Julabo

THE TEMPERATURE CONTROL COMPANY

VALEGRO™

1203 (H)
1503 (H)
1803 (H)
2503 (H)



recirculating cooler

Translation of the original operating manual

30008271.E

2026/08/17
US

Imprint

Headquarters

JULABO GmbH
Gerhard-Juchheim-Strasse 1
77960 Seelbach
Seelbach, Germany
Phone: +49 7823 51-0
info.de@julabo.com
www.julabo.com

Branch Office

JULABO USA, Inc.
884 Marcon Boulevard
Allentown, PA 18109
Phone: +1(610) 231-0250
info@julabo.us
www.julabo.us

Foreword

Congratulations

You have made a good choice.

JULABO thanks you for the trust you have placed in us.

These operating instructions are intended to familiarize you with the operation and possible applications of our appliances. Please read the operating instructions carefully. Keep the operating instructions to hand at all times.

Copyright

The content of this operating manual is protected by copyright. Information, including text, images, and other content, may not be reproduced, distributed, transmitted, stored, disclosed, or used in any other form without prior express written permission.

The illustrations in this operating manual are for illustrative purposes only and are not necessarily shown to scale.

The rights to the operating manual and its contents are held exclusively by JULABO GmbH.

Table of contents

1 General information..... 7
1.1 About This Operator's Manual..... 7
1.2 Accessories..... 7
1.3 Symbols used..... 7
1.4 Operator obligations..... 8
1.5 Qualification of the operating personnel..... 8
2 Safety instructions..... 9
2.1 Meaning of the warnings..... 9
2.2 General Safety Instructions..... 10
2.3 Intended Use..... 13
2.4 Anticipated Misuse..... 13
2.5 Safety Labels..... 14
2.6 Applying Safety Labels..... 15
2.7 Refrigerant..... 17
2.8 Protective devices..... 20
3 Technical data..... 22
3.1 VALEGRO 1203..... 23
3.2 VALEGRO 1203H..... 25
3.3 VALEGRO 1503..... 27
3.4 VALEGRO 1503H..... 29
3.5 VALEGRO 1803..... 31
3.6 VALEGRO 1803H..... 33
3.7 VALEGRO 2503..... 35
3.8 VALEGRO 2503H..... 37
3.9 Materials and Media Compatibility..... 39
3.9.1 Materials of Parts in Contact with the Medium..... 39
3.9.2 heat transfer fluids..... 40
3.10 heat transfer hoses..... 41
4 Structure and function..... 42
4.1 Function Description..... 42
4.2 Controls and Functional Elements..... 43
4.3 Interfaces..... 44
4.3.1 USB-C interface..... 44
4.3.2 RS232 Interface..... 45
4.3.3 Ethernet Interface (Optional)..... 45

5 Transportation....47
6 Set up....49
6.1 Set up the device at the place of operation....49
7 Commissioning....50
7.1 Connecting the device to the power supply....50
7.2 Connecting an External System....51
7.2.1 Connecting an external system with screw connections....53
7.3 Filling the device....55
8 Operation....57
8.1 User Interface....57
8.1.1 Soft Keys and Status Icons....57
8.1.2 Alarms and Warnings....60
8.2 Main Menu....61
8.2.1 Adjust Safety Menu....61
8.2.2 Select the “Thermodynamics” menu....62
8.2.3 Connect Device Menu....62
8.2.4 Timer Menu....63
8.2.5 Menu: Analyze Data....63
8.2.6 Menu: Install Device....63
8.2.7 Settings Menu....64
8.2.8 Service Menu....64
8.2.9 Menu: About the Device....64
8.3 Turning on the Device....65
8.4 Turning Off the Device....66
8.5 Set the Setpoint Temperature....67
8.6 Adjusting the Pump....68
8.7 Start temperature control application....69
8.8 Set the Timer....70
8.9 Enable the Autostart Function....71
8.10 Recording Data....72
8.11 Thermodynamics....73
8.11.1 Control Parameters....73
8.11.2 Optimizing Temperature Curves....74
8.12 Remote Control of the Device....75
8.12.1 Remote Control of the Device via the RS232 Interface....75
8.12.2 Remotely Control a Device via a USB Interface....77
8.12.3 Remotely Control the Device via the Ethernet Interface....77
8.13 Adjusting the Temperature Sensor (ATC)....79

8.13.1 Adjusting the Internal Temperature Sensor....80
9 Cleaning and maintenance....81
9.1 Maintenance Intervals....81
9.2 Emptying the Device....81
9.3 Cleaning the Unit....83
9.4 Cleaning the Condenser....84
9.5 Cleaning the Level Indicator....87
9.6 Replacing the Detachable Power Cord....88
9.7 Check Low-Level Protection for Proper Functioning....89
9.8 Check Safety Markings....89
9.9 Taking the Device Out of Service and Storing It....93
9.10 Send in the unit....94
9.11 Warranty....95
10 Faults and troubleshooting....98
10.1 Alarm and warning messages....98
11 Disposal....104
12 Appendix....105
12.1 Interface Commands....105
12.1.1 IN Commands....106
12.1.2 OUT Commands....108
12.2 Status Messages....109
12.3 LwIP software license....111

1 General information

1.1 About This Operator's Manual

This operating manual contains important notices regarding the safe installation, operation, and maintenance of the devices listed on the cover page.

It is intended for anyone who installs, operates, or maintains these devices.



ADVICE

Observe the safety instructions!
Before putting the device into service, read the operating instructions in their entirety and keep them for future reference.

1.2 Accessories

JULABO offers a wide range of accessories for these devices. These accessories are not described in this operating manual.

You can find the complete range of accessories for the devices described in this operating manual on our website at www.julabo.com. Please use the search function on the website.



ADVICE

Use only genuine JULABO accessories!
Using unsuitable accessories will void the JULABO warranty.

1.3 Symbols used

This user manual uses various symbols to make it easier to understand. The list below describes the symbols used.

► Prerequisite for the following procedure
1. Numbered action steps
⇨ Interim results for individual steps
✓ Final result of a procedure
< > Terms in angle brackets indicate operating menus
[ ] Terms in square brackets refer to keys, softkeys and buttons

1.4 Operator obligations

The operator must comply with the following obligations in order to ensure safe operation:

- The operator is responsible for the qualification of the operating personnel.
- The operator is responsible for training the operating personnel in the use of the equipment.
- Train operating personnel at regular intervals on the hazards associated with their work and on the measures to prevent them.
- The operator must ensure that the persons entrusted with operation, installation and maintenance have read and understood the operating instructions.
- The device may only be configured, installed, maintained and repaired by appropriately qualified personnel.
- If hazardous substances or substances that could become hazardous are used, the device may only be operated by persons who are qualified to handle these substances and the device.
- The operator must ensure that the appliance is checked for safe and proper condition at regular intervals depending on its use.
- The operator must ensure that the mains supply has a low impedance in order to avoid interference with devices that are operated on the same mains supply.
- The appliance is not suitable for children or persons with mental or severe physical disabilities.

1.5 Qualification of the operating personnel

Technical personnel are defined as persons who have successfully completed vocational training. They must be able to assess the work assigned to them and independently recognize and avoid potential hazards based on their technical training and professional experience.

2 Safety instructions

2.1 Meaning of the warnings

The operating instructions contain warnings intended to ensure safety when using the device. Always follow the warnings.

A warning sign in signal color precedes the signal word. The colored signal word classifies the severity of the danger.



DANGER

The signal word indicates a hazard with a high degree of risk which, if not avoided, will result in death or serious injury.



WARNING

The signal word indicates a hazard with a medium degree of risk which, if not avoided, could result in death or serious injury.



CAUTION

The signal word indicates a hazard with a low level of risk which, if not avoided, may result in minor or moderate injury.



ADVICE

The signal word indicates a potentially harmful situation. If it is not avoided, the system or objects in its vicinity may be damaged.

2.2 General Safety Instructions

The device is manufactured in accordance with the state of the art and recognized safety standards. Nevertheless, its use may pose a risk to the life and limb of the user or third parties.

Read and follow the safety instructions below before use.



DANGER

Electric shock from the electrical system!

Touching damaged live parts can result in severe electric shock and may injure or kill people.

- Have damaged insulation and components of the electrical system repaired immediately by a JULABO service technician or a qualified service center.
- Replace damaged power cords immediately.
- Do not operate the unit if the power cord is damaged.
- When making a connection using the power plug, ensure that the plug is always easily accessible.



DANGER

Danger to life due to electric shock!

An electric shock can result in serious injury or death.

- Operate the device only on a power outlet protected by a residual current circuit breaker (Type B, $I_{\Delta n}$ = 30 mA).
- Operate the device only at outlets with a protective ground (PE).



DANGER

Danger to life due to electric shock!

An electric shock can result in serious injury or death.

- Live parts are enclosed within the device housing. If the device housing is damaged, live parts may be exposed.
- Do not connect the device to the power supply if the housing is damaged!



DANGER

Danger of death from electric shock!

The standby switch on the device does not completely isolate all live parts from the power supply. When working on live parts, there is a risk of fatal electric shock even if the standby switch is turned off.

- Use only the power plug to reliably disconnect the device from the power supply.
- Unplug the power cord before working on the device.
- Ensure that the power plug is freely accessible at all times.



DANGER

Risk of death from electric shock!
An electric shock can result in serious injury or death.
- The device may only be opened by a qualified electrician.
- Work on the electrical system must be performed exclusively by qualified electricians.



WARNING

Hot surfaces!
The following parts and components may become hot during operation or remain hot for some time after operation:
– heat transfer fluid
– Connections for external use
– Condenser

Contact may result in severe burns or scalds to the hands, arms, face, and limbs.
- Keep a safe distance from hot surfaces and liquids.
- Wear appropriate protective gloves.



WARNING

Suspended loads!
Falling loads can cause serious injury and damage the equipment.
- Do not stand under a suspended load.
- Transport the unit using suitable and safe lifting equipment.
- Wear personal protective clothing.



WARNING

Maintenance and Repair Work!
Improper maintenance and repair work jeopardizes operational safety. This can result in serious injury or death.
- Perform only the work described in this operating manual.
- Before starting work, turn off the unit and unplug it from the power source.
- Have repair work performed only by JULABO service technicians or an authorized service center.



CAUTION

Improper Use!
If the device is used in a manner not intended by the manufacturer, the protection provided by the device may be compromised.



CAUTION

Immediately take the unit out of service and disconnect it from the power supply in the event of:

- medium leakage,
- Unusual noises, odors, or vibrations,
- Smoke, sparks, or flames inside or on the device.

Do not continue to operate the device. It may only be put back into service after a professional inspection and repair by qualified personnel.



ADVICE

No liability is assumed for the use of unsuitable heat transfer fluids!
Unsuitable heat transfer fluids that have not been approved by JULABO may damage the unit.

- Use heat transfer fluids recommended by JULABO.
- Check parts in contact with the heat transfer fluid for compatibility with the heat transfer fluid before filling.
- Do not exceed the maximum permissible viscosity during operation.
- Consult JULABO before using any heat transfer fluid other than the recommended one.



ADVICE

Continuous operation with the connected system shut off!
Continuous operation with the connected system shut off will result in property damage.
Reduce the pump output to less than 60% when the external system is shut off.



ADVICE

Use only genuine JULABO replacement parts!
Using non-original replacement parts voids the JULABO warranty.



ADVICE

Use only genuine JULABO accessories!
Using unsuitable accessories will void the JULABO warranty.

ADVICE

Wear personal protective equipment!
Failure to use or the use of unsuitable personal protective equipment increases the risk of health hazards and personal injury.
Examples of personal protective equipment include:

- Work gloves
- Safety shoes
- Protective clothing
- Respiratory protection
- Hearing protection
- Face and Eye Protection
- Determine and provide personal protective equipment appropriate for the specific application.
- Use only personal protective equipment that is in good condition and provides effective protection.
- Adjust personal protective equipment to fit the wearer, e.g., size.

