Julabo
THE TEMPERATURE CONTROL COMPANY



DYNEO™ DD

Immersion, bath and cooling thermostats

Original operating instructions

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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.

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1 General information

1.1 About these operating instructions

These operating instructions contain important information on the safe commissioning, operation and maintenance of the appliances listed on the cover page.

It is intended for all persons who install, operate or maintain these appliances.



ADVICE

Observe the safety instructions!
Read the operating instructions in full before commissioning the appliance and keep them for future reference.

1.2 Accessories

JULABO offers a wide range of accessories for the devices. The accessories are not described in this manual.

The complete range of accessories for the devices described in this manual can be found on our website www.julabo.com. Use the search function on the website.

1.3 Symbols used

Various symbols are used in this manual to make it easier to understand. The list describes the symbols used.

► Prerequisite for the following procedure
1. Numbered action steps
⇨ Interim result for individual action 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 instructing the operating personnel on how to use the appliance.
- Instruct the operating personnel at regular intervals about the dangers arising during their activities and 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 manual contains warnings that are intended to increase safety when using the device. Warnings must always be followed.

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 appliance is built in accordance with the state of the art and recognized safety regulations. Nevertheless, its use may pose a risk to the life and limb of the user or third parties.

Read and observe the following safety instructions before use.



CAUTION

Improper use!
If the appliance is used in a manner not intended by the manufacturer, the protection provided by the appliance may be impaired.



DANGER

Electric shock from electrical system!
Touching damaged live parts can lead to serious electric shocks and can injure or kill people.

- Have damaged insulation and components of the electrical system repaired immediately by a JULABO service technician or a qualified specialist workshop.
- Replace damaged mains cables immediately.
- Do not operate the appliance if the mains cable is damaged.
- When connecting with a mains plug, this must always be freely accessible.



DANGER

Danger to life due to electric shock!
An electric shock can cause serious injury or even death.

- Only operate the appliance on a mains connection protected by a residual current circuit breaker (type B, Ia = 30 mA).
- Only operate the appliance on mains sockets with a protective earth contact (PE).



DANGER

Danger to life due to electric shock!
An electric shock can cause serious injury or even death.

- Live parts are enclosed in the appliance housing. If the appliance housing is damaged, live parts can be touched.
- If the appliance housing is damaged, do not connect the appliance to the power supply!



DANGER

Danger to life due to electric shock!
An electric shock can cause serious injury or even death.
- The appliance may only be opened by a qualified electrician.
- Work on the electrical system may only be carried out by qualified electricians.



WARNING

Risk of burns due to flammable temperature control medium!
If a flammable temperature control medium is used, it can ignite and cause severe burns on contact with the skin.
- Ensure that no ventilation openings are blocked.
- Do not smoke! No naked flames!
- When working in the vicinity of the device and the application system, do not use any electrical parts that can generate sparks.
- Drain and refill the temperature control medium when the appliance is idle, the temperature control medium is used with an open bath tank and the temperature control medium is highly volatile at ambient temperature.
- The surface temperature of a flammable temperature control medium must not reach the flash point of the temperature control medium under normal conditions and under conditions of a single fault.
- When using a flammable temperature control medium, attach a sign with the symbol ⚠ to the appliance.



WARNING

Hot surfaces!
The following parts and components can become hot during operation or remain hot for some time after operation:
– Temperature control medium
– Heating element
– Bath cover
– Bath surface

Contact may cause severe burns or scalds to hands, arms, face and limbs.
- Keep sufficient distance from hot surfaces and liquids.
- Wear suitable protective gloves.



WARNING

Risk of burns from hot steam!
Depending on the bath liquid used, hot vapors may be produced at higher temperatures. Contact with hot steam can cause severe burns.
- Do not lean over the open water bath during operation.
- Wear protective gloves and safety goggles.
- If possible, operate the appliance under a fume hood.



WARNING

Suspended loads!
Falling loads can cause serious injury and damage the appliance.
- Do not stand under suspended loads.
- Transport the appliance with suitable and safe lifting gear.
- Wear personal protective clothing.



WARNING

Maintenance and repair work!
Improper maintenance and repair work endangers operational safety. This can result in serious injury or death.
- Only carry out work that is described in these operating instructions.
- Switch off the appliance and disconnect the mains plug before starting work.
- Repairs may only be carried out by JULABO service technicians or an authorized specialist workshop.



ADVICE

No liability if unsuitable temperature control media are used!
Unsuitable temperature control media that have not been approved by JULABO can damage the appliance.
- Use temperature control media recommended by JULABO.
- Check parts in contact with the medium for compatibility with the temperature control medium before filling.
- Do not exceed the maximum permissible viscosity during operation.
- Consult JULABO before using a temperature control medium other than the recommended one.



ADVICE

Only use original JULABO spare parts!
The JULABO warranty is void if non-original spare parts are used.

ADVICE

Wear personal protective equipment!
Missing or unsuitable personal protective equipment increases the risk of damage to health and injury to persons.
Examples of personal protective equipment are

- Work gloves
- safety shoes
- protective clothing
- respiratory protection
- hearing protection
- Face and eye protection
- Determine and provide personal protective equipment for the respective application.
- Only use personal protective equipment that is in proper condition and provides effective protection.
- Adapt personal protective equipment to the person, e.g. size.

ADVICE

Keep safety signs in legible condition!
Safety signs on the appliance warn of hazards at danger points and are an important part of the appliance's safety equipment. Missing safety markings increase the risk of injury to persons.

- Clean dirty safety signs.
- Replace damaged and illegible safety signs immediately.

2.3 Intended use

JULABO thermostats are laboratory devices designed for the temperature control of liquid media in a bath tank or with a chiller. An external temperature control circuit can be connected to the pump connections for constant temperature control of the media.

2.4 Foreseeable misuse

The appliance is not suitable for direct temperature control of foodstuffs and luxury foods or pharmaceutical and medical products.

The appliance is not suitable for use in a potentially explosive environment.

The appliance is not intended for use in residential areas. There may be interference with radio reception.

2.5 Safety markings

The following safety labels are affixed to the appliance.

Symbol	Symbol Description	Location
	Warning of a danger zone. Observe the operating instructions.	Rear of appliance
	Read the operating instructions before switching on.	Rear of appliance
	Hot surface warning	Heating element

2.6 Attaching safety signs

Affixing safety labels

The following section only applies to appliances with natural refrigerants that are operated in the USA or Canada.

After unpacking the appliance, affix the enclosed safety stickers in the places shown.

2.7 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.

Adjustable overtemperature protection

The overtemperature protection prevents the heater from overheating.

If the measured temperature exceeds the set protection temperature, an error message appears on the display. The pump and heater are switched off. A restart is required.

Overheating protection

The overheating protection prevents the heater from overheating:

- The protective mechanism responds if a certain temperature difference between the working temperature sensor and safety temperature sensor is exceeded. A warning message appears on the display. The heating output is limited.
- If the temperature difference persists for longer, an alarm message appears on the display and the temperature control is switched off.

Low level protection

A level switch detects if the level of the temperature control liquid in the bath tank is too low. The appliance warns in two stages to prevent the heater from overheating and the pump from running dry.

- The low level warning is triggered when the liquid level in the bath tank has reached approximately half the fill level. An error message appears on the display. The temperature control fluid must be refilled.
- The low level alarm is triggered when the float reaches its lower limit stop. The appliance switches off the pump and heater. A continuous signal tone sounds. An error message appears on the display. A restart is required.

3 Technical data

Performance data measured according to DIN12876. Power specifications apply at an ambient temperature of 20 °C.

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

According to IEC 61010-1, the device is designed for safe operation under the following environmental conditions
- Indoor use
- Altitude up to 2000 m NHN
- Ambient temperature +5 ... +40 °C (unless otherwise specified in the technical data)
- Maximum relative humidity 80 % at air temperatures up to 31 °C, decreasing linearly up to 50 % relative humidity at 40 °C
- Pollution degree 2

General information		
Display		3.5" TFT display
Protection class according to IEC 60529		IP21

Temperature data		
Operating temperature range	°C	+20 ... +200
Temperature constancy	K	±0.01
Temperature resolution	K	0.01
Temperature control		PID3
Temperature setting		Digital
ATC sensor adjustment		3-point adjustment

Dimensions and weight		
Total dimensions (W x D x H)	cm	13.2 x 16.0 x 35.5
Weight of	kg	2.5
Immersion depth	cm	16

pump		
Volume flow	l/min	8 ... 27
Delivery pressure	bar	0.1 ... 0.7
Viscosity max.	cSt	50

Electrical connection data					
Mains connection	V Hz	100-115 50/60		200-230 50/60	
	V Hz	100 50/60	115 50/60	200 50/60	230 50/60
Current consumption	A	10	11	9	10
Heat output	kW	0.8	1.0	1.5	2.0
Mains fuse, resettable	A	15			

3.1 Technical data refrigerated circulators

Technical data DYNEO DD-200F						
Temperature data						
Operating temperature range	°C	-20 ... +200				
Cooling capacity	°C	+20	+10	0	-10	-20
	kW	0.20	0.17	0.15	0.10	0.02
Mains connection	V	100	115	230		
Permissible voltage tolerance	%	±10	10	5		
Dimensions						
Total dimensions (W x D x H)	cm	23 x 39 x 65				
Usable bathroom opening	cm	13 x 15				
Bath depth	cm	15				
Volume min. ... max.	l	3.0 ... 4.0				
Weight	kg	25.7				

Technical data DYNEO DD-201F						
Temperature data						
Working temperature range	°C	-20 ... +200				
Cooling capacity	°C	+20	+10	0	-10	-20
	kW	0.20	0.17	0.15	0.10	0.02
Permissible voltage tolerance	%	±10				
Dimensions						
Total dimensions (W x D x H)	cm	44 x 41 x 44				
Usable bathroom opening	cm	13 x 15				
Bath depth	cm	15				
Volume min. ... max.	l	3.0 ... 4.0				
Weight	kg	24.7				

Technical data DYNEO DD-300F						
Temperature data						
Working temperature range	°C	-25 ... +200				
Cooling capacity	°C	+20	+10	0	-10	-20
	kW	0.30	0.30	0.27	0.19	0.08
Permissible voltage tolerance	%	±10				
Dimensions						
Total dimensions (W x D x H)	cm	24 x 42 x 66				
Usable bathroom opening	cm	13 x 15				
Bath depth	cm	15				
Volume min. ... max.	l	3.0 ... 4.0				
Weight	kg	27.7				

Technical data DYNEO DD-310F						
Temperature data						
Working temperature range	°C	-30 ... +200				
Cooling capacity	°C	+20	+10	0	-10	-20
	kW	0.30	0.27	0.21	0.12	0.02
Mains connection	V	100	115	230		
Permissible voltage tolerance	%	±10	10	5		
Dimensions						
Total dimensions (W x D x H)	cm	23 x 40 x 65				
Usable bathroom opening	cm	13 x 15				
Bath depth	cm	15				
Volume min. ... max.	l	3.0 ... 4.0				
Weight	kg	27.4				

Technical data DYNEO DD-449F						
Temperature data						
Working temperature range	°C	-30 ... +200				
Cooling capacity	°C	+20	0	-10	-20	-30
	kW	0.44	0.35	0.27	0.20	0.06
Permissible voltage tolerance	%	±10				
Dimensions						
Total dimensions (W x D x H)	cm	39 x 62 x 75				
Usable bathroom opening	cm	28 x 35				
Bath depth	cm	20				
Volume min. ... max.	l	20.0 ... 26.0				
Weight	kg	39.5				

Technical data DYNEO DD-450F						
Temperature data						
Working temperature range	°C	-30 ... +200				
Cooling capacity	°C	+20	0	-10	-20	-30
	kW	0.44	0.37	0.27	0.16	0.06
Mains connection	V	100	115	230		
Permissible voltage tolerance	%	±10	10	5		
Dimensions						
Total dimensions (W x D x H)	cm	23 x 40 x 65				
Usable bathroom opening	cm	13 x 15				
Bath depth	cm	15				
Volume min. ... max.	l	3.0 ... 4.0				
Weight	kg	27.4				

