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so your equipment works exactly as you specify.

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Find the *Julabo SW23* at our website: ***Click HERE***

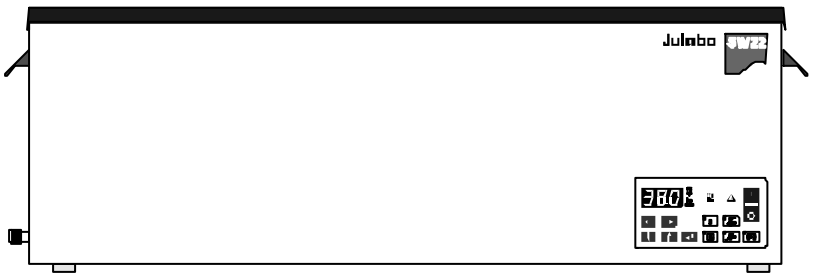
English

Operating manual

Shaking Water Baths

SW22

SW23



Software Version

SW22 n2.6

SW23 n2.7

1.953.4023BU4 07/04

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Print date: 26.07.04 19534023.doc

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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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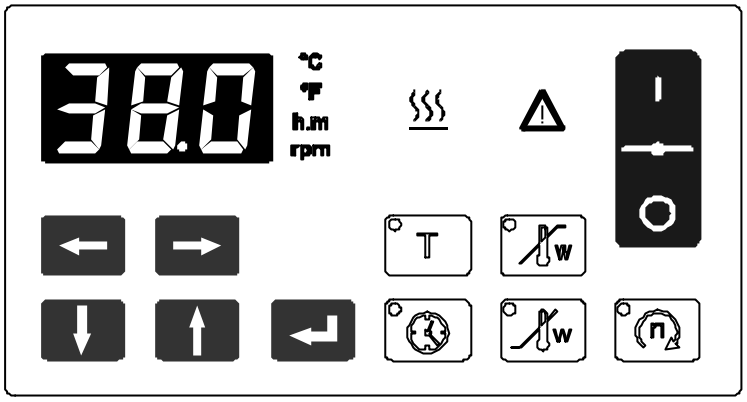
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1. OPERATING CONTROLS AND FUNCTIONAL ELEMENTS



1 

Mains power switch, illuminated

I on

O off

2 

Working temperature

3 

High temperature warning limit

4 

Low temperature warning limit

5 

Operating hours indicator key

6 

Nominal value shaking frequency display key

7 Indication:



- MULTI-DISPLAY (LED)
  Temperature display optionally in °C or °F;
  time display in h:m and shaking frequency.
  The corresponding symbol will illuminate on selection.



