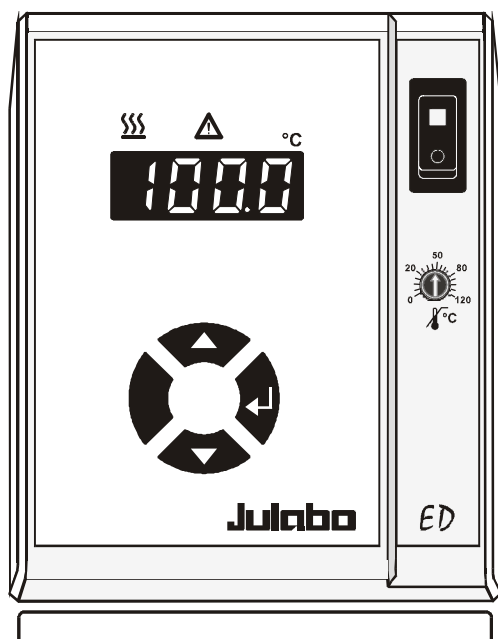


English

Operating manual

Heating Immersion Circulator

ED



Julabo
Innovative Temperature Technology

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Congratulations!

You have made an excellent choice.

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

This operating manual has been designed to help you gain an understanding of the principles of operating and possibilities of our circulators. For optimum utilization of all functions, we recommend that you thoroughly study this manual prior to beginning operation.

Quality Management System



The JULABO Quality Management System:

Development, production and distribution of temperature application instruments for research and industries conform to the requirements according to DIN EN ISO 9001:2000.

Certificate Registration No. 01 100044846

Unpacking and checking

Unpack the circulator and accessories and check for damages incurred during transit. These should be reported to the responsible carrier, railway, or postal authority, and a request for a damage report should be made. These instructions must be followed fully for us to guarantee our full support of your claim for protecting against loss from concealed damage. The form required for filing such a claim will be provided by the carrier.

Printed in Germany

Changes without prior notification reserved

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Operating manual

Description

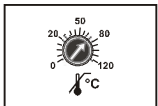
JULABO circulators have been designed for temperature application to specific fluids in a bath tank.



- ☑ The circulators are operated via the splash-proof keypad. The implemented microprocessor technology allows to set and to store the setpoint that can be indicated on the LED temperature display.



- ☑ The PID temperature control adapts the heat supplied to the thermal requirements of the bath.



- ☑ Safety installations conforming to IEC 61010-2-010
The excess temperature protection is a safety installation independent from the control circuit.
The safety value is set using a tool (screwdriver).
If the low level protection device is triggered, a complete shutdown of the heater and circulating pump is effected.



- ☑ The circulator conforms to the relevant requirements specified by European guidelines.



JULABO circulators are not conceived for direct temperature application to food and luxury articles or pharmaceutical and medico-technical products. Direct temperature application means: Unprotected contact of the object with the bath medium (bath fluid).

Operator responsibility – Safety recommendations

The products of JULABO Labortechnik GmbH warrant a safe operation if installation, operation and maintenance is carried out according to common safety regulations. This section informs you about potential dangers that may arise from operating the circulator and also mentions the most important safety precautions.

Persons:

The operator is responsible for the qualification of the personnel operating the units. The operator should be constantly informed about the dangers involved with their job activities as well as preventive actions.

Make sure all persons expected to carry out operation, installation and maintenance of the unit read and understand the safety information and operating instructions.

If you have any questions concerning the operation of your unit or the information in this manual, please contact us!

Contact

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www.julabo.de

Handling:

You received a product conceived for industrial use. Nevertheless, avoid strikes to the housing, vibrations, damages to the keypad foil (keys, display) or contamination.

Make sure the product is regularly checked for proper condition. Regularly check (at least every 2 years) the proper condition of the mandatory, warning, prohibition and safety labels.

Take care that the mains supply features a low impedance to avoid any negative affects on the instrument being operated in the same mains.

