Julabo MV-Basis

Circulator Head

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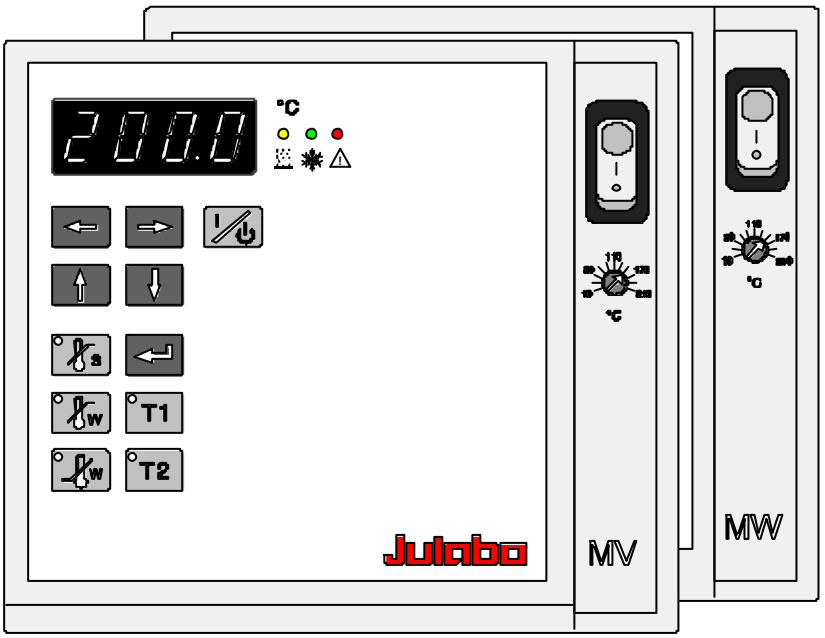
Circulators

MV-4/ MV-6/ MV-12/ MV-26

MW-4/ MW-6/ MW-12/ MW-26

MW-Z



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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.

Safety Warnings

Take care your unit is operated only by qualified persons.
Make sure you read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions concerning the operation of your unit or the information in this manual, contact JULABO.
Performance of installation, operation, or maintenance procedures other than those described in this manual may result in a hazardous situation and may void the manufacturer's warranty.
Transport the unit with care. Sudden jolts or drops may cause damages in the interior of the unit.
Observe all warning labels.
Never remove warning labels.
Never operate damaged or leaking equipment.
Never operate the unit without bath fluid in the bath.
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.
Refer service and repairs to a qualified technician.

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. Read and follow these important instructions. Failure to observe these instructions can result in permanent damage to the unit, significant property damage, personal injury or death.

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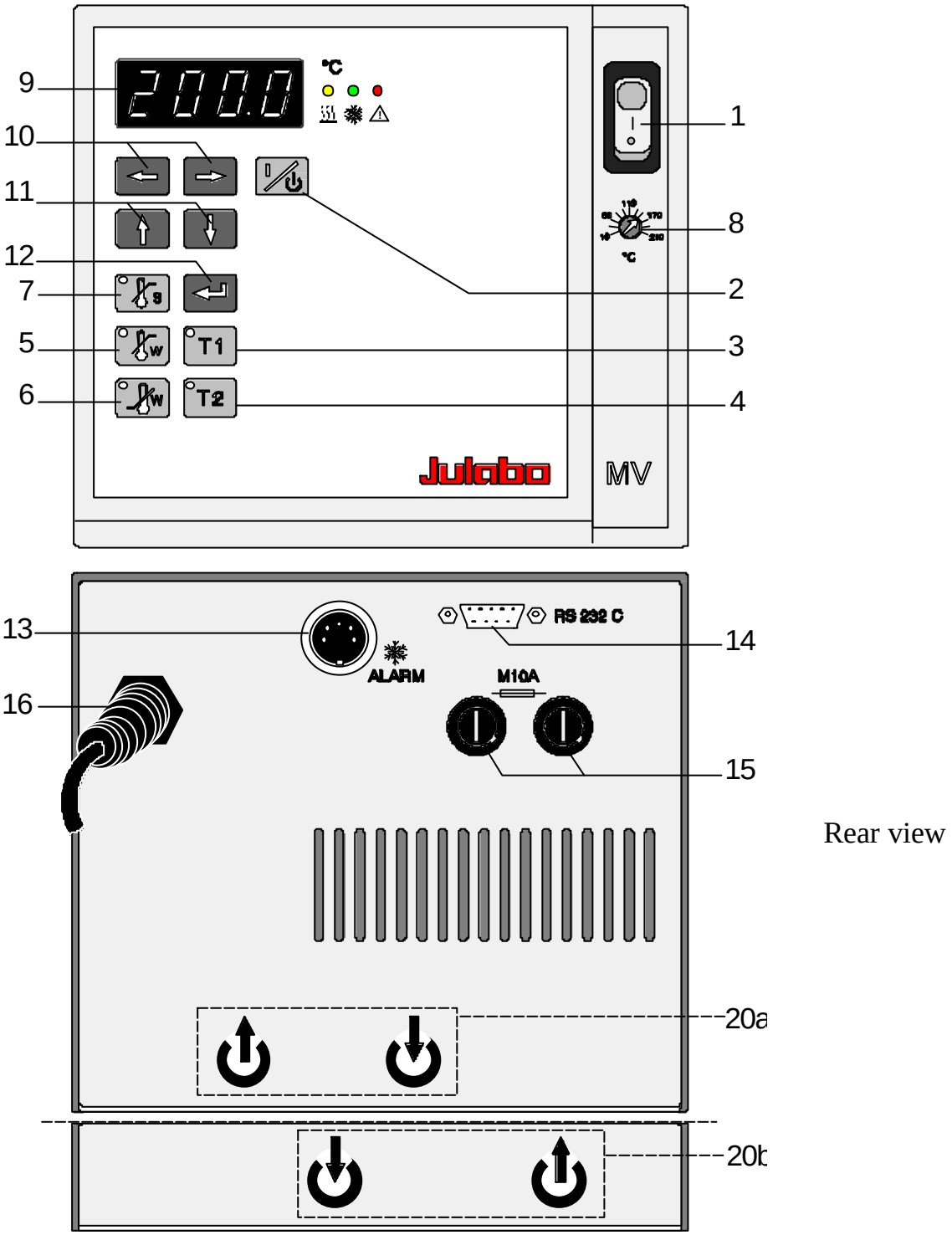
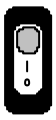
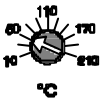
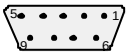
1. Operating controls and functional elements



