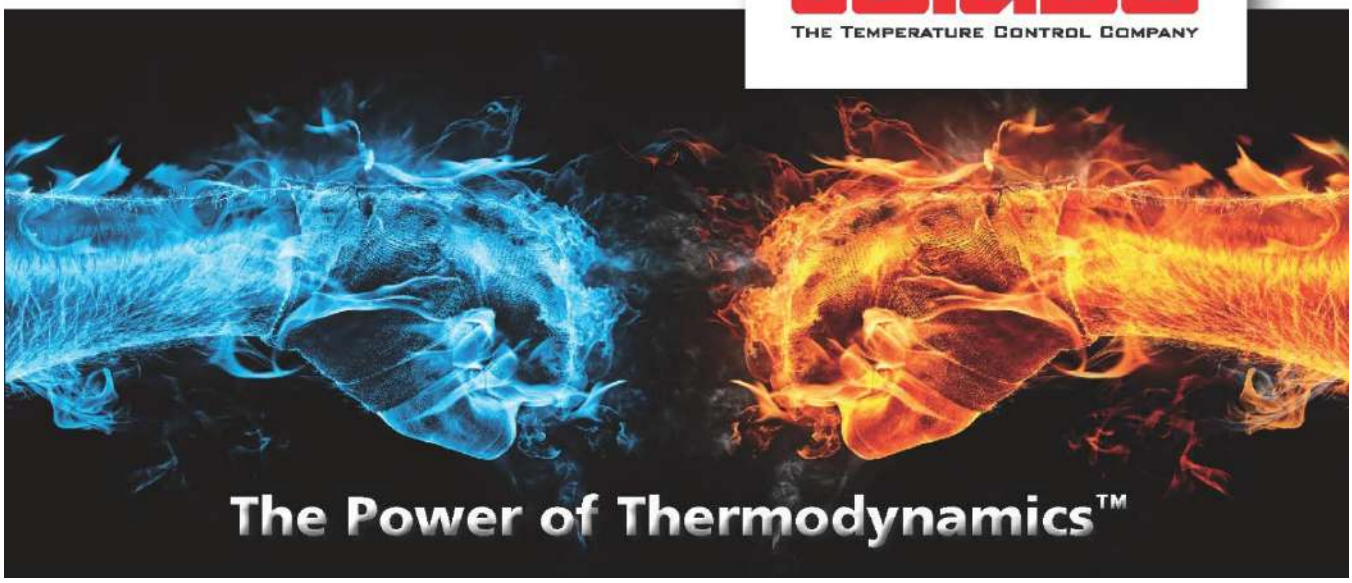
Julabo
THE TEMPERATURE CONTROL COMPANY



Original Operating Manual

PRESTO™

Highly Dynamic Temperature Control System

A80, A80t, **W80, W80t**

See Operating instructions „User Interface“, 1951.3041, for additional information.

1.951.3044-V7 09/19

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Congratulations!

You have made an excellent choice.
JULABO would like to thank you for the trust you have placed in our company and products.
This Operating Manual will help you become acquainted with the use of our temperature control systems. Read this manual carefully before bringing the unit into operation!

The JULABO Quality Management System

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

Unpacking and Inspection

After unpacking the units and accessories, carefully inspect them for any damage. If the packaging has been damaged, you must notify the freight forwarder, railway company, or postal service so they can file a damage report.

Printed in Germany

Changes without prior notification reserved

Important: keep operating manuals for future use

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1. Proper Use

PRESTO™ is a highly dynamic temperature control system designed for controlling the temperature of certain liquids in a closed, external system. The temperature-controlled external system is attached to the protruding pump connections on the rear of the PRESTO™.

JULABO temperature control systems are not suitable for direct temperature control of food or other items intended for human consumption, pharmaceutical products, or medical products.
Direct temperature control means: The temperature-controlled object has unprotected contact with the bath fluid.

1.1. Description

- In addition to the refrigeration unit, the main functional elements are the heater, circulation pump, and control electronics. When used with an external Pt100 control sensor, the auto-optimizing electronic PID controller will automatically adjust to the requirements of the external vessel.
- The pump's powerful output can be reduced for use with pressure-sensitive vessels by altering the motor speed in four stages or by controlling via pressure.
- The refrigeration systems are cooled
  - A80, A80t with air from the ambient surroundings
  - W80, W80t with water.
- The unit is operated via the TFT user interface.
- Remote control through the digital RS232, USB, and ethernet interfaces according to NAMUR enable advanced process control without an additional interface card.
- The high temperature cut-off is a safety device that is independent from the control circuit. The cut-off temperature is adjustable and is displayed on the TFT user interface.
- The integrated programmer lets you store and retrieve setpoints and times for eight different temperature profiles.
- Interfaces available on the right side of the housing:
  - SD card for datalogging
  - USB host interface.
- Analog interfaces:
  - Alarm output for an external signal
  - Ext. Pt100 connection for an external control
  - Connection for JULABO pressure or flow sensor
- An analog module is optionally available, it consists of:
  A *STAND-BY input* for remote shutoff with an external switch.
  REG+E-PROG connection for specifying the setpoint with an external analog setpoint device or programmer. Three analog outputs for datalogging are also integrated.

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2. Operator Responsibilities - General Safety Notices

Products from JULABO GmbH are safe when installed, operated, and maintained according to generally accepted rules of safety. This chapter explains the potential hazards that can arise in conjunction with operation of the temperature control system and describes safety measures for eliminating these hazards when possible.

2.1. Personnel

- The owner/operator is responsible for the qualifications of the operating personnel.
- Make sure that anyone who will operate the temperature control system has been instructed regarding the relevant tasks.
- The operators must be trained on a regular basis on the hazards that may occur during their activities and on measures for mitigating these hazards.
- Make sure that anyone entrusted with operation, maintenance, and installation has read and understood the safety information and the operating manual.
- When using hazardous materials or materials that may become hazardous, allow only persons with complete knowledge of the materials and the circulator to bring the unit into operation. These persons must have the ability to evaluate potential dangers in their entirety.

2.2. Handling guidelines

- Avoid impacts to the housing, vibrations, damage to the keypad (keys, display), or heavy soiling.
- Regularly check, at least once every two years, to ensure proper condition of the safety, warning, and prohibition symbols.
- Ensure that the mains power network exhibits low impedance in order to avoid influencing units that are operated on the same network.
- Magnetic radiation may affect other devices that contain components that are sensitive to magnetic fields, such as a monitor. We advise maintaining a min. distance of 1 m from such devices.
- The ambient temperature may not exceed 40 °C [104 °F], nor fall below 5 °C [41 °F].
- Rel. humidity should not exceed 50% at 40 °C, [104 °F].
- Do not store or use the unit in aggressive (corrosive) atmospheres. Protect the unit from contamination.
- Do not place the device in direct sunlight.

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3. Safety Notices

3.1. Explanation of safety notices

⚠	The Operating Manual contains additional safety notices. They are identified by a triangle with exclamation point. "Caution, warning of a dangerous condition." The significance of the danger is categorized in conjunction with a signal word. Carefully read and observe the instructions!
⚠	**⚠DANGER** Designates a potentially threatening **danger to life and health**. Failure to observe these notices can result in serious health consequences, including life-threatening injuries.
⚠	**⚠WARNING** Designates a potentially **hazardous situation**. If not avoided, they may result in **slight or minor injuries**. The text may also warn against potential property damages.
⚠	**⚠CAUTION** Designates the potential for **property damage**. If not avoided, the **product or something in its vicinity** may be damaged.
	NOTICE Designates a possibly **harmful situation**. If it is not prevented, the **system or something near** it may be damaged.

3.2. Descriptions of other notices

TIPP
This symbol draws attention to important information.

Important!
Refers to usage tips and other useful information.

3.3. Safety instructions for operation

It is essential that you read the operating manuals before initial operation.
It is important that you follow all safety instructions in order to avoid personal injury and property damage. These instructions supplement workplace safety regulations.

- This device may be connected to grounded (protected earth, PE) mains power outlets only!
- These tasks may be performed by properly trained personnel only.
- The mains plug serves as a reliable way to disconnect the unit from its power supply for safety reasons and must be readily accessible at all times.
- Install the unit on a level, noncombustible surface
- Adjust the high temperature cut-off before operating the unit.
- Never operate the unit without bath fluid!
- Observe expansion of the bath oil as the bath temperature rises.
- Do not allow water to enter hot bath oil.
- Do not drain bath fluid while it is hot!
  Check the temperature of the bath fluid before draining; this may be done by briefly switching on the unit.
- Use tubing suitable for temperature-control purposes.
- Avoid kinking the external tubing.
- Secure tubing connections to prevent slipping.
- Regularly check tubing for material fatigue, such as cracks.
- Never operate a damaged or leaking unit.
- Do not attempt to use the unit if the power cable is damaged!
- Before performing service or repair tasks or moving the unit, switch the unit off and remove the power plug from the socket.
- Allow only authorized technicians to perform service and repair tasks.
- Always switch off the device and disconnect it from its power supply before attempting to clean it.
- Completely drain the unit before moving it.
- Transport the unit carefully.
- Do not tilt or lay the unit during transport.
- Shaking or falls may damage the inside of the unit.
- Observe all safety labels!
- Do not remove safety labels!

⚠WARNING

Hot or cold parts.

Risk of burns or frostbite.

Use gloves.

⚠WARNING

Dangerous electrical voltage

Discharging of internal capacitors takes 5 sec. Do not touch plug pins for 5 sec. after pulling the power plug.

3.4. Safety instructions for properly locating and installing the device

⚠WARNING

Danger of burns and property damage if unsuitable bath fluid is used.

Proper use of the temperature control system includes controlling the temperature of a liquid in a reactor or similar vessel.
We do not know which substances you will need to use.
Many substances are:

- combustible, flammable, or explosive
- hazardous to health
- hazardous to the environment
- in other words: **dangerous**.

The user bears sole responsibility for handling these materials!

The following questions are meant to help recognize potential hazards and minimize risks.

- Are all tubes and electrical cables securely attached and laid?
  Watch for:
  sharp edges, hot surfaces during operation, moving mechanical parts, etc.
- Will hazardous vapors or gases be produced during heat-up?
  Is it necessary to work under a fume hood?
- What must be done if a hazardous substance is spilled onto or into the unit?
  Obtain information about the substance before beginning work and define decontamination methods.

Escaping vapors/gases

- Vapors/gases may develop, especially at higher working temperatures. The unit will vent these vapors/gases to ensure optimum performance. Operation under a fume hood is recommended.
  Ensure good ventilation and airflow at the place of installation.

It is advisable to continue circulation for a certain amount of time after you are finished working with the temperature control system. You should also set the working temperature to approximately 20 °C [68 °F] in order to uniformly drop the temperature in the closed loop. This will avoid overheating of the bath fluid and dangerous draining conditions.

Inspect safety devices at least twice per year:

- **High temperature cut-off device.**
  Use a screwdriver to turn the adjustable high temperature cut-off down to the current bath temperature (this will shut off the unit).
- **Low-level safety**
  The float switch on this unit cannot be activated manually for the purpose of checking functionality. Therefore, you should observe the five-stage level indicator each time you refill the unit.
  If the bath fluid becomes thick or cracks during operation, the temperature control system must be cleaned by qualified personnel. This can be avoided by changing the fluid regularly. Refer to *chapter 5.9. "Empty the unit" menu.*

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3.5. Operation

The unit may only be configured, installed, maintained, and repaired by qualified personnel.
Persons who operate the circulator must be trained in the particular tasks by qualified personnel. Please call us if you have any questions about operating the unit or the operating manual.

The bath may be filled with flammable liquids. Fire hazard!
Some bath fluids may represent a chemical hazard.
Observe all warning notices on the materials used (bath fluids) and in their associated instructions (safety data sheets).

Potentially explosive mixtures may be formed if adequate ventilation is not provided. Use the units only in well ventilated areas. The units are not suitable for use in potentially explosive atmospheres.

Proper use includes limitations on the types of materials (bath fluids) used. Do not use toxic, acidic, or corrosive bath fluids.

If using hazardous materials or materials that may become hazardous, the operator must apply the enclosed safety labels to the front side of the unit where they are easily visible.

