



CORIO™ CD



Heating immersion circulators, heating circulators with open bath, refrigerated circulators

Translation of the original operating manual

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EN

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, $I_a = 30 \text{ mA}$).
- 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
- Heating element
- Bath lid
- Bath surface

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

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 circulators are laboratory instruments designed for temperature control of liquid media in a bath vessel or using a cooling machine. An external temperature control circuit can be connected to the pump connections to maintain a constant temperature of the media.

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

2.6 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.

Adjustable overtemperature protection

The overtemperature protection prevents the heater from overheating.

If the measured temperature exceeds the set protection temperature, an error message appears on the display. The pump and heater are switched off. A restart is required.

Overheating protection

The overheating protection prevents the heater from overheating.

The protective mechanism triggers if the appliance detects a temperature difference of more than 20 K between the working temperature sensor and the safety temperature sensor. An error message appears on the display. A restart is required.

Low level protection

A level switch detects if the level of the temperature control liquid in the bath tank is too low. The appliance issues a warning to prevent the heater from overheating and the pump from running dry.

The low level alarm is triggered when the float reaches its lower limit stop. The device switches off the pump and heater. A continuous signal tone sounds. An error 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.

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



NOTE

The maximum transport temperature is +70 °C.

General Information

Display		LED segment display
Protection class according to IEC 60529		IP21

Temperature data

Operating temperature range	°C	+20 ... +150
temperature stability	K	±0.03
Temperature resolution	K	0.01
Temperature control		PID1
Temperature setting		digital
ATC sensor calibration		1-point calibration

Dimensions and Weight

Overall dimensions (W x D x H)	cm	13.2 x 16.0 x 36.6
Weight	kg	2.6
Immersion depth	cm	16.2

Electrical Connection Specifications

Mains connection	V Hz	100 /50	100 / 60	115 /60	230 /50	230 /60
Current consumption	A	9	9	10	10	10
Heating capacity	kW	0.8	0.8	1.0	2.0	2.0
Volume flow at 0 bar	l/min	15	16	16	15	17
Delivery pressure at 0 l	bar	0.27	0.35	0.33	0.35	0.43
Max. viscosity	cSt	50				
Mains fuse, resettable	A	15				

3.1 **Technical Specifications for Refrigerated Circulators**

Technical Specifications for the CORIO CD-200F					
Temperature Data					
Operating Temperature Range	°C	-20 ... +150			
Cooling capacity	°C	+20	0	-10	-20
	kW	0.22	0.17	0.13	0.06
Refrigerant		R-290			
Permissible voltage tolerance		100 V: ±10% 115 V: ±10% 230 V: ±5 %			
Dimensions					
Overall dimensions (W x D x H)	cm	23 x 39 x 65			
Usable bath opening	cm	13 x 15			
Tub depth	cm	15			
Volume min. ... max.	l	3.0 ... 4.0			
Weight	kg	26.0			

Technical Specifications for the CORIO CD-201F**Temperature Data**

Operating Temperature Range	°C	-20 ... +150			
Cooling capacity	°C	+20	0	-10	-20
	kW	0.22	0.16	0.12	0.06
Refrigerant		R134a			
Permissible voltage tolerance		±10%			

Dimensions

Overall dimensions (W x D x H)	cm	44 x 41 x 44			
Usable bath opening	cm	13 x 15			
Tub depth	cm	15			
Volume min. ... max.	l	3.0 ... 4.0			
Weight	kg	25.0			

Technical Specifications for the CORIO CD-300F**Temperature Data**

Operating Temperature Range	°C	-25 ... +150			
Cooling capacity	°C	+20	0	-10	-20
	kW	0.31	0.28	0.20	0.11
Refrigerant		R134a			
Permissible voltage tolerance		±10%			

Dimensions

Overall dimensions (W x D x H)	cm	24 x 42 x 66			
Usable bath opening	cm	13 x 15			
Tub depth	cm	15			
Volume min. ... max.	l	3.0 ... 4.0			
Weight	kg	28.0			

Technical Specifications for the CORIO CD-310F						
Temperature Data						
Operating Temperature Range	°C	-30 ... +150				
Cooling capacity	°C	+20	0	-10	-20	-30
	kW	0.31	0.28	0.22	0.13	0.03
Refrigerant		R449A, R290				
Permissible voltage tolerance		100 V 50/60 Hz: ±10% 115 V 60 Hz: ±5 % 230 V 50/60 Hz: -10 /+5 %				
Dimensions						
Overall dimensions (W x D x H)	cm	23 x 40 x 65				
Usable bath opening	cm	13 x 15				
Tub depth	cm	15				
Volume min. ... max.	l	3.0 ... 4.0				
Weight	kg	25.2				

Technical Specifications for the CORIO CD-449F

Temperature Data

Operating Temperature Range	°C	-30 ... +150				
Cooling capacity	°C	+20	0	-10	-20	-30
	kW	0.45	0.36	0.28	0.21	0.07
Refrigerant		R290				
Permissible voltage tolerance		±10%				

Dimensions

Overall dimensions (W x D x H)	cm	37 x 59 x 69				
Usable bath opening	cm	28 x 35				
Tub depth	cm	20				
Volume min. ... max.	l	20.0 ... 26.0				
Weight	kg	39.5				

Technical Specifications CORIO CD-450F						
Temperature Data						
Operating temperature range	°C	-30 ... +150				
Cooling capacity	°C	+20	0	-10	-20	-30
	kW	0.45	0.38	0.28	0.17	0.07
Refrigerant		R449A, R452A*				
Permissible voltage tolerance		100 V: ±10% 115 V: ±10% 230 V: ± 5 %				
Dimensions						
Overall dimensions (W x D x H)	cm	23 x 40 x 65				
Usable bath opening	cm	13 x 15				
Tub depth	cm	15				
Volume min. ... max.	l	3.0 ... 4.0				
Weight	kg	25.1				

