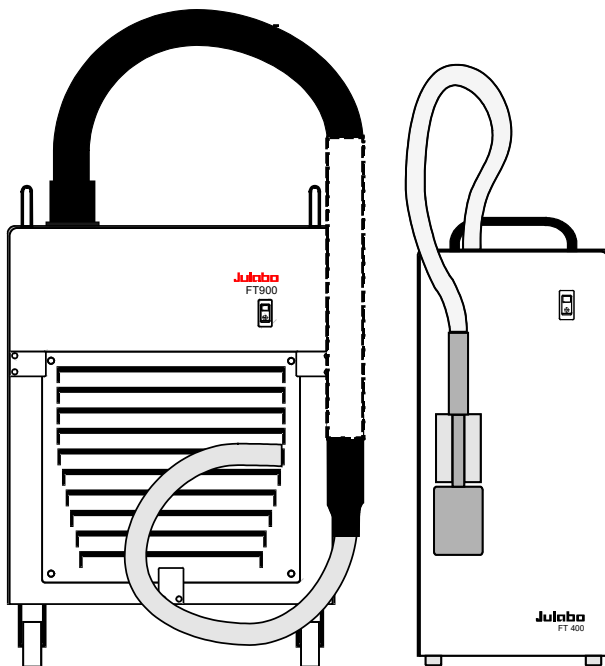


English

OPERATING MANUAL

Immersion Coolers
FT200 FT400 FT900

Flow-Through Cooler
FD200



Julabo
THE TEMPERATURE CONTROL COMPANY

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

Unpacking and inspecting

Unpack the immersion cooler 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.

Important: keep original operating manual for future use

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1. Intended use

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

For example: Dewar vessels, beakers, or other containers in conjunction with heating circulators for continuous countercooling or for dry-ice substitution.



JULABO immersion coolers 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 JULABO immersion coolers FT200, FT 400 and FT900 are employed to cool liquids for working temperatures ranging from +50 °C to -90 °C, such as in:

Dewar vessels, beakers, or other containers
in conjunction with heating circulators for continuous countercooling
or for dry-ice substitution.

The JULABO FD200 Flow-Through Cooler is employed to cool liquids in closed circuits. This unit is generally installed at the intake of a heating circulator to draw heat away from the circulating bath liquid.

Models FD200, FT200 and FT400 are provided with a handle for portable use.

Model FT900 is equipped with four castors. Two of the castors include locking levers that should be pressed down after setting up the unit to prevent it from moving.

The immersion probe is connected to the instrument with a flexible, specially insulated tube. On model FT900 the immersion probe is also flexible and may be adjusted precisely to different positions within the vessel.

2. Operator responsibility – Safety instructions

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.

The operator is responsible for the qualification of the personnel operating the units.

- The personnel operating the units should be regularly instructed about the dangers involved with their job activities as well as measures to avert these dangers.
- Make sure all persons tasked with operating, installing, and maintaining the unit have read and understand the safety information and operating instructions.
- When using hazardous materials or materials that could become hazardous, the circulator may be operated only by persons who are absolutely familiar with these materials and the circulator. These persons must be fully aware of possible risks.

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

Contact	JULABO USA, Inc. 884 Marcon Boulevard Allentown, PA 18109	Phone: +1 (610) 231 0250 Fax +1 (610) 231 0260 info@julabo.us www.julabo.us
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Safety instructions for the operator:

- Avoid strikes to the housing, vibrations, damage to the operating-element panel (keypad, display), and contamination.
- Make sure the product is checked for proper condition regularly (depending on the conditions of use). Regularly check (at least every 2 years) the proper condition of the mandatory, warning, prohibition and safety labels.
- Make sure that the mains power supply has low impedance to avoid any negative effects on the instruments being operated on 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 affect other devices with components sensitive to magnetic fields (e.g., monitors). We recommend maintaining a minimum distance of 1 m.
- Permissible ambient temperature: max. 40 °C, min. 5 °C.
- Permissible relative humidity: 50 % (40 °C).
- Do not store the unit in an aggressive atmosphere. Protect the unit from contamination.
- Do not expose the unit to sunlight.