Switch off the temperature control system if the cooling circuit is disconnected for an extended time period.

	Warns against a dangerous condition. Important! Please observe the documentation. (operating instructions, safety data sheet).
	You must read the operating manual before switching on the unit. Valid in: EU
	You must read the operating manual before switching on the unit. Valid in: USA, NAFTA

Special diligence and care are essential due to the wide operating temperature range.
There are heat- and cold-related hazards: burns, scalding, superheated steam, frostbite.

Hot and cold parts and surfaces that could cause burns or frostbite when touched.

	Warns against hot or cold surfaces.
	Disconnect the unit from the power supply prior to opening.
	Dangerous electrical voltage. Discharging of internal capacitors.

Observe the notices in the instructions for third-party units that you attach to the JULABO unit, especially any safety notices.
The pin assignment of the plugs and the technical data of the products must be observed of all times.

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3.6. Transporting and properly locating the device

WARNING

Risk of explosion by explosive mixtures
Danger of burns
The unit is **not** suitable for use in potentially explosive atmospheres
Tipping hazard!
Unit may tip if pushed from the side with more than 180 N of force.

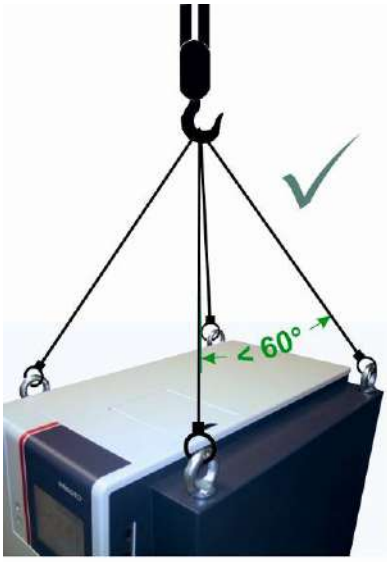
Incorrect lifting techniques and/or lifting equipment can lead to overloading of one or more of the eye bolts (pictured below), which could destroy it/them. As a result, all of the support points used for lifting could become overloaded, leading to a drop that could cause harm to bystanders and/or damage to the device.
When selecting lifting equipment, please take into account the weight of the temperature control system.

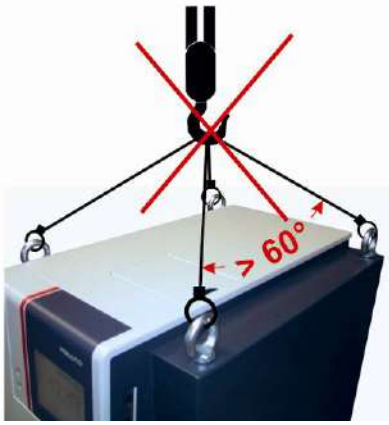
Danger of suspended loads
Risk of impact and crushing
- Do not step beneath the suspended unit.
- Wear personal protective equipment e.g. safety shoes, safety helmet.

3.6.1. Transport

- Fasten lifting gear to the four eye bolts.
- Transport unit to installation site and place in position.
- Remove lifting gear.
- Remove eye bolts and retain.
- Suggestion: Close the tapped bores with the plastic caps included in delivery.

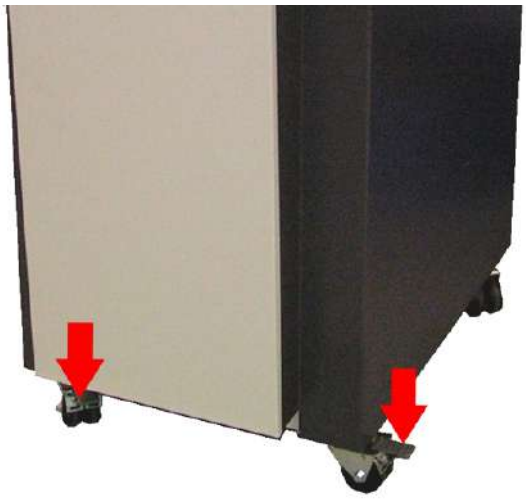
To transport and position the unit with lifting gear there are four lifting points with eye bolts.





3.6.2. Properly locating the device, Earthquake anchorage

- Transport the unit on a firm, level surface. Avoid shocks, e.g. floor grates.
- For longer distances, securely strap the unit to a trolley or cart before transport.
- Position the unit at the desired location and lock the castors.
- Install the unit on a level, noncombustible surface.
- Do not install the unit in the immediate vicinity of a heat source and do not place it in direct sunlight.
- Keep the ventilation grids clear (front and rear)! Maintain clearance of at least 8 inches (20 cm) from objects, walls, etc. in both the front and rear of the unit.
- Clean the ventilation grids (front and rear) at least once every 2-3 weeks. In dirty environments, clean the ventilation grids more often.
- When using an external reservoir, additional space is needed at the rear.

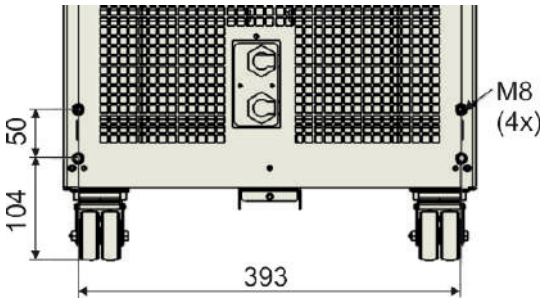


Ensure adequate air conditioning at the installation location.
The installation location should be air conditioned to prevent the exhaust heat of the unit from increasing the ambient temperature too much (maximum ambient temperature 40 °C [104 °F]). Furthermore, standard EN 378 requires a minimum room size for each kilogram of refrigerant in the event of a leak in the refrigeration circuit. Refer to the type label for the refrigerant volume.

0.49 kg of refrigerant R507 requires 1 m^3 of space.

0.68 kg of refrigerant R23 requires 1 m^3 of space.

Mounting holes for Earthquake anchorage (in mm)



3.7. Connecting to power supply

WARNING

Danger of electric shock.

Risk of injury from electric power.

- This device may be attached to grounded (protected earth, PE) mains power outlets only!
- The mains plug serves as a reliable way to disconnect the unit from its power supply for safety reasons and must be readily accessible at all times.
- Do not attempt to use the unit if the power cable is damaged!
- Regularly inspect the power cable for damage.
- JULABO assumes no liability for improper power connection!

Compare the available mains voltage and mains frequency with the specifications on the type label.

See technical data section for information on allowable voltage tolerances.
Connect the mains plug to a grounded (protected earth, PE) power supply socket!

For 60 Hz devices: Since the device is protected by a circuit breaker of characteristic K, the loop impedance of the circuit used must not exceed 0.55 ohms.

3.7.1. Unit for hard-wired installation

Units for hard-wiring are delivered with a mains power cable but without a plug. These units are A80t and W80t units with the voltage 3x208 V / 60 Hz.

When installed in a building, provisions must be made for a circuit breaker of 32-A as separator.

In addition it is recommended to fuse the unit in the building installation with 32-A-with C-characteristic.

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4. Operating and functional elements

4.1. Front side of the unit

1 User Interface

2 Removable ventilation grid

3 High temperature cut-off adjustment

4 Power switch (at the side of the housing)

5 USB Host (Type A) connection and SD Card slot.

Operation of the **user interface** is described in a separate document (see page 1).

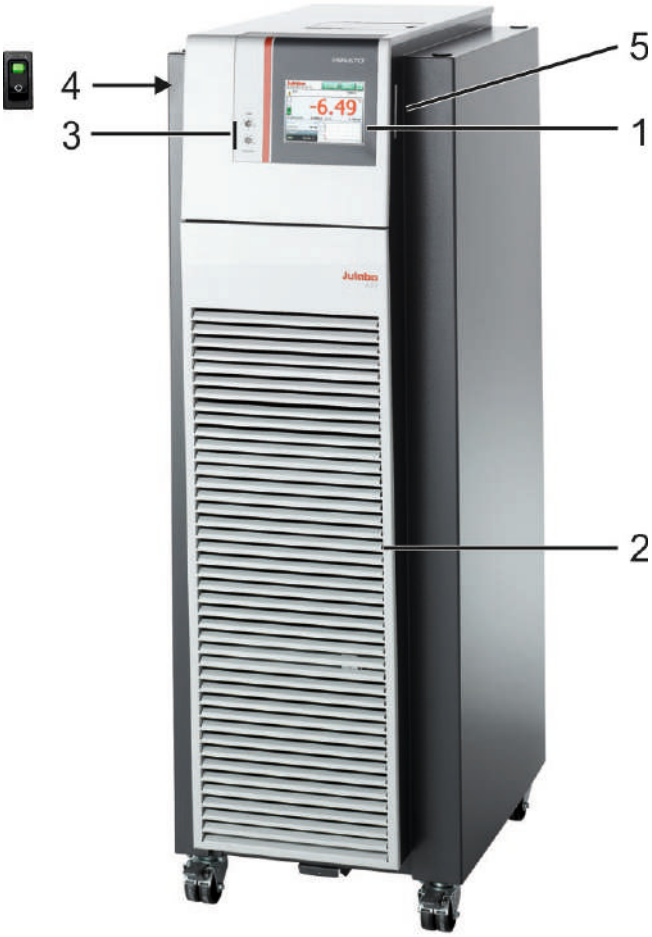


Fig.: A80

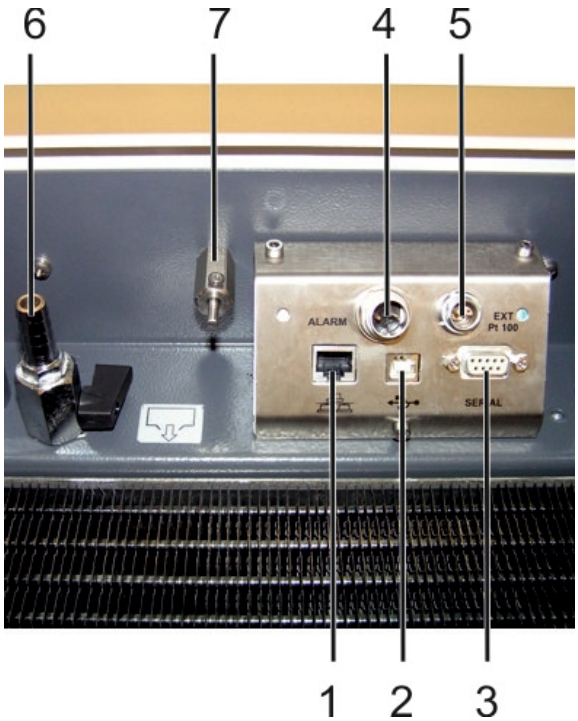
4.1.1. Electrical connections on the front side of the device (upper section)

Remove the ventilation grid (front panel at W80) as follows in order to access the electrical connections:

- Grasp the bottom edge of the ventilation grid (front panel), lift slightly (1), and tilt it forwards (2).
- Remove the ventilation grid (front panel) from the housing frame.

Included connections:

1 Ethernet connection.
2 USB device (Type B plug).
3 RS232 interface
4 Alarm socket for ext. alarm signal.
5 Socket for external measurement and control sensor (Pt100).
6 Connection for draining residual bath fluid.
7 Sensor for ambient temperature measurement.



☞ Using tubing and a suitable vessel, open the connection (6), about every 2-3 weeks, to release any built-up deposits

4.1.2. Drain elements on the front side of the device (lower section)

The drain nozzle (7) with outer diameter ∅12 mm and the drain screw (8) are located near the bottom of the unit behind the ventilation grid.

On the W80 it is possible to completely drain the cooling water system via the sealing plug M10x1 (9).
Details are given in *chapter 5.8. "Empty the unit" menu.*

A80

W80

Replace the ventilation grid (front panel) as follows:

- Slide the venting grid below the upper unit cover. Set the ventilation grid onto the angled metal piece at the bottom of the unit.
- Tilt the ventilation grid towards the unit until it touches the mounting pins.
- Lift the grid slightly and onto the mounting pins.
- Slide the ventilation grid downward.