* at 100 V, 50/60 Hz

Technical Specifications for the CORIO CD-600F

Temperature Data

Operating Temperature Range	°C	-35 ... +150				
Cooling capacity	°C	+20	0	-10	-20	-30
with R449A	kW	0.60	0.46	0.29	0.18	0.06
with R452A	kW	0.60	0.53	0.35	0.22	0.10
Refrigerant		R449A, R452A*				
Permissible voltage tolerance		100 V: ±10% 115 V: ±10 % 230 V ± 5 %				

Dimensions

Overall dimensions (W x D x H)	cm	33 x 47 x 69				
Usable bath opening	cm	22 x 15				
Tub depth	cm	15				
Volume min. ... max.	l	5.0 ... 7.5				
Weight	kg	36.0				

Technical Specifications CORIO CD-601F						
Temperature Data						
Operating temperature range	°C	-35 ... +150				
Cooling capacity	°C	+20	0	-10	-20	-30
with R449A	kW	0.60	0.46	0.29	0.18	0.06
with R452A	kW	0.60	0.50	0.35	0.20	0.07
Refrigerant		R449A, R452A*				
Permissible voltage tolerance		100 V: ±10% 115 V: ±10% 230 V: ± 5 %				
Dimensions						
Overall dimensions (W x D x H)	cm	33 x 47 x 74				
Usable bath opening	cm	22 x 15				
Bathtub depth	cm	20				
Volume min. ... max.	l	8.0 ... 10.0				
Weight	kg	38.5				

* at 100 V, 50/60 Hz

Technical Specifications for the CORIO CD-800F

Temperature Data

Operating Temperature Range	°C	-40 ... +150				
Cooling capacity	°C	+20	0	-20	-30	-40
	kW	0.85	0.75	0.4	0.27	0.13
Refrigerant		R1270				
Permissible voltage tolerance		±10%				

Dimensions

Overall dimensions (W x D x H)	cm	33 x 47 x 70				
Usable bath opening	cm	18 x 13				
Tub depth	cm	15				
Volume min. ... max.	l	5.0 ... 7.5				
Weight	kg	42.0				

Technical Specifications for the CORIO CD-1000F

Temperature Data

Operating Temperature Range	°C	-40 ... +150					
Cooling capacity	°C	+20	0	-10	-20	-30	-40
	kW	1.00	0.98	0.75	0.53	0.27	0.13
Refrigerant		R449A					
Permissible voltage tolerance		100 V: ±10% 115 V: ±10% 230 V: ± 5 %					

Dimensions

Overall dimensions (W x D x H)	cm	42 x 49 x 74					
Usable bath opening	cm	18 x 13					
Tub depth	cm	15					
Volume min. ... max.	l	5.0 ... 7.5					
Weight	kg	51.5					

Technical Specifications for the CORIO CD-1001F**Temperature Data**

Operating Temperature Range	°C	-38 ... +100					
Cooling capacity	°C	+20	0	-10	-20	-30	-40
	kW	1.00	0.98	0.75	0.53	0.27	0.13
Refrigerant		R449A					
Permissible voltage tolerance		100 V: ±10% 115 V: ±10% 230 V: ± 5 %					

Dimensions

Overall dimensions (W x D x H)	cm	42 x 49 x 74					
Usable bath opening	cm	35 x 41					
Tub depth	cm	30					
Volume min. ... max.	l	5.0 ... 7.5					
Weight	kg	51.5					

Technical Specifications for the CORIO CD-1200F						
Temperature Data						
Operating Temperature Range	°C	-40 ... +150				
Cooling capacity	°C	+20	0	-20	-30	-40
	kW	1.25	1.1	0.63	0.4	0.23
Refrigerant		R1270				
Permissible voltage tolerance		±10%				
Dimensions						
Overall dimensions (W x D x H)	cm	33 x 47 x 70				
Usable bath opening	cm	18 x 13				
Tub depth	cm	15				
Volume min. ... max.	l	5.0 ... 7.5				
Weight	kg	42.0				

Technical Specifications for the CORIO CD-1201F

Temperature Data

Operating Temperature Range	°C	-40 ... +100					
Cooling capacity	°C	+20	0	-10	-20	-30	-40
	kW	1.25	1.10	0.85	0.54	0.30	0.05
Refrigerant		R1270					
Permissible voltage tolerance		±10%					

Dimensions

Overall dimensions (W x D x H)	cm	45 x 64 x 95					
Usable bath opening	cm	35 x 40					
Tub depth	cm	30					
Volume min. ... max.	l	42 ... 56					
Weight	kg	68					

Technical Specifications for the CORIO CD-1200FW

Temperature Data

Operating Temperature Range	°C	-50 ... +200				
Cooling capacity	°C	+20	0	-20	-30	-40
	kW	1.25	1.10	0.63	0.38	0.21
Refrigerant		R1270				
Permissible voltage tolerance		100 V: ±10 % 115 V: ±10 % 230 V: ±10 %				

Dimensions

Overall dimensions (W x D x H)	cm	33 x 47 x 70				
Usable bath opening	cm	18 x 13				
Tub depth	cm	15				
Volume min. ... max.	l	5.0 ... 7.5				
Weight	kg	42				

3.2 Materials and Media Compatibility

3.2.1 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
- 1.4401 / 316 / S31600
- 1.4404 / 316L / S31603
- 1.4571 / 316Ti / S31635
- FPM / FKM 75
- PPS

3.2.2 Heat Transfer Fluids

The most important criterion when selecting the heat transfer fluid is the operating temperature range in which the application is used.