Appropriate operation

Only qualified personnel is authorized to configure, install, maintain, or repair the circulator. Persons who operate the circulator must be trained in the particular tasks by qualified personnel. The summarized user guidance (short manual) and the specification table with information on individual parameters are sufficient for this.

Use

The bath can be filled with flammable materials. Fire hazard!

There might be chemical dangers depending on the bath medium used.



Observe all warnings for the used materials (bath fluids) and the respective instructions (safety data sheets).

Insufficient ventilation may result in the formation of explosive mixtures. Only use the unit in well ventilated areas.


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

Operator responsibility – Safety instructions

When using hazardous materials or materials that could become hazardous, the operator must affix the enclosed safety labels (1 + 2) to the front of the unit so they are highly visible:

1		Danger area. Attention! Observe instructions. (operating manual, safety data sheet)
2		Carefully read the user information prior to beginning operation.

Particular care and attention is necessary because of the wide operating range. There are thermal dangers: Touchable parts of the probe can be very cold. The user must attach the enclosed safety labels to the unit so they are well visible.

	Attention: Do not touch cold probe.
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2.1. Disposal

The product may be used with oil as bath fluid. These oils fully or partially consist of mineral oil or synthetic oil. For disposal, follow the instructions in the material safety data sheets.

This unit contains refrigerants, which at this time are not considered harmful to the ozone layer. However, over the long operating period of the unit, disposal rules may change. Therefore, only qualified personnel should handle the disposal.



Valid in EU countries

See the current official journal of the European Union – WEEE directive. Directive of the European Parliament and of the Council 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!

2.2. Warranty conditions

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

Initial Warranty

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

EXCLUSION OF ALL OTHER EXPRESS WARRANTIES; EXCLUSION OF ALL IMPLIED WARRANTIES.

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

Exclusions

The Initial Warranty does not include damage to the product resulting from accident, misuse, improper installation or operation, unauthorized or improper repair, replacement or alteration (including but not limited to repairs, replacements, or alterations made or performed by persons other than Seller's employees or authorized representatives), failure to provide (or use of improper) maintenance, unreasonable or unintended use or abuse of the product, or failure to follow written installation or operating instructions.

Buyer must return the product's record of purchase to the Seller or one of Seller's authorized representatives within thirty (30) days of the date the product is shipped by Seller to Buyer in order to make a claim under the Initial Warranty. Notwithstanding anything contained herein to the contrary, all glassware, including but not limited to reference thermometers, are expressly excluded from the Initial Warranty.

Buyer's sole remedies; Limitations on Seller's Liability

Buyer's sole and exclusive remedy under the Initial Warranty is strictly limited, in Seller's sole discretion, to either: (i) repairing defective parts; or (ii) replacing defective parts. In either case, the warranty period for the product receiving a repaired or replaced part pursuant to the terms of the Initial Warranty shall not be extended. All repairs or replacements performed by Seller pursuant to these Warranty Provisions shall be performed at one of the Seller's facility in Allentown, Pennsylvania, U.S.A. or at the facility of an authorized representative of Seller, which location shall be determined by Seller in its sole discretion; provided, however, that Seller may, in its sole discretion perform such repairs or replacements at Buyer's facility in which case Buyer shall pay Seller's travel, living and related expenses incurred by Seller in performing the repairs or replacements at Buyer's facility. As a condition precedent to Seller's obligation to repair or replace a product part under the Initial Warranty, Buyer shall (i) promptly notify Seller in writing of any such defect; (ii) shall have returned the product's record of purchase to Seller or to Seller's authorized representatives within thirty (30) days of the date the product is shipped by the seller; and (iii) assist Seller in all respects in its attempts to determine the legitimacy and basis of any claims made by or on behalf of Buyer including but not limited to

Operator responsibility – Safety instructions

providing Seller with access to the product to check operating conditions. If Buyer does not provide such written notice to Seller within the Initial Warranty period or fails to return the product's record of purchase as set forth above, Seller shall have no further liability or obligation to Buyer therefor. In no event shall Seller's liability under the Initial Warranty exceed the original purchase price of the product which is the subject of the alleged defect.

