Operation manual

PRO supplementary pump for PRO bath thermostats

For temperature control in external applications

V02R9

Read this manual prior to performing any task!

°FAHRENHEIT. °CELSIUS. °LAUDA.

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Table of contents

1 Safety

1.1 Safety structure of the device

- The device must only be operated as intended under the conditions stated in this operating manual. Any other mode of operation is considered to be unintended use and could compromise the protection provided by the device.
- The device is not designed for use in medical applications in accordance with DIN EN 60601-1 and IEC 601-1!
- This operating manual is part of the device. The information in this operating manual must therefore be kept at hand in the immediate vicinity of the device. Be sure to carefully store this copy of the operating manual.

If this operating manual is lost, contact LAUDA Service Constant Temperature Equipment. You will find the contact information here ↳ Chapter 11.4 “Contact LAUDA” on page 26.

When operating the device, there is a risk of injury from high and low temperatures, fire and the presence of electrical energy. These risks posed by the device have been mitigated in the design to the extent possible in keeping with the applicable norms. The remaining risk can be reduced using one of the following measures:

- Safety equipment is available for the device. This equipment is critical to the safety of the device. Appropriate maintenance activities must be implemented to ensure the device remains in good working order.
  The safety fittings for the device are described in this "Safety" chapter.
- Various warning symbols are located on the device. These symbols must be observed without fail.
  The warning symbols on the device are described in this "Safety" chapter.
- This operating manual contains safety information. This information must be followed at all times.
- Personnel and the protective equipment worn by personnel are also subject to specific requirements.
  These requirements are described in this "Safety" chapter.

Refer to ↳ Chapter 1.15 “Structure of warnings” on page 7 *for more information on the general structure of safety notices.*

1.2 EMC requirements

Table 1: Classification in accordance with EMC requirements

Device	Immunity requirements	Emissions class	Customer power supply
PRO supplementary pump for PRO bath thermostats	Type 2 (Industrial) in accordance with DIN EN 61326-1	Emissions class B in accordance with CISPR 11	Worldwide No limitation

Instructions for Class A digital device, USA

"This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC (Federal Communication Commission) Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate

radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense."

Instructions for Class A digital device, Canada

"This Class A digital apparatus complies with Canadian ICES-003" (ICES = Interference Causing Equipment Standards).

« Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada ».

1.3 Software versions

These operating instructions are valid for devices with the following software versions or higher.

Software	Valid from version
Pump	1.00

1.4 Please read the operating manual for the PRO bath thermostat

The PRO supplementary pump can only be operated in conjunction with a PRO bath thermostat. Please read the operating manual for the PRO bath thermostat.

1.5 Intended use

As intended

- The PRO supplementary pump may only be used to pump flammable and non-flammable heat transfer liquids with a PRO bath thermostat. The heat transfer liquid is pumped through an external circuit with a closed consumer unit and then back into the thermostat.

Unintended

The following types of use are considered unintended:

- Use with or as a medical device
- Use in potentially explosive areas
- Use for controlling the temperature of foodstuffs
- Use with other bath vessels

1.6 Foreseeable misuse

The following are considered cases of foreseeable misuse:

- Operating the device without heat transfer liquid
- Connecting hoses incorrectly
- Setting an incorrect pump pressure

1.7 Prohibition of modifications to the device

Any technical modification of the device by the user is prohibited. Any damage resulting from unauthorized modification is not covered by customer service or the product warranty. Service work may only be performed by the LAUDA Service department or a service partner authorized by LAUDA.

1.8 Materials

All parts of the device that come into contact with heat transfer liquid are manufactured from high-quality materials adapted to withstand the operating temperature. The range of materials used includes high-quality stainless steels, high-quality, temperature-resistant plastics and brass.