- Indicator light - Alarm red illuminated



- Indicator light - Heating yellow illuminated

8 

Cursors left/right

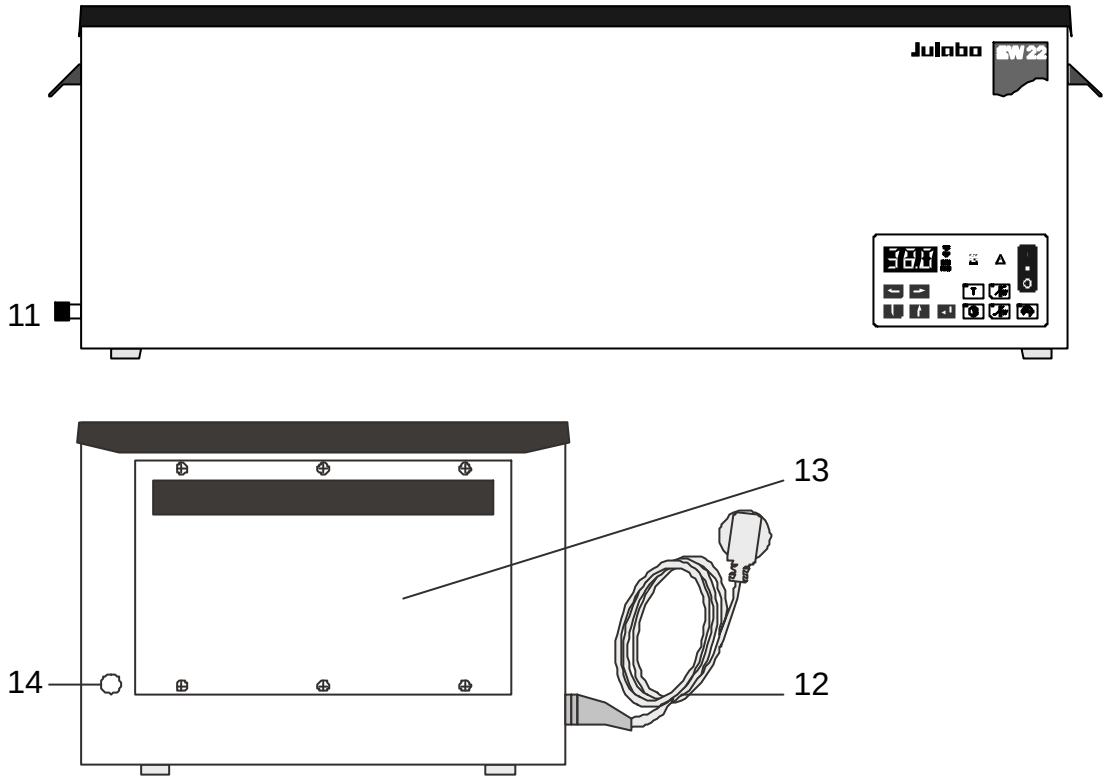
9 

Edit keys (increase/decrease setting)

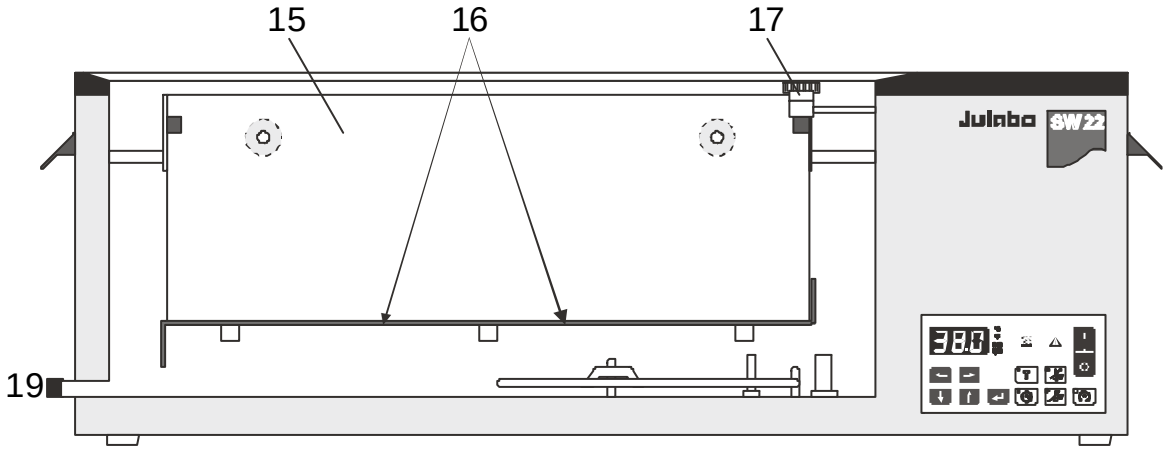
10 

Enter key (store/quitting the audible signal)

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11		Drainage screw Connector for liquid level/cooling set (accessory)
12		Mains power cable with plug
13		T 10 A power supply fuses behind side cover
14		RS232C interface
15		Shaking carriage - totally removable - 8 kg load-carrying capability
16		Surface for placement of items (fixtures)
17		Stroke bar with fastening screw



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2. THE JULABO QUALITY MANAGEMENT SYSTEM



Development, production and distribution of temperature application instruments for research and industries conform to the requirements according to DIN EN ISO 9001:1994-08.
Certificate Registration No. QA 051004008.

3. DESCRIPTION

JULABO shaking water baths of the series SW22 and SW23 are ideally suited for laboratory applications and research in the fields biology, biochemistry, pharmacology, chemistry and general medical technologies. They are likewise suited for routine laboratory tasks and long-term unattended operation. The JULOBO shaking water bath SW 23 with constant bath liquid circulation, ensures a constant water temperature with a maximum deviation of ± 0.02 °C .
Julabo shaking water baths feature a stainless steel bath containing heater, temperature sensor and the overtemperature protection safety element. The shaking carriage is totally removable.
The units are operated via a water protected foil keypad with integrated mains switch. Microprocessor technology enables selection and storage of different temperature values and operating times, and display of them in the LED-MULTI-DISPLAY. The self-optimizing electronic PID-control circuit automatically adjusts the heat supply to the value required by the bath.
The RS232C port permits modern process engineering without additional interface, directly on-line, from the waterbath to your application equipment.
The overtemperature protection to DIN 12876-1: 2000 is a safety feature with a fixed safety value of 130 °C. It functions independent of the regulator circuit.
The waterbaths conforms to the safety requirements specified by DIN 12876-1: 2000 (class 1), as well as DIN 12876-2: 1999/12, the guideline for first voltage range EN 61010.

☞ **The safety classification 1 permits unattended operation with non-flammable bath liquids!**

4. UNPACKING AND CHECKING

Unpack the shaking water bath 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.