ADVICE

Keep safety labels legible!
Safety labels on the equipment warn of hazards at danger zones and are an important part of the equipment's safety features. Missing safety labels increase the risk of injury to people.

- Clean any soiled safety labels.
- Replace damaged or illegible safety labels immediately.

2.3 Intended Use

JULABO recirculating coolers are designed for temperature control applications in external, closed-loop systems using a heat transfer fluid.

2.4 Anticipated Misuse

The device is not suitable for the direct temperature control application for food and beverages, as well as pharmaceutical and medical devices.

The device is not suitable for use in a potentially explosive atmosphere.

The device is not suitable for use in a corrosive or aggressive environment.

The device is not intended for use in residential areas. It may interfere with radio reception.

2.5 Safety Labels

The following safety labels are affixed to the device.

Symbol	Description	Location
	Warning of a hazardous area. Follow the operating instructions.	Back of the device
	Read the operating instructions before turning on the device.	Back of the device
	Warning: Hot Surface	Condenser, supply and return connections
	Cold Surface Warning	Supply/Return Connections
	Warning: Flammable Refrigerant	Nameplate

2.6 Applying Safety Labels

The following section applies only to units using natural refrigerants that are operated in the United States or Canada.

After unpacking the unit, apply the included safety labels to the locations shown.

Front of the housing, under the front cover



CAUTION / *ATTENTION*

Risk of fire! / *Risque d'incendie!*

Flammable refrigerent used.

L'appareil contient des réfrigérants inflammables.

- Do not dammage the refrigerant line.
- *Ne pas endommager les conduites du réfrigérant.*

Safety label (Part No. 3.383.2630)

Right side of the housing



CAUTION / *ATTENTION*

Risk of fire! / *Risque d'incendie!*
Flammable refrigerent used.
L'appareil contient des réfrigérants inflammables.
- Dispose of properly
  in accordance with federal of local regulations.
- *Installez l'appareil en vous conformant*
  aux réglementations nationales ou regionales.

Safety label (Part No.: 3.383.2600)

NOTICE / *AVIS*

This unit is intended for commercial, industrial or institutional use, as defined in the safety standards for regrigeration systems according to ANSI/ASHRAE 15.

Cet appareil est destiné à un usage commercial, industriel ou institutionel tel que défini par les normes de sécurité des systèmes de réfrégération, selon ANSI/ASHRAE 15.

Notice (Order No. 3.383.2640)

2.7 Refrigerant

In the event of a leak in the refrigerant cycle, safety regulations require a specific room volume per kilogram of refrigerant at the installation site to prevent the formation of a flammable refrigerant-air mixture. The refrigerant charge is specified on the nameplate.



WARNING

Leakage of flammable refrigerant!
The unit contains flammable refrigerant in a technically hermetically sealed circuit. If the refrigerant circuit leaks, a flammable concentration may form in the air, which could ignite or explode due to potential ignition sources in the vicinity. This can result in serious injury or death.

- Observe the required minimum room size for operating the unit.
- Use the unit only in well-ventilated rooms.
- Avoid ignition sources in the immediate vicinity of the unit (e.g., electrical switches, hot surfaces, open flames).
- Do not damage the refrigerant lines.
- Do not damage the condenser fins.
- In the event of a refrigerant leak, shut down the unit immediately, keep open flames and ignition sources away, ventilate the room thoroughly, and contact JULABO Service.



WARNING

Flammable refrigerant may leak into the external system!
The unit contains flammable refrigerant in a technically permanently sealed circuit. If there is a leak from the refrigerant circuit in the heat exchanger into the temperature control circuit, a flammable concentration of refrigerant may form in the temperature control circuit, which could ignite or explode due to potential ignition sources in the external system. This can result in serious injury or death.

- When using water as the heat transfer fluid, freeze protection must be activated.
- There must be no ignition sources within the temperature control circuit in the external system (e.g., components that generate electrical or mechanical sparks, or surfaces with a temperature exceeding 370 °C).



CAUTION

Refrigerants are harmful to health!
Refrigerants and their vapors are harmful to health. There is a risk of suffocation in enclosed spaces.

- Avoid contact and inhalation.
- Damage to the refrigerant cycle may only be repaired by JULABO service technicians or qualified personnel.
- If refrigerant leaks, shut off the unit immediately and ventilate the room thoroughly.

For 0.008 kg of R-290 refrigerant, 1 m³ of space must be provided; for 1 kg of R-290 refrigerant, a room volume of 125 m³ is required.

The calculation/assessment of whether **one or more** refrigeration systems are required per room remains **the same in all cases**, as it is assumed that multiple leaks are **not causally** related and that secondary failures may occur.

2.8 Protective devices

Technical safety devices ensure safe operation. If a safety device is triggered, the operator is warned by a message on the display and an acoustic signal.

Freeze Protection

The freeze protection feature protects the device from damage caused by freezing water.

Freeze protection is enabled by default. If necessary, you can disable this feature in the **<Install Device>** menu.

The following safety mechanisms are activated with freeze protection:

- The setpoint temperature is limited to a minimum of +5°C.
- After the temperature control application stops, the pump is turned off after a delay.

  ADVICE Do not turn off the unit using the standby switch or disconnect it from the power supply until “OFF” appears on the pump’s display.

- Additional monitoring functions detect critical conditions and, if necessary, intervene or shut down the unit to prevent freezing.
- If icing of the heat transfer fluid is detected, the system automatically activates a defrost function. During this phase, the normal temperature control application is suspended and a warning message is displayed. Once defrosting is complete, the system automatically terminates the defrost function.

ADVICE

Property damage due to freezing water!
Freezing water can damage the unit and the material being temperature-controlled.

- When using water as the heat transfer fluid, the freeze protection must be activated.

ADVICE

When freeze protection is activated, the unit’s energy consumption may be slightly higher.

high temperature cut-off

The high temperature cut-off prevents the device from overheating. The protection temperature is fixed at 90 °C.

The protection mechanism is triggered when the temperature of the temperature-control fluid or the safety sensor on the heater (if present) exceeds the set limit. The temperature control application is shut off. An audible alarm sounds, and an alarm message appears on the display.

Low level protection

A level switch detects if the level of the temperature control fluid is too low.

In the event of a low-level alarm, the entire temperature control application is shut down to prevent the pump from running dry. A continuous beep sounds. An alarm message appears on the display. A restart is required.

3 Technical data

Performance specifications measured in accordance with DIN 12876.
Performance specifications apply at an ambient temperature of 20 °C.

The following applies to the sound pressure level values:
- From: Unit in base load operation (40% pump stage, 20 °C bath, 20 °C ambient temperature).
- up to: Unit under rated conditions (100% pump stage, 20 °C bath, 20 °C ambient temperature).
- Sound pressure levels may increase at higher ambient temperatures.

Classification of the device according to CISPR 11:
- The device is an ISM device of Group 1, Class A, which uses radio frequency for internal purposes
- Class A: Use in an industrial electromagnetic environment

The device is designed in accordance with IEC 61010-1 for safe operation under the following environmental conditions:
- Indoor use
- Altitude up to 2000 m above sea level
- Ambient temperature +5 … +40 °C (unless otherwise specified in the technical data)
- Maximum relative humidity of 80% at air temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C
- Pollution degree 2
- Overvoltage category II



ADVICE

The maximum transport temperature is +70 °C.

3.1 VALEGRO 1203

General Information		
Cooling		Air
Display		OLED
Protection Class per IEC 60529		IP21
Class according to DIN 12876		NFL
sound pressure level	dB(A)	46 ... 59

Temperature Data		
Operating temperature range	°C	-20 ... +40
temperature stability	K	±0.3
Temperature resolution	K	0.1
Max. permissible return temperature	°C	+85

Dimensions and Weight		
Dimensions of the body (W x D x H)	cm	43 x 50 x 68
Overall Dimensions (W x D x H)	cm	43 x 56 x 69
Weight	kg	60.5

Cooling capacity	°C	20	0	-10	-20
200 ... 230 V	kW	1.20	0.90	0.50	0.30

Pump		
Flow rate	l/min	15 ... 40
Delivery pressure	bar	0.5 ... 3.5
Max. viscosity	cSt	50
Internal volume	l	3 ... 8
pump connection		M24 x 1.5 male thread

Electrical Connection Specifications					
Mains connection	V Hz	200 ... 230 50/60			
Current consumption	V	200	208	220	230
	A	7	7	7	7
Permissible voltage tolerance	%	±10	±10	±10	±10

3.2 VALEGRO 1203H

General Information		
Cooling		Air
Display		OLED
Protection Class per IEC 60529		IP21
Class according to DIN 12876		NFL
sound pressure level	dB(A)	46 ... 59

Temperature Data		
Operating temperature range	°C	-20 ... +85
temperature stability	K	±0.2
Temperature resolution	K	0.1
Max. permissible return temperature	°C	+85

Dimensions and Weight		
Cabinet Dimensions (W x D x H)	cm	43 x 50 x 68
Overall Dimensions (W x D x H)	cm	43 x 56 x 69
Weight	kg	60.8

Cooling capacity	**°C**	**20**	**0**	**-10**	**-20**
200 ... 230 V	kW	1.20	0.90	0.50	0.30

Heating capacity		
200 V 50/60 Hz	kW	1.5
208 V 60 Hz	kW	1.6
220 V 50/60 Hz	kW	1.8
230 V	kW	2

Pump					
Flow rate	l/min	15 ... 40			
Delivery pressure	bar	0.5 ... 3.5			
Max. viscosity	cSt	50			
Internal volume	l	3 ... 8			
pump connection		M24 x 1.5 male thread			

Electrical Connection Specifications					
Mains connection	V Hz	200 ... 230 50/60			
Current consumption	V	200	208	220	230
	A	13	14	14	14
Permissible voltage tolerance	%	±10	±10	±10	±10

3.3 VALEGRO 1503

General Information		
Cooling		Air
Display		OLED
Protection Class per IEC 60529		IP21
Class according to DIN 12876		NFL
sound pressure level	dB(A)	46 ... 60

Temperature Data		
Operating temperature range	°C	-20 ... +40
temperature stability	K	±0.3
Temperature resolution	K	0.1
Max. permissible return temperature	°C	+85

Dimensions and Weight		
Dimensions of the body (W x D x H)	cm	43 x 50 x 68
Overall Dimensions (W x D x H)	cm	43 x 56 x 69
Weight	kg	60.5

Cooling capacity	**°C**	**20**	**0**	**-10**	**-20**
200 ... 230 V	kW	1.50	1.00	0.70	0.35

Pump		
Flow rate	l/min	15 ... 40
Delivery pressure	bar	0.5 ... 3.5
Max. viscosity	cSt	50
Internal volume	l	3 ... 8
pump connection		M24 x 1.5 male thread

Electrical Connection Specifications					
Power supply	V Hz	200 ... 230 50/60			
Current consumption	V	200	208	220	230
	A	8	8	7	7
Permissible voltage tolerance	%	±10	±10	±10	±10

3.4 VALEGRO 1503H

General Information		
Cooling		Air
Display		OLED
Protection Class per IEC 60529		IP21
Class according to DIN 12876		NFL
sound pressure level	dB(A)	46 ... 60

Temperature Data		
Operating temperature range	°C	-20 ... +85
temperature stability	K	±0.2
Temperature resolution	K	0.1
Max. permissible return temperature	°C	+85

Dimensions and Weight		
Cabinet Dimensions (W x D x H)	cm	43 x 50 x 68
Overall Dimensions (W x D x H)	cm	43 x 56 x 69
Weight	kg	60.8

Cooling capacity	°C	20	0	-10	-20
200 ... 230 V	kW	1.50	1.00	0.70	0.35

Heating capacity		
200 V 50/60 Hz	kW	1.5
208 V 60 Hz	kW	1.6
220 V 50/60 Hz	kW	1.8
230 V	kW	2