1.9 Heat transfer liquid requirements

- Heat transfer liquids are used to control the temperature. Only LAUDA heat transfer liquids are approved for use in the device. LAUDA heat transfer liquids are liquids that have been tested and approved by LAUDA DR. R. WOBSER GMBH & CO. KG.
- The device is designed for combustible heat transfer liquids according to class III as per DIN 12876-1.
- The heat transfer liquids are suitable for a specific temperature range. This temperature range must correspond with the temperature range of your application.
- The use of heat transfer liquids poses a risk of injury from high and low temperatures and fire if certain upper or lower temperature thresholds are exceeded or the container is broken, causing a reaction with the heat transfer liquid.
- All possible risks in handling the heat transfer liquid are specified in the safety datasheet for the liquid together with corresponding safety measures. The safety datasheet must therefore be observed in order to use the device as intended.

1.10 Hose requirements

It is recommended to use LAUDA hoses for the external hydraulic circuit. These hoses have been tested in terms of material compatibility, temperature resistance and pressure resistance in conjunction with the corresponding LAUDA heat transfer liquid.

For the selection of suitable hoses, see also PRO operating instructions

1.11 Application area

The device may only be used in the following areas.

- Commercial sector
- Internal areas, not suitable for outdoor installation
- Maximum storage temperature 60 °C

1.12 Personnel qualification

Operating personnel

Operating personnel are personnel who have been instructed on how to use the device as intended in line with the information in the operating manual.

Specialized personnel

Certain activities on the device must be performed by specialized personnel. Specialized personnel are personnel whose education, knowledge, and experience qualify them to assess the function and risks associated with the device and its use.

1.13 Personal protective equipment

Protective clothing

Protective clothing must be worn for certain tasks. This protective clothing must meet the legal requirements for personal protective equipment valid in the European Union.

Safety glasses

Safety glasses must be worn for certain tasks. These safety glasses must meet existing legal requirements for personal protective equipment valid in the European Union.

Protective gloves

CE protective gloves must be worn for certain tasks. These protective gloves must meet the legal requirements for personal protective equipment valid in the European Union.

1.14 Product safety label

Hot

A "Hot surface" graphical symbol is affixed to the device. This symbol warns against hot surfaces on the device. These surfaces must not be touched during operation. These surfaces must be allowed to cool to room temperature before they can be touched during other operation phases such as servicing.

1.15 Structure of warnings

Dangerous

- A warning of "dangerous" indicates an **immediately dangerous** situation.
- If this warning is not observed, then **death** or **severe, irreversible injury** could occur.

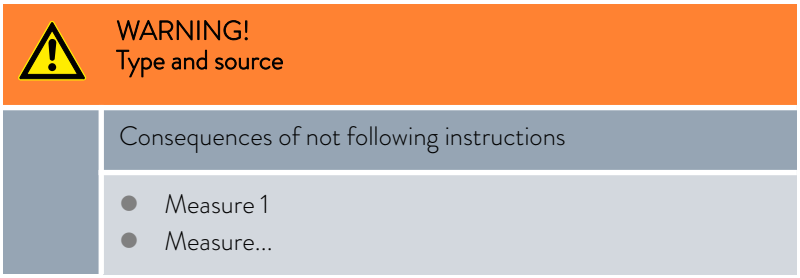
DANGER!
Type and source

Consequences of not following instructions

- Measure 1
- Measure...

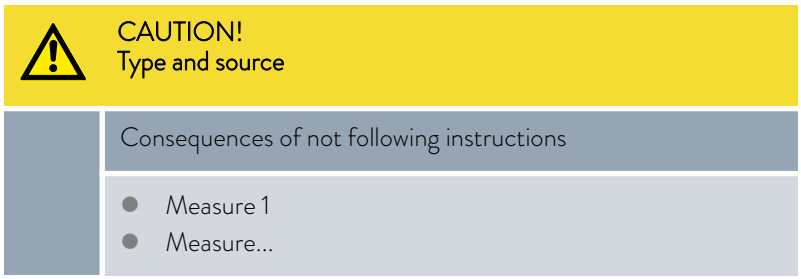
Warning

- A warning of "warning" indicates a **possibly dangerous** situation.
- If this warning is not observed, then **death** or **severe, irreversible injury** could occur.