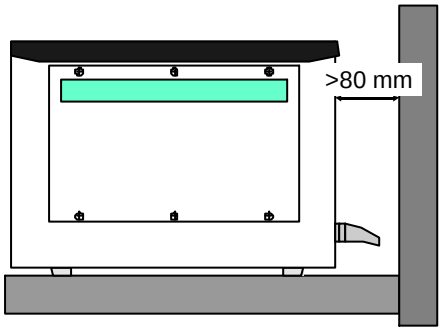
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5. PREPARATIONS

5.1. Installation

The installation site should meet the following conditions:

1. The base of the installation site should be level to ensure proper functioning of the safety features.
2. The laboratory table, for example, should be sturdy enough, to where the shaking frequency cannot cause vibration of the table. Consider that the masses moved may be in the order of several kg.



⚠ At unattended operation, the vibration may cause items on the table top to fall off under extreme unfavorable circumstances.

3. Keep a wall distance of minimum 80 mm.

5.2. Bath liquid

- **Recommended bath liquid:** Water

⚠ **Do not use flammable bath liquids!**

No liability for use of other bath liquids!

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

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

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

i.e.:dangerous

You alone are responsible for the handling of these substances!

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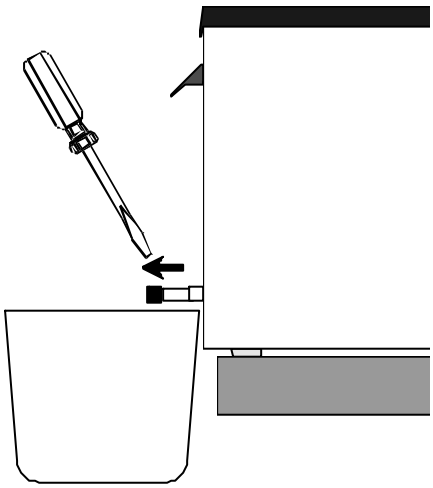
5.3. Filling / Draining

Filling:

- Maximum filling level: 6 cm below the bath rim
- Minimum filling level: 7 cm (level approx. 3 cm above surface (16) for the placement of items/fixtures)

Note:
The working filling level depends on size and number of the items (fixtures) to be placed inside.

Fill to minimum level only. Insert the complemented shaking carriage and correct the filling level (adding or removing liquid) as required.



Draining:

- Switch off the shaking water bath with the mains switch and move the equipment to the table edge.
- Place a suitable collecting bucket or tub underneath the equipment for draining the used liquid.
- To drain the liquid open the dainage screw (11) on the side of the water bath.
- After the liquid has been fully drained, securely tighten the drainage screw (11) again.

Exercise CAUTION when emptying hot bath liquids!

Recommendation:
Use the water bath cover to keep temperature losses to a minimum. This is especially important for working temperatures above 70 °C.

Lift-up Makrolon® cover
Order No. 8 970 288

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5.4. Maintaining a constant water level / Countercooling

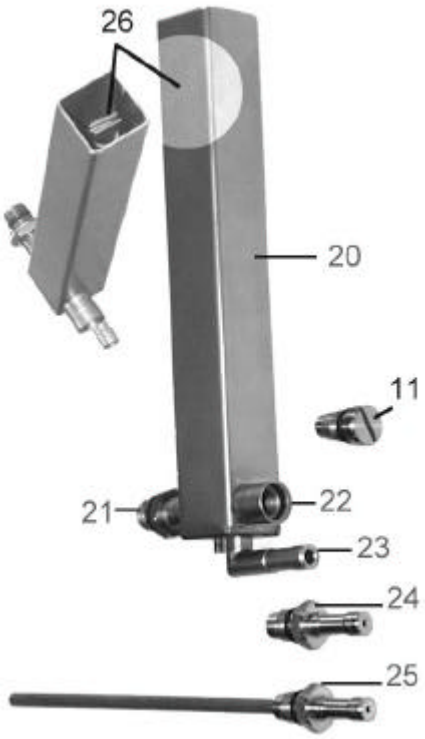
For cooling tasks near the ambient air temperature the liquid level/cooling set can be used for countercooling.

By special pipe routing, cool faucet water is continuously supplied to the water bath, while at the same time, the heated water is drained via the overflow connection of the Level/Cooling set.

A specific water flow rate of 100 ml/minute is sufficient to compensate for the characteristic temperature.

Use of the liquid level/cooling set for a continuous supply of faucet water:

1. to keep the water level constant, especially for applications up to the boiling point (supply of faucet water only in the amount of evaporation losses).
2. for countercooling of cooling tasks near the ambient surrounding temperature (cool faucet water is continuously supplied to the water bath, while at the same time, the heated water is drained via the overflow connection of the liquid level/cooling set).