Technical data DYNEO DD-600F							
Temperature data							
Working temperature range	°C	-35 ... +200					
Cooling capacity	°C	+20	+10	0	-10	-20	-30
R452A*	kW	0.60	0.54	0.50	0.33	0.19	0.07
R449A	kW	0.60	0.54	0.44	0.27	0.16	0.04
Mains connection	V	100		115		230	
Permissible voltage tolerance	%	±10		10		5	
Dimensions							
Total dimensions (W x D x H)	cm	33 x 47 x 69					
Usable bathroom opening	cm	22 x 15					
Bath depth	cm	15					
Volume min. ... max.	l	5.0 ... 7.5					
Weight	kg	35.7					

** at 100 V 50/60 Hz*

Technical data DYNEO DD-601F							
Temperature data							
Working temperature range	°C	-35 ... +200					
Cooling capacity	°C	+20	+10	0	-10	-20	-30
R452A*	kW	0.60	0.54	0.50	0.33	0.19	0.07
R449A	kW	0.60	0.54	0.44	0.27	0.16	0.04
Mains connection	V	100		115		230	
Permissible voltage tolerance	%	±10		10		5	
Dimensions							
Total dimensions (W x D x H)	cm	33 x 47 x 74					
Usable bathroom opening	cm	22 x 15					
Bath depth	cm	20					
Volume min. ... max.	l	8.0 ... 10.0					
Weight	kg	38.2					

** at 100 V 50/60 Hz*

Technical data DYNEO DD-800F						
Temperature data						
Working temperature range	°C	-40 ... +200				
Cooling capacity	°C	+20	0	-20	-30	-40
	kW	0.84	0.74	0.39	0.26	0.12
Permissible voltage tolerance	%	±10				
Dimensions						
Total dimensions (W x D x H)	cm	33 x 47 x 70				
Usable bathroom opening	cm	18 x 13				
Bath depth	cm	15				
Volume min. ... max.	l	5.0 ... 7.5				
Weight	kg	42.0				

Technical data DYNEO DD-1000F							
Temperature data							
Working temperature range	°C	-50 ... +200					
Cooling capacity	°C	+20	0	-10	-20	-30	-40
	kW	1.00	0.96	0.73	0.51	0.25	0.11
Mains connection	V	100		115		230	
Permissible voltage tolerance	%	±10		10		5	
Dimensions							
Total dimensions (W x D x H)	cm	42 x 49 x 70					
Usable bathroom opening	cm	18 x 13					
Bath depth	cm	15					
Volume min. ... max.	l	5.0 ... 7.5					
Weight	kg	51.2					

Technical data DYNEO DD-1001F							
Temperature data							
Working temperature range	°C	-38 ... +200					
Cooling capacity	°C	+20	+10	0	-10	-20	-30
	kW	1.00	0.95	0.85	0.60	0.32	0.12
Mains connection	V	100		115		230	
Permissible voltage tolerance	%	±10		10		5	
Dimensions							
Total dimensions (W x D x H)	cm	45 x 64 x 95					
Usable bathroom opening	cm	35 x 41					
Bath depth	cm	30					
Volume min. ... max.	l	42.0 ... 56.0					
Weight	kg	73.7					

Technical data DYNEO DD-1200F						
Temperature data						
Working temperature range	°C	-50 ... +200				
Cooling capacity	°C	+20	0	-20	-30	-40
	kW	1.24	1.09	0.62	0.39	0.22
Permissible voltage tolerance	%	±10				
Dimensions						
Total dimensions (W x D x H)	cm	33 x 47 x 70				
Usable bathroom opening	cm	18 x 13				
Bath depth	cm	15				
Volume min. ... max.	l	5.0 ... 7.5				
Weight	kg	42.0				

Technical data DYNEO DD-1201F							
Temperature data							
Working temperature range	°C	-40 ... +200					
Cooling capacity	°C	+20	0	-10	-20	-30	-40
	kW	1.25	1.10	0.85	0.54	0.30	0.05
Permissible voltage tolerance	%	±10					
Dimensions							
Total dimensions (W x D x H)	cm	45 x 64 x 95					
Usable bathroom opening	cm	35 x 41					
Bath depth	cm	30					
Volume min. ... max.	l	42.0 ... 56.0					
Weight	kg	68.0					

Technical data DYNEO DD-1200FW						
Temperature data						
Working temperature range	°C	-50 ... +200				
Cooling capacity	°C	+20	0	-20	-30	-40
	kW	1.24	1.09	0.62	0.37	0.20
Mains connection	V	100	115	230		
Permissible voltage tolerance	%	±10	10	10		
Dimensions						
Total dimensions (W x D x H)	cm	33 x 47 x 70				
Usable bathroom opening	cm	18 x 13				
Bath depth	cm	15				
Volume min. ... max.	l	5.0 ... 7.5				
Weight	kg	44.0				

3.2 Materials and media compatibility

3.2.1 Materials of the parts in contact with the medium

The following table lists the parts that may come into contact with the temperature control medium and the materials of which these parts are made.

The information can be used to check compatibility with the temperature control medium used.

Parts in contact with the medium	Material
Float	1.4401
Float tube	1.4571
Hose olive	1.4301
motor	1.4301
Motor shaft	1.4404
pump	PPS
Heating element	1.4404/316L
Built-in temperature sensor Pt100	1.4571
Temperature sensor connection	1.4301
One-ear terminal	1.4301
Hose	FPM/FKM

3.2.2 Temperature control media

The most important criterion when selecting the temperature control medium is the working temperature range in which the application is operated.

- Select the temperature control medium in such a way that its flash point cannot be exceeded at any time where it comes into contact with the ambient air.
- Recommended temperature control fluids and further information can be found on the JULABO website.



WARNING

Risk of burns from hot steam!
Depending on the temperature control medium used, hot vapors may be generated at higher temperatures. Contact with hot steam can cause severe burns.

- Do not lean over the open water bath during operation.
- Wear protective gloves and safety goggles.
- If possible, operate the appliance under a fume hood.



ADVICE

No liability if unsuitable temperature control fluids are used!
Unsuitable temperature control media that have not been approved by JULABO can damage the device.

- Use temperature control media recommended by JULABO.
- Check parts in contact with the medium for compatibility with the temperature control medium before filling.
- Do not exceed the maximum permissible viscosity during operation.
- Consult JULABO before using a temperature control medium other than the recommended one.

3.3 Temperature control hoses

Temperature control hoses for connection to an external system must be matched to the working temperature range and the respective temperature control application.

You can find temperature control hoses for every area of application on our homepage.

Temperature control hoses must meet the following requirements:

- Temperature resistance
- Pressure resistance
- Suitable material properties for the temperature control medium used



CAUTION

Risk of scalding due to damaged temperature control hoses!
Hot temperature control medium can escape from damaged temperature control hoses and cause severe scalding on contact with the skin.

- Check temperature control hoses regularly to ensure they are intact.
- Replace damaged temperature control hoses immediately.
- Do not kink the temperature control hoses.
- Replace temperature control hoses regularly.
- Check pump connections for leaks.



ADVICE

Damage to the temperature control hoses due to kinking!
Temperature control hoses are damaged by kinking and can leak.

- Lay the temperature control hoses in large radii.
- Avoid kinking the temperature control hoses.



ADVICE

Damage to the mains cable due to excessive temperature!
The temperature control hoses must not touch the mains cable during operation.

- Keep the temperature control hoses and mains cable separate.

4 Structure and function

4.1 Product overview

The thermostats can be combined with various baths and chillers.

Immersion thermostat	Circulation thermostat	Refrigerated circulator
		
DYNEO DD thermostat	Thermostat with closed stainless steel bath tank. Example: DYNEO DD-BC6 for temperature control in the bath or an external application.	Thermostat with chiller. Example: DYNEO DD-601F for standard temperature control tasks.

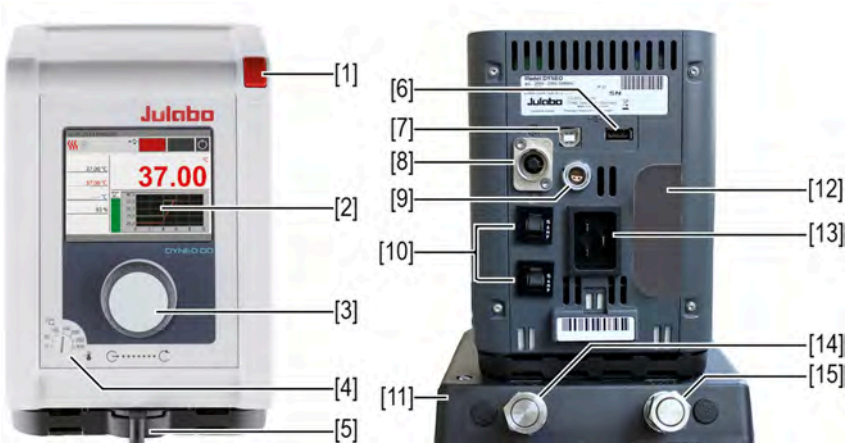
4.2 Functional description

The thermostat can be mounted on any bath tank with a volume of up to 50 liters and can be used for internal and external temperature control.

Mounted on a bath tank, the thermostat becomes a circulation thermostat. In combination with a chiller, it becomes a cooling circulation thermostat.

4.3 Operating and functional elements

This chapter describes the operating and functional elements and shows their position on the device.



Operating and functional elements

1. Mains switch
2. Display
3. Central controller
4. Overtemperature protection setting
5. Internal / external flow direction setting
6. USB interface type A
7. USB interface type B
8. CAN socket for connection with chiller
9. Interface for external temperature sensor
10. Mains fuse, resettable
11. Mounting attachment with pump connections (not for immersion circulator)
12. Cover for optional interfaces
13. Mains connection
14. Pump connection return
15. Pump connection flow

4.4 Interfaces

This section describes the electronic interfaces available on the device with the corresponding pin assignments and connection values.

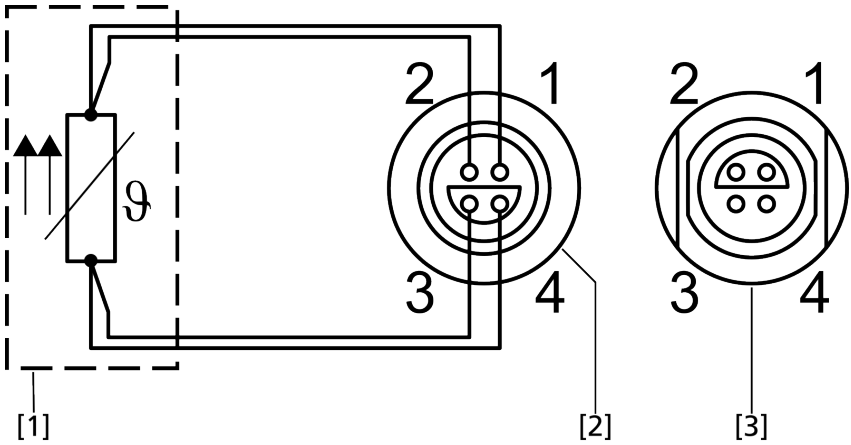
4.4.1 Connection of external equipment

External equipment connected to the device must be reinforced or double-insulated from the mains and the maximum voltage must be below the values of 30 VAC / 60 VDC.

Also observe the maximum voltage specifications in the technical specifications of the individual interfaces.

4.4.2 Pt100 temperature sensor connection

An external Pt100 temperature sensor is connected to the ext. Pt100 socket. The following section describes the wiring of the socket and the connecting cable of the temperature sensor.



Connecting an external Pt100 temperature sensor

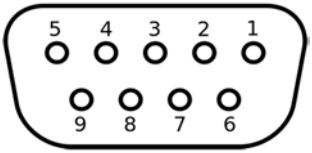
1. Pt100 temperature sensor
2. Plug, view solder side
3. Connection socket on the device

PIN assignment Pt100 connection

pin	signal
1	I+
2	U+
3	U-
4	I-

4.4.3 RS232 interface

The RS232 interface is a 9-pin D-Sub socket for connecting the device to a PC.