This unit is designed for operation in a controlled electromagnetic environment. This means that transmitting devices (e.g. cellular phones) should not be used in the immediate vicinity.

Magnetic radiation may influence other units with components susceptible to magnetic fields

(e.g. a monitor). We recommend to keep a minimum distance of 1 m.

Permissible ambient temperature: max. 40 °C, min. 5 °C.

Permissible relative air humidity: 50 % (40 °C).

Do not store in an aggressive atmosphere. Protect from contaminations. Do not expose to sunlight.

Operation:

Only qualified personnel is authorized to perform configuration, installation, maintenance and repairs of the circulator.




Routine operation can also be carried out by untrained personnel who should however be instructed by trained personnel. The summarized user guidance (short manual) and the specification table with information on individual parameters are sufficient for this.

Use:


The bath may **not** be filled with flammable materials. Fire hazard!

Only use recommended materials (bath fluids). Only use recommended materials (bath fluids). Only use non-acid and non corroding materials.

When using hazardous materials, **the user must** attach the enclosed safety labels to the front of the unit so they are well visible: The yellow warning label W09 (danger area) and the blue mandatory label M018 or Semi S1-0701 Table A1-2 #9 (Carefully read the user information prior to beginning operation).

<p>Warning label W09: Colors: yellow, black</p>		<p>Danger area. Attention! Observe instructions. (operating manual, safety data sheet)</p>
<p>Mandatory label M018 Colors: blue, white</p>		<p>Carefully read the user information prior to beginning operation Scope: EU</p>
<p>Semi S1-0701 Table A1-2 #9</p>		<p>Carefully read the user information prior to beginning operation Scope: NAFTA</p>

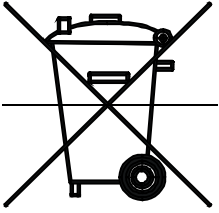
Particular care and attention is necessary because of the wide operating range. There are thermal dangers: Burn, scald, hot steam, hot parts and surfaces that can be touched.

<p>Warning label W26: Colors: yellow, black</p>		<p>Hot surface warning. (The label is put on by JULABO)</p>
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Observe the instructions in the manuals for instruments of a different make that you connect to the circulator, particularly the respective safety recommendations. Also observe the pin assignment of plugs and technical specifications of the products.

Disposal:Valid in EU countries

Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE).



This directive requires electrical and electronic equipment marked with a crossed-out trash can to be disposed of separately in an environmentally friendly manner.

Contact an authorized waste management company in your country. Disposal with household waste (unsorted waste) or similar collections of municipal waste is not permitted!

EC Conformity

The product described in the operating instructions conforms to the requirements of the following European guidelines:

Low voltage regulations with respect to legal harmonization of the member countries concerning electric devices for use within certain voltage limits.

EMC guideline with respect to legal harmonization of the member countries concerning electromagnetic compatibility.

Julabo

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77960 Seelbach / Germany

Warranty conditions

JULABO Labortechnik GmbH warrants its products against defects in material or in workmanship, when used under appropriate conditions and in accordance with appropriate operating instructions

for a period of ONE YEAR.

Extension of the 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 Labortechnik GmbH's original invoice.

JULABO Labortechnik 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.

Technical specifications

		ED	
Working temperature range	°C	20 ... 100	
Temperature stability	°C	±0.03	
Temperature selection		digital	
Temperature indication		LED	
Resolution	°C	0.1	
Temperature control		PID1	
Heater wattage	(at 230 V) W	2000	
or	(at 115V) W	1000	
Circulating pump:			
discharge, max.at 0 bar	l/min	15	
pressure, max. at 0 l	bar	0.35	
Overall dimensions (WxDxH)	cm	13x15x33	
Usable bath depth	cm	from 8 to 16.5	
Weight	kg	3.3	
Ambient temperature	°C	5 ... 40	
Mains power connection 230 /50	V/ Hz	190-253 / 50	
Current input at 230 V	A	9	
Mains power connection 230 /60	V/ Hz	190-253 / 60	
Current input at 208 V/230 V	A	8 / 9	
Mains power connection 115 /60	V/ Hz	103-127 / 60	
Current input at 115 V	A	9	
Mains power connection 100 /50-60	V/ Hz	90-120 V/ 50-60	
Current input at 100 V	A	8	

All measurements have been carried out at:
 rated voltage and frequency operating temperature: 70 °C
 ambient temperature: 20 °C bath fluid: water

Technical changes without prior notification reserved.

