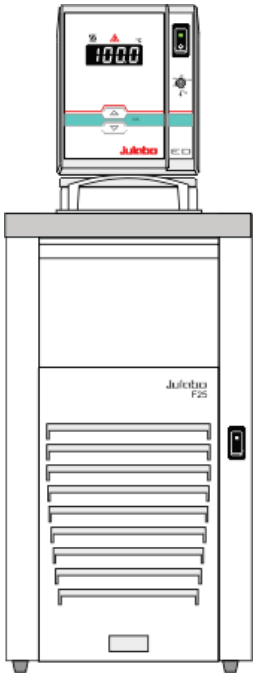
English

Operating manual

Refrigerated / Heating Circulator

F12-ED F25-ED

F26-ED



Julabo

The Temperature Control Company

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1.951.0272-V3 02/16

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 operation and possible applications of our circulators. For optimal utilization of all functions, we recommend that you thoroughly study this manual prior to beginning operation.

The JULABO Quality Management System

Temperature control devices for research and industry are developed, produced, and distributed according to the requirements of ISO 9001 and ISO 14001. Certificate Registration No. 01 100044846

Unpacking and inspecting

Unpack the circulator and accessories and inspect them for possible transport damage. Damage should be reported to the responsible carrier, railway, or postal authority, and a damage report should be requested. 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

Important: keep original operating manual for future use

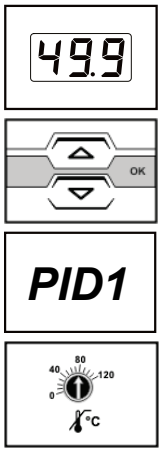
Operating manual

1. Intended use

JULABO circulators have been designed to control the temperature of specific fluids in a bath tank. The units feature pump connections for temperature control of external systems (loop circuit).

	JULABO circulators are not suitable for direct temperature control of foods, semi-luxury foods and tobacco, or pharmaceutical and medical products. Direct temperature control means unprotected contact of the object with the bath medium (bath fluid).

1.1. Description



- ☑ 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.

2. Operator responsibility – Safety recommendations

The products of JULABO ensure safe operation when installed, operated, and maintained according to common safety regulations. This section explains the potential dangers that may arise when operating the circulator and also specifies the most important safety precautions to preclude these dangers as far as possible.

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.

Handling:

- 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.

Appropriate 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.

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.

2.4. Technical specifications

		F12-ED	*F25-ED*
Working temperature range	°C	-20 ... 100	-28 ... 100
Temperature stability	°C	±0,03	±0,03
Temperature selection		digital	digital
Temperature indication		LED	LED
Resolution	°C	0.1	0.1
Temperature control		PID1	
Heater wattage (at 230 V)	kW	2,0	2,0
Heater wattage (at 115V)	kW	1,0	1,0
Cooling capacity	°C	+20 0 -20	+20 0 -20
Medium ethanol	kW	0.16 0.1 0.02	0.26 0.2 0.06
Refrigerant		R134a	R134a
Circulating pump:			
discharge, max.at 0 bar	l/min	15	15
pressure, max. at 0 l	bar	0.35	0.35
Overall dimensions (WxDxH)	cm	20x36x56	23x42x61
Bath opening (WxL)	cm	13x15	12x14
Bath depth	cm	13	14
Filling volume	liters	3 ... 4,5	3 ... 4,5
Weight	kg	22	30
Ambient temperature	°C	5 ... 40	5 ... 40
Mains power connection	V/ Hz	230 / 50	230 / 50
Current input (bei 230 V)	A	11 (CH 9 + 1)	12 (CH 9 + 2)
Mains power connection	V/ Hz	230 / 60	230 / 60
Current input (at 230 V)	A	11	12
Mains power connection	V/ Hz	115 / 60	115 / 60
Current input (at 115 V)	A	12	13
Mains power connection	V/ Hz	100 / 50/60	100 / 50/60
Current input (at 100 V)	A	15	13