RS232 socket

Pin assignment RS232 interface

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.

Factory setting RS232 interface

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

4.4.4 Analog interfaces (option)

The analog interfaces are optionally installed ex works.

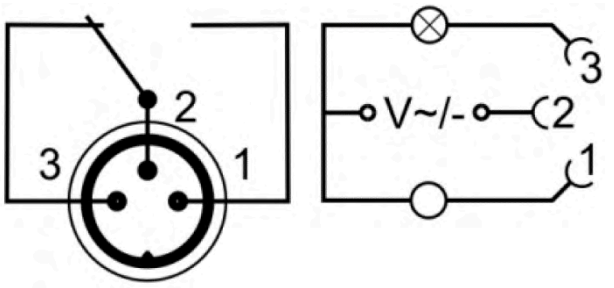


Plug-in unit with analog connections

1. Alarm output
2. REG/EPROG socket
3. Standby input

4.4.4.1 Alarm output

The alarm output is designed as a potential-free changeover contact that can be used to switch an externally connected circuit.



Alarm output diagram

A defined status can be selected as the trigger for the **<Alarm output>** in the **<Analog module>** menu.

Pin 2 and pin 3 are connected when the respective status is reached:

- Standby
- alarm
- Alarm + Standby
- Pump on

When the respective status is reached, pin 1 and pin 2 are connected:

- Standby/Inverse
- Alarm/Inverse
- Alarm + Standby/Inverse
- Pump on/inverse

Technical data alarm output

Alarm output parameter	Parameter Value	Unit
Maximum switching capacity	30 /25	W / VA
Maximum switching voltage	30 /25	VDC / VAC
Maximum switching current	1	A

4.4.4.2 REG/EPROG socket

The REG/EPROG socket has three signal outputs and one signal input.

A connected signal generator can specify the setpoint temperature or the power as a control variable via the program generator input. The input signal can be a voltage source or a current source.

The signal outputs can be used in parallel. Two of the three output channels are designed as voltage outputs, the third as a current output.

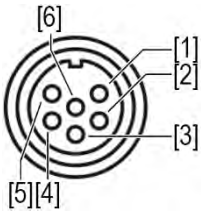


Diagram REG/EPROG socket

1. Voltage output channel 1 (0-10 VDC, max. 10 mA)
2. Voltage output channel 2 (0-10 VDC, max. 10 mA)
3. Gnd for outputs (0 V)
4. EPROG programmer (0-10 VDC/0-20 mA, max. 24 VDC)
5. Current output channel 3 (4-20 mA/0-20 mA, max. 24 VDC)
6. Gnd for EPROG programmer (0 V)

4.4.4.3 Standby input

The device can be switched to standby mode by an external signal transmitter via the standby socket.

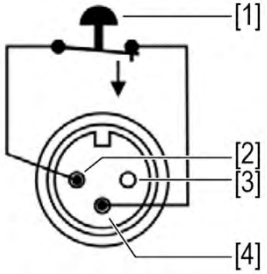


Diagram of standby socket

1. External contact, e.g. switch
2. Pin 3
3. Pin 1
4. Pin 2

5 Transportation



CAUTION

Hot / cold surface!
The heating element can still be hot even after the appliance has been switched off and can cause burns if touched.
- Wear temperature-resistant protective gloves.
- Allow the appliance to cool down to room temperature after switching off.



CAUTION

Risk of crushing due to falling appliance!
An unsecured appliance can fall down and cause crushing injuries if transported incorrectly.
- Secure the appliance against tipping and falling during transportation.
- Secure loose parts against falling during transportation.
- Transport the appliance in an upright position using a suitable means of transportation.
- Wear safety shoes.

The thermostat can be transported together with the chiller when assembled.

Prerequisites
▶ The appliance is switched off and disconnected from the mains.
▶ The temperature control medium has been drained.
▶ All external connections have been removed.

Procedure
1. Use the recessed grips to lift the refrigeration machine onto the center of the transport trolley - two people at a time if necessary.

   ⇨ See technical data for weight specifications.

2. Secure the refrigeration machine with straps on the transport trolley to prevent it from tipping over.
3. Place loose parts, e.g. cables, to the appliance on the transport trolley.

✓ The appliance is ready for transportation and can be transported safely to its installation location.

6 Set up

6.1 Set up the device at the operating site

Prerequisites

- ▶ The device has been transported to the operating site.
- ▶ The size and infrastructure of the operating location are suitable for operating the device.
  ADVICE Recommended minimum distance of 1 m from neighboring devices to avoid electromagnetic interference.

Procedure

1. Set up the appliance on a flat, smooth, non-flammable surface.
   ADVICE
   - Ensure that the appliance stands securely.
   - Leave at least 20 cm of free space in front of and behind the appliance.
   - All ventilation openings in the casing must not be covered.
   - The refrigeration circuit must not be damaged.

✓ The appliance is set up at the operating location.

7 Commissioning

7.1 Installing the circulation or cooling circulation thermostat

With a circulation thermostat or a refrigeration circulation thermostat, the thermostat is mounted on the closed bath or on the refrigeration machine.

If the thermostat is removed, e.g. due to a change of appliance or for service purposes, it can then simply be refitted with the connection box.

Prerequisites

- ▶ The thermostat is ready for installation on a closed bath or chiller.
- ▶ The bath is empty.

Procedure

1. Carefully insert the thermostat into the bath. Align the four holes of the connection box with the four threaded sleeves of the bath.



2. Position the fixing screws in the holes in the plenum box.
3. Tighten the fixing screws.



4. Check the correct fit and seal.

✓ The circulation thermostat or cooling circulation thermostat is fitted.

7.2 Connecting the device to the power supply

7.2.1 Connecting the bridge or circulation thermostat

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



DANGER

Danger to life due to electric shock!
An electric shock can cause serious injury or even death.
- Only operate the appliance on a mains connection protected by an RCD (type B, Ia = 30 mA).
- Only operate the appliance on a mains socket with a protective earth contact.
- Do not operate the appliance if the mains cable is damaged.



DANGER

Danger to life due to electric shock!
An electric shock can cause serious injury or even death.
- Live parts are enclosed in the appliance housing. If the appliance housing is damaged, live parts can be touched.
- If the appliance housing is damaged, do not connect the appliance to the power supply!



ADVICE

Damage to the mains cable due to excessive temperature!
The mains cable must not touch any parts that become hot during operation.
- Keep the mains cable away from surfaces that can become hot.

Prerequisites

- ▶ The thermostat is installed as a bridge or circulation thermostat.
- ▶ The mains cable is ready.
  ADVICE If the 200-230 V 50/60 Hz variant is used in the United States or Canada, the JULABO mains cable USA 3x12AWG (order number 7.901.2694) must be used. This power cable is not included in the scope of delivery.

Procedure

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



2. Insert the plug of the mains cable into the socket.

✓ The appliance is electrically connected.

7.2.2 Connecting the cooling circulation thermostat

This section describes how to connect the thermostat as a cooling circulation thermostat.



DANGER

Danger to life due to electric shock!
An electric shock can cause serious injury or even death.
- Only operate the appliance on a mains connection protected by an RCD (type B, Ia = 30 mA).
- Only operate the appliance on a mains socket with a protective earth contact.
- Do not operate the appliance if the mains cable is damaged.



DANGER

Danger to life due to electric shock!
An electric shock can cause serious injury or even death.
- Live parts are enclosed in the appliance housing. If the appliance housing is damaged, live parts can be touched.
- If the appliance housing is damaged, do not connect the appliance to the power supply!

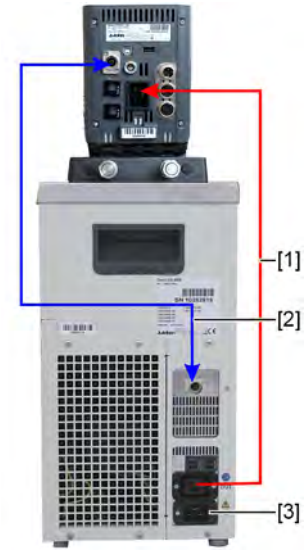


ADVICE

Damage to the mains cable due to excessive temperature!
The mains cable must not touch any parts that become hot during operation.
- Keep the mains cable away from surfaces that can become hot.

Prerequisites

- ▶ The thermostat is mounted on the chiller.
- ▶ The connection cable, mains cable and CAN bus cable are ready.



Procedure

1. Connect the thermostat to the chiller using the connection cable [1].
2. Connect the CAN sockets of the two devices via the CAN bus cable [2].
3. Connect the chiller to the mains via the mains cable [3].

✓ The appliance is electrically connected. Alternatively, both appliances can be connected to separate power circuits. If necessary, the power supply must be set up in the device settings.

7.3 Basic settings

7.3.1 Setting the language

The language of the user interface can be switched to one of the available languages.

Prerequisites

▶ The device is switched on.

Procedure

1. Call up the **<Main menu>**.
2. In the **<Settings>** submenu, select the **<Language>** menu item.

   ⇨ The **<Language>** submenu lists all the languages installed on the device.

3. Select the desired language.

✓ The selected language is activated immediately.

7.3.2 Setting the date and time

The date and time are preset at the factory. This section describes how to change the date and time.

Prerequisites

▶ The device is switched on.

Procedure

1. Call up the **<Main menu>**.
2. In the **<Settings>** submenu, select the **<Date/Time>** menu item.

   ⇨ The submenu shows the currently set date and time as well as selectable display formats.

3. Set the date and time.
4. Save settings with the **[Save + Esc]** softkey.
5. Activate one of the selection fields to display the date and time in a different format.

✓ The date and time are set.

7.3.3 Activating the autostart function

The autostart function enables temperature control to be started directly with the mains switch or via an intermediate timer.

The appliance is configured at the factory so that it switches to a safe operating state in the event of a power failure. The autostart function is deactivated. OFF" appears on the display. The cooling unit, the heater and the pump motor are disconnected from the mains voltage.



WARNING

Unattended auto-start of the appliance!
When commissioning the appliance, ensure that an unattended auto-start of the appliance, e.g. after a power failure, cannot pose a risk to persons or systems.

- Ensure that the protective and warning devices on the appliance are functioning correctly.

Prerequisites

▶ The appliance is switched on.

Procedure

1. Call up the **<Main menu>**.
2. Call up the **<Autostart>** menu item in the **<Set security>** submenu.
3. Activate the setting with the **<On>** selection field.

✓ The autostart function is activated. The next time it is switched on, temperature control starts immediately with the preset values. A timer can be interposed and programmed. In this case, the mains switch of the appliance must remain switched on.

7.3.4 Setting the physical units

The physical units for temperature, pressure and flow rate can be set in the menu.

Prerequisites

▶ The device is switched on.

Procedure

1. Call up the **<Main menu>**.
2. Call up the **<Units>** menu item in the **<Settings>** submenu.
3. Set the desired units by activating the selection fields.

✓ The physical units are set.

7.3.5 Setting the key tones

The button tones of the device can be activated and deactivated in the menu.

Prerequisites

▶ The device is switched on.

Procedure

1. Call up the <Main menu>.
2. In the <Settings> submenu, select the <Key tones> menu item.
3. Activate or deactivate key tones.

✓ The key tones are set. The setting is applied directly.

7.4 Connecting an external system

The appliance is used to control the temperature of external closed systems in a temperature control circuit. An external system is connected to the pump connections of the appliance.



CAUTION

Risk of scalding due to damaged temperature control hoses!
Hot temperature control medium can escape from damaged temperature control hoses and cause severe scalding on contact with the skin.
- Check temperature control hoses regularly to ensure they are intact.
- Replace damaged temperature control hoses immediately.
- Do not kink the temperature control hoses.
- Replace temperature control hoses regularly.
- Check pump connections for leaks.



