



Immersion / Open Bath / Refrigerated Circulators

Operating Instructions

Important: keep original operating manual for future use.

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Congratulations.

You have made an excellent choice.

JULABO thanks you for the trust.

This operating manual is designed to familiarize you with the operation of our units and their possible applications. Please read the operating manual carefully.

Please call us if you have any questions about the operation of the unit or about the operating manual.

Contact:

The JULABO quality management system



The standards for the development, production and distribution of temperature control devices for laboratory and industry use satisfy the requirements of ISO 9001 and ISO 14001. Registration certificate No. 01 100044846.

Unpacking and inspection

If the packaging is damaged or if you discover any concealed transport damage when you have unpacked the devices and the accessories, please notify the supplier in the form of a statement of damage.

NOTICE

The operating manual

- should be kept for future use.
- must be available to operating personnel at all times.

1 CORIO® CD product overview

			
Immersion circulator for bath tanks up to 50 l.	Open bath circulator with high quality bath tanks made of transparent plastic or stainless steel.	Bath circulator for temperate control in an internal bath or an external application.	Refrigerated circulator for standard temperature control and routine tasks.

2 Intended use

JULABO circulators are laboratory devices which are designed for the temperature control of certain liquid media in a bath tank or with a refrigeration unit. The bath fluids recommended by JULABO must be used as tempering media.

Units with pump connections allow the tempering tasks to be carried out in an external temperature control system.

JULABO circulators are not designed for the direct temperature control of foods, semi-luxury foods and tobacco, or pharmaceutical and medical products.

- Direct temperature control means unprotected contact between the object and the tempering medium (bath fluid).
- The devices are not suitable for use in potentially explosive environments.

3 Description

- These circulators are operated via the splash-proof keypad. The microprocessor technology allows the setpoint to be set, displayed and saved using the temperature display LED.
- The PID temperature control automatically adjusts the heat supply to the requirements in the bath.
- ATC - Absolute Temperature Calibration (1-point calibration)
- The pump function can be switched from internal to external circulation by a simple switchover button.
- Safety equipment to IEC 61010-2-010:
 - Excess temperature protector is a safety device which is independent of the control circuit whose value is set using a tool (screwdriver).
 - A float switch acts as the low level safety device. If these safety devices trip, the heater and circulating pump are completely shut down.
- Interfaces:
 - CAN bus to communicate with the refrigeration machine
 - USB connector to act as host to update and read data. USB device for remote control.



NOTICE

It is important to follow these safety instructions to prevent personal injury and property damage. These instructions apply in addition to the safety instructions at your workstation.

It is essential that you read the user information before starting the device.

4 Explanation of safety information



The operating manual contains warnings to increase safety when using the unit. The general warning sign, consisting of an equilateral triangle surrounding an exclamation sign and reproduced in various signal colors, is preceded by the signal words.

"Warning of a dangerous situation".

The significance of the danger is classified with a signal word. Read the instructions carefully and follow them.



⚠ DANGER

This signal word designates a danger with a high level of risk which, if it not prevented, will result in death or serious injury.



⚠ WARNING

This signal word designates a danger with a medium level of risk which, if it not prevented, may result in death or serious injury.



⚠ CAUTION

This signal word designates a danger with a low level of risk which, if it not prevented, may result in minor or moderate injury.

NOTICE

Designates a possibly harmful situation. If it is not prevented, the system or something near it may be damaged.

4.1 Explanation of other information



TIP

Your attention is drawn to something special by this.

Designates user tips and other useful information.



Dangers at second glance

Designates states which only occur after the start of an action and could have been prevented if the warning had been heeded.



Informative note

Provides additional information.

5 Safety instructions

It is important to follow these safety instructions to prevent personal injury and property damage. These instructions apply in addition to standard safety practices for working places.

- It is essential that you read the user information before starting the unit.
- Use PPE (safety gloves, safety shoes, safety goggles).
- Transport the unit carefully. The interior of the unit can also be damaged by impacts or if it is dropped.
- Do not loiter under the unit during transportation and operation.
- The unit is not intended for use in potentially explosive areas.
- Please observe the specifications for the minimum space requirement when setting up the unit.
- Only operate the unit in rooms that are well-ventilated, dry and free of frost.
- Switch the unit off immediately if there is refrigerant leakage.
- Place the unit on a flat surface of non-flammable material.
- Operate the unit under an exhaust hood as much as possible.
- Do not start the unit if it is damaged or leaking.
- Compare the mains voltage and frequency with the specifications on the type plate.
- Only connect the unit to a fused mains connection via a FI circuit breaker (I_a=30 mA).
- Only connect the unit to a power socket with ground contact (PE – protective earth)!
- The power supply plug serves as safe disconnecting device from the power supply network and must be freely accessible at all times.
- Check the mains cable regularly for signs of damage.
- Do not start the unit if it has a damaged power cable.
- Keep the mains cable away from hot pump connections.
- Refer to the safety sticker. Parts of the unit can be hot or cold.
- Never use the unit without bath fluid.
- Do not reach into the thermal bath fluid.
- Check the filling level of the bath fluid at regular intervals. The pump and heater must always be completely covered with bath fluid.
- Adjust over-temperature safety device below the flash point of the bath fluid.
- Consider the restricted working temperature range if you are using plastic bath tanks.

- Monitor the heat expansion of the bath oils as the bath temperature rises.
- Prevent water getting into hot bath oils.
- Use suitable tubing.
- Secure the tubing connections to prevent them sliding off.
- Do not bend the bath fluid tubing.
- Check the hoses at regular intervals for signs of material fatigue (for example cracking).
- Do not drain the bath fluid when it is hot.
- Check the temperature of the bath fluid before draining it, for example by switching on the unit briefly.
- Switch off the unit and pull the plug before moving the unit or carrying out service or repair work.
- Have all service and repair work carried out by authorized specialists only.
- Switch off the unit and disconnect it from the power supply before cleaning it.
- Drain the unit completely before transporting it.

6 Operator's responsibility - safety instructions

Products manufactured by JULABO GmbH ensure safe operation when installed, operated and according to common safety regulations. This section explains the potential dangers which may occur when operating the unit and specifies the most important safety measures to prevent these dangers as far as possible.

6.1 Requirements for the operating personnel

The operator is responsible for the qualifications of the personnel operating the unit. Ensure that the personnel who operate the unit are trained in the relevant work application by a trained person.

The operative must receive regular training about the dangers involved with their work and about action to prevent such dangers.

Ensure that everybody involved with the operation, maintenance and installation have read and understood the safety information and the operating manual. The unit may only be configured, installed, maintained and repaired by trained personnel.

If hazardous substances or substances which may become hazardous are used, the unit may only be used by a person who is completely familiar with these substances and the unit. This person must be able to assess the possible dangers in full.

6.2 Operating and ambient conditions for using the unit

- Avoid impacts on the housing, vibrations, damage to the operative keypad (keys and display) and heavy soiling.
- Ensure that the product is checked at regular intervals suitable for its frequency of use to ensure that it is in perfect condition.
- Check the proper condition of the mandatory warning, prohibition, and safety labels at least every 2 years.
- Ensure that the mains supply has a low impedance to prevent influencing of other units powered in the same mains.
- The unit is designed for operation in a controlled electromagnetic environment. This means that in an environment of this nature, transmission equipment such as mobile phones should not be used in the immediate vicinity.
- Other units with components which are susceptible to magnetic fields may be influenced by magnetic radiation. We recommend to maintain a minimum distance of 1 m.
- Permissible ambient temperature: max. 40 °C, min. 5 °C.
- The relative humidity should not exceed 50 % (40 °C).
- Do not store in an aggressive atmosphere. Protect from dirt.
- Protect from direct sunlight.

6.3 Operating the unit

The bath may be filled with flammable materials. **Fire hazard!**

Chemical dangers may occur, depending on the bath medium.

Refer to all warnings on the substances used (bath fluids) and in the relevant instructions (safety data sheets).

The formation of explosive mixtures is possible if the ventilation is inadequate.

Only use the units in well ventilated areas. The unit is not suitable for use in potentially explosive environments.

Special substance specifications (bath fluids) must be observed for correct operation. Caustic or corrosive bath fluids must not be used.

