Julabo
THE TEMPERATURE CONTROL COMPANY

VALEGRO™
350 / 500



Recirculating cooler

Translation of the original operating manual

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Foreword

Congratulations

You have made a good choice.

JULABO thanks you for the trust you have placed in us.

These operating instructions are intended to familiarize you with the operation and possible applications of our appliances. Please read the operating instructions carefully. Keep the operating instructions to hand at all times.

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1 General information

1.1 About This Operating Manual

This operating manual contains important notices on the safe installation, operation, and maintenance of the devices listed on the cover page.

It is intended for anyone who installs, operates, or maintains these devices.



NOTE

Observe the safety instructions!
Before putting the device into service, read the operating manual in its entirety and keep it for future reference.

1.2 Notes on CE marking

The conformity of this product with the relevant EU directives is confirmed by the EU Declaration of Conformity contained in the appendix to these instructions.

The conformity of this product with the relevant regulations of the United Kingdom is demonstrated by the UKCA Declaration of Conformity included in the appendix to this manual.

1.3 Accessories

JULABO offers a wide range of accessories for these devices. These accessories are not described in this operating manual.

You can find the complete range of accessories for the devices described in this operating manual on our website at www.julabo.com. Please use the search function on the website.



NOTE

Use only genuine JULABO accessories!
Using unsuitable accessories voids the JULABO warranty.

1.4 Symbols used

This user manual uses various symbols to make it easier to understand. The following list describes the symbols used.

► Prerequisite for the following procedure
1. Numbered action steps
⇨ Interim results for individual steps
✓ Final result of a procedure
< > Terms in angle brackets indicate operating menus
[ ] Terms in square brackets refer to keys, softkeys and buttons

1.5 Operator obligations

The operator must comply with the following obligations in order to ensure safe operation:

- The operator is responsible for the qualification of the operating personnel.
- The operator is responsible for training the operating personnel in the use of the equipment.
- The operator must train operating personnel at regular intervals on the hazards associated with their work and the measures to prevent them.
- The operator must ensure that the persons entrusted with operation, installation and maintenance have read and understood the operating instructions.
- The device may only be configured, installed, maintained and repaired by appropriately qualified personnel.
- If hazardous substances or substances that could become hazardous are used, the device may only be operated by persons who are qualified to handle these substances and the device.
- The operator must ensure that the appliance is checked for safe and proper condition at regular intervals depending on its use.
- The operator must ensure that the mains supply has a low impedance in order to avoid interference with devices that are operated on the same mains supply.
- The appliance is not suitable for children or persons with mental or severe physical disabilities.

1.6 Qualification of the operating personnel

Technical personnel are defined as persons who have successfully completed vocational training. They must be able to assess the work assigned to them and independently recognize and avoid potential hazards based on their technical training and professional experience.

2 Safety instructions

2.1 Meaning of the warnings

The operating instructions contain warnings intended to ensure safety when using the device. Always follow the warnings.

A warning sign in signal color precedes the signal word. The colored signal word classifies the severity of the danger.



DANGER

The signal word indicates a hazard with a high degree of risk which, if not avoided, will result in death or serious injury.



WARNING

The signal word indicates a hazard with a medium degree of risk which, if not avoided, could result in death or serious injury.



CAUTION

The signal word indicates a hazard with a low level of risk which, if not avoided, may result in minor or moderate injury.



NOTE

The signal word indicates a potentially harmful situation. If it is not avoided, the system or objects in its vicinity may be damaged.

2.2 General Safety Instructions

The device is manufactured in accordance with the state of the art and recognized safety standards. Nevertheless, its use may pose a risk to the life or physical well-being of the user or third parties.

Read and follow the safety instructions below before use.



DANGER

Electric shock from the electrical system!
Touching damaged live parts can result in severe electric shock and may injure or kill people.

- Have damaged insulation and components of the electrical system repaired immediately by a JULABO service technician or a qualified repair shop.
- Replace damaged power cords immediately.
- Do not operate the unit if the power cord is damaged.
- When making a connection using the power plug, ensure that the plug is always freely accessible.



DANGER

Danger to life due to electric shock!
An electric shock can result in serious injury or even death.

- Operate the device only on a power connection protected by a residual current circuit breaker (Type B, Ia = 30 mA).
- Operate the device only at outlets with a protective ground (PE).



DANGER

Danger to life due to electric shock!
An electric shock can result in serious injury or death.

- Live parts are enclosed within the device housing. If the device housing is damaged, live parts may be exposed.
- Do not connect the device to the power supply if the housing is damaged!



DANGER

Danger of death from electric shock!
An electric shock can cause serious injury or even death.

- The device may only be opened by a qualified electrician.
- Work on the electrical system must be performed exclusively by qualified electricians.



WARNING

Hot surfaces!
The following parts and components may become hot during operation or remain hot for some time after operation:
– heat transfer fluid
– Connections for external use
– Condenser

Contact may result in severe burns or scalds to the hands, arms, face, and limbs.
- Keep a safe distance from hot surfaces and liquids.
- Wear appropriate protective gloves.



WARNING

Suspended loads!
Falling loads can cause serious injury and damage the equipment.
- Do not stand under a suspended load.
- Transport the unit using suitable and safe lifting equipment.
- Wear personal protective clothing.



WARNING

Maintenance and Repair Work!
Improper maintenance and repair work jeopardizes operational safety. This can result in serious injury or death.
- Perform only the work described in this operating manual.
- Before starting work, turn off the unit and unplug it from the power source.
- Have repair work performed only by JULABO service technicians or an authorized service center.



CAUTION

Improper Use!
If the device is used in a manner not intended by the manufacturer, the protection provided by the device may be compromised.



CAUTION

Immediately take the unit out of service and disconnect it from the power supply in the event of:
- medium leakage,
- Unusual noises, odors, or vibrations,
- Smoke, sparks, or flames inside or on the device.

Do not continue to operate the device. It may only be put back into service after a professional inspection and repair by qualified personnel.

NOTE

No liability is assumed for the use of unsuitable temperature-control media!
Unsuitable temperature control media that have not been approved by JULABO may damage the unit.
- Use temperature-control media recommended by JULABO.
- Check parts in contact with the heat transfer fluid for compatibility with the heat transfer fluid before filling.
- Do not exceed the maximum permissible viscosity during operation.
- Consult JULABO before using any heat transfer fluid other than the recommended one.

NOTE

Continuous operation with the connected system shut off!
Continuous operation with the connected system shut off will result in property damage.
Reduce the pump output to less than 60% when the external system is shut off.

NOTE

Use only genuine JULABO replacement parts!
Using non-original replacement parts voids the JULABO warranty.

NOTE

Use only genuine JULABO accessories!
Using unsuitable accessories voids the JULABO warranty.

NOTE

Wear personal protective equipment!
Failure to use or the use of unsuitable personal protective equipment increases the risk of health hazards and personal injury.
Examples of personal protective equipment include:
- Work gloves
- Safety shoes
- Protective clothing
- Respiratory protection
- Hearing protection
- Face and Eye Protection
- Determine and provide personal protective equipment appropriate for the specific application.
- Use only personal protective equipment that is in good condition and provides effective protection.
- Adjust personal protective equipment to fit the wearer, e.g., size.



NOTE

Keep safety labels legible!
Safety labels on the equipment warn of hazards at danger zones and are an important part of the equipment's safety features. Missing safety labels increase the risk of injury to people.

- Clean dirty safety labels.
- Immediately replace any safety labels that are damaged or have become illegible.

2.3 Intended Use

JULABO recirculating coolers are designed to control the temperature of external, closed-loop applications using a heat transfer fluid.

2.4 Anticipated Misuse

The device is not suitable for the direct temperature control of food and beverages, as well as pharmaceutical and medical devices.

The device is not suitable for use in a potentially explosive atmosphere.

The device is not suitable for use in a corrosive or aggressive environment.

The device is not intended for use in residential areas. It may interfere with radio reception.

2.5 Safety Labels

The following safety labels are affixed to the device.

Symbol	Description	Location
	Warning of a hazard. Follow the operating instructions.	Back of the device
	Read the operating instructions before turning on the device.	Back of the device
	Warning: Hot Surface	Condenser, supply and return connections
	Warning: Flammable Refrigerant	Nameplate

2.6 Refrigerant

In the event of a leak in the refrigerant cycle, safety regulations require a specific room volume per kilogram of refrigerant at the installation site to prevent the formation of a flammable refrigerant-air mixture. The refrigerant charge is specified on the nameplate.



WARNING

Leakage of flammable refrigerant!
The unit contains flammable refrigerant in a technically permanently sealed circuit. If the refrigerant circuit leaks, a flammable concentration may form in the air, which could ignite or explode due to potential ignition sources in the vicinity. This can result in serious injury or death.