- Select the heat transfer fluid so that its flash point is never exceeded at any time when it comes into contact with the ambient air.
- Recommended temperature control media and further information are available on the JULABO website.



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

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: $0.7\text{--}1.4^{\text{mmol}}/\text{l}$
- 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

3.3 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.

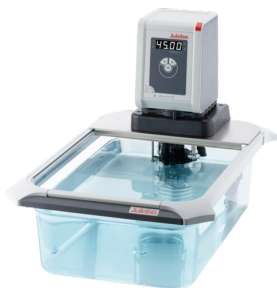
- Lay out the heat transfer hoses with large bends.
- Avoid kinking the heat transfer hoses.

4 Structure and function

4.1 Product Overview

The circulators can be combined with various baths with volumes of up to 50 l.

Hanging thermostat



CORIO CD circulator for bath vessels up to 50 l.

heated circulator



Circulator with a sealed stainless steel bath vessel. Example: CORIO CD-BC4 for temperature control in the bath or with an external application.

refrigerated circulator



Circulator with a cooling machine. Example: CORIO CD-200F for standard temperature control tasks.

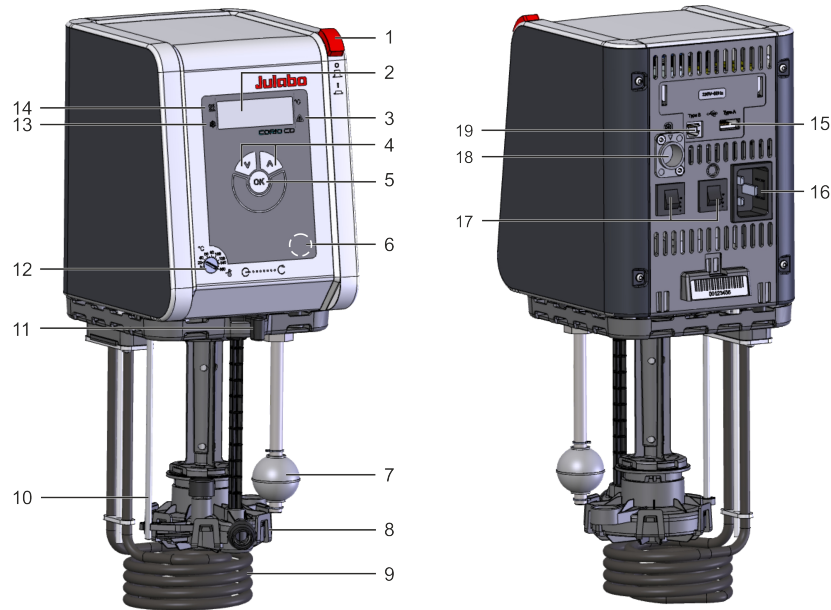
4.2 Function Description

The circulator can be mounted on any bath vessel with a volume of up to 50 liters and can be used for both internal and external temperature control.

When mounted on a bath vessel, the circulator functions as a heated circulator. When combined with a cooling machine, it functions as a refrigerated circulator.

4.3 Controls and Functional Elements

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



Control and Function Elements CORIO CD

1. Power switch
2. LED temperature display, menu display
3. Status indicator – Alarm
4. Edit buttons:
Set temperature setpoint higher/lower; press button briefly for single steps, hold button down for rapid increment
5. OK button: 1. Turn the device on/off; 2. Save value/parameter
6. Service button (hidden)
7. Float
8. Pump
9. Pipe heater
10. Temperature sensor
11. Pump switch, external/internal circulation
12. Adjustable high temperature cut-off
13. Control display – cooling
14. Control display – Heating
15. USB host interface (Type A)
16. Power connection: Built-in power plug (power cord included as an accessory)
17. Mains fuse: 15 A circuit breakers
18. CAN connector for connection to the cooling machine.
19. USB device interface (Type B) for data transfer to a PC, e.g., for control tasks using the EasyTEMP software.

The device is operated via the keypad. All menu functions and inputs are controlled here.

Button	Function
	The [OK] key starts a temperature control cycle or stops a running one. The [OK] key activates a selected function or confirms a set value.
	Use the arrow keys to select a function or set a value. Press briefly for single steps; hold down to scroll through values quickly.

4.4 Interfaces

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

4.4.1 Connection of External Equipment

Any external equipment connected to the device must be reinforced or double-insulated from the power supply, and the maximum voltage must be below 30 VAC / 60 VDC.

Also observe the maximum voltage specifications listed in the technical specifications for each interface.

4.4.2 USB-A port

A USB flash drive can be connected to the USB A port. The device can read data from the USB flash drive and save data to it.

Technical Specifications for the USB A Port

Parameters	Value	Unit
Output Voltage	5	VDC
Maximum current	500	mA

5 Transportation



CAUTION

Hot/cold surface!

The heating element may still be hot even after the device has been turned off and can cause burns if touched.

- Wear heat-resistant protective gloves.
- Allow the unit to cool to room temperature after turning it off.



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.

The circulator can be transported while installed, together with the cooling machine.

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 by the recessed handles on the cooling machine—with two people if necessary—and place it in the center of the transport cart.

! NOTE See the technical specifications for weight information.