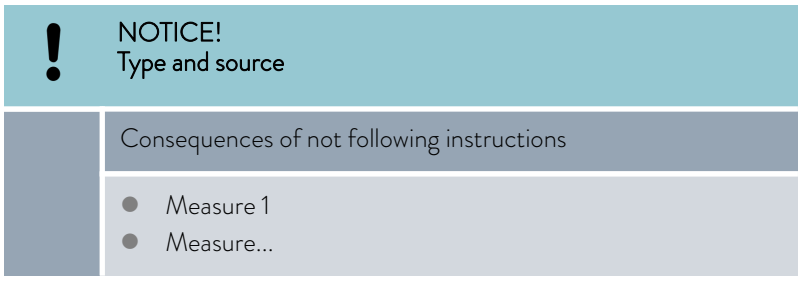
Caution

- A warning of "caution" indicates a **possibly dangerous** situation.
- If this warning is not observed, then **minor, reversible injury** could occur.



Notice

A "notice" warns that dangers to property or the environment may exist.



2 Unpacking

DANGER!
Transport damage

Electric shock

- Closely inspect the device for transport damage prior to commissioning!
- Never operate a device that has sustained transport damage!

Never lift the device by the pump shaft or pump housing.

- To lift or carry the supplementary pump, grab the underside of the housing and hold the pump connectors.

1. Unpack the device.

Keep the original packaging of your supplementary pump for subsequent transportation.

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

If the device or accessories are damaged contrary to expectations, immediately inform the shipping company so that a damage report can be compiled and the transport damage inspected. Also notify LAUDA Service Temperature control devices immediately. You will find the contact information here Chapter 11.4 “Contact LAUDA” on page 26.

Table 2: Standard accessories for the supplementary pump

Designation	Quantity	Cat. No.
Operating manual	1	YACD0104
Adapter sheet 20 L-bath	1	ADQ 158
Adapter sheet 30 L-bath	1	ADQ 159
Screw cap M16 x 1	2	HKM 032
Olive 13 mm	2	HKO 026
Stopper	2	HKN 065
Warranty card	1	---

3 Description of supplementary pump

Rear view

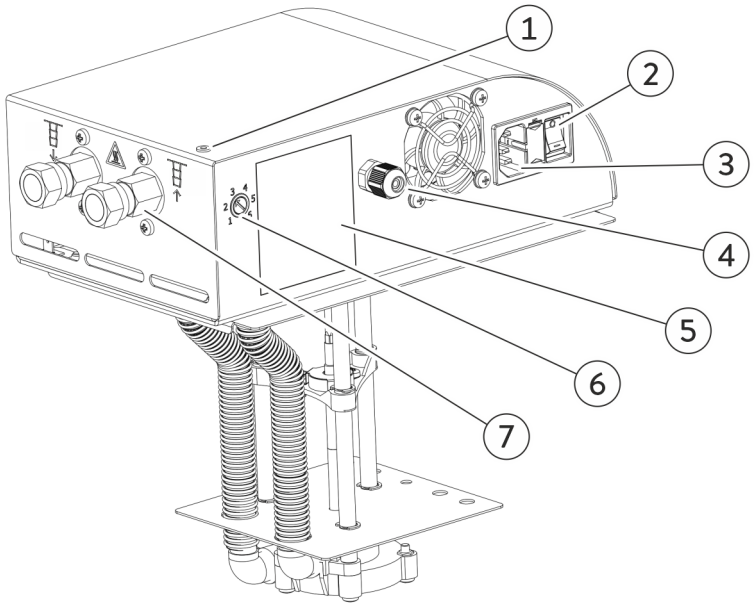


Fig. 1: Rear view of supplementary pump

1 Visual operation and fault indicator (LED)
2 Mains switch
3 Power supply
4 LiBus cable, connection to bath thermostat
5 Rating label
6 Pump speed, adjustment
7 Pump connectors inflow `OUTLET` and return `INLET`

Supplementary pump

The supplementary pump is fitted with a powerful vario flex pump (pressure-suction pump) to control the temperature of external consuming units effectively. The pump speed can be continuously adjusted using the rotary knob to optimize the output, discharge pressure, noise emissions and mechanical heat input.