Liquid level/cooling set
Order number: 8 970 415

11 drainage screw on water bath
20 compensation reservoir
21 connecting sleeve
22 supply/drainage sleeve
23 overflow sleeve
24 adaptor screw for constant liquid level function
25 adaptor screw assy. for countercooling function and simultaneous constant liquid level control
26 adjuster screw for filling level adjustment

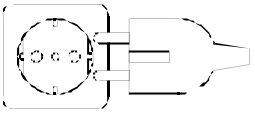


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6. OPERATING PROCEDURES

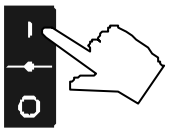
6.1. Power connection

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.

7. SWITCHING ON



- 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 0.0) appears.



  Together with the display of the water bath temperature the operating state is also displayed.
  (Example: 18.6 °C)



  The monitor lamp illuminates when the heater is in operation (on).

Notes:

- Adjustable parameters and temperature values are retained and the electronic timer is reset to zero when the equipment is switched off.
- When the shaking water bath is operating under remote control at the time of switchoff (connected to PC via RS-232 interface connection), the MULTI-DISPLAY (LED) will display the message „OFF“.
  (see chapter 8.5. Setup for remote control



- If shaking operation is not desired it can be switched off at menu level. Select the menu level and activate the option SA (see page 16)

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7.1. Setting the temperature



Display and adjustment of the working temperature:

① Press the setpoint key T.
The indicator light **blinks** and the value previously set appears on the MULTI-DISPLAY (LED).
(example: 25.0 °C).

If no further key is pressed the display will return to show the actual bath temperature after approx. 8 seconds.

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).

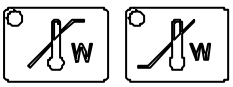


④ Press enter ↵ to store the selected value
(example: 38.0 °C).

The working temperature is maintained constant after a short heat-up time (e. g. 38.0 °C).

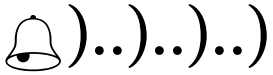
> When the working temperature is higher than 90 °C, it might happen that due to strong production of steam there is considerable dripping on the inside of the lift-up Makrolon® cover. Some drops may fall directly into the material to be tempered.

7.2. Warning functions or temperature limit



More protection for your samples in the bath!
As soon as the actual temperature leaves one of the pre-adjusted limits, this status is evaluated.

The high- and low-temperature limit can be evaluated in two ways (see page 21).

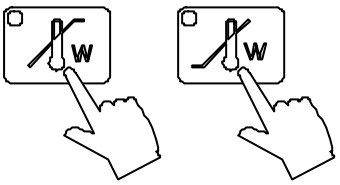


1. As pure warning function with an acoustic signal in regular intervals. (Signal - Pause)
(DBGM: G94 10 134.5)



2. As temperature limit by switching-off the heating and alarm.

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Display and adjustment of over-/undertemperature:

① Press the key

 (example: 41 °C)

or

 (example: 35 °C).

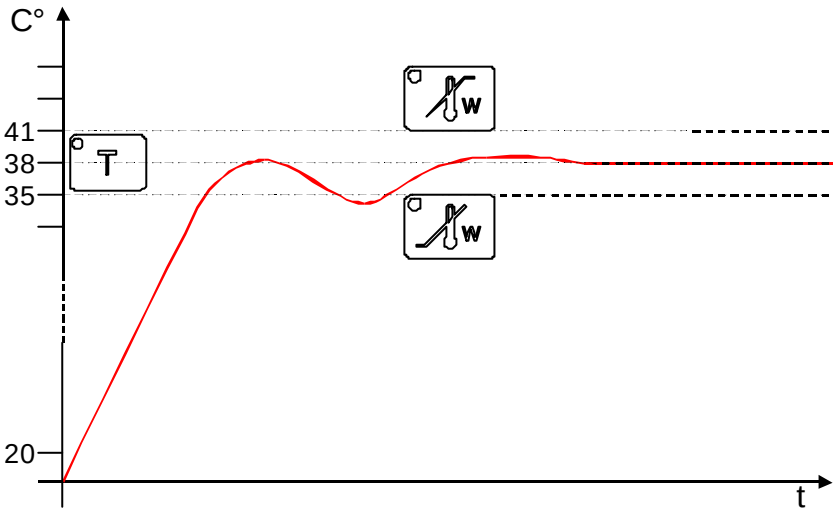
The indicator light **blinks** and the value previously set appears on the MULTI-DISPLAY (LED).

If no further key is pressed the display will return to show the actual bath temperature after approx. 8 seconds.

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





Note:

The warning functions will be activated only after the bath temperature has remained for at least 3 seconds within the adjusted threshold values after the equipment is switched on.

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7.3. Adjustment of the shaking frequency

The shaking frequency is adjustable between 20...200 rpm. If shaking operation is not desired it can be switched off at menu level. Select the menu level and activate the option SA (see page 16)

Display and adjustment of the shaking frequency



① Press the key .
The indicator light **blinks** and the value previously set appears on the MULTI-DISPLAY (LED).
(example: 120 rpm).