Rear view

20a MV Feed Return

20b MW Suction pump Pressure pump

1		Mains power switch, illuminated
2		Start / stop key
3		Working temperature T1
4		Working temperature T2
5		High temperature warning limit
6		Low temperature warning limit
7		Safety temperature
8		Adjustable excess temperature protection (safety temperature)
9		MULTI-DISPLAY (LED) temperature indication
10		Cursors left/right
11		Edit keys (increase/decrease setting)
12		Enter key (store)
		Indicator light - Alarm
		Indicator light - Cooling (not operational)
		Indicator light - Heating
13		Connector: alarm output
14		RS232C interface
15		Mains fuses, fuse holders
16		Mains power cable with plug
20a		Pump connectors on MV
20b		Pump connectors on MW

2. Quality Management System

The JULABO **Q**uality **M**anagement **S**ystem:
Development, production and distribution of temperature application instruments for research and industries conform to the requirements according to DIN EN ISO 9001:1994-08.
Certificate Registration No. QA 051004008.

3. 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.

4. Description

The JULABO circulators are suitable for temperature application to liquids in a bath tank.
The main functional elements are the heater, circulation pump, and control electronics. An electronic proportional temperature control (PID characteristic) adapts the heat supplied to the thermal requirements of the bath.

Setting is rapid and simple using the keypad with its easy to learn symbols. Keypad is splash-proof, easily cleaned and ergonomically designed.
The microprocessor technology allows four temperature values to be stored and indicated on the MULTI-DISPLAY (LED): working temperatures T1 and T2, high and low temperature warning limits.

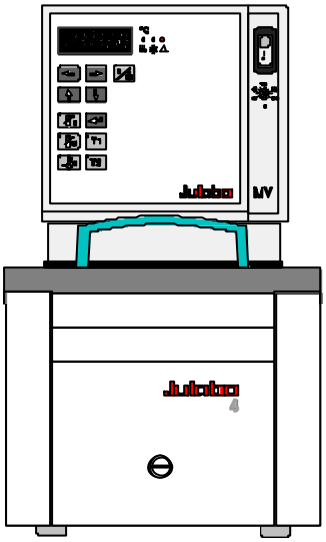
The safety value for excess temperature protection, a safety installation independent from the control circuit, is adjustable on the front and visible on the MULTI-DISPLAY (LED).

The RS232C port permits modern process engineering without additional interface, directly on-line, from the circulator to your application equipment.

The circulator conforms to the safety requirements specified by DIN 12 876 (safety class III), as well as DIN 58 966, and the guideline for first voltage range EN 61010.

5. Preparations

5.1. Installation



Heating circulators

- Place the circulator in an upright position.

Bridge mounted circulator

- Place the bath tank in an upright position.
- Adjust the bridge to width of the bath tank and place it on the bath tank.
  Bridge is extendable from 310 mm to 660 mm.

5.2. Bath liquids and tubing

Operation with **flammable** bath liquids permitted.

- Recommended bath liquids:

Bath liquids	Temperature range	Flash point	fire point
Thermal M	+50 °C ... 170 °C	>275 °C	>320 °C
Thermal H	+50 °C ... 250 °C	>280 °C	>350 °C
deionized water	5 °C bis 80 °C		

ATTENTION: The maximum permissible viscosity is 30 $mm^2 \times s^{-1}$.

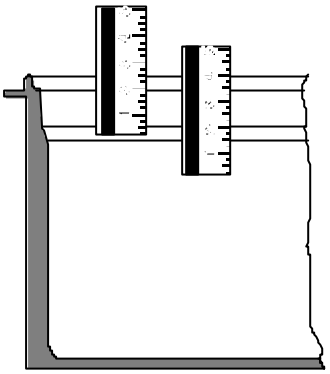
No liability for use of other bath liquids!

Order No.	Bath liquid	
8 940 100	Thermal M	10 liters container
8 940 101	Thermal M	5 liters container
8 940 102	Thermal H	10 liters container
8 940 103	Thermal H	5 liters container

• Recommended tubing:

	Temperature range
CR tubing	-20 °C to +120 °C
Viton tubing	-50 °C to +200 °C

5.3. Filling / draining



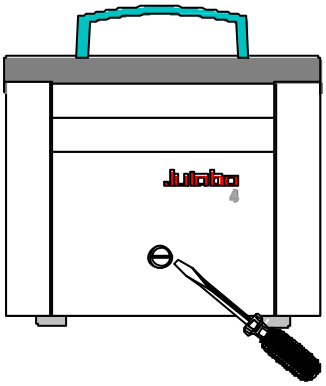
Filling

Take care that no liquid enters the interior of the circulator.

- Recommended maximum filling level with water as bath liquid: 25 mm below the tank rim
- Recommended maximum filling level with bath oils: 40 mm below the tank rim

ATTENTION: the volume of bath oils will increase due to thermal expansion when the bath temperature rises.

Exercise CAUTION when emptying hot bath liquids!



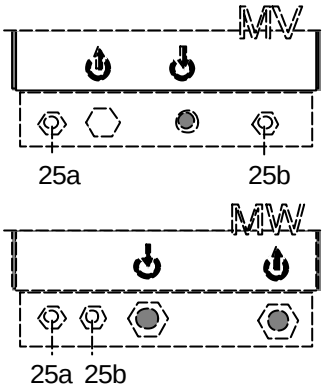
Draining

- Press the mains switch to turn the circulator off.
- Place the heating circulator near the rim of the table. Use a suitable vessel as recipient for the bath liquid.
- A drain plug is located on the front of the bath tank that is unscrewed to drain the bath.

- Remove the bridge mounted circulator from the bath tank.
- Empty the bath tank.