4.2. Rear of unit

4.2.1. A80, A80t, air-cooled

1 Circuit breakers for mains supply
1a at A80t

2 Mains cable with plug
2a at A80t

3 Overflow connection, M16x1 male

4 Pump connection (supply), M24x1.5 male

5 Pump connection, (return IN), M24x1.5 male

6 Connection for external expansion reservoir, M16x1 male

Reservoir extern

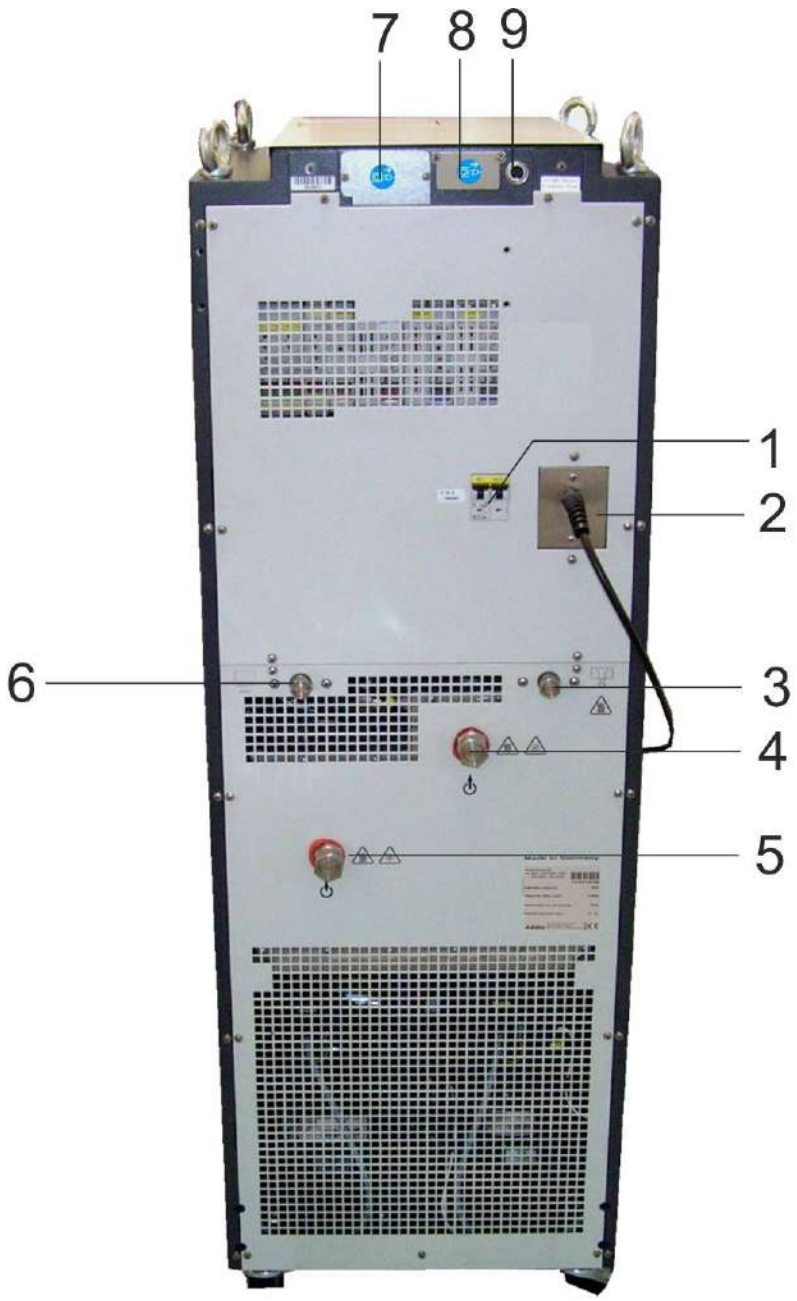
Options

7 Socket for connection of optional accessory analog connections (Order No. 8900105).

8 Socket for connection of Pt100 module with connector (Order No. 8900106).

9 JULABO Pressure / Flow Sensor socket.

More information regarding these connections can be found in chapter *6. Electrical connection pin assignments, page 37*



Safety cutouts and mains cable at A80t

4.2.2. W80, W80t, water-cooled

1 Circuit breakers for mains supply
1a at W80t

2 Mains cable with plug
2a at W80t

3 Overflow connection, M16x1 male

4 Pump connection (supply), M24x1.5 male

5 Pump connection (return,), M24x1.5; male

6 Cooling water outlet, (OUT) G3/4“ barbed fittings for ½” inner diameter

7 Cooling water inlet, (IN) G3/4“ barbed fittings for ½” inner diameter

8 Connection for external expansion reservoir, M16x1 male

Reservoir extern

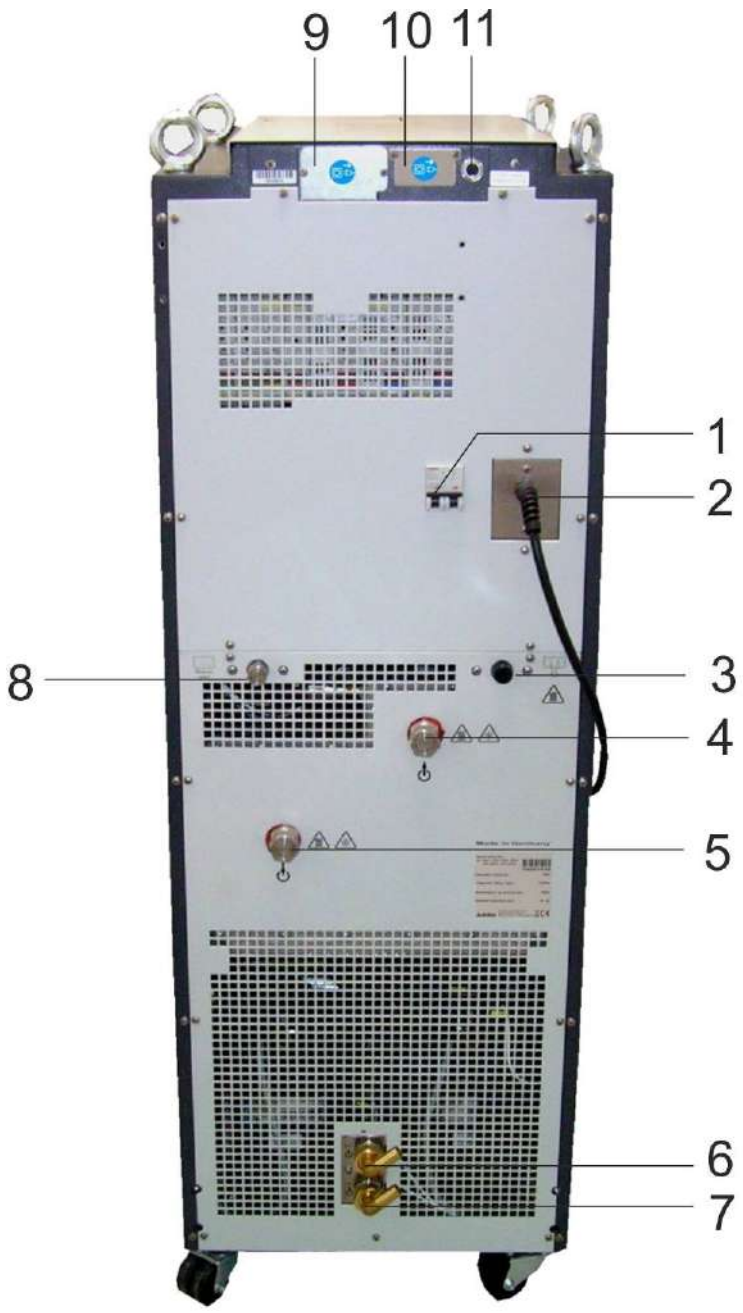
Options

9 Socket for connection of optional accessory analog connections (Order No. 8900105).

10 Socket for connection of Pt100 module with connector (Order No. 8900106)

11 JULABO Pressure / Flow Sensor socket

More information reg. these connections can be found in chapter *6. Electrical connection pin assignments, page 37*



Safety coutouts and mains cable at W80t

5. Preparations

5.1. Cooling water connections at W80 and W80t

Even high quality heat exchangers, like those installed in our equipment, can be damaged by unsuitable cooling water.
Cooling water quality can vary based on local conditions.

The heat exchanger may become leaky due to corrosion, or it may become clogged due to particulates building up inside.

Cooling water pressure (IN / OUT)	max.	6 bar
Differential pressure (IN - OUT)	0.5 bar	
Cooling water temperature	< 30 °C [< 86 °F]	

Cooling water quantity see technical data.

NOTICE

Danger of corrosion of heat exchanger due to unsuitable quality of cooling water.

- Due to its high lime content, hard water is not suitable for cooling. It will cause scale formation in the heat exchanger.
- Water containing high amounts of iron will cause rusting even in heat exchangers made of stainless steel.
- Chlorinated water will cause pitting corrosion in heat exchangers made of stainless steel.
- Due to their corrosive characteristics, distilled water and deionized water are unsuitable and will cause corrosion of the bath.
- Due to its corrosive characteristics, sea water is not suitable.
- Due to their microbial (bacterial) components which settle in the heat exchanger, untreated and unpurified water from rivers and/or cooling towers is unsuitable.
- Avoid particulate matter in cooling water.
- Avoid putrid water.

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5.1.1. Recommended quality of cooling water:

pH	*7.5 to 9.0*
Sulfate $[SO_4]^{2-}$	*< 100 ppm*
Hydrocarbonate $[HCO_3]$/ sulphate $[SO_4]^{2-}$	*> 1 ppm*
Hardness $[Ca^{2}+, Mg^{2+}]/[HCO_{3-}]$	*> 0.5 °dH*
Alkalinity	*60 ppm < $[HCO_{3-}]$ < 300 ppm*
Conductivity	*< 500 µs/cm*
Chloride (Cl -)	*< 50 ppm*
Phosphate (PO4 3-)	*< 2 ppm*
Ammonia (NH_3)	*< 0.5 ppm*
Free chlorine	*< 0.5 ppm*
Trivalent iron ions (Fe^{3+})	*< 0.5 ppm*
Manganese ions (Mn^{2+})	*< 0.05 ppm*
Carbon dioxide (CO_2)	*< 10 ppm*
Hydrogen sulfide (H_2S)	*< 50 ppm*
Oxygen content	*< 0.1 ppm*
Algae growth	*Not permitted*
Suspended solids	*Not permitted*

NOTICE

Cooling water circuit

There is a risk that oil could leak from the refrigeration system (compressor) of the temperature control system into the cooling water in case of a fault in the cooling water circuit!

Obey the laws and regulations of the water distribution company.in the region where the unit is operated.

Connect cooling water:

- Cooling water connectors G3/4" female / Barbed fittings ½" inner diameter.
- The used cooling water will exit via the outlet (OUT ⏻). Plumb this connection to the respective drain or return flow circuit.
- Supply cooling water via the inlet (IN ⏻).

5.1.2. Accessories

Order No.:	Description
8 930 312	Reinforced tubing (pressure resistant) 1/2“ inner dia.
8 970 482	2 Tube clamps
8 920 000	Particle filter for cooling water circuit

5.2. Bath fluids

WARNING

Observe the safety data sheet of the bath fluid, especially the fire point!
The unit must be supervised at all times if using a bath fluid with a fire point of ≤ 65 °C [≤ 149 °F].
When device leaks, leaky hose connections or defective temperature control tubing, it must be provided to absorb the bath fluid with a suitable binder according to safety data sheet.

Recommended JULABO bath fluids for closed, external systems

Order No.	Description		Working temperature range
8940140	THERMAL HL60	10 l	-60…+250 °C
8940141	THERMAL HL60	5 l	

WARNING

Use of non-recommended bath fluids may result in a fire hazard or other hazard:
JULABO will **assume** no liability for damages resulting from use of an unsuitable bath liquid.

Unsuitable bath liquids include substances with the following characteristics:

- highly viscous
  (significantly higher than 50 cSt (50 mm^2/s) at the relevant working temperature)
- low viscosity, but with creep properties
- corrosive properties
- liquids that tend to crack.

JULABO assumes no liability if unsuitable liquids are used!

