JUMO eTRON T100

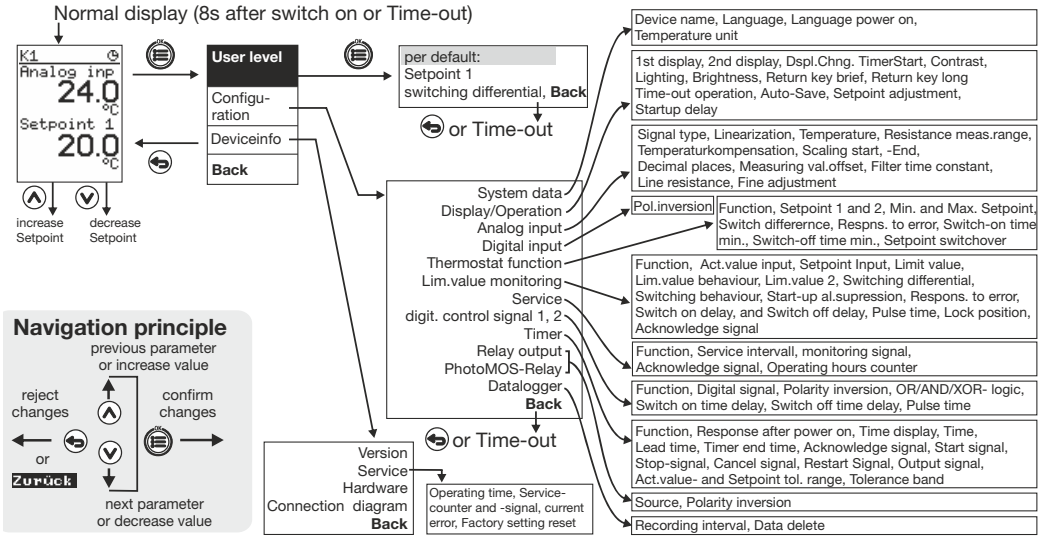
Electronic Thermostat with Timer

Operating instructions

70105200T90Z001K000

V1.00/EN/00712587/2019-10-24

Operating overview



1 Brief description

The electronic thermostat acquires the temperature via a RTD temperature probe, thermocouple, or current 0(4) to 20 mA and can be configured as a simple heating or cooling thermostat depending on the set switching behavior.
Using the timer function, it is possible to control time-limited functions such as setpoint changeover.

The switching statuses of the relay and of the optional digital input and digital output, as well as the actual value and setpoint value are shown simultaneously in the display. It has a resolution of 64 × 80 pixels, has background lighting, and can be switched to the national languages German, English, French, and Spanish.

The device is operated via 4 keys on the front panel. The electrical connection is carried out via terminal blocks with PUSH IN technology.

A PhotoMOS® relay or a digital input for connecting a potential-free contact are available as options. A setup program is available as an accessory for simple configuration, parameterization, and reading out of the data logger.

1.1 Safety information

Symbol	Meaning	Explanation
	Note	This symbol refers to important information about the product, its handling, or additional benefits.
	Danger	This symbol indicates that personal injury from electrocution may occur if the appropriate precautionary measures are not taken.
	Caution	This symbol in connection with the signal word indicates that **material damage** or **data loss** will occur if the respective precautionary measures are not taken.

Symbol	Meaning	Explanation
	Warning	This symbol in connection with the signal word indicates that **personal injury** may occur if the respective precautionary measures are not carried out.
	Read	This symbol, which is attached to the device, indicates that the associated device documentation must be followed. This is necessary in order to recognize the nature of the potential danger and take the necessary measures to prevent it. Manipulations not described in the operating manual or expressly forbidden will jeopardize your warranty rights.
⇨	Reference	This symbol refers to further information in other manuals, chapters, or sections.
abc[1]	Footnote	Remarks at the end of a page that **refer to** specific text passages and are marked with a number placed in superscript.
*	Action instruction	The steps (marked with an asterisk) must be carried out one after another in the reading order.

2 Identifying the device version

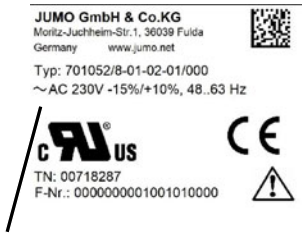
Caution
The voltage supply that is connected must correspond to the voltage specified on the nameplate!

The device can be supplied with power via the USB socket for testing purposes, and configured (relay does not activate).

* Press key  and under **Menu->Deviceinfo->Hardware** you will find information about the power supply unit, input, and options.

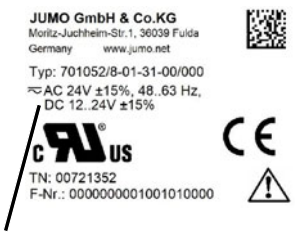
The nameplate is affixed to the side of the device.