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

Assignment

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

Governing Law

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

Waiver

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

Freight

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

Out of Box Failure (OBF)

An Out of Box Failure (OBF) is defined as a product failure immediately following unpacking and installation of a newly delivered product. JULABO provides a 14-day grace period after the date of shipment, during which time the delivered product must be checked for defect. The same exclusions that apply to the regular warranty also apply to OBF classification. For example, JULABO will not be liable for transport damage, damage inflicted by the customer or any other party, or defects arising from improper installation or usage.

2.3. Technical specifications

		FT200	FD200
Temperature range	°C	-20 ... +30	10 ... +30
Cooling capacity (medium ethanol)	$\frac{^{\circ}\text{C}}{\text{kW}}$	<u>+20 0 -30</u> 0.25 0.15 0.04	<u>+20 +10</u> 0.22 0.18
Refrigerant		R134a	R134a
Recommended flow rate	l/min	-----	2 ... 3
Freezing protection	°C	-----	10
Immersion probe (Lxdia.)	cm	9x4	-----
Connection tubing (L)	cm	120	-----
Dimensions (WxLxH)	cm	18x27x39	18x27x39
Weight	kg	18	16
Ambient temperature	°C	5 ... 35	5 ... 35
Mains power connection	V/Hz	230/50	230/50
Current draw (at 230 V)	A	2.0	2.0
Mains power connection	V/Hz	115/60	115/60
Current draw (at 115 V)	A	3.0	3.0

		FT400	FT900
Temperature range	°C	-40 ... +30	-90 ... +30
Cooling capacity (medium ethanol)	$\frac{^{\circ}\text{C}}{\text{kW}}$	<u>+20 +10 -20 -40</u> 0.45 0.36 0.14 0.03	<u>+20 +10 -40 -80</u> 0.3 0.27 0.2 0.07
Cooling compressor		1-stage	2-stage
Refrigerant		R404A, R452A*	R404A/R23
Immersion probe (Lxdia.)	cm	12x5	65x1.5 (flexible)
Connection tubing (L)	cm	120	160
Dimensions (WxLxH)	cm	20x30x43	38x55x60
Weight	kg	24	50
Ambient temperature	°C	5 ... 35 (32*)	5 ... 35
Mains power connection	V/Hz	230/50	230/50/60
Current draw (at 230 V)	A	3.0	6.0
Mains power connection	V/Hz	115/60	115/60
Current draw (at 115 V)	A	4.0	12.0

* at 230 V / 50 Hz

All measurements have been carried out at rated voltage and frequency. Ambient temperature 20 °C.

Environmental conditions according to IEC 61 010-1:

Use indoors only.

Altitude up to 2000 m - normal zero.

Ambient temperature: see Technical specifications

Humidity:

Max. relative humidity 80% for temperatures up to +31 °C,
linear decrease down to 50% relative humidity at a temperature of +40 °C

Max. mains voltage fluctuations of $\pm 10\%$ are permissible.

Protection class according to IEC 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.

EMC requirements

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

NOTICE:

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

Information about the used refrigerants

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

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

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

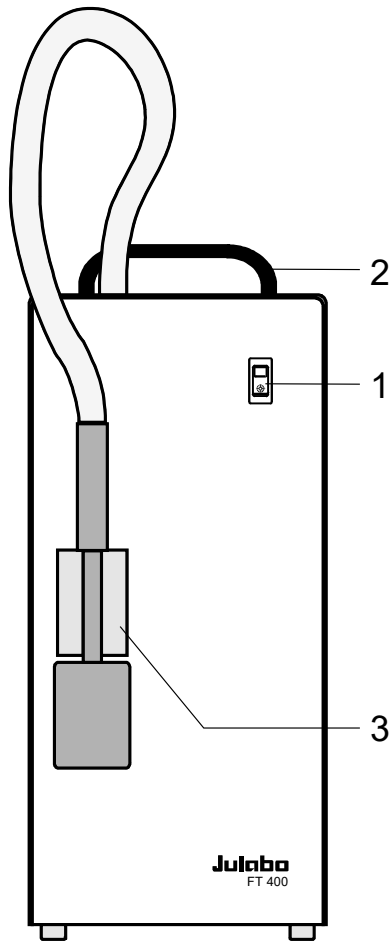
Under Regulation 517/2014, the operator of a system of this nature has the following duties:

- The operator must ensure that the equipment is checked at regular intervals for leaks.
- These intervals depend on the CO₂ equivalent of the system. This is calculated from the refrigerant fill volume and type of refrigerant. The CO₂ equivalent of your system is shown on the model plate.
- The operator undertakes to have maintenance, repair, service, recovery and recycling work carried out by certified personnel who have been authorized by JULABO.
- All such work must be documented. The operator must keep records and archive them for at least five years. The records must be submitted to the relevant authority on request.

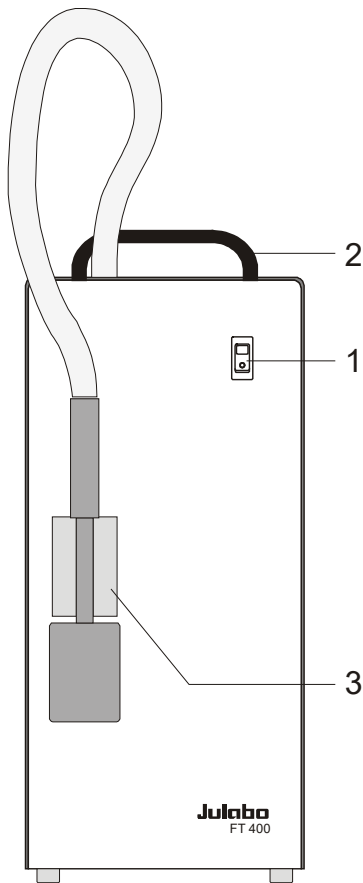
Refer to the text of the Regulation for further information.

