

Operation manual

Filling and draining unit FD 50

Filling and flow control system consisting of FD 50 and MID 80

Accessories for the Integral IN XT



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1 Safety

1.1 General Information







Operating manual



IMPORTANT READ CAREFULLY BEFORE USE KEEP FOR FUTURE REFERENCE

- Read this operating manual carefully before use.
- All personnel must have read and understood the operating instructions before operating the device.
- Also read the operating manual for the constant temperature equipment.
- Follow all the warnings and safety instructions on the device and in the operating manual.
- Always keep the operating manual within easy reach near the device.
- This operating manual is part of the device. Never pass the device on to third parties without the operating manual.
- The operating manual is available on our website (<https://www.lauda.de>).
- In this operating manual, the term *device* is used for the Filling and draining unit.
- The device must always be operated as intended according to the instructions in this operating manual. Any other use is considered to be unintended use.
LAUDA accepts no liability for damage resulting from improper use of the device.

Structure of warnings

Warning signs	Type of danger
	Warning – dangerous electrical voltage.
	Warning – explosive atmosphere.
	Warning – flammable substances.
	Warning – hot surface.
	Warning – slip hazard.
	Warning – danger zone.

Signal word	Meaning
DANGER!	This combination of symbol and signal word indicates an imminently dangerous situation that will result in death or serious injury if it is not avoided.
WARNING!	This combination of symbol and signal word indicates a potentially dangerous situation that can result in death or serious injury if it is not avoided.
CAUTION!	This combination of symbol and signal word indicates a possible dangerous situation that can result in minor injury if it is not avoided.
NOTICE!	This combination of symbol and signal word indicates a potentially dangerous situation that can result in material and environmental damage if it is not avoided.

1.2 Safety information

Personnel

- Ensure that the device is only operated by trained operating personnel or skilled personnel.
- The user must have read and understood this operating manual and be able to follow all the information and instructions given.
- Use appropriate personal protective equipment when carrying out any work on the device or connected components.

Installation

- Install the device on an even, non-slip surface. The installation surface must not be flammable or sensitive to moisture.
- Keep flammable materials and liquids away from the immediate vicinity of the device. Do not store them above the device.
- Only set up the device indoors and protect it from condensation and dripping.

Operation

- Never operate the device without heat transfer liquid.

Hose requirements

- Only use suitable hoses. The
 - temperature,
 - pressure and
 - media resistance of the hoses must be suitable for the respective application.
- Connect the hoses in such a way that no kinks can occur during operation. When routing the hoses, make sure that the radii are as large as possible and secure the hoses with hose clips.
- Check the hoses regularly for damage and material fatigue.

1.3 Intended use

The Filling and draining unit is an accessory part for the Integral XT product line and is designed to fill and drain non-flammable heat transfer liquid in an external application. The Filling and draining unit must only be used together with LAUDA Integral XT devices.




The device is designed for non-flammable heat transfer liquids equivalent to class I, in accordance with DIN 12876-1.

Permitted heat transfer liquids:

- LAUDA Kryo 30 heat transfer liquid
- Monoethylene glycol/water mixture

The device can only be used as intended and under the conditions specified in this operating manual. Any other use is considered to be unintended use. LAUDA accepts no liability for damage resulting from improper use of the device.

Reasonably foreseeable improper use

	 DANGER! Ignition source placed in a hazardous atmosphere
	Explosion <ul style="list-style-type: none"> ● Do not operate the device in hazardous areas.
	 DANGER! Contact with live parts
	Electric shock <ul style="list-style-type: none"> ● Do not operate the device outdoors.
	 WARNING! The relevant standards are not observed
	Personal injury <ul style="list-style-type: none"> ● Do not use the device for medical applications. ● Do not use the device in the food sector.

The following are considered cases of reasonably foreseeable misuse:

- Use with incompatible constant temperature equipment
- Operating the device without heat transfer liquid
- Operating the device with an unsuitable or flammable heat transfer liquid
- Operation outdoors
- Operation in a potentially explosive area
- Operation using cables or hoses that are defective, unsuitable or do not conform to standards
- Operation in the food sector
- Operation in medical applications
- Connecting a compressed air supply with an excessively high pressure
- Operation with a glass reactor without overpressure protection
- Overfilling the buffer tank

Residual risks

The residual risks are described in the safety instructions in this operating manual.

Service life

The device is designed for continuous operation.
The device is designed for 20,000 operating hours.

Accompanying documents

The instructions in the manual of the respective constant temperature equipment must also be followed to ensure that the device is used as intended. If in doubt, these instructions take precedence.

1.4 Environmental limits

The device may only be used in the following areas:

- Production, quality assurance, research and development in an industrial environment
- Only used inside buildings
- Up to a height of 2,000 m above sea level
- Within an ambient temperature range from 5°C to 40°C
- Maximum relative humidity 80% at an ambient temperature of 31°C, relative humidity linearly decreasing to 50% at 40°C.
- Fluctuations of the mains voltage up to $\pm 10\%$ of the nominal voltage
- Transient electrical surge up to the values of surge category II
- Sporadic electric surges that occur in the mains power supply
- Pollution degree 2

1.5 Heat transfer liquid requirements

- Heat transfer liquid is used to control the temperature. LAUDA heat transfer liquids are recommended for use in the filling and draining unit. LAUDA heat transfer liquids are transfer fluids that have been tested and approved by LAUDA DR. R. WOBSEER GMBH & CO. KG.
- Heat transfer liquids are only suitable for a specific temperature range. This temperature range must correspond to the temperature range of your application.
- The safety data sheet of the heat transfer liquid specifies hazards and the corresponding safety measures required for handling the liquid. The safety data sheet of the heat transfer liquid must therefore be observed to ensure proper use of the device.
- If you wish to use your own heat transfer liquid, check to ensure that the liquid is compatible with the materials used.
- The heat transfer liquid used must be provided with corrosion protection.
- You must check the suitability of the heat transfer liquid by performing a test run within the desired temperature range.

1.6 Prohibition of modifications to the device

It is prohibited to make any technical modifications to the device.

Service work may only be performed by LAUDA Service or a service partner authorized by LAUDA.

1.7 Warranty conditions

LAUDA grants a standard warranty of one year.

1.8 Copyright

This operating manual was written in German, checked and approved. If the content of other language editions deviates from the German edition, the information in the German edition shall take precedence. If you notice any discrepancies in the content, please contact LAUDA Service, see [🔗 Chapter 1.9 “Contact LAUDA” on page 10.](#)

Company and product names mentioned in the operating manual are usually registered trademarks of the respective companies and are therefore subject to brand and patent protection. Some of the images used may also show accessories that are not included in the delivery.

All rights reserved, including those relating to technical modifications and translations. This operating manual or parts thereof may not be modified, translated or used in any other capacity without the written consent of LAUDA. Violation of this may obligate the violator to the payment of damages. Other claims reserved.

1.9 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

Email: service@lauda.de

1.10 Personnel qualification

Operating personnel

Operating personnel are personnel who have been instructed by qualified personnel on how 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 people whose professional education, knowledge, and experience as well as knowledge of relevant standards qualify them to assess the function and risks associated with the device and its use.

1.11 Personal protective equipment



Protective gloves

Protective gloves must be worn for certain tasks. The protective gloves must comply with standard DIN EN ISO 374-1. The protective gloves must be chemically resistant.



Protective work clothing

Protective clothing must be worn for certain tasks. This protective clothing must meet the legal requirements for personal protective equipment. Protective clothing with long sleeves must be worn. Additionally safety shoes are required.



Safety glasses

Safety glasses must be worn for certain tasks. The safety glasses must comply with the standard DIN EN 166. The glasses must be tightly closed and equipped with side plates.