When using hazardous substances or substances which may be hazardous, the operator must apply the enclosed safety symbols (1 + 2a or 2b) on the control side panel where they are clearly visible:



3

WARNING: This product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

Warning of a danger zone. Attention!
Observe documentation. (Operating manual, safety data sheet)

It is essential that you read the user information prior to operation.
Area of validity: EU

It is essential that you read the user information prior to operation.
Area of validity: USA, NAFTA

Warning label Proposition 65

As a result of the wide range of operating temperatures, special care and caution is essential.

There are thermal dangers: Burns, scalds, hot steam, hot parts and surfaces which may be touched.



Warning about hot surfaces.
(The label is applied by JULABO)

If external units are connected

Refer to the instructions in the manuals for the external units which you connect to the JULABO unit, particularly the safety instructions.

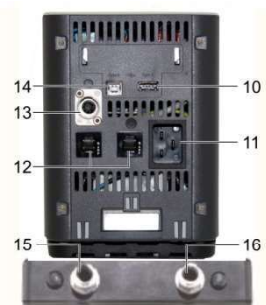
The connection assignment of the plugs and the technical data for the products must be observed at all times.

7 Control and function elements

Front



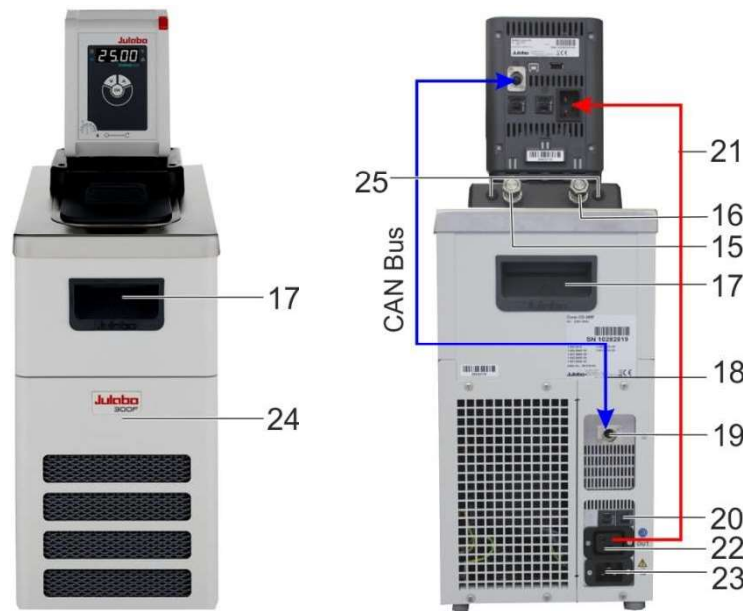
Rear



Position	Designation
1	Main switch
2	Four-digit temperature display LED, menu display
3	Control indicator - alarm
4	Edit keys Temperature setpoint increase or decrease Press the key briefly for step-by-step changes. Press and hold the key for fast change of setpoint.
5	OK key 1. Switch the device on/off. 2. Store value / parameter.
6	Pump switchover, Delivery  external.....internal
7	Adjustable excess temperature safety device
8	Control indicator - cooling
9	Control indicator - heating
10	USB host interface (type A)

11	Mains connection: Integrated connector for voltage supply (mains cable included as accessory)		
12	Fuses: Miniature circuit-breaker		
13	CAN plug for connecting to the refrigeration machine.		
14	USB device interface (type B) for data transfer to the PC, for example for control tasks using the EasyTEMP software.		
15	Pump connection: Return,	IN	M16x1, external
16	Pump connection: Supply,	OUT	M16x1, external

Refrigerated Circulators



17	Recessed handle (front, rear)		
18	CAN connection cable for refrigeration machine circulator		
19	CAN plug for connecting to the circulator.		
20	Fuses: Miniature circuit-breakers, for refrigeration machine Resettable fuses for 600F refrigeration units (115 V, 100 V)		

21	Connection cable: Voltage supply, refrigeration machine → circulator
22	Electrical connection: Integrated connector to supply power to the circulator
23	Electrical connection: Integrated connector to supply power to the refrigeration circulator
24	Drain cock and drain port (behind ventilation grille)
25	Caps (connectors for the cooling coil)

Accessories, included in the supply



1x Main cable for voltage supply for the refrigeration machine (23) and circulator (11)
(use one only for refrigeration circulator)



1x Connection cable: Refrigeration machine (22) → Circulator (11)

1x CAN connection cable (18, for refrigeration machine circulator)

7.1 Installation of the circulator



CAUTION

Danger of scalding due to leaks from the baths

The JULABO plastic baths are not solvent-resistant. JULABO plastic bath tanks are for water at a working temperature range from +20°C to +100°C.

Do not contaminate the bath fluid with solvents.

Things to keep in mind during the installation process:

WARNING

Risk of tipping due to improper transportation

Crushing, damage to the unit

- Use PPE (safety gloves, safety shoes, safety goggles).
- Carry the unit with 2 persons (see the Technical Data for the weight).
- Transport the unit carefully on firm, level ground. The interior of the unit can also be damaged by impacts or if it is dropped.
- Do not loiter under the unit during transportation and operation.
- The installation site should be a sufficiently large room to ensure that it does not become too hot due to the heat emission.
- The surface for the device should be flat and made of non-flammable material.
- A specific room size is prescribed for refrigerated circulators.
- At high temperatures, position the unit under an exhaust hood as much as possible due to potential vapors from the thermal bath fluid.
- Observe the safety sticker - do not remove!

8 Preparations for operating the device

8.1 Securing the immersion circulator



! WARNING

Danger of electric shock.

- Carefully secure the immersion circulator on the bath vessel. Poorly installed circulators can fall into the bath tank.
- Have the unit checked by a service technician prior to re-use.
- The heater must not be in contact with the wall or the bottom of the bath tank. Minimum distance 15 mm.
- Pull the plug to disconnect the unit from the power supply. Only then take the immersion circulator out of the bath tank.

A range of accessories is available for various applications:

- Bath clamp (for securing the circulator to baths)
- Bracket (for securing the circulator to JULABO refrigeration machines)
- Pump set (for connecting external applications)
- Cooling coil (for operating close to ambient temperature)
- Stand holder with rod (for securing to a laboratory stand)



Bath attachment clamp, order No. 9970420

- Pay special attention to the circulator's immersion depth (see Technical data) when selecting the bath.
- Place the bath on a flat surface on a pad made of non-flammable material.
- Secure the bath attachment clamp to the bath tank. The wall thickness may be up to 30 mm.
- Attach the circulator with a "click" to the bath attachment clamp.



Stand attachment, order No. 9970022

For use with glass tanks a stand attachment with rod is available as an optional accessory.

The circulator must be mounted vertically and secured against rotation. If necessary, secure the nuts of the rod also.



Bracket, order No. 9970177

Installation on the circulator

- Slide the bracket over the heater and pump on to the circulator
- Push the end of the tubing on the "OUT" side on to the outlet port on the pump.
- Secure against slipping using the clamp.
- Push the end of the tubing on the "IN" side into the holding device on the pump.
- Secure the bracket housing to the base of the circulator using the four screws.



Connect an external system

- Remove the union nuts and sealing plates from the pump connectors.
- The tubing connections can be used for hoses with M16x1 connections in this state.

Or:

- Secure barbed fittings to the union nuts.
- Connect tempering hoses and secure them with tube clamps to prevent them sliding off.
- Connect the tubing for the supply and return to the pump connectors and the external consumer and secure them with tube clamps.
- Switch the pump function to external circulation.

Pump set, order No. 9970140



Installation on the circulator

- Push the end of the tubing on the "OUT" side on to the port on the pump.
- Secure against slipping using the clamp.
- Push the end of the tubing on the "IN" side on to the holding device on the pump.
- Secure the pump housing to the base of the circulator using the two screws.



- Attach the circulator to the bath clamp.
The total immersion depth will be reduced due to the pump set.

Connect an external system (also applies to bracket)

- Remove the union nuts and sealing plates from the pump connectors.
- The hose connectors can be used for tubing with M16x1 connections in this state.

Or:

- Secure barbed fittings to the union nuts.
- Connect tubing and secure them with tube clamps to prevent them sliding off.
- Connect the tubing for the supply and return to the pump connectors and the external consumer and secure them with tube clamps.
- Switch the pump function to external circulation.

Cooling coil, order No. 9970100



A cooling coil is required for working at around ambient temperature (20 °C) A cooling water flow rate of 45 ml/min is generally sufficient to compensate for the intrinsic temperature.