Store and dispose the used bath liquid according to the laws for environmental protection.

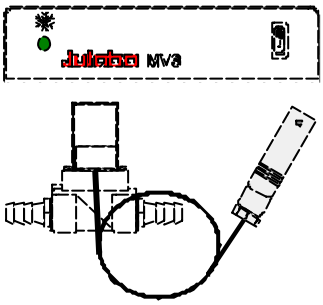
5.4. Countercooling



For applications near the ambient temperature, the cooling coil must be connected to the water mains.

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).

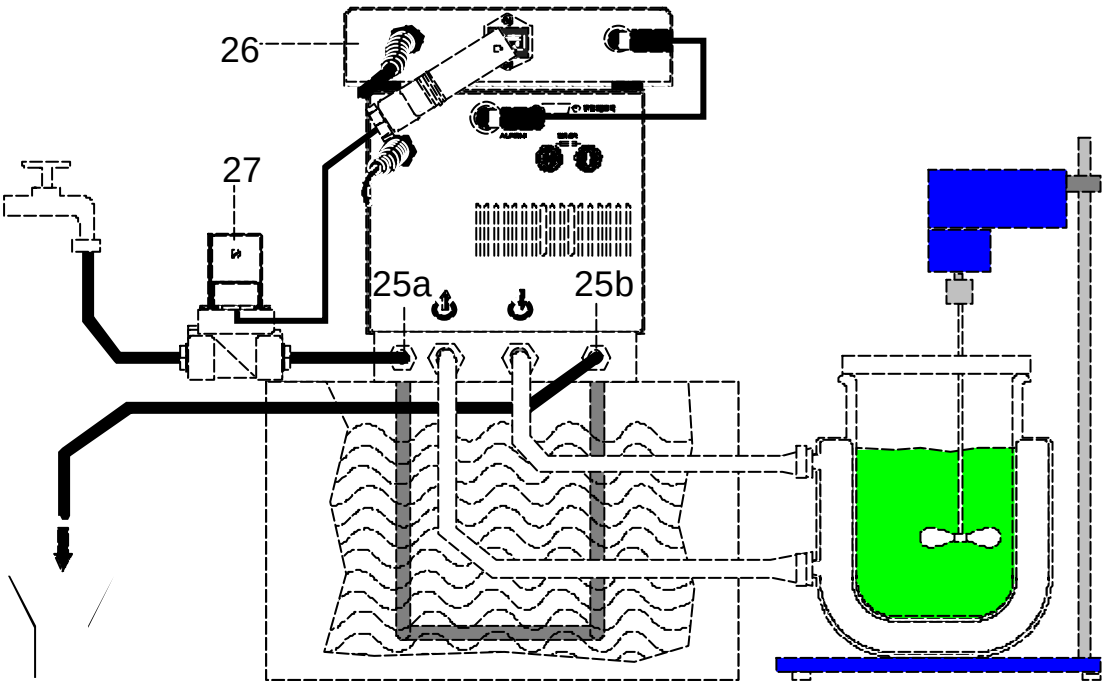
A specific water flow rate of 130 ml/minute (MW) or 100 ml/minute (MV) is sufficient to compensate for the characteristic temperature.

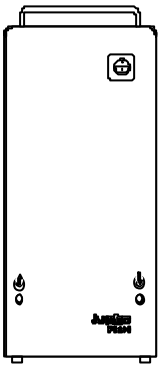


By installing the MVS controller (26) and a solenoid valve (27), sudden temperature increases can be rapidly reversed by tap water flowing through the built-in cooling coil.

Low water consumption: For applications requiring constant near-ambient temperature, tap water is only used in small amounts. Configuration see page 22.

Order No.	Description
9 790 000	MVS controller
8 980 700	Solenoid valve, 220 V





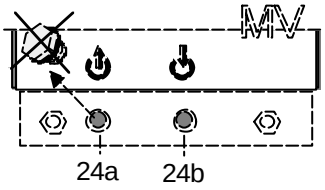
NOTE: Flow-through cooler

Order No.	Description
9 655 825	FD200

The FD200 is suitable as cooling device for liquids in closed circuits (loops).
This unit is integrated in the return flow circuit from the external system connected to a circulator, and continuously withdraws heat from the liquid.

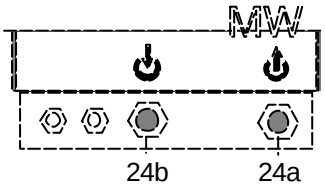
5.5. Temperature application to external systems

Temperature application to external, closed systems.
The circulator is used for temperature application to external, closed systems (loop circuit) with simultaneous temperature application in the circulator bath.

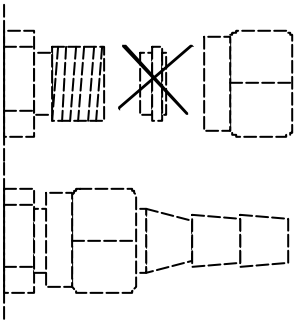


Connecting the external system:

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



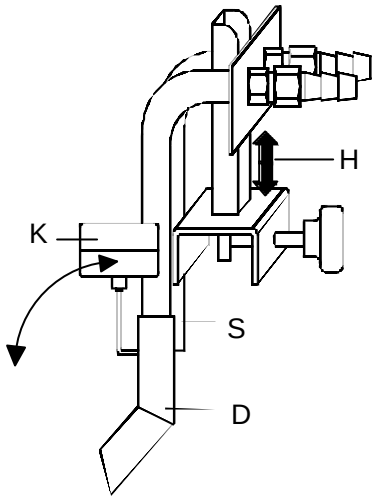
- Unscrew the M 16 x 1 collar nuts on the pump connectors (pressure pump 24a, suction pump 24b) with a 19 mm (3/4") wrench and remove the sealing disks. Using the collar nuts, screw on the tubing connection fittings delivered with the unit (8 mm or 12 mm in diameter) and tighten firmly.



- Push on the tubings, and secure with tube clamps.

- Attach the tubings to the connectors of the external closed system, e.g., an instrument with a pressure-resistant temperature jacket or a temperature coil, and fasten with tube clamps to prevent slipping.

