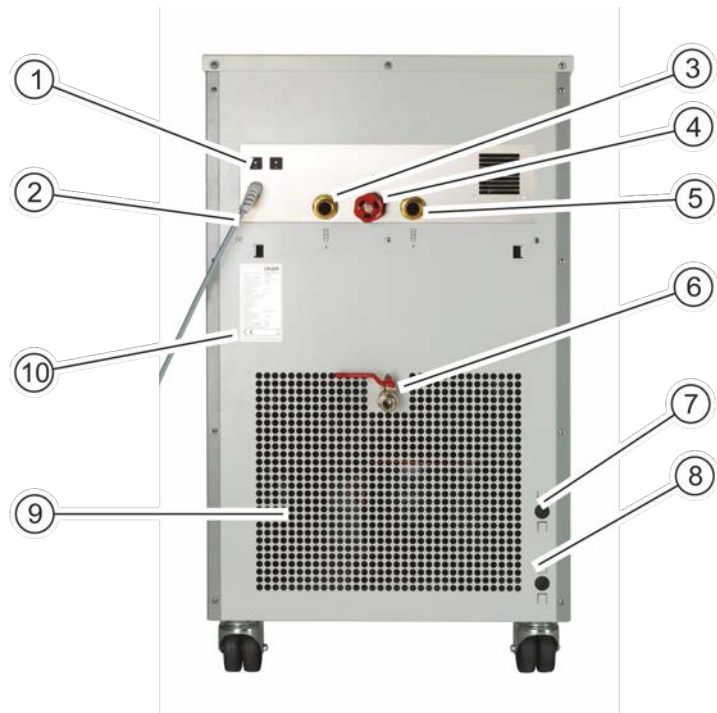


Fig. 2: Overview of the rear side

- 1 Fuses
- 2 Mains cable
- 3 Pump connection, outlet
- 4 Bypass controller (starting with VC 1200 (W))
- 5 Pump connection, return
- 6 Drain tap
- 7 Water cooling output (only for water-cooled devices)
- 8 Water cooling input (only for water-cooled devices)
- 9 Ventilation openings
- 10 Rating plate

### Control panel



Fig. 3: Control panel

- 1 Light sensor
- 2 TFT display
- 3 ENTER button and arrow buttons
- 4 Soft keys left and right
- 5 Mains power switch
- 6 USB interface (on the side of the control panel)

### 3.3 Controls

#### 3.3.1 Mains power switch

##### VC 600 to VC 3000 (W)

The mains power switch can be switched over to the following positions:

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

##### VC 5000 (W) and higher

The mains power switch can be turned to the following positions:

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

#### 3.3.2 Screen buttons



Fig. 4: Screen buttons

- 1 Arrow buttons
- 2 ENTER button
- 3 Soft keys

Functions on the screen of the device can be controlled using the screen buttons.

- The UP, DOWN, RIGHT and LEFT arrow buttons can be used to navigate in the screen.
- A selection in the screen can be confirmed with the ENTER button.
- You can control can buttons functions shown in the display with the soft keys.

### 3.4 Function elements

#### 3.4.1 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
- Immersion pump for conveying the heat transfer liquid into the external consumer via the pump connections
- Starting with VC 1200 (W), devices are equipped with an adjustable bypass to adapt the pump pressure to the requirements of the external consumer.
- Optional heater for heating the transfer liquid





You can find detailed information about the technical data of the pump in [Chapter 11.3 'Hydraulic circuit'](#) on page 92.

### 3.4.2 Manometer



Fig. 5: Manometer



The bypass is available for device types starting with model VC 1200 (W).

### 3.4.3 Refrigeration unit

The refrigeration unit includes the following components:

- Compressor  
A reciprocating compressor is used in the refrigeration unit. The compressor is equipped with a motor circuit breaker which trips on the compressor temperature and compressor current consumption.
- Condenser  
Depending on the machine type, an air-cooled or water-cooled condenser is used in the refrigeration unit. In air-cooled condensers, the heated heat is discharged to the environment. The fresh air is sucked in on the front of the device with a fan, heated and discharged on the rear of the device. In water-cooled condensers, the heat is discharged via cooling water circuit.
- Evaporator  
In the internal bath, heat is discharged with a pipe coil evaporator.



Technical information on the refrigeration unit can be found in [Chapter 11.2 'Refrigeration unit'](#) on page 91.

### 3.4.4 Interfaces

#### USB interface

The devices are equipped with a USB interface (USB device socket, type B) as standard. This allows, for instance, connection with a PC and operation with the control software Wintherm Plus. The USB interface also allows software updates.

#### Alarm output

Via this interface 12N "General fault", an electrical contact is output in the event of malfunctions. This neutral contact can be converted to, for example, an optical signal.

#### Other optional modules

Devices can be amended with additional interface modules.

- The optional analog module (order no. LRZ 912) has 2 inputs and 2 outputs on a 6-pin DIN socket. The inputs and outputs can be adjusted independently as a 4...20 mA, 0...20 mA or 0...10 V interface. For voltage supply of an external sensor with evaluation electronics, the socket is supplied with 20 V.
- The optional RS 232/485 interface module (order no. LRZ 913) is designed as a 9-pin SUB-D socket. Galvanically separated with an opto-coupler. The LAUDA command set makes the module compatible with the device lines ECO, Proline, Proline Kryomat, Integral XT and Integral T for the most part. The RS-232 interface can be connected directly with the PC using a straight-through cable.
- The contact module (order no. LRZ 914) is designed as plug-in connector according to NAMUR NE28. This contact module is designed to be identical with the LRZ 915, but with only per 1 output and 1 input on 2 DIN sockets. The coupling socket (order no. EQD 047) and the coupling plug (order no. EQD 048) are 3-pin connectors.
- The contact module (order no. LRZ 915) is designed as a 15-pin SUB-D socket. With 3 relay contact outputs (change-over contact, max. 30 V/ 0.2 A) and 3 binary inputs to control via external potential-free contacts.
- Profibus module (order no. LRZ 917). You can find details in the separate profibus module operating manual.
- Pt100- / LiBus module (order no. LRZ 918). An external temperature sensor can be connected to the Pt100 connection of the module. The remote control unit Command of the Proline device line can be used with the thermostat via the LiBus connection. A solenoid valve for cooling water control, return flow protection or a through-flow cooler can be additionally connected this way.
- LiBus module (order no. LRZ 920). The remote control unit Command of the Proline device line can be used with the thermostat via the LiBus connection. A solenoid valve for cooling water control, return flow protection or a through-flow cooler can be additionally connected this way.

### 3.5 Serial number

The serial number of a LAUDA device has the following structure:

- LAUDA order number
- Year of manufacture  
The year is indicated with two digits.
- Sequential number of the device in the year of manufacture  
The sequential number is a four-digit number.

This information is displayed in the format <order number>-<year of manufacture>-<sequential number>. One example for the Vario-cool devices is the LWG183-13-0420.

## 4 Before commissioning

### 4.1 EMC classification

#### Approval of the equipment according to EMC classification

Countries	EMC class
Europe	Class B  This classification has been made according to the EMC standard DIN EN 61326-1 (corresponds to VDE 0843-20-1).

#### Instructions for machines, Europe

EMC classification of the equipment:

- Class A: Operation only on mains power supplies without connected residential areas.
- Class B: Operation on mains power supplies with connected residential areas.

In the case of unfavourable mains conditions, disruptive voltage fluctuations can occur.

### 4.2 Placement

Very specific placement conditions are applicable for the equipment. These placement conditions are specified in the technical data of the machine for the most part.



Further information about the technical data can be found in [Chapter 11.1 'General data'](#) on page 88.

Additional placement conditions are described below.

- Toxic vapours can be produced depending on the heat transfer liquid used and type of operation. Ensure sufficient extraction of the vapours.
- Please note the requirements of the device for electromagnetic compatibility (EMC).
- Do not cover the ventilation openings.



Further information about EMC requirements can be found in [Chapter 4.1 'EMC classification'](#) on page 20.

Personnel: ■ Operating personnel



**WARNING!**  
**Rolling or toppling of the device from incorrect handling**

Impact, crushing

- Do not tilt the machine.
- Place the device on a level, skid-free surface with sufficient load bearing capacity.
- Engage the reel brake when setting up the device.
- Do not place any heavy parts on the machine.

1. Place the devices on a suitable floor.



The devices can be moved. Release the locking brakes of the castors for this by pressing the lever upward.

2. Lock the castors of the device in place. Press the lever downward to lock them.
3. Attach the "Hot" warning label in a well visible position for applications above 70 °C.



### 4.3 External consumer

#### 4.3.1 Tempering hoses and hose clamps



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

Scalding, frostbite

- Use hoses with a temperature resistance that appropriate for the operating temperature range of the device.
- Use hoses with a temperature resistance of at least 100 °C for the heater option.

## Before commissioning



### CAUTION! Contact with hot or cold hoses

Burns, frostbite

- Use insulated hoses for temperatures below 0 °C.
- Use insulated hoses for temperatures above 70 °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 machines can be found in [Chapter 11.3 'Hydraulic circuit'](#) on page 92.

## Hoses

Type	Machine Pump con- nection		Pump pressure	Clear width x outer diameter in mm	Temper- ature range in °C	Order number
EPDM hose, insu- lated	VC 600 M16 x 1 (10)	Connector HKO 025, screw cap HKM 032	< 1 bar	12 x 30	-35...90	LZS 021
EPDM hose, not insulated	VC 600 M16 x 1 (10)	Connector HKO 061, screw cap HKM 032	< 1 bar	9 x 11	10...90	RKJ 111
EPDM hose, not insulated	VC 600 M16 x 1 (10)	Connector HKO 025, screw cap HKM 032	< 1 bar	12 x 16	10...90	RKJ 112
Rubber hose with fabric reinforce- ment	VC 600 M 16 x 1 (10)	Connector HKO 025, HKO 026, screw cap HKM 032	All equip- ment	13 x 19	-40...100	RKJ 031

Type	Machine Pump con- nection		Pump pressure	Clear width x outer diameter in mm	Temper- ature range in °C	Order number
Rubber hose with fabric reinforce- ment	VC 1200 to VC 5000 (W) G $\frac{3}{4}$ (15), con- nector $\frac{3}{4}$ "	Connector with screw cap EOA 004	All equip- ment	19 x 27	-40...100	RKJ 032
Rubber hose with fabric reinforce- ment	VC 7000 to VC 10000 (W) G $1\frac{1}{4}$ (20), connector 1"	Connector with screw cap EOA 005	All equip- ment	25 x 34	-40...100	RKJ 033

#### Hose clamps

Fits hose	Internal Ø in mm	Order number
RKJ 111	8...16	EZS 012
RKJ 112, RKJ 031	12...22	EZS 013
RKJ 032, RKJ 033	25...40	EZS 016

#### 4.3.2 Connecting external consumers



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

Electric shock, scalding, frostbite

- Use only closed consumers.



**CAUTION!**  
Bursting of the external hydraulic circuit because of  
overpressure

Impact, cutting, scalding, frostbite

- Lay tempering hoses so that they do not kink.

Note the following:

- Always use the largest possible diameters and shortest possible hose lengths in the external liquid circuit.  
If the tempering hose 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 tempering hoses 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, you risk device overflow.
- In the event of hose rupture, hot liquid can escape and become a danger for persons and material.

## 4.4 Cooling water

### 4.4.1 Cooling water requirements

This section is relevant for the following:

- For water-cooled equipment

#### General requirements

There are specific requirements for the cooling water concerning its purity. In accordance with the cooling water requirements, a suitable process for treatment and maintenance of the water must be used. The condenser and the complete cooling water circuit can be clogged, damaged and leak due to unsuitable cooling water. Extensive consequential damage to the complete refrigerant circuit can be produced. The cooling water quality is dependent on the local conditions.

- Free chlorine, e.g. from disinfectants and water containing chloride results in pitting corrosion in the cooling water circuit.
- Distilled, deionised or demineralised water is not suitable due to its corrosive properties and results in corrosion in the cooling water circuit.
- Sea water is not suitable due to its corrosive properties and results in corrosion in the cooling water circuit.
- Water containing iron and iron particles in the water result in rust formation in the cooling water circuit.
- Hard water is not suitable for cooling due to the high lime content and results in calcification in the cooling water circuit.
- Cooling water with suspended matter is not suitable.
- Untreated, not purified water, e.g. river or cooling tower water is not suitable due to its microbiological content (bacteria) which can settle in the cooling water circuit.



Suitable cooling water quality

Data	Value	Unit
pH value	7.5 – 9.0	
Sulphates [SO <sub>4</sub> <sup>2-</sup> ]	< 70	mg/L
Hydrogen carbonate [HCO <sub>3</sub> <sup>-</sup> ] / Sulphates [SO <sub>4</sub> <sup>2-</sup> ]	> 1.0	
Water hardness (alkaline earth ions content)	0.71 - 1.52	mmol/L
Hydrogen carbonate [HCO <sub>3</sub> <sup>-</sup> ]	70 – 300	mg/L
Conductivity	10 - 500	µs/cm
Chlorides (Cl <sup>-</sup> )	< 50	mg/L
Sulphite (SO <sub>3</sub> <sup>2-</sup> )	< 1	mg/L
Free chlorine gas (Cl <sub>2</sub> )	< 1	mg/L
Nitrates (NO <sub>3</sub> <sup>-</sup> )	< 100	mg/L
Ammonia (NH <sub>3</sub> )	< 2	mg/L
Iron (Fe), dissolved	< 0.2	mg/L
Manganese (Mn), dissolved	< 0.1	mg/L
Aluminium (Al), dissolved	< 0.2	mg/L
Free, aggressive carbonic acid (CO <sub>2</sub> )	< 5	mg/L
Hydrogen sulphide (H <sub>2</sub> S)	< 0.05	mg/L
Algae growth	not permitted	
Suspended matter	not permitted	

#### 4.4.2 Connecting cooling water

This section is relevant for the following:

- For water-cooled devices

Description	Value
Maximum cooling water pressure	10 bar
Differential pressure cooling water $\Delta p$	1...6 bar VC 1200 W and VC 2000 W 3...6 bar $\geq$ VC 3000 W
Cooling water temperature	approx. 15 °C recommended, 10 to 30 °C permissible (with performance restrictions)

Note the following:

- Fix the cooling water hoses in place with hose clamps.
- Fix the supply hose of the water cooling in place in the sink area to prevent uncontrolled sliding, also in the event of pressure surges.  
Fix the supply hose of the water cooling in place in the sink area so that spraying out of hot cooling water is not possible.
- Prevent kinking or squeezing of the hoses.
- We recommend using a leak detector with water shut-off to prevent damage due to cooling water system leaks.
- Ensure that the cooling water meets the required criteria.
- In the case of leaks in the condenser, there is the danger that refrigerator oil and refrigerant from the refrigerant circuit of the device can get into the cooling water. Comply with all applicable legal provisions and the requirements of the water supply companies at the operating site.

## 4.5 Interfaces

### 4.5.1 Install USB driver

The driver is installed once per PC. Supported operating systems are Windows ME, Windows XP, Windows 2000 and Windows Vista. The driver must be installed before connecting the PC to the device. LAUDA provides a driver specially designed for the USB interface for a free download at <http://www.lauda.de>.