The cooling water temperature should be at least 5 °C lower than the working temperature.



Install the cooling coil on the pump set

- Remove the caps from the pump set.
- Insert the ends of the cooling coil through the fastening boreholes and secure them with the washers and hex nuts.
- Install the connection ports to the cooling coil.
- Slide the cooling water hoses over the connection ports and prevent slipping.



Bracket with cooling coil, order No. 9970176

Install the cooling coil on the bracket

- Remove the caps from the bracket.
- Slide the ends of the cooling coil through the fastening boreholes.
- Secure them with the washers and hex nuts.
- Install the connection ports to the cooling coil.

- Slide the cooling water tubing over the connection ports and prevent slipping.

8.2 Open bath tanks



Open JULABO baths can be combined with JULABO circulators from the CORIO product series. When combined with these circulators they are designed for controlling the temperature of liquid media recommended by JULABO. The circulators are mounted on the baths using bath attachment clamps, for example.

Technical details for transparent bath tanks



UL approval with CORIO CD 115 V / 60 Hz)

Type		BT5	BT9	BT19	BT27
Order numbers		9901305	9901309	9901319	9901327
Temperature range	°C	+20 ... +100			
Approx. weight	kg	1.2	1.5	2.3	2.7
Dimensions (WxDxH*)	cm	23 x 38 x 38	32 x 38 x 38	38 x 58 x 38	38 x 58 x 43
Useful bath opening (WxLxD)	cm	15 x 15 x 15	23 x 15 x 15	30 x 35 x 15	30 x 35 x 20
Filling volume, Min...Max	l	3.5 ... 5.0	6.0 ... 9.0	14.0 ... 19.0	20.0 ... 27.0
Material		Parts in contact with the bath fluid: Polycarbonate			
* With CORIO circulators					



Technical details for stainless steel bath tanks



UL approval with CORIO CD 115 V / 60 Hz)

Type		B5	B13	B17	B19
Order numbers		9903405	9903413	9903417	9903419
Temperature range	°C	+20 ... +150			
Approx. weight	kg	2.6	5.2	6.1	6.9
Dimensions (WxDxH*)	cm	23x38x41	38x40x42	38x40x47	38x58x42
Useful bath opening (WxLxD)	cm	15x15x15	30x18x15	30x18x20	30x35x15
Filling volume, Min...Max	l	3.5 ... 5.0	9.0 ... 13.0	13.0 ... 17.0	14.0 ... 19.0
Material		Parts in contact with the bath fluid: Stainless steel			

Type		B27	B33	B39
Order numbers		9903427	9903433	9903439
Temperature range	°C	+20 ... +150		
Approx. weight	kg	8.0	17.6	14.6
Dimensions (WxDxH*)	cm	38x58x47	91x36x43	54x34x57
Useful bath opening (WxLxD)	cm	30x35x20	66x32x15	33x30x30
Filling volume, Min...Max	l	17.0 ... 27.0	26.0 ... 39.0	35.0 ... 41.0
Material		Parts in contact with the bath fluid: Stainless steel		

* With CORIO circulators

B

ath covers

Order No.	Designation	For Baths
9970296	Flat stainless steel bath cover	B5
9970290	Flat stainless steel bath cover	B13, B17
9970291	Flat stainless steel bath cover	B19, B27
9970292	Flat stainless steel bath cover	B33
9970293	Flat stainless steel bath cover	B39
9970254	Lift-up stainless steel gable cover	B19, B27, BT19, BT27
9970257	Lift-up stainless steel gable cover	B33

9 Closed stainless steel bath tanks

Intended use

JULABO BC4, BC6, BC12 and BC26 closed stainless steel baths can be combined with JULABO circulators from the CORIO product series. When combined with these circulators they are designed for controlling the temperature of JULABO recommend liquid media.



Technical details for the sealed baths

The circulators feature the bracket which is secured to the baths.



UL approval with CORIO CD 115 V / 60 Hz)

Type		BC4	BC6	BC12	BC26
Order No.		9905504	9905506	9905512	9905526
Temperature range	°C	+20...+300			
Approx. weight	kg	5.2	6.4	8.2	15.0
Dimensions (WxDxH*)	cm	23x41x42	24x44x47	33x49x47	39x62x48
Useful bath opening (WxLxD), inner	cm	13x15x15	13x15x20	22x15x20	26x35x20
Filling volume Min. ... Max.	l	3.0...4.5	4.5...6.0	8.5 ... 12.0	19.0 ...26.0
Materials for parts in contact with the medium		Bath and drain cock: 1.4301 / 304H Bath/Bath cover seal: FKM Viton® O-ring on drain cock: FKM Viton®			

* / With circulator

9.1 Basic refrigeration baths



Intended use

The basic refrigeration baths can be combined with JULABO circulators of the CORIO product series. In combination with these circulators, they are intended for the temperature control of liquid media (bath fluids).

Technical details for basic refrigeration baths

The bracket is required for installation on the circulator.

Type		200F	201F	300F	600F
Order No.		9461701	9461702	9461703	9461704
Temperature range	°C	-20...150	-20...150	-25...150	-35...150
Weight	kg	26,0	25,0	28,0	36,0
Dimensions (WxDxH*)	cm	23x39x65	44x41x44	24x42x66	33x47x69
Useful bath opening (WxLxD), inner	cm	13x15x15	13x15x15	13x15x15	22x15x15
Filling volume Min. ... Max.	l	3,0...4,0	3,0...4,0	3,0 ... 4,0	5,0 ... 7,5
Materials for parts in contact with the medium		Bath and drain valve: 1.4301 / 304H Bath/Bath cover seal: FKM Viton® O-ring on drain valve: FKM Viton®			
Type		601F	900F	1000F	
Order No.		9461705	9461706	9461707	
Temperature range	°C	-40...150	-40...150	-40...150	
Weight	kg	36,0	52,0	49,0	
Dimensions (WxDxH*)	cm	36x46x74	39x62x75	42x49x70	
Useful bath opening (WxLxD), inner	cm	22x15x20	26x35x20	18x13x15	
Filling volume Min. ... Max.	l	8,0...10,0	21,0...30,0	5...7,5	
Materials for parts in contact with the medium		Bath and drain valve: 1.4301 / 304H Bath/Bath cover seal: FKM Viton® O-ring on drain valve: FKM Viton®			

* / with circulator

9.2 Bath fluids



WARNING

Danger of burns and property damage if unsuitable bath fluid is used.

- Only use thermal oils which are recommended by JULABO. The viscosity of the oil is tailored to the pump capacity.
- Refer to the safety data sheet of the bath fluid, particularly its flash point.
- Set the excess temperature protector correctly.
- Always store bath fluid so that it cannot harm the environment.

There is a selection of recommended bath fluids on the JULABO homepage at www.julabo.com. Do not exceed the maximum viscosity of 50 mm²/s when you select your product.

Water as the bath fluid

NOTICE

If you use water as the bath fluid

Recommended water mixture:

70 % soft/decalcified water and 30 % tap water for a temperature range from 5 °C to 80 °C.

The parts of the bath which come into contact with the bath fluid may be damaged and cause the failure of the device.

The water quality depends on the local conditions.

- Hard water is not suitable for temperature control tasks due to its high lime content and will produce lime deposits in the bath.
- Ferrous water can cause corrosion, even on stainless steel.
- Chloric water can cause pitting corrosion.
- Distilled and deionized water is not suitable. Their specific properties cause corrosion in the bath, even on stainless steel.
- ① Check the quality of the water you use at regular intervals.
- ① Evaporation and constant refilling may produce a concentration of harmful substances in the bath. You should therefore check the quality of the water in the bath at regular intervals.
- ① Replace the water in the bath in full at regular intervals.

**⚠ CAUTION****Unsuitable bath fluids.**

JULABO cannot accept any liability for damage caused by the selection of an unsuitable **bath fluid**.

Unsuitable products include **bath fluids** which

- are highly viscous (much higher than recommended at the relevant working temperature).
- tend to crack.
- have a toxic, caustic or corrosive effect.

**⚠ CAUTION****Properties of indirectly temperature-controlled fluids and substances**

The intended use of the units includes the indirect temperature control of fluids.

We do not know which substances these are.

Many substances are:

- inflammable, flammable or explosive
- harmful
- polluting

In other words: dangerous

The user bears sole responsibility for handling these substances!

Use personal protective equipment!



The following questions should help to identify possible dangers and minimize risk.