Pump					
Flow rate	l/min	15 ... 40			
Delivery pressure	bar	0.5 ... 3.5			
Max. viscosity	cSt	50			
Internal volume	l	3 ... 8			
pump connection		M24 x 1.5 male thread			

Electrical Connection Specifications					
Mains connection	V Hz	200 ... 230 50/60			
Current consumption	V	200	208	220	230
	A	13	14	14	14
Permissible voltage tolerance	%	±10	±10	±10	±10

3.5 VALEGRO 1803

General Information		
Cooling		Air
Display		OLED
Protection Class per IEC 60529		IP21
Class according to DIN 12876		NFL
sound pressure level	dB(A)	46 ... 60

Temperature Data		
Operating temperature range	°C	-20 ... +40
temperature stability	K	±0.3
Temperature resolution	K	0.1
Max. permissible return temperature	°C	+85

Dimensions and Weight		
Dimensions of the body (W x D x H)	cm	43 x 50 x 68
Overall Dimensions (W x D x H)	cm	43 x 56 x 69
Weight	kg	60.5

Cooling capacity	**°C**	**20**	**0**	**-10**	**-20**
200 ... 230 V	kW	1.80	1.30	0.8	0.40

Pump		
Flow rate	l/min	15 ... 40
Delivery pressure	bar	0.5 ... 3.5
Max. viscosity	cSt	50
Internal volume	l	3 ... 8
pump connection		M24 x 1.5 male thread

Electrical Connection Specifications					
Mains connection	V Hz	200 ... 230 50/60			
Current consumption	V	200	208	220	230
	A	8	8	8	7
Permissible Voltage Tolerance	%	±10	±10	±10	±10

3.6 VALEGRO 1803H

General Information		
Cooling		Air
Display		OLED
Protection Class per IEC 60529		IP21
Class according to DIN 12876		NFL
sound pressure level	dB(A)	46 ... 60

Temperature Data		
Operating temperature range	°C	-20 ... +85
temperature stability	K	±0.2
Temperature resolution	K	0.1
Max. permissible return temperature	°C	+85

Dimensions and Weight		
Cabinet Dimensions (W x D x H)	cm	43 x 50 x 68
Overall Dimensions (W x D x H)	cm	43 x 56 x 69
Weight	kg	60.8

Cooling capacity	**°C**	**20**	**0**	**-10**	**-20**
200 ... 230 V	kW	1.80	1.30	0.8	0.40

Heating capacity		
200 V 50/60 Hz	kW	1.5
208 V 60 Hz	kW	1.6
220 V 50/60 Hz	kW	1.8
230 V	kW	2

Pump					
Flow rate	l/min	15 ... 40			
Delivery pressure	bar	0.5 ... 3.5			
Max. viscosity	cSt	50			
Internal volume	l	3 ... 8			
pump connection		M24 x 1.5 male thread			

Electrical Connection Specifications					
Mains connection	V Hz	200 ... 230 50/60			
Current consumption	V	200	208	220	230
	A	13	14	14	14
Permissible voltage tolerance	%	±10	±10	±10	±10

3.7 VALEGRO 2503

General Information		
Cooling		Air
Display		OLED
Protection Class per IEC 60529		IP21
Class according to DIN 12876		NFL
sound pressure level	dB(A)	46 ... 62

Temperature Data		
Operating temperature range	°C	-20 ... +40
temperature stability	K	±0.3
Temperature resolution	K	0.1
Max. permissible return temperature	°C	+85

Dimensions and Weight		
Dimensions of the body (W x D x H)	cm	43 x 50 x 68
Overall Dimensions (W x D x H)	cm	43 x 56 x 69
Weight	kg	60.5

Cooling capacity	**°C**	**20**	**0**	**-10**	**-20**
200 ... 230 V	kW	2.50	1.45	1.00	0.50

Pump		
Flow rate	l/min	15 ... 40
Delivery pressure	bar	0.5 ... 3.5
Max. viscosity	cSt	50
Internal volume	l	3 ... 8
pump connection		M24 x 1.5 male thread

Electrical Connection Specifications					
Mains connection	V Hz	200 ... 230 50/60			
Current consumption	V	200	208	220	230
	A	9	9	8	8
Permissible voltage tolerance	%	±10	±10	±10	±10

3.8 VALEGRO 2503H

General Information		
Cooling		Air
Display		OLED
Protection Class per IEC 60529		IP21
Class according to DIN 12876		NFL
sound pressure level	dB(A)	46 ... 62

Temperature Data		
Operating temperature range	°C	-20 ... +85
temperature stability	K	±0.2
Temperature resolution	K	0.1
Max. permissible return temperature	°C	+85

Dimensions and Weight		
Cabinet Dimensions (W x D x H)	cm	43 x 50 x 68
Overall Dimensions (W x D x H)	cm	43 x 56 x 69
Weight	kg	60.8

Cooling capacity	**°C**	**20**	**0**	**-10**	**-20**
200 ... 230 V	kW	2.50	1.45	1.00	0.50

Heating capacity		
200 V 50/60 Hz	kW	1.5
208 V 60 Hz	kW	1.6
220 V 50/60 Hz	kW	1.8
230 V	kW	2

Pump					
Flow rate	l/min	15 ... 40			
Delivery pressure	bar	0.5 ... 3.5			
Max. viscosity	cSt	50			
Internal volume	l	3 ... 8			
pump connection		M24 x 1.5 male thread			

Electrical Connection Specifications					
Mains connection	V Hz	200 ... 230 50/60			
Current consumption	V	200	208	220	230
	A	13	14	14	14
Permissible voltage tolerance	%	±10	±10	±10	±10

3.9 Materials and Media Compatibility

3.9.1 Materials of Parts in Contact with the Medium

The following table lists the materials that may come into contact with the heat transfer fluid.

This information can be used to verify compatibility with the heat transfer fluid being used.

- 1.4301 / 304 / S30400
- 1.4401 / 316 / S31600
- 1.4404 / 316L / S31603
- 1.4571 / 316Ti / S31635
- Aramid
- CR
- EPDM
- FPM / FKM 75
- Copper
- Brass
- MS polymer
- NBR
- PP
- PVC-U
- Silicon carbide
- Tungsten carbide

3.9.2 heat transfer fluids

Only water or a 1:1 water-glycol mixture is permitted as a heat transfer fluid.

ADVICE

No liability is assumed for the use of unsuitable heat transfer fluids!
Unsuitable heat transfer fluids that have not been approved by JULABO may damage the device.

- Use heat transfer fluids recommended by JULABO.
- Check parts in contact with the heat transfer fluid for compatibility with the heat transfer fluid before filling.
- Do not exceed the maximum permissible viscosity during operation.
- Consult JULABO before using any heat transfer fluid other than the recommended one.

ADVICE

Property damage due to freezing water!
Freezing water can damage the unit and the material being temperature-controlled.

- When using water as the heat transfer fluid, the freeze protection must be activated.

ADVICE

Adding ammonia to the heat transfer fluid is not permitted!

Water Quality Requirements

When using water as the heat transfer fluid, the following water quality requirements apply:

- Calcium carbonate concentration: 0.7–1.4 mmol/L
- Chloride concentration (depending on the maximum operating temperature): linearly decreasing from a maximum of 100 ppm (at 25 °C) to a maximum of 20 ppm (at 85 °C)
- pH value: 6–8.5
- Ultrapure water / distilled water is suitable as a heat transfer fluid after adding 0.15 g of $_{NaHCO3}$ per liter of water.

ADVICE

The following types of water are unsuitable as a heat transfer fluid:

- distilled, deionized, and fully desalinated water
- seawater
- water containing halogens or halides (e.g., chlorinated water or fluorinated water)
- contaminated water
- water containing iron
- River water

3.10 heat transfer hoses

Heat transfer hoses for the connection to an external system must be designed for the operating temperature range and the specific temperature control application.

You can find heat transfer hoses for every application on our website.

Heat transfer hoses must meet the following requirements:

- Temperature resistance
- Pressure resistance
- Material properties suitable for the heat transfer fluid used

ADVICE

Damage to heat transfer hoses due to kinking!

Heat transfer hoses are damaged by kinks and may develop leaks.

- Lay the heat transfer hoses in wide bends.
- Avoid kinking the heat transfer hoses.

4 Structure and function

4.1 Function Description

The unit is a recirculating cooler that operates with a refrigerant cycle. Intelligent control technology regulates the temperature control application. The evaporator extracts heat from the heat transfer fluid, and the condenser releases this heat into the ambient air.

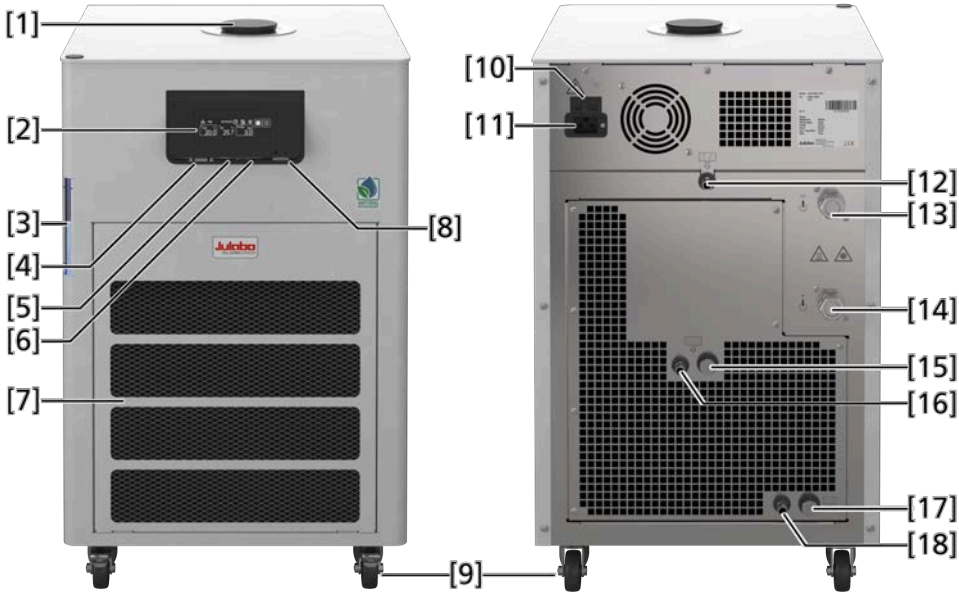
An external application is connected to the unit via the pump connections. To temperature-control the application, the heat transfer fluid is circulated by the circulation pump through the heat exchanger in a closed loop.

The electronics evaluate the data from the unit’s sensors and control the actuators.

The refrigeration unit and the heater (if present) bring the heat transfer fluid to the desired temperature.

4.2 Controls and Functional Elements

This chapter describes the controls and functional elements and shows their locations on the device.



Control and Functional Elements VALEGRO 1203(H)/1503(H)/1803(H)/2503(H)

1. Cover, fill port
2. Touchscreen
3. Illuminated level indicator
4. RS232 interface
5. USB-C interface
6. Ethernet interface (optional)
7. Removable ventilation grille
8. Standby switch
9. Casters
10. Resettable circuit breaker
11. Power connection
12. overflow
13. Flow connection
14. Return connection
15. Knurled screw Drain (bath)
16. Drain (tub)
17. Knurled drain screw (pump)
18. Drain (pump)

4.3 Interfaces

This section describes the electronic interfaces available on the device, along with their pin assignments and connection specifications.

4.3.1 USB-C interface

The device has a USB-C interface.

The following functions can be performed via the USB-C interface:

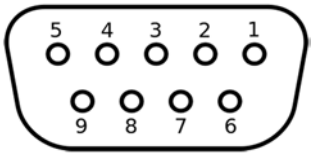
- Remote control of the device via a PC
- Recording data to an external storage device
- Saving black box data to an external storage device
- Installing firmware from an external storage device

Technical Specifications for the USB-C Interface

Parameters	Value	Unit
Input/Output Voltage	5	VDC
Maximum current / current consumption	500	mA

4.3.2 RS232 Interface

The RS232 interface is a 9-pin D-Sub connector for establishing a connection between the device and a PC.