2 Device description

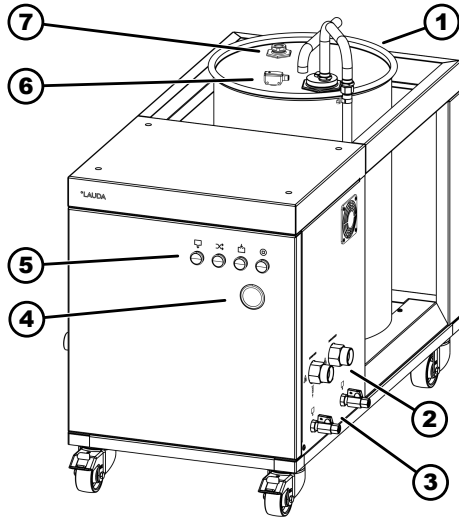


Fig. 1: Front view of FD 50

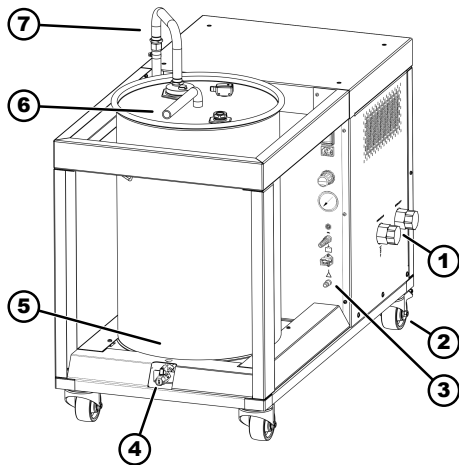


Fig. 2: Rear view of FD 50

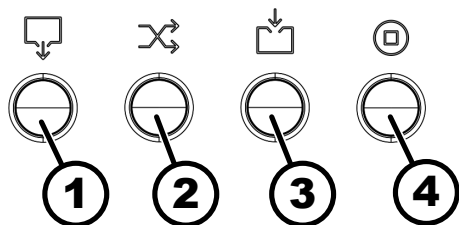


Fig. 3: Operating buttons

- 1 Buffer tank
- 2 Connecting sleeves for the application
- 3 Drain tap with draining nozzle
- 4 Pressure gauge
- 5 Operating buttons
- 6 Fill level sensor
- 7 Sight glass

The Filling and draining unit FD 50 facilitates operation with the application by allowing the user automatically fill and drain its application.

The device is operated with the operating buttons (5). Settings are configured on the Integral XT. The LiBus cable is used to connect the two devices. The software menu of the constant temperature equipment is extended by the functions of the Filling and draining unit.



The LiBus cable to the constant temperature equipment must be extended by a maximum of 25 meters.

- 1 Connecting sleeves (with screw caps) for the Integral XT/through-flow controller
- 2 Four castors, two with a parking brake
- 3 Supply connections, pressure reducer and type plate
- 4 Drain tap with draining nozzle
- 5 Buffer tank with filter screen in the outlet (filter screen catalog number HZF 127)
- 6 Overflow pipe
- 7 Drain pipe

There are four operating buttons on the Filling and draining unit:

- 1 Drain (yellow)
- 2 Change application (green)
- 3 Leak test / filling (blue)
- 4 Stop (red)

Meaning of the operating button lights:

- Drain button (yellow), fill button (blue) and stop button (red) light up at the same time:
 - Initialization state after switching on
- No operating buttons light up:
 - Idle state (temperature control mode) or Filling and draining unit is switched off (disconnected from the power)
- Drain button (yellow) flashes slowly:
 - Pre-temperature control active, preparation for draining

- Drain button (yellow) permanently lit:
 - Draining active
- Drain button (yellow) and fill button (blue) flash at the same time:
 - Hold state active
- Application change button (green) lights up:
 - Application change release
- Fill button (blue) flashes slowly:
 - Leak test active, preparation for filling
- Fill button (blue) lights up permanently:
 - Filling active
- Fill button (blue) flashes quickly:
 - Buffer tank refilling active or necessary
- Stop button (red) lights up for 3 seconds:
 - Stop button has been pressed
- Stop button (red) flashes:
 - Device has malfunctioned
- Drain button (yellow) and stop button (red) both light up permanently:
 - Decommissioning mode active

- 1 Circuit breaker and non-heating socket (high resistance)
- 2 Pressure reducer with pressure gauge
- 3 LiBus socket (output)
- 4 LiBus cable with connector
- 5 24 VDC output with connector (EQS 005) for connecting a pump or solenoid valve; automatic refilling
- 6 Compressed air connection

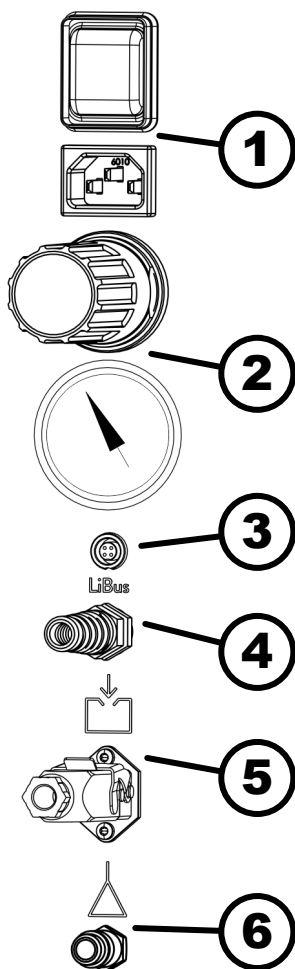


Fig. 4: Supply connections and pressure reducer

Rectangular connectors from the ST series "STAS 2"

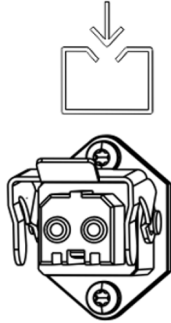


Fig. 5: Socket with securing bracket

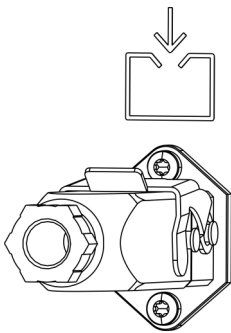


Fig. 6: Socket with connector

The ST series connector is designed for robust and reliable applications in harsh industrial environments.

The Filling and draining unit is fitted with a rectangular socket from the ST series "STAS 2" and an associated safety bracket. The socket is used to connect pumps or valves for automatically refilling of heat transfer liquid into the temperature control circuit.



Any pumps or solenoid valves connected here must be certified or listed according to UL/CSA standards.

The associated plug (standard accessory) is plugged into the socket on delivery.

Technical specification

Output voltage - 24 VDC

Maximum current - 6 A

Pin assignment

Pin 1 - +24 volt

Pin 2 - GND

Pin 3 - PE

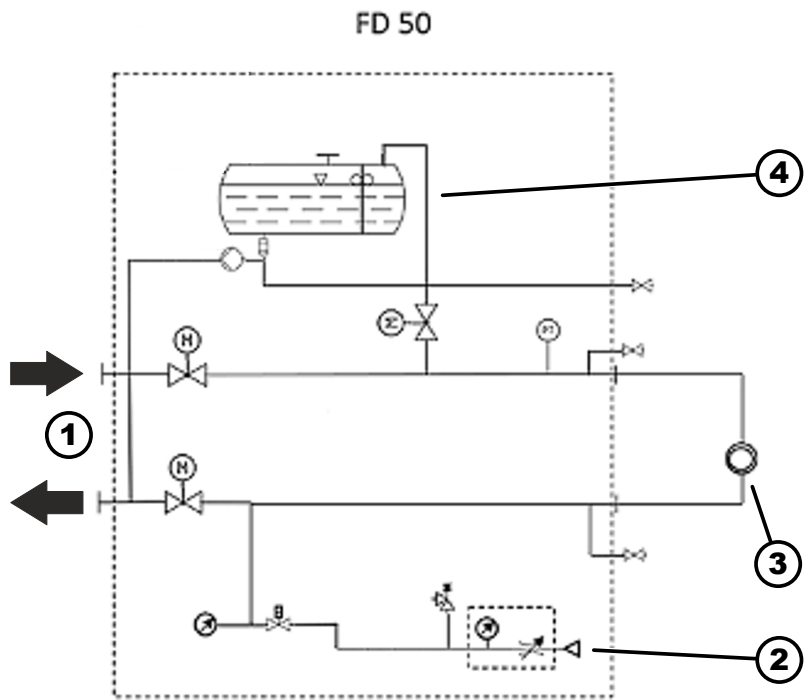


Fig. 7: Hydraulic diagram FD 50

- 1 Connection for Integral XT/through-flow controller
- 2 Connection for compressed air
- 3 Application
- 4 Buffer tank

3 Assembling the devices

3.1 Assembly warning information



DANGER!