- Are hazardous vapors or gases produced when heated?
Does operation of the bath has to be conducted in a fume hood?
- What should you do if a dangerous substance has been spilled on or in the device?
Obtain information on the substance before starting work and define a decontamination method.
- Are all hoses and electrical cables securely connected and routed?
Keywords: Sharp edges, hot surfaces during operation, moving machine parts, etc.

9.3 Temperature control for external connected systems



CAUTION

Danger from the incorrect use of external connected systems.

Unsuitable materials may cause the failure of the system.

Check the externally connected systems for the following:

- Compression strength.
- Corrosion resistance.
- Check the materials used for parts in contact with the medium.

The circulator is designed for the temperature control of external connected systems (temperature control system).

Connect an external system

Remove the union nuts and sealing plates from the pump connectors.

The tube connectors can be used for tubing with M16x1 (internal) connections in this state.

Tighten the connections with a maximum torque of 3 Nm, holding the nuts (a.f. 17 mm) as you do so.



Second method

Secure barbed fittings to the union nuts. Tighten the connections with a maximum torque of 3 Nm, holding the nuts (a.f. 17 mm) as you do so.

Connect tubing and secure them with tube clamps to prevent them sliding off.

Connect the tubing for the supply and return to the pump connectors and the external consumer and secure them with tube clamps.

Switch the pump function to external circulation.

9.4 Tubing



CAUTION

Danger of injury from defective tubing.

The bath fluid tubing is a potential source of danger at high working temperatures. Large volumes of hot bath fluids can be pumped out of a damaged tubing in a short period of time.

Possible consequences:

- Skin burns
- Breathing problems due to the hot atmosphere

Danger from unsealed pump connections.

- If the pump connections are not sealed, bath fluid may be pumped out without any control.
- Set the lever on the pump to internal circulation.
- Unused pump connections must always be sealed with sealing screws.

Danger from the incorrect use of tubing.

- The tubing must be suitable for the pressure and temperature range which results from operation and for the bath fluid (for example silicon oil must not be used with silicon tubings).
- Secure the tubing connections to prevent them sliding off. Use tube clamps.
- Do not kink the tubing. This will reduce throughput and may cause the maximum pressure in the system to be exceeded (glass reactor). The tube length should therefore be kept at a reasonable level.
- Prepare a maintenance plan.
Check tubing at regular intervals, at least once per year, for signs of material fatigue (for example cracking)
The tubing must be replaced at regular intervals if they are in constant use.

We recommend that you select suitable tubing on the JULABO homepage.

10 Commissioning



⚠ WARNING

Danger from mains voltage.

Risk of injury from electric power.

- Compare the mains voltage and frequency with the details on the model plate.
- Connect the device only to a safe power supply via FI-circuit breaker (IA = 30 mA).
- The device may only be connected to power outlets with a ground contact (PE – protective earth).
- The mains plug serves as a safe disconnecting device from the power supply network and must be freely accessible at all times.
- Do not start the device if it has a damaged mains cable.
- Check the mains cable regularly for signs of damage.
- We disclaim all liability for damage caused by incorrect line voltages!

Commissioning the circulator with a refrigeration machine

Connect the circulator and refrigeration machine using the mains lead. Connect them to the voltage supply using the fitted plug on the refrigeration machine and the mains lead. Connect the CAN jacks on both devices with the CAN connection cable to transfer data.



⚠ CAUTION

Cold or hot device surfaces

Frostbit or burns

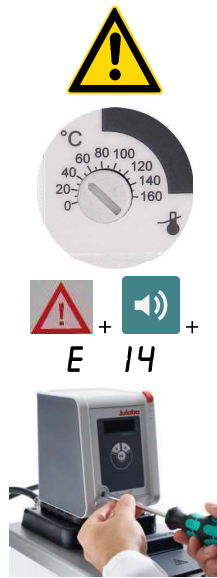
What should be observed when operating the JULABO temperature control unit?

- Unit parts may develop high surface temperatures. A hot surface means it has a temperature of 60 °C / 140 °F or more.
- Let the device cool down to an uncritical safe temperature.
- Use safety gloves.

10.1 Excess temperature and low level safety devices

The safety devices are not affected by the control circuit. When they trip all actors are permanently shut down.

The alarm is displayed optically and acoustics with a continuous signal tone and the reason for the alarm is shown on the display as a number.



! WARNING

Danger from damaged safety devices

Possible serious consequences for personnel and working areas.

Check the safety devices at least twice per year.

Excess temperature protector, IEC 61010-2-010

Turn the adjustable excess temperature protector to the cut-out point (actual temperature) using a screwdriver. The actors will be shut down on all poles, the circulator will show error message E 14, the "Alarm" control display will be lit and a continuous signal tone will sound.

Low level safety device, IEC 61010-2-010

The float switch in this device must be moved manually in the bath to test the function, for example using a screwdriver. Push down the float until it reaches the mechanical stop.

The actors will be shut down on all poles, the circulator will show error message E 01, the "Alarm" control display will be lit and a continuous signal tone will sound.

10.2 Filling



CAUTION

Basic dangers.

The volume of oil used as bath fluid changes with the temperature. Starting from the volume when the bath is filled (room temperature) it may increase or decrease during operation.

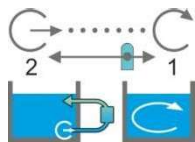
The bath temperature rises - hot bath fluid can overflow.
The bath temperature falls - the low level alarm will stop the tempering process.

Monitor the level until it reaches working temperature.

Filling process

- Ensure that the drain valve is closed. Turn the knurled screw.
- Carefully insert bath fluid - never allow bath fluid to get inside the circulator.
- Do not exceed the maximum bath capacity (see Technical Data).
- 1 - The bath temperature rises - hot bath fluid can overflow.
- 2 - The bath temperature falls - the low level alarm will stop the tempering process.
- Monitor the level until it reaches working temperature.

10.3 Pump settings



To meet all the requirements for internal and/or external temperature control tasks, the direction of the pump flow is continuously adjustable.

For this purpose the lever below the head of the circulator can be adjusted from:

- 1.)  Max. internal pump flow to...
- 2.)  Max. external pump flow.

CAUTION

Risk of burns due to hot bath fluid

When adjusting the pump flow, make sure that no bath fluid is spilled from the bath opening due to circulation. For internal temperature control (external pump connections closed), the adjusting lever is to be set first to reduced internal circulation (2) before the circulator is started. After starting the circulator, circulation can be optimized through adjustment.

10.4 Switching on / Start - Stop



When pressing the keys, it is advisable to hold the circulator head with one hand.

Switching on

- The device is switched on by pressing the power switch (1).
- ① The unit performs a self-test. All the segments of the four digit LED temperature display will illuminate. The "OFF" signal then indicates that the unit is ready to operate.

Start

- Press **OK** for approx. 1 second. The current bath temperature will be shown on LED temperature display.

Stop

- Press **OK** for approx. 1 second.
- Switch off the unit with the circulator's mains power switch.
- ① In combination with the cold bath base units 600F, 601F, 900F, 1000F, the flashing control indicator "Cooling" after temperature regulation is complete indicates that a valve is still open. Only turn off the main power switch after this indicator has stopped flashing.

10.5 Setting the desired temperature value

Factory setting: 10 °C

The temperature can be set when the device has been started or stopped.

- ① The set value is saved so that it will be retained even after a power outage.
- 1. Press the edit key  or  briefly to switch from displaying the actual value to the desired value. The digits before the decimal point flash.
- 2. Change the value:
Press the  key to set a higher value.
Press the  key to set a lower value.
Press the key briefly for single steps, press and hold the key to adjust the values quickly.
- 3. Save the set value as the desired value by pressing the **OK** key. The digits after the decimal point flash.
- 4. Change the value:
Press the  key to set a higher value.
Press the  key to set a lower value.

Example:
Changing the desired value
from 33.00 to 45.50



Press the key briefly for single steps, press and hold the key to adjust the values quickly.

5. Save the set value as the desired value by pressing **OK**. The new desired value will flash three times.

10.6 Setting the timer

Timer displays



Timer set to 15 minutes.



The timer keeps the set value for a defined period of time. The device then stops (**OFF**). The timer settings can be set when the device has been started or stopped.

- ① The set value is saved so that it will be retained even after a power outage.