ADVICE

Material damage due to incompatible externally connected system!
If the temperature range and/or pressure parameters of an externally connected system do not match the device, this can lead to damage to individual components or even failure of the entire system.
- Before connecting, check whether the external system is compatible with the appliance combination.
- If an external system is connected that is not designed for the maximum pressure of the appliance, the delivery rate of the pump must be limited in the settings.
- If an external system is connected, the safety of the entire system is the responsibility of the operator.



ADVICE

Hot pump connections!
The pump connections can become very hot during operation. Heat-sensitive parts or pipes can be damaged if touched.
- Pump connections must be free during operation.
- No loose parts or lines may come into contact with the pump connections during operation.

ADVICE

Overflow of temperature control medium through externally connected systems!
If the externally connected system is higher than the temperature control system, temperature control medium may flow back and overflow when the system is switched off.
- Arrange the connected external system at the same or lower level 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 the temperature control hoses due to kinking!
Temperature control hoses are damaged by kinking and can leak.
- Lay the temperature control hoses in large radii.
- Avoid kinking the temperature control hoses.

ADVICE

Material damage due to overflow of the temperature control medium!
The maximum filling volume of the system can be exceeded if the temperature control medium expands during operation. Uncontrolled leakage of the temperature control medium can cause damage to the appliance.
- Connect the hose to the overflow and guide it into a suitable collecting vessel.
- Never close the overflow at the rear of the appliance!
- Allow for approx. 12 % volume change per 100 °C temperature change.

ADVICE

Material damage due to incompatible externally connected system!
If the permissible temperature range and / or operating pressure of the connected external system are below the values specified in the technical data of the temperature control unit, this may result in damage to components or failure of the entire system.
- Before connecting, check whether the external system is compatible with the specifications of the temperature control unit.
- If an external system is connected that is not designed for the maximum operating pressure of the temperature control unit (e.g. glass apparatus), take suitable measures to limit the pressure (e.g. pressure relief devices).
- Do not install shut-off valves in the return line.
- Check the pump settings before and during commissioning and adjust if necessary.
- If an external system is connected, the safety of the entire system is the responsibility of the operator.

7.4.1 Connecting an external system with screw connections

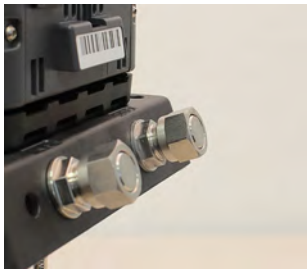
This section describes how to connect an external closed system with screw connections to the appliance.

Requirements

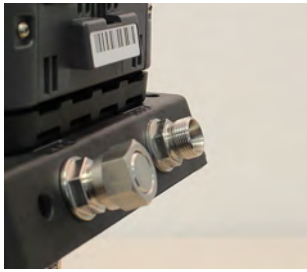
- ▶ Two open-end wrenches, size 17 mm and 19 mm
- ▶ Torque wrench
- ▶ The thermostat is equipped with the optional mounting attachment or the pump set.
- ▶ The temperature control hoses of the external system are equipped with an M16x1 internal thread and conical seal.

Procedure

1. Remove the union nuts from the pump connections.



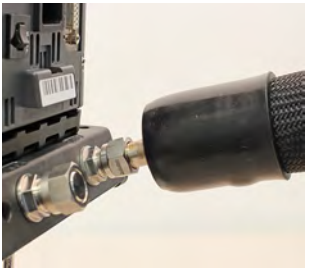
2. Remove the sealing plugs.



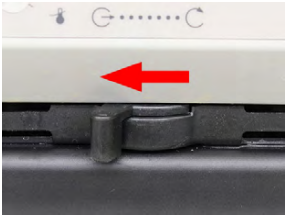
3. Screw the hoses onto the pump connections by hand.
   ADVICE Pay attention to the flow and return positions.



4. Tighten the pump connections to a maximum torque of 3 Nm. Hold the nut (SW 17) with an open-end wrench.
   ADVICE The mounting attachment may tear if the pump connections are tightened too much.



5. Set the lever for setting the flow direction to external circulation.



✓ The external system is connected.
ADVICE If the external system is dismantled, the pump connections must be closed again with the sealing plugs so that no temperature control fluid can spray out during operation.

7.4.2 Connecting an external system with hose clamps

This section describes how to connect an external, closed system with hose olives to the device.

Requirements
- ▶ Two open-end wrenches, size 17 mm and 19 mm
- ▶ Torque wrench
- ▶ The thermostat is equipped with the optional mounting attachment or the pump set.
- ▶ Hose clamps for mounting the external system are available.

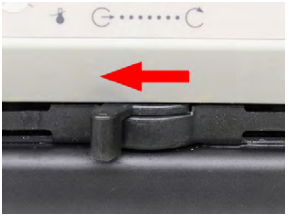
Procedure
1. Remove the union nut from the pump connections.



2. Remove the sealing plugs.
3. Push a hose olive through one of the union nuts.
4. Fit the hose olives to the pump connections using the union nuts.



5. Tighten the pump connections to a maximum torque of 3 Nm. Hold the nut (SW 17) with an open-end wrench.
   ADVICE The mounting attachment may tear if the pump connections are tightened too much.
6. Attach the hoses of the external system to the hose olives.
   ADVICE Pay attention to the flow and return positions.
7. Secure the hoses against slipping with hose clamps.
8. Set the lever for setting the flow direction to external circulation.



✓ The external system is connected.
ADVICE If the external system is dismantled, the pump connections must be closed again with the sealing plugs so that no temperature control fluid can spray out during operation.

7.5 Setting the overtemperature protection

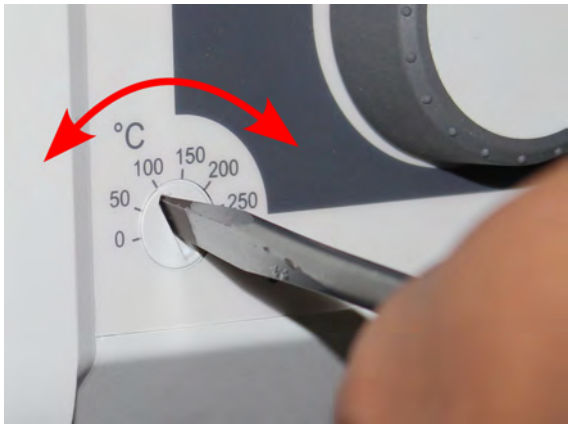
The temperature for the overtemperature protection must be set before each new temperature control task. The set value must be below the flash point and at least 25 K below the focal point of the temperature control medium used. The surface temperature of the temperature control medium must not exceed the flash point at any time. An alarm is triggered if the set value is exceeded.

Requirements

▶ Slotted screwdriver size 3

Procedure

1. Switch on the appliance.
   ADVICE If no temperature control fluid has been added, the under-temperature alarm is triggered.
   ADVICE Depending on the default setting, the overtemperature protection alarm is displayed.
2. Use the [Display] softkey to select the start screen view that shows the overtemperature protection value.



3. Use the screwdriver to set the overtemperature protection.
   ⇨ The set value is shown on the display.
   ⇨ The set value is active immediately.

   ADVICE The set value must be below the flash point and at least 25 K below the flash point of the temperature control medium used.
4. Switch off the appliance so that the alarm messages are reset.

✓ The overtemperature protection is set.

7.6 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

Material damage due to overflow of the temperature control medium!
The maximum filling volume of the system can be exceeded if the temperature control medium expands during operation. Uncontrolled leakage of the temperature control medium can cause damage to the appliance.

- Connect the hose to the overflow and guide it into a suitable collecting vessel.
- Never close the overflow at the rear of the appliance!
- Allow for approx. 12 % volume change per 100 °C temperature change.

7.7 Connecting an external temperature sensor

A Pt100 temperature sensor can be connected to the front of the device A Pt100 temperature sensor can be connected to the front.

Prerequisites

- ▶ The device is switched off.
- ▶ A Pt100 temperature sensor with a suitable connection is available.

Procedure

1. Connect the Pt100 to the Ext. Pt100 socket.
2. Switch on the device.
3. Call up the **<Main menu>**.
4. In the **<Thermodynamics>** submenu, select the **<Set controller>** menu item.
5. Activate the **[External]** menu item for external control.
6. Set the control parameters for external control.

✓ The external temperature sensor is connected and ready for operation.

7.8 Setting up the power supply

The power supply for a refrigerated circulator is configured at the factory. The thermostat is supplied with power from the refrigeration machine. Alternatively, both devices can be connected to separate power circuits with one power cable each. The type of power supply is set in the menu.

Prerequisites

- ▶ A refrigeration machine is connected to the thermostat.
- ▶ Both appliances are switched on.

Procedure

1. Call up the **<Main menu>**.
2. In the **<Install device>** submenu, select the **<Power supply>** menu item.
3. Select the type of power supply:
   - **[Via chiller]** when connected to the same mains supply
   - [**Separate supply]** when connected to separate power grids

✓ The power supply for the cooling circulator is set up.

7.9 Setting the flow of the temperature control medium

The flow direction of the temperature control medium is set using the lever on the front panel:

- Lever position left (external): The temperature control medium is mainly directed into the external application.
- Lever position right (internal): The temperature control medium is mainly circulated in the internal bath.

ADVICE

Temperature control medium spraying out

If the pump connections are not closed, temperature control medium may spray out even if the flow direction is set internally.

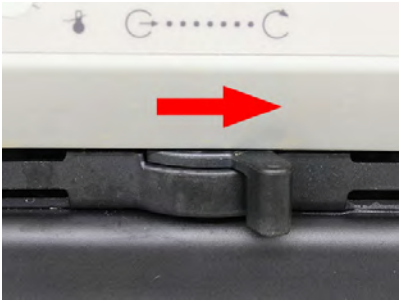
- Close the external pump connections for internal temperature control.

Prerequisites

▶ The appliance is switched off.

▶ The appliance is filled with temperature control medium.





Procedure

1. Set the lever to a low level for internal circulation (e.g. position 2 from the right stop).
2. Switch on the appliance and check whether the flow of the temperature control medium is suitable for the application.
3. Adjust the flow until it matches the application.

✓ The flow of the temperature control medium is set.

7.10 Setting the cooling mode

The cooling mode of a cooling circulation thermostat is preset to automatic mode at the factory. Three different cooling modes can be selected in the operating menu:

- Automatic mode: If the setpoint jumps by more than +5 K, the control unit calculates the duration of the heating process. Based on the calculated heating time, the control unit decides whether or not to switch off the chiller depending on demand.
- Always switched on: The chiller is permanently switched on during operation.
- Always switched off: The chiller remains switched off during operation.

Prerequisites

▶ A chiller is connected to the thermostat.
▶ Both appliances are switched on.

Procedure

1. Call up the <Main menu>.
2. Call up the <Refrigeration mode> menu item in the <Install device> submenu.
   ADVICE The menu item can only be called up if the thermostat detects a connected chiller.
3. Select the desired cooling mode.

✓ The cooling mode is set.

7.11 Set limit values

7.11.1 Setting temperature warning limits

Undertemperature and overtemperature are adjustable temperature limits that serve as warning limits for the appliance. If one of the warning limits is exceeded during temperature control, the appliance warns with an acoustic signal and a warning message on the display.

Prerequisites

▶ The appliance is switched on.

Procedure

1. Call up the **<Main menu>**.
2. In the **<Set safety>** submenu, select the **<Temperature limits>** menu item.
3. Enter the lower temperature warning limit in °C in the **<Lower temperature>** menu item and confirm by pressing on the central controller.
4. Enter the upper temperature warning limit in °C in the **<Overtemperature>** menu item and confirm by pressing on the central controllers.
   ADVICE Only values that are within the performance values of the appliance can be entered.

✓ The temperature warning limits are set.

7.11.2 Setting the temperature setpoint limits

The temperature setpoint limits restrict the adjustable temperature range. If a temperature setpoint is set for temperature control that is outside the setpoint limits, a message appears on the display.

The setpoint limit for the pump defines the upper limit for the pump speed that can be set in the **<Thermodynamics>** menu. The lower limit value is set to 30 % at the factory.