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

		F26-ED
Working temperature range	°C	-28 ... 100
Temperature stability	°C	±0,03
Temperature selection		digital
Temperature indication		LED
Resolution	°C	0.1
Temperature control		PID1
Heater wattage (at 230 V)	kW	2,0
Heater wattage (at 115V)	kW	1,0
Cooling capacity	°C	+20 0 -20
Medium ethanol	kW	0.26 0.2 0.06
Refrigerant		R134a
Circulating pump:		
discharge, max.at 0 bar	l/min	15
pressure, max. at 0 l	bar	0.35
Overall dimensions (WxDxH)	cm	42x42x42
Bath opening (WxL)	cm	12x14
Bath depth	cm	14
Filling volume	liters	3 ... 4,5
Weight	kg	30
Ambient temperature	°C	5 ... 40
Mains power connection	V/ Hz	230 / 50
Current input (at 230 V)	A	12 (CH 9 + 2)
Mains power connection 230 V/60 Hz	V/ Hz	230 / 60
Current input (at 230 V)	A	------
Mains power connection	V/ Hz	115 / 60
Current input (at 115 V)	A	13
Mains power connection	V/ Hz	100 / 50/60
Current input (at 100 V)	A	13

All measurements have been carried out at:
rated voltage and frequency ambient temperature: 20 °C
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
Max. mains fluctuation of ±10 % are permissible.

Protection class according to EN 60 529 IP21

The unit corresponds to Class I
Overvoltage category II
Pollution degree 2

Caution:
The unit is not for use in explosive environment.

Standards for interference resistance according to EN 61326-1
This unit is an ISM device classified in Group 1 (using high frequency for internal purposes) Class A (industrial and commercial range).

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.

Operating instructions

3. Safety notes for the user

3.1. Explanation of safety notes

In addition to the safety warnings listed, warnings are posted throughout the operating 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 classified using a signal word.
Read and follow these important instructions for averting dangers.

Warning:
Describes a **possibly** highly dangerous situation. If these instructions are not followed, 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 property damage may 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.

3.2. Explanation of other notes

Note!
Draws attention to something special.

Important!
Indicates usage tips and other useful information.

3.3. 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)!
- The power supply plug serves as safe disconnecting device from the line and must be always easily accessible.
- 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.
- 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.
- Do not drain the bath fluid while it is hot!
  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.

Notice: Check the safety installations 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.

Caution:

The temperature controlling i.e. of fluids in a reactor 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

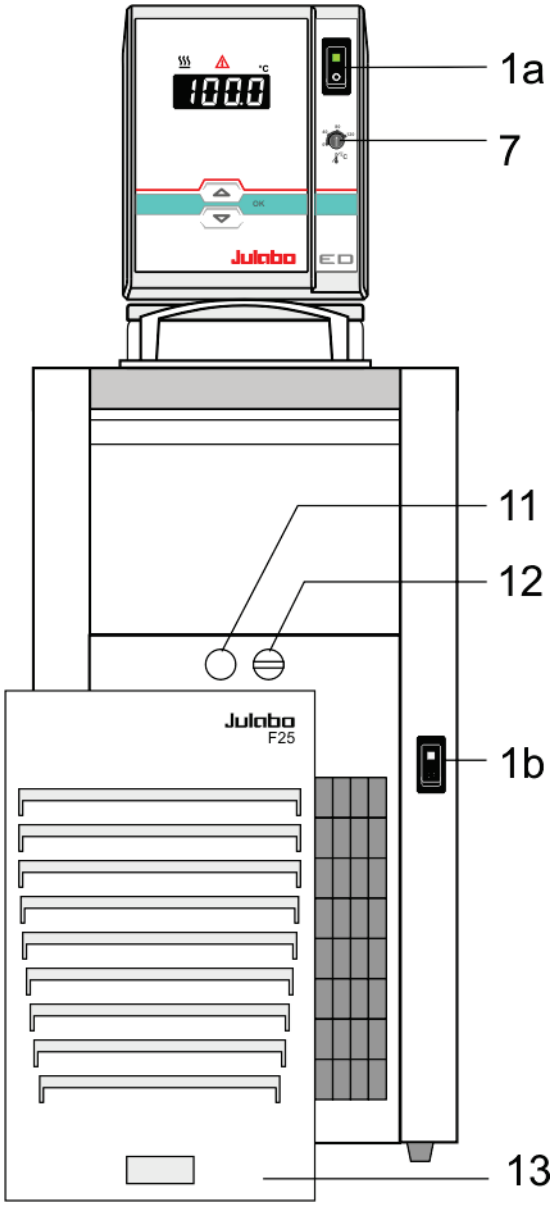
i.e.: **dangerous**

The user alone is responsible for the handling of these substances!
The following questions shall help to recognize possible dangers and to reduce the risks to a minimum.