2 Identifying the device version



Voltage supply AC 230 V:

Voltage supply AC 115 V:



Voltage supply AC/DC 24 V:

	(1)	**Basic type**
701052		eTRON T100 for mounting on DIN rail (1 relay output changeover contact 10A)
	(2)	**Version**
8		Standard with default settings
9		Customer-specific configuration (specifications in plain text)
	(3)	**Input**
01		RTD temperature probes Pt100, Pt1000, KTY2X-6
02		Thermocouple
03		Current 0(4) to 20 mA
04		NTC (5 kΩ at 25 °C) for railway applications
05		Ni1000 DIN 43760, Ni1000 Landis & Gyr TK 5000 for railway applications
	(4)	**Voltage supply**
02		AC 230 V, +10/-15 %, 48 to 63 Hz
05		AC 115 V, +10/-15 %, 48 to 63 Hz
31		DC 12 to 24 V +15/-15 %[a] / AC 24 V +15/-15 %, 48 to 63 Hz (the device may only be connected to SELV or PELV electrical circuits)

(5)	Options
00	None (connection of RTD temperature probes in three-wire circuit is possible)
01	Digital output PhotoMOS® relay (connection of a three-wire circuit **is not** possible)
02	Digital input for potential-free contact (connection of a three-wire circuit **is not** possible)
(6)	**Extra codes**
950	Suitable for railway applications according to DIN EN 50155[a], declaration of manufacturer at http://www.jumo.de

a. The only DC voltage supply approved for railway applications (extra code 950) is DC 24 V +15/-15 %

	(1)	/	(2)	-	(3)		(4)		(5)		(6)
Order code		/		-		-		-		/	
Order example	701052	/	8	-	01	-	02	-	00	/	950

2.1 Scope of delivery

- Type 701052 in the ordered version
- 1 operating manual (leaflet)

⇨ A detailed version of the documentation is available for download via QR code.

2.2 Service addresses

⇨ See back cover, at the end of the leaflet

Caution
Any interference with the inside of the device is prohibited!
Repairs may only be performed by JUMO in the company's headquarters in Fulda.
If you have any problems, please contact the nearest branch office or the head office.

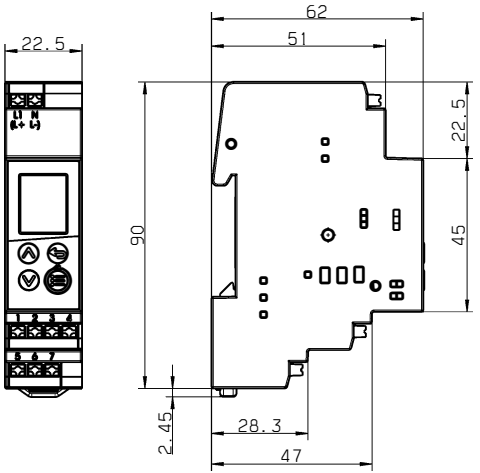
2.3 Care and treatment of the front cover

The front plate can be cleaned with commercial detergents, rinsing, and cleaning agents.

3 Mounting

3.1 Dimensions

The device size described in DIN 43880 (Built-in equipment for electrical installations; overall dimensions and related mounting dimensions) is complied with.



3.2 Mounting site, DIN-rail mounting

Warning
The device is **not** suitable for installation in potentially explosive areas.
The device is clipped to a 35-mm DIN rail (DIN EN 60715) from the front and locked into place by pressing downwards.

- The ambient conditions at the mounting site must meet the requirements specified in the technical data.

  ⇨ Chapter 8 "Technical data"

- Install it in a way that, insofar as possible, it is free from vibration.
- The atmosphere must be free from aggressive media (e.g., strong acids and lyes), as well as free from dust, flour, or other suspended solids to prevent blocking of the cooling slots!

3.3 Close mounting

- Maintain the minimum distance of 20 mm above and below.

  1. So that the release slot can still be accessed with a screwdriver from the bottom.
  2. So that when dismounting, the device can be swiveled upwards and removed from the DIN rail.

- Several devices can be mounted right next to one another without a minimum distance.

4 Electrical connection

4.1 Installation notes

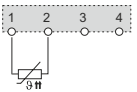
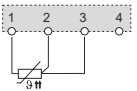
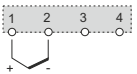
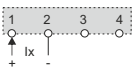
- Check to see if the device is installed in a manner appropriate to the application (temperature measurement) and that it is operated within the admissible plant parameters. When it comes to controlling heating processes, overtemperature protection or another form of safety equipment that is independent of the device must be used for monitoring that the process functions properly.
- The device is intended to be installed in control cabinets, machines, or plants.
  Ensure that the customer's fuse protection does not exceed 20 A.
- Disconnect the device from the mains voltage on all poles prior to starting service or repair work.
- All incoming and outgoing lines without a connection to the power supply network should be laid with shielded and twisted lines. The shield must be grounded on the device side.
- Do not lay the input and output cables close to components or lines through which current is flowing.
- Do not connect any additional loads to the screw terminals for the voltage supply of the device.
- Both the choice of cable material for the installation as well as the electrical connection of the device must conform to the local requirements of VDE 0100 "Regulations on the Installation of Power Circuits with Nominal Voltages below 1000 V" or the appropriate regulations for the country.
- Suitable measures must be taken to protect the relay circuit.
  The maximum switching capacity is 230 V, 10 A (resistive load).
- The electromagnetic compatibility conforms to the standards and regulations cited in the technical data.
  ⇨ Chapter 8 "Technical data"
- Compared with the USB interface, the analog input and digital input are not galvanically isolated.
  This is why, when connecting the USB interface, unwanted coupling via the protective conductor terminal may occur. Please test the isolation on the sensor side, or use a laptop in battery mode for setup applications.