Personnel:           ■ Specialist

1. Execute the file "LAUDA\_ECO\_USB\_Treiber.exe".
  - An assistant is displayed. Follow the instructions.

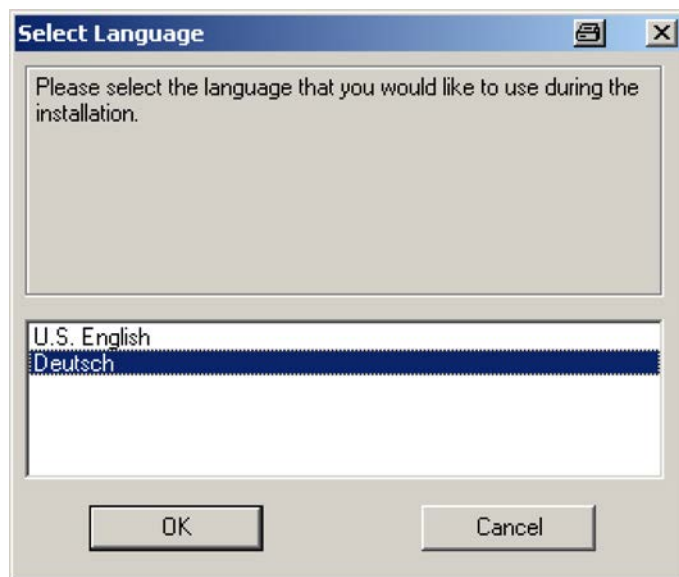


Fig. 6: USB driver "Select language"

2. Select a language and confirm with **OK**.

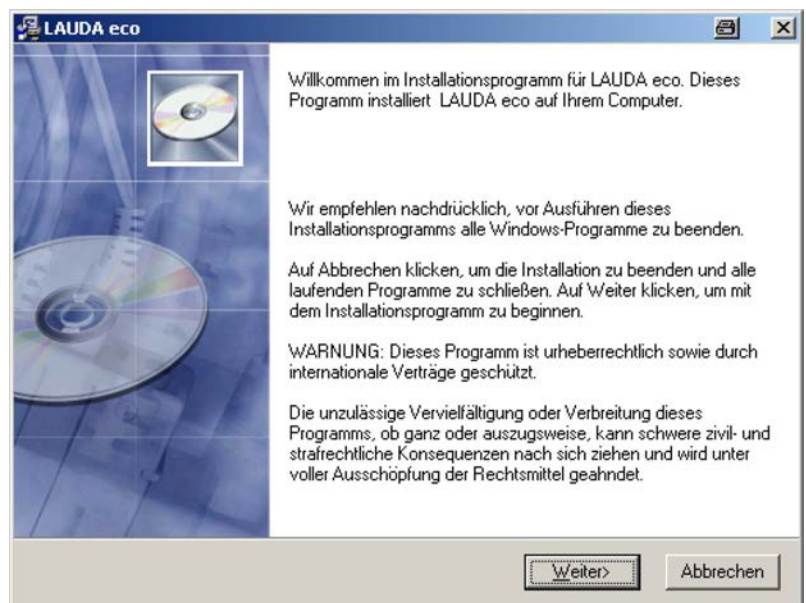


Fig. 7: USB driver "Welcome"

3. Click on *More*.



Fig. 8: USB driver "Complete installation"

4. Click on *Complete*.
  - The driver is installed.

### 4.5.2 Create USB connection

If a device is connected with the USB interface, a free COM port is assigned automatically. The PC clearly identifies the device with an internal serial number and always assigns the same COM port to the device. If additional devices are connected with the USB interface then other free COM ports are assigned to these devices.



Before connecting a PC via USB interface, install the appropriate USB driver on the PC.

#### Create the connection

Personnel: ■ Specialist

1. Switch off the machine.
2. Plug the USB cable into the control head.



The connecting cable is not included in the delivery scope. Make sure to use the correct plug for the connection.

3. Switch on the machine with the mains power switch.
  - During the first start-up, an assistant for searching for new hardware opens. Follow the instructions of the assistant.

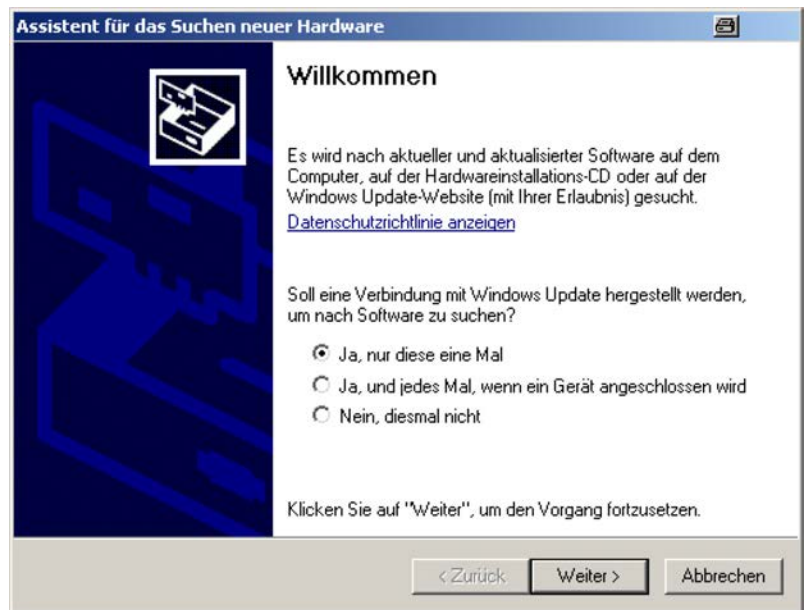


Fig. 9: USB driver set-up "Welcome"

4. Click on *More*.

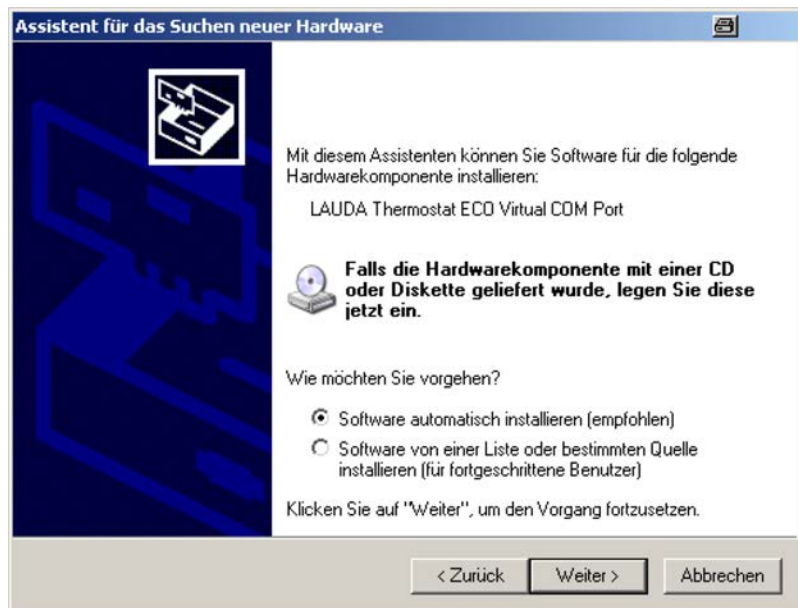


Fig. 10: USB driver set-up "Query"

5. Click on *More*.

- The installation process is started. The following window may be displayed during installation under Windows, if necessary. You can ignore the message. Click on *Continue installation*.



Fig. 11: USB driver set-up "Compatibility"

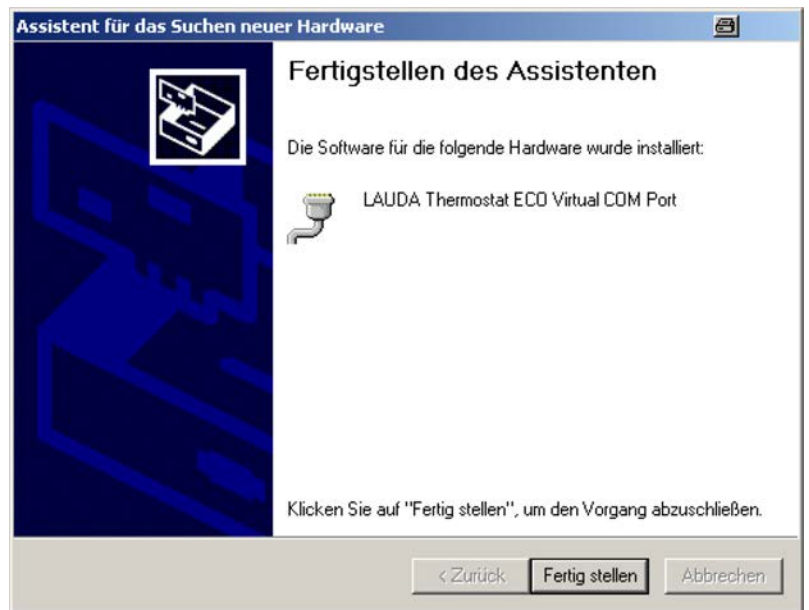


Fig. 12: USB driver set-up "Complete"

6. Click on *Complete*.
  - Installation is completed.

### Where is the COM port?

The device can be operated as a COM port with the regular communication programs (e.g. Hyperterminal or putty). Other settings, like e.g. baud rate, are not necessary.

1. Open the control panel of your operation system.
2. Select the entry *System*.
3. Select the tab *Hardware*.
4. Click on the *Device manager*.
5. Open the entry *Connections (COM and LPT)*.

### 4.5.3 Alarm output 12N

#### Available functions

Function	Description
<i>Alarm output</i>	
<i>Alarm and standby</i>	for on-site return flow protection

- View of flange connector (front) or solder side coupling socket
- Max. 30 V DC; 1 A

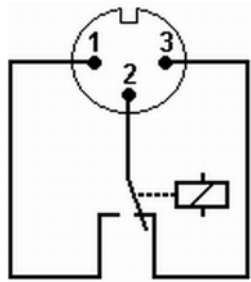


Fig. 13: Flange connector (front) in idle state

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

### Idle state

- The device is in idle state when it is switched off and in case of failure.
- Pins 1 and 2 are open.
- Pins 3 and 2 are closed.

### GO state

- The device is in GO state immediately after switching on and during normal operation.
- Pins 1 and 2 are closed.
- Pins 3 and 2 are open.

### Note the following:

- Only use shielded connection cables; connect the shield to the connector case. Cover unused plug connections with protective caps.

## 4.5.4 RS 232/485 module

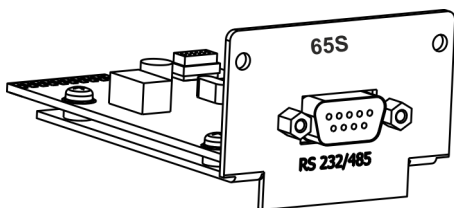


Fig. 14: RS 232/485 module 65S

The serial interface is an RS 232/485 interface module with 9-pin SUB-D socket (order no. LRZ 913). It is galvanically separated with an opto-coupler. The LAUDA command set makes it compatible with the Proline and Integral series for the most part.

Serial cable RS 232: Order no. EKS 037, 2 m cable and EKS 057, 5 m cable



## Cable and interface test RS 232

Computer					Thermostat		
Signal	9-pin Sub-D connector		25-pin Sub-D connector		9-pin Sub-D 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. Unassigned pins should not be connected.
- The RS-232 interface can be easily checked on a connected PC with the Microsoft Windows operating system. In Windows® 95/98/NT/XP, with the program "HyperTerminal".



Starting with Windows Vista, HyperTerminal is no longer an integral part of Windows. However, it is possible to purchase and download the program. Alternatively, there are also Open Source terminal programs such as putty with a similar range of functions.

## Protocol RS 232

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.  
CR = Carriage Return (hex: 0D); LF = Line Feed (hex: 0A)
- The response from the thermostat is always terminated with CRLF.

Example for set-point transfer of 30.5 °C to the thermostat.

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

### Cable RS 485

Contact	Data
1	Data A (-)
5	SG (Signal Ground) optional
6	Data B (+)

Note the following:

- Use shielded connection cables. Connect shield to connector case.
- The cables must be galvanically isolated from the rest of the electronics.
- Unassigned pins should not be connected.
- A RS 485 bus absolutely requires bus termination in the form of a termination network that ensures a defined idle state during the high-ohm phases of bus operation. The bus termination looks as follows. This termination network is generally integrated on the PC plug-in card (RS 485).

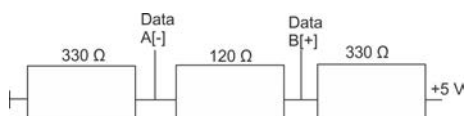


Fig. 15: RS 485 termination

### Protocol RS 485

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 device address always precedes the RS 485 commands. Up to 127 addresses are possible. The address must always have three digits (A000\_... to A127\_...).
- The command from the computer must be terminated with CR. CR = Carriage Return (hex: 0D)
- The response from the thermostat is always terminated with CR.

Example for set-point transfer of 30.5 °C to the thermostat.  
Address 15 is used in this example.

Computer	Thermostat
"A015_OUT_SP_00_30.5"CR	➔
←	"A015_OK"CR

### 4.5.5 Analog module

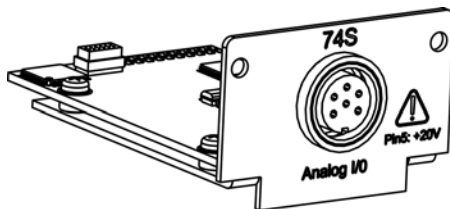


Fig. 16: Analog module 74S

The analog module (order no. 912) has 2 input and 2 outputs that are fed out to a 6-pin DIN socket according to the Namur recommendation (NE 28).

The inputs and outputs can be adjusted independently as 0...20 mA, 4...20 mA and 0...10 V interfaces. Different functions can be selected for input and outputs. The signal is accordingly interpreted differently on the input or different information emitted on the output. There are 20 V DC available for measuring transducers.

Interfaces are freely scalable with *minimum* and *maximum value* according to the set function. For instance, 4 mA complies with 0 °C and 20 mA complies with 100 °C. The precision of the inputs and outputs after calibration is better than 0.1 % of the full scale value (full scale).

- Current inputs: Input resistance < 100 ohm
- Voltage inputs: Input resistance > 50 k Ohm
- Current outputs: Output load < 400 ohm
- Voltage outputs: Load > 10 k Ohm

#### Available functions

##### Inputs

Function	Description
<i>Target temperature</i>	
<i>Ext. actual temperature</i>	external actual temperature
<i>Pump performance</i>	

##### Outputs

Function	Description
<i>Target temperature</i>	
<i>Controlled temp.</i>	The temperature that is set.

Function	Description
<i>Internal temp.</i>	Actual temperature (bath temperature)
<i>External temp. Pt100</i>	External actual temperature of the Pt100
<i>External analog temp.</i>	External actual temperature of the analog input
<i>External serial temp.</i>	External actual temperature of the serial interface
<i>Control variable</i>	
<i>Pump performance</i>	
<i>Pump speed</i>	



The menu items that cannot be carried out during practical use are hidden from this menu item collection.

### Connection

A 6-pin round connector with threaded coupling and contact arrangement according to DIN EN 60130-9 or IEC 130-9 is required.

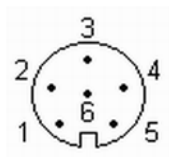


Fig. 17: Namur analog plug

### View of the socket (socket 74S) front or solder side plug

Contact	Description
Contact 1	Output 1
Contact 2	Output 2
Contact 3	0 V reference potential
Contact 4	Input 1
Contact 5	+20 V (max. 0.1 A)
Contact 6	Input 2

Use only shielded connection cables. Connect the shield to the connector case.

#### 4.5.6 Contact module LRZ 914

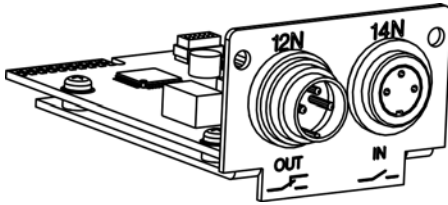


Fig. 18: Contact module LRZ 914

Contact module with plug-in connector according to NAMUR NE28 with 1 output and 1 input each on 2 DIN sockets (order no. LRZ 914).

##### Available functions

##### Inputs

Function	Description
<i>Error</i>	Set malfunction
<i>Standby</i>	Set standby
<i>Control timer</i>	Control timer control. Input 1 activates the control timer. During the first "closed", the control timer is started and set to <i>pause</i> with "open". The next "closed" triggers <i>forward</i> .
<i>Alternating operation</i>	Alternating operation control. Two different target temperatures are assigned to the switching states contact "open" or "closed".
<i>Control type</i>	Control type control. Two different control temperature sources can be assigned to the switching states input "open" or "closed", for instance internal or external control.