The vario flex pump can operate briefly at a maximum viscosity of 150 mm²/s. However, 50 mm²/s should not be exceeded during regular operation. The ideal temperature controller setting is 30 mm²/s or lower.

Mains switch

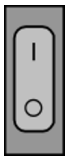


Fig. 2: Mains switch

The mains switch can be set to the following positions:

- Position [I] switches the device on.
- Position [O] switches the device off.

Rotary knob with scale

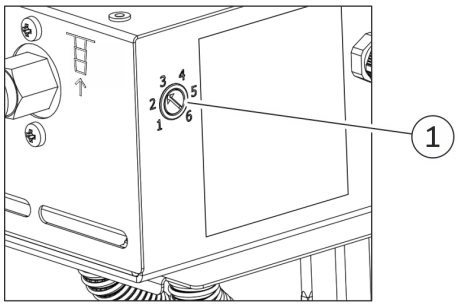


Fig. 3: Rotary knob

1 Rotary knob

The rotary knob can be used to adjust the pump level and pump speed. To do so, use a screwdriver.

Rating label

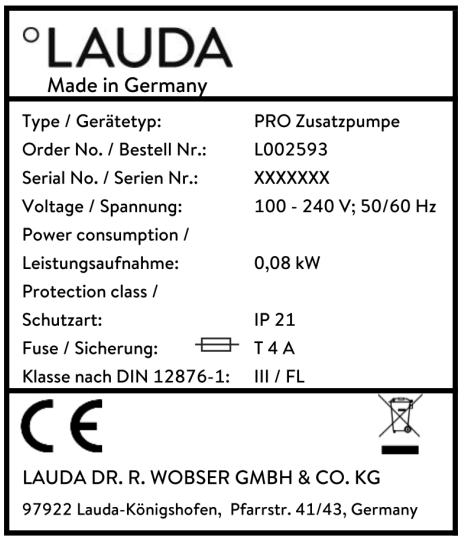


Fig. 4: Rating label

The specifications on the rating label are described in more detail in the following table.

Specification	Description
Type:	Device type
Part No.:	Catalog number of the device
Serial No.:	Serial number of the device
Voltage:	Device may only be operated with this distribution voltage and frequency
Power consumption:	Maximum power consumption of the device during operation
Protection class:	IP protection level of the device
Class according to DIN 12876-1:	German standard for electrical laboratory equipment

4 Commissioning

General safety notices for any work on the device

WARNING!
Splashing heat transfer liquid

Eye damage

- Always wear suitable safety glasses when working on the device.

CAUTION!
Risk of external consuming unit bursting

Scalding, cold burns

- If the external consuming unit is located in a lower position and is sensitive to pressure, also take into account the additional pressure resulting from the difference in height between the consuming unit and the device.

You can reduce the pump pressure by adjusting the pump speed, if required.

Safety instruction for setting up the supplementary pump

DANGER!
If the pump falls into the filled bath

Electric shock

- Disconnect the supplementary pump from the mains before placing it on the bath thermostat. No liquid may get into the control head.

WARNING!
If the power cable falls into the filled bath

Electric shock

- First place the supplementary pump on the bath thermostat and then connect the power cable.
- Before removing the supplementary pump, first disconnect the power cable from the power supply. The power cable must not fall into the filled bath.

WARNING!
Danger of device falling or overturning

Crushing, impacts

- Make sure that the adapter sheet and supplementary pump are each correctly positioned on the bath thermostat.

Never lift the device by the pump shaft or pump housing.

- To lift or carry the supplementary pump, grab the underside of the housing and hold the pump connectors.

Setting up the supplementary pump

1. Check if you can use the supplementary pump on your PRO bath thermostat without an adapter sheet, or if an adapter sheet is needed. If no adapter is required, continue to point 3.