Contact with voltage conductors due to faulty power supply cable

Electric shock

- Always use standard power supply cables such as the one supplied.
- Check the supplied power supply cable for damage prior to use.



WARNING!

Danger of the device rolling away or overturning

Impact, crushing

- Do not tilt the device.
- Position the device on an even, non-slip surface with a sufficient load carrying capacity.
- Actuate the caster brake when setting up the device.
- Do not place heavy parts on the device.
- To assemble the LAUDA Flow controller on the Filling and draining unit, follow the mounting instructions included in the assembly kit.



WARNING!

Risk of heat transfer liquid escaping

Scalding, cold burns

- The temperature resistance of the hoses must be suitable for the application temperature range.
- Use hoses with a greater compressive strength than the maximum possible pump pressure. For liquids with a density above 1 kg/dm^3 , the pump pressure must be converted according to the density.
- Use pressure-resistant external applications or safety valves in the hydraulic circuit.
- When laying the hoses for the application, make sure that the hoses cannot be kinked or crushed.
- Filling operations can cause the operating point of the pump to shift, which can result in the maximum possible pressure being produced for the selected pump level.



WARNING!
Contact with hot or cold hoses

Hot and cold burns

- Use insulated hoses for temperatures below 0 °C and above 70 °C.



WARNING!
Risk of heat transfer liquid escaping during operation due to open application

Scalding, cold burns

- Always use hydraulically sealed applications.



WARNING!
Bursting of the external application due to excessive pressure

Scalding, cold burns

- If the external application 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 application and the device.
- For pressure-sensitive applications (for example, glass apparatus) with a maximum permissible working pressure below the maximum pressure of the pump (see Technical data section), the hoses of the application must be laid in such a way that bending or squeezing is not possible.
- A separate safety valve must be installed in the outflow to protect against operating errors.
- The bypass is used to adjust the pump pressure according to your application.



WARNING!
Use of unsuitable heat transfer liquid

Fire

- Select a heat transfer liquid with a temperature range suitable for the application.
- Use the same heat transfer liquid as used in the LAUDA constant temperature equipment.



CAUTION!
Mixture of compressed air and vapor released from the heat transfer liquid when the compressed air is connected

Breathing difficulties

- A connecting hose with a collecting vessel must be attached to the overflow pipe.
- Aerosols from the heat transfer liquid must discharge via the overflow pipe.
The vapor must dissipate in an environmentally compatible manner.
- Observe the safety data sheet for the heat transfer liquid.

3.2 Tightening torque

Hose with union nut M38 x 1.5

Please note:

- The thread connections of the sleeves or the thread connections of the union nut and the seat of the nut must be moistened with lubricant.
For example: Copper paste, graphite paste.

Connection thread	Maximum tightening torque in Nm
M38 x 1.5	130

3.3 Assembling the Filling and draining unit with constant temperature equipment

Assembly and installation



The description is valid for the use of a Filling and draining unit together with a Integral XT.

Before operating the Integral XT, read the associated operating manual.



The connecting sleeves on the device are marked with RETURN USER, OUTFLOW USER, OUTFLOW XT/P, RETURN XT/P and additional symbols.

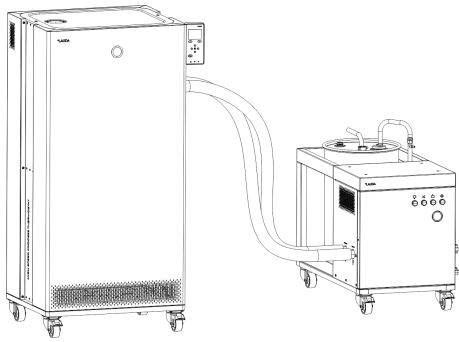


Fig. 8: FD 50 with constant temperature equipment

Connect the Integral XT and Filling and draining unit using two hoses

- Personnel: ■ Specialized personnel
- Tool: ■ Open-end wrench size 46
 ■ Open-end wrench size 41

1. All devices are switched off.
2. Position the Filling and draining unit so that the sleeves are pointing in the correct direction.
 The sleeves on the Filling and draining unit marked RETURN USER and OUTFLOW USER must face in the direction of the application.
3. Actuate the parking brakes on the castors of the Filling and draining unit.



4. Screw the first hose onto the Filling and draining unit. The sleeve is marked RETURN XT/P.

i *Screw the union nut clockwise onto the connecting sleeve. Tighten the union nut on the connecting sleeve using an open-end wrench. While doing so, brace the connecting sleeve with a second open-end wrench.*



5. Screw the other end of the hose onto the pump connector (outlet) of the Integral XT.



6. Screw the second hose onto the inlet sleeve (OUTFLOW XT/P) of the Filling and draining unit.



7. Screw the other end of the hose onto the pump connector (outflow) of the Integral XT.

► The two hoses cross over one another.

Connect the Filling and draining unit and application using two hoses



8. Connect the two hoses from the Filling and draining unit to your application. The two sleeves are marked RETURN USER and OUTFLOW USER.



The hoses must be connected to the application in such a way that the liquid flows through them from the bottom upwards so that any gas/vapor bubbles are dissipated reliably from the application.

Plugging in the LiBus cable

9. Insert the LiBus cable (4, Fig. 4) of the Filling and draining unit into the LiBus socket on the Integral XT and screw tight in a clockwise direction.
10. Insert and screw the connector with resistor (EKS) onto the LiBus socket (3, Fig. 4) of the Filling and draining unit. The connector serves as a bus termination for the LiBus.

Compressed air connection

11. Connect the Filling and draining unit to a compressed air supply. Attach the compressed air hose to the connection (6, Fig. 4) on the Filling and draining unit.

3.4 Assembling the Filling and draining unit with Flow controller and constant temperature equipment

Assembly and installation

Before installing the Flow controller on the Filling and draining unit, follow the assembly instructions included in the assembly kit.



The description is valid for the use of a Filling and draining unit with a Flow controller attached.

Before operating the Flow controller, read the associated operating manual.



The connecting sleeves on the device are marked with RETURN USER, OUTFLOW USER, OUTFLOW XT/P, RETURN XT/P and additional symbols.

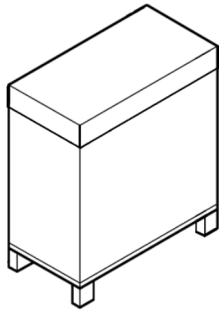


Fig. 9: Packaging (generic image)

Screwing on the pipework

- Personnel: ■ Specialized personnel
- Tool: ■ Open-end wrench size 46
■ Open-end wrench size 41

The Filling and draining unit is packed together with the Flow controller and two pipes.

1. Unpack the devices and the pipes.
 - ▶ The Flow controller mounted on the Filling and draining unit is ready for operation. The pipes are insulated. There is a short curved pipe with a T-extender (5) and a long curved pipe (10, Fig. 11).
2. Actuate the parking brakes on the castors of the Filling and draining unit.
3. Screw the RETURN USER sleeve (3, Fig. 10) tight using a union nut and an inserted closing plug.