CAUTION

Maximum viscosity must not exceed 50 cSt (50 mm^2/s) at working temperature.

Use of purified or unpurified water is not permitted.
Examples:
tap water, distilled water, deionized water, water/glycol mixtures, $CaCl_2$ solutions

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NOTICE

About recommended Bath fluids:

This temperature control system is operated in a **closed, external** temperature loop. As a result, the bath fluid only comes into contact with oxygen in the internal filling reservoir, which is not located directly in the temperature control loop.

A safety device monitors and controls the temperature in the internal reservoir.

The temperature of the bath fluid is held steady at approx.25 °C [77 °F].

A safety device with an adjustable temperature value >RESERVOIR< protects against dangerous conditions, independent of the control loop. When this safety device triggers (e.g. if excessively hot liquid flows into the internal reservoir), the temperature control system is completely shut down and will not restart without manual intervention.

Set the >RESERVOIR< safety temperature at least below the flash point of the bath fluid.

5.3. Temperature control tubing

⚠WARNING

Tubing:
Temperature control tubing is a potential source of danger at high working temperatures. If one or more temperature control tubes are damaged, a large volume of hot bath fluid can be pumped out of the unit in a short period of time.

Potential consequences include:

- Fire hazard
- Explosion hazard
- Severe burns to persons or property
- Difficulty breathing caused by a hot atmosphere

Safety instructions

- Use tubing suitable for temperature control purposes.
- Secure tubing connections against slipping.
- Avoid kinking the tubes.
- Regularly check tubes for material fatigue, such as cracks.

The following tubing is recommended:

Triple-insulated metal tubing, each with two end connections M24x1.5 female, temperature range to
-100 °C ... +350 °C [-148 °F to 662 °F].

Order No.	Length
8.930.261	1.0 m
8.930.262	1.5 m
8.930.263	2.0 m
8.930.264	3.0 m

Maximum pressure 6.0 bar at +20 °C [68 °F]
4.6 bar at +200 °C [392 °F]
3.8 bar at +350 °C [662 °F]

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5.4. Connecting an external vessel

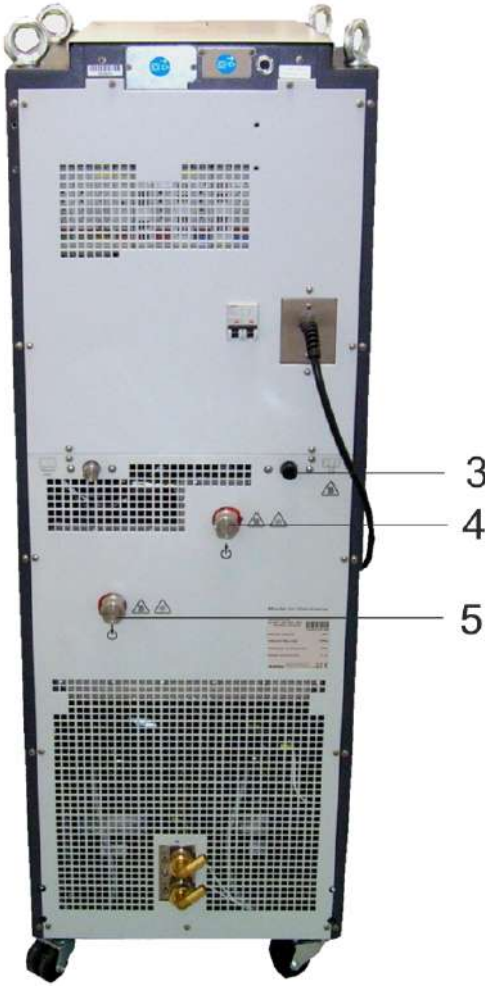
CAUTION

Danger from unsealed pump connections.
Secure tubing connections against slipping.

This temperature control system is designed to control the temperature of an external, closed-loop vessel (temperature loop).
The tubing connections between the temperature control system and the attached external vessel should be as short as possible. This is the only way to fully utilize one of the main advantages of this system (its speed!).

- Remove the screw caps from the pump connections (4, 5) and use appropriate tubing to connect the unit to the external system (M24x1.5 / 27mm wrench).
  The pressure line (4, OUT) must be attached to the lowest fluid connection point of the external vessel to prevent air from becoming trapped.
- Connect one end of an appropriate tube to the overflow (3) adapter and place the other end into a suitable container. The container must always be lower than the "overflow" outlet (M16x1 / 19mm wrench).

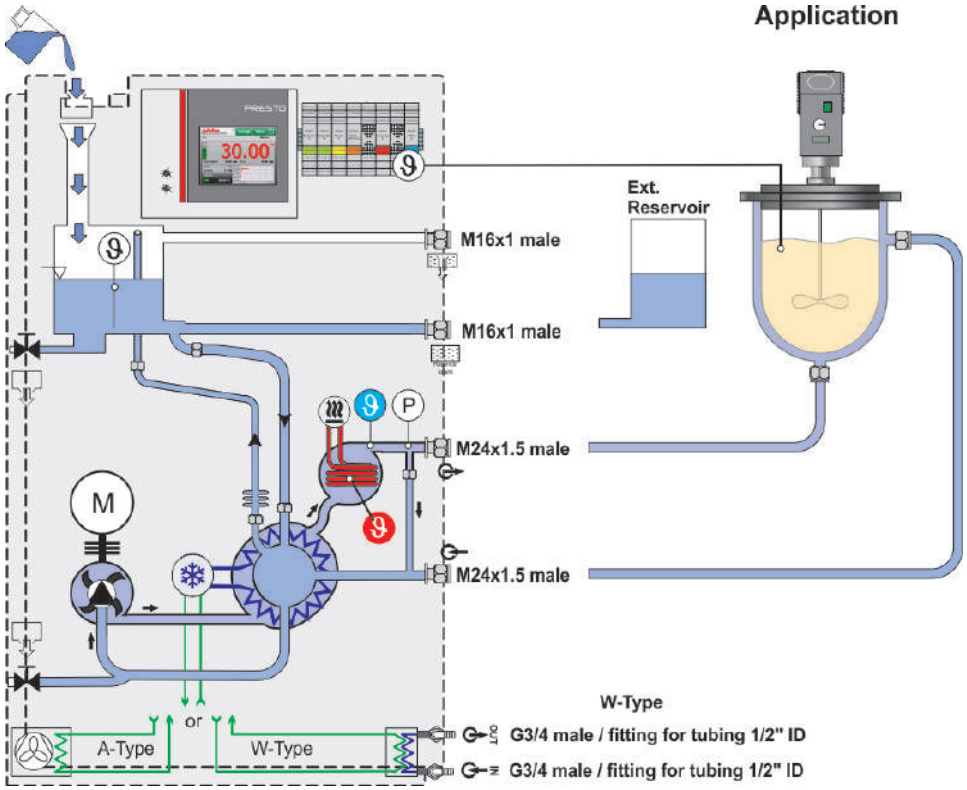
The below picture shows the W80, but the A80 connects to the external vessel in the same way.



NOTICE

If bath fluid drains out through the overflow (3) at your highest working temperature, direct the liquid into a suitable container. If the unit also triggers a low fluid-level alarm at the lowest working temperature, then you should use an external expansion vessel to avoid this problem.

5.5. Diagram: Device structure and mechanical connections



5.6. Accessories

5.6.1. Connectors, Valves, Adapters, etc.

5.7. Filling

CAUTION

Connect the external vessel first!
See chapter 5.4. Connecting an external , page 26.
Be aware of how the bath fluid changes volume within the temperature control system's working temperature range.
Rule of thumb:
Expect about 12 % volume change for every 100 °C [212 °F] temperature change.

NOTICE

Always check to make sure the drain screw is closed before filling.

Recommendation:

- Use a 2-liter measuring cup or similar for filling.
- Use a heat transfer fluid that is appropriate for your application.

5.7.1. Sample Calculation: Determining whether an external expansion reservoir is needed

Assumption:
The external vessel for this example is a reactor with capacity 5 l.
The length of the connection tube is 6 m, the inner diameter is 10 mm.
The bath fluid has a thermal expansion coefficient (γ) of $1.1 \cdot 10^{-3}$ K^{-1}
The temperature difference ($\Delta\vartheta$) is 280 °C.

The change in volume (ΔV) of the bath fluid can be calculated as follows:

$$\Delta V = V_{ges} \cdot \gamma \cdot \Delta\vartheta$$

In which $V_{ges} = V_M + V_S + V_G$

V_M = Jacket volume (approx. 1/3 of external reactor volume) = 0.33 • 5 l = approx. 1.65 l
V_S = Volume of the tubes (A • l) = 78.5 mm^2 • 6 m = 0.47 l
V_G = Volume of the active heat exchanger volume = 1.7 l

V_{ges} = 1.65 + 0.47 + 1.7 = 3.82 l

ΔV = 3.82 l • $1.1 \cdot 10^{-3}$ K^{-1} • 280 K = 1.18 • 20 % safety factor = **approx. 1.4 l**.

In this case, the internal usable expansion volume (please see technical data) would be sufficient.

With a reactor volume of 50 l in this example, the external expansion reservoir, offered by JULABO (Order No. 8970833), would be necessary.

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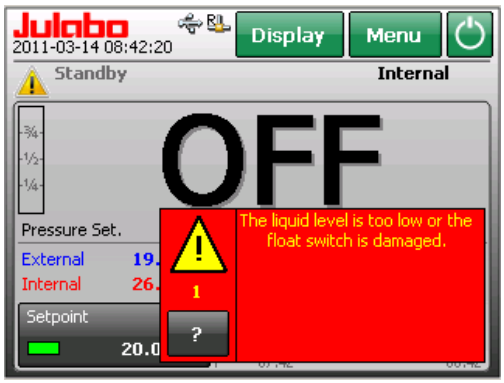
5.7.2. Filling a closed, external system

(Also refer to the *"User Interface"* operating manual, *1.951.3041*)

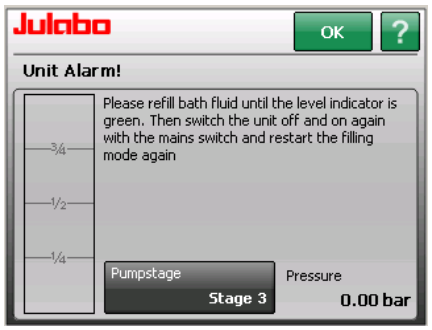
Connect the unit to the mains power supply and switch on the unit at the mains switch.
After the self-test is completed, the unit will be in the "OFF" state and will emit an audible signal.
To mute the audible alarm, touch the alarm notice's red box.
The fill level indicator on the left side of the display shows that the unit is empty.



To continue,

press the button.

You will see a message instructing how to fill the unit. Press the button labeled “Fill unit” and follow the instructions displayed on the User Interface.

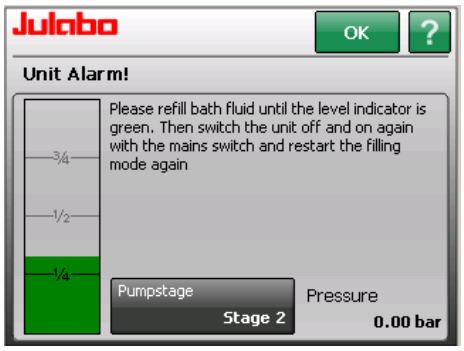


Filling the unit:

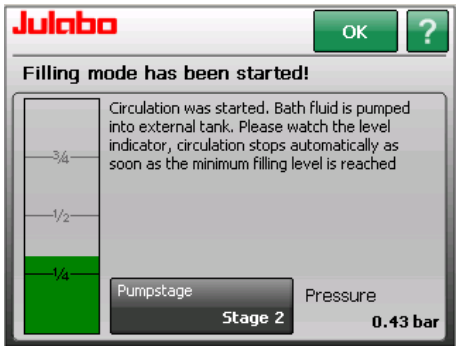
- Open the cover on top of the housing
- Remove the plug (not pictured).
- Slowly pour heat transfer liquid into the round opening (Use a funnel or a container designed for pouring, for best results).