Thermostat	Adapter sheet
P 10, RP 1090, RP 10100	No adapter sheet
P 20, RP 2040, RP 2045, RP 2090	ADQ 158
P 30, RP 3035	ADQ 159

2. First place the adapter sheet on the bath thermostat.

   If using a P 30 or RP 3035, also place the front bath cover on the bath.

   Check that the components are correctly positioned and reposition if necessary.

3. Place the supplementary pump on the bath or adapter plate respectively. Check that the supplementary pump is correctly positioned and reposition if necessary.
4. Connect the LiBus cable of the supplementary pump to the bath thermostat.
5. Connect the power cable to the supplementary pump.

Filling the bath thermostat and consuming unit

LAUDA is not liable for damages resulting from the use of unsuitable heat transfer liquids. Further information about heat transfer liquids can be found in the operating manual for the PRO bath thermostat.

DANGER!
If the pump falls into the filled bath

Electric shock

- Disconnect the supplementary pump from the mains before filling with heat transfer liquid. No liquid may get into the control head.

WARNING!
Overflow of heat transfer liquid

Electric shock

- Do not overfill the device. Observe the level display and the thermal volume expansion of the heat transfer liquid.

Heat transfer liquids expand when heated (approx. 10% for every 100°C). If an external consuming unit is connected, expansion occurs exclusively in the thermostat bath.

Please note:

- Irritant vapors may develop, depending on the heat transfer liquid and operating mode used. Always ensure that the vapors are adequately extracted. Also use the bath cover.

1. Close the drain tap on the bath thermostat by turning it clockwise.
2. Pull the mains plug from the supplementary pump.
3. Remove the supplementary pump from the bath.
4. Carefully fill the bath with heat transfer liquid.

   The recommended fill level in the bath thermostat is between 30 and 100 mm below the upper edge of the bath.

   Overlevel handling is initiated at a fill level of 25 mm below the upper edge of the bath. The customer can adjust overlevel handling as required. A *low level warning* is issued at approx. 110 mm and a *low level alarm is triggered* at approx. 120 mm below the upper edge of the bath.

Fig. 5: Filling the bath thermostat

5. Place the supplementary pump on the filled bath.
6. Check the correct positioning of the supplementary pump.
7. Reconnect the power cable to the supplementary pump.
8. Switch the bath thermostat and supplementary pump back on.
9. If the fill level (starting at level 5) is adequate, press the [Standby] softkey to start the pump and fill the connected external consuming unit.

   ▶ Heat transfer liquid is pumped into the external consuming unit. The level of the heat transfer liquid in the bath vessel drops.

   If the fill level drops too far, the bath thermostat automatically switches to the *Low level* alarm state. The pump is switched off.
10. Top up the heat transfer liquid. When topping up, always disconnect the power cable from the mains plug and ensure that the supplementary pump does not fall into the bath.

    Deactivate the alarm with the [unlock key].

    ▶ The pump automatically restarts.
11. Repeat points 9 and 10 until the bath thermostat and the connected consuming unit are filled.

Establishing a mains connection

CAUTION!
Risk of heat transfer liquid escaping from incorrectly sealed pump connections

Slipping hazard, loss of heat transfer liquid

- Attach a stopper or pump link to the pump connections if there is no external consuming unit connected.

NOTICE!
Use of impermissible mains voltage or mains frequency

Device damage

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

Please note:

- Note for electric installation on site:
  - The devices must be protected with a 16 ampere circuit breaker fitted during installation.
    Exception: Devices with 13 ampere UK plugs.
- Only use the supplied power cable for the power supply.
- Only connect the device to sockets with a protective earth conductor (PE).
- Note the electromagnetic compatibility (EMC) requirements of the device. Refer to Chapter 1.2 “EMC requirements” on page 4 for more information.

5 Operation

General safety notices for any work on the device

WARNING!
Overflow of heat transfer liquid due to increase in volume caused by heating

Scalding, electric shock

- Take into account the increase in volume caused by heating of the heat transfer liquid.