- Observe the required minimum room size for operating the unit.
- Use the unit only in well-ventilated rooms.
- Avoid ignition sources in the immediate vicinity of the unit (e.g., electrical switches, hot surfaces, open flames).
- Do not damage the refrigerant lines.
- Do not damage the condenser fins.
- In the event of a refrigerant leak, shut down the unit immediately, keep open flames and ignition sources away, ventilate the room thoroughly, and contact JULABO Service.



CAUTION

Refrigerants are harmful to health!
Refrigerants and their vapors are harmful to health. There is a risk of suffocation in enclosed spaces.

- Avoid contact and inhalation.
- Damage to the refrigerant cycle may only be repaired by JULABO service technicians or qualified personnel.
- If refrigerant leaks, shut off the unit immediately and ventilate the room thoroughly.

For 0.008 kg of R-290 refrigerant, 1 m³ of space must be provided; for 1 kg of R-290 refrigerant, a room volume of 125 m³ is required.

The calculation/assessment of whether **one or more** refrigeration systems are required per room remains **the same in all cases**, as it is assumed that multiple leaks are **not causally** related and that secondary failures may occur.

2.7 Protective devices

Technical safety devices ensure safe operation. If a safety device is triggered, the operator is warned by a message on the display and an acoustic signal.

Overtemperature protection

The overtemperature protection prevents the appliance from overheating. The protection temperature is fixed at 90 °C.

The protective mechanism responds if the temperature of the temperature control fluid exceeds the set limit value. The temperature control is switched off. An acoustic signal sounds and an alarm message appears on the display.

Low level protection

A level switch detects if the level of the temperature control fluid is too low.

In the event of a low-level alarm, the entire temperature control system is shut down to prevent the pump from running dry. A continuous beep sounds. An alarm message appears on the display. A restart is required.

3 Technical data

Performance specifications measured in accordance with DIN 12876.
Performance specifications apply at an ambient temperature of 20 °C.

The following applies to the sound pressure level values:
- From: Unit in base load operation (40% pump stage, 20 °C bath, 20 °C ambient temperature).
- up to: Unit under rated conditions (100% pump stage, 20 °C bath, 20 °C ambient temperature).
- Sound pressure levels may increase at higher ambient temperatures.

Classification of the device according to CISPR 11:
- The device is an ISM device of Group 1, Class A, which uses radio frequency for internal purposes
- Class A: Use in an industrial electromagnetic environment

The device is designed in accordance with IEC 61010-1 for safe operation under the following environmental conditions:
- Indoor use
- Altitude up to 2000 m above sea level
- Ambient temperature +5 … +40 °C (unless otherwise specified in the technical data)
- Maximum relative humidity of 80% at air temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C
- Pollution degree 2
- Overvoltage category II



NOTE

The maximum transport temperature is +70 °C.

3.1 VALEGRO 350

General information		
Cooling		Air cooling
Display		OLED
Protection class according to IEC 60529		IP21
Class according to DIN 12876		NFL
Sound pressure level	dB(A)	50 ... 52

Temperature data		
Working temperature range	°C	-20 ... +40
Temperature stability	K	±0.3
Temperature resolution	K	0.1
Temperature control		digital
Working temperature sensor		Pt100
Max. permissible return temperature	°C	+85

Dimensions and weight		
Body dimensions (W x D x H)	cm	23 x 40 x 44
Overall dimensions (W x D x H)	cm	23 x 46 x 45
total weight	kg	26

Cooling capacity	°C	20	0	-10	-20
115 ... 230 V	kW	0.35	0.25	0.18	0.07
100 V	kW	0.35	0.20	0.15	0.03

Pump					
Volume flow	l/min	16			
discharge pressure	bar	0.6			
Viscosity max.	cSt	50			
Internal filling volume	l	1.5 ... 3			
Pump connections		M16 x 1 external thread			

Electrical connection data					
Mains connection	V Hz	100 ... 115 50/60		200 ... 230 50/60	
Power consumption max.	V	100	115	200	230
	A	5	4	3	3
Permissible voltage tolerance	%	±10	±10	±5	±5

3.2 VALEGRO 500

General information		
Cooling		Air
Display		OLED
Protection class according to IEC 60529		IP21
Class according to DIN 12876		NFL
Sound pressure level	dB(A)	51 ... 55

Temperature data		
Working temperature range	°C	-20 ... +40
Temperature stability	K	±0.3
Temperature resolution	K	0.1
Temperature control		digital
Working temperature sensor		Pt100
Max. permissible return temperature	°C	+85

Dimensions and weight		
Body dimensions (W x D x H)	cm	23 x 40 x 44
Overall dimensions (W x D x H)	cm	23 x 46 x 45
total weight	kg	26

Cooling capacity	°C	20	0	-10	-20
115 ... 230 V	kW	0.50	0.37	0.25	0.10
100 V	kW	0.45	0.32	0.20	0.03

Pump					
Volume flow	l/min	19			
Delivery pressure	bar	0.85			
Viscosity max.	cSt	50			
Internal filling volume	l	1.5 ... 3			
Pump connections		M16 x 1 external thread			

Electrical connection data					
Mains connection	V Hz	100 ... 115 50/60		200 ... 230 50/60	
Power consumption max.	V	100	115	200	230
	A	5	4	3	3
Permissible voltage tolerance	%	±10	±10	±5	±5

3.3 Materials and Media Compatibility

3.3.1 Materials of Parts in Contact with the Medium

The following table lists the materials that may come into contact with the heat transfer fluid.

This information can be used to verify compatibility with the heat transfer fluid being used.

- 1.4301 / 304 / S30400
- 1.4404 / 316L / S31603
- 1.4571 / 316Ti / S31635
- Aramid
- CR
- Graphite
- EPDM
- FPM / FKM 75
- Ceramic
- MS polymer
- NBR
- Nylon-ferrite composite
- PP
- PPS
- PVC-U

3.3.2 Heat Transfer Fluids

Only water or a 1:1 water-glycol mixture is permitted as a heat transfer fluid.

NOTE

No liability is assumed for the use of unsuitable temperature-control media!
Unsuitable temperature-control media that have not been approved by JULABO may damage the device.

- Use temperature-control media recommended by JULABO.
- Check parts in contact with the heat transfer fluid for compatibility with the heat transfer fluid before filling.
- Do not exceed the maximum permissible viscosity during operation.
- Consult JULABO before using any heat transfer fluid other than the recommended one.

NOTE

Property damage due to freezing water!
Freezing water can damage the unit and the material being temperature-controlled.

- When using water as the heat transfer fluid, do not set the temperature below 5 °C.

NOTE

Adding ammonia to the heat transfer fluid is not permitted!

Water Quality Requirements

When using water as the heat transfer fluid, the following water quality requirements apply:

- Calcium carbonate concentration: 0.7–1.4 $^{mmol}/_{l}$
- pH value: 6–8.5
- Ultrapure water or distilled water is suitable as a heat transfer fluid after adding 0.15 g of $NaHCO_3$ per liter of water.

NOTE

The following types of water are unsuitable as a heat transfer fluid:
- distilled, deionized, and fully desalinated water
- seawater
- water containing halogens or halides (e.g., chlorinated water or fluorinated water)
- contaminated water
- water containing iron
- River water

3.4 Heat Transfer Hoses

Heat transfer hoses for the connection to an external system must be designed for the operating temperature range and the specific temperature control application.

You can find heat transfer hoses for every application on our website.

Heat transfer hoses must meet the following requirements:
- Temperature resistance
- Pressure resistance
- Appropriate material properties for the heat transfer fluid used

NOTE

Damage to heat transfer hoses due to kinking!
Heat transfer hoses are damaged by kinks and may develop leaks.
- Lay out the heat transfer hoses with large bends.
- Avoid kinking the heat transfer hoses.

4 Structure and function

4.1 Function Description

The unit is a recirculating cooler that operates with a refrigerant cycle. Intelligent control technology regulates the temperature control. The evaporator extracts heat from the heat transfer fluid, and the condenser releases this heat into the ambient air.