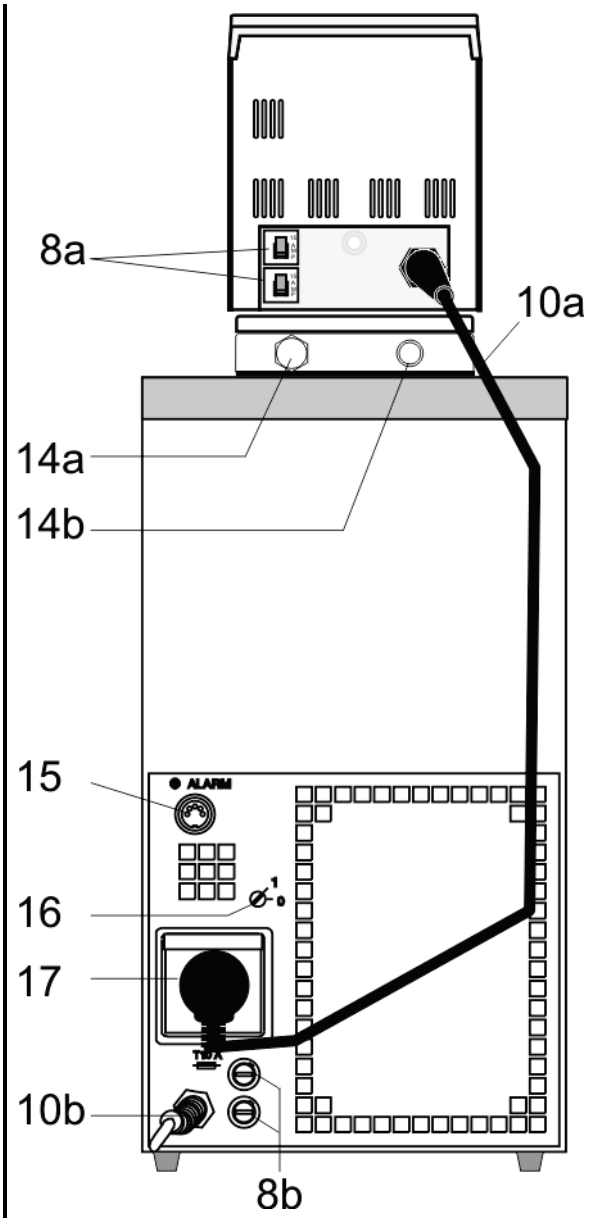
- Are all tubes and electrical cables connected and installed?
  Note:
  sharp edges, hot surfaces in operation, moving machine parts, etc.
- Do dangerous steams or gases arise when heating?
  Is an exhaust needed when working?
- What to do when a dangerous substance was spilled on or in the unit?
 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

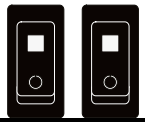
4. Operating controls and functional elements

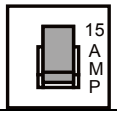
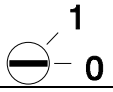
Front view



Rear view

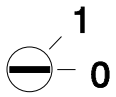


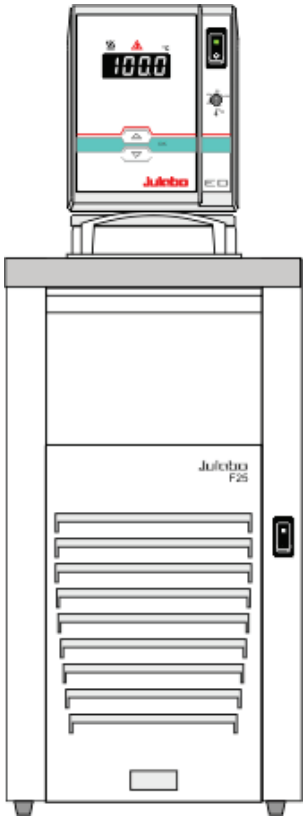
1a		Mains power switch, illuminated	for circulator
1b		Mains power switch, illuminated	for cooling machine
2		Edit keys Setpoint increase or decrease Press keys shortly for step-by-step changes, Keep the keys pressed for fast change of setpoint	
3		OK key (store)	
4		LED temperature display, menu indication	

5		Control indicator –Heating
6		Control indicator – Alarm
7		Adjustable excess temperature protection according to IEC 61010-2-010
8a		Circulator: Mains circuit breakers (resettable) 15 A
8b		Mains fuses for cooling machine: T 10,0 A, D5 x 20 mm
10a		Mains power cable with plug for circulator
10b		Mains power cable with plug cooling machine
11		Drain port
12		Drain tap 
13		Venting grid, removable
14a		Pump connector for feed
14b		Pump connector for return
15	 ALARM	Connector: Cooling machine control (not in use for operation with ED circulator)
16		Selector dial for cooling machine Position "0" for operation with ED circulator.
17		Built-in mains outlet for connection of circulator

5. Preparations

5.1. Installation





- Place the unit on an even surface on a pad made of **non-flammable** material.
- Set selector dial for cooling machine (16) in position "0" for operation with ED circulator. (only F25, F26)

- Keep at least 20 cm of open space on the front and rear venting grids.
- Do not set up the unit in the immediate vicinity of heat sources and do not expose to sun light.