Screw the union nut clockwise onto the connecting sleeve. Tighten the union nut on the connecting sleeve using an open-end wrench. While doing so, brace the connecting sleeve with a second open-end wrench.



4. Fit the long pipe first of all.
Screw the long pipe to the OUTFLOW USER sleeve (4, Fig. 10) on the Flow controller.
The pipe leads downward to the other side of the device.

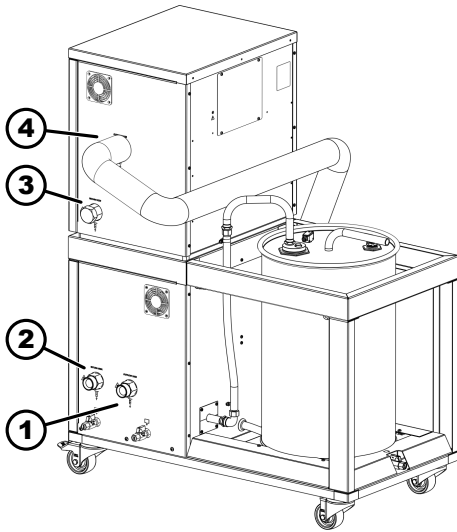


Fig. 10: Assembly on the application side

- 1 OUTFLOW USER sleeve
- 2 RETURN USER sleeve
- 3 RETURN USER sleeve
- 4 OUTFLOW USER sleeve



- 5. Screw the other end of the pipe to the OUTFLOW XT/P sleeve (6, Fig. 11) on the Filling and draining unit.
- 6. On this side of the two devices, screw the short pipe with the T-extender to the bottom sleeve. The sleeve is marked RETURN XT/P (4, Fig. 11).
- 7. Screw the other end of the pipe to the Flow controller. The sleeve is marked RETURN XT/P (3, Fig. 11).

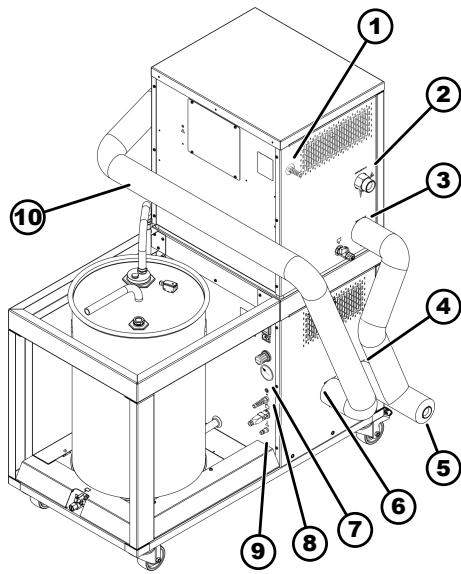


Fig. 11: Assembly shown without constant temperature equipment

- 1 LiBus cable with connector on Flow controller
- 2 OUTFLOW XT/P sleeve
- 3 RETURN XT/P sleeve
- 4 RETURN XT/P sleeve
- 5 Short pipe with T-extender
- 6 OUTFLOW XT/P sleeve
- 7 LiBus socket (output) on Filling and draining unit
- 8 LiBus cable with connector on Filling and draining unit
- 9 Compressed air connection
- 10 Long pipe

- 8. Align the devices between the application and the constant temperature equipment accordingly. The sleeves on the Flow controller and Filling and draining unit labeled RETURN USER and OUTFLOW USER must face in the direction of the application (Fig. 10).
- 9. Connect two hoses from the Filling and draining unit to your application. The two sleeves are marked OUTFLOW USER and RETURN USER (1 and 2, Fig. 10).

i The hoses must be connected to the application in such a way that the liquid flows through them from the bottom upwards so that any gas/vapor bubbles are dissipated reliably from the application.



- 10. Screw a hose onto the pump connector (outlet) of the Integral XT.
- 11. Screw the other end onto the T-extender of the Filling and draining unit (5, Fig. 10).



- 12. Screw the other hose onto the pump connector (inlet) of the Integral XT.



- 13. Screw the other end onto the inlet sleeve of the Flow controller. The inlet sleeve is marked OUTFLOW XT/P (2, Fig. 11).

Plugging in the LiBus cable

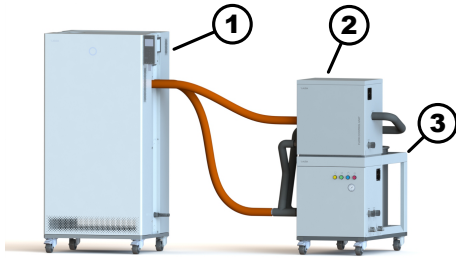


Fig. 12: Integral XT with Flow controller and FD 50 (bottom right of image)





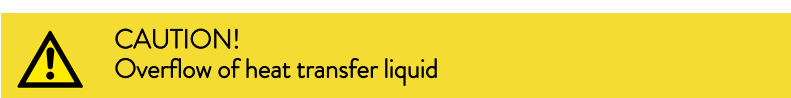
- 1 Integral XT
- 2 Flow controller
- 3 Filling and draining unit

Compressed air connection

14. Insert the LiBus cable (8, Fig. 11) of the Filling and draining unit into the LiBus socket on the Integral XT and screw tight in a clockwise direction.
15. Insert and screw the T-connector (EKS 073) for LiBus into the LiBus socket (7, Fig. 11) of the Filling and draining unit.
16. Attach the connector on the LiBus cable (1, Fig. 11) of the Flow controller to a LiBus socket on the T-connector (7) of the Filling and draining unit.
17. Attach the connector with resistor (EKS 233) to the other side of the T-connector and screw tight. The connector serves as a bus termination for the LiBus.
18. Connect the Filling and draining unit to a compressed air supply. Attach the compressed air hose to the connection (9, Fig. 11) on the Filling and draining unit.

4 Commissioning

4.1 Warnings related to commissioning

	
Electric shock	
	<ul style="list-style-type: none">● Closely inspect the device for transport damage prior to starting up.● Never operate a device that has sustained transport damage!
	
Electric shock	
	<ul style="list-style-type: none">● The power supply cable must not come into contact with hoses containing heat transfer liquid or other hot parts.
	
Eye damage	
	<ul style="list-style-type: none">● Always wear suitable safety glasses when working on the device.
	
Fire	
	<ul style="list-style-type: none">● Select a heat transfer liquid with a temperature range suitable for the application.● Use the same heat transfer liquid as used in the LAUDA constant temperature equipment.
	
Slipping or falling over	
	<ul style="list-style-type: none">● Do not overfill the device. Please note the level display and keep in mind that the heat transfer liquid will increase in volume when heated (for the total volume with application and hoses).



CAUTION!
Spraying of heat transfer liquid

Slipping or falling over

- Use a funnel for filling.



CAUTION!
Risk of heat transfer liquid escaping

Slipping or falling over

- Drain tap must be closed.
- Ensure that all hydraulic connections are tight.



NOTICE!
Use of impermissible mains voltage or mains frequency

Device damage

- Only connect the device to a mains voltage and frequency specified on the type plate.

4.2 Establishing the power supply

Establishing a mains connection

Note the following information:

- Only connect the device to a mains voltage and frequency specified on the type plate.
- The high resistance socket connection is a device that disconnects the unit safely from the mains power supply.
- Only use the power supply cable provided to connect to the power supply.
- Only connect the device to a socket with a protective earth conductor (PE).
- The mains switch on the Filling and draining unit has a safety function. It triggers when overloading occurs and then switches off the device automatically.

The connector on the power supply cable is fitted with a lock. To remove the connector from the socket, press and hold the unlocking button and then pull out the connector.