2. Secure the unit in the center of the transport cart with straps to prevent it from tipping over.
 3. Place loose parts, such as cables, on the transport cart next to the unit.
- ✓ The unit is ready for transport and can be safely moved to its installation location.

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 Installing a Heated Circulator or Refrigerated Circulator

In the case of a heated circulator or a refrigerated circulator, the circulator is mounted on the closed bath or on the cooling machine.

If the circulator is removed—for example, to replace the unit or for servicing—it can easily be reinstalled using the junction box.

Prerequisites

- ▶ The circulator is ready for installation on a closed bath or a cooling machine.
- ▶ The bath is empty.

Procedure

1. Carefully insert the circulator into the bath. Align the four holes in the junction box with the four threaded sleeves on the bath.



2. Insert the mounting screws into the holes in the junction box.
3. Tighten the mounting screws.



4. Check for proper fit and sealing.
- ✓ The circulation thermostat or cooling circulation thermostat is now installed.

7.2 Connect the device to the power supply

7.2.1 Connecting a Bridge Thermostat or Heated Circulator

This section describes the electrical connection of the device with a power plug to the electrical outlet.



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, $I_a = 30 \text{ mA}$).
- Operate the device only at outlets with a protective ground (PE).



DANGER

Danger of death from electric shock!

An electric shock can result in serious injury or even death.

- Live parts are enclosed within the unit housing. If the unit housing is damaged, live parts may be exposed.
- Do not connect the unit 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.

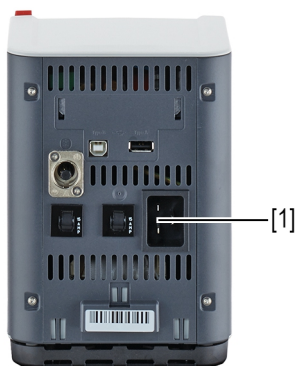
Prerequisites

- ▶ The circulator is installed as a bridge or heated circulator.
- ▶ The power cord is ready.

! NOTE If the 200–230 V, 50/60 Hz version is used in the United States or Canada, the JULABO USA 3x12AWG power cord (order number 7.901.2694) must be used. This power cord is not included in the scope of delivery.

Procedure

1. Plug the device connector of the included power cord into the power connection socket on the back of the unit [1].



2. Plug the power cord into an outlet.
- ✓ The device is now connected to the power supply.

7.2.2 Connecting a Refrigerated Circulator

This section describes how to connect the circulator as a refrigerated circulator.



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, $I_a = 30 \text{ mA}$).
- Operate the device only at outlets with a protective ground (PE).



DANGER

Danger of death from electric shock!

An electric shock can result in serious injury or even death.

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



NOTE

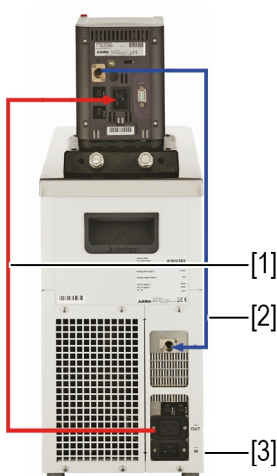
The power cord may be damaged by excessive heat!

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 circulator is mounted on the cooling machine.
- ▶ The connection cable, power cord, and CAN bus cable are ready.



Procedure

1. Connect the circulator to the cooling machine using the connection cable [1].
 2. Connect the CAN jacks of the two units using the CAN bus cable [2].
 3. Connect the cooling machine to the power supply using the power cord [3].
- ✓ The unit is now electrically connected. Alternatively, both units can be connected to separate electrical circuits. If necessary, the power supply must be configured in the unit settings.

7.3 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!

7.3.1 Connecting an external system with screw connections

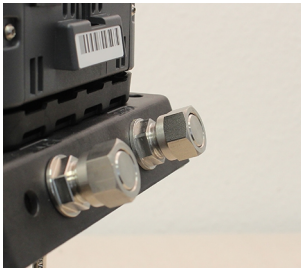
This section describes how to connect an external closed system with screw connections to the appliance.

Requirements

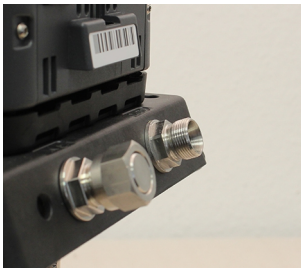
- ▶ Two open-end wrenches, sizes 17 mm and 19 mm
- ▶ Torque wrench
- ▶ The circulator is equipped with the optional mounting bracket or the pump set.
- ▶ The heat transfer hoses of the external system are equipped with M16x1 female threads and a conical seal.

Procedure

1. Remove the cap nuts from the pump connections.



2. Remove the plugs.



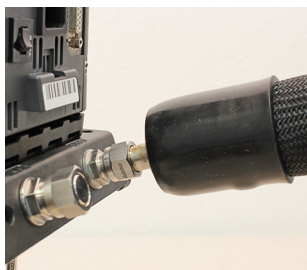
3. Screw the hoses onto the pump connections by hand.

! NOTE Ensure the supply and return lines are correctly oriented.



4. Tighten the pump connections to a maximum torque of 3 Nm. Hold the nut (SW 17) in place with an open-end wrench while tightening.

! NOTE The mounting bracket may crack if the pump connections are tightened too much.



5. Set the lever for adjusting the flow direction to “external circulation.”



- ✓ The external system is now connected.

! NOTE If the external system is removed, the pump connections must be resealed with the plugs to prevent temperature control fluid from leaking out during operation.

7.3.2 Connecting an External System Using Hose Fittings

This section describes how to connect an external, closed system to the device using hose connectors.