Safety installations according to IEC 61010-2-010:

Excess temperature protection	adjustable from 20 to 120 °C
Low liquid level protection	float switch
Classification according to DIN 12876-1	class I
Alarm indication	optical + audible (permanent)

Environmental conditions according to EN 61 010, part 1:

Use only indoor.

Altitude up to 2000 m - normal zero.

Ambient temperature: +5 ... +40 °C (for storage and transportation)

Air humidity:

Max. rel. humidity 80 % for temperatures up to +31 °C,

linear decrease down to 50 % relative humidity at a temperature of +40 °C

Protection class according to EN 60 529 IP21

Power supply: according to class 1, VDE 0106 T1

not for use in explosive atmosphere

Max. mains fluctuation of ± 10 % are permissible.

Overvoltage category II

Pollution degree 2

Standards for interference resistance EN 61326

Emitted interferences

The unit adheres to the threshold values for emitted interferences according to table 3.

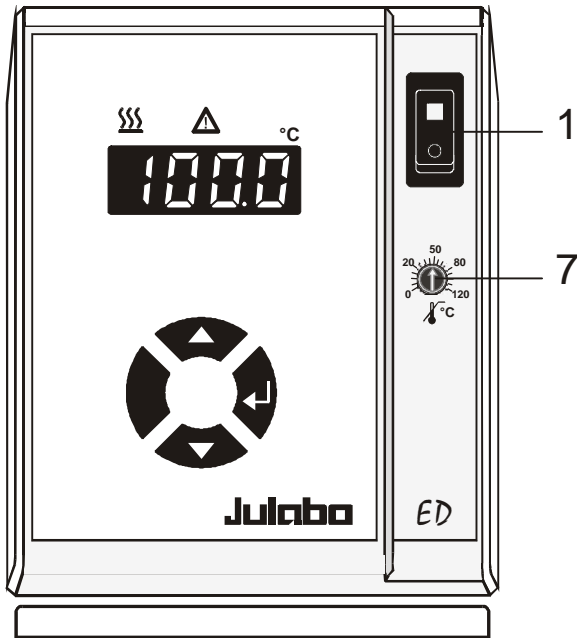
Interference resistance

The unit conforms to the requirements according to table B.1.

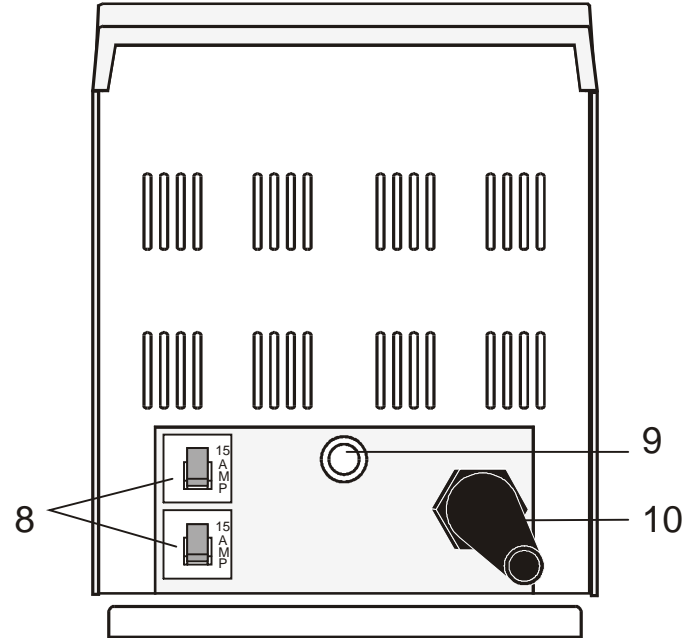
Operating instructions







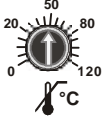
1. Operating controls and functional elements