3. Operating and functional elements

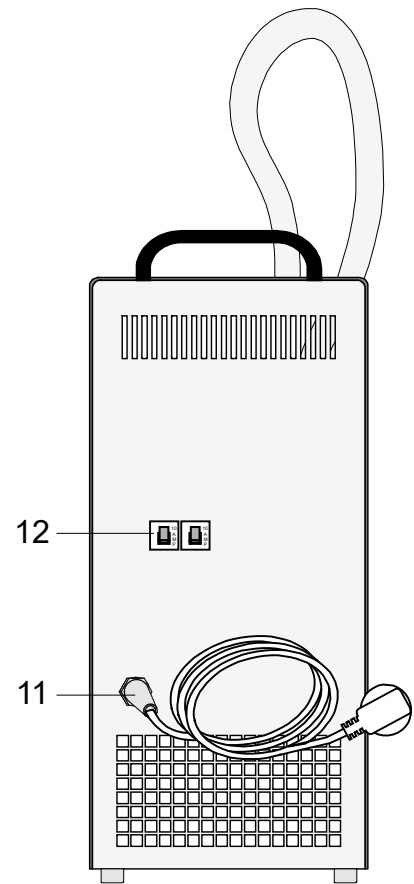
FT400





FT200

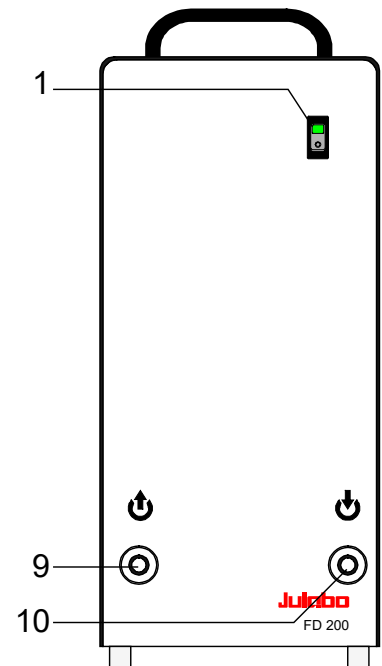


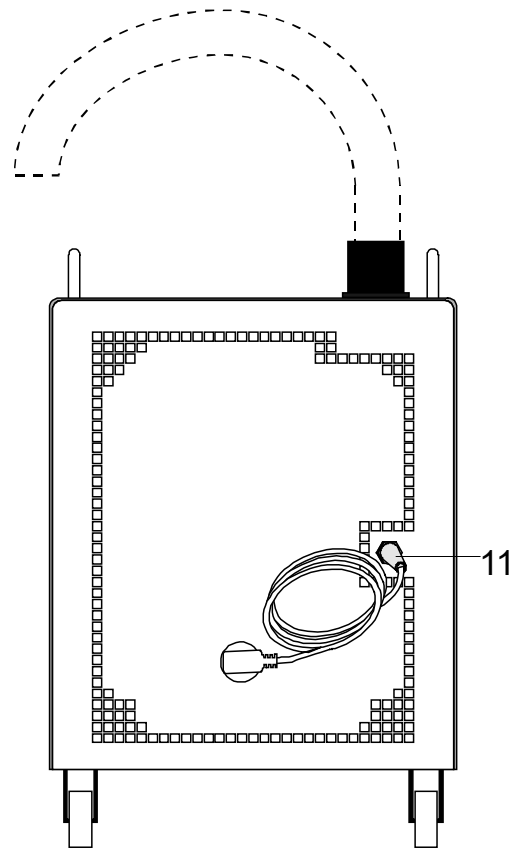
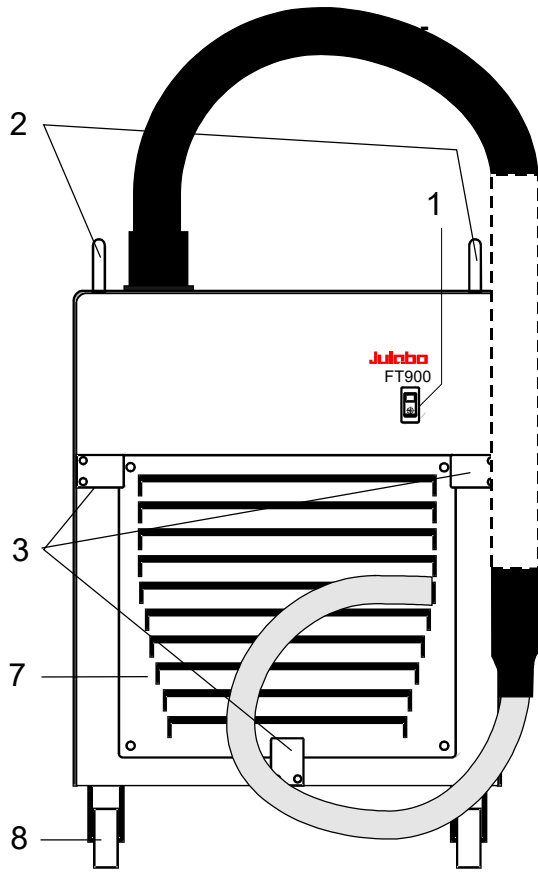
Rear view



- 1 Mains switch, illuminated
- 2 Cooling control light
- 3 Clamp for immersion probe
- 7 Removable ventilation grid
- 8 Castor with locking lever
- 9 Tube connection - discharge 
- 10 Tube connection - intake 
- 11 Mains power cable with plug
- 12 Safety cutouts: Mains fuses 10 A

FD200







4. Safety notes for the user


4.1. Warnings


The manual contains warnings to increase safety when using the device. Warnings must always be observed.