WARNING!
Overflow of heat transfer liquid caused by objects placed in the bath

Scalding, cold burns

- When filling, take into account any objects placed in the bath.

WARNING!
Boiling heat transfer liquid overflows from the bath

Chemical and heat burns

- Never replenish hot heat transfer liquid with other fluids.

WARNING!
Contact with voltage conductors due to faulty mains cable

Electric shock

- The mains cable must not come into contact with the top of the device, hoses containing hot heat transfer liquid and other hot parts, neither during operation nor after the device is switched off.

CAUTION!
Risk of heat transfer liquid escaping during operation due to open consuming unit

Scalding, cold burns

- Always use hydraulically sealed consuming units.

CAUTION!
Risk of heat transfer liquid escaping

Electric shock, hot or cold burns

- If the external consuming unit is positioned above or below the device, heat transfer liquid may escape when the pump stops. Use the reverse flow protection available as an accessory in the external hydraulic circuit if required.

CAUTION!
Bursting of external consuming unit due to excess pressure

Scalding, frostbite, cuts

- If using a pressure-sensitive consuming unit (such as a glass reactor), use a pressure relief device.

CAUTION!
Contact with hot or cold surfaces

Hot and cold burns

- Do not touch the connection nozzle or draining nozzle during operation.
- In addition, the temperature of some bath cover parts may exceed 70 °C at higher operating temperatures.

Switching on the supplementary pump

Please note:

- Irritant vapors may develop, depending on the heat transfer liquid and operating mode used. Always ensure that the vapors are adequately extracted. Also use the bath cover.

1. First switch on the bath thermostat at the mains switch.
2. Then switch on the supplementary pump at the mains switch.
   - ▶ If there is no fault, the LED of the supplementary pump continuously lights up green.

Operating modes

The supplementary pump supports two operating modes.

- In *Operation* mode, the supplementary pump runs at the set speed.
- In *Standby* mode, the supplementary pump stands still.

Adjusting the pump speed

When the supplementary pump is running at high speed, the temperature difference between the bath and the external consuming is kept as low as possible.

The pump level of the bath thermostat should not be set too low, as this is crucial for circulation in the bath.

The speed of the supplementary pump can be adjusted using the rotary knob. The different pump levels optimize output, conveyance pressure, noise emissions and mechanical heat input.

1. Use a screwdriver to turn the rotary knob with the scale from 1 to 6. To increase the pump speed, turn clockwise.
   ▶ The setting is active immediately.

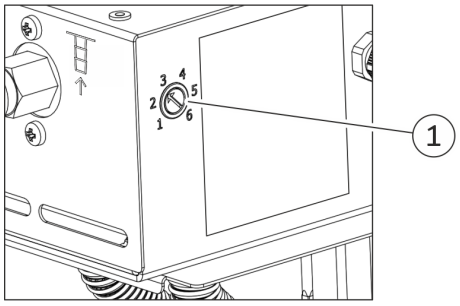


Fig. 6: Rotary knob

1 Rotary knob

The scale on the rotary knob provides a guide for adjusting the pump speed. The output of the pump also depends on the heat transfer liquid used.

6 Maintenance

General safety instructions

DANGER!
Contact with live or moving parts

Electric shock, impacts, cutting, crushing

- The device must be disconnected from the mains power supply before any kind of maintenance is performed.
- Only skilled personnel are permitted to perform repairs.

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

Scalding, hot or cold burns

- Allow device parts, accessories and heat transfer liquid to reach room temperature before touching.

Maintenance intervals

The maintenance intervals described in the following table must be observed. The following compulsory maintenance tasks must be performed before operating the device for prolonged periods.

Interval	Maintenance work
Monthly	Inspect the external condition of the supplementary pump
	Inspect the external hoses for material fatigue
Six monthly	Check the heat transfer liquid

Clean the supplementary pump

WARNING!
Risk of cleaning agent entering the device

Electric shock

- Only use a slightly damp cloth to clean the device.