Front view






Rear view



- 1  Mains power switch, illuminated
- 2  Edit keys (increase/decrease setting)
- 3  Enter key (store)
- 4  LED temperature display, menu indication
- 5  Control indicator – Heating
- 6  Control indicator – Alarm
- 7  Adjustable excess temperature protection according to IEC 61010-2-010

Rear

- 8  Mains circuit breakers (resettable) 15 A
- 9  Threaded fitting (10 mm) for stand rod attachment
- 10  Mains power cable with plug

2. Safety notes for the user



In addition to the safety warnings listed above, warnings are posted throughout the manual. These warnings are designated by an exclamation mark inside an equilateral triangle. „Warning of a dangerous situation (Attention ! Please follow the documentation).“
The danger is described according to an alarm keyword.
Read and follow these important instructions.



Warning:

Describes a possibly highly dangerous situation. If this is not avoided, serious injury and danger to life could result.



Caution:

Describes a possibly dangerous situation. If this is not avoided, slight or minor injuries could result.
A warning of possible damage can also be contained in the text.



Notice:

Describes a possibly harmful situation. If this is not avoided, the product or anything in its surroundings can be damaged.

3. Preparations

3.1. Installation



Caution:

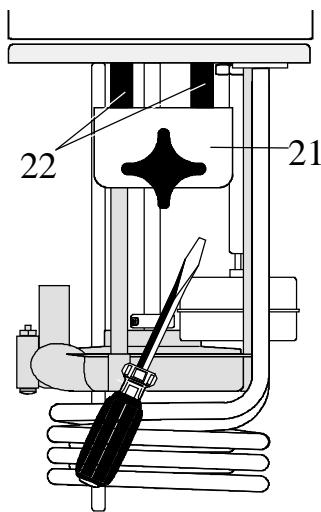
Securely fix the immersion circulator. The heater may not be in contact with the wall of the bath tank. Keep a distance of at least 15 mm.

Units not adequately fixed may drop into the bath tank.

Danger of electric shock!

First pull out the power plug to disconnect the unit from the power supply net. Then take the immersion circulator out of the bath tank.

Make a service technician check the instrument before it is used again.



The heating immersion circulator is mounted using a bath attachment clamp (21) designed for bath wall thicknesses up to 26 mm.

Use the two sleeves (22) supplied with the unit to reduce the immersion depth from 165 mm to 145 mm (see drawing).

For use with glass vessels an upright stand rod (order no. 8 970 020), available as optional accessory, may be screwed in the threaded fitting (9).

3.2. Bath fluids



Caution:

No liability for use of other bath fluids!

Do not use flammable bath fluids!

Water:

The quality of water depends on local conditions.

Ferrous water can cause corrosion - even on stainless steel.

Chloric water can cause pitting corrosion.

- Recommended bath fluid: water.

**Caution:**

Please contact JULABO before using other than recommended bath fluids.

JULABO takes no responsibility for damages caused by the selection of an unsuitable bath fluid.

Unsuitable bath fluids are liquids which e.g.

- are very highly viscous
(much higher than 30 mm² /s at the respective working temperature)
- are of low viscosity and have creep capacities
- have corrosive characteristics or
- tend to cracking.

**Caution:**

The temperature controlling i.e. immersing of test tubes, Erlenmeyer flasks or similar objects directly within the circulator constitutes normal circulator practice.

We do not know which substances are contained within these vessels. Many substances are:

- inflammable, easily ignited or explosive
- hazardous to health
- environmentally unsafe

i.e.: dangerous

You alone are responsible for the handling of these substances!

The following questions shall help to recognize possible dangers and to reduce the risks to a minimum.