Requirements

- ▶ Two open-end wrenches, sizes 17 mm and 19 mm
- ▶ Torque wrench
- ▶ The circulator is equipped with the optional mounting adapter or the pump kit.
- ▶ Hose fittings for installing the external system are provided.

Procedure

1. Remove the union nuts from the pump connections.



2. Remove the sealing plugs.
3. Slide one hose fitting through each of the union nuts.
4. Install the hose fittings on the pump connections using the union nuts.



5. Tighten the pump connections to a maximum torque of 3 Nm. Hold the nut (SW 17) in place with an open-end wrench while tightening.

! NOTE The mounting adapter may crack if the pump connections are tightened too much.

6. Connect the hoses of the external system to the hose fittings.

! NOTE Ensure the flow and return directions are correct.

7. Secure the hoses with hose clamps to prevent them from slipping.
8. Set the lever for adjusting the flow direction to “external circulation.”



- ✓ The external system is now connected.

! NOTE When the external system is removed, the pump connections must be resealed with the plugs to prevent temperature control fluid from spilling out during operation.

7.4 Setting the high temperature cut-off

Before each new temperature control task, the temperature for the high temperature cut-off must be set. The set value must be below the flash point and at least 25 K below the ignition point of the heat transfer fluid being used. The surface temperature of the heat transfer fluid must not exceed the flash point at any time. If the set value is exceeded, an alarm is triggered.

Requirements

- Size 3 flat-blade screwdriver
- The device is connected

Procedure

1. Turn on the device.

! NOTE If no temperature-control fluid has been added yet, the low-level alarm will be triggered.

! NOTE Depending on the default settings, the high temperature cut-off alarm may be displayed.

2. Use the screwdriver to adjust the high temperature cut-off.

- ⇒ The display shows the set value.
- ⇒ The set value takes effect immediately.

! NOTE The set value must be below the flash point and at least 25 K below the combustion point of the heat transfer fluid being used.



3. Turn off the device to reset the alarm messages.
- ✓ The high temperature cut-off is now set.

7.5 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!

Requirements

- The drain is closed.
- The unit is turned off.

Procedure

1. Remove the bath cover.
2. Fill with heat transfer fluid to about halfway.

! NOTE As the temperature rises, the temperature control medium expands and may overflow.

! NOTE If the temperature drops, the low-level protection may activate and interrupt the temperature control process.

3. Turn on the unit and start the temperature control process.
4. Monitor the fluid level and adjust it as needed by refilling or draining.

! NOTE At operating temperature and with the material to be temperature-controlled in place, the level of the heat transfer fluid in the bath vessel should be above the circulator's heating coil or above the cooling machine's cooling coil.

5. Close the bath opening with the bath lid.
- ✓ The unit is filled with heat transfer fluid.

7.6 Setting Up the Power Supply

The power supply is configured at the factory. The circulator is powered by the cooling machine. Alternatively, both units can be connected to separate circuits using their own power cords. The type of power supply is set in the menu.

Prerequisites

- ▶ A cooling machine is connected to the circulator.
- ▶ Both devices are turned on.

Prerequisites

- ▶ A cooling machine is connected to the circulator.
- ▶ Both devices are turned on.

Procedure

1. Press the **[Up Arrow]** button and the power switch at the same time.
 - ⇒ The unit turns on and the display shows the current setting **<hHI>** or **<hLO>**.
2. To select the other setting, turn off the unit and repeat the procedure.

! NOTE <HLO> when the device combination has a connection to the same power supply. The heating power limit is activated. Depending on the total current draw, it limits the circulator's heating power and prevents the power supply from being overloaded.

! NOTE <HHI> with a connection to separate power sources. Full heating power is available.

- ✓ The power supply for the refrigerated circulator is now set up.

7.7 Adjusting the Flow of the Heat Transfer Fluid

Use the lever on the front panel to set the flow direction of the heat transfer fluid:

- Lever position on the left (external): The heat transfer fluid is primarily directed to the external application.
- Lever position to the right (internal): The heat transfer fluid is primarily circulated within the internal bath.



NOTE

Spilling heat transfer fluid

If the pump connections are not sealed, heat transfer fluid may spray out even when the flow direction is set internally.

- For internal temperature control, seal the external pump connections.

Prerequisites

- ▶ The unit is turned off.
- ▶ The unit is filled with heat transfer fluid.



Procedure

1. Set the lever to a low setting for internal circulation (e.g., position 2 from the right stop).
 2. Turn on the unit and check whether the flow of the heat transfer fluid is suitable for the application.
 3. Adjust the flow until it is suitable for the application.
- ✓ The heat transfer fluid flow is now set.

7.8 Setting the Cooling Mode

Cooling mode is preset to automatic operation at the factory. In the control menu, you can choose between three different cooling modes:

- Automatic mode: If the setpoint changes by more than +5 K, the control system calculates the duration of the heating process. Based on the calculated heating duration, the control system decides on a demand-based basis whether to shut off the cooling machine or not.
- Always On: The cooling machine remains continuously on during operation.
- Always Off: The cooling machine remains off during operation.

Prerequisites

- ▶ A cooling machine is connected to the circulator.
- ▶ Both devices are turned on.

Procedure

1. Press and hold the **[Down Arrow]** button **and** the power switch simultaneously until the unit turns on and briefly displays the cooling mode.
 2. To select a different cooling mode, turn off the unit and repeat the procedure.
 - The respective cooling mode is briefly displayed: **<CON>** for cooling machine always on, **<AUTO>** for automatic mode, or **<COFF>** for cooling machine off.
- ✓ The cooling mode is now set.

