julabo

english

Immersion / Open Bath / Refrigerated Circulators

Operating Instructions

Important: keep original operating manual for future use.

1.951.0801-V3

Table of contents

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.

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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 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.

2 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.

3 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.

3.1 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.

4 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 device
- 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 in chapter 12.3 Refrigerant, page 32.
- 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 (Ia=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.
- Set the excess temperature protector below the flash point of the bath fluid.

- 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.

5 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.

5.1 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.

5.2 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 suceptible 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.

5.3 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:

1 	Warning of a danger zone. Attention! Observe documentation. (Operating manual, safety data sheet)
2a 	It is essential that you read the user information prior to operation. Area of validity: EU
2b 	It is essential that you read the user information prior to operation. Area of validity: USA, NAFTA

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

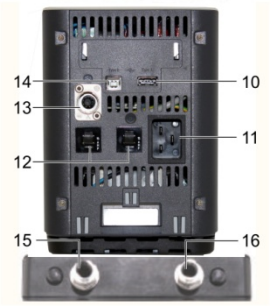
Refer to the instructions in the manuals for the external units which you connect to the JULABO unit, particularly the safety instructions.

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

6 Control and function elements

Front

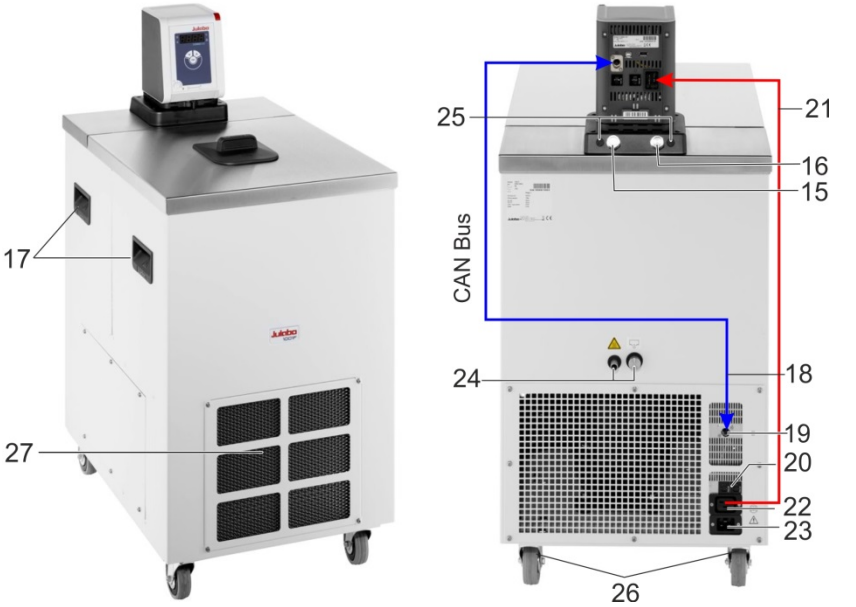
Rear



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, male
16	Pump connection: Supply,	OUT	M16x1, male

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
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)
26	Equipment castors (front lockable)
27	Ventilation grille

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)

Mains cable, country-specific, order number, see www.julabo.com.

6.1 Installation of the circulator

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.
- Lock the castors, once the device is at the operating location.
- 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!

6.2 Bath fluids

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.

ⓘ Check the quality of the water you use at regular intervals.

ⓘ 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.

ⓘ Replace the water in the bath in full at regular intervals.

Water bath protection products

The water bath protection product "Aqua-Stabil" is recommended to combat algae, bacteria and fungus formation.

Order No.	Designation
8 940 006	6x 100 ml bottles
8 940 012	12x 100 ml bottles

⚠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.

7 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.
- Only connect the unit to a fused mains connection via a 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 surface temperatures of the unit

- Unit parts may develop low or 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.

7.1 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 its 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.

7.2 Filling the 1001F

NOTICE

Top up the tempering fluid timely.

Ensure that no tempering fluid gets into the thermostat during filling.

- By inserting the material, the tempering fluid is displaced. This should be considered when filling the bath tank.

7.3 Filling quantities and shut-off criteria

Filling height without basket and bottles	Number of bottles	Filling height with basket an bottles
40 mm	5 bottles	20 mm
60 mm	10 bottles	20 mm
78 mm	15 bottles	20 mm
95 mm	20 bottles	20 mm

Fill the bath tank as per table (e.g., with Thermal G). Place the stainless steel basket with bottles into the bath tank. The filling height should now be approx. 20 mm below the edge of the bath tank.

Limit values:

The recommended filling height for water amounts to

- maximum approx. 20 mm below the edge of the bath tank
- minimum approx. 60 mm below the edge of the bath tank

Emptying

- Switch off the unit and pull the plug.
- Place a container under the drain port (24).
- Open the drain cock.
- Close the drain cock again after the tank is completely emptied.

7.4 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).

ⓘ 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.

ⓘ 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.