Temperature application to external, open systems



S = Suction pump connection

D = Pressure pump connection

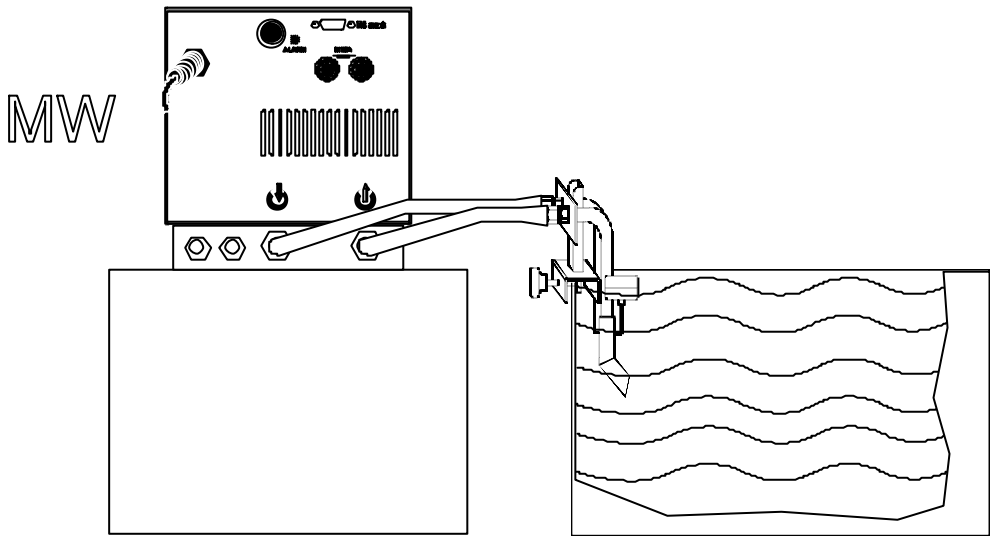
K = Float

H = Height adjustment

MW circulators are equipped with both a pressure and suction pump for external temperature application in open systems.
Connections are to be made as described on page 10.

Differing flow rates of the pressure and suction pumps should be compensated. To maintain a constant liquid level, the JULABO "D+S" Level Adapter is recommended for the external bath tank. The flow rate of the pressure pump (24a) will be then regulated by a built-in float device. The liquid level may be changed by a height adjustment on the "D+S" Level Adapter.

Order No. 8 970 410 "D+S" Level Adapter

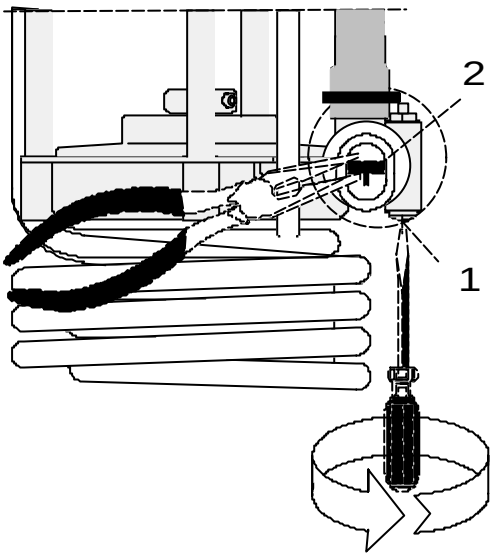


Note: If the liquid levels in the circulator bath and the external system are at different heights, overflowing must be prevented after the power has been turned off. Close off both connection tubings with standard pinchcocks or shut-off valves

Order No.	Description
8 970 456	Shut-off valve (suitable up to +90 °C)
8 970 457	Shut-off valve (suitable up to +250 °C)

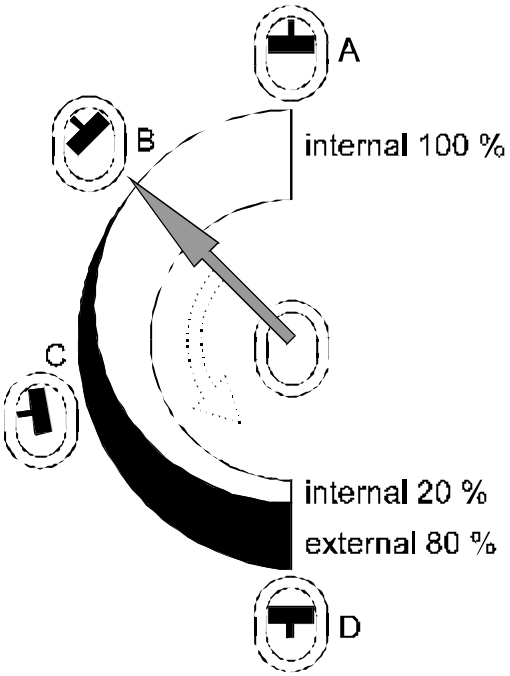
Fasten tubing to prevent slipping.

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 liquid)

External/internal applications

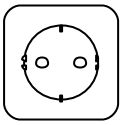
C 40 % external discharge, 60 % internal circulation (for large bath tanks)

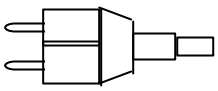
D 80 % external discharge, 20 % internal circulation (for small bath tanks)

6. Operating procedures

6.1. Power connection

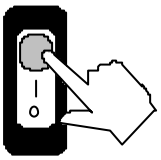
Connect the unit only to a grounded mains power socket!
We disclaim all liability for damage caused by incorrect line voltages!





Check to make sure that the line voltage matches the supply voltage specified on the identification plate.
Deviations of ±10 % are permissible.

6.2. Switching on / Start - Stop



Switching on:
Turn on the mains power switch.
The unit performs a self-test. All segments of the 4-digit MULTI-DISPLAY (LED) and all indicator lights will illuminate.
Then the software version (example: n 1.2) appears.
The display "**OFF**" or "**r OFF**" indicates the unit is ready to operate (standby mode).

The circulator enters the operating mode activated before switching the circulator off:
keypad control mode (manual operation) or
remote control mode (operation via personal computer).