The maximum pressure setpoint defines the upper limit for the pump pressure that can be set in the **<Thermodynamics>** menu.

Prerequisites

▶ The device is switched on.

Procedure

1. Call up the **<Setpoint limits>** menu item in the **<Set safety>** submenu.
2. Enter the lower setpoint limit in °C in the <Setpoint **min.>** menu item and confirm by pressing on the central controller.
3. Enter the upper setpoint limit in °C in the menu item <Setpoint **max.>** and confirm by pressing on the central controllers.
4. Enter the respective limit value in the menu item **<Pump max.>** or **<max. pressure setpoint>** and confirm by pressing on the central controller.

✓ The temperature setpoint limits are set.

7.11.3 Setting actual value limits

The **Internal minimum** and **Internal maximum** actual value limits are effective in **External control** mode. They define the limits for the expected temperature in the internal bath. The temperature controller cannot exceed these limits. Under certain circumstances, the external setpoint may not be reached.

Prerequisites

▶ The device is switched on

How to proceed

1. Call up the **<Main menu>**.
2. In the **<Thermodynamics>** submenu, select the **<Set controller>** menu item.

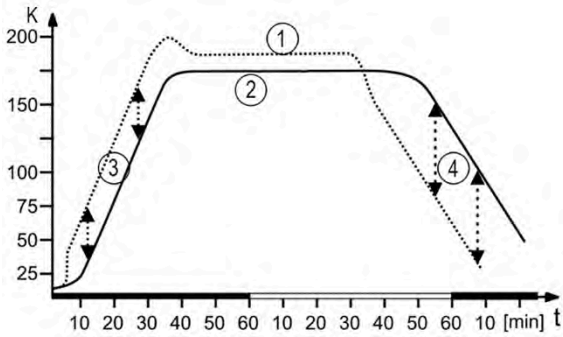
   ⇨ The dialog box for setting the controller appears on the display.

3. Call up the **<Limitations>** submenu.
4. Set the values for internal minimum and internal maximum in the dialog box that appears.

✓ The actual value limits are set and immediately active.

7.11.4 Band limits with external control

If an external system is controlled, a temperature difference occurs during both the heating phase and the cooling phase due to inertia. The curve illustrates the relationship between the internal and external temperature curve.



Schematic temperature curve internal / external

1. Internal temperature curve
2. External system temperature curve
3. Upper band limit
4. Lower belt limit

Maximum permissible temperature differences can be set for the heating phase and the cooling phase in order to maintain a gentle temperature in the external system or, for example, to protect a glass reactor from thermal stresses.

7.11.5 Setting the band limits

The upper and lower band limits are specified in K. In the heating phase, the set value is added to the external actual value. In the cooling phase, the set value is subtracted from the external actual value. The setting range is 1 to 200 K.

Prerequisites

▶ The device is switched on

How to proceed

1. Call up the **<Main menu>**.
2. In the **<Thermodynamics>** submenu, select the **<Adjust controller>** menu item.

   ⇨ The dialog box for setting the controller appears on the display.

3. Switch to the **<Limits>** submenu.
4. Set the lower and upper band limits in the dialog box that appears and confirm the entry.

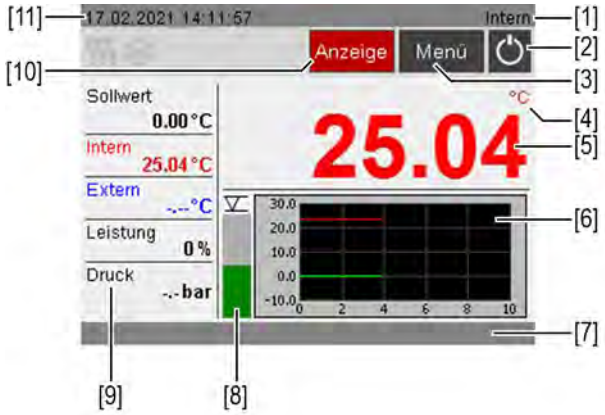
✓ The band limits are set and immediately active.

8 Operation

8.1 User interface

8.1.1 User interface

The device is operated via the central controller. After switching on, the display shows the start screen. The [**Display]** softkey can be used to switch between three different views of the start screen.



Start screen

1. Internal/external temperature control
2. Start/Stop
3. Softkey **[Menu]** opens the **<Main menu>**
4. Temperature unit Celsius/Fahrenheit
5. Display current temperature internal/external, display Off in stand-by mode
6. Temperature curve setpoint temperature/current temperature internal and external
7. Status bar for operator messages/alarms/warnings
8. Liquid level display
9. Display of current performance parameters
10. **Display]** softkey switches the display of the start screen
11. Date/time

8.1.2 Operating with the central controller

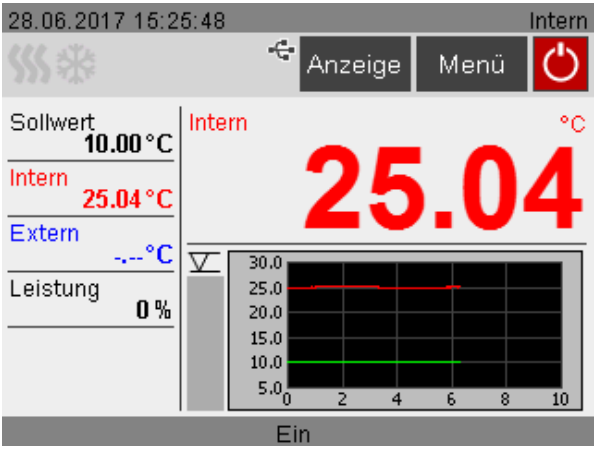
The central controller is used to control all menu functions and inputs on the user interface. Selected menus, softkeys or input fields are highlighted in red.

Rotate:
- navigates between menus, buttons and input fields
- Sets values

Press:
- Opens menus
- activates softkeys and buttons
- Activates input fields and selected functions
- confirms an entry

8.1.3 Softkeys and status icons

The user interface contains the following softkeys and status icons.



Icon	Icon Description
	Temperature control start / stop
	Call up start screen
	Go back one menu level
	Call up help menu
	Save entries
	Heating display active
	Cooling active display
	Alarm message
	Warning message

8.1.4 Alarm and warning messages

Warning:

Temperature control is not interrupted in the event of a warning. A warning message with a yellow background appears on the display. An intermittent signal tone sounds. The signal tone can be switched off by pressing the central controller. Once the cause of the warning has been rectified, the warning goes out. Depending on the cause, warnings may disappear by themselves after some time.

Alarm:

In the event of an alarm, temperature control is stopped. The actuators are switched off. At the same time, a continuous acoustic signal sounds and a red alarm message appears on the display. The signal tone can be switched off by operating the central controller. The cause of the alarm must be eliminated. A restart is required.



ADVICE

The list of alarm and warning messages can be found in **chapter 10 Faults and troubleshooting**.

8.1.5 Operator messages

Operator messages are informal messages that inform the operator about changes to the status of the appliance.

Operator messages provide information about the operating status of individual units in the status bar of the start screen. Status messages from a connected chiller are also displayed as operator messages.

8.2 Main menu

Press the **[Menu]** softkey on the start screen to open the main menu. The main menu is divided into menu items, each of which contains further submenus or in which settings can be made directly. The start screen can be called up at any time using the **[Home]** softkey.

The **<Main menu>** is divided into the following menu items:
- Settings
- Record data
- Thermodynamics
- Set safety
- Programmer
- Connect device
- Service
- Install device

8.2.1 Settings menu

Basic device settings are made in the **<Settings>** menu.
- Set language
- Set the date and time
- Activate/deactivate autostart
- Set physical units
- Activate/deactivate button tones
- Read out alarm memory

8.2.2 Record data menu

The device can record data on an external storage medium. The conditions for this are defined in the **<Record data>** menu and recording is started. The recorded data can be used for subsequent evaluation.
- Record measurement data
- Read out black box data

8.2.3 Thermodynamics menu

In the **<Thermodynamics>** menu, the control parameters for the temperature curve are defined and the pump output is set.

Set controller

Control behavior:
- Setting the control parameters for internal or external control
- Definition of the control behavior
- Setting the limit values for heating output and cooling output

Limits:
- Setting max. cooling capacity [%]
- Setting max. heating capacity [%]
- Setting internal minimum / maximum temperature [°C]
- Setting lower / upper band limit [K]

Set pump

Type:
- Changeover power [%] / pressure control [bar]

Mode:
- Changeover Auto / Overrun 3 min. / Pump always on

8.2.4 Set security menu

In the **<Set safety>** menu, limit values are defined to specify a range for a safe process sequence.

- Temperature limits: Setting the upper and lower warning limits
- Setpoint limits: Setting the upper and lower limits for the temperature set-point

8.2.5 Programmer menu

In the **<Programmer>** menu, temperature curves are programmed that can be called up according to definable rules.

- Timer: Setting the start time, duration and setpoint value
- Profile timer: Timer function for individual profiles
- Profile series: Planning of individual profile series sequences
- Edit profile: Creating, managing, importing and exporting profiles

8.2.6 Connect device menu

The device can be connected to a PC via the USB interface or the RS232 interface (option) and controlled remotely. In addition, external programmers can be connected via analog interfaces (option). The parameters for remote control operation are set in the **<Connect device>** menu.

- Remote control: off, RS232, USB, Ethernet, TCP/IP mode
- Digital interfaces: Ethernet, RS232
- External setpoint: off, Pt100, EPROG
- Analog interfaces: Analog module
- Control value specification: Controller, digital, EPROG
- Switch-on behavior: Manual setting, remote setting

8.2.7 Service menu

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

8.2.8 Install device menu

Some basic settings are made in the **<Install device>** menu. Depending on the device configuration, not all menu functions may be available.

- Reset device (factory reset)
- Adjust temperature sensor
- Import and export device settings
- Set power supply
- Set cooling mode

8.3 Switching on the device

This section describes how to switch on the device.

Prerequisites

▶ The device is connected and ready for operation.

Procedure

1. Switch on the device at the power switch.

   ⇨ The software boots and starts the device. The display shows the device name, the voltage variant and the loaded configuration.

✓ The device is switched on. It switches to the last active operating mode. If the autostart function is activated, the device starts temperature control directly with the last setting.



ADVICE

When the remote control is activated, it is not possible to operate the device.

8.4 Switching off the device

This section describes how to switch off the device.

Prerequisites

▶ The device is switched on.

Procedure

1. Stop the current temperature control.
   ADVICE Only switch off the appliance when it is in standby mode.
2. Switch off the appliance at the power switch.

✓ The appliance is switched off.

8.5 Starting temperature control

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

Prerequisites

- ▶ The appliance is switched on.
- ▶ The setpoint temperature is set.

Prerequisites

- ▶ The appliance is switched on.

Procedure

1. Select the **<setpoint>** field on the start screen with the central controller.
2. Enter the desired setpoint and confirm the entry.
3. Press the **[Start/Stop]** softkey.

✓ The appliance starts temperature control immediately. The temperature control can be stopped with the **[Start/Stop]** softkey. The setpoint entered is saved.



ADVICE

Note for heating thermostats:
For temperature control tasks close to or below the ambient temperature: Use a cooling coil or JULABO immersion cooler.

8.6 Record data

8.6.1 Recording measurement data

Measurement data from a running temperature control system can be recorded synchronously on a USB stick. The date, time, setpoint temperature, internal actual, external actual and the percentage output are documented in the recording. The data is saved as a .txt file and can be analyzed retrospectively.

Prerequisites

- ▶ The device is switched on.
- ▶ A USB stick is available.

Procedure

1. Call up the **<Main menu>**.
2. Call up the **<Record data>** submenu.

   ⇨ The message appears: “Please insert a USB stick!”

3. Insert the USB stick into the USB socket on the back of the device.
4. Call up the **<Start measurement data recording on USB stick>** submenu.
5. Set sampling interval from 1 to 60 seconds and confirm entry.
6. Press the **[Start]** softkey.
7. Change file name if necessary.
8. Confirm with the **[OK]** softkey.