7.9 Setting Temperature Warning Limits

The low temperature limit and high temperature limit are adjustable temperature limits that serve as warning limits for the device. If either warning limit is exceeded during temperature control, the device will issue an audible alert and display a warning message.

Prerequisites

- ▶ The device is turned on.

8 Operation

8.1 User Interface

8.2 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. An intermittent beep sounds. The display alternately shows the current temperature and the error code. The beep can be turned off by pressing the **[OK]** button. Once the cause of the warning has been resolved, the warning will clear. Depending on the cause, warnings may clear on their own after a certain amount of time, e.g., as the unit cools down.

Alarm:

When an alarm occurs, the indicator LED lights up. Temperature control is stopped. At the same time, a continuous beep sounds and an error code appears on the display. The beep can be turned off by pressing the **[OK]** button. 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.”**

8.3 Operator Messages

Operator messages are informal messages that inform the operator of status changes in the unit.

Operator messages display the operating status of individual units in the status bar of the home screen. Status messages from a connected cooling machine are also displayed as operator messages.

8.4 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.
 - ⇒ All display elements light up briefly; the software boots and starts the device.
- ✓ The device is turned on and ready for operation. The display shows "OFF." If the autostart function is enabled, the device starts up directly with the last setting.

**NOTE**

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

8.5 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.

8.6 Start Tempering

A tempering cycle can be started directly on the unit. Another option is to control the tempering process using the timer.

Prerequisites

- The device is turned on and ready for operation.

Procedure

1. Use the arrow keys to set the desired setpoint temperature.
2. Hold down the **[OK]** button until temperature control begins.
- ✓ The setpoint temperature is saved. The display flashes briefly. The device begins temperature control immediately. Press the **[OK]** button to pause temperature control.



NOTE

Note for heating thermostats:

For temperature control tasks near or below ambient temperature: Use a cooling coil or a JULABO immersion chiller.

8.7 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. Briefly press one of the arrow keys.
 - ⇒ The display switches from the actual value display to the setpoint display and shows the last saved setpoint temperature. The digit before the decimal point flashes.
2. Adjust the value before the decimal point using the arrow keys and confirm with **[OK]**.
 - ⇒ The set value is accepted. The decimal place flashes.
3. Use the arrow keys to set the decimal place value and confirm twice with **[OK]**.
 - ⇒ The set value is applied. The new setpoint temperature flashes briefly.

- ✓ The setpoint temperature is now set and active.

8.8 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 off
- ▶ The autostart function is disabled.

Procedure

1. Press and hold the **[OK]** button and the power switch simultaneously until the device turns on.
 - ⇒ The display shows **<AOn>**.
- ✓ The autostart function is enabled. Temperature control starts automatically with the preset values and continues each time the device is turned on, as long as the autostart function remains active. To disable it, turn off the device and repeat the procedure. **<AOFF>** will then appear on the display.

A timer can be connected and programmed. In this case, the device's power switch must remain on at all times.

8.9 Record data

8.9.1 Recording Measurement Data

Measurement data from an ongoing temperature control process can be recorded synchronously to a USB flash drive. The recording documents the date, time, setpoint temperature, internal actual value, external actual value, and power output as a percentage. The data is saved as a .txt file and can be analyzed later.

Prerequisites

- ▶ The device is turned on.
- ▶ A USB flash drive is available.

Procedure

1. Insert the USB flash drive into the USB port.
 2. Press and hold the **[Up Arrow]** and **[OK]** buttons simultaneously until the display shows **<LOG I>**.
- ✓ Measurement data recording starts and is indicated on the display by a blinking dot. Use the same key combination to stop recording. The display then shows **<LOG O>**.

8.9.2 Reading Black Box Data

The black box stores all relevant data from the last 20 minutes. It also logs alarm and warning messages.

The black box can be read out, and the data can be sent to Technical Service for analysis.

Prerequisites

- ▶ The device is turned on.
- ▶ A USB flash drive is available.

Procedure

1. Insert the USB flash drive into the USB port.
 2. Press the **[OK]** button **and** the Service button at the same time.
 - ⇒ While the data is being saved, **<-BB->** appears on the display.
- ✓ The black box data is saved to the USB flash drive as a .txt file.

8.10 Remote Control of the Device

The device can be controlled remotely via its interface.

8.10.1 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 circulator (USB Type B port) to the computer using a standard USB cable.
2. Download the appropriate USB driver from the download section of the website www.julabo.com.

! NOTE Depending on the operating system of the connected PC, it may be necessary to install the USB driver.

3. Install the USB driver on the PC.
 4. Turn on the device.
 - ⇒ The circulator will appear on the PC as a COM port in Device Manager with the identifier “STMicroelectronics Virtual COM Port.”
 5. Hold down both arrow keys simultaneously.
 - ⇒ Remote control mode is activated; the display shows **<rOn>**. To deactivate it, press the key combination again until the display shows **<rOFF>**.
 6. Launch the terminal program on the computer.
 7. In the terminal program, select the circulator’s COM port and establish a connection.
- ✓ Remote control via the USB interface is now active. The circulator can now be remotely controlled via the computer using the interface commands.

8.11 Set the Timer

The timer allows you to program a temperature control duration of 0 to 999 minutes. The setpoint temperature is maintained for the programmed duration. Once the set duration has elapsed, the device switches to standby mode.

Prerequisites

⇒ The device is turned on.

Procedure

1. Press the **[Down Arrow]** key and the **[OK]** key at the same time.

⇒ The display shows **<t O>**.

2. Use the arrow keys to set the minutes and press **[OK]** to confirm.

⇒ The display flashes briefly.