- Before operating the unit after transport, wait about one hour after setting it up. This will allow any oil that has accumulated laterally during transport to flow back down thus ensuring maximum cooling performance of the compressor.

- The place of installation should be large enough and provide sufficient air ventilation to ensure the room does not warm up excessively because of the heat the instrument radiates to the environment. (Max. permissible ambient temperature: 40 °C).
  With regard to a disturbance in the cooling loop (leakage), the guideline EN 378 prescribes a certain room space to be available for each kg of refrigerant.
  The necessary amount of refrigerant is specified on the type plate.
  > For 0.25 kg of refrigerant R134a, a room space of 1 m^3 is required.

5.2. 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.

- Due to the high concentration of lime, hard water is not suitable for temperature control because it leads to calcification in the bath.
- Ferrous water can cause corrosion - even on stainless steel.
- Chloric water can cause pitting corrosion.
- Distilled and deionized water is unsuitable. Their special properties cause corrosion in the bath, even in stainless steel.

Recommended bath fluids:

Bath fluid	Temperature range
soft/decalcified water	5 °C to 80 °C
mixture water/glycol, mixture 1:1	-20°C to 50°C
Thermal G	-30°C to 80°C

JULABO Bath liquids	Order No.
Thermal G 10 Liters	8 940 124
Thermal G 5 Liters	8 940 125

See website for list of recommended bath fluids.
Contact: see page 5

Notice:
Please contact JULABO before using other than recommended bath fluids.
Only use non-acid and non corroding 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.

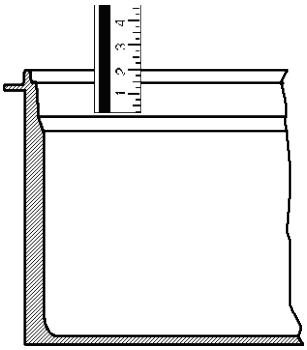
- are very highly viscous
  (much higher than 30 mm^2 /s at the respective working temperature)
- have corrosive characteristics or
- tend to cracking.

5.3. Filling / Draining

Notice: Filling

Check the filling level of the bath fluid from time to time. Pump and heater must always be fully covered with the bath fluid!

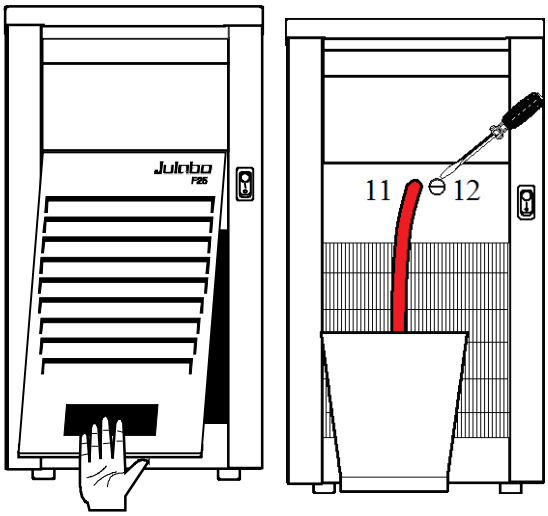
The instrument is **not** suited for unsupervised continuous operation.



Filling

- Take care that no liquid enters the interior of the circulator.
- Recommended maximum filling level with water as bath liquid: 20 mm below the tank rim

ⓘ After filling, immerse the samples in the bath or place the lid on the bath, in case the opening is not to be used.



Draining:

- Turn off the circulator and cooling machine.
- Hold the venting grid, pull out and remove.
- Slide a short piece of tube onto the drain port (11) and hold it into a pail.
  (only F25, F26)
- Unscrew the drain tap (12) and empty the unit completely.
- Tighten the drain tap.