✓ The measurement data recording is started. The data is recorded at the specified interval until you press the [**Stop recording]** softkey.

8.6.2 Reading out black box data

The black box stores all relevant data from the last 30 minutes. The black box also logs alarm and warning messages.

The black box can be read out and the data sent to the Technical Service for analysis.

Prerequisites

- ▶ The device is switched on.
- ▶ A USB stick is available.

Procedure

1. Call up the **<Main menu>**.
2. Call up the **<Record data>** submenu.

   ⇨ The message appears: “Please insert a USB stick!”

3. Insert the USB stick into the USB socket on the back of the device.
4. Call up the <Save blackbox to USB stick> submenu.
5. Change file name if necessary.
6. Confirm with the **[OK]** softkey.

✓ The black box data is saved on the USB stick as a .txt file.

8.6.3 Display alarm memory

Alarm messages are saved with the date, time, alarm code and device ID. The data can be displayed via the menu.

Prerequisites

1. The device is switched on.

Procedure

1. Call up the **<Main menu>**.
2. Call up the **<Alarm memory>** menu item in the **<Settings>** submenu.

   ⇨ The device lists the saved alarm messages.

3. Press the **[Delete]** softkey to delete all entries.

✓ The alarm memory is displayed and deleted.

8.7 Thermodynamics

8.7.1 Control parameters

The appliance works with PID control. With the factory-set control parameters, experience has shown that an optimum temperature curve is achieved in the temperature control product.

The internal and external control parameters can be adjusted in the **<Control behavior>** submenu.

With internal control, you can choose between Standard and Aperiodic for the control dynamics:

- With Aperiodic, the temperature rise is delayed and the actual temperature does not overshoot.
- With Standard, the temperature rise is faster and the actual temperature can overshoot by up to 5 %.

Proportional band Xp

The proportional range Xp is the temperature range between the setpoint and actual value in which the heating output is regulated from 100 % to 0 %. The value for Xp can be selected from 0 K to 10 K.

Integral controller Tn

The integral controller Tn is specified in seconds. It reduces the difference between the setpoint and actual value caused by the Xp component and then maintains the setpoint.

Differential controller Tv

The differential controller Tv is specified in seconds. It shortens the settling time.

CoSpeed factor

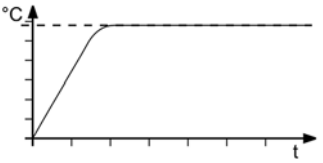
The CoSpeed factor influences the temperature curve with external control. It acts directly on Xpu and results in more aggressive temperature control.

Proportional band Xpu

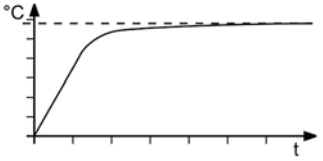
The proportional band Xpu plays a role in external control. It corresponds to the proportional range Xp for internal control.

8.7.2 Optimizing temperature curves

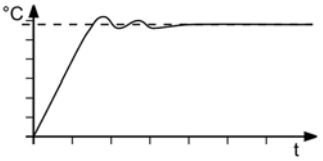
The temperature curve shown on the display provides information on how individual control parameters can be optimized to achieve a better result.



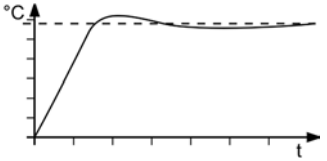
Optimum temperature curve, temperature quickly reaches the setpoint without overshooting and maintains the setpoint.



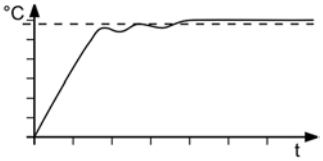
Symptom: Temperature curve approaches the setpoint slowly and does not quite reach it. Remedy: Reduce Tv and/or Tn, increase Xp.



Symptom: Temperature curve approaches the setpoint quickly, overshooting with oscillations occurs. Remedy: Increase Tv and/or Tn.



Symptom: Temperature curve quickly approaches the setpoint, overshooting occurs. Remedy: Increase Xp.



Symptom: Temperature curve is rapidly approaching the setpoint value, temperature builds up, setpoint value is exceeded. Remedy: Reduce Xp and/or Tv.

8.7.3 Setting the controller

The individual control parameters for internal and external control are set in the **<Set controller>** menu.

Prerequisites

▶ The device is switched on.

Procedure

1. Call up the **<Main menu>**.
2. In the **<Thermodynamics>** submenu, select the **<Adjust controller>** menu item.

   ⇨ The dialog box for setting the controller appears on the display.

3. Activate internal or external control.

   ⇨ This results in the respective adjustable control parameters. External control is only possible with an externally connected Pt100 temperature sensor.

4. Switch to the **<Control behavior>** submenu.
5. Set the desired parameters in the dialog window and confirm the entry .
   ADVICE For internal control: Activate aperiodic temperature curve or the standard temperature curve.

✓ The control parameters are set and immediately active.

8.7.4 Limit cooling capacity and heating capacity

The cooling capacity and heating capacity are limited in the **<Limitations>** menu.

Prerequisites

▶ The appliance is switched on.

Procedure

1. Call up the **<Main menu>**.
2. In the **<Thermodynamics>** submenu, select the **<Set controller>** menu item.

   ⇨ The dialog box for setting the controller appears on the display.

3. Switch to the **<Limits>** submenu.

4. Set the limit values for the cooling capacity and heating capacity in the dialog box that appears and confirm the entry.

✓ The values are set and immediately active.

8.7.5 Setting the pump

The pump output can be set in one percent increments.

Prerequisites

▶ The appliance is switched on.

Procedure

1. Call up the **<Main menu>**.
2. Call up the **<Set pump>** menu item in the **<Thermodynamics>** submenu.
3. Enter the desired value for the pump output as a percentage and confirm the entry.

   ⇨ The minimum value is set internally in the device. The maximum value is limited by the adjustable maximum pump output in the **<Setpoint limits>** menu.

4. Activate the desired pump mode.

✓ The pump is set.

In order to achieve low setpoint temperatures, it may make sense to reduce the pump output in individual cases. This reduces the heat input of the pump into the temperature control fluid.

8.8 Remote control of the device

The device can be connected to a PC via its interfaces and controlled remotely using a program such as EasyTemp. It is also possible to send interface commands to the device via a terminal program. The respective interface is set up when remote control is deactivated. If remote control mode is activated, no operation is possible on the appliance.

8.8.1 Controlling the device remotely via the RS232 interface

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

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

Setting parameters

Prerequisites

▶ Remote control is deactivated.

Procedure

1. Call up 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.

   ⇨ With parity “None”, the number of data bits is set to 8.

✓ The interface parameters are set and immediately active.

Remote control device

Prerequisites

▶ The device is switched off.

▶ A terminal program is installed on the PC.

Procedure

1. Connect the device and PC with a null modem cable.
2. Switch on the device.
3. Call up the **<Main menu>** on the device.
4. In the <Connect **device>/<Interfaces>** submenu, activate the RS232 serial interface.

5. In the **<Connect device>/<Remote control>** submenu, activate the “Serial” connection type.

   ⇨ RS232 mode is displayed on the start screen.

6. Start the terminal program on the PC.
7. Enter the interface parameters in the terminal program.
8. Select the COM port of the device in the terminal program and establish a connection.

✓ Remote control via the RS232 serial interface is active. The device can be remote-controlled via the terminal program using the interface commands. For interface commands, see appendix.

8.8.2 Setting the EPROG input

An external voltage or current signal can be transmitted to the thermostat via the EPROG input. Depending on the setting, the thermostat interprets the input signals as setpoint temperature, power, flow rate, pressure or actual value and can output the values as a display on the start screen.

Observe the technical data of the REG/EPROG socket.

Prerequisites

- ▶ The device is switched on.
- ▶ The remote control mode is deactivated.
- ▶ An external voltage or current source is connected via the REG/EPROG socket.

Procedure

1. Call up the **<Main menu>**.
2. Call up the **<Connect device>** submenu.
3. Call up the **<EPROG>** menu item in the **<Analog interfaces>/<Analog module>** submenu.
4. Select the input variable setpoint, power or flow rate in the selection window.

   ⇨ If Setpoint is selected, the external setpoint specification must be set up.
   ⇨ If power is selected, the control value specification must be set up.

5. Select the voltage or current signal type.
6. Approach the upper limit value with the external voltage/current source.

   ⇨ The applied voltage or current is displayed as a measured value.

7. Enter the upper input value and confirm your entry.
8. Repeat steps 6 and 7 for the lower limit value.

✓ The EPROG input is set.

8.8.3 Set up external setpoint specification

By default, the setpoint is set on the device or via the programmer. In addition, the device offers the option of specifying the setpoint externally via the analog REG/EPROG socket or an external Pt100 temperature sensor.

Prerequisites

- ▶ The device is switched on.
- ▶ Remote control mode is deactivated.

Procedure

1. Call up the **<Main menu>**.
2. In the **<Connect device>** submenu, select the **<External setpoint>** menu item.
3. Select Pt100 or EPROG.
   ADVICE Pt100 can only be selected if an external Pt100 temperature sensor is connected to the device. The setpoint is then set via the external temperature sensor.
   ADVICE EPROG can only be selected if the analog option is available and setpoint has been defined as an input variable in the **<Analog module>** submenu for EPROG.

✓ The external setpoint specification is set up.

8.8.4 Setting the control value

If the device is in remote control mode, the actuating variable (power) with which the cooling unit or heater is controlled can be specified via interface commands. This section describes how to set up the control value specification.

Prerequisites

▶ The device is switched on.

Procedure

1. Call up the **<Main menu>**.
2. In the **<Connect device>** submenu, select the **<Set actuating value default>** menu item.
3. Select Digital or EPROG in the dialog box.
   ADVICE Digital can only be selected if remote control mode is active.
   ADVICE EPROG can only be selected if the electronics module with analog connections is available and power has been defined as an input variable in the **<Analog module>** submenu for EPROG. Remote control mode must be deactivated.

✓ The control value specification is set up.

8.8.5 Query device status

The current device status can be queried via an interface command.

Prerequisites

▶ The device is connected to a PC via an interface.

Procedure

1. Enter the command “status” in the terminal program and press **[Enter]**.

✓ The device responds with a status message. If an alarm or warning is pending, the device sends the respective alarm or warning message in response to the status query.

ADVICE

- Explanations of the status messages can be found in the **appendix**.
- Explanations of the alarm and warning messages can be found in **the Faults and troubleshooting chapter.**

8.9 Working with the programmer

Temperature control profiles are defined temperature curves with a set target temperature and a specified temperature control duration or gradient.

The programmer calculates a temperature ramp from these programmed values.

Individual temperature control profiles can be started with the profile timer function and the number of repetitions can be defined. Several temperature control profiles can be combined to form a profile series.

The appliance must remain switched on for programmed temperature control profiles to run automatically.



ADVICE

Falling level of the temperature control fluid!

During prolonged temperature control, the level of the temperature control liquid in the bath tank may fall below the alarm limit due to evaporation. A low level alarm is triggered and temperature control is stopped.

- During prolonged temperature control, regularly check the level of the temperature control liquid in the bath tank.
- If the level is low, top up the temperature control fluid.

8.9.1 Setting the timer

The timer can be used to program the duration of temperature control from 0 to 999 minutes and the start time. The target temperature is set as the setpoint temperature.

After the set duration has elapsed, the appliance switches to the previously defined state:

- Standby mode
- Maintain target temperature
- Temperature control to original setpoint temperature

Prerequisites

⇨ The appliance is switched on.

Procedure

1. Call up the <Main menu>.
2. Call up the <Timer> menu item in the <Programmer> submenu.

   ⇨ The dialog box for setting the timer appears on the display.

3. Set the start time and start date and confirm each entry.
4. Set the temperature setpoint and the desired duration and confirm each entry.
5. In the <final state> field, select how the appliance should behave after the temperature control has elapsed.
6. Select the <active> field to activate the timer.

✓ The timer is programmed and active.