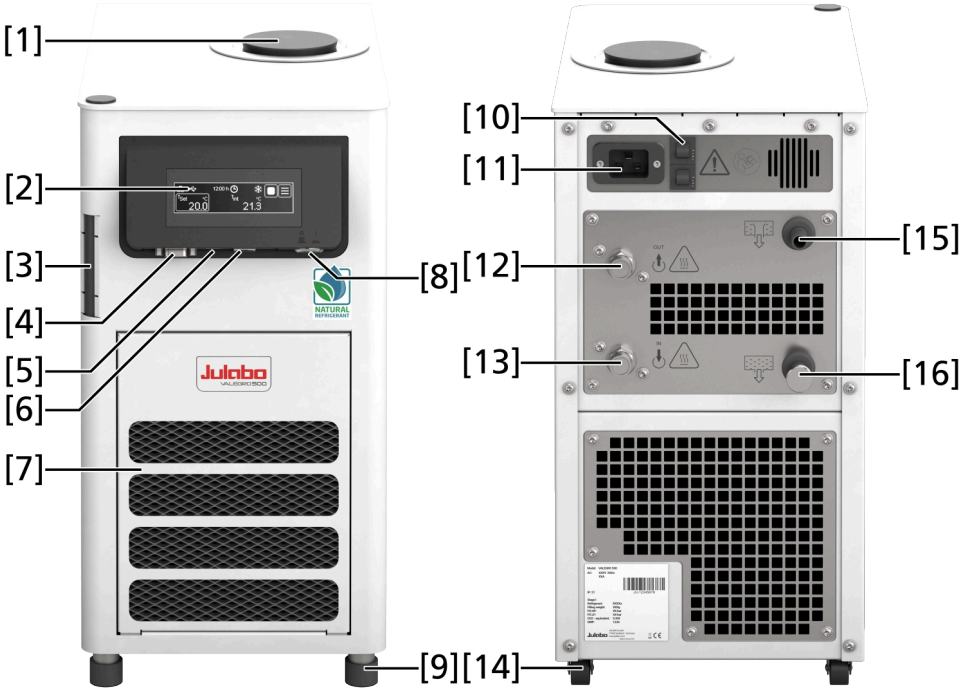
An external application is connected to the unit via the pump connections. To temperature-control the application, the heat transfer fluid is circulated by the circulation pump through the heat exchanger in a closed loop.

The electronics evaluate the data from the unit's sensors and control the actuators.

The refrigeration unit brings the heat transfer fluid to the desired temperature.

4.2 Controls and Functional Elements

This chapter describes the controls and functional elements and shows their locations on the device.



Control and Function Elements VALEGRO 350/500

1. Filler Neck Cover
2. Touchscreen
3. Illuminated level indicator
4. RS232 interface
5. USB-C interface
6. Ethernet interface (optional)
7. Removable ventilation grille
8. Power switch
9. Feet
10. Resettable power fuse
11. Power connection
12. Supply connection
13. Return connection
14. Casters
15. overflow
16. Drain

4.3 Interfaces

This section describes the electronic interfaces available on the device, along with their pin assignments and connection specifications.

4.3.1 USB-C Interface

The device has a USB-C interface.

The following functions can be carried out via the USB-C interface:

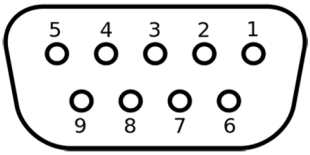
- Remote control of the device via a PC
- Data recording on an external storage medium
- Saving black box data to an external storage medium
- Uploading firmware from an external storage medium

Technical data USB-C interface

Parameters	Value	Unit of measurement
Output / input voltage	5	VDC
Maximum current / current consumption	500	mA

4.3.2 RS-232 Interface

The RS232 interface is a 9-pin D-Sub connector for establishing a connection between the device and a PC.



RS232 Jack

RS232 Interface Pin Assignment

Pin	Assignment	Pin	Assignment
Pin 2	RxD Receive Data	Pin 7	RTS Request to Send
Pin 3	TxD Transmit Data	Pin 8	CTS Clear to Send
Pin 5	0 V Signal GND		

Pins 1, 4, 6, and 9 are reserved. Do not use them.

Factory setting for RS232 interface

Parameter	Value
Parity	even
Baud rate	4800 baud
Handshake	Hardware
Data bit	7
Stop bit	1

4.3.3 Ethernet Interface (option)

The Ethernet interface allows the device to be connected to a network or directly to a PC.

Technical Specifications for the Ethernet Interface

Parameters	Value	Unit
Voltage Level	3.3	VDC

5 Transportation



CAUTION

Risk of crushing from falling equipment!
An unsecured unit can fall during improper transport and cause crush injuries.
- Secure the unit against tipping over and falling during transport.
- Secure any loose parts to prevent them from falling during transport.
- Transport the equipment in an upright position using a suitable means of transport.
- Wear safety shoes.



CAUTION

Risk of injury from the device tipping over!
When pulling or pushing, the unit may tip over and cause injuries.
- Always keep the unit upright on its casters during transport.
- Secure any loose parts to prevent them from falling during transport.
- Wear safety shoes.



CAUTION

Risk of injury from the unit tipping over!
The filled unit may tip over during transport.
- Drain the heat transfer fluid before transport.



NOTE

Property damage may result from holding onto the control panel!
The control panel must not be used as a handle during transport.

Transport on Casters

The unit can be transported on level ground and over short distances using its casters.

Prerequisites

- ▶ The unit is turned off and disconnected from the power supply.
- ▶ The heat transfer fluid has been drained.
- ▶ All external connections have been removed.

Procedure

1. Lift the unit slightly at the front bottom and pull it to its place of operation.
2. Position the unit at its place of operation.

✓ The unit was transported safely on its casters.

Transport with a forklift

The device can be transported using a forklift.

Prerequisites

- ▶ The unit is turned off and disconnected from the power supply.
- ▶ The heat transfer fluid has been drained.
- ▶ All external connections have been removed.

Procedure

1. Place the unit in the center of a pallet.
2. Place any loose parts, such as cables, on the pallet next to the unit.
3. Secure the device to the pallet with straps.
4. Transport the device to its place of operation using a suitable forklift.

✓ The device has been safely transported to its place of operation.

6 Set up

6.1 Set up the device at the place of operation

Prerequisites

- ▶ The device has been transported to the place of operation.
- ▶ The size and infrastructure of the place of operation are suitable for operating the device.

NOTE Recommended minimum distance of 1 m from adjacent devices to avoid electromagnetic interference.

Procedure

1. Place the device on a level, smooth, non-flammable surface.

NOTE

- Ensure the device is stable.
- Maintain a clearance of at least 20 cm in front of and behind the device.
- Do not cover any ventilation openings in the housing.
- The refrigerant cycle must not be damaged.

✓ The unit is installed at the place of operation.

7 Commissioning

7.1 Connecting the device to the power supply

This section describes the connection of the device to the power supply using the power plug.



DANGER

Electric shock from the electrical system!
Touching damaged live parts can result in severe electric shock and may injure or kill people.
- Have damaged insulation and components of the electrical system repaired immediately by a JULABO service technician or a qualified repair shop.
- Replace damaged power cords immediately.
- Do not operate the unit if the power cord is damaged.
- When making a connection using the power plug, ensure that the plug is always freely accessible.



DANGER

Danger to life due to electric shock!
An electric shock can result in serious injury or even death.
- Operate the device only on a power connection protected by a residual current circuit breaker (Type B, Ia = 30 mA).
- Operate the device only at outlets with a protective ground (PE).



DANGER

Danger to life due to electric shock!
An electric shock can result in serious injury or death.
- Live parts are enclosed within the device housing. If the device housing is damaged, live parts may be exposed.
- Do not connect the device to the power supply if the housing is damaged!



NOTE

The power cord may be damaged by excessive heat!
The power cord must not come into contact with any parts that become hot during operation.
- Keep the power cord away from surfaces that may become hot.

Prerequisites

▶ The device is at its place of operation.

Procedure

1. Plug the device plug of the included power cord into the power connector on the back of the device.
2. Plug the power cord into an outlet.

✓ The device is now connected to the power supply.

7.2 Connecting an External System

The unit is used to maintain the temperature of external closed systems within a temperature control loop. An external system is connected to the unit's pump connections.



CAUTION

Risk of scalding from damaged heat transfer hoses!
Hot heat transfer fluid can leak from damaged heat transfer hoses and cause severe scalds upon skin contact.

- Check the heat transfer hoses regularly for damage.
- Replace damaged heat transfer hoses immediately.
- Do not kink heat transfer hoses.
- Replace heat transfer hoses regularly.
- Check the pump connections for leaks.



CAUTION

Injuries and property damage due to an incompatible externally connected system!
If the temperature range and/or pressure parameters of an externally connected system do not match those of the unit, this can result in damage to individual components or even failure of the entire system. Hot heat transfer fluid can escape under high pressure or cause components to burst.