- Are all tubes and electrical cables connected and installed?
Note:
sharp edges, hot surfaces in operation, moving machine parts, etc.
- Do dangerous steams or gases arise when heating?
Is an exhaust needed when working?
- What to do when a dangerous substance was spilled on or in the unit?
Before starting to work obtain information concerning the substance and determine the method of decontamination.

Water bath protective media

We recommend the use of the "Aqua-Stabil" protective media to eliminate the formation of algae, bacteria, and other micro-organisms

Order No.	Description
8 940 006	6 bottles each 100 ml
8 940 012	12 bottles each 100 ml

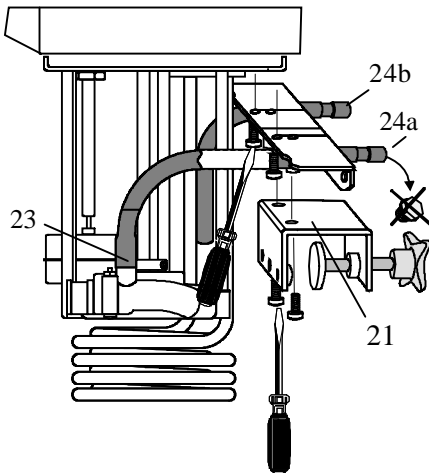
3.3. Temperature application to external systems

The circulator is used for temperature application to external, closed systems (loop circuit).

3.3.1. Pump set

Accessories

Order No. Description
8 970 140 Pump set



Mounting the pump set:

- Remove the bath attachment clamp (21).
- Screw the pump set to the circulator, and then fix the bath attachment clamp to the pump set.
- Slide the short piece of tubing supplied with the pump set onto the short pump nozzle and the pump connector (23).
- Thus the total immersion depth is reduced to 145 mm.
- Adjusting the pump for external bath circulation see example D page 17.

Connecting an external system:

- Unscrew the collar nuts from the pump connector (24a).
- Slide the tubing onto the pump connectors for feed and return flow (24a, 24b).
-



Caution: Securely attach all tubing to prevent slipping.

If the circulator is operated without external system, close the pump connector (24a) with the cap nut.

3.3.2. Tubing

Recommended tubing:

Order No.	Length		Temperature range
8930008	1 m	CR® tubing 8 mm ID	-20 °C ... 120 °C
8930010	1 m	CR® tubing 10 mm ID	-20 °C ... 120 °C
8930108	1 m	Viton tubing 8 mm ID	-50 °C ... 200 °C
8930110	1 m	Viton tubing 10 mm ID	-50 °C ... 200 °C
8930410	1 m	Insulation for tubing 8 mm ID or 10 mm ID	-50 °C ... 100 °C



Warning: Tubing:

At high working temperatures the tubing used for temperature application and cooling water supply represents a danger source. A damaged tubing line may cause hot bath fluid to be pumped out within a short time.

This may result in:

- Burning of skin
- Difficulties in breathing due to hot atmosphere

Safety recommendations

- Employ suitable connecting tubing.
- Make sure that the tubing is securely attached.
- Avoid sharp bends in the tubing, and maintain a sufficient distance from surrounding walls.
- Regularly check the tubing for material defects (e.g. for cracks).
- Preventive maintenance: Replace the tubing from time to time.

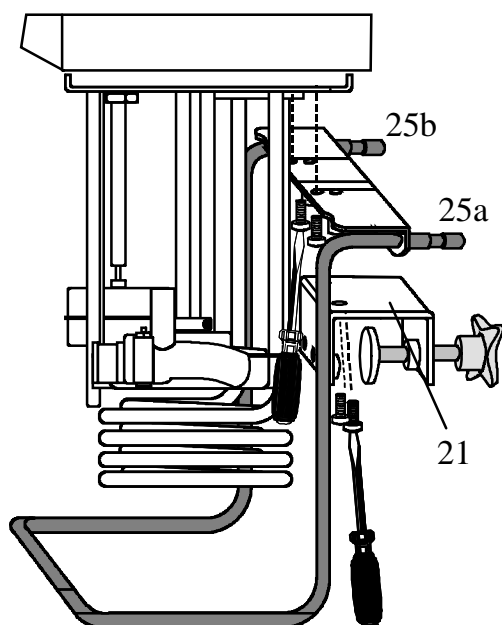
3.4. Countercooling



Notice:

Observe the laws and regulations of the water distribution company valid in the location where the unit is operated.