Start:

- Press the start/stop key.
  - The MULTI-DISPLAY (LED) indicates the actual bath temperature. (example: 21.0 °C)
  - An illuminated indicator light in the "T1" or "T2" key indicates the activated working temperature.

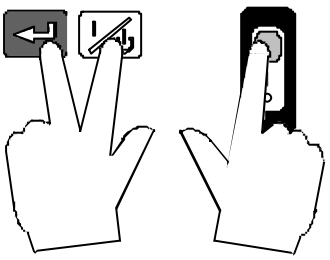
Stop:

- Press the start/stop key.
  The MULTI-DISPLAY (LED) indicates the message "OFF".

The unit also enters the safe operating state "OFF" or "r OFF after a mains power interruptance. The temperature values entered via the keypad remain in memory. With the circulator in keypad control mode, press the start/stop key to restart operation.
With the circulator in remote control mode, the personal computer must first resend the parameters set via the interface before the circulator may be restarted.

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“ or „rOFF“, resp. on the MULTI-DISPLAY (LED). A complete shutdown of the main functional elements such as heater and circulation 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.

Automatic / non-automatic start mode

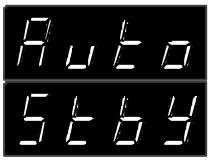


Activating/deactivating AUTOSTART

❶ Keep depressed enter and the start/stop key

❷ and turn on the circulator with the mains power switch.

For a short while the MULTI-DISPLAY indicates the effective start mode:

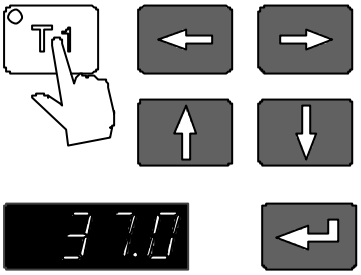


⇨ AUTOSTART on.

⇨ AUTOSTART off.

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.

6.3. Setting the temperatures



Setting the working temperature "T1":

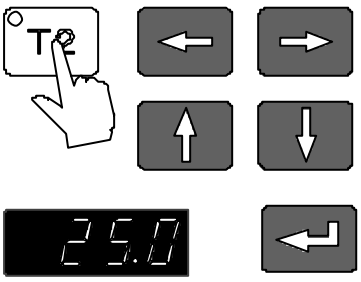
① Press the setpoint key T1.
The indicator light **blinks** and the value previously set appears on the MULTI-DISPLAY (LED).

② Use the cursor keys ← → to move left or right on the display until the numeral you wish to change is blinking.

③ Use the increase/decrease arrows ↑ ↓ to change the selected numeral (-, 0, 1, 2, 3, ... 9).

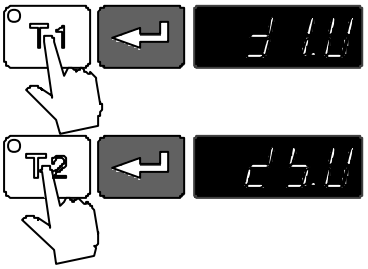
④ Press enter ↵ to store the selected value (example: 37.0 °C).

The working temperature is maintained constant after a short heat-up time (e. g. 37.0 °C).



Setting the working temperature "T2":

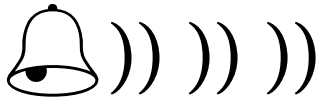
① Press the setpoint key T2.
② Same procedure
③ as with "T1"
④ (example: 25.0 °C).



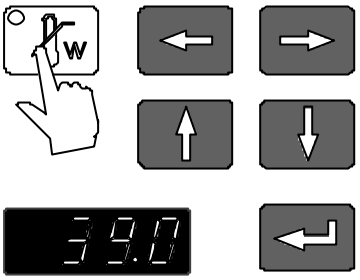
Selecting the working temperature:

- Press the setpoint key T1 or T2 and then enter ↵.

6.4. Warning functions



More protection for your samples in the bath!
An audible signal sounds in intervals when the actual temperature value exceeds one of the set limits (patented).



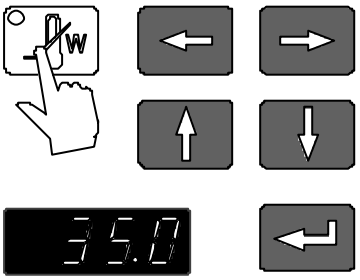
Setting the high temperature limit:

① Press the key .
The indicator light **blinks** and the value previously set appears on the MULTI-DISPLAY (LED).

② Use the cursor keys to move left or right on the MULTI-DISPLAY (LED) until the numeral you wish to change is blinking.

③ Use the edit keys to increase or decrease the numeral value (-, 0, 1, 2, 3, ... 9).

④ Press enter to store the value (example: 39.0 °C).



Setting the low temperature limit:

① Press the key .

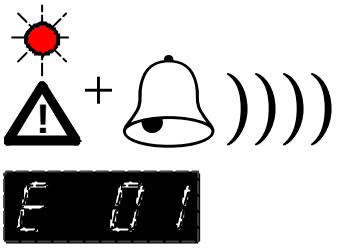
② Follow the instructions

③ for

④ (example: 35.0 °C).

> **Note:** The warning functions will only be triggered when the actual bath temperature, after start from the „OFF“ or „rOFF“ mode, lies within the set limits for 3 seconds.

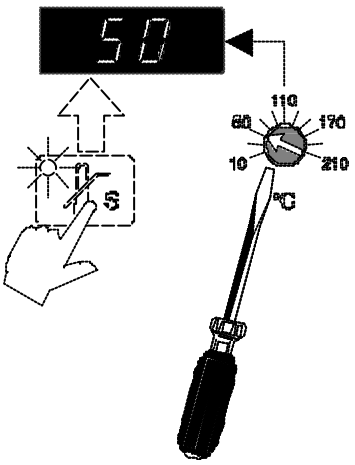
6.5. Setting the safety temperature (with shutdown function)



(excess temperature protection / low liquid level protection)

These safety installations are independent of the control circuit. When the temperature of the bath liquid has reached the safety temperature or the liquid level is insufficient, a complete shutdown of the heater and pump is effected.