- Before the connection, verify that the external system is compatible with the temperature control unit's specifications.
- If an external system is connected that is not designed for the unit's maximum pressure (e.g., glassware), limit the pump's flow rate in the settings and take appropriate measures to limit pressure (e.g., pressure relief devices).
- Allow for sufficient safety margins. System-related pressure spikes may briefly exceed the specified maximum delivery pressure.
- Do not install shut-off valves in the return line.
- Check the pump settings before and during startup and adjust them as needed.
- If an external system is connected, the operator is responsible for the safety of the entire system.



NOTE

Hot pump connections!
During operation, the pump connections can become very hot. Heat-sensitive parts or lines may be damaged if touched.

- Pump connections must remain unobstructed during operation.
- During operation, no loose parts or lines may come into contact with the pump connections.

NOTE

Overflow of heat transfer fluid from externally connected systems!
If the externally connected system is located higher than the temperature control system, the heat transfer fluid may flow back and overflow when the system is turned off.

- Position the connected external system at the same level or lower than the temperature control system.
- Install a shut-off valve or solenoid valve as a backflow preventer between the external system and the temperature control system.

NOTE

Damage to heat transfer hoses due to kinking!
Heat transfer hoses are damaged by kinks and may develop leaks.

- Lay out the heat transfer hoses with large bends.
- Avoid kinking the heat transfer hoses.

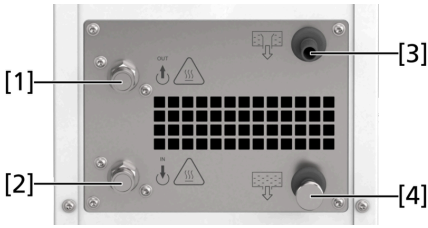
NOTE

Property damage due to overflow of the heat transfer fluid!
Expansion of the heat transfer fluid during operation can cause the system's maximum fill volume to be exceeded. Uncontrolled leakage of the heat transfer fluid can cause damage to the unit.

- Do not fill the unit unattended.
- Connect the hose to the overflow and route it into a suitable collection vessel.
- Never block the overflow at the back of the unit!

7.2.1 Connecting an external system with screw connections

This section describes how to connect an external closed system with screw connections to the appliance.



1. Flow Connection
2. Return connection
3. Overflow connection
4. Drain connection

Requirements

- ▶ Two open-end wrenches, sizes 19 mm and 22 mm
- ▶ Two open-end wrenches, sizes 27 mm
- ▶ Torque wrench
- ▶ Suitable heat transfer hoses with threaded connections are available
- ▶ The heat transfer hoses are connected to the external system
- ▶ An overflow hose with an inner diameter of 10 mm is provided

Procedure

1. Remove the union nuts from the pump connections on the supply and return lines.
2. Remove the plugs.
3. Install the heat transfer hoses. Hold them in place with a second open-end wrench.
   - ⇨ Tightening torque for the M16 nuts: 20 Nm
   - ⇨ Connect the heat transfer hose from the lower inlet of the external system to the pump connection. This ensures proper venting of the external system.
4. Connect the overflow hose to the overflow connection and secure it with a hose clamp.
5. Route the overflow hose into a suitable container to collect the heat transfer fluid.

   NOTE The overflow hose must hang freely into the collection vessel and must not be submerged. Pressure equalization must be possible.

6. Check all lines for a secure fit and leaks.

✓ The external system is connected to the unit.

7.3 Filling the device

This section describes how to fill the appliance with temperature control medium during commissioning.

The filling quantity can be found in the technical data.

NOTE

Property damage due to overflow of the heat transfer fluid!
Expansion of the heat transfer fluid during operation can cause the system's maximum fill volume to be exceeded. Uncontrolled leakage of the heat transfer fluid can cause damage to the unit.

- Do not fill the unit unattended.
- Connect the hose to the overflow and route it into a suitable collection vessel.
- Never block the overflow at the back of the unit!

Prerequisites

▶ The drain valve is closed.

▶ The unit is turned off.

▶ The external system is connected.

Procedure

1. Open the fill port of the internal reservoir.
2. Fill with heat transfer fluid up to approximately the upper mark on the fill level indicator.
3. Turn on the unit at the power switch.
4. Set the target temperature.
5. Start temperature control.

   ⇨ The heat transfer fluid is pumped into the connected external system.

6. Top off the heat transfer fluid to halfway up the fill level indicator.
7. Once the setpoint temperature is reached, adjust the fill level by refilling or draining.

   NOTE
   - As the temperature rises, the heat transfer fluid expands and may overflow.
   - As the temperature drops, the low-level protection may activate and interrupt the temperature control process.

8. Close the fill port.

✓ The unit and the external application are filled with heat transfer fluid.

8 Operation

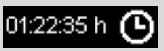
8.1 User interface

8.1.1 Softkeys and status icons

The outlined softkeys on the touchscreen can be selected with a finger to access submenus. Numerical values can be selected and changed by swiping up, down, left or right.

The user interface contains the following softkeys and status icons.



Icon	Icon Description
	Display Ethernet connection active
	Display External storage medium inserted
	Recording to external storage medium active
	Timer display: • Start date / time of the timer or • the remaining time when the timer is running
	Heating display active
	Cooling display active
	Display current internal temperature
	Display error messages: Only the first error is displayed. If there are several warnings, each cause must be eliminated separately and the appliance restarted.
	Display warning message: Only the first warning is displayed. If there are several warnings, each cause must be eliminated separately.
	Display operating status
	Setting setpoint temperature / display current setpoint temperature
	Pump level setting Display current pump stage

Icon	Icon Description
	Call up main menu
	Temperature control start
	Temperature control stop

8.1.2 Alarms and Warnings

Alarms and warnings are indicated by error codes on the display. Important error codes are described in the chapter **“Malfunctions and Troubleshooting**.”

If an error cannot be resolved by the operator, contact Technical Support.

Warning:

A warning does not interrupt the temperature control. A warning message appears on the display. An intermittent beep sounds. The beep can be turned off by touching the touchscreen. Once the cause of the warning has been resolved, the warning disappears. Depending on the cause, warnings may disappear on their own after a while.

Alarm:

In the event of an alarm, temperature control is stopped. The actuators are shut off. At the same time, a continuous beep sounds and an alarm message appears on the display. The beep can be silenced by touching the touchscreen. The cause of the alarm must be resolved. A restart is required.

NOTE

The list of alarm and warning messages can be found in **Chapter 10, “Malfunctions and Troubleshooting.”**

8.2 Main menu



Press the [☰] softkey on the start screen to open the main menu. The main menu is divided into menu items, each of which contains further submenus or in which settings can be made directly.

The **<Main menu>** is divided into the following menu items:

- Adjust safety
- Determine thermodynamics
- Connect device
- Timer
- Evaluate data
- Installing the device
- Device settings
- Service settings
- About the device

8.2.1 Adjust safety menu



- Autostart yes / no
- Pump mode Automatic / Pump always on / Pump run-on
- Temperature limits:
  - Setpoint min. / max.: Setting the upper and lower limit value for the temperature setpoint
  - Over / subtemperature alarm, over / subtemperature warning: Setting alarm and warning limits
  - High temperature cut-off

8.2.2 Determine thermodynamics menu



- Set controller:
  - Xp
  - Tn
  - Tv
- Set pump:
  - Pump output

8.2.3 Connect device menu



- Remote control: off, serial, USB, Ethernet (option)
- Interfaces:
  - Serial:
    - Mode
    - Baud rate
    - Parity
    - Handshake
  - Ethernet (option):
    - Obtain IP via DHCP
    - MAC address
    - IP address
    - Subnet mask
    - Default gateway
    - Remote control port
    - Host name

8.2.4 Timer menu



- Activate yes / no
- Schedule start
  - immediately
  - Date / time
- Start date
- Start time
- Setpoint
- End state
  - Standby
  - Last setpoint
  - Start setpoint
- Duration

8.2.5 Evaluate data menu



- Record data
  - Activate yes / no
  - Sampling time
- Save black box data
- Alarm memory

8.2.6 Install device menu



- Adjust temperature sensor
- Reset device
- Enable options: Display all options and indicate whether they are enabled or not
- MAC address



NOTE

Property damage due to freezing water!
Freezing water can damage the unit and the material being temperature-controlled.
- When using water as the heat transfer fluid, do not set the temperature below 5 °C.

8.2.7 Settings menu



- Set language
- Set date and time
- Set physical units
  – Temperature °C / °F
- Screen brightness
- Screen saver yes / no
  ⇨ The current temperature is displayed while the screen saver is active. Touching the touchscreen interrupts the screen saver.





NOTE

Damage to the OLED display caused by a deactivated screensaver!
Disabling the screensaver has a negative impact on the display's lifespan.
- The screensaver is enabled by default.
- To prevent image burn-in, do not disable the screensaver.

8.2.8 Service menu



The **<Service>** menu is password protected. Only JULABO service technicians have access.