For applications near the ambient temperature, the cooling coil (order no. 8 970 105) must be connected to the water mains.

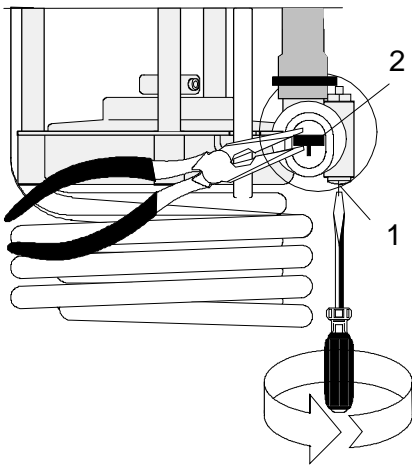


Mounting the cooling coil:

- Remove the bath attachment clamp (21).
- Screw the cooling coil to the circulator, and then fix the bath attachment clamp to the cooling coil.
- Thus the total immersion depth is reduced to 145 mm.
- Using tubing, connect the cooling coil (25a) to the tap water supply, and lead the tap water in a sink through the return connector (25b).

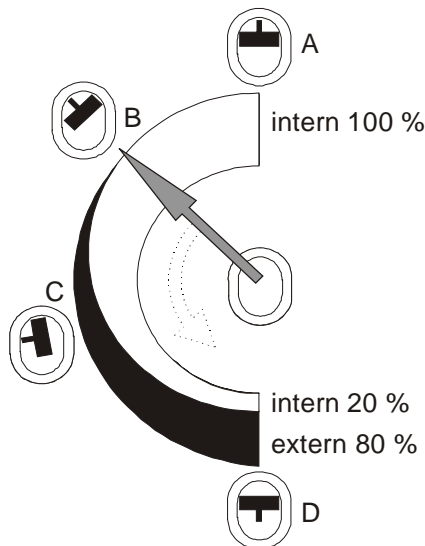
- ① A specific water flow rate of 45 ml/minute is sufficient to compensate for the characteristic temperature.
- ① For applications near ambient temperature (20 °C), the cooling water temperature should at least be 5 °C below the working temperature.

3.5. Adjusting the pump flow



The pump flow is pre-adjusted in the factory and can be modified to suit user requirements.

- Using a screwdriver turn the screw (1) anti-clockwise by 360 °.
- Using flat pliers turn the marking of the slide (2) to the desired position.
- Tighten the screw.



Examples:

Internal applications in the bath

- A 100 % internal bath circulation
(for large bath tanks)
- B Reduced internal bath circulation
(for smooth surface of bath fluid)

External/internal applications

- C 40 % external discharge,
60 % internal circulation
(for large bath tanks)
- D 80 % external discharge,
20 % internal circulation
(for small bath tanks)

4. Operating procedures

4.1. Power connection



Caution:

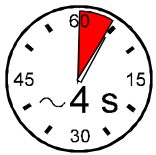
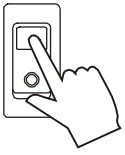
Only connect the unit to a power socket with earthing contact (PE – protective earth)!

We disclaim all liability for damage caused by incorrect line voltages!

Check to make sure that the line voltage matches the supply voltage specified on the identification plate.

Deviations of $\pm 10\%$ are permissible.

4.2. Switching on / Start - Stop



- **Switching on:**

Turn on the mains power switch (1).


- ① The unit performs a self-test. All segments of the 4-digit LED temperature DISPLAY and all indicator lights will illuminate (as illustrated on the left).

The display "OFF" indicates the unit is ready to operate (standby mode).