7.5 Setting the desired temperature value

Factory setting: 10 °C

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

ⓘ 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.

Example:
Changing the desired value from 33.00 to 45.50

4. 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.
5. Save the set value as the desired value by pressing the OK key.

The new desired value will flash three times.

Setting the timer

Timer displays

Timer set to 15 minutes.

28 seconds until the timer ends

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.

ⓘ 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 the OK key.

   The new timer value will flash three times.

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

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

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

1-point calibration:

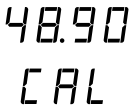
The temperature sensor can be calibrated at any value in the working temperature range.

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

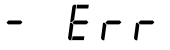
1. Switch on the circulator at its mains switch
2. Set the required calibration value as described in "Adjusting temperature setpoint" (example: 50.00°C).

3. Start the unit:
   Press the OK key.
4. The bath will be heated to 50.00°C.
   When the setpoint is reached, allow the bath temperature to settle for approx. 3 minutes.
5. Start the calibration:
   Press the "Service" and the ▼ key together until the comma in the display starts to flash.

6. Read the bath temperature value on the calibrated thermometer and and set it.
   (Example: 48.90 °C)



7. Press the OK key to confirm.
8. The circulator will confirm the process by displaying "CAL".



NOTICE

If the value is outside a window of ±5°C, its entry will be ignored!
Error message: **Err** = Error

7.7 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.

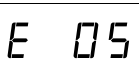
1. Press and hold the OK key and
2. switch on the circulator using the main switch.

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

Autostart on

Autostart off (With a setpoint change of 50 K, the circulator is also switched off)

8 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.
	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.
	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.
E 118	The internal AD converter is defective.

	Alarms and warnings for refrigeration machines 200F, 201F, 300F
E431	Maximum compressor current exceeded.
E1431	Warning: No compressor current detected.

	Alarms and warnings for refrigeration machine 600F, 601F, 900F, 1001F
E401	Temperature sensor evaporator outlet defective (short circuit).
E402	Temperature sensor evaporator outlet defective (break).
E413	Evaporation pressure sensor defective (short circuit).
E414	Evaporation pressure sensor defective (break).
E417	Condensation pressure sensor defective (short circuit).
E418	Condensation pressure sensor defective (break).
E425	Error in refrigeration system.
E426	Error in refrigeration system.
E427	Error in refrigeration system.
E1427	Warning: Error in refrigeration system
E431	Maximum compressor current exceeded.
E432	Error in refrigeration system.
E433	Error in refrigeration system.
E1431	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

Phone: +49 (0) 07823 / 5166

Fax: +49 (0) 07823 / 5199

Email: service.de@julabo.com

9 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	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 On" or "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 LO61. 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 LO60.

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:

- „COn" → Refrigeration unit always on,

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

- „AUtO" → Automatic operation (factory setting)

where cooling capacity is available if needed

- „COFF" → 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 "-88-".

10 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 drainging. The temperature of the bath fluid should not exceed 50 °C.

Enclosed baths and refrigeration machines

- Connect a suitable hose to the drain port (∅ 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 ≤ 0 °C since the drain tap may freeze.

11 Technical data

11.1 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:		200 V / 50 Hz	200 V / 60 Hz	230 V / 50 Hz	230 V / 60 Hz
Delivery rate at 0 bar	L/min	12	14	15	17
Pressure at 0 liters	bar	0.30	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			
Operating temperature range	°C	-40 … 150			
Mains power connection	V / Hz	230 ±10 % / 50			
Current consumption (230 V)	A	10			
For CH and GB model (at 230 V)	A	10			
Mains power connection	V / Hz	230 ±10 % / 60			
Current consumption (at 230 V)	A	10			
Mains power connection	V / Hz	115 ±10 % / 60			
Current consumption (at 115 V)	A	10			
Mains power connection	V / Hz	100 ±10 % / 50-60			
Current consumption (at 100 V)	A	9			
Classification to DIN 12876-1		III (FL)			

11.2 Technical data for refrigeration circulation circulator

Refrigeration circul. circulator		CD-1001F					
Working temperature range	°C	-38 ... 100					
Temperature stability	°C	±0.03					
Temperature display		LED					
Resolution	°C	0.01					
ATC – Absolute Temperat. Calibration		1-point					
Temperature control		PID1					
Refrigeration capacity	°C	20	10	0	-10	-20	-30
(medium ethanol)	kW	1	0.95	0.9	0.63	0.35	0.13
Refrigerant		R452A					
Dimensions (WxDxH)	cm	45 x 64 x 95					
Useful bath opening (WxD)	cm	35 x 41					
Bath depth	cm	30					
Filling volume, from...to	Liter	42 ... 56					
Weight, with circulator	kg	74					
Ambient temperature range	°C	5 ... 40					
Mains power connection	V/ Hz	230 ±5 % / 50/60					
Current consumption (at 230 V / 50 Hz)	A	Nom. 5 / Tot. 16					
at model CH (at 230 V / 50 Hz)	A	Nom. 5 / Tot. 10					
at model GB (at 230 V / 50 Hz)	A	Nom. 5 / Tot. 13					
Current consumption (at 230 V / 60 Hz)	A	Nom. 5 / Tot. 16					
Mains power connection	V/ Hz	200 +10 %; -5 % / 50 / 60					
Current consumpt. (at 200 V / 50/60 Hz)	A	Nom. 5 / 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.