##### Outputs

Function	Description
<i>Error diagnosis</i>	Signalling various error conditions
<i>Standby</i>	Signal standby
<i>Temperature range</i>	Specify the status of the actual temperature within a specific range (inside/outside)
<i>Control timer</i>	State the control timer status

### Output and input contact

#### Output

- View of flange connector (front) or solder side coupling socket
- Max. 30 V; 0.2 A

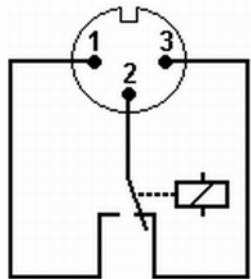


Fig. 19: Coupling socket output

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

#### Input

- View of socket (front) or solder side plug
- Signal approx. 5 V, 10 mA
- Do not assign contact 3

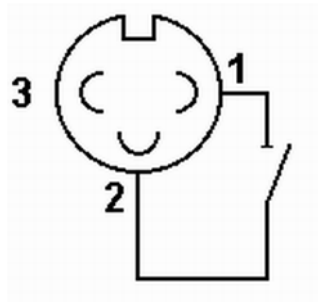


Fig. 20: Coupling plug input

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

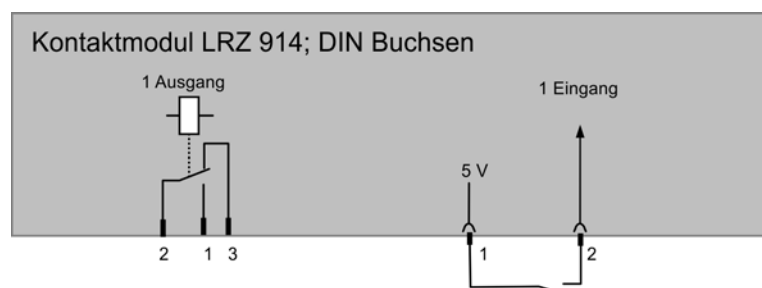


Fig. 21: Connection LRZ 914

## Connection

Note the following:

- Only use shielded connection cables; connect the shield to the connector case. Cover unused plug connections with protective caps.

### 4.5.7 Contact module LRZ 915

Note the following:

- The following steps may be carried out by technical staff only.

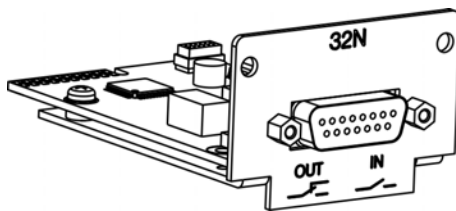


Fig. 22: Contact module LRZ 915

Contact module on 15-pin SUB-D socket (order no. LRZ 915). The contact module has the same functionality as LRZ 914, but with 3 relay contact outputs (change-over contact, max. 30 V/ 0.2 A) and 3 binary inputs for control via external potential-free contacts.

## Contact input and output

View of socket from the plug side or of the plug from the solder side.

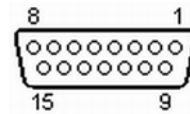


Fig. 23: Socket LRZ 915

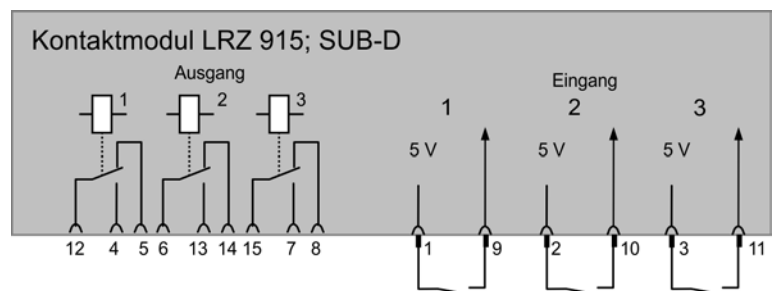


Fig. 24: Connection LRZ 915

You can order a matching 15-pin Sub-D plug together with the matching case with order no. EQM 030 (connector case order no. EQG 017).

## 5 Commissioning

### 5.1 LAUDA heat transfer liquids

Note the following:

- In each case, the heat transfer liquids cover a specific temperature range. This temperature range must match the temperature range of your application. The temperature range of your application is defined using the adjustable temperature limits of the device.
- At the lower limit of the temperature range of the heat transfer liquid, worsening of the tempering characteristics can be expected due to the rising viscosity. Therefore, only use all of this temperature range if required.
- Never use contaminated heat transfer liquids. Soiling of the pump chamber can result in blocking of the pump and thus lead to a shut-down of the device.
- Observe the safety data sheet of the heat transfer liquid. You can request the safety data sheets at any time if required.

#### Heat transfer liquids overview

LAUDA designation	Chemical designation	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		
					Order number		
					5 L	10 L	20 L
Kryo 30	Mono ethylene glycol / water	-30...90	4	50 at -25 °C	LZB 109	LZB 209	LZB 309
Kryo 40	Aqueous saline solution	-40...60	2.4	8 at -20 °C	LZB 119	LZB 219	LZB 319
Aqua 90	decalcified water	5...90	1	--	LZB 120	LZB 220	LZB 320

Note the following for Kryo 30:

- The water content reduces during long operating with higher temperatures and the mixture becomes flammable (flame point 128 °C). Check the mixture ratio using a hydrometer.

#### Heat transfer liquid water

- The earth alkaline ions content in 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 machine.
- The pH value of the water must be between 6.0 and 8.5.




- Distilled, deionised, demineralised water or sea water 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 ( $\text{Na}_2\text{CO}_3$ , sodium carbonate) per litre of water.
- 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.

Use of purified water

- The use of purified water is an option for devices VC 600 to VC 2000 (W).

5.2 Establishing power supply

Personnel:                    ■ Operating personnel

**NOTICE!**  
**Use of unauthorised mains voltage or mains frequency**

Machine damage

- Compare the rating plate with available mains voltage and mains frequency.

Also note the following:


- Only connect the equipment to earthed (PE) power sockets.

5.3 Setting pump pressure

The pump pressure can be regulated using a bypass valve for machines with bypass. The pump pressure can thus be set individually when using pressure-sensitive external consumers.

Personnel:                    ■ Qualified operating personnel

1. To reduce the pump pressure, turn the bypass regulator anti-clockwise until the maximum permissible pressure for the external consumer is reached.

 Monitor the display on the manometer for this.

2. To increase the pump pressure, turn the bypass regulator clockwise until the required pressure for the external consumer is reached.

### 5.4 Filling the device

- Personnel: ■ Operating personnel
- Protective equipment: ■ Protective goggles  
■ Protective clothing  
■ Protective gloves



#### **WARNING!** **Discharge of heat transfer liquid**

Scalding, frostbite

- Make sure that the device is not filled excessively. Please note the level indicator as well as thermal volume expansion of the heat transfer liquid.
- Avoid spraying heat transfer liquid. Use a funnel for filling.



#### **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.

1. Close the drain tap. Turn the levers to the left for this.
2. Pull up the cover of the filler nozzle up.
3. Switch on the machine using the mains power switch. A signal tone sounds.



For VC 600 to VC 3000 (W), press the mains power switch to the position [1].

For VC 5000 (W) and higher, turn the mains power switch to the position [1].

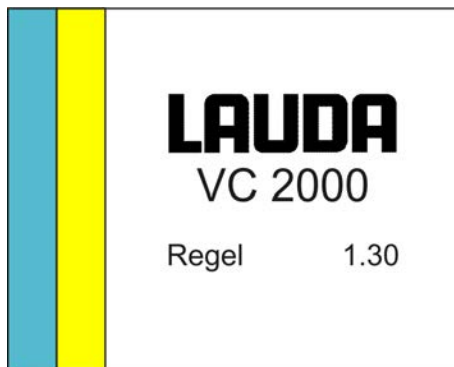


Fig. 25: Start image

4. Type designation and version numbers of the software available as standard in the device are shown in the display for approx. 5 seconds.



You can call the version numbers of the software available in the device at any time with a menu call.



Fig. 26: Menu language

5. You can select the required menu language with the arrow buttons UP and DOWN. Confirm your selection with the ENTER button.



Select *German*, for instance, to see display entries in German.

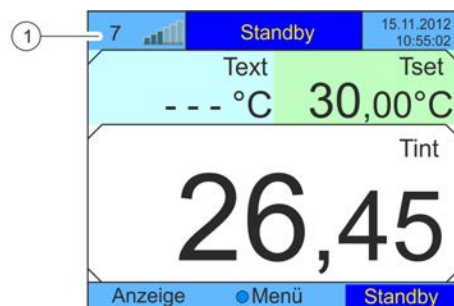


Fig. 27: Basic window, device in standby

- 1 Level indicator

6. The basic window is displayed.



After start-up, the device is automatically in the standby operating mode.

7. Fill the device with heat transfer liquid. Monitor the level indicator while filling.



If necessary, use a funnel for the filling.



The internal bath of the device must be filled with heat transfer liquid above the minimum fill level. Otherwise, there is an alarm. The minimum fill level is reached when the first bar in the level indicator lights up blue.



The internal bath of the device may not be filled with heat transfer liquid above the maximum fill level. Otherwise, there is a warning. The maximum fill level is reached when all bars in the level indicator light up blue.

8. Activate device operation by pressing the right [Standby] soft key.
9. Close the filler nozzle with the cover.

## 6 Operation

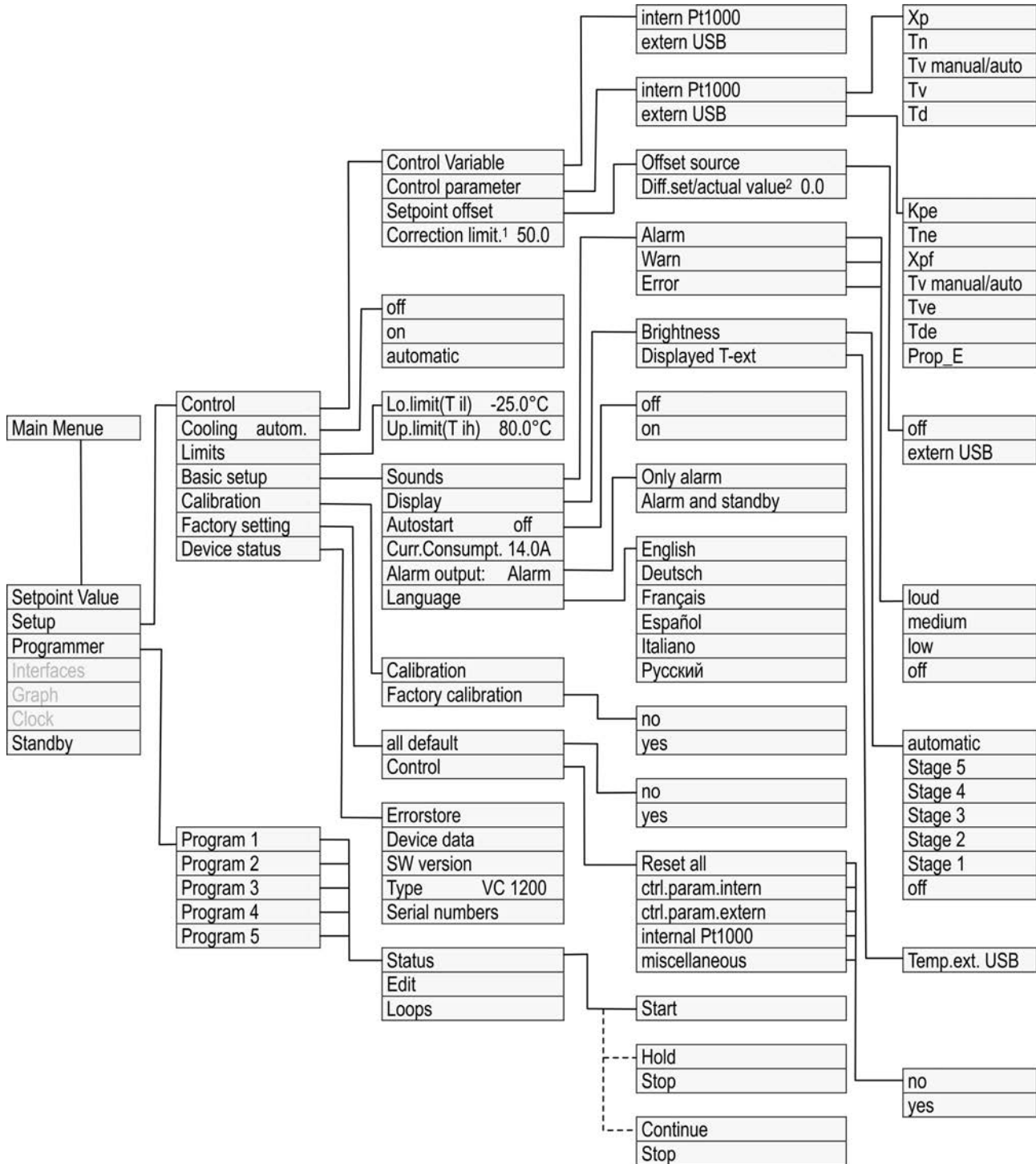
### 6.1 Operating modes

Two operating modes are supported for the devices.

- During operation, all components of the device are operated.
- During standby, all components of the device are switched off. Only the device display is supplied with power. This operating mode is suitable for making comprehensive settings, for instance.

## 6.2 Menu structure overview

Menu structure for target temperature, settings and control timer



<sup>1</sup> Correction limitation

<sup>2</sup> Difference between set point/actual value

Fig. 28: Menu structure part 1

Menu structure for diagram, clock and standby

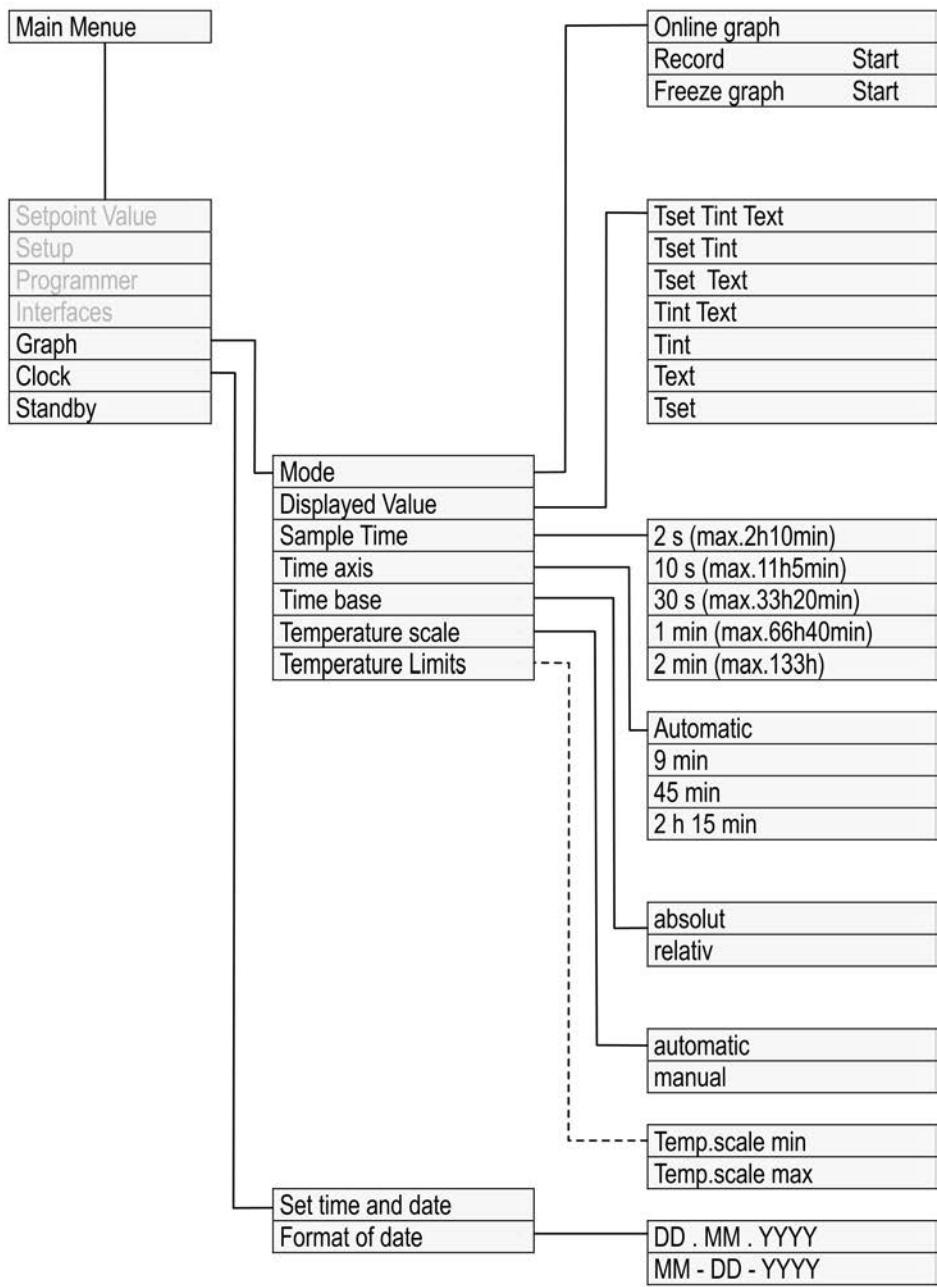


Fig. 29: Menu structure part 2

### 6.3 Switching on the machine

Personnel: ■ Operating personnel

1. Switch on the machine using the mains power switch. A signal tone sounds.



For VC 600 to VC 3000 (W), press the mains power switch to the position [1].