RS232 Jack

RS232 Interface Pin Assignment

Pin	Assignment	Pin	Assignment
Pin 2	RxD Receive Data	Pin 7	RTS Request to Send
Pin 3	TxD Transmit Data	Pin 8	CTS Clear to Send
Pin 5	0 V Signal GND		

Pins 1, 4, 6, and 9 are reserved. Do not use them.

Factory setting for RS232 Interface

Parameter	Value
Parity	even
Baud rate	4800 baud
Handshake	Hardware
Data bit	7
Stop bit	1

4.3.3 Ethernet Interface (Optional)

The Ethernet interface allows the device to be connected to a network or directly to a PC.

Technical Specifications for the Ethernet Interface

Parameters	Value	Unit
Voltage Level	3.3	VDC

5 Transportation



CAUTION

Risk of crushing from falling equipment!
An unsecured unit can fall during improper transport and cause crush injuries.
- Secure the unit against tipping over and falling during transport.
- Secure loose parts to prevent them from falling during transport.
- Transport the equipment in an upright position using a suitable means of transport.
- Wear safety shoes.



CAUTION

Risk of injury from the unit tipping over!
When pulling or pushing, the unit may tip over and cause injuries.
- Drain the heat transfer fluid before transport.
- Always keep the unit upright on its casters during transport.
- Secure loose parts to prevent them from falling during transport.
- Wear safety shoes.



ADVICE

Property damage may result from gripping the control panel!
The control panel must not be used as a handle during transport.

Transport on Casters

The unit can be transported on level ground and over short distances using its casters.

Prerequisites

- ▶ The unit is turned off and disconnected from the power supply.
- ▶ The heat transfer fluid has been drained.
- ▶ All external connections have been removed.

Procedure

1. Release the casters.
2. Push the unit to its place of operation.
3. Position the unit and lock the casters.

✓ The unit was transported safely on its casters.

Transport with a forklift

The device can be transported using a forklift.

Prerequisites

- ▶ The unit is turned off and disconnected from the power supply.
- ▶ The heat transfer fluid has been drained.
- ▶ All external connections have been removed.

Procedure

1. Place the unit in the center of a pallet.
2. Lock the casters.
3. Place any loose parts, such as cables, on the pallet next to the unit.
4. Secure the device to the pallet with straps.
5. Transport the device to its place of operation using a suitable forklift.

✓ The device has been safely transported to its place of operation.

6 Set up

6.1 Set up the device at the place of operation

Prerequisites

▶ The device has been transported to the place of operation.

▶ The size and infrastructure of the place of operation are suitable for operating the device.

ADVICE Recommended minimum distance of 1 m from adjacent devices to prevent electromagnetic interference.

Procedure

1. Place the unit on a level, smooth, non-flammable surface.
2. Lock the casters.

ADVICE

- Ensure the unit is stable.
- Maintain a clearance of at least 1 m in front of and behind the unit.
- Do not cover any of the ventilation openings in the housing.
- The refrigerant cycle must not be damaged.

✓ The unit is installed at the place of operation.

7 Commissioning

7.1 Connecting the device to the power supply

This section describes the electrical connection of the device with mains plug.



DANGER

Electric shock from the electrical system!
Touching damaged live parts can result in severe electric shock and may injure or kill people.
- Have damaged insulation and components of the electrical system repaired immediately by a JULABO service technician or a qualified service center.
- Replace damaged power cords immediately.
- Do not operate the unit if the power cord is damaged.
- When making a connection using the power plug, ensure that the plug is always easily accessible.



DANGER

Danger to life due to electric shock!
An electric shock can result in serious injury or death.
- Operate the device only on a power outlet protected by a residual current circuit breaker (Type B, $I_{\Delta n}$ = 30 mA).
- Operate the device only at outlets with a protective ground (PE).



DANGER

Danger to life due to electric shock!
An electric shock can result in serious injury or death.
- Live parts are enclosed within the device housing. If the device housing is damaged, live parts may be exposed.
- Do not connect the device to the power supply if the housing is damaged!



DANGER

Danger of death from electric shock!
The standby switch on the device does not completely isolate all live parts from the power supply. When working on live parts, there is a risk of fatal electric shock even if the standby switch is turned off.
- Use only the power plug to reliably disconnect the device from the power supply.
- Unplug the power cord before working on the device.
- Ensure that the power plug is freely accessible at all times.

ADVICE

Damage to the power cord due to excessive heat!
The power cord must not come into contact with any parts that become hot during operation.
- Keep the power cord away from surfaces that may become hot.

Requirements

▶ The device is at its operating location.

Procedure

1. Insert the appliance plug of the mains cable supplied into the mains connection socket on the back of the appliance.
2. Insert the plug of the mains cable into the socket.

✓ The appliance is electrically connected.

7.2 Connecting an External System

The unit is designed for a temperature control application for external closed systems within a temperature control circuit. An external system is connected to the unit's pump connections.

WARNING

Flammable refrigerant may leak into the external system!
The unit contains flammable refrigerant in a technically permanently sealed circuit. If there is a leak from the refrigerant circuit in the heat exchanger into the temperature control circuit, a flammable concentration of refrigerant may form in the temperature control circuit, which could ignite or explode due to potential ignition sources in the external system. This can result in serious injury or death.
- When using water as the heat transfer fluid, freeze protection must be activated.
- There must be no ignition sources within the temperature control circuit in the external system (e.g., components that generate electrical or mechanical sparks, or surfaces with a temperature exceeding 370 °C).



CAUTION

Risk of scalding from damaged heat transfer hoses!
Hot heat transfer fluid can leak from damaged heat transfer hoses and cause severe scalds upon skin contact.

- Check the heat transfer hoses regularly for damage.
- Replace damaged heat transfer hoses immediately.
- Do not kink the heat transfer hoses.
- Replace heat transfer hoses regularly.
- Check the pump connections for leaks.



CAUTION

Injuries and property damage due to an incompatible externally connected system!
If the temperature range and/or pressure parameters of an externally connected system do not match those of the unit, this can result in damage to individual components or even failure of the entire system. Hot heat transfer fluid can escape under high pressure or cause components to burst.

- Before the connection, verify that the external system is compatible with the temperature control unit's specifications.
- If an external system is connected that is not designed for the unit's maximum pressure (e.g., glassware), limit the pump's flow rate in the settings and take appropriate measures to limit pressure (e.g., pressure relief devices).
- Allow for sufficient safety margins. System-related pressure spikes may briefly exceed the specified maximum delivery pressure.
- Do not install shut-off valves in the return line.
- Check the pump settings before and during startup and adjust them as needed.
- If an external system is connected, the operator is responsible for the safety of the entire system.



ADVICE

Hot pump connections!
During operation, the pump connections can become very hot. Heat-sensitive parts or lines may be damaged if touched.

- Pump connections must remain unobstructed during operation.
- During operation, no loose parts or lines may come into contact with the pump connections.

ADVICE

Overflow of heat transfer fluid from externally connected systems!
If the externally connected system is located higher than the temperature control system, the heat transfer fluid may flow back and overflow when the system is turned off.

- Position the connected external system at the same level or lower than the temperature control system.
- Install a shut-off valve or solenoid valve as a backflow preventer between the external system and the temperature control system.

ADVICE

Damage to heat transfer hoses due to kinking!
Heat transfer hoses are damaged by kinks and may develop leaks.

- Lay the heat transfer hoses in wide bends.
- Avoid kinking the heat transfer hoses.

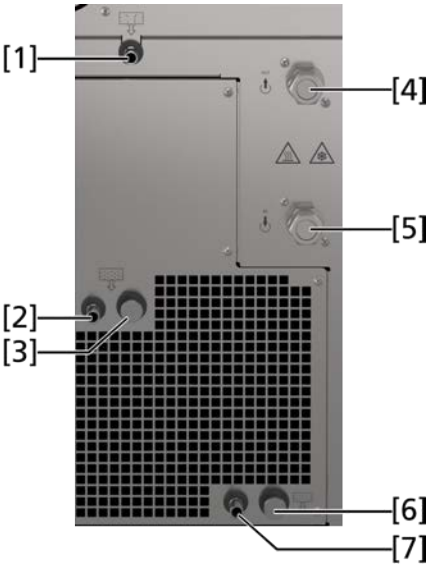
ADVICE

Property damage due to overflow of the heat transfer fluid!
Expansion of the heat transfer fluid during operation can cause the system's maximum fill volume to be exceeded. Uncontrolled leakage of the heat transfer fluid can cause damage to the unit.

- Do not fill the unit unattended.
- Connect the hose to the overflow and route it into a suitable collection vessel.
- Never block the overflow at the back of the unit!

7.2.1 Connecting an external system with screw connections

This section describes how to connect an external closed system with screw connections to the appliance.



1. Overflow connection
2. Drain
3. Knurled drain screw
4. Inlet connection
5. Return connection
6. Knurled drain screw for pump
7. Pump drain

Requirements

- ▶ Two open-end wrenches, size 27 mm
- ▶ Torque wrench
- ▶ Suitable heat transfer hoses with threaded connections are available
- ▶ The heat transfer hoses are connected to the external system
- ▶ An overflow hose with an inner diameter of 10 mm is provided

Procedure

1. Remove the union nuts from the pump connections on the supply and return lines.
2. Remove the plugs.
3. Install the heat transfer hoses. Hold them in place with a second open-end wrench.
   - ⇨ Tightening torque for the M24 nuts: 47 Nm
   - ⇨ Connect the heat transfer hose from the lower inlet of the external system to the pump connection. This ensures proper venting of the external system.

4. Connect the overflow hose to the overflow connection and secure it with a hose clamp.
5. Route the overflow hose into a suitable container to collect the heat transfer fluid.

   ADVICE The overflow hose must hang freely into the collection vessel and must not be submerged. Pressure equalization must be possible.

6. Check all lines for a secure fit and leaks.

✓ The external system is connected to the unit.

7.3 Filling the device

This section describes how to fill the appliance with temperature control medium during commissioning.

The filling quantity can be found in the technical data.

ADVICE

Property damage due to overflow of the heat transfer fluid!
Expansion of the heat transfer fluid during operation can cause the system's maximum fill volume to be exceeded. Uncontrolled leakage of the heat transfer fluid can cause damage to the unit.

- Do not fill the unit unattended.
- Connect the hose to the overflow and route it into a suitable collection vessel.
- Never block the overflow at the back of the unit!

Prerequisites

▶ The drain valve is closed.
▶ The unit is turned off.
▶ The external system is connected.

Procedure

1. Open the fill port of the internal reservoir.
2. Fill with heat transfer fluid up to approximately the upper mark on the fill level indicator.
3. Turn on the unit using the standby switch.
4. Set the target temperature.
5. Start temperature control application.

   ⇨ The heat transfer fluid is pumped into the connected external system.

6. Top off the heat transfer fluid to halfway up the fill level indicator.
7. Once the setpoint temperature is reached, adjust the fill level by refilling or draining.

   ADVICE
   - As the temperature rises, the heat transfer fluid expands and may overflow.
   - As the temperature drops, the low-level protection may activate and interrupt the temperature control process.

8. Close the fill port.

✓ The unit and the external application are filled with heat transfer fluid.

8 Operation

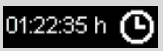
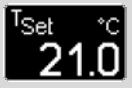
8.1 User Interface

8.1.1 Soft Keys and Status Icons

On the touchscreen, you can tap the outlined soft keys with your finger to access submenus. Numeric values can be selected and changed by swiping up, down, left, or right.

The user interface includes the following soft keys and status icons.