Setting the timer

1. **✓** and simultaneously press **OK** "t" and **0.** appear on the display.
2. Changing the timer value (in minutes):
Press the **▲** key to set a higher value.
Press the **▼** key to set a lower value.
Press the key briefly for single steps, press and hold the key to adjust the values quickly.
3. Save the set value as the desired value by pressing **OK**.

The new timer value will flash three times.

28 seconds until the timer ends



The decimal point flashes until the desired value (± 0.1 K) is reached. After the desired value is reached, the timer starts and the display alternates between the actual temperature (for 3 sec.) and the remaining time (for 2 seconds). The remaining time < 1 min is displayed in seconds. Until the desired value is reached, it can still be changed. The timer remains active and will start when the new desired value is reached. If the desired value is changed while the timer is running, the timer will be deactivated. After the set time elapses, a beep sounds twice and the device goes into the **OFF** state.

Stopping the timer

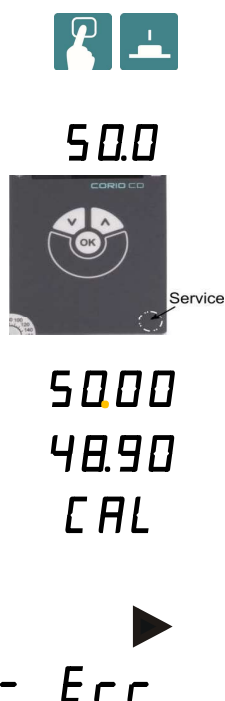
- Press the **OK** key for about 1 sec. - **OFF**.

10.7 ATC - Absolute Temperature Calibration (1-point calibration)

1-point calibration:

The temperature sensor can be calibrated at any value in the working temperature range.

Place a calibrated thermometer (resolution: 0.01°C) in the center of the bath to measure the actual bath temperature.



1st Switch on the circulator at its mains switch

2nd Set the required calibration value as described in "Adjusting temperature setpoint" (example: 50.00 °C).

3rd Start the unit:

Press the **OK** key.

4th The bath will be heated to 50.00°C.

When the setpoint is reached, allow the bath temperature to settle for approx. 3 minutes.

5th Start the calibration:

Press the "Service" and the **OK** key together until the comma in the display starts to flash.

6th Read the bath temperature value on the calibrated thermometer and round it up or down and set it. (Example: 48.87 °C to 48.90 °C)

7. Press the **OK** key to confirm.

7th The circulator will confirm the process by displaying "CAL".

NOTICE

If the value is outside a window of $\pm 5^\circ\text{C}$, its entry will be ignored!
Error message: **Err** = Error

10.8 Switch Autostart on and off



The AUTOSTART function allows the device to be started as soon as the main switch is pressure, which in turn allows you to use a timer.

! WARNING

Uncontrolled device start

If circulators are started using "AUTOSTART", ensure that even if it is started accidentally, for example after a power outage, it does not pose a danger to personnel or equipment.

- Ensure that the circulator's safety equipment is set correctly.



1. Press and hold the **OK** key and
2. switch on the circulator using the main switch.

The switchover process is shown briefly on the temperature display LED.

AOn

Autostart on

AOff

Autostart off

11 Error messages / Possible causes of faults

 + 	The following faults which trigger alarms result in the units's heater and circulating pump being shut down permanently. The alarm indicator  lights up and a continuous signal tone will sound. The reason for the alarm or warning will be shown on the LED temperature display in coded form. Warnings are displayed alternately with the actual value on the display.
	The signal tone can be muted by pressing the OK key.
E 01	The device is being operated with no or too little bath fluid or the level is below the minimum level. Top up the bath fluid. A hose has burst (bath fluid level too low because it has been pumped out). Replace the hose and top up the bath fluid.
E 05	The cable for the working temperature sensor has been interrupted or short-circuited.
E 06	Defect of the working or excess temperature sensor. The working and excess temperature sensors report a temperature difference of more than 20 K.
E 14	The cut-out value of the excessive temperature protector is below the defined working temperature . Set the safety temperature to a higher value.
E 33	The cable for the overtemperature safety sensor has been broken or short-circuited.
E 60	Internal error. Contact JULABO Service Department.
E 61	Connection error between Corio CD and refrigeration unit The data communication between the Corio CD and the refrigeration unit is permanently monitored. If communication cannot be established (e.g. by a defective connection cable), the error message „E 61 “ is generated. By pressing the „OK“ key, the alarm is acknowledged. The Corio CD continues operating purely as heating circulator until the next interruption of the power supply (power-off). When the fault has been repaired, the Corio CD controls the refrigeration unit according to the settings in the menu (Off, Auto, On) after the next power-on.
E 63	Internal error. Contact JULABO Service Department.

E 70	Internal error. Contact JULABO Service Department.
E 72	Internal error. Contact JULABO Service Department.
E 80	Warning: Internal error. Contact JULABO Service Department.
E 82	Warning: Update error (incorrect hex file). Contact JULABO Service Department.
E 83	Warning: Excessive power consumption via USB interface (<300 mA).
E 108 E 116	The self-locking alarm is still active. Switch off the device at the main switch. Wait for approx. 4 seconds and then switch it on again. The cut-out value of the excessive temperature protector is below the defined working temperature . Set the safety temperature to a higher value.
E 118	The internal AD converter is defective.

	Alarms and warnings for refrigeration machines 200F, 201F, 300F
E 431	Maximum compressor current exceeded.
E 1431	Warning: No compressor current detected.

	Alarms and warnings for refrigeration machine 600F
E 401	Temperature sensor evaporator outlet defective (short circuit).
E 402	Temperature sensor evaporator outlet defective (break).
E 413	Evaporation pressure sensor defective (short circuit).
E 414	Evaporation pressure sensor defective (break).
E 417	Condensation pressure sensor defective (short circuit).

E 4 18	Condensation pressure sensor defective (break).
E 425	Error in refrigeration system.
E 426	Error in refrigeration system.
E 427	Error in refrigeration system.
E 1427	Warning: Error in refrigeration system
E 431	Maximum compressor current exceeded.
E 432	Error in refrigeration system.
E 433	Error in refrigeration system.
E 1431	Warning: No compressor current detected.



To cancel the alarm state

1. Switch off the device at the main switch.
2. Eliminate the cause of the alarm.
3. Eliminate the cause of the alarm or wait for approx. 4 seconds, depending on error type.
4. Switch on the device again at the mains power switch.
5. If the error occurs again, a remote diagnostic is to be made.

Faults which are not displayed:

Circulating pump motor overload protection.

The circulating pump motor is protected from overloads. After a cooling phase the motor will restart automatically.

If necessary the unit should be inspected by a JULABO service technician.

JULABO Technical Service

12 Operation of the CORIO CD via the USB interface

- PC and CORIO CD are switched on.
- Connect the CORIO CD and PC with the USB cable.

The CORIO CD reports to the PC after the installation of the driver with the identifier "STMicroelectronics virtual COM port" COM port in Device Manager

For comfortable operation, you can use the JULABO software EasyTemp.

There are also interface commands to the direct query available:

Input	Function
STATUS	current operating status
VERSION	device name + voltage variant + software version
IN_SP_00	Setpoint query
IN_PV_00	current value query
IN_PV_01	Variable query
IN_PV_03	Safety sensor query
IN_PV_04	Safety potentiometer query
IN_MODE_05	Start/Stopp query
OUT_SP_00	Setpoint input
OUT_SP_01	Send setpoint
OUT_MODE_05	Start/Stop device 1/0

Remote operation

The device can be controlled remotely via the USB interface. To do this, connect the unit to a PC via the interface.

When remote operation is active (press and hold down  and  simultaneously for approximately 3 seconds) the display alternates between the current bath temperature or "OFF" and the message "-r-". Switching remote operation on and off is confirmed with a short "r OFF".

Data logging

Certain characteristic parameters can be read. To do this:

1. Attach the USB flash drive.
2. Start data logging with the  and **OK** key combination. Hold the keys down until the activation is indicated by **L 06 I**. Data logging is also indicated by a flashing dot after the last decimal place (**28.33.**). Every record is automatically provided with a log file name and stored in a separate txt file.
3. The same key combination can be used to stop data logging. Deactivation is indicated by **L 06 0**.

Cold Mode:

You can set the refrigeration unit operating mode. Here you can switch between automatic operation, refrigeration unit always on, and refrigeration always off.