For VC 5000 (W) and higher, turn the mains power switch to the position [1].

2. Type designation and version numbers of the software available as standard in the device are shown in the display for approx. 5 seconds.



You can call the version numbers of the software available in the device at any time with a menu call.



Fig. 30: Start image

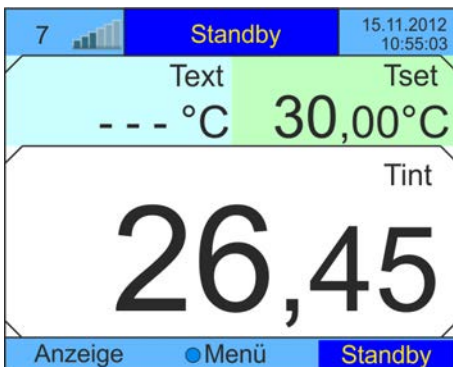


Fig. 31: Basic window, device in standby

3. The basic window is displayed.



After start-up, the device is automatically in the standby operating mode.

- During normal operation, the components of the device are started, like e.g. the pump. During standby operation, the components stay switched off. The basic window is shown in the display.
4. Activate device operation by pressing the right [Standby] soft key.

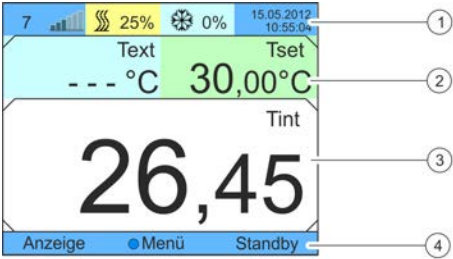
### 6.4 Screen displays

#### 6.4.1 Basic window

The basic window is displayed after the device is switched on. The basic window contains different components depending on the operating mode.

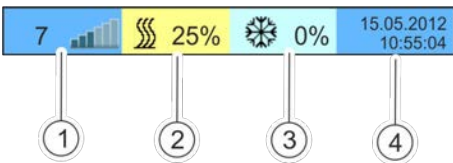


## During normal operation



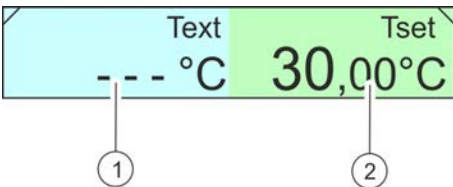
- 1 Expanded status display
- 2 Status display
- 3 Internal actual temperature Tint (depending on set variable, the external actual temperature Text is also displayed here)
- 4 Soft key bar

Fig. 32: Basic window set-up



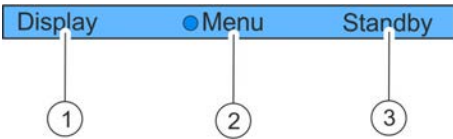
- 1 Level indicator
- 2 Heater is active and heats with the shown percental performance of the total performance. This display is available only if the device is equipped with the optional heater.
- 3 The cooling is active and cools with the shown percental performance of the total cooling performance.
- 4 Display of date and time

Fig. 33: Expanded status display



- 1 External actual temperature Text (depending on set variable, the internal actual temperature Tint is also displayed here)
- 2 Target temperature Tset

Fig. 34: Status display

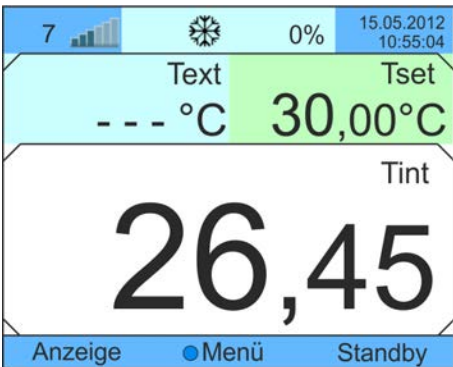


- 1 Soft key left
- 2 ENTER button
- 3 Soft key right

This bar shows the functions of the soft keys. The function of the ENTER button is additionally displayed.

Fig. 35: Soft key bar

## During normal operation - devices without optional heater



Unlike devices with optional heater, there is no field with heat output information available in the expanded status display.

Fig. 36: Basic window without optional heater

## During standby operation



Fig. 37: Basic standby window

## 6.4.2 Menu window

### Navigate to main menu

- You can carry out the following steps to get to the main menu:
  - Press the ENTER button in the basic window.
  - If you are in a submenu, you can return to the main menu with the left arrow button.

### Main menu set-up

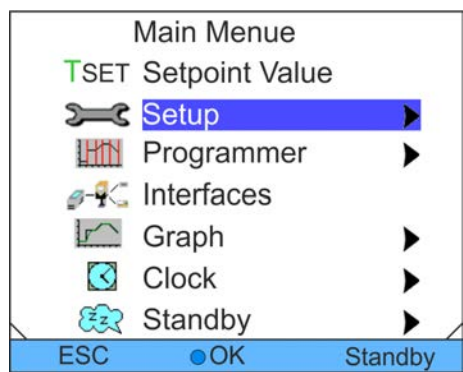


Fig. 38: Main menu

The main menu as well as the submenus are comprised of menu items that are marked as follows.

Symbol	Description
▶	Shows that there are additional menu levels (submenus).
🔒	The padlock symbolises a blocked function. These functions may not be adjusted.
	The currently selected entry is highlighted with colour.

### Soft key bar functionality

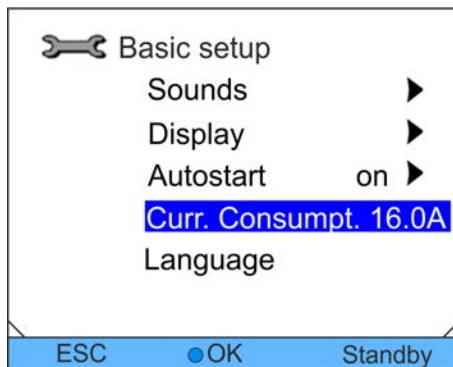
The soft key bar is shown in the lower display area. The following functions can, for instance, be selected with the soft keys:

[ESC] takes you back to the basic window.

[OK] takes you to the submenu or an entry window.

[Standby] resets the device to the standby status.

## Set-up of submenus



The set-up of submenus essentially complies with that of the main menu.

Fig. 39: Power consumption adjustment

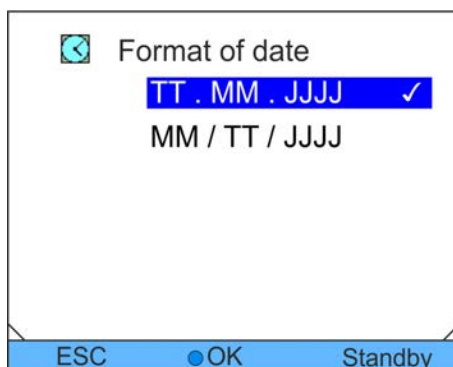
## Navigation in the menus

1. You have the following options:
  - Use you the arrow buttons UP and DOWN to navigate between the menu items.
  - Press the right arrow button to select a submenu.
  - To return to a previous menu, press the left arrow button.
  - The selected menu entry is highlighted in colour.

## 6.4.3 Input window

The input window is used for configuration of settings in the screen. There are different variants of input windows.

### Input window for selecting options



- The arrow keys are used for navigation in the options.
- The currently active setting is shown highlighted.
- The setting confirmed using the ENTER key is marked with a tick.

Fig. 40: Selecting date format

### Input window for manual input

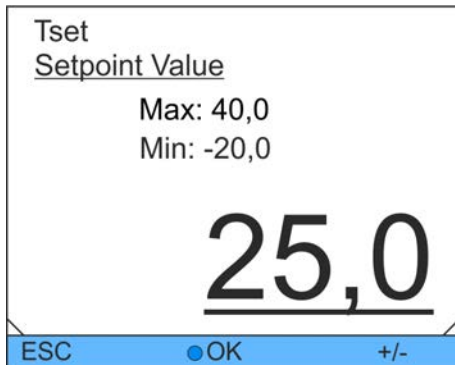


Fig. 41: Specifying setpoint temperature

- The value to be entered is displayed larger. The cursor under the value flashes.
- The value can be changed using the UP and DOWN arrow keys. If one of the two arrow keys is kept pressed longer, the input is accelerated.
- Individual digits can be selected and changed by pressing the RIGHT and LEFT arrow keys.

## 6.5 Defining temperature limit values

With the temperature limits you define the temperature range of your application, i.e. the range in which tempering can take place.

Personnel: ■ Operating personnel

1. Switch to the main menu.
2. Select the menu item *Settings* → *Temp. limit values*.
3. Select one of the following options:
  - To set the lower limit value, chose the first entry *Til*.
  - To set the upper limit value, chose the second entry *Tih*.

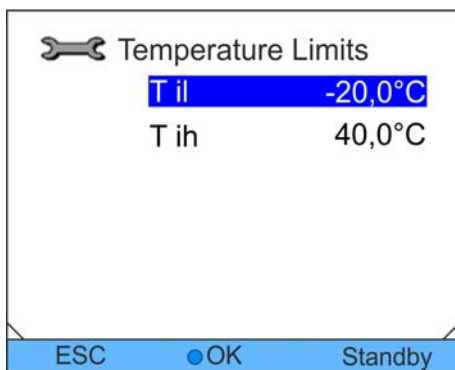


Fig. 42: Select the temperature limit value

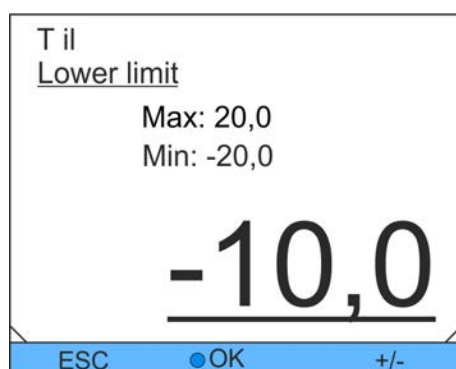


Fig. 43: Defining a temperature limit value

4. Adjust the value in the following entry window.



You can change the algebraic sign with the soft key button [+/-].



Using the softkey *ESC*, you return to the previous display without making any changes.

## 6.6 Defining the target temperature value

Personnel:  Operating personnel

1. Switch to the main menu.
2. Select the menu item *Target temperature* in the main menu.
  - An entry window is displayed. The cursor flashes below the value. The target temperature can be adjusted within the shown limit values.
3. Adjust the target temperature accordingly.

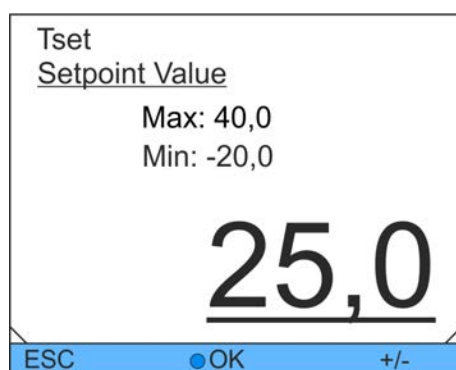


Fig. 44: Defining the target temperature



You can change the algebraic sign with the soft key button [+/-].



Using the softkey *ESC*, you return to the previous display without making any changes.

4. Confirm with the ENTER button.

## 6.7 Activating and deactivating standby

During standby operation, the components of the device are switched off, like e.g. the pump. The display remains activated.



Fig. 45: Basic standby window

Personnel: ■ Operating personnel

1. Press the [Standby] soft key button.
  - The standby mode is activated. The *Standby* entry in the soft key bar is highlighted. This operating mode is additionally shown in the expanded status display.
2. To deactivate the standby mode again, press the *Standby* soft key button again.

## 6.8 Restoring the factory settings

### Navigating to the factory settings

1. Switch to the main menu.
2. Select the menu item *Settings* → *Factory settings*.

### Restoring individual settings

Personnel: ■ Operating personnel

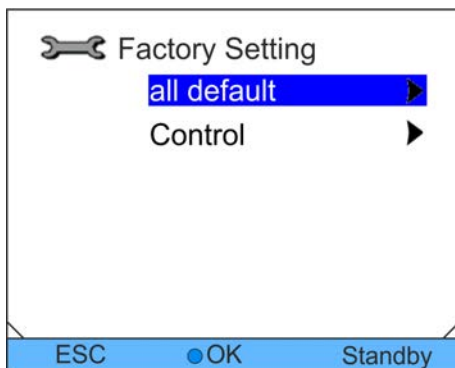


Fig. 46: Select the mode

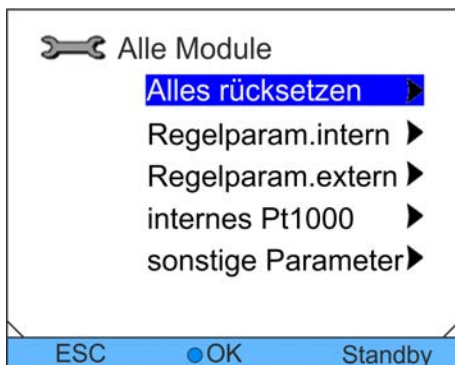


Fig. 47: Restoring control parameters

1. Select the menu item *Control*.
  - It takes you to a list with which you can reset the parameters individually.
2. Select the appropriate menu item in the parameter list.
  - With *Control param.internal*, you can reset the internal control parameters.
  - With *Control param.external*, you can reset the external control parameters.
  - With *Internal Pt1000*, you can reset the settings for the internal sensor.
  - With *Other parameters*, you can reset set-point and max. power consumption. Control is additionally set to internal control.

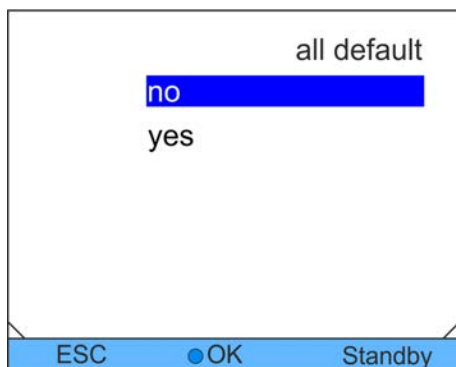


Fig. 48: Reset query

## Restoring all settings

3. Select one of the following options in the entry window:
  - No takes you to the previous display without changes.
  - Yes resets the selected parameter if you confirm with the ENTER button.