If no further key is pressed the display will return to show the actual bath temperature after approx. 8 seconds.

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).

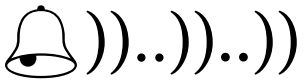
④ Press enter to store the selected value

CAUTION!
Do NOT reach between shaking carriage and bath casing during shaking operation. Danger of injury!

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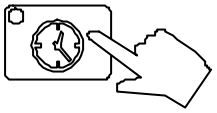
7.4. Electronic timer

The electronic timer enables adjustment of the operating time up to a maximum of 9 hours and 59 minutes. Countdown then commences to zero, at which time an acoustical time signal will be issued in intervals (double signal - pause).



- the equipment will not be switched off -

Display and adjustment of the operating time:



① Press the key .
The indicator light **blinks** and and the MULTI-DISPLAY (LED) will display the remaining operating time (example: 4.28 h:m).

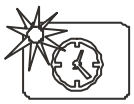


If no further key is pressed the display will return to show the actual bath temperature after approx. 8 seconds.

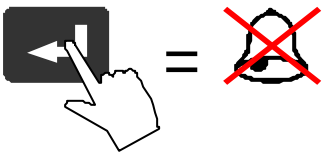
② Use the cursor keys  to move left or right on the MULTI-DISPLAY (LED) until the numeral you wish to change is blinking.

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

④ Press enter  to store the value when the countdown will commence. During that time the monitor lamp (control lamp) will remain permanently illuminated.



When the operating time is expired an acoustical time signal is issued in intervals.



Cancellation of the time signal:

Press enter  to silence the time signal.



Notes:

- Following switch-on of the equipment and after a power failure, the timer will show 0:00 h:m.
- When the equipment is operating remotely controlled the timer is rendered inoperative.

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8. MENU FUNCTIONS

Adjustment of parameters which, in most instances, need only be adjusted once, are performed on the water bath at menu level.

1. Shaking operation On/Off
2. Circulator pump On/Off
   (Only shaking water bath SW23).
3. MULTI-DISPLAY temperature display in °C or °F
4. ATC (absolute temperature calibration)
5. Switchover to remote controlled operation
6. Adjustment of interface parameters
7. Adjustment of the high and low temperature limit. Choice between pure warning function or a temperature limit by switching off the heating.

Selecting/exiting the menu level.

- Simultaneously
  press the cursor key ← and enter ↵ .

8.1. Shaking operation On/Off





❶ Press the cursor key ← and enter ↵ **at the same time.**

❷ Use the cursor keys ← → to select the menu option „shaking operation“
example: „SA1“ = shaking frequency ON.

❸ Select the alternative state with the edit keys ↓ ↑ and confirm the selection with the ENTER key ↵.
The display now shows „SA0“ = shaking frequency OFF.

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8.2. Circulator pump on/off

Only shaking water bath SW23 feature a circulator pump.
The pump can be set to **on** and **off** at the menu level.
At working temperatures > 80° C the pump will switch off automatically





❶ Press ← and ↵ **at the same time**.

❷ Use the cursor keys ← → to select the menu option PUMP
(example: „Pu1“ = Pump ON)

❸ Select the alternative state with the edit keys ↓ ↑ and confirm the selection with the ENTER key ↵
(example: „Pu0“ = Pump OFF).

❹ Press ← and ↵ **at the same time**.

8.3. Temperature indication in °C or °F

The working temperature can be displayed in the MULTI-DISPLAY (LED) in °C or °F as desired.





❶ Press ← and ↵ **at the same time**.

❷ Use the cursor keys ← → to select the menu option „temperature display“
(example: „t C“ = temperature display in °C).

❸ Select the alternative state with the edit keys ↓ ↑ and confirm the selection with the ENTER key ↵ .
The display now shows „t F“ = temperature display in °F.

❹ Press ← and ↵ **at the same time**.

Switchover to the selected display mode takes place automatically upon leaving the menu level.

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8.4. ATC - Absolute Temperature Calibration



Internal sensor (T_F)

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.



Measuring point(T_M)

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





❶ Press the cursor key ← and enter ↵ **at the same time.**

❷ Use the cursor keys ← → to select the menu option „At0“.

❸ With the edit keys ↓ ↑ select "At1" and then press enter ↵.

Enter the corrective value.



❹ Using the cursor keys ← → and the edit keys ↓ ↑ set the correcting factor (example -0.20 °C) and then press enter ↵.

❺ Press ← and ↵ **at the same time**.



Measuring point

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

The ATC function stays activated until resetting to 00.0 °C.

Recommendation:
Use a calibrated temperature measuring instrument.