✓ The timer is programmed and active.

The decimal point flashes on the display until the timer starts. The timer starts when the setpoint temperature is reached and maintained for at least 30 seconds with an accuracy of ± 0.1 °K. If the remaining time is less than 1 minute, it is displayed in seconds. Once the set time has elapsed, a beep sounds twice and the device switches to standby mode. The setpoint temperature can still be changed until it is reached. The timer remains active and starts when the new setpoint temperature is reached. If the setpoint temperature is changed while the timer is running, the timer is deactivated. Press the **[OK]** button to stop the running timer

8.12 Adjusting the Temperature Sensor (ATC)

Due to physical conditions, a temperature difference may develop in the bath vessel between the temperature sensor and a defined, more distant point within the temperature control medium volume. As a result, the measured temperature deviates slightly from the actual temperature in the bath. Calibrating the temperature sensor can improve the accuracy of the temperature control.

Prerequisites

- ▶ The bath vessel is filled.
- ▶ The device is turned on.

Procedure

1. Hang the thermometer in the bath vessel and place the bath lid on top.
2. Set the desired target temperature and start the temperature control.
 - ⇒ Once the setpoint is reached, allow the temperature to stabilize for a few minutes.

! NOTE The more stable the temperature in the bath vessel, the more accurate the calibration result.

3. Press the Service button and the **[Down Arrow]** button simultaneously until the decimal point flashes briefly.
4. Use the arrow keys to enter the measured reference temperature, then confirm with **[OK]**.

! NOTE The calibration value is applied immediately. The display shows **<CAL>** to confirm.

⇒ The entered reference temperature must be within ± 5 °C of the setpoint temperature; otherwise, an error message will appear and the entry will be ignored.

- ✓ The temperature sensor is calibrated.

9 Cleaning and maintenance

9.1 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. Completely drain the heat transfer fluid.
 3. Clean the unit inside and out.
 4. Remove all residues of the cleaning fluid from the piping system (e.g., with compressed air).
 5. Close all connections and drain valves.
 6. 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.

9.2 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 6 months	Check the function of the low-level protection	Operator	15
Every 2 years	Check safety labels	Operator	1



NOTE

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

9.3 Genuine JULABO Replacement Parts

Reliable continuous operation and safety also depend on the quality of the replacement parts used.

Only genuine JULABO replacement parts guarantee the highest quality and safety. You can obtain genuine JULABO replacement parts directly from JULABO or through authorized JULABO dealers.



NOTE

Use only genuine JULABO replacement parts

Using non-genuine replacement parts voids the JULABO warranty.

9.4 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. Remove the bath lid.
2. Open the drain valve.
 - ⇒ The temperature-control fluid flows into the provided collection vessel.

3. Once the unit is completely drained, close the bath vessel.
 4. Close the drain valve.
- ✓ The unit is now drained.

9.5 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.

9.6 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
7.901.2655	EU power cord, 200–230 V

9.7 Checking the High Temperature Cut-Off for Proper Function

This section describes how to check the high temperature cut-off for proper function.

Requirements

- ▶ Size 3 flat-blade screwdriver
- ▶ The device is turned on.
- ▶ Temperature control has started.

Procedure

1. Use a screwdriver to adjust the high temperature cut-off to a temperature below the displayed current value.
 - ⇒ A beep sounds and the error code “E 14” is displayed. The high temperature cut-off is functioning.
 2. Set a value that is higher than the current value.
 3. Turn off the device, wait a few seconds, and turn it back on.
 - ⇒ The alarm message is deactivated.
 4. Set the high temperature cut-off.
- ✓ The high temperature cut-off has been set and tested for proper function.

9.8 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.
1. Remove the bath lid.
 2. Using a long object, carefully push the circulator's float down until it reaches the mechanical stop.
 - ⇒ An audible signal sounds and the error code **<E 01>** is displayed. The low-level protection device is functioning properly.
 3. Turn off the unit, wait a short while, then turn it back on.
 - ⇒ The alarm message is deactivated.
 4. Close the bath opening.
- ✓ The low-level protection device has been tested.

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
- 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 set-point.
E04	The measured temperature is below the set under-temperature limit.	Reduce the “Undertemperature” temperature limit or increase the temperature set-point.
E05	Open circuit or short circuit in the operating temperature sensor of the over-temperature protection device.	Contact JULABO Service.
E06	There is too great a temperature difference between the working temperature sensor and the safety temperature sensor.	Increase the circulation. Check the viscosity of the temperature control medium. If the fault is not rectified, contact Technical Service.
E14	The set protection temperature has been exceeded.	Check the operating temperature range of the application. Increase the protection temperature value or decrease the setpoint temperature until it is lower than the set protection temperature  WARNING Set the high temperature cut-off to at least 25 K below the flash point of the heat transfer fluid being used.
E15	The external temperature sensor wire is shorted or broken.	Check the electrical connection to the external temperature sensor
E33	The safety temperature sensor wire is shorted or broken.	Contact JULABO Service.