Notice: Draining

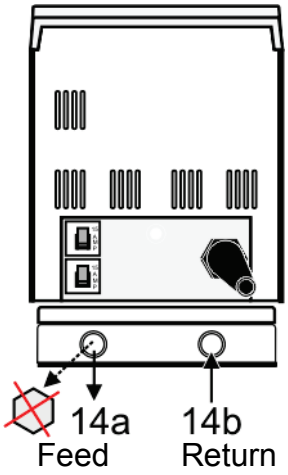
Do not drain the bath fluid while it is hot!
Recommendation: Temperature range 5 °C to 40 °C

Check the temperature of the bath fluid prior to draining (by switching the unit on for a short moment, for example).

5.4. Temperature application to external systems

Caution:
Securely attach all tubing to prevent slipping.

If the circulator is operated without external system, close the pump connector (14a) with the cap nut.



The circulator is used for temperature application to external, closed systems (temperature loop) with simultaneous bath internal temperature application.

Connecting an external system:

- Unscrew the collar nut from the pump connector (14a).
- Slide the tubing onto the pump connectors for feed and return flow (14a, 14b). Secure the tubing with tubing clamps.

ⓘ Use tubing insulation.

5.5. 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
8970480		2 Tubing clamps, size 1 for tubing 8 mm ID	
8970481		2 Tubing clamps, size 2 for tubing 10 or 12 mm ID	

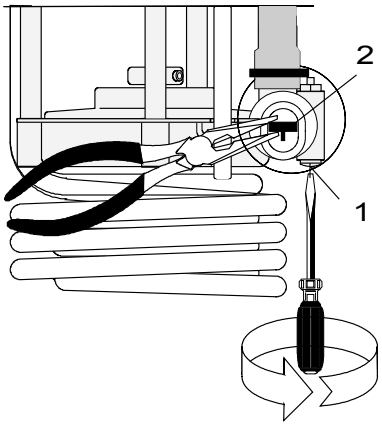
Warning: Tubing:
At high working temperatures the tubing used for temperature application and cooling water supply represents a danger source.
A damaged tubing line may cause hot bath fluid to be pumped out within a short time.
This may result in:

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

Safety recommendations

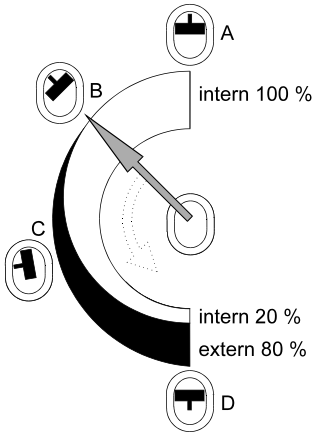
- Employ suitable connecting tubing.
- Make sure that the tubing is securely attached.
- Avoid sharp bends in the tubing, and maintain a sufficient distance from surrounding walls.
- Regularly check the tubing for material defects (e.g. for cracks).
- Preventive maintenance: Replace the tubing from time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

5.6. 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)

6. Operating procedures

6.1. Power connection

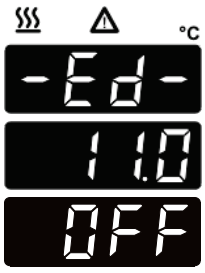
Caution:

- Only connect the unit to a power socket with earthing contact (PE – protective earth)!
- The power supply plug serves as safe disconnecting device from the line and must be always easily accessible.
- Never operate equipment with damaged mains power cables.
- Regularly check the mains power cables for material defects (e.g. for cracks).
- 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.

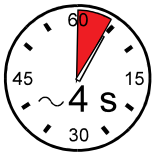
- Connect the circulator with mains power cable (10a) to the mains outlet (17).
- Connect the refrigerated circulator with mains power cable (10b) to the mains socket.

6.2. Switching on / Start – Stop



- **Switching on:**
  Circulator and cooling machine may be turned on and off with separate mains switches. The integrated control light will illuminate to indicate that power has been applied.

- The unit performs a self-test. The segments of the 4-digit LED temperature DISPLAY and all indicator lights will illuminate (as illustrated on the left).
  Then the software version (example: 11.0) appears. The display „**OFF**“ indicates the unit is ready to operate. (standby mode).



Start:

- Press the OK key **for about 4 seconds.**
  The LED temperature DISPLAY indicates the actual bath temperature.

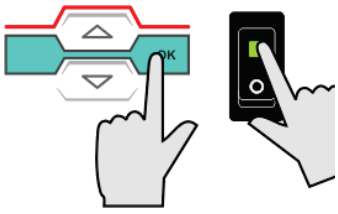
Stop:

- Press the OK key for about 4 seconds.

- Turn the unit off with the mains power switch.