8.2.9 About the device menu



- Display of the device identity with voltage variant and firmware version.

8.3 Turning on the Device

This section describes how to turn on the device.

Prerequisites

▶ The device is connected and ready for use.

Procedure

1. Turn on the device using the power switch.
   ⇨ The software boots and starts the device. The display shows the device name, the voltage variant, and the loaded configuration.

✓ The device is turned on. It switches to the last active operating mode. If the autostart function is enabled, the device starts temperature control directly with the last setting.

NOTE

In “always on” pump mode, the pump starts immediately.

NOTE

If remote control is enabled, the device cannot be operated manually.

8.4 Turning off the Device

This section describes how to turn off the device.

Prerequisites

▶ The device is turned on.

Procedure

1. Stop the current temperature control.

   NOTE Do not turn off the unit until it is in standby mode.

2. Turn off the unit at the power switch.

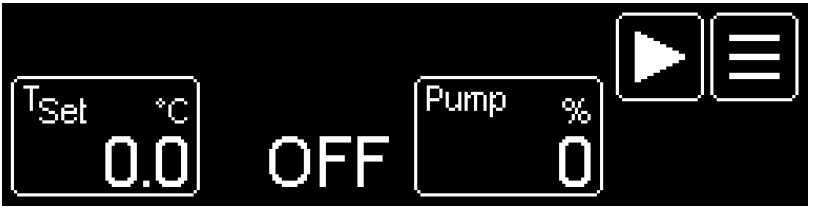
✓ The unit is now turned off.

8.5 Set the Setpoint Temperature

The device maintains the temperature at the setpoint. The setpoint can be changed during temperature control. The set value is saved.

Prerequisites

▶ The device is turned on.



Procedure

1. Press the **[TSet]** soft key.
   ⇨ The setting screen for the setpoint temperature opens.



2. Use the arrow keys or swipe across the display (left, right, up, down) to set the setpoint temperature, then confirm with **[✓].**

✓ The setpoint temperature is set and active. You can cancel setting the setpoint temperature by pressing the **[x]** button. The previous value is retained.

8.6 Setting the Pump

The pump output can be set in one percent increments.

NOTE

Property damage due to excessive pump pressure!
If the permissible operating pressure of the external system is lower than the pump's maximum delivery pressure, an incorrect pump setting can cause damage to the application.

- Monitor the pressure at the application when changing the pump settings.
- During initial startup or after making changes to the system, start the pump at minimum output and carefully increase the output during operation as needed.

Prerequisites

▶ The appliance is switched on.

Procedure

1. Call up the **<Main menu>**.
2. In the **<Determine thermodynamics>** submenu, select the **<Set pump>** menu item.
   ⇨ Alternatively, you can click directly on the **[Pump]** softkey on the start screen to set the pump output or the pressure setpoint (for pump pressure control).



3. Use the arrow buttons or swipe across the display to set the desired value and confirm with **[✓]**.
   ⇨ The minimum value is set internally in the device. The maximum value is limited by the maximum pump output that can be set in the **<Adjust safety>** menu.

4. Confirm entry.

✓ The set value takes effect immediately. The pump is set. The pump output setting can be canceled with the **[x]** button. The previous value is retained.

8.7 Start Temperature Control Application

A temperature control cycle can be started directly on the machine. Other optio
ns
include controlling the temperature control process via the timer and remote control via aconnected PC.

Prerequisites

- ▶ The unit is turned on.
- ▶ The setpoint temperature has been set.

Procedure

1. Press the **[►]** soft key.

✓ The device immediately begins temperature control. Press the **[■]** soft key to stop temperature control.

8.8 Set the Timer

The timer can be used to program the duration of a temperature control cycle for up to 100 hours, as well as the start date and time. The target temperature is set as the setpoint temperature.

Once the set duration has elapsed, the device switches to the previously defined state:

- Standby mode
- Maintain target temperature
- Temper to the original setpoint temperature

Prerequisites

▶ The device is turned on.

Procedure

1. Open the **<Main Menu>**.
2. Open the **<Timer>** submenu.
   ⇨ The dialog box for setting the timer appears on the display.
3. Set the start time and start date, then confirm with [✓].
4. Set the temperature setpoint and the desired duration, then confirm with [✓].
5. In the **<End State>** field, select how the device should behave once the temperature control period has elapsed.
6. In the **<Activate>** submenu **,** select **<Yes>** to activate the timer.

✓ The timer is programmed and active.

8.9 Enable the Autostart Function

The autostart function allows you to start a temperature control cycle directly using the power switch or via an intermediate timer.

The unit is factory-configured to switch to a safe operating state in the event of a power failure. The autostart function is disabled. “OFF” appears on the display. The chiller, heater, and pump motor are disconnected from the mains power supply.



WARNING

Unsupervised automatic startup of the unit!
When commissioning the unit, ensure that an unattended automatic start-up—e.g., following a power outage—cannot pose a hazard to people or equipment.

- Ensure that the unit’s safety and warning devices are functioning properly.

Prerequisites

▶ The unit is turned on.

Procedure

1. Open the **<Main Menu>**.
2. In the **<ADJUST safety>** submenu, select the **<AUTOSTART>/<YES>** menu item.

✓ The autostart function is enabled. The next time the device is turned on, the temperature control will start immediately using the preset values. A timer can be connected and programmed. In this case, the device’s power switch must remain on.

8.10 Recording data

The device can record data on an external storage medium. The conditions for this are defined in the <Evaluate data> menu and recording is started.

The recorded data can be evaluated at a later time.

Prerequisites

- ▶ The device is switched on.
- ▶ An external data carrier is available.

Procedure

1. Connect the external data carrier to the USB-C socket.
2. Call up the **<Main menu>**.
3. Call up the **<Evaluate data>** submenu.
4. Call up the **<Record data>** submenu.
5. Set the sampling time and confirm with [✓].
6. Select **<Activate>/<Yes>** in the submenu to activate the recording.
7. Confirm the settings with the [✓] softkey.

✓ Data recording starts. The data is recorded at the set interval until recording is stopped.

8.11 Thermodynamics

8.11.1 Control parameters

The appliance works with a PID controller whose behavior is determined by the proportional range Xp, the reset time Tn and the derivative time Tv. The optimum values for these control parameters depend on the application. The control parameters are set at the factory so that good control behavior is achieved with most applications. In individual cases or if there are special control requirements, the control parameters can be adapted to the application.

The internal control parameters can be adjusted in the **<Determine thermodynamics>/<Adjust controller>** submenu.

Proportional range Xp

The proportional range Xp is the range around the setpoint in which the P component of the controller is active. Within this range, the P component of the controller behaves proportionally to the control deviation. The smaller Xp, the faster the controller becomes. A value for Xp that is too small can cause the system to oscillate.

Reset time Tn

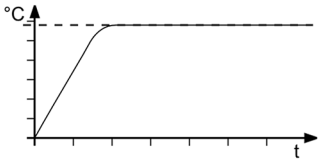
The reset time Tn is a measure of the “strength” of the I component of the controller. The I component builds up by adding up the control deviation over time and thus ensures that no permanent control deviation occurs. A small Tn leads to a faster elimination of the control deviations, but increases the risk of overshoot and oscillations. If Tn is set to 0 s, the I component of the controller is deactivated.

Derivative time Tv

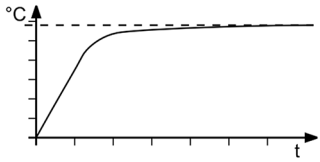
The derivative action time Tv influences the D component of the controller, which reacts to the rate of change of the control deviation and counteracts it. This allows overshoots to be damped. The greater Tv, the greater the damping effect. However, if Tv is set too high, this can lead to unsteady control behavior. If Tv is set to 0 s, the D component of the controller is deactivated. This is how it is configured on delivery, as satisfactory control behavior can usually also be achieved with a pure PI controller.

8.11.2 Optimizing temperature curves

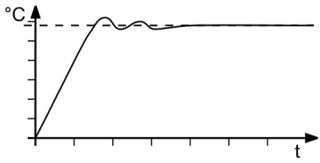
A recorded temperature curve provides information on how individual control parameters can be optimized to achieve a better result.



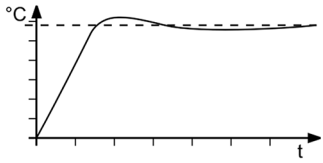
Optimum temperature control curve, temperature quickly reaches the setpoint without overshooting and maintains the setpoint.



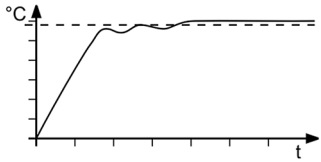
Symptom: Temperature curve approaches the setpoint slowly and does not quite reach it. Remedy: Reduce Tv and/or Tn, increase Xp.