Establishing the compressed air supply

1. Connect the device to the compressed air supply using a workshop connection with a nominal size of 7.2.
2. Then set the pressure reducer on the device to the maximum pressure. The maximum pressure is calculated by subtracting the safety buffer from the pressure load capacity of the application.

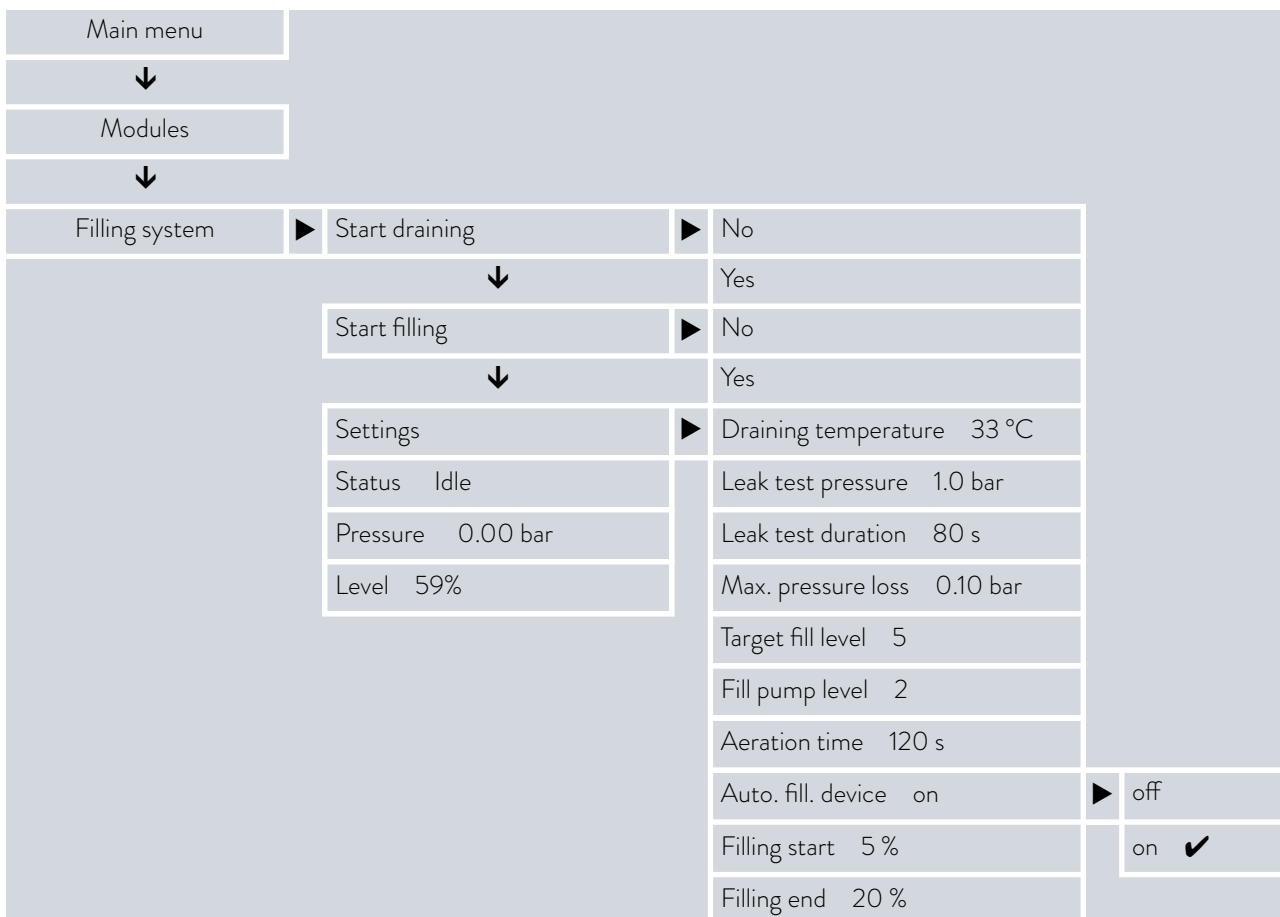


Please note:

The pressure of the leak test (↩ “Leak test pressure” on page 28) can only be below the pressure set on the pressure reducer.

4.3 Menu structure

The menu for configuring the Filling and draining unit is integrated into the main menu of the connected constant temperature equipment:



4.4 Configuring the Filling and draining unit

Configuring the Filling and draining unit

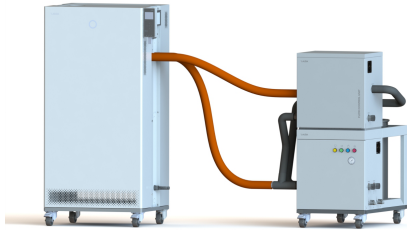


Fig. 13: Integral XT with through-flow controller and FD 50 (bottom right of image)

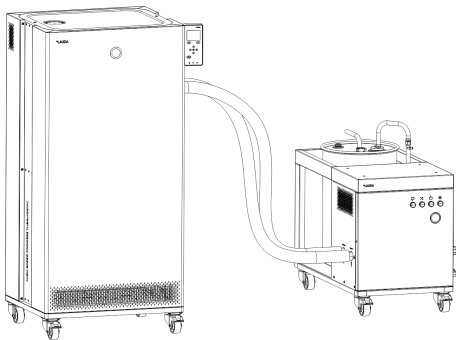


Fig. 14: FD 50 with constant temperature equipment

Before draining or filling, you can adjust the unit to your connected application by changing the configuration via the menu of the Integral XT. During the first run (draining and filling), check whether the new settings are suitable for your application. If not, optimize the settings during or after performing a run.

Start-up sequence

- Personnel: ■ Specialized personnel
- Protective equipment: ■ Safety glasses
 ■ Protective work clothing
 ■ Protective gloves

1. First switch on the Integral XT.
2. Switch the Integral XT to standby mode.
3. Then switch on the Filling and draining unit.
 - ▶ After switching on, the Filling and draining unit may take up to 30 seconds to reach initialization state. During this time, the yellow, blue and red operating buttons light up permanently at the same time.

Adjusting the parameters

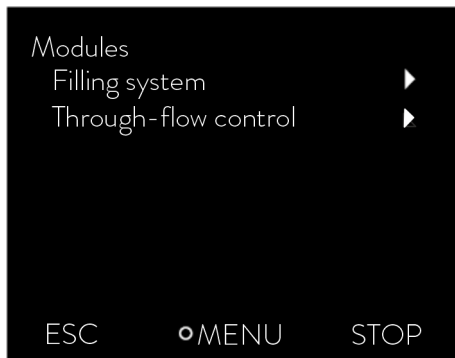


Fig. 15: Menu → Modules → Filling system

Draining temperature

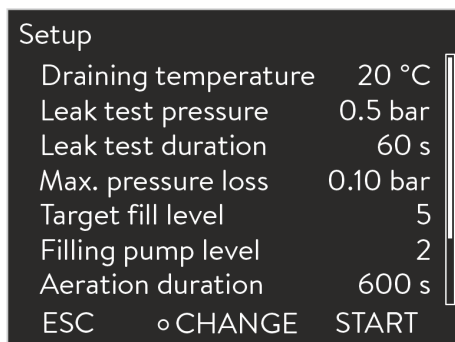


Fig. 16: Settings menu

Leak test pressure

- Personnel: ■ Specialized personnel
- Protective equipment: ■ Safety glasses
■ Protective work clothing
■ Protective gloves

The Integral XT is in standby mode.

1. Press the [Enter key] on the Integral XT to open the menu.
2. Select the menu items → *Modules* → *Filling system* → *Settings*.



Before the drain valve opens to start the draining process, the Integral XT adjusts the heat transfer liquid to the preset draining temperature to ensure that the drained liquid is not too hot or too cold.