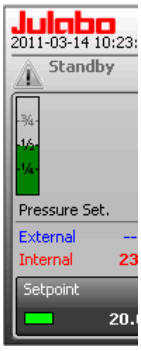
The area around the filling opening is sealed from the housing, but you should avoid spilling large amounts of bath fluid. Clean up any spilled fluid with a towel or similar.

Watch the level indicator. As soon as the minimum filling level has been reached the fill level indicator will turn green. Switch the unit off and switch it back on again.

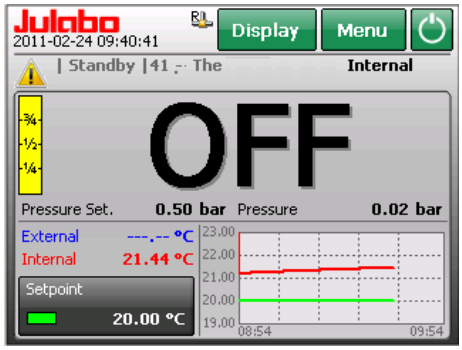


You may now continue filling up to the desired level.
Return to standard display by pressing OK.





If there is too much bath fluid or if the bath fluid expands due to heating during operation, a high fluid level warning is activated.
In this case, use the residual fluid drain (6) to remove some bath fluid.
See the next chapter for draining instructions..



Ticker text:
The early warning system for high fluid level reports a critical fluid level. Please drain some bath fluid.

5.8. "Empty the unit" menu

CAUTION

- Do not drain the bath fluid while it is hot!
  Check the temperature of the bath fluid before draining; this may be done by briefly switching on the unit.
- Always store and dispose of old bath fluid in an environmentally friendly way.
  Always observe the applicable disposal regulations in your region.

After removing the ventilation grid, the drain nozzle (7) and the drain screw (8) can be operated. For draining:

- Attach a tube (outer diameter 12 mm) to the drain port (7).
- Place a suitable container for holding or storing the liquid under the unit.

A80

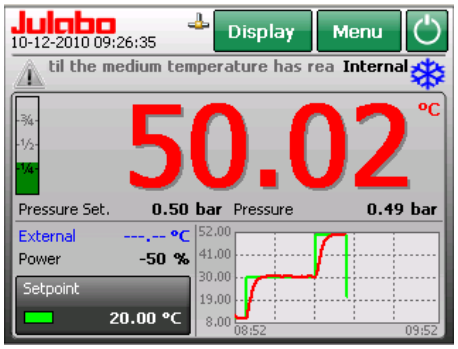
W80

The draining operation is menu-driven on the user interface, but it also requires some mechanical operations.

Call up the main menu, then press

Press

The ticker in the display reports the start of the automatic draining mode. The setpoint is automatically changed to 20.00°C. As soon as the temperature reaches 20 °C (± 10 K), the ticker text will change and prompts you to drain the unit.



Ticker text:
Automatic draining mode active. Wait until the medium temperature has reached the adjusted setpoint.
Automatic draining mode finished. You can drain the unit now.

- Unscrew the drain screw (8) by a few turns.

A80

- To drain excess or stagnant cooling water from the W80 before transportation, use the M10x1 drain screw (9)

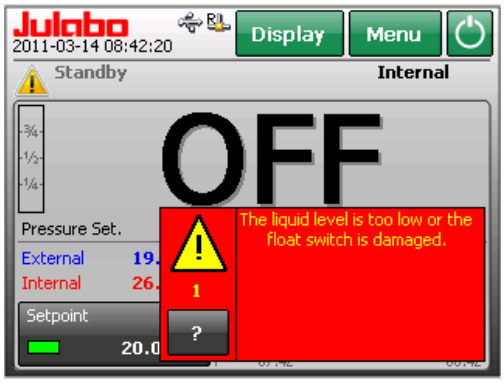
W80

As the liquid drains, the fluid level will decrease. The low-level warning (warning 40) and then the low-level alarm (alarm 1, red) will eventually occur when the level drops to the two trigger points.

Warnings are displayed as a ticker in the status line.

Mute the audible signal by pressing the yellow symbol.

Mute the audible signal by touching the red box.



In order to completely drain the bath fluid, it is necessary to also empty the filling reservoir.

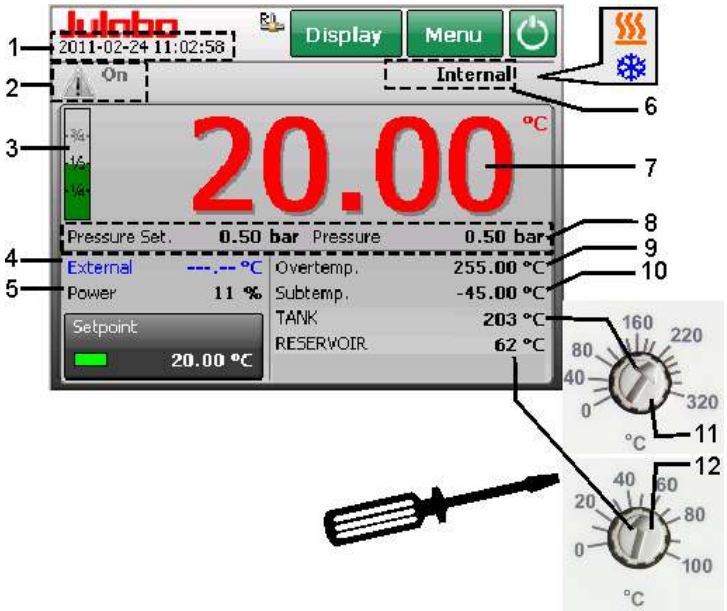
Connect a piece of tubing (diam. 11.5 mm), and flip the ball valve's handle (6) to empty the filling reservoir.

5.9. Additional thermal adjustment and electrical connection elements

5.9.1. Adjustable high temperature cut-off

Two circular potentiometers for setting the high temperature cut-off are located on the front of the unit. Use a screwdriver to turn these dials.

On the TFT you will find the continuous display of important values and functions.



Warning

The >TANK< high temperature cut-off (complies with DIN standard 12876-1-2000) should be set to 15 °C above the highest working temperature setpoint. Make sure that the fluid is rated for use at this temperature, first!

The >RESERVOIR< high temperature cut-off must be set to at least below the bath fluid's flash point.

Adjust the high temperature cut-off by slowly turning the dial with a screwdriver. The exact value will appear on the display.

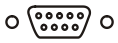
1 Date / time
2 Status: On/Standby
3 Fill level indicator
4 External temperature sensor value
5 Current power output (X% heating, -X% cooling)
6 Selected temperature control mode (internal/external)
7 Current liquid temperature
8 Selected max. pump pressure and current pump pressure
9 Selected high temperature warning setpoint
10 Selected low temperature warning setpoint
11 High temperature cut-off setting (**TANK**)
12 High temperature cut-off setting (**RES**)

Cooling indicator icon - Blinking or continuous

Heating indicator icon - Blinking or continuous

5.9.2. Electrical connections

Electrical connections (behind the ventilation grid on the front of the unit, see Chapter 4.1.1)

Ethernet-based network connection	1			ETHERNET
USB device interface	2			USB DEVICE
Interface RS232C For controlling the unit via a PC or a higher priority process control system.	3			SERIAL
Connector: **ALARM** output (for external alarm signal)	4			ALARM
Connection socket: **Ext**ernal measurement and control sensor Connect the external **Pt100** sensor to the socket, calibrate with the "ATC Ext" function, and then use a suitable device to secure the sensor inside the external vessel.	5			EXT Pt100
There are cable guides at the side for a neat and easy installation of the connection cables.				

USB HOST and SD-Card slot are located on the right side of the housing:

USB HOST for configuring the unit from a USB stick, or datalogging.

SD Card for datalogging

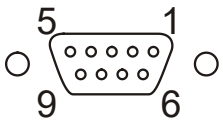
6.Electrical connection pin assignments

NOTICE

Use shielded cables only.
The shield should be continuous, and should be electrically connected to the plug's housing.
When working with the SERIAL interface, use a null modem cable.

Normal operation can be ensured only if cables no longer than 3m (9.85 ft.) are used. The use of longer cables does not itself affect proper performance of the unit, however external interference (e.g. cellular phones) may have a negative impact on performance in this configuration.

SERIAL interface
Use this socket to connect a PC via null modem cable to PRESTO™ in order to remotely control the temperature control system.



RS232 pin assignments

Pin 2	RxD	Receive Data
Pin 3	TxD	Transmit Data
Pin 5	0 V	Signal GND
Pin 7	RTS	Request to send
Pin 8	CTS	Clear to send
Pin 1; 4; 6, 9 Reserved - do not use!		

6.1. Accessories

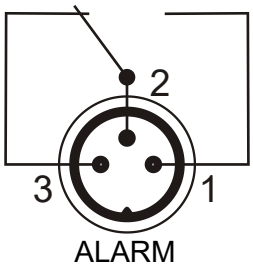
Order No.:	Description
8 980 073	RS232 interface cable 9 pole/9 pole, 2.5 m (8.2 ft) long.
8 900 110	USB interface adapter cable

6.1.1. Alarm output

This socket is a voltage-free change-over contact. With the options in the menu item > AL-OUT Function< (see operating instructions for the user interface), all possible operating conditions can be signalled as desired, without having to change the wiring of the cable. Normally during an alarm, pins 2 and 3 are connected.

Alarm output
This output can be used to alert the user when the unit enters an alarm condition, from a distance.

Check the operating condition of the plug regularly (about every 2-3 days).



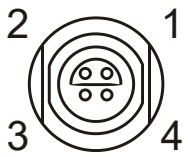
Breaking capacity	max. 30 W / 25 VA
with turn-on voltage	max. 30 V_{DC}; max.25 V_{AC}
with switching current	max. 1 A

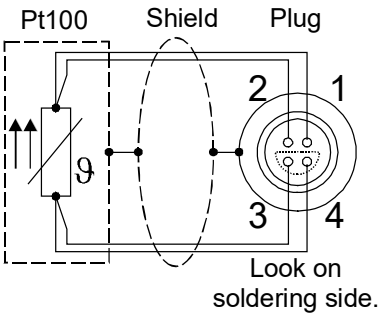
6.1.2. Connection for the external Pt100 sensor

The cable's shield must be electrically connected to both the sensor's sheath as well as the housing of the connector plug.

External sensor connection for external temperature measurement and control. Only use shielded sensors.

Check the plausibility of the external temperature measurement regularly (about every 2-3 days), by placing the Pt100 in a state where the temperature is already known (e.g. in ambient air, or a container of ice water).





Pin	Signal
1	I+
2	U+
3	U-
4	I-

6.2. Options (on the rear side)

WARNING

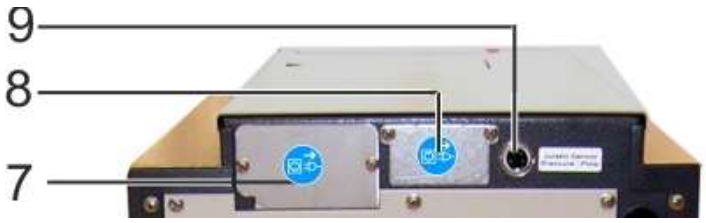
Danger: electricity.
During assembly conductive objects may drop into the unit and cause a short circuit.
Disconnect the unit from the power supply prior to opening.

Installation and maintenance may be performed only by authorized, qualified personnel.

7 Socket for connection of optional accessory analog connections (Order No. 8900105).

8 Socket for connection of Pt100 module with connector (Order No. 8900106).

9 JULABO Pressure / Flow Sensor socket.



6.2.1. Analog module

Order No.: 8900105

7a **7b**

The analog module has two circular female connectors.

7a Female connector **STAND-BY** input (can be used for an external "on/off" switch).

7b Female connector **REG+E-PROG** with three analog datalogger outputs, and one input for an external programmer or other voltage and/or current sources.

ⓘ Information regarding labeling:

test For service purposes only. This button has no function during regular operation.

reset The module can be „reset“ with this key. This may be necessary in case of an error, for example if the red LED (error) lights up.

on ●

If the Green LED is blinking
Blinking indicates that the module is receiving information (CAN-Messages) and is working correctly.

If the Green LED is illuminated
The module is powered on, but is not receiving any information (CAN-Messages).