Personnel: ■ Operating personnel

1. Select the menu item *Restore everything*.
2. Select one of the following options:
  - No takes you to the previous display without changes.
  - Yes restores all factory settings if you confirm with the ENTER button.

## 6.9 External control

### 6.9.1 Activating the external control

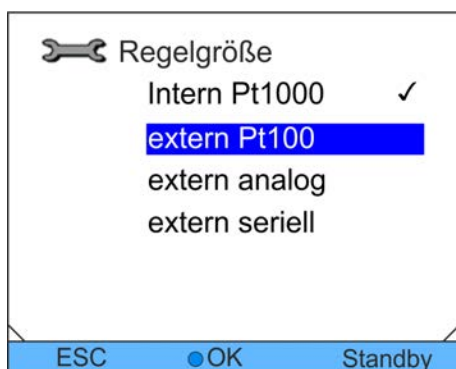


Fig. 49: Activating the external control

Personnel: ■ Operating personnel

1. Switch to the main menu.
2. Select the menu item *Settings* → *Control* → *Variable*.
3. Select the option *External Pt100* in the entry window.



This option is available only if a Pt100 module for an external temperature sensor has been connected. A temperature sensor must be connected to the module.

4. Confirm with the ENTER button.

### 6.9.2 Defining the set-point offset

It is possible to apply a value to the temperature that is predefined by the external temperature sensor and then process it as a set-point. The bath temperature can thus be e.g. -15 °C below the temperature of a reactor that the external temperature sensor measures.

#### Navigating to the settings

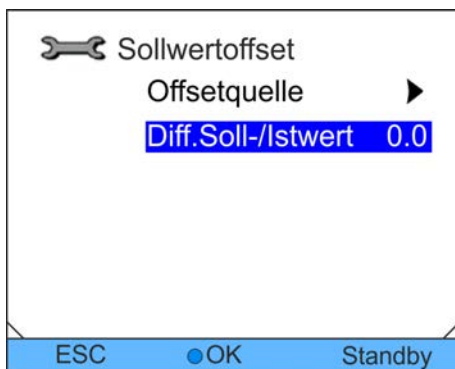


Fig. 50: Set-point offset menu

1. Switch to the main menu.
2. Select the menu item *Settings* → *Control* → *Set-point offset*.
3. Select one of the following options:
  - With *Offset source* you can determine which source to use to measure the offset.
  - With *Diff.target/actual value*, you can define the offset.

#### Defining the offset source

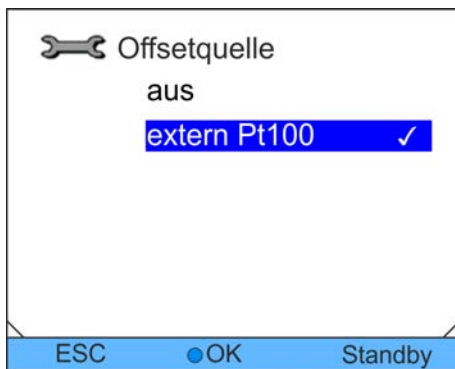


Fig. 51: Adjusting the set-point offset

Personnel: ■ Operating personnel

1. Select the menu item *Offset source* in the Set-point offset menu.
2. Select one of the following options:
  - You can deactivate the set-point offset with *Off*.
  - You can select the appropriate source with the other menu items. With *External Pt100*, for instance, you can define the set-point offset via external temperature sensor.



The left arrow button takes you to the previous display without changes.

3. Confirm with the ENTER button.

#### Defining the offset

Personnel: ■ Operating personnel

1. Select the menu item *Diff.target/actual value* in the Set-point offset menu.
  - An entry window is displayed. The offset can be adjusted within the shown limit values.



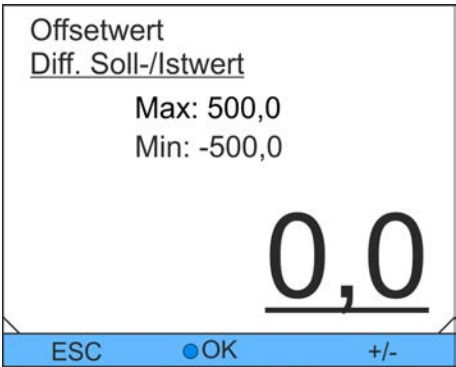




Fig. 52: Defining the offset

6.10 Control timer



6.10.1 Program example

2. Adjust the offset value accordingly.

-  You can change the algebraic sign with the soft key button [+/-] if the device has the appropriate equipment.
-  Using the softkey *ESC*, you return to the previous display without making any changes.

3. Confirm with the ENTER button.

The control timer function allows you to save a temperature-time program. The program consists of several temperature-time segments as well as information on their interval. Possible are ramps, temperature leaps (time is zero) or also temperature holding phases with identical start and end temperature in the segment. During the start, the current set-point is stored as the starting value of the first segment.

-  The total number of freely programmable segments is 150.
-  Five temperature-time program can be saved.

Possible settings

Setting	Description
No.	Segment number of the program
Tend	End temperature to be reached
hh	Time in hours (hh) in which the preset temperature is to be reached
mm	Time in minutes (mm) in which the preset temperature is to be reached
Tolerance	Tolerance determines the level of accuracy with which the end temperature is to be achieved before the next segment will be processed.

Setting	Description
Pump	Pump level at which the segment is to be processed.
S1, S2, S3	Switching contacts of the contact module (if available) can be programmed here. Contact modules are available as accessories.

The diagram on the side shows an example of reprogramming a target-temperature course.

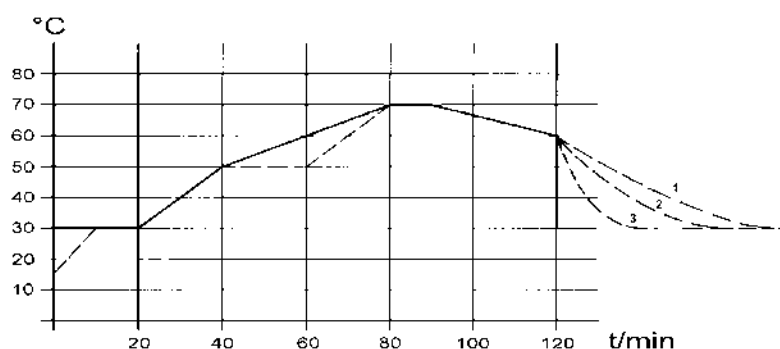


Fig. 53: Program example

The cooling time in the diagram varies depending on device type, consumer and the like. In sample segment no. 2, 50 °C is to be reached within 20 minutes.

The original values of the following table, "previously", are shown with solid lines, the edited course of the following table, "afterwards", with a dashed line.

previously (—)								
No.	Tend	hh	mm	Tol	Pump	S1	S2	S3
Start	30.00	--	--	0.1	2	off	off	off
2	50.00	0	20	0.0	2	off	off	off
3	70.00	0	40	0.0	3	off	off	off
4	70.00	0	10	0.1	4	off	off	off
5	60.00	0	30	0.0	2	off	off	off
6	30.00	0	0	0.0	2	off	off	off

A new segment with the number 3 was entered in the edited table. The time and pump level for the segment with number 4 were additionally changed. The tolerance and the pump level for the segment with number 5 were adjusted.

afterwards (---, edited)								
No.	Tend	hh	mm	Tol	Pump	S1	S2	S3
Start	30.00	--	--	0.1	2	off	off	off
2	50.00	0	20	0.0	2	off	off	off
<b>3</b>	50.00	0	20	0.1	3	off	off	off
<b>4</b>	70.00	<b>0</b>	<b>20</b>	0.0	<b>4</b>	off	off	off
<b>5</b>	70.00	0	10	<b>0.8</b>	<b>2</b>	off	off	off
6	60.00	0	30	0.0	2	off	off	off
7	30.00	0	0	0.0	2	off	off	off

The entered tolerance can have a great influence with an external bath control. The diagram on the side of the edited course clarifies the possible run-on of the actual temperature in the bath vessel (solid line) for the target temperature of the control timer (shaded grey).

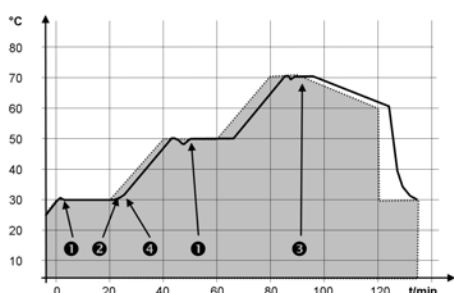


Fig. 54: Tolerance program

Please note:

- The field tolerance enables precise adherence to the delay time at a specific temperature. Only after the actual temperature of the tolerance range has been reached (1), will the subsequent segment be processed so that e.g. the ramp of the second segment will be started with a delay only at 2.
- A tolerance range that has been selected too narrow can also cause undesired delays. Especially with external control, the range should not be too narrow. In segment 5, a larger tolerance was entered so that the desired time of 10 minutes can be adhered to even with transient processes (3).
- Only flat (slow) ramps should be programmed with a tolerance range as needed. Steep ramps that are close to the maximum possible heating or cooling rates of the thermostat, may be highly delayed (4) with a too narrow tolerance range (here in segment 2).

A default time is not possible in the starting segment (no. 1). The temperature of the first segment is reached as quickly as possible to switch to segment 2 after reaching the set tolerance.

### 6.10.2 Selecting a program

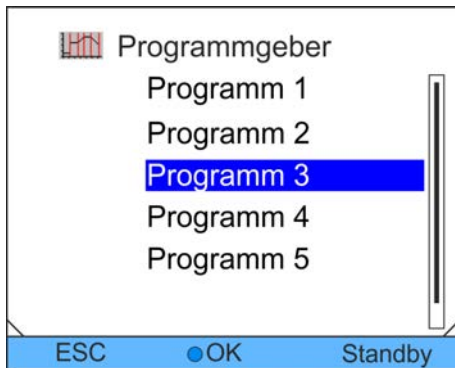


Fig. 55: Selecting a program

### 6.10.3 Creating a program

Personnel: ☒ Operating personnel

1. Switch to the main menu.
2. Select the menu item *Control timer*.
3. Select one of the available programs.

Note the following:

- Even if a program is currently carried out, new segments can be embedded and existing ones changed, even the currently active segment. In addition, all segments with the exception of the currently active one can be deleted at any time.
- Changes to the currently running segment are possible. The segment is continued as if the change had been valid since the segment was started.
- If the new segment time is shorter than the already passed segment time, the program will jump to the next segment.
- If a segment time of >999h: 59min is intended, this time must be distributed among several successive segments.

## Start processing

Nr.	Tend	hh	mm	Toleranz
Start	30.00	--	--	0.1
2	50.00	0	20	0.0
3	50.00	0	20	0.0
4	70.00	0	20	0.1
5	60.00	0	30	0.0
6	30.00	0	0	0.0

ESC
neu
lös

Fig. 56: Editing the program

## Editing segments

Personnel: ■ Operating personnel

1. Select the menu item *Edit* for the program.
2. You can now edit the segments.

Personnel: ■ Operating personnel

Note the following:

- A default time is not possible in the starting segment. The temperature of the first segment is reached as quickly as possible to switch to segment 2 after reaching the set tolerance.
  - If the value "0" is entered in the fields *hh* and *mm*, then the set-point is stored immediately and the bath temperature reached as quickly as possible.
  - If a tolerance range that is too small has been selected in the field *Tolerance*, the program may not be continued because the required tolerance is never reached.
  - Changes to the pump stage are entered in the respective program line. If the pump stage is to be left unchanged, "0" is entered (display hereby "---").
  - The standard setting for contact modules is *Off*. The entry „- -“ for contact modules stands for no changes to the previous segment, i.e. if „- -“ is in all fields, the contact setting of the starting setting or the setting before the program start is maintained.
1. You have the following options:
    - You can have additional columns of the program displayed with the right and left arrow buttons.
    - With the arrow keys UP and DOWN you can navigate in the segments a program.
    - You can edit a selected segment with the ENTER button. You can adjust the value with the arrow buttons UP and DOWN. Individual digits can be selected with the right and left arrow buttons. Confirm your changes with the ENTER button.



You can cancel segment editing with the soft key button *ESC*.

## Operation

### Inserting a new segment

Nr.	Tend	hh	mm	Toleranz
Start	30.00	--	--	0.1
2	50.00	0	20	0.0
3	50.00	0	20	0.0
4	70.00	0	20	0.1
5	60.00	0	30	0.0

ESC   ●neu   löschr

Fig. 57: Select program segments

### Deleting a segment

Personnel:      ■ Operating personnel

1. Navigate to the segment below which a new segment is to be inserted.
2. Press the ENTER button.

Personnel:      ■ Operating personnel

1. Navigate to the segment you want to delete.
2. Press the soft key button *Delete*.

### Completing editing

Personnel:      ■ Operating personnel

1. When you have completed the program, you can return to the program overview with the left arrow button.

## 6.10.4 Starting, interrupting and finishing a program

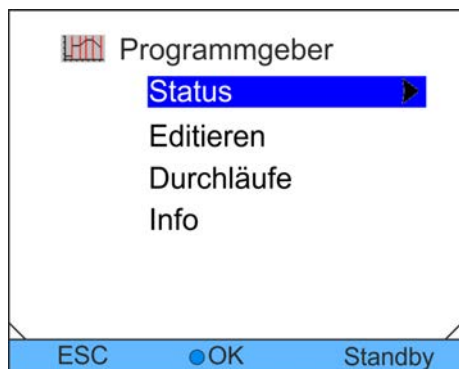


Fig. 58: Setting the program status

Personnel:      ■ Operating personnel

1. Select the menu item *Status* for the selected program.

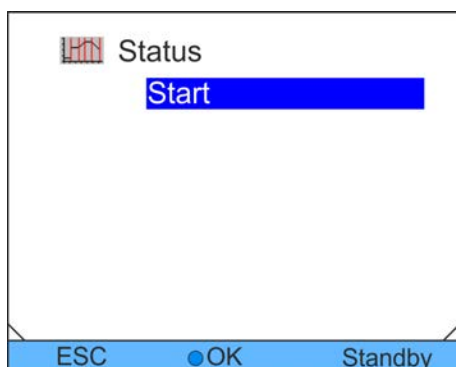


Fig. 59: Defining the program status

2. You have the following options:

- Select the option *Start* to start the program.
- When the program is started, it can be interrupted with *Pause*. An interrupted program can be continued with *Next*.
- Select the option *Stop* to stop the program.
- You can stop the control timer with the soft key button *Standby*. After the standby mode has been deactivated, the control timer will continue in the previously selected operating mode (pause or active operation).

## 6.10.5 Defining program sequences

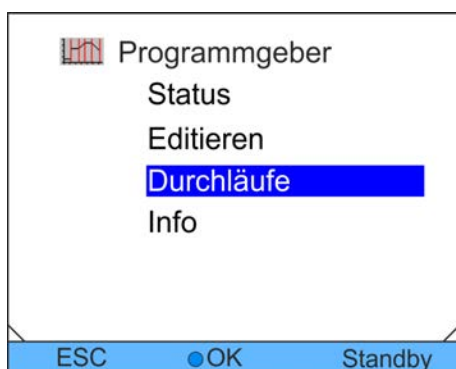


Fig. 60: Setting program sequences

Personnel:

- Operating personnel

1. Select the menu item *Sequences* for the selected program.

- An entry window is displayed. The sequences can be defined within the shown limit values.



Fig. 61: Defining program sequences

2. Adjust the number of sequences accordingly.



Press the left arrow button to enter two or three digit numbers. Another digit is displayed and can be adjusted.



If "0" is entered, the program is repeated continuously.