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



1. Excess temperature protection

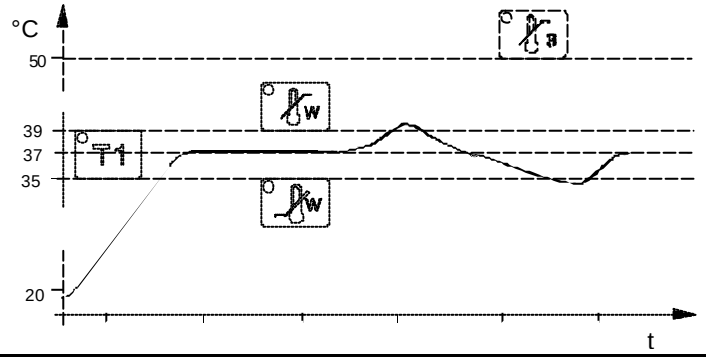
- Press the key to indicate the safety temperature value on the MULTI-DISPLAY and using a screwdriver simultaneously turn the setting screw to the desired value (example: 50 °C).

Setting range: 20 °C to 210 °C in 2 °C steps

Recommendation:

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

Example: Setting the warning functions and the safety temperature



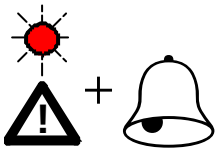
2. Low liquid level protection

- This device is triggered when the float reaches a fixed minimum liquid level.

The excess temperature protection should be set at least 20 °C below the fire point of the bath liquid used.

In the event of wrong setting there is a fire hazard!
We disclaim all liability for damage caused by wrong settings!

7. Troubleshooting guide / Error messages



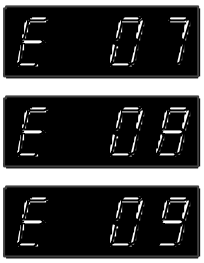
Whenever the microprocessor electronics registers a failure, a complete shutdown of the heater and circulation pump is performed. The alarm light "⚠" illuminates and a continuous signal tone sounds.

	Cause	Remedy
	• The circulator is operated without bath liquid, or the liquid level is insufficient.	• Replenish the bath tank with the bath liquid.
	• Tube breakage has occured (insufficient filling level due to excessive bath liquid pumped out).	• Replace the tubing and replenish the bath tank with the bath liquid.
	• The float is defect (e. g., because damaged in transit).	• Repair by authorized JULABO service personnel.
	• The safety temperature value lies below the working temperature setpoint.	• Set the safety temperature to a higher value.
	• A heat reaction or sudden temperature increase, e.g. caused by an exothermic chemical reaction or by the immersion of preheated samples.	• Set the safety temperature to a higher value.

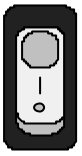
After eliminating the malfunction, press the mains power switch off and on again to cancel the alarm state.

• The wires of the working temperature sensor are interrupted or short-circuited.

• Defect of the working or safety temperature sensor.
The difference between the working temperature and safety sensors is above 25 °C.



other errors



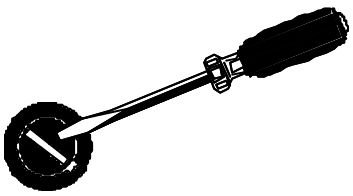
After eliminating the malfunction, press the mains power switch off and on again to cancel the alarm state.
If the unit cannot be returned to operation, contact an authorized JULABO service station.

If the error message "**C**onfiguration **Err**or" appears, 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 fuses

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

  (Fine fuse T 10.0 A, dia. 5 x 20 mm)

Only use fine fuses with a nominal value as specified.

8. Safety recommendations

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

- Connect the unit only to a grounded mains power socket!
- Observe the flash point of the bath medium used.
  The excess temperature protection should be set at least 20 °C below the fire point.
- Pay attention to the thermal expansion of bath oil during heating to avoid overflowing of the liquid.
- Prevent water from penetrating into the hot bath oil.
- 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.
- Exercise caution when emptying hot bath liquids!
- Observe the limited working temperature range when using plastic bath tanks.
- Employ suitable connecting tubing.
- Make sure that the tubes are 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).
- Before cleaning the unit, disconnect the power plug from the mains socket.

Recommendation:
When you have finished the application, it is recommended to keep on circulating the liquid in the bath or the external system for some time. Simultaneously set the working temperature to +20 °C to allow the temperature in the system to decrease slowly.
Thus fractional over-heating of the bath liquid is prevented.

9. ATC - Absolute Temperature Calibration

Circulator (T_T)

Measuring point (T_M)

ATC serves to compensate a temperature difference that might occur between circulator and a defined measuring point in the bath tank because of physical properties.

The difference temperature is determined ($\Delta T = T_M - T_T$) and stored as correcting factor (example ΔT = -0.2 °C).

- Press the cursor key and enter **at the same time.**
- The MULTI-DISPLAY (LED) indicates "Atc0".
- With the edit keys select "Atc1" and then press enter.
- Using the cursor keys and the edit keys set the correcting factor (example -0.20 °C) and then press enter.
- Press and **at the same time**.

The temperature on the measuring point rises to a temperature of 37.0 °C and is indicated on the MULTI-DISPLAY (LED).

Measuring point (T_M)

Note:

The correcting factor always affects the actual working temperature, even if this is set via the interface.

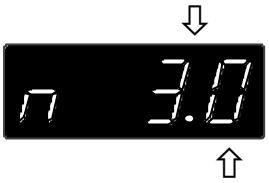
The ATC function stays activated until resetting to 00.00 °C.

Recommendation:

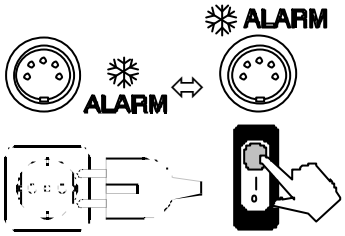
In case a calibrated temperature measuring instrument is used, the ATC function allows the circulator to be used as testing instrument according to DIN/ISO 9000.