A warning sign displayed in signal color precedes the signal word. The signal word, highlighted in color, specifies the severity of the hazard.



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

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

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

	NOTE
	This signal word designates a possibly harmful situation. If it is not avoided, the system or objects in its vicinity may be damaged.

4.2. Explanation of other notes

	Note! Draws attention to something special.
	Important! Indicates usage tips and other useful information.

4.3. Safety instructions

Follow the safety instructions to avoid personal injury and property damage. Also, the valid safety instructions for workplaces must be followed.



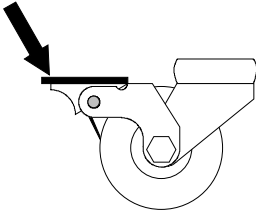
- Only connect the unit to a power socket with an earthing contact (PE – protective earth)!
- The power supply plug serves as a safe disconnecting device from the line and must always be easily accessible.
- Place the unit on an even surface on a base made of nonflammable material.
- Do not stay in the 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.
- Do not touch the immersion probe if it is frosted.
- Do not bend the tube connection of the immersion probe
- Keep the air intake and exhaust grids free of obstructions. (Maintain a sufficient distance from all surrounding surfaces!)
- Do not move the unit from the position where it was set up during operation.
- 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 turn off the unit and disconnect the mains cable from the power source before cleaning the unit.
- Transport the unit with care.
- Sudden jolts or drops may cause damage in the interior of the unit.
- Observe all warning labels.
- Never remove warning labels.
- Never operate units with damaged mains power cables.
- Repairs are to be carried out only by qualified service personnel.



- There are thermal dangers: Touchable parts of the probe can be very cold. Therefore, exercise particular caution when touching these parts. Use gloves.

5. Preparations

5.1. Installation



- Place the unit on an even surface on a pad made of non-flammable material.
- Press down the castor levers on model FT900.
- The instrument should be set up at a frost-proof and dry location.
- 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 rejects to the environment.

For a fault (leakage) in the refrigeration system, the standard EN 378 prescribes a certain room space to be available for each kg of refrigerant.

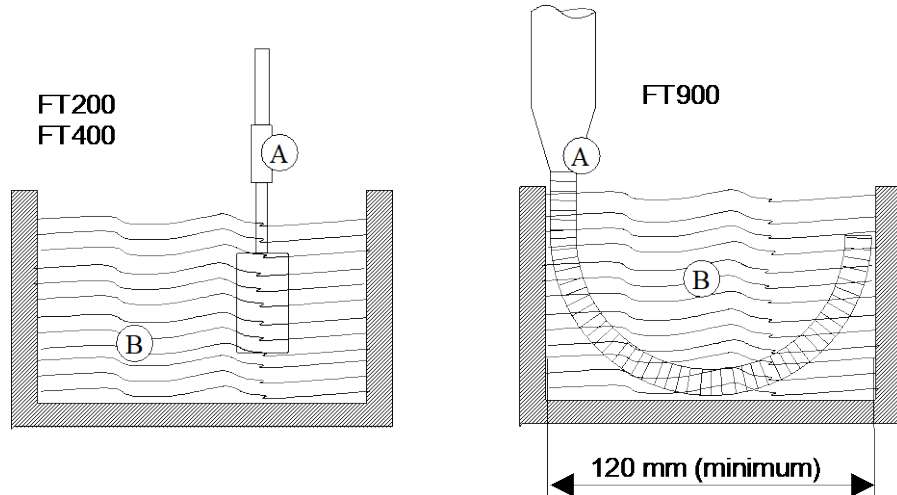
- > For 0.25 kg of refrigerant R134a, 1 m³ of space is required.
- > For 0.52 kg of refrigerant R404A, 1 m³ of space is required.
- > For 0.423 kg of refrigerant R452A, 1 m³ of space is required.
- > For 0.68 kg of refrigerant R23, 1 m³ of space is required.
- The ambient temperature must not exceed 35 °C (32 °C at units with R452A).
- 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.