E38	The setpoint is set to an external temperature sensor, but no signal is present.	Check whether an external temperature sensor is connected or whether the electrical connection is broken. If necessary, change the setpoint.
E40	The low-level protection system is indicating a critical fluid level.	Refill the heat transfer fluid.
E41	The overfill early warning system reports a critical fluid level.	Drain 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.
E61	Connection error between the circulator and the cooling machine	Check the connection cable for damage and replace it if necessary. Switch the device back on. If the error has not been rectified, contact Technical Service. Alternatively: Deactivate the cooling unit. The thermostat is working as a heating thermostat.
E62	CAN bus error	Switch off the device at the power switch, wait 4 seconds and then switch the device back on.
E63	The watchdog function has been triggered.	Switch off the device at the mains switch, wait 4 seconds and then switch the device back on.
E70	The device is being operated at an incompatible voltage or frequency, or the device is configured incorrectly.	Check the device's permissible operating voltage and its configuration.
E72	Configuration between the circulator and the connected cooling machine failed.	Switch off the appliance at the mains switch, wait 4 seconds and then switch the appliance back on.
E83	Excessive power consumption via the USB interface.	Check the connected external storage device for errors and replace it if necessary. The USB port is not suitable for devices with a power draw exceeding the maximum allowable limit.
E104	The AD conversion of the AF overtemperature protection device is malfunctioning.	Contact JULABO Service.

E106	Error in the internal temperature sensor.	Contact JULABO Service.
E107	Error in internal temperature measurement.	Contact JULABO Service.
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.
E112	Error in the internal temperature sensor.	Contact JULABO Service.
E114	Error in internal temperature sensing.	Contact JULABO Service.
E115	Error in internal temperature sensing.	Contact JULABO Service.
E116	The protective 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.
E118	Error in the internal temperature sensor.	Contact JULABO Service.
E142	Device started, external temperature actual value source set on the display, external temperature reception timeout via CAN bus.	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.
E301	The pressure in the external temperature control circuit exceeded the entered limit value for 1 second.	Contact JULABO Service.
E302	The pressure in the external temperature control circuit has exceeded the entered limit value for 5 seconds.	Contact JULABO Service.

E427	The maximum permissible condensation pressure has been exceeded.	Check ambient temperature and reduce if necessary. Check condenser for soiling and clean if necessary. Switch off the appliance at the power switch, wait 4 seconds and then switch the appliance back on. If the fault is not rectified, contact Technical Service.
E431	The maximum permissible current draw at the compressor has been exceeded.	Check mains voltage for nominal voltage. If the fault has not been rectified, contact Technical Service.
E503	External setpoint set via EPROG, but no analog module is connected.	Connect analog module or deactivate external setpoint setting via EPROG.
E504	External control signal set via EPROG, but no analog module is connected.	Connect analog module or deactivate external actuating value specification via EPROG.
E505	The analog module is sending an invalid setpoint.	Check EPROG settings.
E999	Internal error.	If this occurs repeatedly, contact JULABO Service.
E1103	Level detection error.	Contact JULABO Service.
E1109	The viscosity of the heat transfer fluid is too high, or circulation is insufficient.	Check the temperature control medium for suitability in the temperature range used or adjust the circulation.
E1217	Mains frequency measurement is faulty.	Contact JULABO Service.
E1218	Mains frequency measurement is faulty.	Contact JULABO Service.
E1302	The pressure has fallen below the threshold for shutting off the heating output. Motor malfunction or fluid viscosity too high.	Check the pump settings and adjust them if necessary. Check the viscosity of the heat transfer fluid and adjust it if necessary.
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.

E1427	The warning threshold for high condensation pressure has been exceeded.	Check ambient temperature and reduce if necessary. Check condenser for soiling and clean if necessary. Switch off the appliance at the mains switch, wait 4 seconds and then switch the appliance back on. For water-cooled appliances: Check cooling water temperature and supply. If the fault is not rectified, contact Technical Service.
E1431	The current draw at the compressor fell below the minimum permissible level.	Check mains voltage for nominal voltage. The specified voltage tolerance of the appliance must not be exceeded. Check the mains cable of the chiller for damage and replace if necessary. Check ambient temperature and lower if necessary. Check the CAN bus cable for damage and replace if necessary. If the fault is not rectified, contact Technical Service.
E1501	Timeout on the digital interface.	If the watchdog is activated, the temperature setpoint must be sent cyclically to the device at least according to the set timeout.
E1502	The pressure in the temperature control circuit exceeds the set warning limit.	Correct the pressure setpoint downwards or Set warning limit upwards (if justifiable from a safety point of view).
E1503	The pressure in the temperature control circuit has fallen below the set warning limit.	Correct pressure setpoint upwards or Set warning limit downwards (if justifiable from a safety point of view).

10.2 Error Messages During the Configuration Process

If errors occur during a configuration process or during a firmware update, they are displayed on the screen as an error code in a scrolling message.

Error code	Description	Solution
CFG Error	Error during configuration.	• Repeat the process. • If the error occurs again, replace the USB flash drive. • If the error persists, contact Technical Support.
ProG Error	Firmware update error.	• Repeat the procedure. • If the problem occurs again, replace the USB flash drive. • If the error persists, contact Technical Support.

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.

12 Appendix

12.1 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



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

Produkt / Product: Thermostat / Circulator

Typ / Type: CORIO CD

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 Gestaltungsgrundsätze - 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 61010-2-010:2020

Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte Teil 2-010: Besondere Anforderungen an Laborgeräte für das Erhitzen von Stoffen
Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 2-010: Particular requirements for laboratory equipment for the heating of materials

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

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, 16.05.2023

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

12.2 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: Circulator

Type: CORIO CD

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 61010-2-010:2020

Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 2-010: Particular requirements for laboratory equipment for the heating of materials

EN 61326-1 : 2013

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

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, 16.05.2023

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

12.3 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↵

12.4 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

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%)

12.5 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 [%]
in_pv_03	Current temperature of the safety temperature sensor
in_pv_04	Current setpoint of the over-temperature protection device

Setpoints and warning limits	Comment
in_sp_00	Set temperature setpoint

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 (%)