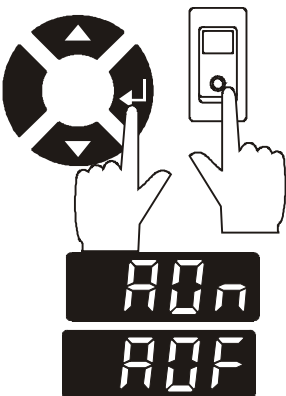
Start:


- Press enter  for about 4 seconds.
The LED temperature DISPLAY indicates the actual bath temperature.

Stop:

- Press enter  for about 4 seconds.
- Turn the unit off with the mains power switch.

4.3. Automatic / non-automatic start mode



- ① Keep depressed enter  and
- ② turn on the circulator with the mains power switch.

For a short while the LED temperature DISPLAY indicates the effective start mode:

⇒ AUTOSTART on.

⇒ AUTOSTART off.

NOTE:

The circulator has been configured and supplied by JULABO according to N.A.M.U.R. recommendations. This means for the start mode, that the unit must enter a safe operating state after a power failure (non-automatic start mode). This safe operating state is indicated by „OFF“ on the LED temperature display. A complete shutdown of the main functional elements such as heater and circulating pump is effected simultaneously. Should such a safety standard not be required, the AUTOSTART function (automatic start mode) may be activated, thus allowing the start of the circulator directly by pressing the mains power switch or using a timer.



Warning:

For supervised or unsupervised operation with the AUTOSTART function, avoid any hazardous situation to persons or property.

The circulator does no longer conform to N.A.M.U.R. recommendations.

Take care you fully observe the safety and warning functions of the circulator.

The instrument is **not** suited for unsupervised continuous operation.

4.4. Setting the temperatures

Factory setting:
25 °C

① Setting can be carried out in the start/stop condition.

1. Press one of the keys ▼ ▲ for a short moment. The setpoint value instead of the actual value is indicated on the display for about 8 seconds. The value can now be changed.

2. Change value:

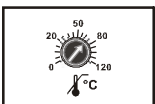
Press ▲ to set a higher value.

Press ▼ to set a lower value.

Keep the keys depressed for the value to change fast.

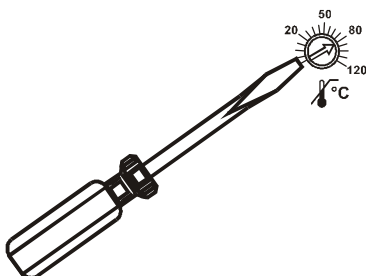
3. Press enter ↵ to store the value.

4.5. Excess temperature protection



This safety installation is independent of the control circuit. When the temperature of the bath fluid has reached the safety temperature, a complete shutdown of the heater and pump is effected.

The alarm is indicated by optical and audible signals (continuous tone) and on the LED-DISPLAY appears the error message "Error 01".



Setting range: 20 °C to 120 °C

- Using a screwdriver turn the setting screw to the desired value.

Recommendation:

Set the excess temperature protector at 5 to 10 °C above the working temperature setpoint.

4.6. Low liquid level protection



This safety installation is independent of the control circuit. If the low liquid level protection device (according to IEC 61010-2-010) is triggered, a complete shutdown of the heater and circulating pump is effected. The alarm is indicated by optical and audible signals (continuous tone) and on the LED-DISPLAY appears the error message "Error 01".

- ① Turn off the unit with the mains switch, refill bath fluid and turn the unit on again!

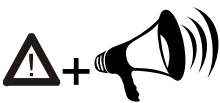


Notice:

Check the safety installations for proper function at least twice a year!

- Excess temperature protection according to IEC 61010-2-010
With a screwdriver turn back the adjustable excess temperature protection until the shut-down point (actual temperature).
- Low level protection according to IEC 61010-2-010
To check the function of the float, it can be manually lowered with a screwdriver for example.