Please note:

- Ensure that the device is decontaminated after coming into contact with hazardous materials.
- It is forbidden to use decontaminants or cleaning agents that may react with parts of the device or materials contained in those parts and potentially pose a **hazard**.
- We recommend using ethanol as a decontaminant. If you are unsure whether decontaminants or cleaning agents are compatible with parts of the device or the materials contained in those parts, please contact LAUDA Service Temperature control devices.

7 Operating faults

Faults on the bath thermostat

If an **error** occurs on the bath thermostat, the supplementary pump is also switched off and the fault indicator (LED) flashes red.

All **alarms**, **error messages** and **warnings** triggered appear in text form on the display.

Faults on the supplementary pump

If a **fault** occurs on the supplementary pump, the pump is switched off and the fault indicator (LED) flashes red.

If a **fault** occurs on the supplementary pump, please switch off the bath thermostat and supplementary pump at the mains switch. If the **fault** occurs again after the devices are switched back on, note down the error message together with the detailed code. Then contact **LAUDA Service Temperature control devices**. You will find the contact information here ↳ Chapter 11.4 “Contact LAUDA” on page 26.

The error messages appear on the thermostat display together with a detailed code and a consecutive number in the sequence in which they occurred.

8 Decommissioning

Information on decommissioning and course of action if there is a risk of freezing

- Drain the pump housing on the supplementary pump from the intake side using compressed air or a watertight industrial vacuum cleaner.

NOTICE!
Pump output decreases

Device damage

- Before decommissioning the device or if there is a risk of freezing, drain the pump completely from the intake side. Blow compressed air through the circuit.

Draining heat transfer liquid

WARNING!
Contact with hot or cold heat transfer liquid

Scalding, cold burns

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

WARNING!
Splashing heat transfer liquid

Eye damage

- Always wear suitable safety glasses when working on the device.

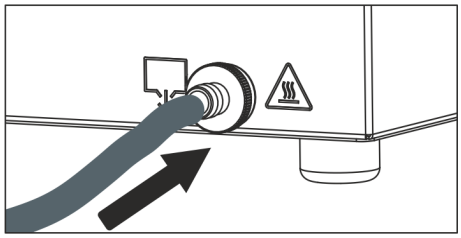


Fig. 7: Attaching hose

Observe the regulations for the disposal of used heat transfer liquid.

1. Allow the devices and heat transfer liquid to cool or warm up to room temperature.
2. Turn off the bath thermostat and pull out the mains plug.
3. Turn off the supplementary pump and pull out the mains plug.
4. Attach a hose to the drain nozzle.
5. Place the hose in a suitable container to collect the heat transfer liquid.

It may be necessary to drain the device several times if the filling volume is high.

6. Open the drain tap by turning it counterclockwise.

Drain the bath, external consuming unit, accessories and hoses completely.

7. If necessary, clean or flush out the devices (for example, with new heat transfer liquid).

9 Disposal

9.1 Device disposal

The following applies for EU member states: The device must be disposed of according to Directive 2012/19/EU (WEEE Waste of Electrical and Electronic Equipment).

9.2 Disposing of packaging

The following applies for EU member states: Disposal of the packaging must proceed according to regulation 94/62/EC.

10 Technical data

Table 3: Supplementary pump for PRO bath thermostats

Specification	Value	Unit
Installation and use	Indoors	---
Maximum height of installation above sea level	Up to 2,000	m
Air humidity	Maximum relative air humidity 80 % at ambient temperature of 31 °C and up to 40 °C, 50 % with linear decrease	---
Ambient temperature range	5 – 40	°C
IP protection level	IP 21	---
Mains voltage fluctuations	up to ±10 % of the mains voltage	
Protection class for electrical equipment DIN EN 61 140 (VDE 0140-1)	1	---
Class division according to DIN 12 876-1		
- Class designation	III	---
- Identification code	FL (suitable for combustible and non-combustible liquids)	---
Storage temperature range	5 – 60	°C
Transportation temperature range	-20 – 60	°C
Power input		
- maximum	50	W
- minimum	20	W
Device dimensions (W x H x D)	240 x 150 x 90	mm
Pump data		
Maximum conveyance pressure	0.5	bar
Maximum pump suction	0.4	bar
Maximum flow rate pressure	18	L/min
Maximum flow rate suction	17	L/min
Pump connecting thread	M16 x 1	mm
Noise level (1 m)	48	dB(A)
Weight	3.8	kg
Power consumption		
- maximum	75	W
- minimum	30	W