Icon	Description
	Indicates active Ethernet connection
	Indicates that an external storage device is inserted
	Recording to external storage medium active
	Timer indicator: • Start date/time of the timer or • remaining time when the timer is running
	Heating active indicator
	Cooling active indicator
	Current internal temperature indicator
	Display error messages: Only the first error is displayed. If multiple alarms occur, each cause must be resolved separately, and the device must be restarted.
	Display warning message: Only the first warning is displayed. If there are multiple warnings, each cause must be resolved separately.
	Display operating status
	Setpoint Temperature Setting / Display Current Setpoint Temperature
	Pump stage setting Display of current pump output in percent.

Icon	Description
	Pump pressure setting Display of current pump pressure **ADVICE** Switch from pump stage to pump pressure in the **<Determine Thermodynamics>** menu
	Open the main menu
	Temperature Control Application Start
	Temperature Control Application Stop

8.1.2 Alarms and Warnings

Alarms and warnings are indicated by error codes on the display. Important error codes are described in the chapter **“Malfunctions and Troubleshooting**.”

If an error cannot be resolved by the operator, contact Technical Support.

Warning:

A warning does not interrupt the temperature control application. A warning message appears on the display. An intermittent beep sounds. The beep can be turned off by touching the touchscreen. Once the cause of the warning has been resolved, the warning disappears. Depending on the cause, warnings may disappear on their own after a short time.

Alarm:

In the event of an alarm, the temperature control application is stopped. The actuators are shut off. At the same time, a continuous beep sounds and an alarm message appears on the display. The beep can be turned off by touching the touchscreen. The cause of the alarm must be resolved. A restart is required.

ADVICE

The list of alarm and warning messages can be found in **Chapter 10, “Malfunctions and Troubleshooting.”**

8.2 Main Menu



Press the [☰] soft key on the home screen to open the main menu. The main menu is divided into menu items, each of which contains additional submenus or allows you to make settings directly.

The **<Main Menu>** is divided into the following menu items:
- adjust safety
- Determine Thermodynamics
- Connect Device
- Timer
- Analyze Data
- Install the device
- Settings
- Service
- About the Device

8.2.1 Adjust Safety Menu



- Autostart: Yes / No
- Pump Mode: Automatic / Pump Always On / Pump Run-After
- Temperature Limits:
  - Setpoint min. / max.: Setting the upper and lower limits for the temperature setpoint
  - Subtemperature Alarm, Subtemperature Warning: Setting alarm and warning limits
  - high temperature cut-off

- Pump limits:
  - Maximum pump pressure: Setting the upper limit for the pressure setpoint
  - Upper pressure limit
    ⇨ If this limit is exceeded for more than 5 seconds, the device shuts down.

  - Upper pressure limit (peak)
    ⇨ As soon as this limit is exceeded for longer than 1 second, the device shuts down.

  - Low-pressure warning
  - Overpressure warning

8.2.2 Select the “Thermodynamics” menu



- Set Controller:
  - Xp
  - Tn
  - Tv
- Set pump:
  - Pump capacity
    ⇨ Visible only when pump control is set to “Flow.”
  - Pump control: Flow [%], Pressure [bar]
  - Pump Pressure Setpoint
    ⇨ Visible only when the pump control is set to “Pressure”
  - Actual Pump Pressure
- Set limits:
  - Set the limit values for the cooling capacity
  - Set the limit values for the heating capacity (only for units with a heater)

8.2.3 Connect Device Menu



- Remote Control: Off, Serial, USB, Ethernet (Optional)
- Interfaces:
  - Serial:
    - Mode
    - Baud Rate
    - Parity
    - Handshake
  - Ethernet (optional):
    - Obtain IP via DHCP
    - MAC address
    - IP address
    - Subnet mask
    - Default gateway
    - Remote Control Port
    - Hostname

8.2.4 Timer Menu



- Enable: Yes / No
- Schedule Start
  - Immediately
  - Date / Time
- Start Date
- Start time
- Target value
- End state
  - Standby
  - Last setpoint
  - Start setpoint
- Duration

8.2.5 Menu: Analyze Data



- Record Data
  - Enable: Yes / No
  - Sampling Time
- Save Blackbox Data
- Alarm Log

8.2.6 Menu: Install Device



- Freeze Protection Yes / No
- Adjust Temperature Sensor
- Reset Device
- Enable Options: Display all options and indicate whether they are enabled or not
- MAC Address



ADVICE

Property damage due to freezing water!
Freezing water can damage the unit and the material being temperature-controlled.

- When using water as the heat transfer fluid, the freeze protection must be activated.

8.2.7 Settings Menu

- Set Language
- Set Date and Time
- Set Physical Units
  - Temperature °C / °F
  - Pressure bar / psi

- Screen brightness
- Screen Saver: Yes / No
  - ⇨ While the screensaver is active, the current temperature is displayed. Touching the touchscreen will exit the screensaver.



ADVICE

Damage to the OLED display caused by a deactivated screensaver!
Disabling the screensaver has a negative impact on the display's lifespan.
- The screensaver is enabled by default.
- To prevent image burn-in, do not disable the screensaver.

8.2.8 Service Menu

The **<SERVICE>** menu is password-protected. Only JULABO service technicians have access.

8.2.9 Menu: About the Device

- Displays the device ID, including voltage variant and firmware version.

8.3 Turning on the Device

This section describes how to turn on the device.

Prerequisites

▶ The device is connected and ready for use.

Procedure

1. Turn on the device usingthe power switch or standby switch.
   ⇨ The software boots and starts the device. The display shows the device name, the voltage variant, and the loaded configuration.

ADVICE

Fan Ramp-Up
After turning on the unit using the standby switch, the fans initially run at an increased speed for a defined period of time. This fan ramp-up is intended to remove any refrigerant that may have leaked from the interior of the unit before the unit begins operation. The fan pre-run is indicated by the operating status on the display.
The following functions are not available during the fan ramp-up:
- temperature control application
- Pump
- USB interface

However, the temperature control application can already be started using the **[Start Temperature Control Application]** soft key. The temperature control application then starts automatically once the fan pre-run is complete.

✓ The device is turned on. It switches to the last active operating mode. If the autostart function is enabled, the device starts the temperature control application directly using the last settings.

ADVICE In “always on” pump mode, the pump starts immediately.

ADVICE

Fan Operation in Standby
In standby mode, the fans continue to run at a very low speed. This prevents any escaping refrigerant from accumulating inside the unit.

ADVICE

If remote control is enabled, the device cannot be operated manually.

8.4 Turning Off the Device

This section describes how to turn off the device.

Prerequisites

▶ The device is turned on.



DANGER

Danger of death from electric shock!
The standby switch on the device does not completely isolate all live parts from the power supply. When working on live parts, there is a risk of fatal electric shock even if the standby switch is turned off.

- Use only the power plug to reliably disconnect the device from the power supply.
- Unplug the power cord before working on the device.
- Ensure that the power plug is freely accessible at all times.

Procedure

1. Stop the current temperature control application.

   ADVICE Do not turn off the unit until it is in standby mode.

   ADVICE Due to the pump's run-down time when frost protection is active, do not turn off the unit until **"OFF"** is **displayed** for the pump.

2. Turn off the unit usingthe power switch or standby switch.

✓ The unit is now turned off.

8.5 Set the Setpoint Temperature

The device maintains the temperature at the setpoint. The setpoint can be changed during the temperature control application. The set value is saved.

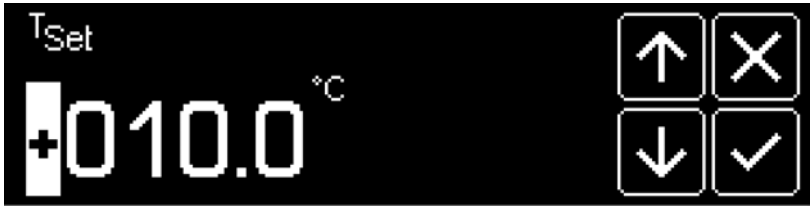
Prerequisites

▶ The device is turned on.



Procedure

1. Press the **[TSet]** soft key.
   ⇨ The setting screen for the setpoint temperature opens.



2. Use the arrow keys or swipe across the display (left, right, up, down) to set the setpoint temperature, then confirm with **[✓].**

✓ The setpoint temperature is set and active. You can cancel setting the setpoint temperature by pressing the **[x]** button. The previous value is retained.

8.6 Adjusting the Pump

The pump output can be adjusted in one-percent increments.

ADVICE

Property damage due to excessive pump pressure!
If the permissible operating pressure of the external system is lower than the pump's maximum delivery pressure, an incorrect pump setting can cause damage to the application.

- Monitor the pressure at the application when changing the pump settings.
- During initial startup or after making changes to the system, start the pump at minimum output and carefully increase the output during operation as needed.

Prerequisites

▶ The device is turned on.

Procedure

1. Open the **<Main Menu>**.
2. In the **<Determine Thermodynamics>** submenu, select the **<Set Pump>** menu item.
   ⇨ Alternatively, you can click the **[Pump]** soft key directly on the start screen to set the pump output.



⇨ In the <Pump Control> submenu, you can switch the input/display from power [%] to pressure [bar].



3. Use the arrow keys or swipe across the display to set the desired value and confirm with **[✓].**
   ⇨ The minimum value is preset by the device. The maximum value is limited by the adjustable maximum pump output in the **<ADJUST safety>** menu.
4. Confirm the entry.

✓ The set value takes effect immediately. The pump is now set. You can cancel the pump output setting by pressing the **[x]** key. The previous value is retained.

8.7 Start temperature control application

A temperature control application can be started directly on the machine. Other options include controlling the temperature control application via the timer and remote control via a connected PC.

Prerequisites

▶ The unit is turned on.

▶ The setpoint temperature has been set.

Procedure

1. Press the **[►]** soft key.

✓ The device immediately begins the temperature control application. Press the **[■]** soft key to stop the temperature control application.

8.8 Set the Timer

The timer can be used to program the duration of a temperature control application for up to 100 hours, as well as the start date and time. The target temperature is set as the setpoint temperature.

Once the set duration has elapsed, the device switches to the previously defined state:

- Standby mode
- Maintain target temperature
- Temper to the original setpoint temperature

Prerequisites

▶ The device is turned on.

Procedure

1. Open the **<Main Menu>**.
2. Open the **<Timer>** submenu.
   ⇨ The dialog box for setting the timer appears on the display.
3. Set the start time and start date, then confirm with [✓].
4. Set the temperature setpoint and the desired duration, then confirm with [✓].
5. In the **<End State>** field, select how the device should behave once the temperature control period has elapsed.
6. In the **<Activate>** submenu **,** select **<Yes>** to activate the timer.

✓ The timer is programmed and active.

8.9 Enable the Autostart Function

The autostart function allows you to start a temperature control application directly using thepower switch or the standbyswitch, or via an intermediate timer.

The unit is factory-configured to switch to a safe operating state in the event of a power failure. The autostart function is disabled. “OFF” appears on the display. The chiller, heater, and pump motor are disconnected from the mains power supply.



WARNING

Unsupervised automatic startup of the unit!
When commissioning the unit, ensure that an unattended automatic startup—e.g., following a power outage—cannot pose a hazard to people or equipment.

- Ensure that the unit’s safety and warning devices are functioning properly.

Prerequisites

▶ The unit is turned on.

Procedure

1. Open the **<Main Menu>**.
2. In the **<ADJUST safety>** submenu, select the **<AUTOSTART>/<YES>** menu item.

✓ The autostart function is enabled. The next time the device is turned on, the temperature control application will start immediately using the preset values. A timer can be connected and programmed. In this case, the device’s standby switch must remain on.

8.10 Recording Data

The device can record data to an external storage medium. In the <Evaluate Data> menu, you can set the conditions for this and start the recording.

The recorded data can be analyzed at a later time.

Prerequisites

- ▶ The device is turned on.
- ▶ An external storage medium is available.