3. Select → *Draining temperature* and press the Enter key to confirm.
 - ▶ The Input window opens.
The permitted *Max:* and *Min:* limit values are displayed.
4. Enter the required temperature value and press the Enter key to confirm.
 - ▶ The display returns to the previous screen with the new setting.



After the application is changed, a leak test is performed with compressed air. The pressure set point is set here.



The pressure for the leak test may only be below the pressure set on the pressure reducer.

5. Select → *Leak test pressure* and press the Enter key to confirm.
 - ▶ The Input window opens.
The permitted *Max:* and *Min:* limit values are displayed.
6. Enter the required pressure and press the Enter key to confirm.
 - ▶ The display returns to the previous screen with the new setting.

Leak test duration



Adjustable time period for the leak test.

7. Select → *Leak test duration* and press the Enter key to confirm.
 - ▶ The Input window opens.
The permitted *Max:* and *Min:* limit values are displayed.
8. Enter the required duration in seconds and press the Enter key to confirm.
 - ▶ The display returns to the previous screen with the new setting.

Maximum pressure loss



At the end of the leak test, the unit checks how much pressure has been lost compared to the start of the leak test. The maximum permissible pressure difference that classifies the leak test as successful can be preselected.

9. Select → *Max. pressure loss* and press the Enter key to confirm.
 - ▶ The Input window opens.
The permitted *Max:* and *Min:* limit values are displayed.
10. Enter the required pressure difference and press the Enter key to confirm.
 - ▶ The display returns to the previous screen with the new setting.

Fill level in the expansion tank



*Lowest fill level in the expansion vessel of the Integral XT at the end of filling.
LAUDA recommends level 5.*

11. Select → *Target fill level* and press the Enter key to confirm.
12. Enter the required level for the expansion vessel of the Integral XT and press the Enter key to confirm.
 - ▶ The display returns to the previous screen with the new setting.

Pump level during filling



Pump level of the Integral XT used for filling. You can also adjust this value during filling, if necessary. If a through-flow control is activated, it will be deactivated for the duration of the filling process. LAUDA recommends pump level 2, or pump level 4 for IN 2560 XTW/PW.

A higher pump level accelerates the filling process and improves aeration. However, the maximum pressure load capacity of the application must be taken into consideration.

13. Select → *Fill pump level* and press the Enter key to confirm.
14. Enter the pump level required for filling and press the Enter key to confirm.
 - ▶ The display returns to the previous screen with the new setting.

Aeration time



Adjustable aeration time during which the system continues to operate after filling in order to aerate the heat transfer liquid as effectively as possible.

15. Select → *Aeration time* and press the Enter key to confirm.
 - ▶ The Input window opens.
The permitted *Max:* and *Min:* limit values are displayed.
16. Enter the required duration in seconds and press the Enter key to confirm.
 - ▶ The display returns to the previous screen with the new setting.

Automatic filling device for filling the buffer tank



If an external pump or valve is connected to refill the buffer tank of the Filling and draining unit, you can activate the automatic filling device here.

17. Select → *Automatic filling device* and press the Enter key to confirm. Whenever you need to use the automatic filling device, select [On] and press the Enter key to confirm.
 - ▶ The display returns to the previous screen with the new setting.

Starting and stopping the filling process



If the level of the heat transfer liquid in the buffer tank of the Filling and draining unit falls below this level (in percent), filling will start automatically (if activated beforehand).

If the fill level of the buffer tank reaches the upper percentage threshold during filling, the filling process stops.

18. Select → *Start filling* or → *Stop filling* and press the Enter button to confirm.
 - ▶ The Input window opens.
19. Enter the required level in percent and press the Enter key to confirm.
 - ▶ Filling starts or stops at this value.

The draining and filling parameters are now configured. The settings you selected can be modified at any time to optimize the process or adapt the process to another application.

5 Operation

5.1 Warnings related to operation



WARNING!
Splashing heat transfer liquid

Eye damage

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



WARNING!
Ejection of parts

Impact, crushing

- The gauge pressure which escapes from the device through the overflow pipe may only be discharged in a safe area. The overflow pipe may be not closed, also not partially, or tapered.



WARNING!
Gauge pressure

Impact, crushing

- Do not disconnect the application until the green pilot lamp is illuminated and the pressure gauge displays a system pressure of zero.



CAUTION!
Contact with hot/cold surfaces

Hot and cold burns

- Never touch parts that are labeled with the warning symbol "Hot surface".



NOTICE!
Contamination can damage the pump and clog the pipes

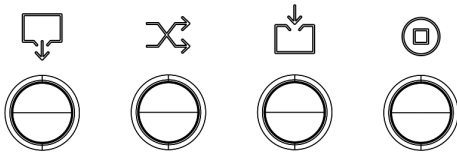
Device damage

- Avoid contamination in the connected application.
- Do not use contaminated heat transfer liquid.
- If contamination is unavoidable, integrate a filter into the hydraulic circuit. Clean the filter at regular intervals.
- In the event of contamination, the buffer tank must be cleaned regularly as described in the operating manual.
- A filter may not be able to separate the contamination, depending on the type of contamination. Therefore, damage to the device cannot be ruled out.

LAUDA recommends using filters in the hydraulic circuit: Order number LWZ 139 (M38 x 1,5).

5.2 Filling devices with heat transfer liquid for the first time

Initial situation



The application is connected. The Integral XT is in standby mode. Switch on the Filling and draining unit.

When the unit switches on, the drain button (yellow), fill button (blue) and stop button (red) light up at the same time.

Fig. 17: Operating buttons on the FD 50

Filling devices with heat transfer liquid for the first time

Personnel: ■ Operating personnel

Protective equipment: ■ Safety glasses
■ Protective work clothing
■ Protective gloves

- During operation, the heat transfer liquid is only filled via the Integral XT. Read the operating manual of the constant temperature equipment for more information.
 - Refer to the constant temperature equipment's operating manual for information on the properties of the heat transfer liquid used.
1. Connect the drain taps to the devices.
 2. To fill the Filling and draining unit and the application, open all manual shut-off valves in the temperature control circuit.
 3. The Integral XT is in *Standby* mode.
 4. Fill the Integral XT as described in the accompanying operating manual.



You can fill the buffer tank of the Filling and draining unit manually beforehand.

5. Open the clamping ring on the buffer tank. Lift off the clamping ring and cover.
6. Pour the heat transfer liquid into the buffer tank. The amount filled depends on the application. Note the minimum filling volume.
7. Place the cover and clamping ring on the buffer tank. Close the buffer tank securely with the clamping ring.
8. Switch on the Filling and draining unit. Switch the constant temperature equipment from *Standby* to *Operation* mode.
9. Only fill heat transfer liquid via the constant temperature equipment.

5.3 Draining, changing and filling the application

- Personnel: ■ Operating personnel
- Protective equipment: ■ Safety glasses
 ■ Protective work clothing
 ■ Protective gloves

Leak test

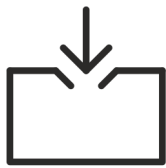



1. Once the application has been changed and all screw connections are completely closed, press the green operating button on the Filling and draining unit. The leak test starts, whereby compressed air is supplied to the application. The leak test is carried out to check whether the application has been connected correctly and to detect any possible leaks.
 - ▶ During the leak test, the blue operating button flashes slowly.
 - ▶ If the system fails the leak test, the system reverts back to the application change program point.

2. If you wish to cancel the leak test, press the red stop button on the Filling and draining unit. The leak test is canceled and the compressed air is released immediately. The red operating button lights up for about 3 seconds to indicate that the test has been canceled.

The Filling and draining unit reverts back to the application change in the program sequence. You can now repair any existing leaks and start the leak test again using the green operating button.