If the Green LED is not illuminated
The unit is turned off, or the module is damaged, or the power supply to the module is not working.

error ●

If the Red LED is not illuminated
If the unit is operating and this LED is not illuminated, the module is working properly.

If the Red LED blinks
An unknown error has occurred while this module was communicating on the CAN-Bus. The CAN-Bus has deactivated itself for safety reasons. Turn the unit off via the power switch, wait a few seconds, and turn it back on again. If the error occurs again, please contact

If the Red LED is illuminated
A fault has occurred with the module. The TFT display will show the type of error (Alarm code) and troubleshooting steps, if applicable.

6.2.2. Module with Pt100 connector

Order No.: 8900106

The module with a Pt100 connector is intended for the connection of a second Pt100 external sensor. The sensor is connected at the back of the JULABO temperature control system. It will measure a second temperature at any point in an application. The value (external 2) can be displayed on the user interface. For setup use the path > Menu Customize Home display <. For description see the operating manual “User Interface”, 1.953.3041 of the JULABO temperature control system.

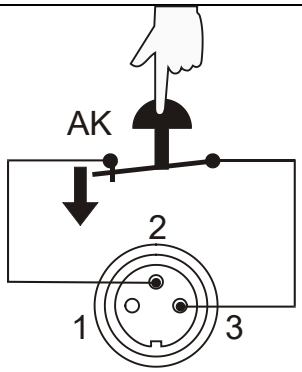
6.2.3. Connecting to the STAND-BY socket

The STAND-BY-socket can be enabled or disabled via the TFT user interface.

When the STAND-BY socket is activated, a connected switch must be closed to start the device. If this function is activated, but an external switch is not connected and properly closed, the TFT will display the message "E-OFF." When you see this message, it means that the external switch must be closed to start the device.

Stand-BY

Socket for connecting an external on/off switch.



STAND-BY

Pin	Signal
1	Not used
2	5 VDC
3	0 V

WARNING

This feature does not turn off the power to the instrument

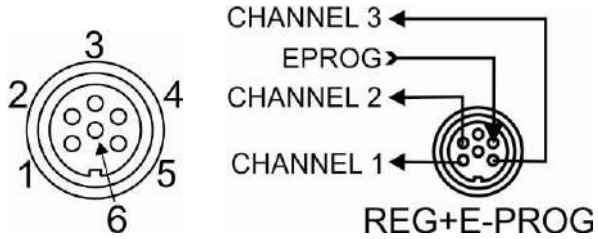
6.2.4. Connecting to the REG+E-PROG socket

The programmer input and all of the datalogger outputs are configurable via the TFT user-interface.

Channel 1	Voltage output, e.g. for datalogger	(V)
Channel 2	Voltage output, e.g. for datalogger	(V)
Channel 3	Current output, e.g. for datalogger	(mA)
E-PROG	Input for external programmer	

With the E-PROG - input, you can use either a voltage source or a current source to change the unit's setpoint temperature.

REG+E-PROG
SELV input (Safety Extra Low Voltage)



Pin	Signal
1 Voltage output*, channel 1	0 ... 10 V
2 Voltage output*, channel 2	0 ... 10 V
3 Gnd for outputs	0 V
4 Programmer input, EPROG	0 ... 10 V or 0 ... 20 mA
5 Current output**, channel 3	0 ... 20 mA or 4 ... 20 mA
6 Gnd for programmer	0 V

* The resistance of any load placed on either of the voltage outputs must be, at minimum, 10 kΩ.

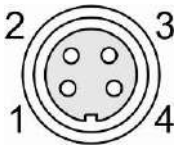
** The resistance of any load placed on the current output must be, at minimum, 400 Ω.

The programmer input (E-PROG, pin 4) can be configured as a voltage or current input via the TFT user interface.

6.2.5. Connecting to the JULABO Pressure / Flow Sensor socket

Signal input for the connection of an external pressure sensor or flow-through sensor. Please note that only the JULABO accessory sensors will work with this socket.

Julabo Sensor Pressure / Flow



Pin	Signal
1	24 V
2	5 V
3	4…20 mA
4	GND (0 V)

Pressure sensors for PRESTO™ in JULABO program

Order No.	*Description*
8980771	Pressure sensor M24x1.5 male

NOTICE

Possible incorrect measurement when connecting a JULABO pressure sensor!

- If the customer's application is positioned higher or lower than the PRESTO™ Temperature Control System, the height difference will affect the measurement and cause incorrect results.

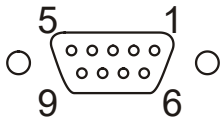
Remedy:
Position the PRESTO™ Temperature Control System and the application at the same height level.

Check the plausibility of the sensor measurement regularly (about every 2-3 days).

7. Remote operation, laboratory automation

7.1. Preparing for remote control

RS232, serial interface.
Refer to the "User Interface" operating instructions (1.951.3041).



SERIAL

BAUD RATE	4800 Baud
PARITY	Even parity
HANDSHAKE	RTS/CTS Protocol (Hardware handshake)
Data bits	7
Stop bit	1

7.2. Communication with PC or higher priority data system

When the PRESTO™ temperature control system is in remote control mode, the following symbol appears on the TFT display:

"R " = REMOTE

In most cases, commands are sent from the computer (“master device”) to the temperature control system (“slave device”). The temperature control system will also send error messages to the computer, if the computer requests to know the current status of the instrument.

If there is a power failure during remote control operation, the computer must resend the start command and all other settings through the RS232 or USB interface.
The instrument will not automatically restart when power is restored!

Signals are transferred in accordance with DIN standard 66022 and DIN standard 66003, code table 1.

A transmission sequence consists of:

- Command
- Space (⇔; Hex: 20)
- Parameter (if applicable; period (“dot”) character used for decimal point)
- Termination (↵; Hex: 0D)

Commands are divided into **in** and **out** commands.
In commands: retrieve parameters from the instrument
out commands: set parameters on the instrument

out commands can only be used while remote control mode is active.

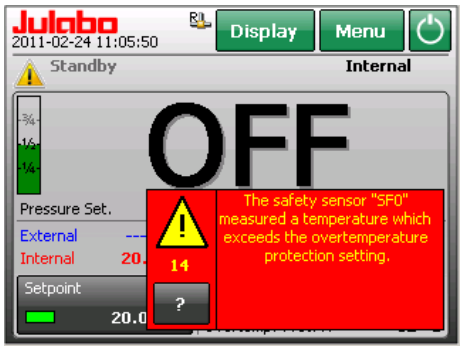
For more information, see the *"User Interface" manual, 1.953.3041.*

7.3. Status messages / Error messages

7.3.1. Alarms

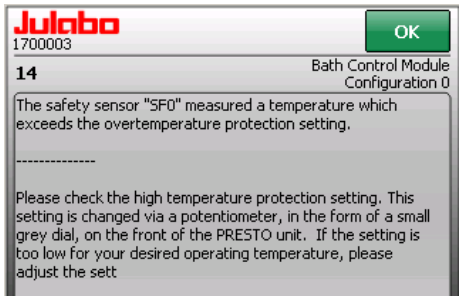
Alarm messages are displayed in a flashing red box, and are accompanied by a loud beeping tone.
Example: Error 14

Touch the red box to mute the alarm.



The unit switches to "Standby". The heater, refrigeration unit and circulation pump are all switched off.

Press <?> button for help text.

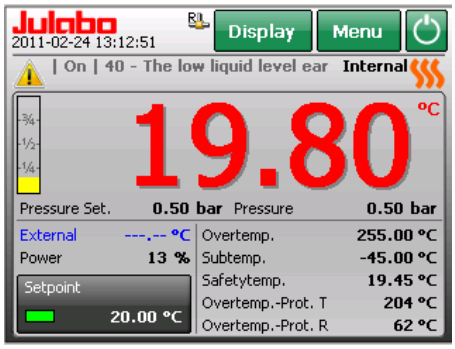


7.3.2. Warnings

Warnings are displayed in a ticker on the status line

Example: Warning 40

Touch the icon to mute the beeping tone.



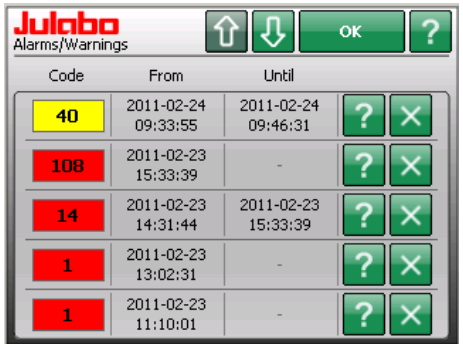
Help is always accessible through the icons

or .

Touch the icon and the error history is displayed.

ALARMS are shown in Red > 14

WARNINGS are shown in Yellow > 40



The dates and times when each error occurred are also displayed.
If possible, this data will also be recorded when the error is cleared.
Examples: codes 40, 14.

For more information, including a list of alarm and warning codes with explanations, please see the separate *User Interface manual, 1.953.3041*.

8. Technical Data

PRESTO™		A80		
Order No.		9420801.14	9420801.03	9420801.04
Mains connection (nom. volt.)	V	208	230	230
Nominal frequency	Hz	60	50	50
Tolerance of the nom.voltage	%	- 10…+ 15	± 10	± 10
Max. current consumption	A	15.0	16.0	13.0
Max. heating capacity at 200 V	kW	1.3	-	-
at 208 V	kW	1.5	-	-
at 220 V	kW	1.76	-	-
at 230 V	kW	-	1.8	1.05
Working temperature range	°C [°F]	-80…250 [-112…482]		
Temperature stability	K	± 0.01…± 0.05		
Cooling capacity	°C	200 100 20 0 -10 -20 -30 -40 -60 -80		
Liquid: Silicon Oil//Ethanol*	kW	1.2 1.2 1.2 1.2 1.2 1.1 1.1 1.1 0.65 0.1		
Refrigeration compressor	dual stage	air-cooled		
Refrigerant		First stage: R507; Second Stage: R23		
Pump capacity				
Pressure, max.	bar [psi]	1.3 [18.85]	1.7 [24.66]	
Flow rate, max. at 0 bar	l/min	38	40	
	[gal/min]	[10.04]	[10.57]	
		Viscosity not to exceed max. 50 mm^2/s (50 cSt)		
Noise level, 1 m distance	dBA	68		
Ambient temperature	°C [°F]	5…40 [41…104]		
Rel. Humidity	%	< 80 (at <31 °C) up to < 50 (at 40 °C)		
Process volume, min.	l [gal]	3.9 [1.04]		
Active heat exchanger vol.	l [gal]	1.7 [0.45]		
Internal usable expansion vol.	l [gal]	5.6 [1.48]		
Overall dimensions (WxDxH)	mm	430 x (650 + (Stud 35)) x 1258		
	[inch]	[16.9 x (25.6 + Stud 1.38)] x 49.5]		
Weight, approx.	Kg [lbs]	164 [361.6]		

* at 200 °C [392 °F] and 100 °C [212 °F] : measured using Thermal HL45

All data provided in this operating manual assumes use at the rated nominal voltage and rated nominal frequency and with ambient temperature of 20 °C [68 °F].

Information subject to technical changes without notice.