Procedure

1. Connect the external storage device to the USB-C port.
2. Open the **<Main Menu>**.
3. Open the **<Evaluate Data>** submenu.
4. Open the **<Record Data>** submenu.
5. Set the sampling time and confirm with [✓].
6. In the submenu, select **<Activate>/<Yes>** to start recording.
7. Confirm the settings with the [✓] soft key.

✓ Data recording begins. The data is recorded at the set interval until recording is stopped.

8.11 Thermodynamics

8.11.1 Control Parameters

The unit uses a PID controller whose behavior is determined by the proportional band Xp, the response time Tn, and the lead time Tv. The optimal values for these control parameters depend on the specific application. The control parameters are factory-set to ensure good control performance for most applications. In specific cases or when special control requirements exist, the control parameters can be adjusted to suit the application.

The internal control parameters can be adjusted in the **<Determine Thermodynamics>/<Set Controller>** submenu.

Proportional Band Xp

The proportional band Xp is the range around the setpoint within which the P-component of the controller is active. Within this range, the P-component of the controller behaves proportionally to the control deviation. The smaller the value of Xp, the faster the controller responds. A value for Xp that is too small can cause the system to oscillate.

Settling time Tn

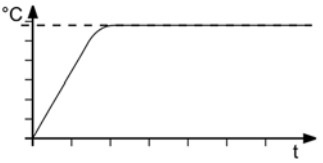
The reset time Tn is a measure of the “strength” of the controller’s I-component. The I-component builds up by summing the control deviation over time, thereby ensuring that no persistent control deviation occurs. A small Tn value results in faster elimination of control deviations but increases the risk of overshoot and oscillations. If Tn is set to 0 s, the I-component of the controller is deactivated.

Lead Time Tv

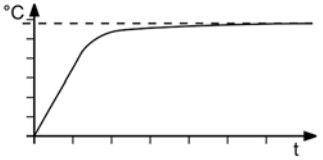
The lead time Tv influences the D component of the controller, which responds to the rate of change of the control error and counteracts it. This allows overshoots to be damped. The larger Tv is, the greater the damping effect. However, if Tv is set too high, this can lead to unstable control behavior. If Tv is set to 0 s, the D component of the controller is deactivated. This is the factory setting, as satisfactory control behavior can generally be achieved even with a pure PI controller.

8.11.2 Optimizing Temperature Curves

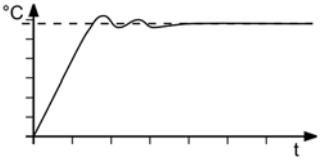
A recorded temperature curve provides information on how individual control parameters can be optimized to achieve a better result.



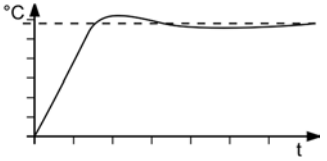
Optimal temperature profile: The temperature quickly reaches the setpoint without overshooting and maintains the setpoint.



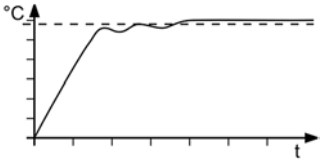
Symptom: The temperature curve approaches the setpoint slowly and does not quite reach it. Remedy: Decrease Tv and/or Tn; increase Xp.



Symptom: The temperature curve approaches the setpoint quickly, resulting in overshoot with overshoot oscillations. Remedy: Increase Tv and/or Tn.



Symptom: The temperature curve approaches the setpoint quickly, resulting in overshoot. Remedy: Increase Xp.



Symptom: The temperature curve approaches the setpoint quickly, causing the temperature to oscillate; the setpoint is exceeded. Solution: Decrease Xp and/or Tv.

8.12 Remote Control of the Device

8.12.1 Remote Control of the Device via the RS232 Interface

The device can be controlled remotely via the RS232 Interface. A null modem cable is required for the connection to a PC.

The interface parameters cannot be changed during remote control operation. If they differ from the factory settings, they must be configured before enabling remote control operation.

Setting Parameters

Prerequisites

▶ Remote control is disabled.

Procedure

1. Open the **<Main Menu>**.
2. In the **<CONNECT Device>/<DIGITAL Interfaces>** submenu, select the **<RS232>** menu item.
3. Set the interface parameters **[Baud Rate], [Handshake]**, and **[Parity]** if they differ from the factory settings.
   ⇨ If parity is set to “None,” the number of data bits is set to 8.

✓ The interface parameters are set and take effect immediately.

Remote Control of the Device

Prerequisites

▶ The device is turned off.

▶ A terminal program is installed on the PC.

Procedure

1. Connect the device and the PC using a null modem cable.
2. Turn on the device.
3. Open the **<Main Menu>** on the device.
4. In the **<CONNECT Device>/<INTERFACES>** submenu, enable the RS232 serial interface.
5. In the **<Connect Device>/<Remote Control>** submenu, enable the “Serial” connection type.
   ⇨ The RS232 mode is displayed on the home screen.

6. Start the terminal program on the PC.
7. Enter the interface parameters in the terminal program.
8. In the terminal program, select the device's COM port and establish a connection.

✓ Remote control via the RS232 serial interface is now active. The device can be remotely controlled using the terminal program and the interfaces commands. See the appendix for interfaces commands.

8.12.2 Remotely Control a Device via a USB Interface

Prerequisites

- ▶ The device is turned off.
- ▶ A terminal program is installed on the PC.

Procedure

1. Connect the device and the PC using a standard.
2. Download the appropriate USB driver from the download section of the website www.julabo.com (up to and including Microsoft Windows 8).

   ADVICE Depending on the operating system of the connected PC, you may need to install the USB driver.

3. Install the USB driver on the PC.
4. Turn on the device.
5. Open the **<Main Menu>** on the device.
6. In the **<CONNECT Device>/<REMOTE Control>** submenu, enable the USB Interface.

   ⇨ USB mode is displayed on the home screen.

7. Launch the terminal program on the PC.
8. In the terminal program, select the device's COM port and establish a connection.

✓ Remote control via the USB interface is active. The device can be remotely controlled using the interface commands via the terminal program. See the appendix for interface commands.

8.12.3 Remotely Control the Device via the Ethernet Interface

The device can be controlled remotely via the Ethernet interface (optional).

Prerequisites

▶ A program must be installed on the PC that can establish a socket connection and send commands through it.

Procedure

1. Connect the device and the PC using a standard network cable.
2. Open the **<Main Menu>** on the device.
3. In the **<CONNECT Device>/<INTERFACES>** submenu, select the **<ETHERNET>** menu item.
4. Enable the **[Obtain IP via DHCP]** function to automatically configure the connection if a DHCP server is available on the network.
5. Alternatively, manually set the IP address, subnet mask, and default gateway.
6. Enter the **<Remote Control Port>**.
7. Go back one menu level and enable Ethernet in the **<Connect Device>/ <Remote Control>** submenu.

✓ Remote control via the Ethernet interface is now set up and active. The device can be remotely controlled using interface commands via the terminal program. See the appendix for interface commands.

8.13 Adjusting the Temperature Sensor (ATC)

Due to physical factors, a temperature difference may arise in the temperature control circuit between the internal temperature sensor and a more distant measurement point. As a result, the temperature measured by the device deviates slightly from the temperature in the external application. Calibrating the temperature sensor can improve the accuracy of the temperature control application.

A 1-point calibration is possible when the application is maintained at a specific setpoint. The calibration curve is shifted parallel to the measurement curve by the offset.

8.13.1 Adjusting the Internal Temperature Sensor

This section describes how to calibrate the device's internal temperature sensor.

Prerequisites

- ▶ A suitable reference thermometer is attached to the desired measurement point of the external application.
- ▶ The device is filled.
- ▶ The device is turned on.

Procedure

1. Set the desired setpoint temperature and start the temperature control application.
   ⇨ Once the setpoint is reached, allow the temperature to stabilize for a few minutes.

   ADVICE The more stable the temperature in the bath vessel, the more accurate the calibration result.
2. Compare the temperature of the reference thermometer with the device's internal temperature shown on the display and determine the difference.
3. Open the **<Main Menu>**.
4. In the **<Install Device>** submenu, select the **<Calibrate Temperature Sensor>** menu item.
5. Enter the determined temperature difference as the offset and confirm with **[✓].**
   ⇨ The offset is applied immediately.

✓ The temperature sensor is calibrated.

ADVICE The setpoints for the temperature setpoint as well as for the warning and alarm limits are also shifted by the offset.

ADVICE The high temperature cut-off operates independently of the calibration, using the internally measured temperature without an offset.

9 Cleaning and maintenance

9.1 Maintenance Intervals

The table lists the regular maintenance tasks according to their maintenance intervals. The maintenance intervals listed apply to single-shift operation. The time specifications are approximate.

Interval	Task	Qualification	Duration [min]
Every 2 years	Check safety markings	Operator	1
As needed	Clean the condenser	Operator	5
As needed	Clean the level indicator	Operator	5



ADVICE

For information on JULABO's maintenance and service offerings, contact JULABO Sales or Service.

9.2 Emptying the Device

If the device is to be sent to Technical Service or disposed of properly, it must be completely emptied.

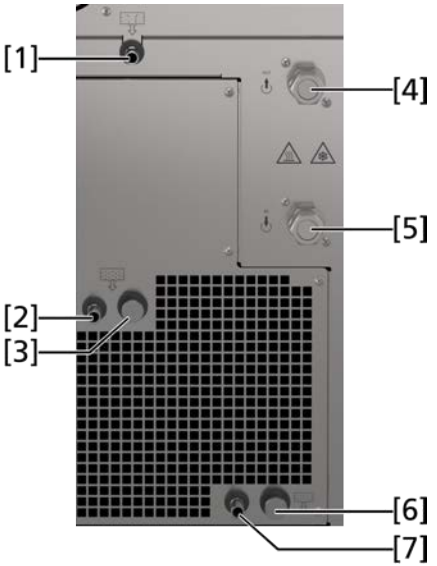
As a general rule, the device should be completely drained before any extended period of non-use and whenever the external application is changed.



CAUTION

Risk of scalding from hot heat transfer fluid!
The heat transfer fluid can become very hot during the temperature control process. Contact with hot heat transfer fluid can cause scalding.

- Allow the unit to cool to room temperature before draining it.
- Avoid direct contact with hot heat transfer fluid
- Wear protective gloves.



1. Overflow connection
2. Drain
3. Knurled drain screw
4. Inlet connection
5. Return connection
6. Knurled drain screw for pump
7. Pump drain

Prerequisites

- ▶ The unit is turned off.
- ▶ The device has reached room temperature.
- ▶ A sufficiently large collection container is placed beneath both drains of the device.

Procedure

1. Open both knurled screws on the drain valves.
   ⇨ The temperature control fluid flows into the provided collection vessel.
2. Once the unit is completely drained, close both knurled screws.

✓ The unit has been drained.

ADVICE If draining only through the upper drain, approximately 170 ml of heat transfer fluid will remain in the unit.

9.3 Cleaning the Unit

The exterior of the unit should be cleaned at regular intervals. Before using any cleaning or decontamination method other than those recommended by JULABO, consult with JULABO to ensure that the intended method will not damage the unit.

ADVICE

Damage to the electronics caused by water ingress!
Water ingress can damage the device's electronics and cause the device to fail.

- Clean the exterior of the unit only with a damp cloth.
- Prevent water from entering the unit.

Requirements

▶ Lint-free cloth
▶ Mild detergent
▶ The unit is turned off.
▶ The device is disconnected from the power supply.

Procedure

1. Allow the device to cool to room temperature.
2. Clean the surface of the device with a damp cloth.

   ADVICE You can use a small amount of dish soap for cleaning. If in doubt, ask Technical Support about alternative cleaning agents.

✓ The device is clean.

9.4 Cleaning the Condenser

From time to time, the condenser on the front of the unit should be cleaned to maintain full cooling capacity.