Filling



3.  *Filling operations can cause the operating point of the pump to shift, which can result in the maximum possible pressure being produced for the selected pump level.*

On successful completion of the leak test, filling starts automatically, whereby the filling pump conveys the heat transfer liquid from the buffer tank into the outlet of the Integral XT. The program activates the filling mode of the Integral XT, while its pump starts to convey the heat transfer liquid further into the application.

- ▶ The blue operating button on the Filling and draining unit remains continuously lit during the filling process.
- ▶ The pump of the Integral XT repeatedly stops briefly during the filling process to maximize aeration.

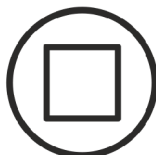
End of the filling process

4. Once the filling process is complete, the operating buttons no longer light up. Temperature control can now be started. However, it may be useful to run through filling mode and degassing mode again. Obtain the operating rights for this via the [Padlock] symbol on the Integral XT.

Filling

5. If the level of the buffer tank falls below the `Start filling` threshold (factory setting 10 %) during filling, filling is interrupted and the state switches to `Filling`.
 - ▶ This is indicated by the rapid flashing of the blue operating button on the Filling and draining unit.
6. If the automatic filling device is activated, the filling pump starts automatically. If you have not connected a filling pump for the buffer tank, filling must be initiated manually via the Integral XT.
 - ▶ If the fill level in the buffer tank of the Filling and draining unit exceeds the preset `End of filling` threshold (factory setting 30 %), filling of the application continues.

Hold



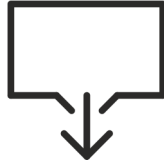
7. You can interrupt draining or filling and switch to the `Hold` state at any time by pressing the red stop button.
 - ▶ The red operating button lights up for 3 seconds to indicate that the user has interrupted the process.

8. If the yellow or blue operating button is pressed, the `Hold` state is lifted and `Draining` or `Filling` continues.

Idle state

9. If the red operating button is pressed again, the `Hold` state is lifted and the `Idle` state is activated. Filling or draining is then canceled.

Controlling the temperature and initiating the draining process



10.

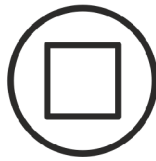


Aerosols may be produced during the draining process. The amount of aerosol produced largely depends on the application and use of the Filling and draining unit. If the load is excessive, the overflow pipe/exhaust air connection can be fitted with a filter or the aerosols can be discharged from the room together with other process exhaust air. However, it should be noted that larger volumes of liquid can escape from this connection (overflow function).
The maximum back pressure must not be greater than 50 mbar.

To start the draining process, press the yellow operating button with the [Drain] icon on the Filling and draining unit.

Alternatively, you can select the menu items → Modules → Filling system → Start draining → yes on the Integral XT.

- ▶ The constant temperature equipment initially adjusts the temperature to the preset draining temperature to ensure that the heat transfer liquid is not drained when too hot or too cold.
- ▶ During this process, the yellow operating button on the Filling and draining unit flashes slowly.

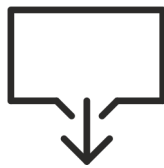


11.

If you wish to cancel the temperature control function, press the red stop button on the Filling and draining unit.

- ▶ The draining process is canceled and the red operating button lights up for about 3 seconds to indicate this. The constant temperature equipment then continues to operate in normal temperature control mode. You must set the desired target temperature in the usual way.

Drain



12.



When draining starts, the Filling and draining unit is given exclusive operator rights and passes them to the constant temperature equipment at the end of filling (or if filling is canceled). Changing settings on the Integral XT remotely or directly on the operating unit is not possible.

Temperature control stops as soon as the draining temperature is reached. A safety relay locks the outflow valve and return valve to ensure that the valves cannot open while the application is changed. Draining then starts automatically, whereby the pneumatic valve opens to allow compressed air to flow into the connected application. The heat transfer liquid is ejected from the application and flows into the buffer tank, where it is stored.

- ▶ During this process, the yellow operating button is permanently lit.

Heat transfer liquid level too high, hold draining/filling

13.

If the buffer tank is more than 95 % full when the application is drained, draining is interrupted and the state switches to Hold.

- ▶ This is indicated by the rapid flashing of the yellow and blue operating buttons on the Filling and draining unit.

Changing application



14. Drain the buffer tank until there is enough free volume for additional heat transfer liquid from the application.
Pressing the yellow operating button continues the draining process.

15. If the green operating button on the Filling and draining unit lights up permanently, you can change the application.



Only initiate an application change when the green operating button is lit.

- ▶ Now switch to the new application.

6 Maintenance/inspection, troubleshooting/repairs

6.1 Maintenance/inspection



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 maintenance work.



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.

Interval	Maintenance work
Before switching on the device	Visual inspection of the power supply cable for damage
After every filling or draining process	Check whether the sealing caps are fitted to the draining nozzles and tightened.
As required, once a month at the latest	Visual inspection of the external hoses, tubing clips and screw connections for leaks and damage.
As required, every three months at the latest	Clean the hydraulic circuit
The system operator must define the intervals in line with the operating conditions every six months at the latest.	Check that the internally installed safety valve is functioning properly.
As required, once a year at the latest	Check the external condition of the device for damage and stability.

- Comply with the intervals without fail. Failure to do so endangers the safe operation of the constant temperature equipment and Filling and draining unit.
- Remedy any defects found immediately, at the latest before the next operation.
- In the case of major damage, contact the manufacturer immediately
↳ Chapter 1.9 “Contact LAUDA” on page 10.

Clean the filter screen in the buffer tank

Personnel: ■ Operating personnel

Protective equipment: ■ Safety glasses

1. Switch off the constant temperature equipment at the mains switch.
2. Switch off the Filling and draining unit and pull out the power supply cable.
3. Drain the buffer tank via the dedicated drain tap.
4. Open the clamping ring on the buffer tank. Lift off the clamping ring and cover.
5. Remove the filter strainer from the buffer tank. Clean the filter screen with compressed air or under clean flowing water.
6. Insert the filter screen again after cleaning.
7. Place the cover on the buffer tank. Place the clamping ring around the cover and buffer tank.
8. Close the buffer tank securely with the clamping ring.
9. The Filling and draining unit can be put back into operation.


Cleaning the surfaces of the device

Personnel: ■ Operating personnel

Please note:

1. Only use water and detergent to clean the control element. Do not use acetone or solvent as these substances will permanently damage the plastic surfaces.
2. Clean painted sheet metal parts with a cloth and commercial industrial cleaner.
3. Ensure that the device is decontaminated after coming into contact with hazardous materials.
4. 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**.
5. 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 the LAUDA Service department.

6.2 Troubleshooting/repairs


DANGER!
 Contact with live or moving parts

	Electric shock
	<ul style="list-style-type: none"> ● Before performing any service or repair work, switch off the device and pull out the mains plug. ● Only skilled personnel are permitted to perform service and repair work.

Before informing the LAUDA Service department (↪ Chapter 1.9 “Contact LAUDA” on page 10), please check whether you can resolve the problem with the following instructions.

Fault description	Cause	Remedy
Filling stops/is not completed (blue operating button flashes quickly)	The Filling and draining unit interrupts the filling process. The current fill level in the expansion tank does not reach the fill level preset for the expansion vessel.	Check the fill level in the buffer tank and fill with heat transfer liquid, if necessary.
Filling unsatisfactory	Aeration time too short	Increase the value for the aeration time
	Inappropriate pump level during filling	Increase or reduce the pump level during filling (recommendation: pump level 2).
Draining stops (yellow and blue operating buttons flash)	Buffer tank overfilled	Drain the buffer tank.
Filling and draining unit does not drain	The Filling and draining unit only drains the connected application when the temperature in the circuit corresponds to the set temperature.	Heat transfer fluid must be circulated by the pump first. Then the draining process will start.
Draining temperature is not reached.	Cooling not possible	Check whether temperature control is possible. Compressed air not connected or pressure reducer closed.
Leak test is canceled	Application or pipes are leaking.	Repair the leaks and check again.
Not possible to change the settings on the Integral	The Filling and draining unit has exclusive operating rights when filling or draining. The padlock symbol is shown on the display.	---

7 Decommissioning/disposal

7.1 Decommissioning



WARNING!
Discharge of liquid under high pressure

Impacts, cutting, crushing

- Reset the pressure overlay to 0 bar before draining.
- Check the pressure in the device using the pressure gauge on the front of the device.