To do this, press the  button while switching on the power switch. The mode changes one position each time the power switch is switched on and the  button pressed. The display shows:

- „**L 0 n**“ → Refrigeration unit always on,

where the required cooling capacity to maintain the bath temperature is available.

- „**AUT 0**“ → Automatic operation (factory setting)

where cooling capacity is available if needed

- „**L 0 F F**“ → refrigeration unit always off,

where no cooling capacity is required.

Reading black box data:

The black box is integrated into the controller and stores all relevant data from the last 20 minutes. In addition, persisting alarms and warnings are logged to an alarm memory. This data can be read.

Installation is easy and is carried out step by step. Please follow the instructions.

To do this, insert the USB flash drive into the thermostat interface and press the "SERVICE button" + **OK**. The display then shows

" - **BB** - ".

13 Emptying the bath tank



⚠ WARNING

Danger of scalds from hot bath fluid or hot drain tap.

Please note the following when draining the bath fluid:

- Hot bath fluid:
Do not drain the bath fluid when it is hot.
- Environmental Hazard:
Refer to all regulations for disposing of bath fluids.



Emptying

- Switch off the unit and pull the plug or disconnect the connection to the power supply on all poles.
For baths without a drain tap, remove the circulator from the bath tank.
- Small bath tanks do not have a drain tap and can be carried for draining. The temperature of the bath fluid should not exceed 50 °C.

Enclosed baths and refrigeration machines

- Connect a suitable hose to the drain port (Ø 12 mm external).
- Route the hose to a vessel or drain.
- Open the drain valve with the knurled screw.

- ❗ To reduce the weight, the bath can be partly emptied using a hose pump (transfer pump).
- ❗ Do not empty the bath in temperatures of $\leq 0^{\circ}\text{C}$ since the drain tap may freeze.

14 Technical data

14.1 Technical data for circulator

Circulator		CORIO™ CD			
Working temperature range	°C	20 ... 150			
Temperature stability	°C	±0.03			
Temperature setting		Digital			
Temperature display		LED			
Resolution	°C	0.01			
ATC - Absolute Temperature Calibration		1-point			
Temperature control		PID1			
Heating capacity (at 230 V)	kW	2.0			
Heating capacity (at 115 V)	kW	1.0			
Heating capacity (at 100 V)	kW	0.8			
Circulating pump:		100 V / 50-60 Hz	115 V / 60 Hz	230 V / 50 Hz	230 V / 60 Hz
Delivery rate at 0 bar	L/min	15-16	16	15	17
Pressure at 0 liters	bar	0.27-0.35	0.33	0.35	0.43
Max. viscosity	cSt	50			
Dimensions (WxDxH) without bracket	cm	13.2 x 16.0 x 18.4			
Useful immersion depth	cm	16.6			
Weight	kg	2.6			
Ambient temperature range	°C	5 ... 40			
Mains power connection	V / Hz	230 ±10 % / 50			
Power consumption (230 V)	A	10			
For CH and GB model (at 230 V)	A	10			
Mains power connection	V / Hz	230 ±10 % / 60			
Power consumption (at 230 V)	A	10			
Mains power connection	V / Hz	115 ±10 % / 60			
		 UL approval			
Power consumption (at 115 V)	A	10			
Mains power connection	V / Hz	100 ±10 % / 50-60			
Power consumption (at 100 V)	A	9			
Classification to DIN 12876-1		III (FL)			

14.2 Technical data for refrigeration circulation circulator

CORIO refrigeration circulator		CORIO CD-200F			CORIO CD-201F		
Working temperature range	°C	-20 ... 150			-20 ... 150		
Temperature stability	°C	±0.03					
Temperature display		LED					
Setting/Display resolution	°C	0.01					
ATC – Absolute Temperature		1-point					
Temperature control		PID1					
Refrigeration capacity	°C	+20	0	-20	+20	0	-20
(Medium ethanol)	kW	0.22	0.17	0.06	0.20	0.16	0.06
Refrigerant		R134a					
Overall dimensions (HxDxH)	cm	23 x 39 x 65			44 x 41 x 44		
Useful bath opening (WxD)	cm	13 x 15			13 x 15		
Bath depth	cm	15			15		
Filling volume, from...to	Liters	3.0 ... 4.0			3.0 ... 4.0		
Weight, with circulator	kg	26.0			25.0		
Ambient temperature range	°C	5 ... 40					
Mains connection	V / Hz	230 ±10% / 50 / 60					
Power consumption (at 230 V)	A	Nom. 2 / Tot. 16					
For CH model (at 230 V)	A	Nom. 2 / Tot. 10					
For GB model (at 230 V)	A	Nom. 2 / Tot. 13					
Mains connection	V / Hz	230 ±10% / 60					
Power consumption (at 230 V)	A	Nom. 2 / Tot. 16					
Mains connection	V / Hz	115 ±10% / 60					
		 UL approval					
Power consumption (at 115 V)	A	Nom. 4 / Tot. 12			Nom. 3 / Tot. 12		
Mains connection	V / Hz	100 -10 %; +5 % / 50 100 ± 10 % / 60					
Power consumption (at 100 V)	A	Nom. 4 / Tot. 15					

Refrigeration circulator		CORIO CD-300F		
Working temperature range	°C	-25 ... 150		
Temperature stability	°C	±0.03		
Temperature display		LED		
Resolution	°C	0,01		
ATC – Absolute Temperature Calibration		1-point		
Temperature control		PID1		
Refrigeration capacity	°C	20	0	-20
(Medium ethanol)	kW	0.31	0.28	0.11
Refrigerant		R134A		
Dimensions (WxDxH)	cm	24 x 42 x 66		
Useful bath opening (WxD)	cm	13 x 15		
Bath depth	cm	15		
Filling volume, from...to	Liter	3,0 ... 4,0		
Weight, with circulator	kg	28,0		
Ambient temperature range	°C	5 ... 40		
Mains connection	V/Hz	230 ±10 % / 50		
Power consumption (at 230 V)	A	Nom. 2 / Tot. 16		
For CH model (at 230 V)	A	Nom. 2 / Tot. 10		
For GB model (at 230 V)	A	Nom. 2 / Tot. 13		
Mains connection	V/Hz	208-230 ±10 % / 60		
Power consumpt. (208- 230 V)	A	Nom. 2 / Tot. 16		
Mains connection	V/Hz	115 ±10 % / 60 UL approval		
Power consumption (at 115 V)	A	Nom. 4 / Tot. 12		
Mains connection	V/Hz	100 ±10 % /50-60		
Power consumption (at 100 V)	A	Nom. 5 / Tot. 15		

Refrigeration circulator		CORIO CD-600F				
Working temperature range	°C	-35 ... 150				
Temperature stability	°C	±0.03				
Temperature display		LED				
Resolution	°C	0,01				
ATC – Absolute Temperature Calibration		1-point				
Temperature control		PID1				
Refrigeration capacity (Medium ethanol)	°C	20	0	-10	-20	-30
R404A*	kW	0.60	0.53	0.35	0.22	0.10
R449A	kW	0.60	0.46	0.29	0.18	0.06
Refrigerant		R452A*, R449A				
Dimensions (WxDxH)	cm	33 x 47 x 69				
Useful bath opening (WxD)	cm	22 x 15				
Bath depth	cm	15				
Filling volume, from...to	Liter	5,0 ... 7,5				
Weight, with circulator	kg	36,0				
Ambient temperature range	°C	5 ... 40				
Mains connection	V/Hz	230 ±10 % / 50				
Power consumption (at 230 V)	A	Nom. 4 / Tot. 16				
For CH model (at 230 V)	A	Nom. 4 / Tot. 10				
For GB model (at 230 V)	A	Nom. 4 / Tot. 13				
Mains connection	V/Hz	230 ±10 % / 60				
Power consumpt. (208- 230 V)	A	Nom. 4 / Tot. 16				
Mains connection	V/Hz	115 ±10 % / 60 UL approval				
Power consumption (at 115 V)	A	Nom. 7 / Tot. 12				
Mains connection	V/Hz	100 -10 %; +5 %/50 100 ±10 % / 60				
Power consumption (at 100 V)	A	Nom. 11 / Tot. 15				