8.9.2 Creating and editing tempering profiles

Eight individual temperature control profiles can be created, each with up to 60 individual steps. The programmer processes the programmed steps of a temperature control profile according to the specifications.

Prerequisites

▶ The device is switched on.

Procedure

1. Call up the **<Main menu>**.
2. In the **<Programmer>** submenu, select the **<Edit profile>** menu item.
3. Select one of the eight profiles and confirm your selection.

   ⇨ The selected profile changes to red.

4. Call up the **<Edit>** submenu.

   ⇨ The selected temperature control profile is displayed in the dialog box as an editable table, with the profile number, selected step and total number of steps.

5. Add a new step with the **[Add]** softkey.

   ⇨ The added step opens as an editable dialog window.

6. Set the setpoint temperature and the duration in hh/mm/ss format or the gradient in K/min format and confirm the entry with **[OK]**.

   ⇨ If a gradient is specified, the time specifications are set to zero and vice versa, as both values are mutually dependent.

7. Use the **[Add]** softkey at the end or the **[Insert]** softkey above the highlighted line to add further steps.
8. Edit the values of the newly added steps and confirm each entry with **[OK]** .
9. When you have finished editing the temperature control profile, press the **[Back]** softkey to return to the **<Edit profile>** submenu.

✓ The temperature control profile is created and saved.

8.9.3 Delete tempering profile

Existing temperature control profiles can be deleted completely. This deletes all saved profile data.

Prerequisites

- ▶ The device is switched on.
- ▶ Temperature control profiles are saved in the **<Programmer>** submenu.

Procedure

1. Call up the **<Main menu>**.
2. Call up the **<Edit profile>** menu item in the **<Programmer>** submenu.
3. Select a temperature control profile and confirm the selection.

   ⇨ The selected temperature control profile changes to red.

4. To delete the selected temperature control profile, press the **[Delete]** softkey.
5. Confirm the security prompt with **[OK]** to delete the tempering profile.

   ⇨ The temperature control profile is deleted. A confirmation message appears, which must be confirmed with **[OK]** .

✓ The tempering profile is deleted.

The **[Delete all profiles]** softkey can be used to delete all saved tempering profiles at once. The procedure is the same as for deleting an individual temperature profile.

8.9.4 Setting the profile timer

In the **<Profile timer>** submenu, temperature control sequences can be individually programmed for individual temperature control profiles.

Requirements

▶

How to proceed

1. Call up the **<Main menu>**.
2. Call up the **<Profile timer>** menu item in the **<Programmer>** submenu.

   ⇨ The dialog box for setting the profile timer appears on the display.

3. Select the **<Profile>** field.

   ⇨ The display switches to the **<Edit profile>** submenu.

4. Select a profile.
5. Press the **[Back]** softkey to return to the **<Profile timer>** submenu.

   ⇨ The selected temperature control profile is displayed in the dialog box.

6. Set the start time and start date and confirm the entry.
7. In the **<Profile runs>** field, set how often the selected temperature control profile should be repeated.
8. In the **<Final state>** field, select how the appliance should behave after the temperature control cycle has ended.
9. Select the **<active>** field to activate the profile timer.

✓ The profile timer is programmed and active.

8.9.5 Set up profile series

The **<Profile series>** submenu is used to set up the sequence of a profile series. The start time, the number of runs, the periodicity and the behavior of the device at the end of the profile series are defined here.

Prerequisites

▶ The device is switched on.

Procedure

1. Call up the **<Main menu>** .
2. Call up the **<Profile series>** menu item in the **<Programmer>** submenu.

   ⇨ The dialog box for setting the profile series appears on the display.

3. Select the **<Profile>** field.

   ⇨ The display switches to the **<Edit profile>** submenu.

4. Select a profile.
5. Use the **[Back]** softkey to return to the **<Profile series>** submenu.

   ⇨ The selected temperature control profile is displayed in the dialog box.

6. Set the start time and start date as well as the end of the series and the number of runs and confirm the entry in each case.
7. In the **<Days of the week>** field, select the days on which the profile series should run.
8. In the **<Final state>** field, select how the device should behave after the profile series has ended.
9. Select the **<active>** field to activate the profile series.

✓ The profile series is programmed and active. It starts at the programmed start time on the specified start date and runs through the specified number of temperature controls on the specified days of the week. At the end of the series, the appliance switches to the defined end state.

8.10 Configuring the signal outputs of the REG/EPROG socket

Three channels are available as signal outputs with the REG/EPROG socket. The voltage values or current values output via these channels can be processed externally.

The following values can be output:
- Setpoint: set set setpoint
- Internal: Value of the internal temperature sensor
- External: Value of an external Pt100 temperature sensor
- Power: Value of the control variable

Prerequisites
- ▶ The device is switched on.
- ▶ The plug-in unit with analog connections is installed.

Procedure
1. Call up the **<Main menu>**.
2. Call up the **<Connect device>** submenu.
3. In the **<Analog interfaces>/<Analog module>** submenu, select the **<Channel 1...3>** menu item.
4. Select the output variable Setpoint, Internal, External or Power in the drop-down window.
5. Enter the lowest output value for the 0 V value.
6. Enter the highest output value for the 10 V value.
7. Repeat steps 5 and 6 for channel 2 and channel 3 respectively.

   ⇨ The current output is configured for channel 3. 0 mA or 4 mA can be selected for the lowest output value.

✓ The signal outputs of the REG/EPROG socket are configured.

8.11 Activating the standby input

This section describes how to activate the standby input.

Prerequisites

- ▶ The device is switched on.
- ▶ The electronics module with analog connections is installed.

Procedure

1. Call up the <Main menu>.
2. Call up the <Connect device> submenu.
3. In the <Analog interfaces>/<Analog module> submenu, select the <Stand-by> menu item.
4. Select active in the selection window.

✓ The standby input is activated and can be used.

8.12 Adjusting the temperature sensor (ATC)

For physical reasons, a temperature difference can form in the bath tank between the temperature sensor and a defined, more distant point within the temperature control liquid volume. As a result, the measured temperature deviates slightly from the actual temperature in the bath. Adjusting the temperature sensor can increase the accuracy of the temperature control.

When adjusting a temperature sensor, the temperature difference between the temperature sensor and the reference thermometer is determined. Three adjustment options are available:

- 1-point adjustment: When a sample is tempered to a specific setpoint. The adjustment curve is shifted parallel to the original curve by the reference amount.
- 2-point adjustment: If the temperature is adjusted between two setpoints. The gradient of the temperature curve is adjusted between two points.
- 3-point adjustment: If the temperature is adjusted within a temperature range. This results in a curved temperature curve.

8.12.1 Adjusting the internal temperature sensor

This section describes how to adjust the internal temperature sensor of the device.

Prerequisites

- ▶ The bath tank is filled.
- ▶ The appliance is switched on.
- ▶ A calibrated reference thermometer is ready.

Procedure

1. Hang the calibrated thermometer in the bath.
2. Call up the **<Main menu>**.
3. In the **<Install device>** submenu, select the **<Adjust sensor>** menu item.
4. Set the mode for internal to inactive.

   ⇨ The input fields are unlocked.

5. For internal, enter the desired setpoint in the first line and confirm the entry.
6. Activate the blue number field in the first line.

   ⇨ Temperature control is started. Allow the reference thermometer to settle for 10 minutes.

7. Enter the measured reference value in the first line in the Cal. column.
8. If necessary, repeat steps 5 to 7 for a 2-point or 3-point adjustment.
9. Activate the mode for the desired number of measuring points and press the **[Save]** softkey.

   ⇨ The saved correction values are active immediately.

✓ The internal temperature sensor is adjusted.

8.12.2 Adjusting the external temperature sensor

Measurable temperature differences can also occur in a connected application. As with the internal temperature sensor, adjusting the external temperature sensor can improve the accuracy of the temperature control in the application.

Prerequisites

- ▶ The device is switched on.
- ▶ External control is active.
- ▶ An external temperature sensor is connected.
- ▶ The bath tank is at least two thirds full.
- ▶ A calibrated reference thermometer is available.

Procedure

1. Hang the reference thermometer in the connected external bath tank.
2. Call up the **<Main menu>**.
3. In the **<Install device>** submenu, select the **<Adjust sensor>** menu item.
4. Set the mode for external to inactive.

   ⇨ The input fields are unlocked.

5. For external, enter the desired setpoint in the first line and confirm the entry.
6. Activate the blue number field in the first line.

   ⇨ Temperature control is started. Allow the reference thermometer to settle for 10 minutes.

7. Enter the measured reference value in the first line in the Cal. column.
8. If necessary, repeat steps 5 to 7 for a 2-point or 3-point adjustment.
9. Activate the mode for the desired number of measuring points and press the **[Save]** softkey.

   ⇨ The saved correction values are active immediately.

✓ The external temperature sensor is adjusted.

8.13 Reset device

This function is used to reset the device to the factory settings.

Prerequisites

▶ The device is switched on.

Procedure

1. Call up the <Main menu>.
2. In the <Install device> submenu, select the <Reset device> menu item.
3. To reset the device, confirm the security prompt with [OK].

✓ The device is reset to the factory settings.

9 Cleaning and maintenance

9.1 Maintenance intervals

The table lists the regular maintenance work according to their maintenance intervals. The specified maintenance intervals refer to single-shift operation. The times given are approximate values.

Interval	Activity	Qualification	Duration [min]
Every 6 months	Check the function of the low level protection	Operator	15
Every 6 months	Check the function of the overtemperature protection	Operator	5
	Calibrate gas detector (only for appliances with flammable refrigerant)	JULABO Technical Service	-
Every 2 years	Check safety markings	Operator	1

ADVICE

For the JULABO maintenance and service offer, contact JULABO Sales or Service.

9.2 Emptying the appliance

If the appliance is to be sent in for technical service or disposed of properly, it must be completely drained.

The appliance should always be completely emptied before it is taken out of service for any length of time and when the external application is changed.



CAUTION

Risk of scalding from hot temperature control medium!
The temperature control medium can become very hot during the temperature control process. Contact with hot temperature control medium can lead to scalding.

- Allow the appliance to cool down to room temperature before emptying.
- Avoid direct contact with hot temperature control medium
- Wear protective gloves.

Prerequisites

▶ The device is switched off.
▶ The appliance is at room temperature.
▶ The external application is disconnected from the appliance.
▶ A sufficiently large collection container is available under the drain of the appliance.

Procedure

1. Remove the bath cover.
2. Open the drain valve.

   ⇨ The temperature control fluid flows into the collecting vessel provided.

3. When the appliance is completely empty, close the bath tank.
4. Close the drain valve.

✓ The appliance is drained.

9.3 Cleaning the appliance

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

ADVICE

Damage to the electronics due to water ingress!
Water ingress can damage the electronics of the appliance and cause it to fail.
- Only clean the outside of the appliance with a damp cloth.
- Prevent water from entering the appliance .

Requirements
- ▶ Lint-free cloth
- ▶ Mild cleaning agent
- ▶ The appliance is switched off.
- ▶ The appliance is disconnected from the power supply.

Procedure
1. Clean the surface of the appliance with a damp cloth.
   ADVICE You can use a little washing-up liquid for cleaning. If in doubt, ask Technical Service for alternative cleaning agents.

✓ The appliance is cleaned.

9.4 Cleaning the condenser

The condenser at the front of the appliance should be cleaned from time to time in order to maintain full cooling capacity.



WARNING

Leakage of flammable refrigerant!
The appliance contains flammable refrigerant in a technically permanently sealed circuit. In the event of a leak in the refrigerant circuit, a flammable concentration may form in the air, which may ignite or explode due to potential ignition sources in the vicinity. This can lead to serious injury or death.

- Observe the prescribed minimum room size for operating the appliance.
- Do not damage refrigerant lines.
- Do not damage the fins of the condenser.
- If refrigerant leaks, switch off the appliance immediately, keep naked flames and ignition sources away, ventilate the room well.

Prerequisites

▶ The appliance is switched off.
▶ The appliance is disconnected from the power supply.
▶ The appliance has cooled down to room temperature.