Symptom: Temperature curve approaches the setpoint quickly, overshooting with oscillations occurs. Remedy: Increase Tv and/or Tn.



Symptom: Temperature curve quickly approaches the setpoint, overshooting occurs. Remedy: Increase Xp.



Symptom: Temperature curve is rapidly approaching the setpoint value, temperature builds up, setpoint value is exceeded. Remedy: Reduce Xp and/or Tv.

8.12 Remote Control of the Device

8.12.1 Remote Control of the Device via the RS232 Interface

The device can be controlled remotely via the RS232 interface. A null modem cable is required for the connection to a PC.

The interface parameters cannot be changed during remote control operation. If they differ from the factory settings, they must be configured before enabling remote control operation.

Setting Parameters

Prerequisites

▶ Remote control is disabled.

Procedure

1. Open the **<Main Menu>**.
2. In the **<Connect Device>/<Digital Interfaces>** submenu, select the **<RS232>** menu item.
3. Set the interface parameters **[Baud Rate], [Handshake]**, and **[Parity]** if they differ from the factory settings.
   ⇨ If parity is set to “None,” the number of data bits is set to 8.

✓ The interface parameters are set and take effect immediately.

Remote Control of the Device

Prerequisites

▶ The device is turned off.

▶ A terminal program is installed on the PC.

Procedure

1. Connect the device and the PC using a null modem cable.
2. Turn on the device.
3. Open the **<Main Menu>** on the device.
4. In the **<Connect Device>/<Interfaces>** submenu, enable the RS232 serial interface.
5. In the **<Connect Device>/<Remote Control>** submenu, enable the “Serial” connection type.
   ⇨ The RS232 mode is displayed on the home screen.

6. Start the terminal program on the PC.
7. Enter the interface parameters in the terminal program.
8. In the terminal program, select the device's COM port and establish a connection.

✓ Remote control via the RS232 serial interface is now active. The device can be remotely controlled using the terminal program and the interface commands. See the appendix for interface commands.

8.12.2 Remotely Control a Device via a USB Interface

Prerequisites

- ▶ The device is turned off.
- ▶ A terminal program is installed on the PC.

Procedure

1. Connect the device and the PC using a standard USB cable.
2. Download the appropriate USB driver from the download section of the website www.julabo.com (up to and including Microsoft Windows 8).

   NOTE Depending on the operating system of the connected PC, you may need to install the USB driver.

3. Install the USB driver on the PC.
4. Turn on the device.
5. Open the **<Main Menu>** on the device.
6. In the **<Connect Device>/<Remote Control>** submenu, enable the USB interface.

   ⇨ USB mode is displayed on the home screen.

7. Launch the terminal program on the PC.
8. In the terminal program, select the device's COM port and establish a connection.

✓ Remote control via the USB interface is active. The device can be remotely controlled using the interface commands via the terminal program. See the appendix for interface commands.

8.12.3 Remote control of the device via Ethernet interface

The device can be controlled remotely via the Ethernet interface (optional).

Prerequisites

▶ A program is installed on the PC that can establish a socket connection and send commands via it.

Procedure

1. Connect the device and PC with a standard network cable.
2. Call up the **<Main menu>** on the device.
3. In the **<Connect device>/<Interfaces>** submenu, select the **<Ethernet>** menu item.
4. Activate the **[Obtain IP via DHCP]** function to set up the connection automatically if a DHCP server is available in the network.
5. Alternatively, set the IP address, subnet mask and default gateway manually.
6. Enter the **<remote control port>**.
7. Go back one menu level and activate Ethernet in the **<Connect device>/ <Remote control>** submenu.
8. Enter the IP address and the remote control port of the device in the PC program and establish a connection.

✓ Remote control via the Ethernet interface is set up and active. The device can be controlled remotely using the interface commands via the terminal program. For interface commands, see appendix.

8.13 Adjusting the Temperature Sensor (ATC)

Due to physical factors, a temperature difference may arise in the temperature control circuit between the internal temperature sensor and a more distant measurement point. As a result, the temperature measured by the device deviates slightly from the temperature in the external application. Calibrating the temperature sensor can improve the accuracy of the temperature control.

A 1-point calibration is possible when the application is maintained at a specific setpoint. The calibration curve is shifted parallel to the measurement curve by the offset.

8.13.1 Adjusting the internal temperature sensor

This section describes how to adjust the internal temperature sensor of the device.

Prerequisites

- ▶ A suitable reference thermometer is attached to the desired measuring point of the external application.
- ▶ The device is filled.
- ▶ The device is switched on.

Procedure

1. Set the desired setpoint temperature and start the temperature control.
   ⇨ When the setpoint is reached, allow the temperature to stabilize for a few minutes.

   NOTE The more stable the temperature in the bath tank, the more precise the calibration result.

2. Compare the temperature of the reference thermometer with the internal temperature of the appliance shown on the display and determine the difference.
3. Call up the **<Main menu>**.
4. In the **<Install device>** submenu, select the **<Adjust temperature sensor>** menu item.
5. Enter the determined temperature difference as an offset and confirm with **[✓]**.
   ⇨ The offset is accepted directly.

✓ The temperature sensor is adjusted.

NOTE The setting limits for the temperature setpoint and for warning and alarm limits are also shifted by the offset.

NOTE The high temperature cut-off works independently of the adjustment with the internally measured temperature without offset.

9 Cleaning and maintenance

9.1 Maintenance Intervals

The table lists the regular maintenance tasks according to their maintenance intervals. The maintenance intervals listed apply to single-shift operation. The time specifications are approximate.

Interval	Task	Qualification	Duration [min]
Every 2 years	Check safety labels	Operator	1
As needed	Clean the condenser	Operator	5
As needed	Clean the level indicator	Operator	5



NOTE

For JULABO maintenance and service offerings, contact JULABO Sales or Service.

9.2 Emptying the Device

If the device is to be sent to Technical Service or disposed of properly, it must be completely emptied.

As a general rule, the device should be completely drained before any extended period of non-use and whenever the external application is changed.



CAUTION

Risk of scalding from hot heat transfer fluid!
The heat transfer fluid can become very hot during the temperature control process. Contact with hot heat transfer fluid can cause scalding.

- Allow the unit to cool to room temperature before draining it.
- Avoid direct contact with hot heat transfer fluid
- Wear protective gloves.

Prerequisites

- ▶ The unit is turned off.
- ▶ The device is at room temperature.
- ▶ A sufficiently large collection container is placed beneath the unit's drain.

Procedure

1. Open the drain valve.
   - ⇨ The temperature-control fluid flows into the provided collection vessel.
2. Once the unit is completely drained, close the drain valve.

✓ The unit is now empty.

9.3 Cleaning the Unit

The exterior of the unit should be cleaned at regular intervals. Before using any cleaning or decontamination method other than those recommended by JULABO, consult with JULABO to ensure that the intended method will not damage the unit.

NOTE

Damage to the electronics caused by water ingress!
Water ingress can damage the device's electronics and cause the device to fail.

- Clean the exterior of the unit only with a damp cloth.
- Prevent water from entering the unit.

Requirements

▶ Lint-free cloth
▶ Mild detergent
▶ The device is turned off.
▶ The device is disconnected from the power supply.

Procedure

1. Allow the device to cool to room temperature.
2. Wipe the surface of the device with a damp cloth.

   NOTE You can use a small amount of dish soap for cleaning. If in doubt, ask Technical Support about alternative cleaning agents.

✓ The device is clean.

9.4 Cleaning the Condenser

From time to time, the condenser on the front of the unit should be cleaned to maintain full cooling capacity.



WARNING

Leakage of flammable refrigerant!
The unit contains flammable refrigerant in a technically permanently sealed circuit. If the refrigerant circuit leaks, a flammable concentration may form in the air, which could ignite or explode due to potential ignition sources in the vicinity. This can result in serious injury or death.

- Observe the required minimum room size for operating the unit.
- Use the unit only in well-ventilated rooms.
- Avoid ignition sources in the immediate vicinity of the unit (e.g., electrical switches, hot surfaces, open flames).
- Do not damage the refrigerant lines.
- Do not damage the condenser fins.
- In the event of a refrigerant leak, shut down the unit immediately, keep open flames and ignition sources away, ventilate the room thoroughly, and contact JULABO Service.

Prerequisites

- ▶ The unit is turned off.
- ▶ The unit is disconnected from the power supply.
- ▶ The unit has cooled down to room temperature.

Procedure

1. Remove the ventilation grille from the front of the unit.



2. Carefully vacuum the dirt off the condenser using a vacuum cleaner.

   ⚠ **CAUTION** Be careful not to damage the condenser fins.