Pump characteristics

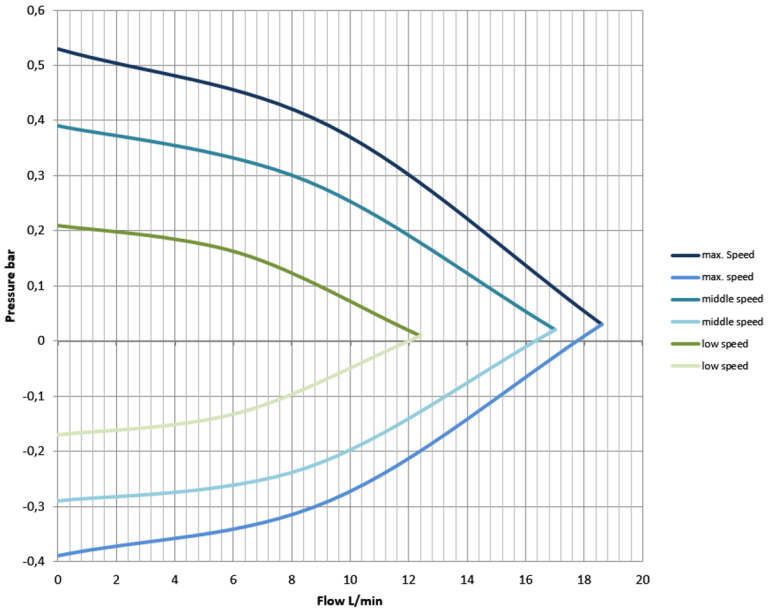


Fig. 8: PRO supplementary pump

11 General

11.1 Copyright

This manual is protected by copyright and only meant for internal use by purchasers.

The relinquishment of this manual to third parties, copying in any way whatsoever – even in the form of excerpts – and the utilization and/or conveyance of its content are not allowed, except for internal purposes, without written approval from the manufacturer.

Violation of this may obligate the violator to the payment of damages. Other claims reserved.

We point out that the designations and brand names of the respective companies used in the manual are generally subject to trademark, brand and patent protection.

11.2 Technical changes

The manufacturer reserves the right to make technical modifications to the device.

11.3 Warranty conditions

LAUDA grants a standard warranty of one year.

11.4 Contact LAUDA

Contact the LAUDA Service department in the following cases:

- Troubleshooting
- Technical questions
- Ordering accessories and spare parts

Please contact our sales department for questions relating to your specific application.

Contact information

LAUDA Service

Phone: +49 (0)9343 503-350

Fax: +49 (0)9343 503-283

Email: service@lauda.de

11.5 Declaration of Conformity

EU DECLARATION OF CONFORMITY

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

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

Product Line: PRO **Serial number:** from S210000001

Types: P 10, P 20, P 30, P 2 E, Additional pump PRO

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

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

The equipment is not covered by the Pressure Equipment Directive 2014/68/EU, as the maximum classification of the equipment is Category 1 and it is covered by the Machinery Directive.
The protective objectives of the Machinery Directive with regard to electrical safety are complied with in accordance with Annex I Paragraph 1.5.1 in conformity with the Low Voltage Directive 2014/35/EU.

Applied harmonized standards:

- EN ISO 12100:2010
- EN 61326-1:2013
- EN 55011:2016 + A1:2017
- EN 61000-6-3:2007/A1:2011/AC:2012
- EN IEC 61000-6-2:2019
- EN 61326-3-1:2018
- EN 61010-1:2010/A1:2019/AC:2019-04
- EN 61010-2-010:2014

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12 Index

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