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8.5. Setup for remote control

If the shaking water bath is to be remotely controlled or monitored, the parameter of the menu option REMOTE must be changed and set from **0** to **1.**

REMOTE 0 = Keypad control
1 = Remote control via RS232 interface

❶ Press ← and ↵ **at the same time**.



❷ Use the cursor keys ← → to select the menu option REMOTE
(display „r 0“).



❸ Select the alternative state with the edit keys ↓ ↑ and confirm the selection with the ENTER key ↵
(display „r 1“).



The shaking water bath will switch to the REMOTE „STOP“ condition and the MULTI-DISPLAY will show the message „OFF“.

❹ Press ← and ↵ **at the same time**.

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8.6. Adjusting interface parameters

Correct data transmission takes place only when the interface parameters of PC and water bath are identical.

❶ Press ← and ↵ **at the same time**.

❷ Use the cursor keys ← → to select the desired menu option
(BAUDRATE, PARITY, HANDSHAKE).

❸ Select the alternative state with the edit keys ↓ ↑ and confirm the selection with the ENTER key ↵.

❹ Press ← and ↵ **at the same time**.

Adjustable interface parameters



BAUDRATE 48 = 4800 bauds *
96 = 9600 bauds



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



HANDSHAKE
0 = Protocol Xon/Xoff (software handshake)
1 = without handshake *
Data bits = 7; Stop bit = 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.**

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8.7. Evaluation of the temperature limits

The high- and low-temperature limit can be adjusted in two ways (see page 12)



1. As pure warning function with an acoustic warning signal in regular intervals.
   Adjustment „Li 0“ – factory adjustment



2. As temperature limit by switching-off the heating.
   Adustment „Li 1“
   The alarm is indicated by optical and audible signals (continuous tone) and on the MULTI-DISPLAY (LED) appears the error message "**E**rror **01**".

❶ Press ← and ↵ **at the same time**.

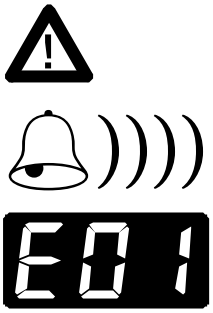
❷ Use the cursor keys ← → to select the menu option Limit. (example: „Li 0“).

❸ Select the alternative state with the edit keys ↓ ↑ and confirm the selection with the ENTER key ↵ (display „Li 1“).

❹ Press ← and ↵ **at the same time**.

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9. SAFETY INSTALLATION (WITH SHUTDOWN FUNCTION)



(excess temperature protection)

These safety installations is independent of the control circuit. When the temperature of the bath liquid has reached the safety temperature, a complete shutdown of the heater and pump (only CW-models) 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**".

10. TROUBLESHOOTING GUIDE / ERROR MESSAGES



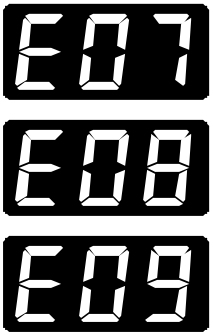
Whenever the microprocessor electronics registers a failure, a complete shutdown of the heater and circulation pump (only CW-models) is performed. The alarm light "⚠" illuminates and a continuous signal tone sounds.



- Cause:
  The waterbath is operated without bath liquid, or the liquid level is insufficient
  or
  The adjusted temperature limit was exceeded or the temperature fell below the limit.
- Remedy: Replenish the bath tank with the bath liquid.
  Control the adjustment of the temperature limit.
  Get to safety the samples.



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



other errors

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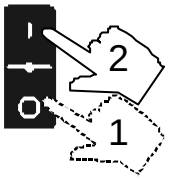
- Heating circuit interrupted.



- Short-circuit of triac.



- Short-circuit in alarm relay.



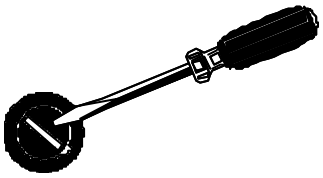
After eliminating the malfunction, press the mains power switch off and on again to cancel the alarm state.
If the unit cannot be returned to operation, contact an authorized JULABO service station.

Disturbances that are not indicated.