Procedure

1. Remove the ventilation grille from the front of the appliance.
2. Carefully vacuum the dirt from the condenser with a vacuum cleaner.
   ⚠ **CAUTION** Take care not to damage the fins of the condenser.
3. Replace the ventilation grille.

✓ The condenser has been cleaned.

9.5 Replacing the detachable power cable

The appliance is equipped with a detachable mains cable.

The appliance may only be operated with the mains cable supplied. If the mains cable needs to be replaced due to a defect, it can be reordered.

9.6 Checking the function of the underlevel protection

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



CAUTION

Risk of scalding from hot temperature control medium!
The temperature control medium can become very hot during the temperature control process. Contact with hot temperature control medium can lead to scalding.

- Allow the appliance to cool down to room temperature before emptying.
- Avoid direct contact with hot temperature control medium
- Wear protective gloves.

Prerequisites

▶ The appliance is switched on.
▶ The appliance is at room temperature.
▶ The external application is disconnected from the appliance.

9.7 Checking the safety markings

Affixing safety labels

The following section only applies to appliances with natural refrigerants that are operated in the USA or Canada.

The safety markings on the appliance must be clearly legible at all times. Their condition must be checked every two years.

Procedure

1. Check the safety markings on the appliance for legibility and completeness.
2. Replace defective or missing safety labels.
   ADVICE Safety labels can be reordered from JULABO.

✓ The safety labels on the appliance have been checked.

9.8 Technical service

In the event of faults on the appliance that the operator cannot rectify himself, contact Technical Service.

JULABO GmbH Technical Service
Gerhard-Juchheim-Strasse 1
77960 Seelbach/Germany
Phone: +49 7823 51-66
E-Mail: Service.de@julabo.com

ADVICE

Observe the following points before sending the device to the Technical Service:

- Clean and decontaminate the device properly to prevent any risk to service personnel.
- Enclose a brief description of the fault.
- Pack the device securely for shipment.

9.9 Warranty

The following warranty terms apply to products sold in North America by Julabo (“Seller”) to the entity identified as the buyer (“Buyer”) on the Seller's invoice.

Initial Warranty

Upon Seller's receipt of full payment for the Products, and subject to Buyer's compliance with the Terms of Sale and all other agreements with Seller with respect to the Products, Seller warrants to Buyer that the Products manufactured by Seller will be 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 Seller to Buyer (the “Initial Warranty”).

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

OTHER THAN THE INITIAL WARRANTY, NO OTHER EXPRESS WARRANTIES ARE GIVEN. 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 ALL RESPECTS AND FOR ALL PURPOSES. SELLER DISCLAIMS AND MAKES NO IMPLIED WARRANTIES OF ANY KIND.

Exclusions

The initial warranty does not cover damage to the product resulting from accident, misuse, improper installation or operation, unauthorized or improper repair, replacement or alteration (including, but not limited to, repair, replacement or alteration performed by anyone other than Seller's employees or authorized representatives), failure to perform (or improper performance of) maintenance, unreasonable or unintended use or misuse of the product, or failure to follow written installation or operating instructions.

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

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

Buyer's sole and exclusive remedy under the Initial Warranty shall be limited, at Seller's sole discretion, to either: (i) repair of defective parts; or (ii) replacement of defective parts. In either case, the warranty period for the product receiving a repaired or replaced part under the terms of the original warranty will not be extended. Any repairs or replacements made by Seller under this warranty shall be made at one of Seller's facilities in Allentown, Pennsylvania, U.S.A., or at the facility of an authorized representative of Seller, which location shall be determined by Seller in its sole discretion; provided, however, that Seller may, in its sole discretion, make such repairs or replacements at Buyer's facility, in which case Buyer shall be responsible for travel, living and other expenses incurred by Seller in making such repairs or replacements at Buyer's facility. As a condition precedent to Seller's obligation to repair or replace any Product part under the Initial Warranty, Buyer shall (i) promptly notify Seller in writing of any such defect; (ii) return the proof of purchase of the Product to Seller or Seller's authorized representatives within thirty (30) days from the date the Product was shipped by Seller; and (iii) assist Seller in all respects in its attempts to determine the legitimacy and basis of any claim made by or on behalf of Buyer, including, but not limited to, granting Seller access to the Product to verify the operating conditions. If Buyer fails to notify Seller in writing within the Initial Warranty Period or fails to return the proof of purchase of the Product as described above, Seller shall have no further liability or obligation to Buyer therefor. In no event shall Seller's liability under the Initial Warranty exceed the original purchase price of the Product that is the subject of the alleged defect.

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

CONSEQUENTIAL DAMAGES TO BUYER OR ANY THIRD PARTY, AND ALL SUCH DAMAGES ARE HEREBY DISCLAIMED.

Assignment

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

Governing Law

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

Waiver

Seller's failure to insist upon strict compliance with the terms of this warranty shall not constitute a waiver of such right. No claim or right arising out of any breach of warranty by Buyer may be waived in whole or in part by a waiver of the claim or right unless the waiver is in writing and signed by an authorized representative of Seller. Seller's waiver or acceptance of any breach by Buyer of any provision of the Warranty shall not constitute a waiver or excuse for failure to comply with any other provision of the Warranty or for any prior or subsequent breach of the same provision.

Freight

Seller shall arrange and pay for the cost of returning the device to Buyer.

Out of Box Failure (OBF)

Out of Box Failure (OBF) is defined as a product failure immediately after unpacking and installation of a newly delivered product. JULABO grants a 14-day grace period after the date of shipment within 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 transport damage, damage caused by the customer or third parties, or for defects caused by 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 described in the table, or if the error continues to occur after switching off and on again, contact Technical Service.

Code	Cause	Action
-01	The appliance is being operated when the fill level is too low.	Top up the temperature control medium. Check temperature control hoses for damage and replace if necessary.
-03	The measured temperature is above the set overtemperature limit.	Increase the “Overtemperature” temperature limit or reduce the temperature setpoint.
-04	The measured temperature is below the set under-temperature limit.	Reduce the “Undertemperature” temperature limit or increase the temperature setpoint.
-05	The line of the working temperature sensor is interrupted or short-circuited.	Contact JULABO Service.
-06	There is too great a temperature difference between the working temperature sensor and the safety temperature sensor.	Increase the circulation. Check the viscosity of the temperature control medium. If the fault is not rectified, contact Technical Service.
-14	The set protective temperature has been exceeded.	Check the working temperature range of the application. Increase the value of the protective temperature or reduce the setpoint temperature until it is lower than the set protective temperature.
-15	The cable of the external temperature sensor is short-circuited or interrupted.	Check the electrical connection to the external temperature sensor.
-33	The line of the safety temperature sensor is short-circuited or interrupted.	Contact JULABO Service.

Code	Cause	Action
-38	The setpoint specification is set to external temperature sensor, but there is no signal.	Check whether an external temperature sensor is connected or whether the electrical connection is interrupted. If necessary, change the setpoint setting.
-40	The low level protection signals a critical fluid level.	Top up the temperature control medium.
-41	The early warning system for excess level reports a critical fluid level.	Drain the temperature control medium.
-60	Internal read/write error.	Switch off the device at the power switch, wait 4 seconds and then switch the device back on.
-61	Connection error between thermostat and chiller	Check connection cable for damage and replace if necessary. Switch the device back on. If the error has not been rectified, contact Technical Service. Alternatively: Deactivate the cooling unit. The thermostat is working as a heating thermostat.
-63	Watchdog function has tripped.	Switch off the device at the mains switch, wait 4 seconds and then switch the device back on.
-70	Device is operated with incompatible voltage or frequency or the device is incorrectly configured.	Check the permissible operating voltage of the device and its configuration.
-72	Configuration between thermostat and connected chiller failed.	Switch off the appliance at the mains switch, wait 4 seconds and then switch the appliance back on.
-83	Excessive power consumption via USB interface.	Check the inserted external data carrier for errors and replace if necessary. The USB interface is not suitable for consumers with a higher power requirement than the maximum permissible.
-108	The latching function of the protective device is still active.	Switch off the appliance at the mains switch, wait 4 seconds and then switch the appliance back on.
-116	The latching function of the safety device is still active.	Switch off the appliance at the mains switch, wait 4 seconds and then switch the appliance back on.

Code	Cause	Action
-401	The cable of the evaporator outlet temperature sensor is short-circuited.	Contact JULABO Service.
-402	The line of the evaporator outlet temperature sensor is interrupted.	Contact JULABO Service.
-413	The evaporator pressure sensor is short-circuited.	Contact JULABO Service.
-414	The evaporator pressure sensor is interrupted.	Contact JULABO Service.
-417	The condensation pressure sensor is short-circuited.	Contact JULABO Service.
-418	The condensation pressure sensor is interrupted.	Contact JULABO Service.
-427	Fault in the 1st stage of the refrigeration system.	Check ambient temperature and reduce if necessary. Check condenser for soiling and clean if necessary. Switch off the appliance at the power switch, wait 4 seconds and then switch the appliance back on. For water-cooled appliances: Check cooling water temperature and supply. If the fault is not rectified, contact Technical Service.
-431	The maximum permissible current consumption at the compressor has been exceeded.	Check mains voltage for nominal voltage. If the fault has not been rectified, contact Technical Service.
-503	External setpoint specification set via EPROG, but no analog module connected.	Connect analog module or deactivate external setpoint setting via EPROG.
-1109	Viscosity of the temperature control medium too high or circulation too low.	Check the temperature control medium for suitability in the temperature range used or adjust the circulation.
-1305	The speed limit for the heating power blocking has not been reached. Motor defective or viscosity of the medium too high.	Check the pump setting and adjust if necessary. Check the viscosity of the temperature control medium and adjust if necessary.
-1427	Pressure sensor detects too high compensation pressure.	Check ambient temperature and reduce if necessary.

Code	Cause	Action
		Check condenser for soiling and clean if necessary. Switch off the appliance at the mains switch, wait 4 seconds and then switch the appliance back on. For water-cooled appliances: Check cooling water temperature and supply. If the fault is not rectified, contact Technical Service.
-1431	The current consumption at the compressor has fallen below the minimum permissible value.	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.

11 Disposal

Observe the applicable country-specific guidelines when disposing of the appliance.



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.



ADVICE

Disposal of the appliance with household waste or similar municipal collection systems is not permitted.

12 Appendix

12.1 Interface commands

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

The interface commands are entered via a terminal program.

Interface commands are divided into IN commands and OUT commands.

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

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

  Example: Querying the setpoint temperature:
  IN_SP_00←

  Example response from the device:
  55.5 ← LF

- OUT commands: Set parameters (only in remote control mode)
  Command structure: Command + ␣ + parameter + ←

  Ex. 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	Actual temperature value
in_pv_01	Current manipulated variable [%]

Setpoints and warning limits	Comment
in_sp_00	Set temperature setpoint
in_sp_03	Set overtemperature warning limit
in_sp_04	Set undertemperature warning limit
in_sp_07	Set pump stage
in_sp_11	Set temperature unit: 0 = °C 1 = °F
in_sp_27	Set pump setting
in_sp_28	Overtemperature alarm limit
in_sp_29	Undertemperature alarm limit

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

Auxiliary parameter	Comment
in_hil_00	Set control value limitation of the cooling capacity (%)
in_hil_01	Set control value limitation of the heating output (%)

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 excess temperature
out_sp_04	Setting the lower temperature
out_sp_07	Setting the pump stage
out_sp_11	Setting the temperature unit: 0 = °C 1 = °F
out_sp_27	Pump output [%]
out_sp_28	Overtemperature alarm limit setting
out_sp_29	Undertemperature alarm limit setting

Device modes	Comment
out_mode_05	Start/stop command of the device in remote control mode: 0 = Stop temperature control 1 = Start temperature control

Auxiliary parameter	Comment
out_hil_00	Setting the control value limitation of the cooling capacity (0 - 100%)
out_hil_01	Setting the control value limitation of the heating output (0 - 100%)

12.2 Status messages

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