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 ±10% are permissible.

Protection class to EN 60 529:	IP 21
The device complies with	Safety class I
Overvoltage category	II
Pollution degree	2

11.3 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
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 CO_2 equivalent of the system. This is calculated from the refrigerant fill volume and type of refrigerant. The CO_2 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.

12 Materials of parts in contact with the bath fluid

12.1 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
Spring hinge clamp	1.1248, coated
Tubing	FPM / FKM

13 Accessories

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

13.1 For external connection

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

13.2 For open baths

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

- Test tube racks
- Immersion-height adjustable platforms

14 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.

14.1 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. Carefully extract the contamination at the condenser through the ventilation grille at the front. Make sure that the fins are not damaged.

14.2 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.

14.3 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.

15 Repair service

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

JULABO Technical Service

Phone: +49 7823 / 51-66

Fax: +49 7823 / 51-99

Email: service.de@julabo.com

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 at http://www.julabo.com/en/support/rma.
- 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.

15.1 Warranty

JULABO warrants the proper functioning of the unit when connected and handled correctly and in accordance with the operating manual.

The warranty period is

one year.

Extension of warranty period – free of charge

With the '1PLUS warranty' the user receives a free of charge extension to the warranty of up to 24 months, limited to a maximum of 10 000 working hours.

To apply for this extended warranty the user must register the unit on the JULABO web site www.julabo.de, indicating the serial no. The extended warranty will apply from the date of JULABO GmbH's original invoice.

JULABO GmbH reserves the right to decide the validity of any warranty claim. In case of faults arising either due to faulty materials or workmanship, parts will be repaired or replaced free of charge, or a new replacement unit will be supplied.

Any other compensation claims are excluded from this guarantee.

16 Waste disposal

16.1 Packaging

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

16.2 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.

16.3 Refrigerant

Refrigerants must be disposed of as prescribed by the current local regulations.
They may only be disposed of by trained personnel.

17 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(0)7823 / 51 - 0

CE

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 den 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 2004/108/EG; EMC-Directive 2004/108/EC (bis zum / until 19. April 2016)
EMV-Richtlinie 2014/30/EU; EMC-Directive 2014/30/EU (vom / from 20. April 2016)
RoHS-Richtlinie 2011/65/EU; RoHS-Directive 2011/65/EU

Angewandte harmonisierte Normen und techn. Spezifikationen:
The above-named product is in compliance with the following harmonized standards and technical specifications:

EN 50581 : 2012
Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

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

EN 61010-1 : 2010
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 61010-2-010 : 2014
Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte, Teil 2-010: Besondere Anforderungen an Laborgeräte für das Erhitzen von Stoffen
Safety requirements for eletrical 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 techn. Unterlagen:
Authorized representative in charge of administering technical documentation:
Hr. Torsten Kauschke, im Hause / *on the manufacturer's premises as defined above*

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

Seelbach, 03.03.2016

M. Juchheim, Geschäftsführer / *Managing Director*

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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(0)7823 / 51 - 0

CE

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

Produkt / *Product*: Kältegerät / Refrigeration Unit

Typ / *Type*: 1001F **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 den nachfolgend aufgeführten EG-Richtlinien entspricht.
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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

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Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

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

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

EN 61010-2-010 : 2014
Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte, Teil 2-010: Besondere Anforderungen an Laborgeräte für das Erhitzen von Stoffen
Safety requirements for eletrical 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

EN 378-1 : 2016
Kälteanlagen und Wärmepumpen – Sicherheitstechnische und umweltrelevante Anforderungen – Teil 1: Grundlegende Anforderungen, Begriffe, Klassifikationen und Auswahlkriterien
Refrigerating systems and heat pumps - Safety and environmental requirements - Part 1: Basics requirements, definitions, classification and selection criteria

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

EN 378-3 : 2016
Kälteanlagen und Wärmepumpen – Sicherheitstechnische und umweltrelevante Anforderungen – Teil 3: Aufstellungsort und Schutz von Personen
Refrigerating systems and heat pumps - Safety and environmental requirements - Part 3: Installation site and personal protection

EN 378-4 : 2016
Kälteanlagen und Wärmepumpen – Sicherheitstechnische und umweltrelevante Anforderungen – Teil 4: Betrieb, Instandhaltung, Instandsetzung und Rückgewinnung
Refrigerating systems and heat pumps - Safety and environmental requirements - Part 4: Operation, maintenance, repair and recovery

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

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

Seelbach, 03.11.2017

M. Juchheim, Geschäftsführer / *Managing Director*

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