Using the softkey *ESC*, you return to the previous display without making any changes.

3. Confirm with the ENTER button.

### 6.11 Control parameter

The control parameters are preset for operation as circulation chiller (with water as heat transfer liquid) with internal control. For tempering external applications with external control, there are also preset parameters. Depending on the applications, adjustments of the configuration can be necessary from case to case. The thermal capacity and the viscosity of the heat transfer liquid also influence the control behaviour.

#### 6.11.1 Calling the control menu

Personnel: ☒ Operating personnel

1. Switch to the main menu.
2. Select the menu item *Settings* → *Control*.

#### 6.11.2 Overview of internal control parameters

The internal control compares the setpoint temperature with the actual temperature and calculates the corrective variable for the tempering.

Description	Abbreviation	Unit
Proportional range	Xp	K
Reset time	Tn	s
Derivative time	Tv	s
Damping time	Td	s



### 6.11.3 Adjusting internal control parameters

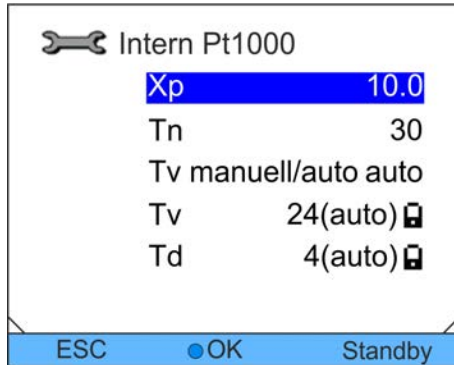


Fig. 62: Internal control parameter menu

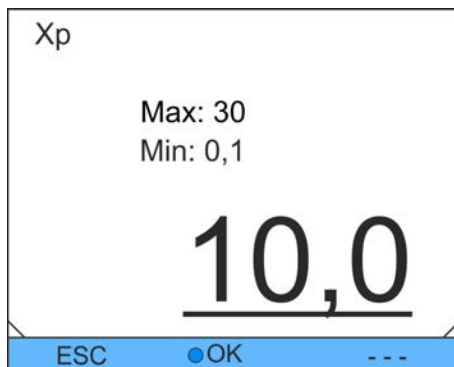


Fig. 63: Defining internal control parameters

Personnel: ☒ Operating personnel

1. Select the menu item *Control parameter* → *Internal Pt1000* in the control menu.
2. Select one of the following options:
  - You can select one of the listed control parameters.
  - With *Tv manually/auto* you can define whether the control parameters *Tv* and *Td* are set manually or automatically. If automatic setting is activated, both control parameters are shown with a lock and cannot be selected. They are derived with firm factors from *Tn* in this case.
3. Confirm with the ENTER button.
  - ▶ Selection of the menu item *Tv manually/auto* activates manual or automatic control depending on the previous setting. An entry window is displayed if other menu items are selected. The respective value can be adjusted within the shown limit values.
4. Adjust the value accordingly.



Please note the influence of the temperature limit values *Tih* and *Til* on the control.



Using the softkey *ESC*, you return to the previous display without making any changes.

5. Confirm with the ENTER button.

## 6.12 Interfaces

### 6.12.1 Read commands for serial interfaces

The following read commands are data requests to the device.



The following information refers to USB as well as RS 232/485 interfaces.

Command	Meaning
IN_PV_00	Query of the bath temperature (outlet temperature).
IN_PV_01	Query of controlled temperature (int./ ext., Pt/ ext., analog/ ext. serial).

## Operation

Command	Meaning
IN_PV_03	Query of external temperature TE (Pt100).
IN_PV_04	Query of external temperature TE (analog input).
IN_PV_05	Query of the level
IN_SP_00	Query of the temperature set-point
IN_SP_02	Query of operating mode cooling (0 = OFF / 1 = ON / 2 = AUTOMATIC).
IN_SP_04	Query of the outlet temperature limit TiH
IN_SP_05	Query of the outlet temperature limit TiL
IN_PAR_00	Query of control parameter Xp
IN_PAR_01	Query of control parameter Tn (181 = OFF).
IN_PAR_02	Query of control parameter Tv.
IN_PAR_03	Query of control parameter Td.
IN_PAR_04	Query of control parameter KpE.
IN_PAR_05	Query of control parameter TnE (response: XXXX; 9001 = OFF).
IN_PAR_06	Query of control parameter TvE (response: XXXX; 5 = OFF).
IN_PAR_07	Query of control parameter TdE (response: XXXX.X).
IN_PAR_09	Query of max. correction value limit.
IN_PAR_10	Query of control parameter XpF.
IN_PAR_14	Query of set-point offset.
IN_PAR_15	Query of control parameter PropE
IN_DI_01	Status of contact input 1: 0 = open / 1 = closed.
IN_DI_02	Status of contact input 2: 0 = open / 1 = closed.
IN_DI_03	Status of contact input 3: 0 = open / 1 = closed.
IN_DO_01	Status of contact input 1: 0 = normally open switch open / 1 = normally open switch closed.
IN_DO_02	Status of contact input 2: 0 = normally open switch open / 1 = normally open switch closed.
IN_DO_03	Status of contact input 3: 0 = normally open switch open / 1 = normally open switch closed.
IN_MODE_00	Keyboard: 0 = free/ 1 = blocked.
IN_MODE_01	Control: 0 = int./ 1 = ext. Pt100/ 2 = ext. Analog/ 3 = ext. Serial.
IN_MODE_02	Stand-by: 0 = device ON / 1 = device OFF.

Command	Meaning
IN_MODE_03	Keyboard remote control unit Command: 0 = free/ 1 = blocked.
IN_MODE_04	Set-point offset source: 0 = normal/ 1 = ext. Pt/ 2 = ext. Analog/ 3 = ext. Serial.
TYPE	Query of device type (response = "VC").
VERSION_R	Query of software version number from the control system.
VERSION_B	Query of software version number of remote control unit Command.
VERSION_A	Query of software version number of analog module.
VERSION_V	Query of software version number of RS 232/485 module.
VERSION_Y	Query of software version number of Ethernet module.
VERSION_D	Query of software version number of digital module.
VERSION_E	Query of software version number of external Pt100 module
STATUS	Query of the machine status, 0 = OK, -1 = fault.
STAT	<p>Query for the fault diagnosis, response: XXXXXXXX; X = 0 no fault, X = 1 fault</p> <p>1 character = error 2 characters = alarm 3 characters = warning 4 characters = low level warning 5 characters = low level alarm 6 characters = condenser dirty 7 characters = external control value missing</p>
RMP_IN_00_XXX	Query of a program segment XXX (response: e.g. 030.00_00010_005.00_001.00 => target temperature = 30.00 °C, time = 10 min, tolerance = 5.00 °C, pump stage = 1).
RMP_IN_01	Query of the current segment number.
RMP_IN_02	Query of the set program sequences.
RMP_IN_03	Query of the current program sequence.
RMP_IN_04	Query of which program additional commands refer to.
RMP_IN_05	Query of which program is currently running (0 = none).

## Operation

Command	Meaning
LOG_IN_00_XXXX	Query of a measuring point XXXX from data logger (response: e.g. 020.00_021.23_030.50 => target temperature = 20.00 °C, bath temperature = 21.23 °C, external temperature = 30.5 °C).
LOG_IN_01	Query of all measuring points from data logger. Unlike with command "LOG_IN_00", a tab is used as a delimiter here instead of '_'. The measuring points are separated with CR and LF. The end is indicated with CR LF CR LF.
LOG_IN_02	Query of starting time from data logger (response: e.g. 20_14_12_20 => day 20, 14:12:20).
LOG_IN_03	Query of recording interval from data logger (response in seconds).

Note the following:

- For “\_”, “ ” (space character) is also permitted.
- If nothing different is specified for the command, the reply is always in fixed decimal format "XXX-XX" or "-XXX-XX" for negative values or "ERR\_X".

### 6.12.2 Write commands of serial interfaces

The write commands are data specifications for the device.



The following information refers to USB as well as RS 232/485 interfaces.

Command	Meaning
OUT_PV_05_XXX.XX	Specifying external temperature via interface
OUT_SP_00_XXX.XX	Set-point transfer with max. 3 digits before the decimal point and max. 2 digits afterwards
OUT_SP_02_XXX	Operating mode cooling (0 = OFF / 1 = ON / 2 = AUTOMATIC).
OUT_SP_04_XXX	Upper limit of TiH outlet temperature
OUT_SP_05_XXX	Lower limit of TiL outlet temperature
OUT_PAR_00_XX.X	Setting control parameter Xp.
OUT_PAR_01_XXX	Setting control parameter Tn (5...180 s; 181 = Off).
OUT_PAR_02_XXX	Setting control parameter Tv.
OUT_PAR_03_XX.X	Setting control parameter Td.
OUT_PAR_04_XX.XX	Setting control parameter KpE.

Command	Meaning
OUT_PAR_05_XXXX	Setting control parameter TnE (0...9000 s; 9001 = Off).
OUT_PAR_06_XXXX	Setting control parameter TvE (5 = OFF).
OUT_PAR_07_XXXX.X	Setting control parameter TdE.
OUT_PAR_09_XXX.X	Setting the correction value limit.
OUT_PAR_10_XX.X	Setting control parameter XpF.
OUT_PAR_14_XXX.X	Setting the set-point offset.
OUT_PAR_15_XXX	Setting control parameter PropE.
OUT_MODE_00_X	Keyboard: 0 = free / 1 = blocked (complies with: "KEY").
OUT_MODE_01_X	Control: 0 = int. / 1 = ext. Pt100/ 2 = ext. Analog/ 3 = ext. Serial.
OUT_MODE_03_X	Keyboard remote control unit Command: 0 = free/ 1 = blocked.
OUT_MODE_04_X	Set-point offset source: 0=normal / 1=ext.Pt / 2=ext.analog / 3=ext.serial.
START	Switches machine on (from standby)
STOP	Switches machine to standby (pump, heater, refrigeration unit off).
RMP_SELECT_X	Selection of program (1...5) that other commands are to refer to. After switching the device on, program 5 is selected.
RMP_START	Starts control timer.
RMP_PAUSE	Stops control timer.
RMP_CONT	Starts control timer again after a break.
RMP_STOP	Stops the program.
RMP_RESET	Deletes program (all segments).
RMP_OUT_00_XXX.XX_XXXXX_XXX.XX_X	Sets the control timer segment (temperature, time, tolerance and pump stage). A segment is added and allocated the appropriate values.
RMP_OUT_02_XXX	Number of program sequences: 0 = infinite / 1...250.

Note the following:

- For “\_”, “ ” (space character) is also permitted.
- Response from the thermostat “OK” or “ERR\_X” in the case of an error. RS 485 interface e.g. “A015\_OK” or with error “A015\_ERR\_X”.

### Permitted data formats

-XXXX.XX	-XXXX.X	-XXXX.	-XXXX	XXXX.XX	XXXX.X	XXXX.	XXXX
-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				

### 6.12.3 Error messages of serial interfaces



The following information refers to USB as well as RS 232/485 interfaces.

Error	Description
ERR_2	Incorrect entry (e.g. buffer overflow)
ERR_3	Incorrect command
ERR_5	Syntax error in the value
ERR_6	Impermissible value
ERR_8	Module or value not available.
ERR_30	Control timer, all segments assigned.
ERR_31	No default set-point possible.
ERR_33	External sensor missing.
ERR_34	Analog value not available.

### 6.12.4 LabView

A convenient individual control or automations software for operating thermostats can be created with the help of the program development tool LABVIEW® of National Instruments <http://sine.ni.com/apps/we/nioc.vp?cid=1381&lang=US>. To be able to address the RS 232/485 interface used here with a program, LAUDA provides a driver especially designed for LABVIEW® for free download at <http://www.lauda.de>.

## 7 Maintenance

### 7.1 General safety instructions



**DANGER!**  
Contact with live parts

Electric shock, impact, cutting, crushing

- The device must be separated from the mains prior to any maintenance work.



**CAUTION!**  
Contact with hot or cold device parts, accessories or heat transfer liquid

Burns, scalding, frostbite

- Make sure device parts, accessories and heat transfer liquid have room temperature before touching them.

### 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 leak tightness of the drain by inspection from the outside
monthly	Inspection of the external condition of the device
	Inspection of the external hoses for material fatigue
	Cleaning of the air-cooled condenser
	Cleaning the water filter (Only for water-cooled devices)
quarterly	Decalcification of the cooling water circuit (Only for water-cooled devices)
half-yearly	Inspection of the heat transfer liquid

### 7.3 Cleaning the machine

Personnel: ☐ Operating personnel



**WARNING!**  
Ingress of cleaning agents in the device

Electric shock

- ☐ Use a moist cloth for cleaning.

Also note the following:

- ☐ Clean the control panel only with water and detergent as a cleaning agent. Do not use acetone or aromatic hydrocarbons (dilution). The consequence would be permanent damage of the plastic surfaces.

### 7.4 Cleaning air-cooled condenser

Personnel: ☐ Operating personnel

1. Switch off the machine.
2. Remove the front panel carefully. Pull the panel to the front with the recess and lift the panel out of the guide.



The front panel is held in place with a magnetic lock.

3. Brush off the condenser. If necessary, blow through from the rear of the device with compressed air.
4. Put the front panel back in carefully.



Fig. 64: Remove the front panel



## 7.5 Cleaning the water filter

Personnel: ■ Operating personnel

1. Switch off the device with the mains power switch.
2. Release the nut from the threaded connector at the water cooling inlet.
3. Remove the connector with the cooling water hose from the threaded connector.
4. Take the water filter from the threaded connector carefully.
5. Clean the water filter and then put it back into the threaded connection.
6. Tighten the connector with the cooling water hose with the nut on the threaded connector of the inlet.

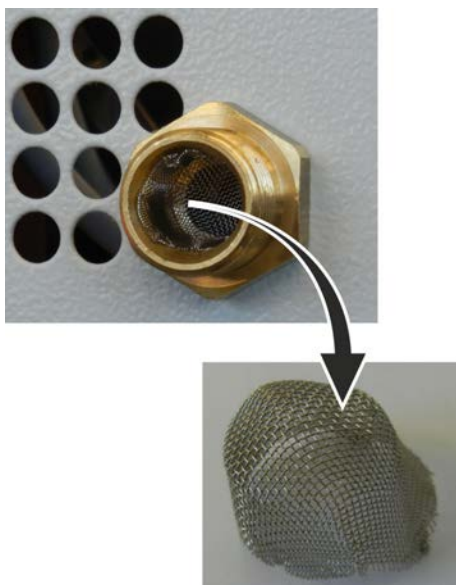


Fig. 65: Remove the water filter water filter

## 7.6 Decalcification of the cooling water circuit

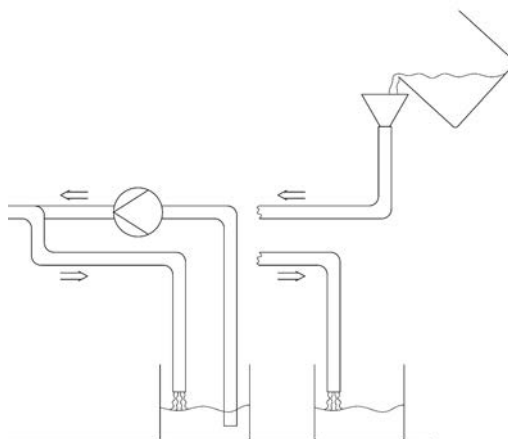


Fig. 66: Decalcification

Personnel: ■ Operating personnel

1. Switch off the device and prepare the decalcification process accordingly.



The descaling agent should be fed to the water cooling with a pump or a funnel through the return hose. The descaling agent return flow should be via flow hose of the water cooling into a vessel with sufficient capacity (approx. 10 liters).



LAUDA descaling agent (order no. LZB 126) at 5 kg is required for decalcification. Please read the safety instructions and the manual instruction on the packaging before handling the chemical.