5.2. Immersion Probe



Avoid touching the immersion probe if it is frosted.
DANGER OF INJURY. Use gloves.
Switch the unit on only if the probe is immersed into the bath fluid.

To prevent the immersion probe (A) from icing, it should be completely immersed into the bath liquid (B).



Accessory: Clamp for cooler probe FT200/400 - order no. 8 970 400

5.3. Tube connection FD200



- Connect the tubes and secure with tube clamps.
discharge (9)
intake (10)

Recommended flow rate: 2 to 3 l/min

6. Initial Operation

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

Make sure that the line voltage and frequency match the supply voltage specified on the type plate.
Deviations of $\pm 10\%$ are permissible.

6.2. Switching On



- The immersion cooler is turned on and off with the mains switch. (1).
The control light in the switch will illuminate.



The immersion probe – as part of the cooling circuit – should not be exposed to bath temperatures above the working temperature of the immersion cooler. This would cause damage to the compressor.
Do not immerse a frosted immersion probe into hot bath oil.
DANGER OF INJURY!

7. Troubleshooting

- **Malfunction of compressor:**
The cooling compressor is equipped with an overload protection device that will be triggered by overheating or excessive current consumption. Possible causes include insufficient ventilation or contamination of the condenser. After a cool-down phase, the motor is automatically switched on again.
- **Interruption of the cooling loop (FD200)** by a bended tube.

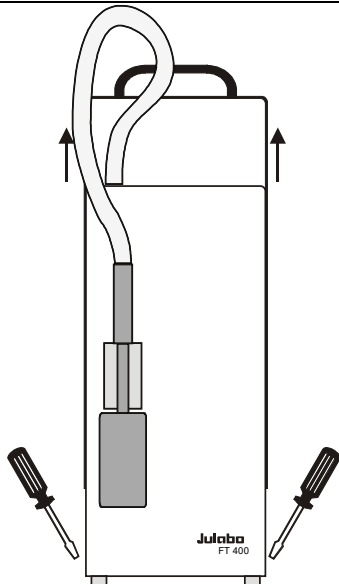
8. Cleaning/repairing the unit



Caution:

Before cleaning the unit, disconnect the power plug from the mains socket! Always turn off the unit and disconnect the mains cable from the power source before performing any service or maintenance procedures. Service and repair work may be performed only by authorized electricians. Prevent humidity from entering into the immersion cooler.

Cleaning/repairing the unit



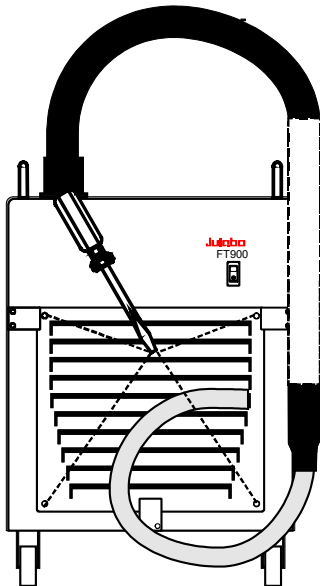
JULABO coolers are designed for continuous operation under normal conditions.

Periodic maintenance is not required.

Regularly check the condenser for dirt contamination. Clean the ribbed condenser, because dust and dirt will reduce cooling performance of the unit.

Cleaning the Cooling Compressor:

- Switch off the unit, disconnect mains power cable.
- Remove the hood (FD200, FT200, FT400).
- The ventilation grid (7) is detached by unscrewing the four mounting screws (FT900).
- Clean the ribbed condenser with a vacuum cleaner.
- Replace the hood or the ventilation grid.
- Switch on the unit.



Clean the outside of the unit using a wet cloth and low surface tension water.

Repairs:

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

JULABO Technical Service

Phone: +1(610) 231-0250 Option 3

Fax: +1(610) 231-260

E-mail: Service@julabo.us

When returning the unit:

- Clean the unit in order to avoid any harm to the service personnel.
- Attach a short fault description.
- 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.