CAUTION!
Residues of heat transfer liquid will flow out when the device is moved

Slipping hazard, contamination

- Drain the device and execute the Drain program so that the valves are open.
- Close the hydraulic connections with the caps provided.



Do not drain the heat transfer liquid in a hot state above 40 °C or in a cold state below 10 °C!

Decommission, drain and clean the Filling and draining unit as follows:



1. Proceed in exactly the same way as when changing the application until the application is drained and the green operating button (changing the application) lights up.
2. Disconnect the application from the temperature control circuit.
3. Now drain the Integral XT as described in the accompanying operating manual. Alternatively, close the isolating valves (if installed) for the outflow and return flow of the constant temperature equipment. Otherwise, the heat transfer liquid will also flow out of the Integral XT through the open connections of the Filling and draining unit when you switch to decommissioning mode.
4. First press the drain button (yellow), then the green operating button (change application) and keep both pressed briefly.
 - ▶ The Filling and draining unit switches to decommissioning mode and all internal valves are opened. The yellow and red operating buttons both light up permanently at the same time.
5. You can now continue to drain and clean the Filling and draining unit. Open the buffer tank and remove any residual heat transfer liquid. Clean the interior with clean cloths.



The next time the Filling and draining unit is switched on, it starts in standby mode for temperature control operation.

7.2 Disposing of packaging

The packaging normally consists of environmentally friendly materials that can be easily recycled when properly disposed of.

- Dispose of packaging materials in accordance with the applicable disposal guidelines in your region.
- Comply with the requirements of Directive 94/62/EC (packaging and packaging waste) if disposing of the product in a member state of the EU.

7.3 Disposing of heat transfer liquid

Different disposal guidelines may apply depending on the type of heat transfer liquid.

- Always read the safety data sheet of the heat transfer liquid before handling it and note the information on work safety and environmental protection in particular.
- Only collect waste heat transfer liquid in approved and sealable containers.
- Dispose of the heat transfer liquid without delay in accordance with the applicable disposal guidelines in your region.

7.4 Disposing of an old device



The device must be properly decommissioned and disposed of at the end of its life cycle.

- Make sure that the device has been completely drained.
- Dispose of the device in accordance with the applicable disposal guidelines in your region.
- Comply with Directive 2012/19/EU (WEEE Waste of Electrical and Electronic Equipment) if disposing of the product takes place in a member state of the EU.

8 Technical data

Table 1: Filling and draining unit FD 50

Specification	Unit	Value
Application circuit operating temperature range (with external cooling)	°C	-40 – 140
Filling / draining operating temperature range	°C	10 – 40
Filling volume, minimum	L	5
Filling volume, maximum	L	55
Compressed air supply	bar	5 – 8
Pressure reducer setting		
- Compressed air consumption for minimum setting of 0.5 bar	l/min	35
- Compressed air consumption for maximum setting of 3 bar	l/min	150
Compressed air connection: brass coupling connector	Nominal size in mm	7.2
Dimensions (W x D x H)	mm x mm x mm	620 x 1015 x 910
Weight	kg	92
Mains voltage	V	100 – 240
Mains frequency	Hz	50 or 60
Power consumption	kW	0.28
Class division for laboratory equipment according to DIN 12 876-1		
- Class designation		I
- Code		NFL*
Maximum / minimum storage temperature	°C	-20 – 43
Maximum / minimum transport temperature	°C	-20 – 43
IP protection level	---	IP 21
Distance between device and environment		
- Front	mm	200
- Back	mm	200
- Left	mm	200
- Right	mm	200
Connection thread (external) inlet/outlet sleeves	mm	M38 x 1.5

*suitable for non-flammable liquids

Table 2: Version of Filling and draining unit with Flow controller

Specification	Unit	Value
Dimensions (W x D x H)	mm x mm x mm	630 x 1015 x 1277
Weight	kg	152

9 Declaration of Incorporation and Certificate



EC DECLARATION OF INCORPORATION

Manufacturer: LAUDA DR. R. WOBSEER GMBH & CO. KG
Laudaplatz 1, 97922 Lauda-Königshofen, Germany

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

Product Line: Accessories **Serial number:** from S230000001
Types: FD 50

comply with all relevant provisions of the EC Directives listed below on the basis of 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 in conjunction with (EU) 2015/863

The special technical documents were drafted in line with 2006/42/EC, Annex VII B. The relevant authorized person sends all documents in writing to the national authorities on justified request.

The equipment may only be operated when incorporated or connected in accordance with the operating instructions and may not be put into service until the completed machinery into which it is to be incorporated or connected has been declared in conformity with the relevant provisions of the Machinery Directive 2006/42/EC.

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.

Applicable standards:

- EN ISO 12100:2010
- EN 61326-1:2021
- EN 61010-1:2010/A1:2019/AC:2019-04

Authorized representative for the composition of the technical documentation:
Dr. Jürgen Dirscherl, Head of Research & Development

Lauda-Königshofen, Germany, 12/11/2023

Dr. Alexander Dinger
Head of Quality and Environmental Management

*FAHRENHEIT. *CELSIUS. *LAUDA.

Q5WA-QA13-057-EN-01

The certificate is only valid for devices with the TÜVus certification mark on the type plate.



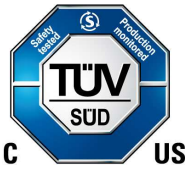
America

CERTIFICATE

No. U8 019054 0017 Rev. 00

Holder of Certificate: LAUDA DR. R. WOBSE R GMBH & CO. KG
 Laudaplatz 1
 97922 Lauda-Königshofen
 GERMANY

Certification Mark:



Product: Laboratory Equipment

This product was voluntarily tested to the relevant safety requirements referenced on this certificate. It can be marked with the certification mark above. The mark must not be altered in any way. This product certification system operated by TÜV SÜD America Inc. most closely resembles system 3 as defined in ISO/IEC 17067. Certification is based on the TÜV SÜD "Testing, Certification, Validation and Verification Regulations (TCVVR)". TÜV SÜD America Inc. is an OSHA recognized NRTL for USA and a Standards Council of Canada ISO/IEC 17065 accredited Certification body for Canada.

Test report no.: 713317130

Date, 2024-08-14

Siemon

(Thorsten Siemon)



America

CERTIFICATE

No. U8 019054 0017 Rev. 00

Model(s): FD 50

Tested according to: UL 61010-1:2012/R:2023-06
CSA C22.2 No. 61010-1:2012/U3:2023-06

Parameters:

Rated voltage:	100-240 V
Rated frequency:	50/60 Hz
Rated power:	0.28 kW
Protection class:	I
Overvoltage category:	II
Pollution degree:	2
Altitude:	Up to 2000 m
Temperature range:	5 - 40 °C
Rel. humidity:	max 80 % @ 31 °C
Compressed air:	5-8 bar

Conditions of Acceptability

- This equipment is for indoor use in non-hazardous locations, operated by qualified personnel skilled in its use.
- The detachable power supply cord shall comply with the National Standards and/or Electrical Codes of the country in question.

10 Product Returns and Clearance Declaration

Product Returns

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

Return address

LAUDA DR. R. WOBSEER GMBH & CO. KG

Laudaplatz 1

97922 Lauda-Königshofen

Deutschland/Germany

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

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

Clearance Declaration

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

Place, date	Name in block letters	Signature

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Manufacturer:

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