WARNING

Leakage of flammable refrigerant!
The unit contains flammable refrigerant in a technically hermetically sealed circuit. If the refrigerant circuit leaks, a flammable concentration may form in the air, which could ignite or explode due to potential ignition sources in the vicinity. This can result in serious injury or death.

- Observe the required minimum room size for operating the unit.
- Use the unit only in well-ventilated rooms.
- Avoid ignition sources in the immediate vicinity of the unit (e.g., electrical switches, hot surfaces, open flames).
- Do not damage the refrigerant lines.
- Do not damage the condenser fins.
- In the event of a refrigerant leak, shut down the unit immediately, keep open flames and ignition sources away, ventilate the room thoroughly, and contact JULABO Service.

Prerequisites

- ▶ The unit is turned off.
- ▶ The unit is disconnected from the power supply.
- ▶ The unit has cooled down to room temperature.

Procedure

1. Remove the ventilation grille from the front of the unit.



2. Carefully vacuum the dirt off the condenser using a vacuum cleaner.

   ⚠ **CAUTION** Be careful not to damage the condenser fins.



3. Reinstall the ventilation grille.

✓ The condenser is now clean.

9.5 Cleaning the Level Indicator

If necessary, the illuminated level indicator can be cleaned using the brush provided.

Requirements

- ▶ Cleaning brush
- ▶ The device is turned off
- ▶ The device is disconnected from the power supply

Procedure

1. Remove the lid from the level indicator.
2. Insert the cleaning brush into the level indicator from above and clean it by moving it up and down.



✓ The level indicator is now clean.

9.6 Replacing the Detachable Power Cord

The device is equipped with a detachable power cord.



ADVICE

The device must only be operated with the power cord provided. If the power cord needs to be replaced due to a defect, it can be reordered.

Order number	Description
7.901.30008626	EU power cord, 200–230 V
7.901.30008628	Power cord for Switzerland, 200–230 V + adapter from Schuko to Swiss plug
7.901.30008629	Power cord for the UK, 200–230 V
7.901.30008630	Power cord for China, 230 V
7.901.2694	US power cord, 200–230 V

9.7 Check Low-Level Protection for Proper Functioning

This section describes how to check the function of the low-level protection.



CAUTION

Risk of scalding from hot heat transfer fluid!
The heat transfer fluid can become very hot during the temperature control process. Contact with hot heat transfer fluid can cause scalding.
- Allow the unit to cool to room temperature before draining it.
- Avoid direct contact with hot heat transfer fluid
- Wear protective gloves.

Prerequisites

▶ The device is turned on.
▶ The device must be in standby mode (OFF state).
▶ The medium is at room temperature.
▶ The external application is disconnected from the device.
▶ A sufficiently large collection container is positioned beneath the device's drain.

Procedure

1. Open the drain valve.
   ⇨ The heat transfer fluid flows into the provided collection vessel.
   ⇨ During the draining process, the low-level alarm is triggered. Acknowledge the message on the display.
2. If the low-level alarm has been triggered, close the drain valve.

✓ The low-level safety device has been tested for proper function. Refill the unit with heat transfer fluid before its next use.

9.8 Check Safety Markings

The following section applies only to units using natural refrigerants that are operated in the United States or Canada.

The safety markings affixed to the device must be clearly legible at all times. Their condition must be inspected every two years.

Procedure

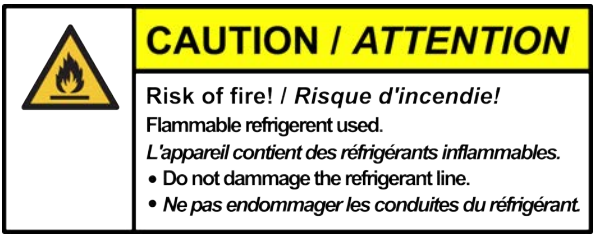
1. Check the safety labels on the device for legibility and completeness.
2. Replace any defective or missing safety labels.

   ADVICE Safety labels can be reordered from JULABO.

✓ The safety labels on the device have been checked.

Front of the housing, under the front cover





Safety label (Part No. 3.383.2630)

Right side of the housing



CAUTION / *ATTENTION*

Risk of fire! / *Risque d'incendie!*
Flammable refrigerent used.
L'appareil contient des réfrigérants inflammables.
- Dispose of properly
  in accordance with federal of local regulations.
- *Installez l'appareil en vous conformant*
  aux réglementations nationales ou regionales.

Safety label (Part No.: 3.383.2600)

NOTICE / *AVIS*

This unit is intended for commercial, industrial or
institutional use, as defined in the safety standards
for regrigeration systems according to ANSI/ASHRAE 15.
Cet appareil est destiné à un usage commercial, industriel
ou institutionel tel que défini par les normes de sécurité
des systèmes de réfrégération, selon ANSI/ASHRAE 15.

Notice (Order No. 3.383.2640)

9.9 Taking the Device Out of Service and Storing It

If a device is not going to be used for an extended period of time or, for example, needs to be sent to Technical Service for repair, it should be taken out of service. To ensure that it continues to function reliably even after prolonged storage, follow the procedure described below.

Prerequisites

▶ The device is turned off and disconnected from the power supply.

Procedure

1. Completely drain the device (see **“Draining the Device”).**
2. Remove the external application.
3. Completely drain the heat transfer fluid.
4. Clean the unit inside and out.
5. Remove all residues of the cleaning fluid from the piping system (e.g., with compressed air).
6. Close all connections and drain valves.
7. Store the unit in a well-ventilated, dust-free, dry, and frost-free location. Avoid corrosive and aggressive environments.

✓ The unit is stored safely and securely. It can be put back into service as needed.

9.10 Send in the unit

If the device malfunctions and the operator cannot resolve the issue on their own, contact Technical Service.

ADVICE

Before shipping, note the following:

- Completely drain the unit
  - heat transfer fluid
  - Refrigerant
- Clean and decontaminate the unit properly to prevent any risk to service personnel.
- Securely close all connections with nuts and caps.
- Pack the unit carefully to protect it from damage.
- Mark the packaging to ensure the unit is transported in an upright position.
- Fill out the online return form at **https://julabo.us/contact-us/product-returns/** completely.

ADVICE

For safe return shipping to JULABO, use the original packaging whenever possible.

Shipping Address

JULABO USA, Inc.

884 Marcon Boulevard

Allentown, PA 18109

Phone: +1(610) 231-0250

info@julabo.us

www.julabo.us

9.11 Warranty

The following warranty terms apply to products sold in North America by JULABO (“Seller”) to the company listed as the buyer (“Buyer”) on the Seller’s invoice.

Initial Warranty

Upon receipt by the Seller of full payment for the products, and provided that the Buyer complies with the Terms of Sale and all other agreements with the Seller regarding the products, the Seller warrants to the Buyer that the products manufactured by the Seller are free from defects in materials and workmanship for a period not to exceed two (2) years of operation from the date the product was shipped by the Seller to the Buyer (the “Initial Warranty”).

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

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

Exclusions

The initial warranty does not cover damage to the product caused by accident, misuse, improper installation or operation, unauthorized or improper repairs, replacements, or modifications (including, but not limited to, repairs, replacements, or modifications performed by anyone other than the Seller’s employees or authorized representatives), failure to perform (or improper performance of) maintenance, inappropriate or unintended use or misuse of the product, or failure to follow the written installation or operating instructions.

To make a claim under the initial warranty, the buyer must return the proof of purchase for the product to the seller or one of its authorized representatives within thirty (30) days of the date the product was shipped by the seller to the buyer. Notwithstanding any provisions to the contrary in this document, all glassware, including but not limited to reference thermometers, is expressly excluded from the initial warranty.

Exclusive Remedies of the Buyer; Limitations on the Seller's Liability

The Buyer's sole and exclusive remedy under the Initial Warranty is limited, at the Seller's sole discretion, to either: (i) the repair of defective parts or (ii) the replacement of defective parts. In either case, the warranty period for the product that receives a repaired or replaced part under the terms of the original warranty will not be extended. All repairs or replacements performed by the Seller pursuant to these warranty provisions shall be carried out at one of the Seller's facilities in Allentown, Pennsylvania, U.S.A., or at a facility of an authorized agent of the Seller, with the location to be determined by the Seller at its sole discretion; however, the Seller may, at its sole discretion, perform such repairs or replacements at the Buyer's facility; in such case, the Buyer shall bear the travel, living, and other expenses incurred by the Seller in performing the repairs or replacements at the Buyer's facility. As a condition precedent to the Seller's obligation to repair or replace a product part under the initial warranty, the Buyer must (i) promptly notify the Seller in writing of such defect; (ii) return the proof of purchase for the product to the Seller or the Seller's authorized representatives within thirty (30) days from the date the product was shipped by the Seller; and (iii) assist the seller in every respect in its efforts to determine the legitimacy and basis of any claims made by or on behalf of the buyer, including, but not limited to, granting the seller access to the product to verify its operating conditions. If the Buyer fails to notify the Seller in writing within the initial warranty period or fails to return the proof of purchase for the product as described above, the Seller shall have no further liability or obligation to the Buyer in this regard. In no event shall the Seller's liability under the initial warranty exceed the original purchase price of the Product that is the subject of the alleged defect.

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

Assignment

The Buyer may not assign its rights or obligations under this Agreement without the Seller's prior written consent; however, if the Buyer is a distributor of the Seller, the Buyer's rights and obligations under these warranty provisions shall inure to the benefit of and be binding upon the Buyer's customers, provided they present proof of purchase of the product to the Seller in accordance with the terms set forth herein. The Seller is entitled to assign its rights and obligations under this contract, in whole or in part, without the prior consent of the Buyer.

Governing Law

These warranty provisions and all matters relating to their validity, interpretation, performance, and enforcement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Pennsylvania, without regard to its conflict of laws principles.

Waiver

Any failure by the Seller to insist on strict compliance with the warranty provisions shall not constitute a waiver of such right. No claim or right arising from a breach of the warranty provisions by the Buyer may be waived, in whole or in part, unless the waiver is in writing and signed by an authorized representative of the Seller. The Seller's waiver of, or acceptance of, a breach of any provision of the warranty terms by the Buyer does not constitute a waiver of or an excuse for non-compliance with other provisions of the warranty terms or for a prior or subsequent breach of the same provision.

Shipping

The Seller shall arrange for and pay the costs of returning the equipment to the Buyer.

Out of Box Failure (OBF)

An "Out of Box Failure" (OBF) refers to a product defect that occurs immediately after unpacking and installing a newly delivered product. JULABO grants a 14-day grace period following the shipping date, during which the delivered product must be inspected for defects. The same exclusions apply to the OBF classification as to the regular warranty. For example, JULABO is not liable for damage incurred during shipping, damage caused by the customer or third parties, or defects resulting from improper installation or use.

10 Faults and troubleshooting

10.1 Alarm and warning messages

Alarm and warning messages are described in the table.
If a displayed error code is not listed in the table, or if the error persists after turning the device off and back on, contact Technical Support and provide them with the error code.

Code	Cause	Action
E01	The level has fallen below the minimum.	Top up the temperature control medium. Check temperature control hoses for damage and replace if necessary.
E03	The measured temperature is above the set overtemperature limit.	Increase the “Overtemperature” temperature limit or reduce the temperature setpoint.
E04	The measured temperature is below the set under-temperature limit.	Reduce the “Undertemperature” temperature limit or increase the temperature setpoint.
E05	Open circuit or short circuit in the operating temperature sensor of the over-temperature protection device.	Contact JULABO Service.
E06	There is too great a temperature difference between two temperature sensors.	Increase the circulation. Check the viscosity of the temperature control medium. If the fault is not rectified, contact Technical Service.
E14	The set protection temperature has been exceeded.	Check the working temperature range of the application. Reduce the setpoint temperature.
E33	The safety temperature sensor wire is shorted or broken.	Contact JULABO Service.
E40	The low-level protection system is indicating a critical fluid level.	Refill the heat transfer fluid.
E60	Internal read/write error.	Turn off the device usingthe power switch or standby switch, wait 4 seconds, and then turn the device back on.