2. Switch the device on and set the set-point to 10 °C. After starting the refrigeration unit, fill the water cooling return hose with LAUDA descaling agent (pump or funnel).
3. Continuously refill or pump descaling agent. Continue this process until the foaming reaction goes down. This is generally the case after approx. 20 to 30 minutes.
4. Subsequently drain the condenser.



Further information on draining the condenser can be found in [Chapter 9.2 'Condenser draining' on page 86](#).

5. Reconnect the device with the water supply and rinse it thoroughly.



Allow at least 10 liters of water to flow through the device.

## 7.7 Checking the heat transfer liquid

Soiled or degenerated 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.



**CAUTION!**  
**Critical temperature of the heat transfer liquid**

Scalding, frostbite

- Bring the heat transfer liquid to be analysed to room temperature.

## 8 Faults

### 8.1 Alarms, errors and warnings

Any alarms, error signals and warnings triggered on the device are shown as plain text on the screen.


#### Procedure in the event of alarms

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

You can find a list of alarms in  *Table on page 77*.


#### Procedure in the event of warnings

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

You can find a list of warnings in  *Table on page 78*.

#### Procedure in the event of errors

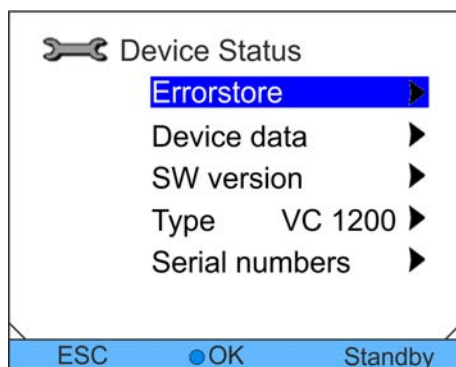
A two-tone signal is output if an error occurs.

In the case of an error, switch off the machine at the mains power switch. If the error occurs again after restarting the device, note the error code and the associated description and contact LAUDA Constant Temperature Equipment service. The contact details can be found in  *Chapter 12.4 'Contact LAUDA Service Constant Temperature Equipment' on page 94*.



Errors are displayed with the appropriate description and an error code in the form of a consecutive number.

### 8.2 Invoking device status



1. Change to the main menu.
2. Select the menu item *Setup* → *Device Status*.
  - ▶ The Device Status menu is displayed.
3. You have the following options:
  - Read errorstore
  - Query device data
  - Query software version
  - Query device type
  - Query serial number

Fig. 67: Device status

### 8.3 Alarm codes

Alarms are relevant for safety. The components of the device like e.g. the pump are switched off. A two-tone signal is output by the machine.

Code	English version	Description
01	Low level Pump	Low level recognised by pump (pump running too fast)
02	Low level Pump	Low level recognised by float gauge
03	Overtemperature	Bath / flow temperature higher than Tmax
04	Pump blocked	Pump is blocked
05	Connect. Command	Remote control unit Command was pulled off during operation
07	Too less flow of liquid	Too little flow
09	T ext Pt100	External actual value Pt100 is not available.
10	T ext analog	External actual value analog is not available.
11	T ext serial	External actual value serial is not available.
12	Input Analog 1	Analog module: Power interface 1, disruption.
13	Input Analog 2	Analog module: Power interface 2, disruption.
14	T ext serial	
15	Digital Input	Malfunction at the digital input
16	Refill failed	Refill automatic for heat transfer liquid
17	Switch 1 open	Switch 1 open (e.g. pressure switch)
18	Switch 2 open	Switch 2 open (e.g. pressure switch)
19	Overpressure	

## 8.4 Low level alarm

### Alarm

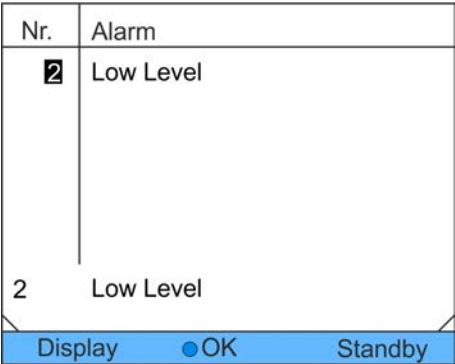


Fig. 68: Alarm Low level

### Rectifying fault

- If the liquid level falls below the minimum level, a two-signal alarm sounds.
- *Low Level* is shown on the screen. The machine components such as the pump are switched off by the electronics.


Personnel:                   ■ Qualified operating personnel

1. Eliminate the cause of the error.
2. Refill missing heat transfer liquid.
3. Unlock the display using the ENTER key.

## 8.5 Warnings

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

### 8.5.1 Warnings - control system



All warnings start with the prefix 0. The prefix is followed by two additional digits. These digits are listed in the following table.

Code	English version	Description
01	CAN receive overflow	Overflow with CAN receipt
02	Watchdog Reset	Watchdog reset
03	T <sub>il</sub> limit active	til limit activated

Code	English version	Description
04	T_ih limit active	tih limit activated
05	corrupt parameter	Incorrect internal parameters
06	corrupt program	Incorrect control timer data
07	Invalid Parameter	Incorrect parameters in the memory
08	CAN system	Problem with internal data exchange
09	Unknown Modul	Unknown module connected
10	SW Control too old	Software version of control system too old
11	SW Safety too old	Software version of safety system too old
12	SW Command too old	Software version of remote control unit Command too old
13	SW Cool too old	Software version of cooling module too old
14	SW Analog too old	Software version of analog module too old
15	SW Serial too old	Software version of serial interface (RS232) too old
16	SW Contact old	Software version of contact module too old
17	SW Valve 0 old	Software version of solenoid valve 0 too old
18	SW Valve 1 old	Software version of solenoid valve 1 too old
19	SW Valve 2 old	Software version of solenoid valve 2 too old
20	SW Valve 3 old	Software version of solenoid valve 3 too old
21	SW Valve 4 old	Software version of solenoid valve 4 too old
22	SW Pump 0 old	Software version of pump 0 too old
23	SW Pump 1 old	Software version of pump 1 too old
24	SW Pump 2 old	Software version of pump 2 too old
25	SW Pump 3 old	Software version of pump 3 too old
26	SW HTC old	Software version of high temperature cooler too old
27	SW Ext. Pt100 old	Software version of external Pt100 too old
28	SW Ethernet old	Software version of Ethernet too old
29	SW EtherCAT old	Software version of EtherCAT too old
33	Clock wrong time	Internal clock defective; supply with battery was/is interrupted.
34	Tset: Prog. is running	Set-point was changed while the control timer is running.
41	Wrong mains voltage	Incorrect mains voltage setting
42	No VC type	Device type not configured
43	No VC voltage	Mains voltage not configured
51	Niveau high	
55	CAN buff. overflow	Buffer overflow with CAN receipt

### 8.5.2 Warnings – safety system



All warnings start with the prefix 1. The prefix is followed by two additional digits. These digits are listed in the following table.

Code	English version	Description
01	CAN receive overflow	Overflow with CAN receipt
02	Watchdog Reset	Watchdog reset
03	Heat Power	
04	Heat 1 failed	Heater 1 defective
05	Heat 2 failed	Heater 2 defective
06	Heat 3 failed	Heater 3 defective
07	Invalid Parameter	Incorrect parameters in the memory
08	CAN system	Problem with internal data exchange
09	Unknown Modul	Unknown module connected
10	SW Control too old	Software version of control system too old
11	SW Safety too old	Software version of safety system too old
12	SW Command too old	Software version of remote control unit Command too old
13	SW Cool too old	Software version of cooling module too old
14	SW Analog too old	Software version of analog module too old
15	SW Serial too old	Software version of serial interface (RS232) too old
16	SW Contact too old	Software version of contact module too old
17	SW Valve 0 old	Software version of solenoid valve 0 too old
18	SW Valve 1 old	Software version of solenoid valve 1 too old
19	SW Valve 2 old	Software version of solenoid valve 2 too old
20	SW Valve 3 old	Software version of solenoid valve 3 too old
21	SW Valve 4 old	Software version of solenoid valve 4 too old
22	SW Pump 0 old	Software version of pump 0 too old
23	SW Pump 1 old	Software version of pump 1 too old
24	SW Pump 2 old	Software version of pump 2 too old
25	SW Pump 3 old	Software version of pump 3 too old



Code	English version	Description
26	SW HTC old	Software version of high temperature cooler too old
27	SW Ext. Pt100 old	Software version of external Pt100 too old
28	SW Ethernet old	Software version of Ethernet too old
29	SW EtherCAT old	Software version of EtherCAT too old
55	CAN buff. overflow	Buffer overflow with CAN receipt

## 8.5.3 Warnings – Smartcool



All warnings start with the prefix 3. The prefix is followed by two additional digits. These digits are listed in the following table.

Code	English version	Description
01	CAN receive overf	Overflow with CAN receipt
02	Watchdog Reset	Watchdog reset
03	Missing SM adaption	Adaptation run is missing
04	Pressure switch activated	Pressure switch in refrigeration circuit has triggered
05	Clean condensor	Clean the condenser
06	TO1 out of range (Klixon)	Injection temperature outside value range
07	Invalid Parameter	Incorrect parameters in the memory
08	CAN system	Problem with internal data exchange
09	Unknown Modul	Unknown module connected
10	SW Control too old	Software version of control system too old
11	SW Safety too old	Software version of safety system too old
12	SW Command too old	Software version of remote control unit Command too old
13	SW Cool too old	Software version of cooling module too old
14	SW Analog too old	Software version of analog too old
15	SW Serial too old	Software version of serial interface (RS232) too old
16	SW Contact old	Software version of contact module too old
17	SW Valve 0 old	Software version of solenoid valve 0 too old
18	SW Valve 1 old	Software version of solenoid valve 1 too old

## Faults

Code	English version	Description
19	SW Valve 2 old	Software version of solenoid valve 2 too old
20	SW Valve 3 old	Software version of solenoid valve 3 too old
21	SW Valve 4 old	Software version of solenoid valve 4 too old
22	SW Pump 0 old	Software version of pump 0 too old
23	SW Pump 1 old	Software version of pump 1 too old
24	SW Pump 2 old	Software version of pump 2 too old
25	SW Pump 3 old	Software version of pump 3 too old
26	SW HTC old	Software version of high temperature cooler too old
27	SW Ext. Pt100 old	Software version of external Pt100 too old
28	SW Ethernet old	Software version of Ethernet too old
29	SW EtherCAT old	Software version of EtherCAT too old
41	sm0 min too small	Starting value of injection valve too low
44	chiller missing	Refrigeration unit does not run
45	Valve not closed	
55	CAN buff. overflow	Buffer overflow with CAN receipt

### 8.5.4 Warnings – analog module – serial interface – contact module



All warnings of the analog module start with the prefix 4. The prefix is followed by two additional digits. These digits are listed in the following table.



All warnings of the serial interface start with the prefix 5. The prefix is followed by two additional digits. These digits are listed in the following table.



All warnings of the contact module start with the prefix 6. The prefix is followed by two additional digits. These digits are listed in the following table.

Code	English version	Description
01	CAN receive overflow	Overflow with CAN receipt
02	Watchdog Reset	Watchdog reset
08	CAN system	Problem with internal data exchange

Code	English version	Description
09	Unknown Modul	Unknown module connected
10	SW Control too old	Software version of control system too old
11	SW Safety too old	Software version of safety system too old
12	SW Command too old	Software version of remote control unit Command too old
13	SW Cool too old	Software version of cooling module too old
14	SW Analog too old	Software version of analog module too old
15	SW Serial too old	Software version of serial interface (RS232) too old
16	SW Contact too old	Software version of contact module too old
17	SW Valve 0 too old	Software version of solenoid valve 0 too old
18	SW Valve 1 too old	Software version of solenoid valve 1 too old
19	SW Valve 2 too old	Software version of solenoid valve 2 too old
20	SW Valve 3 too old	Software version of solenoid valve 3 too old
21	SW Valve 4 too old	Software version of solenoid valve 4 too old
22	SW Pump 0 too old	Software version of pump 0 too old
23	SW Pump 1 too old	Software version of pump 1 too old
24	SW Pump 2 too old	Software version of pump 2 too old
25	SW Pump 3 too old	Software version of pump 3 too old
26	SW Valve 5 too old	Software version of solenoid valve 5 too old
27	SW Ext Pt100 too old	Software version of external Pt100 too old
28	SW Ethernet too old	Software version of Ethernet too old
29	SW EtherCAT too old	Software version of EtherCAT too old

### 8.5.5 Warnings - Pt100/LiBus module



All warnings start with the prefix 17. The prefix is followed by two additional digits. These digits are listed in the following table.

Code	English version	Description
01	CAN receive overflow	Overflow with CAN receipt
02	Watchdog Reset	Watchdog reset
03	Ext_Pt_short	Line short circuit in external Pt100

## Faults

---

Code	English version	Description
07	Invalid Parameter	Incorrect parameters in the memory
08	CAN system	Problem with internal data exchange
09	Unknown Modul	Unknown module connected
10	SW Control too old	Software version of Control too old
11	SW Safety too old	Software version of Protection too old
12	SW Command too old	Software version of remote control unit Command too old
13	SW Cool too old	Software version of cooling module too old
14	SW Analog too old	Software version of analog too old
15	SW Serial too old	Software version of RS 232 too old
16	SW Contact too old	Software version of contact module too old
17	SW Valve 0 too old	Software version of solenoid valve 0 too old
18	SW Valve 1 too old	Software version of solenoid valve 1 too old
19	SW Valve 2 too old	Software version of solenoid valve 2 too old
20	SW Valve 3 too old	Software version of solenoid valve 3 too old
21	SW Valve 4 too old	Software version of solenoid valve 4 too old
22	SW Pump 0 too old	Software version of pump 0 too old
23	SW Pump 1 too old	Software version of pump 1 too old
24	SW Pump 2 too old	Software version of pump 2 too old
25	SW Pump 3 too old	Software version of pump 3 too old
26	SW Valve 5 too old	Software version of solenoid valve 5 too old
27	SW Ext Pt100 too old	Software version of external Pt100 too old
28	SW Ethernet too old	Software version of Ethernet too old
29	SW EtherCAT too old	Software version of EtherCAT too old

## 9 Decommissioning

### 9.1 Draining the machine

Personnel: ■ Qualified operating personnel



**CAUTION!**  
**Contact with heat transfer liquid during draining**

Health hazard when inhaled, damage to eyes / skin

- Observe the safety data sheet of the heat transfer liquid.
- Wear CE protective gloves, protective clothing and protective goggles.
- Avoid spraying heat transfer liquid.



**CAUTION!**  
**Contact with hot / cold heat transfer liquid**

Scalding, frostbite

- Bring the heat transfer liquid to room temperature before draining.
- Ensure that the machine drain is closed after draining.



**CAUTION!**  
**Contact with hot / cold surfaces**

Burn injuries frostbite

- Bring surfaces to room temperature before touching.

Also note the following:

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



The container capacity should correspond to the maximum filling volume of the machine.

4. Open the drain tap. Turn the lever to the right to do so.

### 9.2 Condenser draining

Personnel: ■ Operating personnel

1. Heat the device to approx. 20 °C.
2. Release the water cooling flow hose on the water supply.
3. Set the set-point to 10 °C and blow compressed air through the blow hose immediately after starting up of the compressor. Continue blowing through with compressed air until all the water has flowed out of the machine.
4. Switch off the machine again immediately.

## 10 Disposal

### 10.1 Refrigerant (disposal)

The refrigerant must be disposed of in accordance with EC regulations 303/2008/EC in combination with 842/2006/EC.

	<b>CAUTION!</b> Uncontrolled escape of refrigerant
	<p>Explosion, crushing, impact, cutting</p> <ul style="list-style-type: none"> <li>■ No disposal with the refrigerant circuit being pressurised.</li> <li>■ Disposal is permitted only by a specialist.</li> </ul>

Refrigerant	GWP <sub>(100a)</sub>
R404A	3922 (3.780)

	Global Warming Potential (GWP) time horizon 100 years - according to IPCC IV (2007). Comparisons CO <sub>2</sub> = 1.0.
--	---

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

### 10.2 Device disposal

The device must be disposed of according to EC Directive 2002/96/EC.