* at 100 V / 50/60 Hz

Refrigeration circulator		CORIO CD-601F				
Working temperature range	°C	-40 ... 150				
Temperature stability	°C	±0.03				
Temperature display		LED				
Resolution	°C	0,01				
ATC – Absolute Temperature Calibration		1-point				
Temperature control		PID1				
Refrigeration capacity (Medium ethanol)	°C	20	0	-10	-20	-30
R452A*	kW	0.60	0.50	0.35	0.20	0.07
R449A	kW	0.60	0.46	0.29	0.18	0.06
Refrigerant		R452A*, R449A				
Dimensions (WxDxH)	cm	36x46x74				
Useful bath opening (WxD)	cm	22,0x15,0				
Bath depth	cm	20,0				
Filling volume, from...to	Liter	8,0 ... 10,0				
Weight, with circulator	kg	36,0				
Ambient temperature range	°C	5 ... 40				
Mains connection	V/Hz	230 ±10 %/50/60				
Power consumption (at 230 V)	A	Nom. 3-4 / Tot. 16				
For CH model (at 230 V)	A	Nom. 4 / Tot. 10				
For GB model (at 230 V)	A	Nom. 3-4 / Tot. 13				
Mains connection	V/Hz	230 ±10 %/60				
Power consumpt. (at 230 V)	A	Nom. 4 / Tot. 16				
Mains connection	V/Hz	115 ±10 % / 60				
Power consumption (at 115 V)	A	Nom. 7 / Tot. 12				
Mains connection	V/Hz	100 -10 %; +5 % / 50/60				
Power consumption (at 100 V)	A	Nom. 11 / Tot. 15				

* at 100 V / 50/60 Hz

Refrigeration circulator		CORIO CD-900F					
Working temperature range	°C	-40 ... 150					
Temperature stability	°C	±0.03					
Temperature display		LED					
Resolution	°C	0,01					
ATC – Absolute Temperature Calibration		1-point					
Temperature control		PID1					
Refrigeration capacity (Medium	°C	20	0	-10	-20	-30	-40
	kW	0.90	0.80	0.55	0.35	0.15	0.02
Refrigerant		R449A					
Dimensions (WxDxH)	cm	39 x 62 x 75					
Useful bath opening (WxD)	cm	26,0 x 35,0					
Bath depth	cm	20,0					
Filling volume, from ... to	Liter	21,0 ... 30,0					
Weight, with circulator	kg	52,0					
Ambient temperature range	°C	5 ... 40					
Mains connection	V/Hz	230 ±10 %/50					
Power consumption (at 230 V)	A	Nom. 5 / Tot. 16					
For CH model (at 230 V)	A	Nom. 5 / Tot. 10					
For GB model (at 230 V)	A	Nom. 5 / Tot. 13					
Mains connection	V/Hz	200 -5 %; +10 % /50/60					
Power consumpt. (at 200 V)	A	Nom. 5 / Tot. 16					
Mains connection	V/Hz	230 ±10 %/60					
Power consumption (at 230 V)	A	Nom. 5 / Tot. 16					
Mains connection	V/Hz	115 ±10 % /60					
Power consumption (at 115 V)	A	Nom. 10 / Tot. 16					

Refrigeration circulator		CD-1000F						
Working temperature range	°C	-40 ... 150						
Temperature stability	°C	±0.03						
Temperature display		LED						
Resolution	°C	0.01						
ATC – Absolute Temperat. Calibration		1-point						
Temperature control		PID1						
Heating capacity	kW	2.0						
Refrigeration capacity	°C	20	10	0	-10	-20	-30	-40
(Medium ethanol)	kW	1.00	1.00	0.98	0.75	0.53	0.27	0.13
Refrigerant		R449A						
Dimensions (WxDxH)	cm	42 x 49 x 70						
Useful bath opening (WxD)	cm	18 x 13						
Bath depth	cm	15						
Filling volume, from ... to	Liter	5 ... 7.5						
Weight, with circulator	kg	51.5						
Ambient temperature range	°C	5 ... 40						
Mains connection	V/Hz	230 ±10 % / 50						
Power consumption (at 230 V)	A	Nom. 6 / Tot. 16						
For CH model (at 230 V)	A	Nom. 6 / Tot. 10						
For GB model (at 230 V)	A	Nom. 6 / Tot. 13						
Mains connection	V/Hz	230 ±10 % / 60						
Power consumption (at 230 V)	A	Nom. 6 / Tot. 16						
Mains connection	V/Hz	200 -5%; +10 % / 50 / 60						
Power consumption (at 200 V)	A	Nom. 6 / Tot. 16						
Mains connection	V/Hz	115 ±10 % / 60						
Power consumption (at 115 V)	A	Nom. 9 / Tot. 16						

All measurements have been carried out at rated voltage and frequency. Ambient temperature 20 °C.
Technical changes without prior notification reserved.

Safety precautions to IEC 61010-2-010:

Excess temperature protection, adjustable 0°C ... 170°C

Low level protection Float switch

Classification to DIN 12876-1 Class III

Alarm Optical and audible (permanent)

Ambient conditions to IEC 61010-1:

- For indoor use only.
- Altitude up to 200 m - normal zero.
- Ambient temperature: +5 ... +40 °C

EMC requirements

The device is an ISM device of group 1 per CISPR 11 (uses HF for internal purposes) and is classified in class A (industrial and commercial sector).

NOTICE

- Devices of class A are intended for the use in an industrial electromagnetic environment.
- When operating in other electromagnetic environments, their electromagnetic compatibility may be impacted.
- This device is not intended for the use in living areas and cannot guarantee adequate protection of the radio reception in such environments.

Humidity

- Maximum relative humidity 80%, for temperatures up to 31°C,
- Linear decrease to 50% relative humidity at a temperature of 40°C
- Max. voltage fluctuation of $\pm 10\%$ are permissible.

Protection class to EN 60 529: IP 21

The device complies with Safety class I

Overvoltage category II

Pollution degree 2

14.3 Refrigerant

In the event of an error in the refrigeration system (leak) a certain room size is specified in standard EN 378 for each kg of refrigerant.

The refrigerant used and the quantity are stated on the type plate.

Refrigerant used in relation to JULABO	Limit value for 1 m ³ volume [kg]
R23	0.68
R134a	0.25
R404A	0.52
R449A	0,357
R507	0.53
R508B	0.2
R452A	0.423
Propane (R290)	0.008
Ethylene (R1150)	0.007

Information about the used refrigerants

The **Regulation (EU) No. 517/2014 on fluorinated greenhouse gases** applies to all systems which contain fluorinated refrigerants and replaces (EC) 842/2006.

The aim of the Regulation is to protect the environment by reducing emissions of fluorinated greenhouse gases.

Among other things it regulates the emission limits, use and recovery of these substances. It also contains requirements for operators of systems which require / contain these substances to function.

Under Regulation 517/2014, the operator of a system of this nature has the following duties:

- The operator must ensure that the equipment is checked at regular intervals for leaks.
- These intervals depend on the CO₂ equivalent of the system. This is calculated from the refrigerant fill volume and type of refrigerant. The CO₂ equivalent of your system is shown on the model plate.
- The operator undertakes to have maintenance, repair, service, recovery and recycling work carried out by certified personnel who have been authorized by JULABO.

- All such work must be documented. The operator must keep records and archive them for at least five years. The records must be submitted to the relevant authority on request.

Refer to the text of the Regulation for further information.

15 Materials of parts in contact with the bath fluid**15.1 Circulator**

Description	Material
Motor	1.4301
Pump	PPS
Heater	1.4404 / 316L
Sensor 2xPt 100 metal, fitted	1.4571
Sensor connection	1.4301
Float	1.4401
Float pipe	1.4571
Springband hose clamp	1.1248, coated
Tubing	FPM / FKM

16 Accessories

A wide selection of accessories is available for the following products at for optimum adaption to your temperature control task.

16.1 For external connection

- Bath fluids
- Tubing
- Shut-off valve
- Barbed fittings
- Adapters

16.2 For open baths

Temperature applications for samples, preparation of samples for serology and clinical chemistry, analysis, etc.

- Test tube racks
- Immersion-height adjustable platforms

17 Maintenance, cleaning, storage



CAUTION

Danger of injury during maintenance, repair and transport

Danger from mains voltage.

- Have all service and repair work carried out by authorized specialists only.
- Switch off the unit and pull the plug,
 - before starting any cleaning work,
 - before carrying out any service or repair work or
 - before moving the unit.
- Empty the unit completely before moving it.
- Transport the unit carefully.

17.1 Maintain the refrigeration capacity.



The device is designed for continuous operation in normal conditions. No regular maintenance work is required.