5. Troubleshooting guide / Error messages



Whenever the microprocessor electronics registers a failure, a complete shutdown of the heater and circulating pump is performed. The alarm light "⚠" illuminates and a continuous signal tone sounds.

The LED temperature display indicates the cause for the alarm in form of a code.



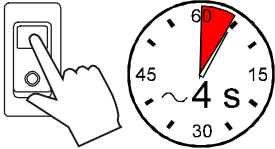
Excess temperature protection or low liquid level protection

- Defect of the working or safety temperature sensor.
- The safety temperature value lies below the working temperature setpoint.
Set the excess temperature protection to a higher value.
- The circulator is operated without bath fluid, or the liquid level is insufficient.
Replenish the bath tank with the bath fluid.

- Tube breakage has occurred (insufficient filling level due to excessive bath fluid pumped out). Replace the tubing and replenish the bath tank with the bath fluid.
- The wires of the working temperature sensor are interrupted or short-circuited.



- Error in A/D converter



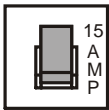
After eliminating the malfunction, press the mains power switch off and on again to cancel the alarm state.

If the unit cannot be returned to operation, contact an authorized JULABO service station.

Disturbances that are not indicated.

Pump motor overload protection

The pump motor is protected against overloading. After a short cooling interval, the motor will automatically start running.



Mains circuit breakers (resettable) 15 A

6. Safety recommendations

Follow the safety recommendations to prevent damage to persons or property. Further, the valid safety instructions for working places must be followed.



- Only connect the unit to a power socket with earthing contact (PE – protective earth)!
- Operation is permitted with **non-flammable** liquids only.
- Place the instrument on an even surface on a pad made of **non-inflammable** material.
- Do not stay in the area below the unit.
- Ensure secure attachment of heating immersion circulators.
- Make sure you read and understand all instructions and safety precautions listed in this manual before installing or operating your unit.
- Never operate the unit without bath fluid in the bath.
- Check the filling level of the bath fluid from time to time. Pump and heater must always be fully covered with the bath fluid!
- The instrument is **not** suited for unsupervised continuous operation.
- Exercise caution when emptying hot bath fluids!
Check the temperature of the bath fluid prior to draining (by switching the unit on for a short moment for example).
- Observe the limited working temperature range when using plastic bath tanks.
- Employ suitable connecting tubing.
Make sure that the tubes are securely attached.
- Never operate damaged or leaking equipment.
- Always turn off the unit and disconnect the mains cable from the power source before performing any service or maintenance procedures, or before moving the unit.
- Always empty the bath before moving the unit.
- Never operate equipment with damaged mains power cables.



- Some parts of the bath cover and the pump connections may become extremely warm during continuous operation. Therefore, exercise particular caution when touching these parts.

7. Cleaning / repairing the unit



Caution:

- Always turn off the unit and disconnect the mains cable from the power source before cleaning the unit.
Prevent humidity from entering into the circulator.
- Electrical connections and any other work must be performed by qualified personnel only.

Cleaning:

For cleaning the bath tank and the immersed parts of the circulator, use low surface tension water (e.g., soap suds).
Clean the outside of the unit using a wet cloth and low surface tension water.

The circulator is designed for continuous operation under normal conditions. Periodic maintenance is not required.

The tank should be filled only with a bath fluid recommended by JULABO. To avoid contamination, it is essential to change the bath fluid from time to time.

Repairs

Before asking for a service technician or returning a JULABO circulator for repair, please contact an authorized JULABO service station.

When returning the unit:

- Clean the unit in order to avoid any harm to the service personnel.
- Attach a short fault description.
If you intend to return your JULABO unit to us, you will find a Service Return Form on our website www.julabo.de . Please use this as a delivery note and include it to the unit or send it in advance either by Fax or E-Mail.
- During transport the unit has to stand upright. Mark the packing correspondingly.
- When returning a unit, take care of careful and adequate packing.
- JULABO is not responsible for damages that might occur from insufficient packing.



JULABO reserves the right to carry out technical modifications with repairs for providing improved performance of a unit.