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PRESTO™		A80t		
Order No.		9420801.06.T	9420801.16.T	9420801.07.T
Mains connection (nom. volt.)	V	230/3PPE	208-220/3PPE	400/3PNPE
Nominal frequency	Hz	50	60	50
Tolerance of the nom.voltage	%	± 10	± 10	± 10
Max. current consumption	A	20.0	20.0	16.0
Max. heating capac.at 200 V	kW	-	2.6	-
at 208 V	kW	-	2.8	-
at 220 V	kW	-	3.1	-
at 230 V	kW	3.4	-	
at 400 V	kW		-	3.4
Working temperature range	°C [°F]	-80…250 [-112…482]		
Temperature stability	K	± 0.01…± 0.05		
Cooling capacity	°C	200 100 20 0 -10 -20 -30 -40 -60 -80		
Liquid: Silicon Oil//Ethanol*	kW	1.2 1.2 1.2 1.2 1.2 1.1 1.1 1.1 0.65 0.1		
Refrigeration compressor	dual stage	air-cooled		
Refrigerant		First stage: R507; Second Stage: R23		
Pump capacity				
Pressure, max.	bar [psi]	1.7 [24.66]		
Flow rate, max. at 0 bar	l/min [gal/min]	40 [10.57]		
		Viscosity not to exceed max. 50 mm^2/s (50 cSt)		
Noise level, 1 m distance	dBA	68		
Ambient temperature	°C [°F]	5…40 [41…104]		
Rel. Humidity	%	< 80 (at <31 °C) up to < 50 (at 40 °C)		
Process volume, min.	l [gal]	3.9 [1.04]		
Active heat exchanger vol.	l [gal]	1.7 [0.45]		
Internal usable expansion vol.	l [gal]	5.6 [1.48]		
Overall dimensions (WxDxH)	mm [inch]	430 x (650 + (Stud 35)) x 1258 [16.9 x (25.6 + Stud 1.38)] x 49.5]		
Weight, approx.	Kg [lbs]	165 [361.6]		

* at 200 °C [392 °F] and 100 °C [212 °F] : measured using Thermal HL45

All data provided in this operating manual assumes use at the rated nominal voltage and rated nominal frequency and with ambient temperature of 20 °C [68 °F].

Information subject to technical changes without notice.

PRESTO™		W80		
Order No.		9421801.14	9421801.03	9421801.04
Mains connection (nom. volt.)	V	208	230	230
Nominal frequency	Hz	60	50	50
Tolerance of the nom. voltage	%	- 10… + 15	± 10	± 10
Max. current consumption	A	15.0	16.0	13.0
Max. heating capacity at 200 V	kW	1.3	-	-
at 208 V	kW	1.5	-	-
at 220 V	kW	1.76	-	-
at 230 V	kW	-	1.8	1.05
Working temperature range	°C [°F]	-80…250 [-112…482]		
Temperature stability	K	± 0.01…± 0.05		
Cooling capacity	°C	200 100 20 0 -10 -20 -30 -40 -60 -80		
Liquid: Silicon Oil//Ethanol	kW	1.2 1.2 1.2 1.2 1.2 1.1 1.1 1.1 0.65 0.1		
Refrigeration compressor	dual stage	water-cooled		
Refrigerant		First stage: R507; Second stage: R23		
Pump capacity				
Pressure, max.	bar [psi]	1.3 [18.85]	1.7 [24.66]	
Flow rate, max. at 0 bar	l[gal]/min	38 [10.04]	40 [10.57]	
		Viscosity not to exceed max. 50 mm²/s (50 cSt)		
Pump connection		M24x1.5		
Cooling water connection		G3/4 / barbed fitting ½“ inner diameter.		
Noise level, 1 m distance	dBA	64		
Ambient temperature range	°C [°F]	5…40 [41…104]		
Rel. Humidity	%	< 80 (at <31 °C) up to < 50 (at 40 °C)		
Process volume, min.	l [gal]	3.9 [1.04]		
active heat exchanger volume	l [gal]	1.7 [0.45]		
Internal usable expans. vol.	l [gal]	5.6 [1.48]		
Dimensions (WxDxH)	mm	430 x (650 + (stud 35)) x 1258		
	[inches]	[16.9 x (25.6 + Stud 1.38)] x 49.5]		
Weight, approx.	kg [lbs]	159 [350]		

* at 200 °C [392 °F] and 100 °C [212 °F] : measured using Thermal HL45

All data provided in this operating manual assumes use at the rated nominal voltage and rated nominal frequency and with ambient temperature of 20 °C [68 °F].

Information subject to technical changes without notice.

PRESTO™		W80t		
Order No.		9421801.06.T	9421801.16.T	9421801.07.T
Mains connection (nom. volt.)	V	230/3PPE	208-220/3PPE	400/3PNPE
Nominal frequency	Hz	50	60	50
Tolerance of the nom. voltage	%	± 10	± 10	± 10
Max. current consumption	A	20.0	20.0	16.0
Max. heating capacity at 200 V	kW	-	2.6	-
at 208 V	kW	-	2.8	-
at 220 V	kW	-	3.1	-
at 230 V	kW	3.4	-	-
at 400 V	kW		-	3.4
Working temperature range	°C [°F]	-80…250 [-112…482]		
Temperature stability	K	± 0.01…± 0.05		
Cooling capacity	°C	200 100 20 0 -10 -20 -30 -40 -60 -80		
Liquid: Silicon Oil//Ethanol	kW	1.2 1.2 1.2 1.2 1.2 1.1 1.1 1.1 0.65 0.1		
Refrigeration compressor	dual stage	water-cooled		
Refrigerant		First stage: R507; Second stage: R23		
Pump capacity				
Pressure, max.	bar [psi]	1.7 [24.66]	1,3 [18.85]	1.7 [24.66]
Flow rate, max. at 0 bar	l/min [gal]	40 [10.57]	38 [10.04]	40 [10.57]
		Viscosity not to exceed max. 50 mm^2/s (50 cSt)		
Pump connection		M24x1.5		
Cooling water connection		G3/4 / barbed fitting ½“ inner diameter.		
Noise level, 1 m distance	dBA	64		
Ambient temperature range	°C [°F]	5…40 [41…104]		
Rel. Humidity	%	< 80 (at <31 °C) up to < 50 (at 40 °C)		
Process volume, min.	l [gal]	3.9 [1.04]		
active heat exchanger volume	l [gal]	1.7 [0.45]		
Internal usable expans. vol.	l [gal]	5.6 [1.48]		
Dimensions (WxDxH)	mm	430 x (650 + (stud 35)) x 1258		
	[inch.]	[16.9 x (25.6 + Stud 1.38)] x 49.5]		
Weight, approx.	kg [lbs]	162 [357]		

* at 200 °C [392 °F] and 100 °C [212 °F] : measured using Thermal HL45

All data provided in this operating manual assumes use at the rated nominal voltage and rated nominal frequency and with ambient temperature of 20 °C [68 °F].
Information subject to technical changes without notice.

All pump data is based on use with liquids having a specific density of 1 kg/dm^3 [8.35 lb/gal]

Temperature setting		Digital
Local / Remote		Control type displayed on TFT User Interface
Remote Control from PC		Displayed on TFT User Interface
Temperature display		Displayed on TFT User Interface
Resolution	°C	0.01
ATC function (ATC3) internal (ATC2) extern.	K	± 3 ± 10
Temperature control		ICC – Intelligent Cascade Control Cascade, parameters may be retrieved and modified
Working temperature sensor		Pt 100 1/3 DIN
Safety temperature sensor		Pt 100

8.1. Cooling water connection, cooling water quantity

Cooling water connections		G3/4 male / barbed fittings for ½“ I.D. tubing
Maximum water pressure	bar [psi]	6 [87]
Min. water pressure at 30 °C	bar [psi]	0.5 [7.25]
Necessary pressure difference	bar [psi]	0.5 [7.25]
Cooling water quantity	l/min	2.0 (at 1.2 kW cooling capacity)
Max. cooling water temperature	°C [°F]	30 [86]

8.2. Connections

Computer interfaces	**RS232, USB-Device V2.0 / Ethernet**
USB-Host V2.0 SD Card	USB-Stick SD-card – up to 2 GB
Alarm output	for external alarm signal
External measurement and control sensor	Pt100
Optional Accessories: (Rear side)	
Analog module	
REG+E-PROG	
Programmer input -100 °C - 400 °C	0 - 10 V or 0 - 20 mA or 4 - 20 mA
Temperature recorder outputs	0 - 10 V (0 V = -100 °C, 10 V = 400 °C)
	0 - 20 mA (0 mA = -100 °C, 20 mA = 400 °C)
	4 - 20 mA (4 mA = -100 °C, 20 mA = 400 °C)
Stand-By-input	for external switch on/off
JULABO Pressure / Flow Sensor	for pressure sensor / flow sensor
Module with Pt100 connection socket	for connection of a further Pt100

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8.3. Safety

High temp. cut-off >TANK<, adjustable setting	0 °C ... 320 °C [32 °F …608 °F]
High temp. cut-off >RESERVOIR<, adjustable setting	0 °C ... 100 °C [32 °F …428 °F]
Low fluid protection	float switch
Fluid level display	represented on TFT in 7 stages
Classification according to DIN 12876-1	Class III (FL)
Additional safety devices	visible + audible (in intervals)
Temperature limit function	See chapter “Safety adjustments“ in the operating manual *“User Interface”, 1.951.3041.*
Setpoint limit function	
Pressure limit function	
Monitoring of the working temperature sensor	Plausibility control
Temperature differential monitoring	
Working/safety temperature sensors	difference >25 K
Alarm messages	visible + audible (constant)

8.4. Ambient conditions for proper operation according to EN 61 010-1

WARNING

Risk of explosion by explosive mixtures.
Burns
The unit is **not** suitable for use in potentially explosive atmospheres

- Designed for indoor use only. Do not use outdoors.
- Up to 2000 m (above sea level) elevation
- Ambient temperature range: +5 ... +40 °C [+41 ... +104°F]
- Relative humidity up to 80% for ambient temperatures up to 31 °C [87.8 °F]; maximum RH% decreases linearly to 50% relative humidity at ambient temperature of 40 °C [104 °F].
- Mains voltage cannot vary by more than +/-10% of the instrument’s rated nominal voltage.
- High voltage classification II according to IEC60664-1.
- Contamination level 2 according to IEC60664-1.
- Protection class according to EN 60529: IP 20
- Unit complies with protection class I

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.

Information about the used refrigerants

The **Regulation (EU) No. 517/2014 on fluorinated greenhouse gases** applies to all systems which contain fluorinated refrigerants and replaces (EC) 842/2006.
The aim of the Regulation is to protect the environment by reducing emissions of fluorinated greenhouse gases.
Among other things it regulates the emission limits, use and recovery of these substances. It also contains requirements for operators of systems which require / contain these substances to function.

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

- The operator must ensure that the equipment is checked at regular intervals for leaks.
- These intervals depend on the CO_2 equivalent of the system. This is calculated from the refrigerant fill volume and type of refrigerant. The CO_2 equivalent of your system is shown on the model plate.
- The operator undertakes to have maintenance, repair, service, recovery and recycling work carried out by certified personnel who have been authorized by JULABO.
- All such work must be documented. The operator must keep records and archive them for at least five years. The records must be submitted to the relevant authority on request.

Refer to the text of the Regulation for further information.

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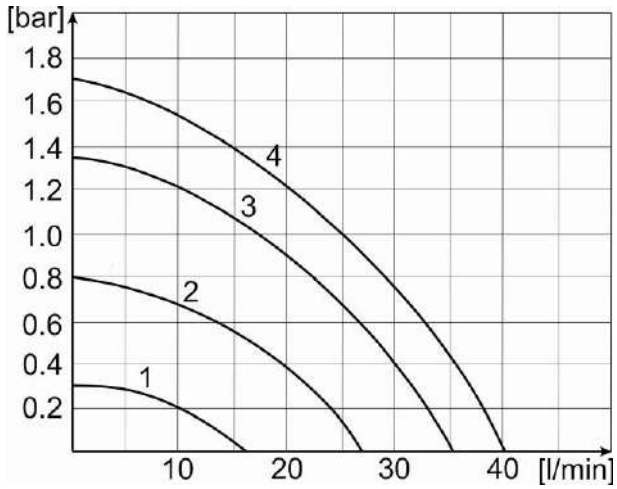
8.5. Materials of Construction of the wetted Parts

Part	Material
Turned parts and sheet metal parts (permanently wetted)	1.4301/ 304H
Heater coils (permanently wetted)	1.4401 / 316L
Corrugated tubing (permanently wetted)	1.4541 / 321
Drain tap (Not subject to circulation, not subject to high or low temperature loads, permanently wetted)	Nickel 99.9%
Membrane pressure sensor (Not subject to circulation, not subject to high or low temperature loads, permanently wetted)	1.4305 / 303
Soldered bush pressure sensor (Not subject to circulation, not subject to high or low temperature loads, permanently wetted)	DHP copper / C12200
O-ring for magnetic coupling (pump) (Not subject to circulation, not subject to high or low temperature loads, permanently wetted)	FKM (Viton®)
O-ring for drain tap (Not subject to circulation, not subject to high or low temperature loads)	FPM (Viton®)
Gasket for level detection unit <-> expansion tank (no direct contact with medium – possibly vapors)	2.0090 SF-Cu F20 (wrought copper-base alloy)
O-ring for flange in expansion tank (Contact with medium only in case of overflow)	NBR (nitrile rubber)
Flat gasket in expansion tank (Contact with medium only in case of overflow, possibly vapors)	VMQ (silicon rubber)
Profile gasket for filling funnel (Possible contact with medium during filling)	FKM (Viton®)
Pump bearings (permanently wetted)	FH42A (carbon graphite)
Plug for filling funnel (no direct contact with medium – possibly vapors)	POM (Polyoxymethylene)
O-ring for plug (filling funnel) (no direct contact with medium – possibly vapors)	CR (Chloroprene)

9. Pump characteristic curves (using water)

The pump characteristic curves of the A80/W80 devices, shown below, correspond to pump stages 1, 2, 3, and 4.
The curves are valid for the rated voltage of 230 V (50-60 Hz).