The condenser on the front should be cleaned from time to time to maintain the full refrigeration capacity.

1. Switch off the device.
2. Pull the plug.
3. Let the unit cool down to room temperature.
4. Remove the ventilation grille.
5. Vacuum the dirt on the condenser.

17.2 Cleaning

Use low surface tension water (for example soap suds) to clean the bath and the functional parts of the circulator which are immersed in it. Clean the exterior device with a cloth and low surface tension water.

The circulator is designed for continuous use in normal conditions. No regular maintenance work is required.

The bath tank should only be filled with suitable bath fluid. In the event of contamination, the bath fluid must be replaced from time to time.

Cleaning open bath tanks

NOTICE

- Leaking bath tanks due to unsuitable cleaning products.
- These bath tanks are not resistant to solvents and pure alcohol. Incorrect cleaning products will make the surface of the bath go cloudy and will dissolve the adhesive. Plastic baths will therefore start to leak.

- Clean bath tanks with wet products - never rub them dry. The cloths or sponges you use should not be contaminated (with scouring particles or dust).
- A good, essentially smear-free cleaning effect can be achieved using a microfiber cloth moistened with water.
- Use warm water with a few drops of washing-up liquid and a soft cloth to clean the bath.
- If it has heavier soiling, particularly if it is greasy, benzol-free pure benzene (washing benzene, light benzene) can be used for cleaning.

18 Storage

Units which are not to be reused must be stored in a dry, place, protected from dust and frost, after cleaning. The system components must be fully emptied and carefully dried, for example using compressed air. Seal the connectors.

19 Repair service

Before asking for a service technician or returning a JULABO unit for repair, please contact our Technical Service Department.

If you return a unit to JULABO:

- Clean the unit to avoid any harm to the service personnel.
- It is essential that you enclose a short fault description.
- Before returning the device, please complete an online return form a
- Ensure careful and adequate packing.
- JULABO cannot accept any liability for damage caused by incorrect packaging.
- In the interest of product improvement, JULABO reserves the right to make any necessary technical modifications during the repair to ensure the proper functioning of the unit.

19.1 Warranty

The following Warranty Provisions shall apply to products sold in North America by Julabo ("Seller") to the entity shown as buyer ("Buyer") on Seller's invoice.

1. **Initial Warranty.**

Upon Seller's receipt of payment in full for the products and subject to Buyer's compliance with the terms of sale and any other agreement with Seller relating to the products, Seller warrants to the Buyer that the products manufactured by the Seller are free from defects in material and workmanship for a period not to exceed two (2) years or ten thousand (10,000) hours of operation, whichever comes first, from the date the product is shipped by Seller to Buyer (the "Initial Warranty").

2. **EXCLUSION OF ALL OTHER EXPRESS WARRANTIES; EXCLUSION OF ALL IMPLIED WARRANTIES. OTHER THAN THE INITIAL WARRANTY, NO OTHER EXPRESS WARRANTIES ARE MADE. ALL IMPLIED WARRANTIES OF EVERY TYPE AND KIND, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE EXCLUDED IN ALL RESPECTS AND FOR ALL PURPOSES. SELLER DISCLAIMS AND MAKES NO IMPLIED WARRANTIES WHATSOEVER.**

3. **Exclusions.**

The Initial Warranty does not include damage to the product resulting from accident, misuse, improper installation or operation, unauthorized or improper repair, replacement or alteration (including but not limited to repairs, replacements, or alterations made or performed by persons other than Seller's employees or authorized representatives), failure to provide or use of improper maintenance, unreasonable use or abuse of the product, or failure to follow written installation or operating instructions. Buyer must return the product's record of purchase to the Seller or one of Seller's authorized representatives within thirty (30) days of the date the product is shipped by Seller to Buyer in order to make a claim under the Initial Warranty. Notwithstanding anything contained herein to the contrary, all glassware, including but not limited to reference thermometers, are expressly excluded from the Initial Warranty.

4. **Buyer's sole remedies; Limitations on Seller's Liability.** Buyer's sole and exclusive remedy under the Initial Warranty is strictly limited, in Seller's sole discretion, to either: (i) repairing defective parts; or (ii) replacing defective parts. In either case, the warranty period for the product receiving a repaired or replaced part

pursuant to the terms of the Initial Warranty shall not be extended. All repairs or replacements performed by Seller pursuant to these Warranty Provisions shall be performed at Seller's facility in Allentown, Pennsylvania, U.S.A. or at the facility of an authorized representative of Seller, which location shall be determined by Seller in its sole discretion; provided, however, that Seller may, in its sole discretion perform such repairs or replacements at Buyer's facility in which case Buyer shall pay Seller's travel, living and related expenses incurred by Seller in performing the repairs or replacements at Buyer's facility. As a condition precedent to Seller's obligation to repair or replace a product part under the Initial Warranty, Buyer shall (i) promptly notify Seller in writing of any such defect; (ii) shall have returned the product's record of purchase to Seller or to one of Seller's authorized representatives within thirty (30) days of the date the product is delivered to Buyer; and (iii) assist Seller in all respects in its attempts to determine the legitimacy and basis of any claims made by or on behalf of Buyer including but not limited to providing Seller with access to the product to check operating conditions. If Buyer does not provide such written notice to Seller within the Initial Warranty period or fails to return the product's record of purchase as set forth above, Seller shall have no further liability or obligation to Buyer therefore. In no event shall Seller's liability under the Initial Warranty exceed the original purchase price of the product which is the subject of the alleged defect.

5. THE REMEDIES PROVIDED IN THE INITIAL WARRANTY ARE THE SOLE AND EXCLUSIVE REMEDIES AVAILABLE TO THE BUYER. NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED HEREIN, AND EVEN IF THE SOLE AND EXCLUSIVE REMEDIES FAIL OF THEIR ESSENTIAL PURPOSE FOR ANY REASON WHATSOEVER, IN NO EVENT SHALL SELLER BE LIABLE FOR BUYER'S MANUFACTURING COSTS, LOST PROFITS, GOODWILL, OR ANY OTHER SPECIAL, INDIRECT, PUNITIVE, INCIDENTAL OR CONSEQUENTIAL DAMAGES TO BUYER OR ANY THIRD PARTY AND ALL SUCH DAMAGES ARE HEREBY DISCLAIMED.

6. **Assignment.** Buyer shall not assign any of its rights or obligations hereunder without the prior written approval of Seller; provided, however, that if Buyer is a distributor of Seller, the rights and obligations of Buyer under these Warranty Provisions shall inure to the benefit of and be binding upon Buyer's customers who provide the product's proof of purchase to Seller pursuant to the terms set forth herein. Seller may assign any or all of its rights or obligations hereunder without Buyer's prior consent.

7. **Governing Law.**

The Warranty Provisions and all questions relating to their validity, interpretation, performance, and enforcement shall be construed in accordance with, and shall be governed by, the substantive laws of the Commonwealth of Pennsylvania without regard to its principles of conflicts of law.

8. **Waiver.**

Any failure of the part of Seller to insist on strict compliance with the Warranty Provisions shall no way constitute a waiver of such right. No claim or rights arising out of a breach of the Warranty Provisions by Buyer may be discharged in whole or in part by a waiver of the claim or right, unless the waiver is in writing signed by an authorized representative of Seller. Seller's waiver or acceptance of any breach by Buyer of any provisions of the Warranty Provisions shall not constitute a waiver of or an excuse for nonperformance as to any other provision of the Warranty Provisions nor as to any prior or subsequent breach of the same provision.

9. **Freight.**

Buyer will arrange and pay for shipping and handling charges for the unit to be returned to the Seller. Seller will arrange and pay for shipping and handling for the return of the unit to the Buyer.

20 Waste disposal

20.1 Packaging

Packaging materials must be disposed of as prescribed by the current local regulations.

20.2 Unit



In the European Economic Area (EEA) the disposal of waste equipment is regulated in the **"Directive of the European Parliament and of the Council on Waste Electrical and Electronic Equipment (WEEE)"**. The current official journal on this matter is available on the European Parliament's homepage.

The symbol for the separate collection of electrical and electronic equipment is a crossed-out trash can.

Disposal with household waste (unsorted waste) or similar collections of municipal waste is not permitted!

Contact an authorized waste disposal contractor in your country.

20.3 Refrigerant

Refrigerants must be disposed of as prescribed by the current local regulations.

They may only be disposed of by trained personnel.