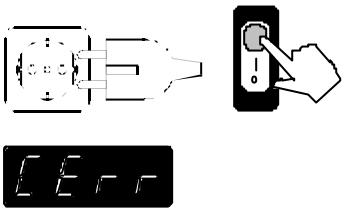
10. Configuration for counter-cooling

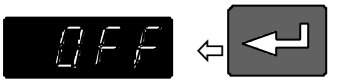
Software version number

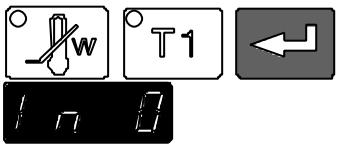


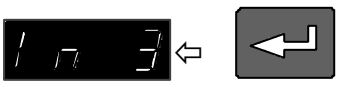
Model combination











The basic circulator is supplied factory-prefitted with software, e.g. version n 3.0, providing the configuration for a heating circulator.

In case the circulator is to be assembled with a JULABO solenoid valve controller (MVS see page 9) or a JULABO refrigerated bath, a new configuration must be performed.

1. Connect the 5-pole control cable between the connectors "❄ ALARM" and secure attachment.

2. Connect the mains power cables of the circulator and solenoid valve controller to grounded mains power sockets. Turn on both mains switches.

3. The unit performs a self-test. Then "CErr" is indicated on the MULTI-DISPLAY and the red indicator light "ALARM" illuminates.

4. Press enter to confirm the message "CErr". The display indicates "OFF" and the indicator light "ALARM" goes out.

5. Select the initialization level by pressing simultaneously the keys , T1 and . The value last entered („In 0“) is indicated.

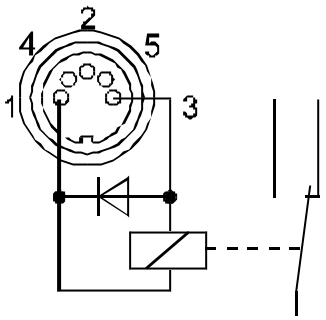
6. By pressing the key set the last digit of the parameter to indicate „In 3“ for use of an MVS controller.

Model combination	Value
using refrigerated bath type „F“ (e. g. F34)	In 2
using MVS controller or refrigerated bath type „FP“	In 3

7. Now press enter to confirm and to finish initialization.

The new configuration is indicated during the self-test (example n 3.3).

11. Electrical connections



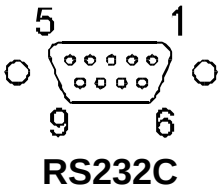
❄ / ALARM connector

The "❄ ALARM" connector may be used as output for alarm messages.

Circuit: Operation = relay powered
Alarm = relay not powered

Pin assignment:

Pin 1: +24 V (max. current 25 mA)
Pin 2: 0 V
Pin 3: Alarm relay
Pin 4: Reserved - do not use!
Pin 5: Cooling pulse



RS232C serial interface

This port can be used to connect a computer with an RS232C cable for remote control of the circulator.

Pin assignments:

Pin 2	RxD	Receive Data
Pin 3	TxD	Transmit Data
Pin 5	0 VD	Signal GND
Pin 6	DTR	Data terminal ready
Pin 7	RTS	Request to send
Pin 8	CTS	Clear to send

Interface correspondence:

Circulator 9-pole		Computer 25-pole	Circulator 9-pole		Computer 9-pole
Pin 2 RxD	⇔	Pin 2 TxD	Pin 2 RxD	⇔	Pin 3 TxD
Pin 3 TxD	⇔	Pin 3 RxD	Pin 3 TxD	⇔	Pin 2 RxD
Pin 5 GND	⇔	Pin 7 GND	Pin 5 GND	⇔	Pin 5 GND
Pin 6 DTR	⇔	Pin 6 DSR	Pin 6 DTR	⇔	Pin 6 DSR
Pin 7 RTS	⇔	Pin 5 CTS	Pin 7 RTS	⇔	Pin 8 CTS
Pin 8 CTS	⇔	Pin 4 RTS	Pin 8 CTS	⇔	Pin 7 RTS

☞ **Use shielded cables only.**

12. Remote control

12.1. Setup for remote control

Interface parameters for the circulator are adjusted at configuration level.

Enter or exit the configuration level by pressing the left arrow and enter at the same time.

The menu item "Atc" appears on the MULTI-DISPLAY (LED). After pressing the cursor key, the second menu item "REMOTE" is indicated. The interface parameters cannot be adjusted unless the display reads "r 0".

Adjusting interface parameters:

Example: changing the baud rate.

① Using the arrow keys move the cursor to the desired menu. The actual parameter is displayed (example: "br 24" = 2400 bauds).

② With the up and down arrows change the number to the desired parameter (example: 4800 bauds). The changed numerals are blinking.

③ The new parameter is stored in memory by pressing enter.

Adjustable interface parameters

REMOTE 0 = keypad control mode
1 = remote control mode via RS232C

BAUDRATE 12 = 1200 bauds
24 = 2400 bauds
48 = 4800 bauds *
96 = 9600 bauds

PARITY 0 = no parity
1 = odd parity
2 = even parity *

HANDSHAKE
0 = Protocol Xon/Xoff (software handshake)
1 = Protokol RTS/CTS (hardware handshake) *

Data bits: 7; Stop bits: 1*

(* Factory setting)

Like all parameters which can be entered through the keypad, interface parameters are stored in memory even after the circulator is turned off.

12.2. Communication with a PC or a superordinated data system

Suitable terminal programs for communicating with a PC are:
- MS-Windows - TERMINAL.EXE (included with MS-Windows).
- MS-DOS - Procomm Plus, Datastrom Technologies.
- MS-DOS - Norton Utilities.

If the circulator is put into remote control mode via the configuration level, the display will read "r OFF" = REMOTE STOP.

The circulator is now operated via the computer.

In general, the computer (master) sends commands to the circulator (slave). The circulator sends data (including error messages) only when the computer asks for it.

A transfer sequence consists of:
- command
- space (⇔; Hex: 20)
- parameter (the character separating decimals in a group is the period)
- end of file (↵; Hex: 0D)

The commands are divided into **in** or **out** commands.
in commands: asking for parameters to be displayed
out commands: setting parameters

The **out** commands are valid only in remote control mode.