Caution:
If the circulator is turned off with the mains switch (1a), the refrigerating unit is not switched off simultaneously.
Turn off the refrigerating unit with the mains switch (1b) as well.
Danger of freezing when water is used as bath fluid!

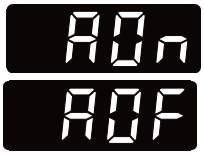
6.3. Automatic / non-automatic start mode



❶ Keep depressed the OK key and

❷ 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.

6.4. Setting the temperatures

Factory setting: 25 °C

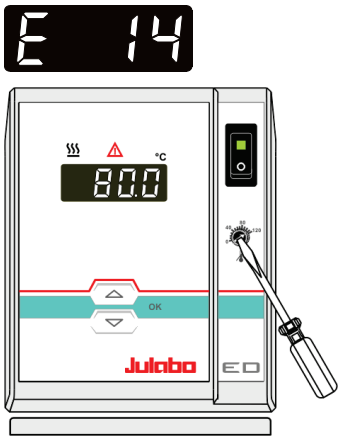
ⓘ Setting can be carried out in the start/stop condition.

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 the OK key to store the value.

6.5. Safety installations according to IEC 61010-2-010

Check the safety installations at least twice a year (see page 17)!

6.5.1. 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 "**E**rro **14**".

Setting range: 20 °C to 120 °C

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

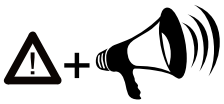
Recommendation:
Set the excess temperature protector at 5 to 10 °C above the working temperature setpoint.

6.5.2. Low liquid level protection

This safety installation is independent of the control circuit.
If the low liquid level protection device 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 "**E**rror **01**".

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

7. 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.

Press the **OK** key to quit the audible signal.

- The circulator is operated without bath fluid, or the liquid level is insufficient.
  Replenish the bath tank with the bath fluid.
- Tube breakage has occured (insufficient filling level due to excessive bath fluid pumped out). Replace the tubing and replenish the bath tank with the bath fluid.

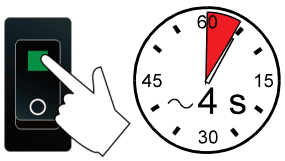
- Cable of the working temperature sensor interrupted or short-circuited.

- Defect of the working or excess temperature sensor.
  Working temperature and excess temperature sensors report a temperature difference of more than 35 K.

- Error in A/D converter

- The excess temperature value lies below the working temperature setpoint.
  Set the excess temperature to a higher value.

- Cable of the excess temperature sensor interrupted or short-circuited.



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.

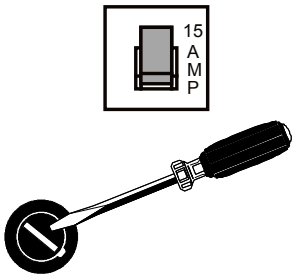
Disturbances that are not indicated.

Pump motor overload protection

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

Cooling compressor overload protection

The motor of the cooling compressor is equipped with an overload protector, which will be activated by excessive temperature in the capsule or by excessive current consumption. Poor air circulation (distance to walls, dirt accumulated on condenser) may cause the motor to be disconnected. After a short cooling interval, the motor will be automatically reconnected.



Circulator: Mains circuit breakers (resettable) 15 A

Cooling machine: Fuse T 10.0 A, dia.5 x 20 mm

The mains fuses on the rear of the unit may easily be exchanged as shown on the left.

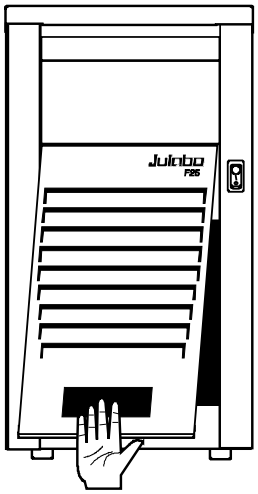
Warning:
Before exchanging the fuses, turn off the mains power switch and disconnect the power plug from the mains socket!
Only use fine fuses with a nominal value as specified.

Example:

Manufacturer	Supplier	Type	Order No.
Wickmann	Wickmann	G- fuse insert T10,0A 5x20 mm	No. 19195

8. 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.



To maintain the full cooling performance, clean the condenser from time to time.

- Switch off the unit, disconnect mains power cable.
- Hold the venting grid, pull out and remove.
- Clean the ribbed condenser with a vacuum cleaner.
- Replace the venting grid.
- Switch on the unit.

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 instrument 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.
- 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.