3. Reinstall the ventilation grille.

✓ The condenser is now clean.

9.5 Cleaning the level indicator

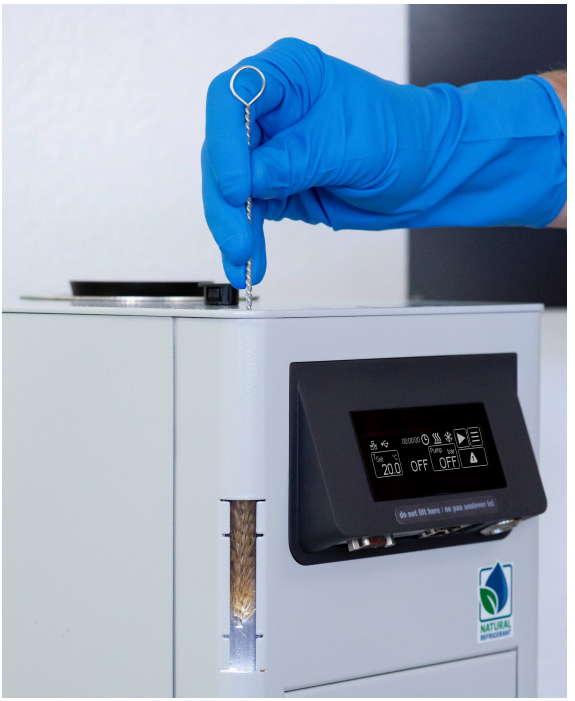
If necessary, the illuminated level indicator can be cleaned using the brush supplied.

Requirements

- ▶ Cleaning brush
- ▶ The appliance is switched off
- ▶ The appliance is disconnected from the power supply

Procedure

1. Remove the level indicator cover.
2. Push the cleaning brush into the level indicator from above and clean with up and down movements.



✓ The level indicator is cleaned.

9.6 Replacing the Detachable Power Cord

The device is equipped with a detachable power cord.



NOTE

The device must only be operated with the power cord provided. If the power cord needs to be replaced due to a defect, it can be reordered.

Order number	Description
7.901.30008626	EU power cord, 200–230 V
7.901.30008628	Power cord for Switzerland, 200–230 V + adapter from Schuko to Swiss plug
7.901.30008629	Power cord for the UK, 200–230 V
7.901.30008630	Power cord for China, 230 V
7.901.30008627	Power cord (US), 100–115 V

9.7 Checking Low-Level Protection for Proper Functioning

This section describes how to test the low-level protection function.



CAUTION

Risk of scalding from hot heat transfer fluid!
The heat transfer fluid can become very hot during the temperature control process. Contact with hot heat transfer fluid can cause scalding.
- Allow the unit to cool to room temperature before draining it.
- Avoid direct contact with hot heat transfer fluid
- Wear protective gloves.

Prerequisites

▶ The device is turned on.
▶ The device must be in standby mode (OFF state).
▶ The medium is at room temperature.
▶ The external application is disconnected from the device.
▶ A sufficiently large collection container is positioned beneath the device's drain.

Procedure

1. Open the drain valve.
   ⇨ The heat transfer fluid flows into the provided collection vessel.
   ⇨ During the draining process, the low-level alarm is triggered. Acknowledge the message on the display.
2. If the low-level alarm has been triggered, close the drain valve.

✓ The low-level safety device has been tested for proper function. Refill the unit with heat transfer fluid before its next use.

9.8 Taking the Device Out of Service and Storing It

If a device is not going to be used for an extended period of time or, for example, needs to be sent to Technical Service for repair, it should be taken out of service. To ensure that it continues to function reliably even after prolonged storage, follow the procedure described below.

Prerequisites

▶ The device is turned off and disconnected from the power supply.

Procedure

1. Completely drain the device (see **“Draining the Device”).**
2. Remove the external application.
3. Completely drain the heat transfer fluid.
4. Clean the unit inside and out.
5. Remove all residues of the cleaning fluid from the piping system (e.g., with compressed air).
6. Close all connections and drain valves.
7. Store the unit in a well-ventilated, dust-free, dry, and frost-free location. Avoid corrosive and aggressive environments.

✓ The unit is stored safely and securely. It can be put back into service as needed.

9.9 Send in the unit

If the device malfunctions in a way that the operator cannot resolve on their own, contact Technical Service.

NOTE

Before shipping, note the following:

- Completely drain the unit
  - heat transfer fluid
  - Refrigerant
- Clean and decontaminate the unit properly to prevent any risk to service personnel.
- Securely close all connections with nuts and caps.
- Pack the unit carefully to protect it from damage.
- Mark the packaging to ensure the unit is transported in an upright position.
- Fill out the online return form at **https://www.julabo.com/de/service/after-sales-service/reparatur-service/ruecksendeformular** completely.

NOTE

For safe return shipping to JULABO, use the original packaging whenever possible.

Shipping Address

JULABO GmbH

Gerhard-Juchheim Street 1

77960 Seelbach

Germany

Phone: +49 7823 51-66

service.de@JULABO.com

9.10 Warranty

JULABO guarantees the proper functioning of the device, provided that it is used and operated in accordance with the operating instructions.

The warranty period is one year from the date of invoice.



With the 1PLUS warranty, the warranty can be extended to two years free of charge.

With the 1PLUS warranty, the user receives a free extension of the warranty to 24 months, limited to a maximum of 10,000 operating hours. The prerequisite is that the user registers the device at www.julabo.com within four weeks of commissioning, stating the serial number.

The date of invoice from JULABO GmbH is decisive for the warranty.

10 Faults and troubleshooting

10.1 Alarm and warning messages

Alarm and warning messages are described in the table.
If a displayed error code is not listed in the table, or if the error persists after turning the device off and back on, contact Technical Support and provide them with the error code.

Code	Cause	Action
E01	The level has fallen below the minimum.	Top up the temperature control medium. Check temperature control hoses for damage and replace if necessary.
E03	The measured temperature is above the set overtemperature limit.	Increase the “Overtemperature” temperature limit or reduce the temperature setpoint.
E04	The measured temperature is below the set under-temperature limit.	Reduce the “Undertemperature” temperature limit or increase the temperature setpoint.
E05	Open circuit or short circuit in the operating temperature sensor of the over-temperature protection device.	Contact JULABO Service.
E14	The set protection temperature has been exceeded.	Check the working temperature range of the application. Reduce the setpoint temperature.
E40	The low-level protection system is indicating a critical fluid level.	Refill the heat transfer fluid.
E60	Internal read/write error.	Switch off the device at the power switch, wait 4 seconds and then switch the device back on.
E63	Electronics malfunction.	Switch off the device at the mains switch, wait 4 seconds and then switch the device back on.
E72	The device has no configuration.	Load valid configuration onto device.
E108	The safety device's self-locking mechanism is still active.	Switch off the appliance at the mains switch, wait 4 seconds and then switch the appliance back on.
E135	A fault has been detected at the pump outlet.	Contact JULABO Service.

E143	The set temperature limit for the overtemperature alarm has been exceeded.	Increase temperature limit for overtemperature alarm or reduce temperature setpoint.
E144	The temperature has fallen below the set limit for the subtemperature alarm.	Reduce temperature limit for low temperature alarm or increase temperature setpoint.
E183	Excessive power consumption via the USB interface.	Check plugged-in external data carrier for errors and replace if necessary. The USB interface is not suitable for consumers with a higher current requirement than the maximum permissible.
E402	The evaporator outlet temperature sensor wire is broken.	Contact JULABO Service.
E473	Error in the refrigeration system.	If this occurs repeatedly, contact JULABO Service.
E999	Internal error.	If this occurs repeatedly, contact JULABO Service.
E1305	The pump speed is too low. The pump is defective, or the viscosity of the fluid is too high.	Check the pump setting and adjust if necessary. Check the viscosity of the temperature control medium and adjust if necessary.
E1437	Error in the refrigeration system.	If the error occurs repeatedly, contact JULABO Service.

11 Disposal

When disposing of the device, follow the applicable state-specific guidelines.



This symbol on the product or its packaging indicates that it must not be disposed of with household waste.
Proper disposal avoids negative effects on people and the environment and allows valuable raw materials to be reused.
Information on collection points for old appliances can be obtained from the city or municipality or an authorized disposal company.



CAUTION

Leakage of flammable refrigerant!
If flammable refrigerant leaks, there is a risk of fire and explosion.

- Do not open the refrigerant circuit.
- Have the unit disposed of by a certified company in accordance with national or regional regulations.