Examples:
- Command to set the working temperature T1 to 55.5 °C:
  out_sp_00 Û **55.5**¿
- Command to ask for the working temperature T1:
  in_sp_00¿
- Response from the circulator:
  55.5¿

12.3. List of commands

Command	Parameter	Response of circulator
version	none	Number of software version (V X.xx)
status	none	Status message, error message (see below)
out_mode_01	0	Use working temperature "T1" *
out_mode_01	1	Use working temperature "T2" *
out_mode_05	0	Stop the circulator = r OFF
out_mode_05	1	Start the circulator
out_sp_00	xxx.x	Set working temperature "T1"
out_sp_01	xxx.x	Set working temperature "T2"
out_sp_02	xxx.x	Set high temperature warning limit
out_sp_03	xxx.x	Set low temperature warning limit
in_sp_00	none	Ask for working temperature "T1"
in_sp_01	none	Ask for working temperature "T2"
in_sp_02	none	Ask for high temperature warning limit
in_sp_03	none	Ask for low temperature warning limit
in_pv_00	none	Ask for actual bath temperature
in_pv_01	none	Ask for the heater wattage being used

12.4. Status messages

Message	Description
00 MANUAL STOP	Circulator in "OFF" state
01 MANUAL START	Circulator in keypad control mode
02 REMOTE STOP	Circulator in "r OFF" state
03 REMOTE START	Circulator in remote control mode

(* see "Note" on page 21).

12.5. Error messages

Message	Description
-01 TEMP / LEVEL ALARM	Safety temperature or low liquid level alarm
-03 EXCESS TEMPERATURE WARNING	High temperature warning " "
-04 LOW TEMPERATURE WARNING	Low temperature warning " "
-05 TEMPERATURE MEASUREMENT ALARM	Error in measuring system
-06 SENSOR DIFFERENCE ALARM	Sensor difference alarm. Working temperature and safety sensors report a temperature difference of more than 25 °C.
-07 I2C-BUS WRITE ERROR -07 I2C-BUS READ ERROR -07 I2C-BUS READ/WRITE ERROR	Internal error
-08 INVALID COMMAND	Invalid command
-10 VALUE TOO SMALL	Entered value too small
-11 VALUE TOO LARGE	Entered value too large
-12 WARNING : VALUE EXCEEDS TEMPERATURE LIMITS	Value lies outside the adjusted range for the high and low temperature warning limits. But value is stored.
-13 COMMAND NOT ALLOWED IN CURRENT OPERATING MODE	Invalid command in current operating mode

13. Cleaning the unit

Before cleaning the unit, disconnect the power plug from the mains socket!

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.

Prevent humidity from entering into the circulator.

14. Maintenance

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

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

15. Technical specifications

		MV -4/-6/-12/-26	MW-Z	MW -4/-6/-12/-26
Working temperature range	°C	40 ... 200	25 ... 200	45 ... 200
with tap water cooling	°C	20 ... 200	20 ... 200	20 ... 200
Temperature stability		±0.01 °C		
Temperature selection		digital		
via keypad		indication on MULTI-DISPLAY (LED)		
remote control via personal computer		indication on monitor		
Temperature indication		MULTI-DISPLAY (LED)		
Resolution		0.1 °C		
ATC - Absolute Temperature Calibration		±3 °C		
Temperature control		PID		
Working temperature sensor		Pt 1000		
Safety temperature sensor		Pt 1000		
Heater wattage		2000 W (at 230 V) or 1000 W (at 115V)		
Pressure pump*:*				
pressure, max.	at 0 liter	340 mbar	340 mbar	340 mbar
discharge, max.	at 0 bar	15l/min	20 l/min	20 l/min
Suction pump:				
suction, max.	at 0 liter		220 mbar	220 mbar
discharge, max.	at 0 bar		14 l/min	14 l/min
Electrical connections				
Alarm output		24-0 V DC / max. 25 mA		
Computer interface		RS232C		
Ambient temperature		5 °C ... 40 °C		
Mains power connection ±10 %		230 V / 50 Hz or 115 V / 60 Hz		
Total power consumption				
	(at 230 V) W	2100	2150	2150
	(at 115 V) W	1100	1150	1150

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

Bridge mounted circulator	MW-Z
Usable immersion depth	from 90 to 145 mm
Overall dimensions (WxDxH)	320x170x320 mm
Weight	5.5 kg

Heating circulators		MV/MW-4	MV/MW-6
Bath opening	mm	130x150	130x150
Bath depth	mm	150	200
Filling volume	liters	3 ... 4.5	4.5 ... 6
Overall dimensions (WxDxH)	mm	210x410 x370	210x410 x430
Weight	kg	9 / 9	14

Heating circulators		MV/MW-12	MV/MW-26
Bath opening	mm	220x150	220x300
Bath depth	mm	200	200
Filling volume	liters	7.5 ... 12	18 ... 26
Overall dimensions (WxDxH)	mm	300x410 x450	360x610 x450
Weight	kg	15	20

Safety Installations (DIN 12876)	
Excess temperature protection	adjustable from 20 to 210 °C
Low liquid level protection	float switch
Safety class	III
Supplementary safety installations:	
High temperature warning function	optical + audible (in intervals)
Low temperature warning function	optical + audible (in intervals)
Supervision of the working sensor	plausibility control
Reciprocal sensor monitoring between working and safety sensors	difference >25 °C
Alarm indication	optical + audible

Standards:

EMC regulations	EN 61326
Guideline for first voltage range	EN 61010-1, EN 61010-2-010

16. EC Declaration of Conformity

CE

The following unit complies with the essential safety requirements outlined by the EC Directives concerning the guidelines for electromagnetic compatibility (89/336/EEC) and for the low voltage regulations (73/23/EEC).

Circulator: **MV, MW**

This unit is manufactured in compliance with the following guidelines

electrical equipment for control technology and laboratory application – EMC requirements outlined by
EN 61326

safety regulation for electrical devices for measuring, control and laboratory application specified by
EN 61010

Julabo

Julabo Labortechnik GmbH
Eisenbahnstr. 45
D-77960 Seelbach / Germany

G. Juchheim, Managing Director

17. 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 no less than

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 or 10.000 working hours; which ever is achieved first.

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.

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