### 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.

### Device-spanning information

Data	Value	Unit
Placement	Indoor areas	
Height above sea level	2,000	m
Atmospheric humidity	Highest relative atmospheric humidity 80 % at 31 °C, up to 40 °C decreasing linearly by up to 50 %	
Ambient temperature range	5...40	°C
IP degree of protection	IP 32	
Contamination level	2	
Distance to environment (to all sides)	50	cm
Overvoltage	Overvoltage category II, transient surge voltages according to category II	
Protection class for electrical supplies (DIN EN 61140)	1	
Protection class for laboratory devices (DIN 12876-1)	I/NFL	
Screen	TFT display, 3.5", 320 x 240 pixels	
Display resolution	±0.01	°C
Setting resolution	±0.01	°C
Storage temperature range	5...40	°C
Transport temperature range	-20...43	°C



**Device-specific**

	Operating temperature range	Operating temperature range with optional heater	Temperature accuracy	Dimensions (wxdxh)	Weight
	°C	°C	K	mm	kg
VC 600	-20...40	-20...80	±0.2	350x480x595	39
VC 1200	-20...40	-20...80	±0.2	450x550x650	54
VC 1200 W	-20...40	-20...80	±0.2	450x550x650	51
VC 2000	-20...40	-20...80	±0.2	450x550x650	57
VC 2000 W	-20...40	-20...80	±0.2	450x550x650	54
VC 3000	-20...40	-20...80	±0.2	550x650x970	93
VC 3000 W	-20...40	-20...80	±0.2	550x650x970	89
VC 5000	-20...40	-20...80	±0.2	550x650x970	98
VC 5000 W	-20...40	-20...80	±0.2	550x650x970	94
VC 7000	-20...40	-20...80	±0.5	650x670x1250	138
VC 7000 W	-20...40	-20...80	±0.5	650x670x1250	131
VC 10000	-20...40	-20...80	±0.5	650x670x1250	147
VC 10000 W	-20...40	-20...80	±0.5	650x670x1250	140

**Power consumption in kW without/with heater**

	230 V; 50 Hz	220 V; 60 Hz	115 V; 60 Hz	200 V; 50/60 Hz	100 V; 50/60 Hz	208-220 V; 60 Hz
	kW	kW	kW	kW	kW	kW
VC 600						
without heater	0.7	0.7	0.8	---	0.7	---
with heater	2.2	2.0	1.3	---	1.1	---
VC 1200 (W)						
without heater	1.1	---	---	1.3	---	1.4
with heater	2.6	---	---	2.3	---	2.4
VC 2000 (W)						
without heater	1.6	---	---	2.0	---	2.2
with heater	2.6	---	---	2.3	---	2.5
VC 3000 (W)						

## Technical data

	230 V; 50 Hz	220 V; 60 Hz	115 V; 60 Hz	200 V; 50/60 Hz	100 V; 50/60 Hz	208-220 V; 60 Hz
without heater	1.8	---	---	n/a	---	n/a
with heater	2.6	---	---	n/a	---	n/a

### Power consumption in kW without/with heater

	400 V; 3/N/PE~50 Hz	208-220 V; 3/PE~60 Hz	200 V; 3/PE~50/60 Hz
	kW	kW	kW
VC 5000 (W)			
without heater	3.3	3.6	3.5
with heater	7.8	4.5	4.3
VC 7000 (W)			
without heater	4.3	4.6	4.5
with heater	8.8	5.7	5.4
VC 10000 (W)			
without heater	5.8	7.0	6.8
with heater	8.8	n/a	n/a



The following information is relevant only with optional heater.

### Heat output in kW (only for devices with heating option)

	230 V; 50 Hz	220 V; 60 Hz	115 V; 60 Hz	200 V; 50/60 Hz	100 V; 50/60 Hz	208-220 V; 60 Hz
	kW	kW	kW	kW	kW	kW
VC 600	1.5	1.35	1.15	---	1	---
VC 1200 (W)	1.5	---	---	1.1	---	1.2 - 1.35
VC 2000 (W)	1.5	---	---	1.1	---	1.2 - 1.35
VC 3000 (W)	1.5	---	---	1.1	---	1.2 - 1.35

### Heat output in kW (only for devices with heating option)

	400 V; 3/N/PE~50 Hz	208-220 V; 3/PE~60 Hz	200 V; 3/PE~50/60 Hz
	kW	kW	kW
VC 5000 (W)	4.5	3.65 - 4.1	3.4

	400 V; 3/N/PE~50 Hz	208-220 V; 3/PE~60 Hz	200 V; 3/PE~50/60 Hz
VC 7000 (W)	4.5	3.65 - 4.1	3.4
VC 10000 (W)	9	7.35 - 8.2	6.8

## 11.2 Refrigeration unit

### Cooling capacity

	Cooling capacity (20 °C)	Cooling capacity (10 °C)	Cooling capacity (0 °C)	Cooling capacity (-10 °C)	Cooling capacity (-20 °C)
	kW	kW	kW	kW	kW
VC 600	0.60	0.50	0.36	0.21	0.08
VC 1200 (W)	1.20	1.00	0.70	0.40	0.18
VC 2000 (W)	2.00	1.50	1.06	0.68	0.38
VC 3000 (W)	3.00	2.40	1.68	1.03	0.60
VC 5000 (W)	5.00	3.90	2.75	1.70	0.90
VC 7000 (W)	7.00	5.30	3.70	2.40	1.30
VC 10000 (W)	10.00	7.60	5.30	3.50	2.00



The cooling capacity is measured with a specific temperature of the device. Information is provided in brackets. The ambient temperature for measurement is 20 °C, ethanol was used as heat transfer liquid. The cooling water temperature is 15 °C and the cooling water pressure 3 bar for the measurement of water-cooled devices.

### Additional data

	Refrigerant	Cooling water connection
VC 600	R404A	---
VC 1200	R404A	---
VC 1200 W	R404A	G 3/4", connector 1/2"
VC 2000	R404A	---
VC 2000 W	R404A	G 3/4", connector 1/2"
VC 3000	R404A	---
VC 3000 W	R404A	G 3/4", connector 1/2"
VC 5000	R404A	---
VC 5000 W	R404A	G 3/4", connector 1/2"

## Technical data

	Refrigerant	Cooling water connection
VC 7000	R404A	---
VC 7000 W	R404A	G ¾", connector ½"
VC 10000	R404A	---
VC 10000 W	R404A	G ¾", connector ½"

### 11.3 Hydraulic circuit

	Maximum/minimum filling volume	Maximum flow	Maximum flow pressure	Pump connection	Drain tap
	L	l/min	bar		
VC 600	8/4	28	0.9	M 16 x 1 (10), connector 13 mm	G ½"
VC 1200 (W)	15/8	28	0.9	G ¾ (15), connector ¾"	G ½"
VC 2000 (W)	15/8	28	0.9	G ¾ (15), connector ¾"	G ½"
VC 3000 (W)	33/20	37	3.2	G ¾ (15), connector ¾"	G ½"
VC 5000 (W)	33/20	37	3.2	G ¾ (15), connector ¾"	G ½"
VC 7000 (W)	64/48	37	3.2	G 1¼ (20), connector 1"	G ¾"
VC 10000 (W)	64/48	37	3.2	G 1¼ (20), connector 1"	G ¾"

### 11.4 Order numbers

Alternating current	VC 600	VC 1200	VC 1200 W	VC 2000	VC 2000 W	VC 3000	VC 3000 W
230 V; 50 Hz	LWG 175	LWG 176	LWG 182	LWG 177	LWG 183	LWG 178	LWG 184
220 V; 60 Hz	LWG 275	---	---	---	---	---	---
115 V; 60 Hz	LWG 475	---	---	---	---	---	---
200 V; 50/60 Hz	---	LWG 576	LWG 582	LWG 577	LWG 583	LWG 578	LWG 584

<b>Alter-nating current</b>	<b>VC 600</b>	<b>VC 1200</b>	<b>VC 1200 W</b>	<b>VC 2000</b>	<b>VC 2000 W</b>	<b>VC 3000</b>	<b>VC 3000 W</b>
100 V; 50/60 Hz	LWG 675	---	---	---	---	---	---
208-220 V; 60 Hz	---	LWG 876	LWG 882	LWG 877	LWG 883	LWG 878	LWG 884

<b>Rotary current</b>	<b>VC 5000</b>	<b>VC 5000 W</b>	<b>VC 7000</b>	<b>VC 7000 W</b>	<b>VC 10000</b>	<b>VC 10000 W</b>
400 V; 3/N/PE~50 Hz	LWG 279	LWG 285	LWG 280	LWG 286	LWG 281	LWG 287
208-220 V; 3/PE~60 Hz	LWG 379	LWG 385	LWG 380	LWG 386	LWG 381	LWG 387
200 V; 3/PE~50/60 Hz	LWG 479	LWG 485	LWG 480	LWG 486	LWG 481	LWG 487

## 12 General

### 12.1 Copyright

This manual is protected by copyright and is intended exclusively 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 other than for internal purposes 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

Technical details subject to change.

### 12.3 Warranty conditions

LAUDA provides a warranty of one year on equipment as standard.

### 12.4 Contact LAUDA Service Constant Temperature Equipment

Contact LAUDA Service Constant Temperature Equipment in the following cases:

- In the event of faults on the machine
- For spare part orders
- In the case of questions about the machine

#### Contact details

LAUDA Service Constant Temperature Equipment

Telephone: +49 (0)9343 503 236

Fax: +49 (0)9343 503 283

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

## 12.5 EC conformity



The machine complies with the applicable occupational health and safety requirements of the directives listed below.

- Machinery Directive 2006/42/EC
- EMC Directive 2004/108/EC

LAUDA DR. R. WOBSE GMBH & CO. KG - Pfarrstraße 41/43 -  
97922 Lauda-Königshofen - Germany



The device comes under category 1 of Pressure Equipment Directive 97/23/EC. The requirements from the above mentioned guidelines are thus sufficiently met for the pressure-relevant hazards of the device.

## 13 Index

<b>A</b>	
Actual bath temperature (display).....	48
Air-cooled	
Clean the condenser.....	72
Alarm.....	76
Codes.....	77
Low level.....	78
Analog module	
Connecting.....	35
Arrow buttons (position).....	16
<b>B</b>	
Basic window	
Normal operation.....	48
Standby operation.....	48
Structure.....	48
<b>C</b>	
Checking	
Heat transfer liquid.....	74
Cleaning.....	72
Code	
Alarms.....	77
Warnings (control system).....	78
Warnings (RS 232 / RS-485 module).....	82
Warnings (safety system).....	80
Warnings (SmartCool).....	81
Warnings (temperature sensor).....	83
Condenser.....	17
Conformity (EC).....	95
Contact module	
Connecting.....	37, 39
Control	
Warnings.....	78
Control menu.....	64
Control parameter	
Access.....	64
Control parameters	
Adjusting (internal).....	65
Internal (overview).....	64
Cooling water	
Connecting.....	25
Requirements.....	24
Copyright.....	94
<b>D</b>	
Damping time.....	64
Defining limit values (temperature).....	52
Defining temperature limit values.....	52
Defining the target temperature value.....	53
Derivative time.....	64
Device	
Invoking status.....	76
Disposal	
Packaging.....	87
Refrigerant.....	87
Draining	
Condenser (water-cooled).....	86
Machine.....	85
<b>E</b>	
EC conformity.....	95
EMC classification.....	20
ENTER button (position).....	16
Error.....	76
Establishing power supply.....	41
Evaporator.....	17
Expanded status display (display).....	48
External consumer	
Connecting.....	23
External control	
Activating.....	55
Defining the set-point offset.....	56
<b>F</b>	
Filling.....	42
<b>H</b>	
Heat transfer liquid	
Checking.....	74
Removing.....	85



Heat transfer liquids		Switching on.....	48
Overview (approved).....	40	Unpacking.....	12
Hose clamps		Machine types.....	13
Overview (tempering).....	21	Main menu	
Hoses		Access.....	50
Overview (tempering).....	21	Navigation.....	50
Hydraulic circuit		Structure.....	50
Description.....	16	Mains power (connection).....	41
<b>I</b>		Mains power switch	
Input window		Operation.....	16
Entering value.....	51	Maintenance	
Selecting options.....	51	Intervals.....	71
Structure.....	51	Manometer	
Intended use.....	8	Description.....	17
Interface		Menu	
Overview.....	18	Navigation.....	50
Invoking status (device).....	76	<b>P</b>	
<b>L</b>		Packaging	
LabView.....	70	Disposal.....	87
LAUDA heat transfer liquids.....	40	Personal protective equipment (overview).....	10
LAUDA Service Constant Temperature Equipment		Personnel qualification (overview).....	9
Address.....	94	Placement	
Contact.....	94	Machine.....	20
Low level		Program	
Alarm.....	78	Access.....	60
LRZ 914 module		Create.....	60
Connecting.....	37	Defining repetitions.....	63
LRZ 915 module		Defining sequences.....	63
Connecting.....	39	Editing.....	60
<b>M</b>		Example.....	57
Machine		Finish.....	62
Cleaning.....	72	Interrupt.....	62
Cleaning condenser (air-cooled).....	72	Select.....	60
Disposal (packaging).....	87	Start.....	62
Disposal (refrigerant).....	87	Proportional range.....	64
Draining.....	85	Protective equipment (personal, overview).....	10
Draining the condenser (water-cooled).....	86	Purified water .....	40
Filling.....	42	<b>R</b>	
Placement.....	20	Rating plate.....	14
Structure.....	14	Refrigerant (disposal).....	87

## Index

---

Refrigeration unit		Submenu	
Description.....	17	Access.....	50
Reset time.....	64	Navigation.....	50
Restoring the factory settings.....	54	Switching on.....	48
RS 232 module		<b>T</b>	
Connecting.....	32	Td.....	64
Warnings.....	82	Technical changes.....	94
RS 485 module		Temperature sensor	
Warnings.....	82	Warnings.....	83
<b>S</b>		Tn.....	64
Safety instruction		Tv.....	64
General.....	7	<b>U</b>	
Safety system (warnings).....	80	Unpacking.....	12
Screen		USB interface	
Actual bath temperature.....	48	Install driver.....	26
Basic window (set-up).....	48	<b>W</b>	
Expanded status display (set-up).....	48	Warning.....	76
Soft key bar.....	48	Control system.....	78
Status display (set-up).....	48	RS 232 module.....	82
Screen buttons		RS 485 module.....	82
Operation.....	16	Safety system.....	80
Serial number		SmartCool.....	81
Description.....	19	Temperature sensor.....	83
Service (LAUDA, Temperature Equipment).....	94	Warranty.....	94
SmartCool (warnings).....	81	Water-cooled	
Soft key bar (display).....	48	Condenser draining.....	86
Soft keys (position).....	16	<b>X</b>	
Specifying the set-point.....	53	Xp.....	64
Standby operation			
Activating.....	53		
Status display (display).....	48		
Structure			
Machine.....	14		





**An / To / A:**

LAUDA Dr. R. Wobser • LAUDA Service Center • Fax: +49 (0) 9343 - 503-222

**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:

Erstellt / published / établi:

Änd.-Stand / config-level / Version:

Datum / date:

Unbedenk.doc

LSC

0.1

30.10.1998

**LAUDA DR. R. WOBSE**R GmbH & Co. KG

Pfarrstraße 41/43

D - 97922 Lauda-Königshofen

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

Tel:

+49 (0)9343 / 503-0

Fax:

+49 (0)9343 / 503-222

E-mail:

[info@lauda.de](mailto:info@lauda.de)





LAUDA DR. R. WOBSE GMBH & CO. KG  
P.O. Box 1251 • 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: [www.lauda.de](http://www.lauda.de)