12 Appendix

12.1 Interface Commands

The device can be controlled remotely using interface commands. Parameters can be retrieved and the current status can be queried. To do this, the device must be connected to the host computer via a digital interface.

Interface commands are entered using a terminal program.

Interface commands are divided into IN commands and OUT commands.

String Element	Symbol	Hex
Space	␣	20
Carriage return	←	0D
Line feed	LF	0A

- IN commands: Retrieve parameters
  Command structure: Command + ←

  Example: Querying the setpoint temperature:
  IN_SP_00←

  Example: Device response:
  55.5 ← LF
  (

- OUT Commands: Set Parameters (Remote control mode only)
  Command structure: Command + ␣ + Parameter + ←

  Example: Setting the setpoint temperature to 55.5 °C:
  OUT_SP_00␣55.5←

12.1.1 IN Commands

IN commands are used to retrieve parameters from the device.

Process Values	Comment
version	Version
status	Status
in_pv_00	Temperature Value
in_pv_01	Current control variable [%]

Setpoints and warning limits	Comment
in_sp_00	Set temperature setpoint
in_sp_03	Set overtemperature warning limit
in_sp_04	Set low temperature warning limit
in_sp_27	Set pump setting
in_sp_28	Set overtemperature alarm limit
in_sp_29	Set low temperature alarm limit

Device modes	Comment
in_mode_05	Set operating mode of the temperature control system: 0 = Stop 1 = Start

Auxiliary parameters	Comment
in_hil_00	Set control variable limit for cooling capacity (%)
in_hil_01	Set control variable limit for heating capacity (%)

12.1.2 OUT Commands

OUT commands are used to set parameters on the device. Remote control mode must be active for this.

Setpoints and Warning Limits	Comment
out_sp_00	Setting the setpoint temperature
out_sp_03	Setting the Overtemperature Warning Limit
out_sp_04	Setting the warning limit for low temperature
out_sp_07	Setting the pump stage
out_sp_11	Setting the temperature unit: 0 = °C 1 = °F
out_sp_27	Pump output setting [%]
out_sp_28	Setting the overtemperature alarm limit
out_sp_29	Setting for the low temperature alarm limit

Device Modes	Comment
out_mode_05	Start/stop command for the device in remote control mode: 0 = Stop temperature control 1 = Start temperature control

Auxiliary parameters	Comment
out_hil_00	Setting for the cooling capacity control variable limit (0–100%)
out_hil_01	Setting for the control variable limit of the heating capacity (0–100%)

12.2 LwIP software license

LwIP is licensed under the BSD license. The following text is a copy of the LwIP license document contained in the source code.

```
/*
 * Copyright (c) 2001-2004 Swedish Institute of Computer Science.
 * All rights reserved.
 *
 * Redistribution and use in source and binary forms, with or without modification,
 * are permitted provided that the following conditions are met:
 *
 * 1. Redistributions of source code must retain the above copyright notice,
 *    this list of conditions and the following disclaimer.
 * 2. Redistributions in binary form must reproduce the above copyright notice,
 *    this list of conditions and the following disclaimer in the documentation
 *    and/or other materials provided with the distribution.
 * 3. The name of the author may not be used to endorse or promote products
 *    derived from this software without specific prior written permission.
 *
 * THIS SOFTWARE IS PROVIDED BY THE AUTHOR ``AS IS'' AND ANY EXPRESS OR IMPLIED
 * WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
 * MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
 * SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL,
 * EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT
 * OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS
 * INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
 * CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
 * IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
 * OF SUCH DAMAGE.
 *
 * This file is part of the lwIP TCP/IP stack.
 *
 */
```

12.3 EC Conformity

EG-Konformitätserklärung nach EG Maschinenrichtlinie 2006/42/EG, Anhang II A
EC-Declaration of Conformity to EC Machinery Directive 2006/42/EC, Annex II A

Hersteller / *Manufacturer*:

JULABO GmbH
Gerhard-Juchheim-Strasse 1
77960 Seelbach / Germany
Tel: +49 7823 51-0

CE

Hiermit erklären wir, dass das nachfolgend bezeichnete Produkt
We hereby declare, that the following product

Produkt / *Product*: Umlaufkühler / *Recirculating coolers*

Typ / *Type*: VALEGRO 350; VALEGRO 500 **Serien-Nr. / *Serial-No.*:** siehe Typenschild / *see type label*

aufgrund seiner Konzipierung und Bauart in der von uns in Verkehr gebrachten Ausführung den grundlegenden Sicherheits- und Gesundheitsanforderungen der nachfolgend aufgeführten EG-Richtlinien entspricht.
due to the design and construction, as assembled and marketed by our Company – complies with fundamental safety and health requirements according to the following EC-Directives.

Maschinenrichtlinie 2006/42/EG; Machinery Directive 2006/42/EC
EMV-Richtlinie 2014/30/EU; EMC-Directive 2014/30/EU
RoHS-Richtlinie 2011/65/EU; RoHS-Directive 2011/65/EU

Angewandte harmonisierte Normen und techn. Spezifikationen:
Applied following harmonized standards and technical specifications:

EN IEC 63000:2018
Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

EN ISO 12100 : 2010
Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobeurteilung und Risikominderung (ISO 12100:2010)
Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)

EN 61010-1 : 2010 / A1 : 2019 / AC : 2019-04, EN 61010-1 : 2010 / A1:2019
Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte, Teil 1: Allgemeine Anforderungen
Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General requirements

EN IEC 61010-2-011 : 2021, EN IEC 61010-2-011 :2021/A11:2021
Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte – Teil 2-011: Besondere Anforderungen für Kühlgeräte
Safety requirements for electrical equipment for measurement, control, and laboratory use –Part 2-011: Particular requirements for refrigerating equipment

EN 61326-1 : 2013
Elektrische Mess-, Steuer-, Regel- und Laborgeräte- EMV-Anforderungen- Teil 1: Allgemeine Anforderungen
Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General requirements

EN IEC 61326-1 : 2021
Elektrische Mess-, Steuer-, Regel- und Laborgeräte- EMV-Anforderungen- Teil 1: Allgemeine Anforderungen
Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General requirements

EN 378-2 : 2016
Kälteanlagen und Wärmepumpen – Sicherheitstechnische und umweltrelevante Anforderungen – Teil 2: Konstruktion, Herstellung, Prüfung, Kennzeichnung und Dokumentation
Refrigerating systems and heat pumps - Safety and environmental requirements - Part 2: Design, construction, testing, marking and documentation

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen:
Authorized representative in charge of administering technical documentation:
Hr. Torsten Kauschke, im Haus / *on the manufacturer's premises as defined above*

Die Konformitätserklärung wurde ausgestellt
The declaration of conformity was issued and valid of

Seelbach, 29.01.2025

i.V. Bernd Rother, Senior Expert Products & Innovation

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12.4 UKCA Compliance

UK Office: JULABO UK Ltd., Unit 7, Casterton Road Business Park, Old Great North Road, Little Casterton, Stamford, PE9 4EJ, United Kingdom, Tel.: +44 1733 265892

UKCA-Declaration of Conformity

Manufacturer:

JULABO GmbH
Gerhard-Juchheim-Strasse 1
77960 Seelbach / Germany
Tel: +49 7823 51-0

This declaration is issued under the sole responsibility of the product manufacturer

Product: Recirculating Coolers

Type: VALEGRO 350, VALEGRO 500 **Serial-No.:** see type label

The object of the declaration described above is in conformity with the relevant UK Statutory Instruments and their amendments:

Supply of Machinery (Safety) Regulations 2008
Electromagnetic Compatibility Regulations 2016
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Applied following harmonized standards and technical specifications:

EN IEC 63000:2018
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

EN ISO 12100 : 2010
Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)

EN 61010-1 : 2010 / A1 : 2019 / AC : 2019-04, EN 61010-1 : 2010 / A1:2019
Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General requirements

EN IEC 61010-2-011 : 2021 / A11:2021
Safety requirements for electrical equipment for measurement, control, and laboratory use –Part 2-011: Particular requirements for refrigerating equipment

EN 61326-1 : 2013
Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General requirements

EN IEC 61326-1 : 2021
Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General requirements

EN 378-2 : 2016
Refrigerating systems and heat pumps - Safety and environmental requirements - Part 2: Design, construction, testing, marking and documentation

Authorized representative in charge of administering technical documentation:

JULABO UK Ltd., Mr. Gary Etherington, Unit 7, Casterton Road Business Park, Little Casterton, Stamford PE9 4EJ United Kingdom, Telephone: +44 1733 265892

The declaration of conformity was issued and valid of

Seelbach, 29.01.2025

i.V. Bernd Rother, Senior Expert Products & Innovation

2025_199_VALEGRO 350_500_Recirculating-Coolers_UKCA