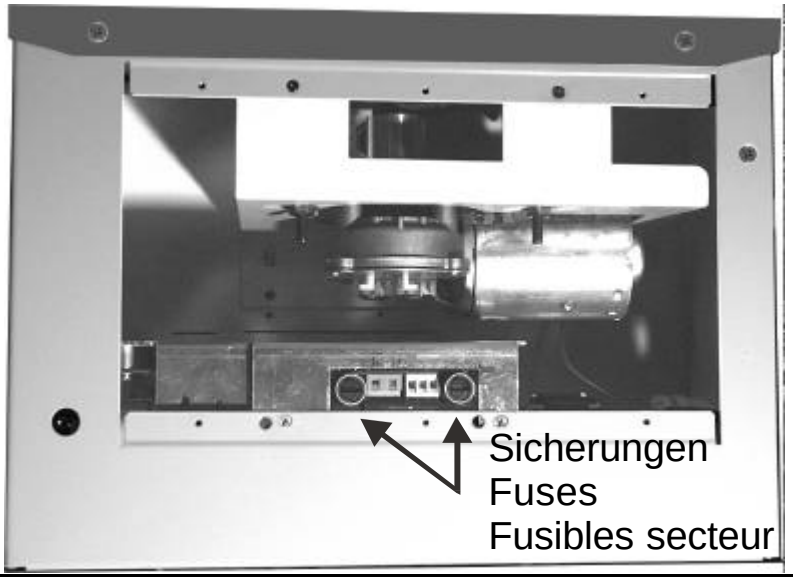
Pump motor overload protection

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

Mains fuses



- Pull the mains plug from the power outlet before opening the equipment!
- The mains fuses are located behind side plate (13).
  The side plate is fastend to the casing with 6 screws .
  (Fine fuse T 10.0 A, dia. 5 x 20 mm)





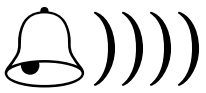
Before exchange the fuses, disconnect the power plug from the mains socket!
Only use fine fuses with a nominal value as specified.

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10.1. Acoustical signals and their differentiation

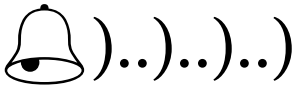
Three different signals are generated by the sound generator as follows:
- an alarm signal
- a warning signal
- a time signal

The signals can easily be recognized and differentiated, even from a good distance. Required actions can be initiated immediately.



- The Alarm signal is a continuous sound signal.

Heater and circulator pump (SW23 only) are completely and permanently switched off.
(see page 22)

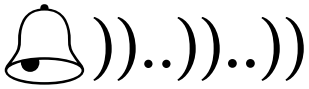


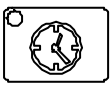




- The warning signal is issued at regular intervals (signal - pause - signal - pause).

The actual bath temperature is higher than the set overtemperature value or lower than the set undertemperature value
(see page 12)





- The time signal is issued in the intervals (double signal - pause - double signal - pause).

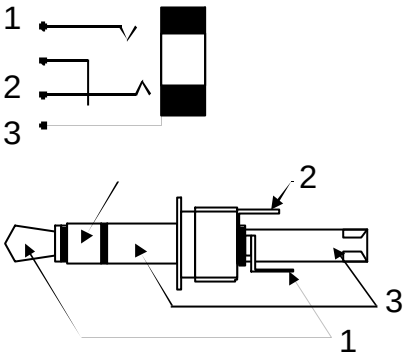
Countdown of the adjusted operating time commences to zero, after which a time signal is issued at intervals
(see page 15)

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11. ELECTRICAL CONNECTION

RS232C serial interface

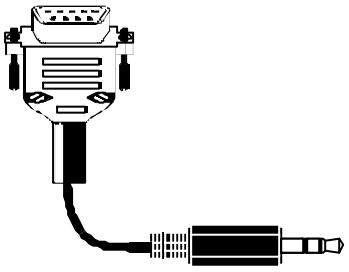
This port can be used to connect a computer with an RS232C cable for remote control of the waterbath.



Pin assignment:

Pin 1	RxD	Receive Data
Pin 2	TxD	Transmit Data
Pin 3	0 VD	Signal GND

Use shielded cables only.



Accessories:

RS-232 interface connecting cable, terminated with 3-pin Cinch plug and 9 hole subD socket. Length: 3.0 m.

Order No. 8 980 075

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12. REMOTE CONTROL

12.1. 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 waterbath is put into remote control mode via the menu level, the display will read "OFF" = REMOTE STOP. (see page 19).

The waterbath is now operated via the computer.

In general, the computer (master) sends commands to the waterbath(slave). The waterbath 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 T to 55.5 °C:
  out_sp_00 Û 55.5¿
- Command to ask for the working temperature T:
  in_sp_00¿
- Response from the waterbath:
  55.5¿

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12.2. List of commands

Command	Parameter	Response of the shaking water bath
version	none	Number of software version(V X.xx)
status	none	Status message, error message (see below)
out_mode_05	0	STOP - returns the water bath to the „OFF“ state
out_mode_05	1	START - water bath is switched to the operating state
out_mode_08	0	Circulator pump „OFF“
out_mode_08	1	Circulator pump „ON“
out_mode_09	0	Shaking operation drive motor „OFF“
out_mode_09	1	Shaking operation drive motor „ON“
out_sp_00	xxx.x	Set working temperature„T“
out_sp_02	xxx.x	Set high temperature warning limit
out_sp_03	xxx.x	Set low temperature warning limit
out_sp_16	xxx.x	Set shaking frequency
in_sp_00	none	Ask for working temperature „T“
in_sp_02	none	Ask for high temperature warning limit
in_sp_03	none	Ask for low temperature warning limit
in_sp_16	kein	Ask for shaking frequency
in_pv_00	none	Ask for actual bath temperature
in_pv_01	none	Ask for the heater wattage being used