E61	CAN Bus Error	Turn off the unit usingthe power switch or standby switch, wait 4 seconds, and then turn the unit back on.
E62	CAN Bus Error	Turn off the device usingthe power switch or standby switch, wait 4 seconds, and then turn the device back on.
E63	Electronic fault.	Turn off the device usingthe power switch or standby switch, wait 4 seconds, and then turn the device back on.
E70	The device is being operated at an incompatible voltage or frequency, or the device is configured incorrectly.	Check the device's permissible operating voltage and its configuration.
E72	The device contains no configuration.	Load valid configuration onto device.
E73	The device's circuit boards have different firmware versions.	Perform a firmware update.
E108	The safety device's self-locking mechanism is still active.	Turn off the device usingthe power switch or standby switch, wait 4 seconds, and then turn the device back on.
E116	The safety device's self-locking function is still active.	Turn off the device at ( ) or the standby switch, wait 4 seconds, and then turn the device back on.
E136	Fan outlet error detected.	Contact JULABO Service.
E143	The set temperature limit for the overtemperature alarm has been exceeded.	Increase temperature limit for overtemperature alarm or reduce temperature setpoint.
E144	The temperature has fallen below the set limit for the subtemperature alarm.	Reduce temperature limit for low temperature alarm or increase temperature setpoint.
E168	The temperature measured at the temperature sensor is below the freeze protection alarm threshold.	Increase the temperature setpoint. Check the system dynamics. If a heat transfer fluid suitable for lower temperatures is being used, deactivate the freeze protection.

E183	Excessive power consumption via the USB Interface.	Check plugged-in external data carrier for errors and replace if necessary. The USB interface is not suitable for consumers with a higher current requirement than the maximum permissible.
E185	Freeze protection is activated and the pump pressure has fallen below the threshold value.	Check the pump settings. If a heat transfer fluid suitable for lower temperatures is being used, deactivate the freeze protection.
E301	The pressure in the external temperature control circuit exceeded the set limit value for 1 second.	Contact JULABO Service.
E302	The pressure in the external temperature control circuit has exceeded the entered limit value for 5 seconds.	Contact JULABO Service.
E401	The evaporator outlet temperature sensor wire is shorted.	Contact JULABO Service.
E402	The wire for the evaporator outlet temperature sensor is broken.	Contact JULABO Service.
E413	The vapor pressure sensor is short-circuited.	Contact JULABO Service.
E414	The vapor pressure sensor is disconnected.	Contact JULABO Service.
E415	The medium pressure sensor is short-circuited.	Contact JULABO Service.
E416	The medium pressure sensor is open-circuit.	Contact JULABO Service.
E417	The condensation pressure sensor is short-circuited.	Contact JULABO Service.
E418	The condensation pressure sensor is disconnected.	Contact JULABO Service.
E425	Error in the refrigeration system.	Contact JULABO Service.
E426	Error in the refrigeration system.	Contact JULABO Service.

E427	The maximum permissible condensation pressure has been exceeded.	Check ambient temperature and reduce if necessary. Check condenser for soiling and clean if necessary. Turn off the unit at ( ) or the standby switch, wait 4 seconds, and then turn the unit back on. If the fault is not rectified, contact Technical Service.
E431	The maximum permissible current draw at the compressor has been exceeded.	Check mains voltage for nominal voltage. If the fault has not been rectified, contact Technical Service.
E432	Error in the refrigeration system.	Contact JULABO Service.
E433	Error in the refrigeration system.	Contact JULABO Service.
E444	Error in the refrigeration system.	Contact JULABO Service.
E445	The pressure switch has tripped.	Possible causes: 1. Ambient temperature too high 2. Condenser is dirty If the cause cannot be determined and resolved, contact JULABO Service.
E447	Error in the refrigeration system.	If the error occurs repeatedly, contact JULABO Service.
E468	Error in the refrigeration system.	If this occurs repeatedly, contact JULABO Service.
E469	Error in the refrigeration system.	If the error occurs repeatedly, contact JULABO Service.
E473	Error in the refrigeration system.	If the error occurs repeatedly, contact JULABO Service.
E475	Error in the refrigeration system.	If this occurs repeatedly, contact JULABO Service.
E476	Error in the refrigeration system.	If the error occurs repeatedly, contact JULABO Service.
E999	Internal error.	If this occurs repeatedly, contact JULABO Service.
E1141	The measured temperature is below the freeze protection warning threshold.	Increase the temperature setpoint. Check the system dynamics. If a heat transfer fluid suitable for lower temperatures is used, deactivate the freeze protection.

E1302	The pressure has fallen below the threshold for shutting off the heating output. Motor malfunction or fluid viscosity too high.	Check the pump settings and adjust them if necessary. Check the viscosity of the heat transfer fluid and adjust it if necessary.
E1305	The pump speed is too low. The pump is defective, or the viscosity of the fluid is too high.	Check the pump setting and adjust if necessary. Check the viscosity of the temperature control medium and adjust if necessary.
E1427	The warning threshold for high condensation pressure has been exceeded.	Check ambient temperature and reduce if necessary. Check condenser for soiling and clean if necessary. Turn off the unit usingthe power switch or standby switch, wait 4 seconds, and then turn the unit back on. For water-cooled appliances: Check cooling water temperature and supply. If the fault is not rectified, contact Technical Service.
E1431	The current draw at the compressor fell below the minimum permissible level.	Check mains voltage for nominal voltage. The specified voltage tolerance of the appliance must not be exceeded. Check the mains cable of the chiller for damage and replace if necessary. Check ambient temperature and lower if necessary. Check the CAN bus cable for damage and replace if necessary. If the fault is not rectified, contact Technical Service.
E1437	Error in the refrigeration system.	If the error occurs repeatedly, contact JULABO Service.
E1438	Error in the refrigeration system.	If the error occurs repeatedly, contact JULABO Service.
E1442	The defrost function of the freeze protection is active.	The cooling function is disabled during this time.
E1502	The pressure in the temperature control circuit exceeds the set warning limit.	Correct the pressure setpoint downwards or Set warning limit upwards (if justifiable from a safety point of view).

E1503	The pressure in the temperature control circuit has fallen below the set warning limit.	Correct pressure setpoint upwards or Set warning limit downwards (if justifiable from a safety point of view).

11 Disposal

When disposing of the device, follow the applicable state-specific guidelines.



This symbol on the product or its packaging indicates that it must not be disposed of with household waste.
Proper disposal avoids negative effects on people and the environment and allows valuable raw materials to be reused.
Information on collection points for old appliances can be obtained from the city or municipality or an authorized disposal company.



CAUTION

Leakage of flammable refrigerant!
If flammable refrigerant leaks, there is a risk of fire and explosion.

- Do not open the refrigerant circuit.
- Have the unit disposed of by a certified company in accordance with national or regional regulations.

12 Appendix

12.1 Interface Commands

The device can be controlled remotely using Interface commands. Parameters can be retrieved and the current status can be queried. To do this, the device must be connected to the host computer via a digital Interface.

Interface commands are entered using a terminal program.

Interface commands are divided into IN commands and OUT commands.

String Element	Symbol	Hex
Space	␣	20
Carriage return	←	0D
Line feed	LF	0A

- IN commands: Retrieve parameters
  Command structure: Command + ←

  Example: Querying the setpoint temperature:
  IN_SP_00←

  Example: Device response:
  55.5 ← LF
  (

- OUT Commands: Set Parameters (Remote control mode only)
  Command structure: Command + ␣ + Parameter + ←

  Example: Setting the setpoint temperature to 55.5 °C:
  OUT_SP_00␣55.5←

12.1.1 IN Commands

IN commands are used to retrieve parameters from the device.

Process Values	Comment
version	Version
status	Status
in_pv_00	Temperature Value
in_pv_01	Current control variable [%]
in_pv_05	Current pressure reading

Setpoints and warning limits	Comment
in_sp_00	Set temperature setpoint
in_sp_03	Set overtemperature warning limit
in_sp_04	Set low temperature warning limit
in_sp_09	Set pressure setpoint
in_sp_12	Set pressure unit
in_sp_14	Set Upper Pressure Warning Limit
in_sp_15	Set lower pressure warning limit
in_sp_16	Set pressure alarm limit (5 s)
in_sp_17	Set pressure alarm limit (1 s)
in_sp_27	Set pump setting
in_sp_28	Set overtemperature alarm limit
in_sp_29	Set low temperature alarm limit

Device Modes	Comment
in_mode_05	Set operating mode of the temperature control system: 0 = Stop 1 = Start
in_mode_09	Set pump operating mode

Auxiliary parameters	Comment
in_hil_00	Set control variable limit for cooling capacity (%)
in_hil_01	Set control variable limit for heating capacity (%)

12.1.2 OUT Commands

OUT commands are used to set parameters on the device. Remote control mode must be active for this.

Setpoints and Warning Limits	Comment
out_sp_00	Setting the setpoint temperature
out_sp_03	Setting the Overtemperature Warning Limit
out_sp_04	Setting the low temperature warning limit
out_sp_07	Setting the pump stage
out_sp_09	Setting the pump pressure setpoint
out_sp_11	Setting the temperature unit: 0 = °C 1 = °F
out_sp_12	Setting the pump pressure unit (bar/psi)
out_sp_14	Setting for upper pressure warning limit
out_sp_15	Lower pressure warning limit setting
out_sp_16	Setting the pressure alarm limit (5s)
out_sp_17	Setting the pressure alarm limit (1 s)
out_sp_27	Pump output setting [%]
out_sp_28	Setting the overtemperature alarm limit
out_sp_29	Setting for the low temperature alarm limit

Device Modes	Comment
out_mode_05	Start/stop command for the device in remote control mode: 0 = Stop temperature control application 1 = Start temperature control application
out_mode_09	Setting the pump operating mode Automatic / Pump always on / Pump run-on

Auxiliary parameters	Comment
out_hil_00	Setting for the cooling capacity control variable limit (0–100%)
out_hil_01	Setting for the control variable limit of the heating capacity (0–100%)

12.2 Status Messages

Status message	Explanation
00 MANUAL STOP	Device in standby mode; manual operation
01 MANUAL START	Device in manual operation
02 REMOTE STOP	Device in standby mode, remote control operation
03 REMOTE START	Device in remote control mode
-08 INVALID COMMAND	Device did not recognize the last command received
-09 COMMAND NOT ALLOWED IN CURRENT OPERATING MODE	The most recently received command is not permitted in this operating mode
-10 VALUE TOO SMALL	The last value set is too small
-11 VALUE TOO LARGE	The last value set is too large
-13 VALUE EXCEEDS TEMPERATURE LIMITS	The value is not within the set temperature limits

12.3 LwIP software license

LwIP is licensed under the BSD license. The following text is a copy of the LwIP license document contained in the source code.

```
/*
 * Copyright (c) 2001-2004 Swedish Institute of Computer Science.
 * All rights reserved.
 *
 * Redistribution and use in source and binary forms, with or without modification,
 * are permitted provided that the following conditions are met:
 *
 * 1. Redistributions of source code must retain the above copyright notice,
 *    this list of conditions and the following disclaimer.
 * 2. Redistributions in binary form must reproduce the above copyright notice,
 *    this list of conditions and the following disclaimer in the documentation
 *    and/or other materials provided with the distribution.
 * 3. The name of the author may not be used to endorse or promote products
 *    derived from this software without specific prior written permission.
 *
 * THIS SOFTWARE IS PROVIDED BY THE AUTHOR ``AS IS'' AND ANY EXPRESS OR IMPLIED
 * WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
 * MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
 * SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL,
 * EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT
 * OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS
 * INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
 * CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
 * IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
 * OF SUCH DAMAGE.
 *
 * This file is part of the lwIP TCP/IP stack.
 *
 */
```