9.1. Medium with a density of 1 kg/dm³ [8.35 lb/gal]



Conversion tables

bar	psi
0.2	2.900755
0.4	5.80151
0.8	11.60302
1.0	14.50377
1.2	17.40453
1.4	20.30528
1.6	23.20604
1.8	26.10679

l/min	gal/min
1	0.2641721
10	2.641721
20	5.283441
30	7.925162
40	10.56688

10. Cleaning the unit

WARNING

Danger of electric shock

Risk of injury from electric power.

- Always switch off the device and unplug it from its power supply before performing any cleaning tasks.
  Never allow moisture to collect inside the temperature control system.
- Service and repair tasks may be performed only by Julabo-authorized service providers.

10.1. External cleaning

Clean the outside of the unit with a damp cloth and a nonabrasive cleaner (such as a mild soap).
Before trying any cleaning or decontamination method other than those recommended by JULABO, the user must inquire with the manufacturer to ensure that the intended method will not damage or destroy the unit.

10.2. Internal cleaning

When replenishing or changing the bath fluid, the internal wetted surfaces must be thoroughly cleaned. The heat exchanger, internal reservoir, connection tubes, and external vessel must be rinsed several times with a liquid cleaner.

WARNING

- Choose a cleaning agent that is designed for removal of the heat transfer fluid.
  Ethanol and silicon remover are examples of suitable cleaning agents for silicone oil.
- Always clean the unit in a well ventilated area!
- Set the working temperature setpoint near room temperature.
  Recommendation: 20 °C [68 °F]

Ethanol is a flammable liquid with low flash point. Do not let the unit unattended during the cleaning run!

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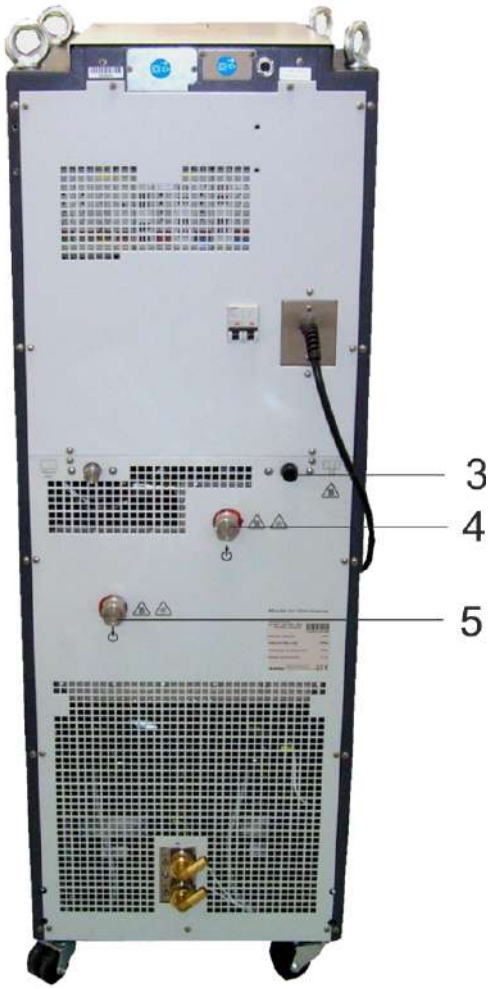
Preparations:

1. Drain the temperature control system.
   See *Chapter 5.8. "Empty the unit" menu.*

2. If only the PRESTO™ temperature control system will be cleaned, you must connect the pump connections (4, 5) together with a hose or piece of tubing.

3. Connect one end of an appropriate tube to the overflow (3) adapter and place the other end into a suitable container.

The picture below shows the W80, but cleaning of the A80 is identical.



Cleaning is performed in two steps. First rinse the internal reservoir, the tubing system, and the heat exchanger. The second step is to remove residual amounts of the liquid cleaner

10.3. Cleaning the reservoir, tubing system and heat exchanger:

⚠CAUTION

Danger from unsealed pump connections.
Secure tubing connections against slipping.

- Fill the unit with cleaning fluid as described in *chapter 5.7. Filling*
- Set the working temperature setpoint.
  Recommendation: 20 °C [68 °F].
- Switch on the unit.
- Start the pump.
- Let the unit run for approx. 10 – 30 minutes.
- Drain the unit as described in *chapter 5.8. "Empty the unit" menu*.

If the drained liquid is very dirty, repeat this procedure until the drained liquid is relatively clean.

10.4. Removing residual cleaning liquid:

- Switch on the unit at the mains switch!
  This will keep the ventilation valve open.
- Blow dry, warm air through the temperature control system.
  Direct the air through the temperature control system's various connections.
- Start with the connections (4, 5) that lead to the internal reservoir.
  Then proceed to the cooling water connections that lead to the heat exchanger, and finally the drain port on the front side.
- After the residual moisture has evaporated, reattach or seal the connections as appropriate for the next use of the temperature control system.
- Close the drain screw on the front side, using a screw driver.

10.5. **Shut**-down and storage

If a unit will not be operated, the temperature control system should be cleaned as described and stored in a dry, dust-free and frost-free environment.

11. Maintenance/repair of the unit

WARNING

Danger of electric shock

Risk of injury from electric power.

- Always switch off the device and unplug it from its power supply before performing any cleaning tasks.
  Never allow moisture to collect inside the temperature control system.
- Service and repair tasks may be performed only by JULABO-authorized service providers.

Clean the condenser occasionally in order to keep the unit running with full cooling capacity.

- Switch off the unit, and unplug it from its power source.
- Remove the ventilation grid.
- Vacuum off dirt from the condenser.
- Replace the ventilation grid.

11.1. Repair service

We recommend speaking with our technical service department before requesting a service technician or sending a JULABO device in for repair.

- Completely drain the unit, remove the expansion tank, seal the connections with nuts and sealing caps.
- Package the unit carefully and properly.
- Always include a brief description of the problem.
  If you send your JULABO unit back to us, please use the respective online return form
- The unit must be standing upright during shipment.
- Label the packaging properly to avoid unintentional damage.

JULABO will not be liable for any damage caused by improper packaging.

During the repair process, JULABO will perform any upgrades or technical changes that are necessary to ensure the reliable operation of the device.

11.2. Warranty

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

for a period of ONE YEAR.

Extension of the warranty period – free of charge

2 Years Warranty
1Plus Warranty
Registration free of charge on www.julabo.com

With the '1PLUS warranty' the user receives a free of charge extension to the warranty of up to 24 months, limited to a maximum of 10 000 working hours.

JULABO 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.

11.3. Disposal

This product contains oils used as bath fluids that must be disposed and consist partially or entirely of petroleum or synthetic oil. Observe regulations for disposal provided in the safety data sheets.

These units contains refrigerants– at this time considered not to have any negative effects on the ozone layer. However, during the long operating period of the unit, disposal prescriptions may change. For this reason, disposal should be performed by qualified personnel only.

Observe all disposal regulations applicable in your country or region.

This symbol on the product or its packaging indicates that it may not be disposed with household waste. Proper disposal avoids negative impacts on people and the environment and enables reuse of valuable raw materials.

Information about collection centers for old units is available from your city or community or an authorized disposal company.

1.888.610.7664 www.calcert.com sales@calcert.com

12. EC compliance

EG-Konformitätserklärung nach EG Maschinenrichtlinie 2006/42/EG, Anhang II A
EC-Declaration of Conformity to EC Machinery Directive 2006/42/EC, Annex II A

Hersteller / *Manufacturer*:

JULABO GmbH
Gerhard-Juchheim-Strasse 1
77960 Seelbach / Germany
Tel: +49(0)7823 / 51 - 0

CE

Hiermit erklären wir, dass das nachfolgend bezeichnete Produkt
We hereby declare, that the following product

Produkt / *Product*: Presto

Typ / *Type*: A80, W80, A80t, W80t **Serien-Nr. / *Serial-No.*:** siehe Typenschild / *see type label*

aufgrund seiner Konzipierung und Bauart in der von uns in Verkehr gebrachten Ausführung den grundlegenden Sicherheits- und Gesundheitsanforderungen den nachfolgend aufgeführten EG-Richtlinien entspricht.
due to the design and construction, as assembled and marketed by our Company – complies with fundamental safety and health requirements according to the following EC-Directives.

Maschinenrichtlinie 2006/42/EG; Machinery Directive 2006/42/EC
EMV-Richtlinie 2014/30/EU; EMC-Directive 2014/30/EU
RoHS-Richtlinie 2011/65/EU; RoHS-Directive 2011/65/EU

Angewandte harmonisierte Normen und techn. Spezifikationen:
The above-named product is in compliance with the following harmonized standards and technical specifications:

EN 50581 : 2012
Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

EN ISO 12100 : 2010
Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobeurteilung und Risikominderung (ISO 12100:2010)
Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)

EN 61010-1 : 2010
Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte, Teil 1: Allgemeine Anforderungen
Safety requirements for electrical equiment for measurement, control, and laboratory use, Part 1: General requirements

EN 61010-2-010 : 2014
Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte, Teil 2-010: Besondere Anforderungen an Laborgeräte für das Erhitzen von Stoffen
Safety requirements for eletrical equipment for measurement, control, and laboratory use, Part 2-010: Particular requirements for laboratory equipment for the heating of materials

EN 61326-1 : 2013
Elektrische Mess-, Steuer-, Regel- und Laborgeräte- EMV-Anforderungen- Teil 1: Allgemeine Anforderungen
Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General requirements

EN 378-1 : 2016
Kälteanlagen und Wärmepumpen – Sicherheitstechnische und umweltrelevante Anforderungen – Teil 1: Grundlegende Anforderungen, Begriffe, Klassifikationen und Auswahlkriterien
Refrigerating systems and heat pumps - Safety and environmental requirements - Part 1: Basics requirements, definitions, classification and selection criteria

EN 378-2 : 2016
Kälteanlagen und Wärmepumpen – Sicherheitstechnische und umweltrelevante Anforderungen – Teil 2: Konstruktion, Herstellung, Prüfung, Kennzeichnung und Dokumentation
Refrigerating systems and heat pumps - Safety and environmental requirements - Part 2: Design, construction, testing, marking and documentation

EN 378-3 : 2016
Kälteanlagen und Wärmepumpen – Sicherheitstechnische und umweltrelevante Anforderungen – Teil 3: Aufstellungsort und Schutz von Personen
Refrigerating systems and heat pumps - Safety and environmental requirements - Part 3: Installation site and personal protection

EN 378-4 : 2016
Kälteanlagen und Wärmepumpen – Sicherheitstechnische und umweltrelevante Anforderungen – Teil 4: Betrieb, Instandhaltung, Instandsetzung und Rückgewinnung
Refrigerating systems and heat pumps - Safety and environmental requirements - Part 4: Operation, maintenance, repair and recovery

Bevollmächtigter für die Zusammenstellung der techn. Unterlagen:
Authorized representative in charge of administering technical documentation:
Hr. Torsten Kauschke, im Hause / *on the manufacturer's premises as defined above*

Die Konformitätserklärung wurde ausgestellt
The declaration of conformity was issued and valid of

Seelbach, 20.10.2017

M. Juchheim, Geschäftsführer / *Managing Director*

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