12.3. Status messages

Message	Description
01 MANUAL START	Waterbath in keypad control mode.
02 REMOTE STOP	Waterbath in „OFF“ state
03 REMOTE START	Waterbath in remote control mode

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12.4. 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
-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

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13. OPERATING SAFETY / MAINTENANCE

JULABO Skaking Water Baths are designed for continuous operation under normal conditions. Periodic maintenance of the units is not required.

The bath 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 water bath 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.



Some parts of the bath cover may become extremely warm during continuous operation.
When lifting the bath cover, pay attention to hot steam!

Be careful when touching these parts!

Condensation that could appear in and on other units near the water bath may result in reduced operating safety. Be careful when setting up and operating the water bath!

13.1. Cleaning the unit



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

Use water (with a low surface tension, e.g., soap) for cleaning the bath.

Clean the unit housing with a moist cloth.

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14. TECHNICAL DATA

		SW22	SW23
Working temperature range	°C	25 ... 99,9*	25 ... 99,9*
with water cooling	°C	20 ... 99,9*	20 ... 99,9*
MULTI-DISPLAY (LED) Resolution	°C	0.1	0.1
Temperature stability	°C	±0.2	±0.02
Computer interface		RS232	RS232
Electronic timer	h.min	0:01 ... 9:59	0:01 ... 9:59
Heater wattage (at 230 V / 115 V)	W	2000/1000	2000/1000
Adjustable shaking frequency,	rpm	20 ... 200	20 ... 200
Shaking stroke	mm	15 / 25	15 / 25
Bath opening (B x L)	cm	50 x 30	50 x 30
Usable bath depth	cm	18	18
Filling volume	liters	8 ... 20	8 ... 20
Dimensions W x L x H (including cover)	cm	70 x 35 x 26 (42)	70 x 35 x 26 (42)
Weight	kg	22	23
Mains power connection ±10 %	V/Hz	230/50	230/50
or	V/Hz	115 / 60	115 / 60
Total power consumption (at 230 V / 115 V)	W	2100/1100	2150/1150

All measurements have been carried out at: (DIN 12876-2: 1999/12) rated voltage and frequency ambient temperature: 20°C; operating temperature: 70°C; bath liquid: water

***)**

Important notice:

When the working temperature is higher than 90 °C, it might happen that due to strong production of steam there is considerable dripping on the inside of the lift-up Makrolon® cover. Some drops may fall directly into the material to be tempered.

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Safety installations according to IEC 61010-2-010:	
Excess temperature protection	130 °C - fixed value
Alarm indication	optical + audible (continuous tone)
Classification according to DIN 12876-1	class I
High temperature warning function	optical + audible (in intervals)
Low temperature warning function	optical + audible (in intervals)
Timer	audible (in intervals)
Protection class	IP43 acc. to IEC 529

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

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15. WARRANTY CONDITIONS

JULABO USA, Inc. 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

TWO (2) YEARS

or a maximum of ten thousand hours (10,000), whichever comes first, from the date of delivery of the products. To avoid forfeiture of the warranty and to allow JULABO to be of continuing service to the scientific community, the record of the purchase is required to be returned to JULABO or one of its authorized representatives within 30 days of receipt of equipment.
JULABO's sole obligation shall be to repair or to replace at JULABO's option, F.O.B. its plant or locally, without charge, any part(s) that prove defective within the warranty period, providing the customer notifies JULABO promptly and in writing of any such defect. Compensation for labor other than Julabo's employees will not be JULABO's obligation. Part(s) replacement does not constitute an extension of the original warranty period.
JULABO will not assume responsibility for unauthorized product modifications, or for repairs, replacements, or modifications negligently or otherwise improperly made or performed by persons other than JULABO employees or authorized representatives.
JULABO MAKES NO WARRANTY OR MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, AS TO THE DESIGN, SALE, INSTALLATION, OR USE OF ITS PRODUCTS, AND SHALL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS.
While JULABO's personnel or that of its authorized representatives are available to advise customers concerning general applications of all manufactured products, oral representations are not warranties with respect to particular applications, and should not be relied upon if inconsistent with product specifications or the terms stated herein.
All glassware, such as reference thermometers, etc, are expressly excluded from this warranty declaration.
In any event, the terms and conditions contained in JULABO's formal sales contracts shall be controlling and any change must be in writing and signed by an authorized executive of JULABO USA, Inc.

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