Caution!
The electrical connection and settings in the configuration level up to system startup may only be carried out by qualified personnel.

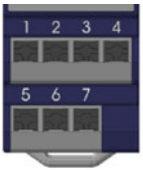
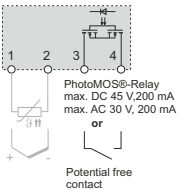
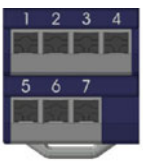
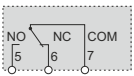
4.2 Connection diagram

The connection is made via terminal blocks with PUSH IN technology.

Conductor	Admissible cross section
Rigid or flexible	0.2 to 2.5 mm^2
Flexible with ferrule with or without plastic sleeve	0.25 to 2.5 mm^2
AWG	12 to 24
Stripping length	10 mm
Flammability class	V0

Screen	Connection	Symbol and terminal designation
4.2.1 Actual value of analog input		
	RTD temperature probe in 2-wire circuit	
	RTD temperature probe in 3-wire circuit	
	Thermocouple	
	Current 0(4) to 20 mA	

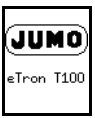
■ Default setting

Screen	Connection	Symbol and terminal designation
4.2.2 Digital input or output (option)		
 **Note:** If the PhotoMOS® relay or digital input option is selected, an RTD temperature probe **cannot** be connected in a 3-wire circuit.	**Digital input or PhotoMOS® relay K2**	
4.2.3 Digital outputs		
 ■ Default setting	**Relay output K1 (zero-current state)**	 Relay AC 250 V, 10 A

Screen	Connection	Symbol and terminal designation
4.2.4 Voltage supply (according to nameplate) ⇨ Chapter 2 "Identifying the device version"		
	**AC:** L1 line conductor N Neutral conductor	AC 115 V or AC 230 V
	DC: (L+) (L-)	DC 12 to 24 V or AC 24 V (The device may only be connected to SELV or PELV electrical circuits)

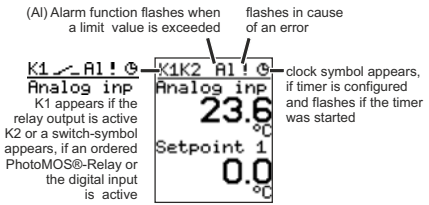
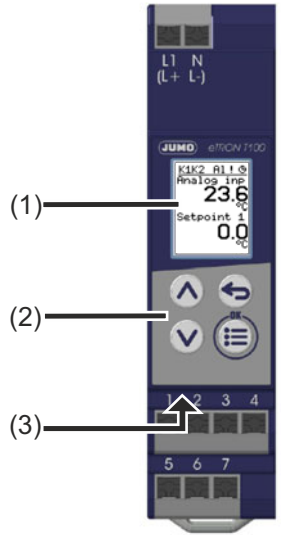
5 Starting operation of the device

5.1 Display and control elements

✱ Apply the voltage supply and you will see:  Then the actual value and setpoint value is displayed: 

⇨ If an error message appears, see Chapter 10 "Fehlermeldungen" (in the detailed operating manual).

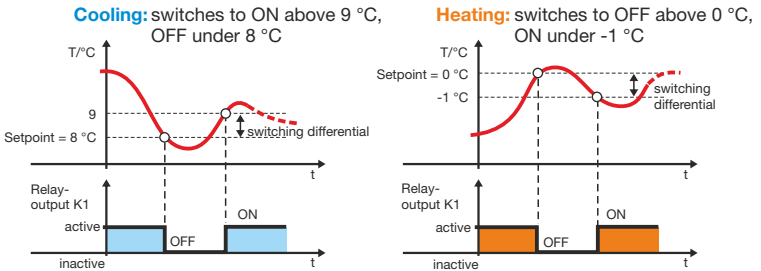
If a suitable temperature probe is connected, the device in the example shown here will display an actual value of 21.5 °C. The default setpoint value 1 is 0.0 °C.

Legend	Comment	Screen
1	**LCD display** Black/white with background lighting, 64 x 80 pixels  	
2	**Keys** Increase value / previous menu item Reduce value / next menu item Back / cancel change, (special function: quick return or press and hold key for longer) One level down in the menu, confirm change	
3	**USB device** For connection with the setup program.	

5.2 Checking device function

The default setting is **Thermostatfunction -> Function -> Heating**. Initially, the relay output K1 is disabled when the default setpoint value is 0 °C, because, at a room temperature of 20 °C, the setpoint value has already been reached, or even exceeded.

* If the probe is now cooled down to a temperature of below -1° C, the relay will activate and K1 will appear on the display.



Another way of carrying out the device test involves changing the setpoint value in the following way:

* From the normal display, press (v) or (^) until setpoint value 1 flashes.

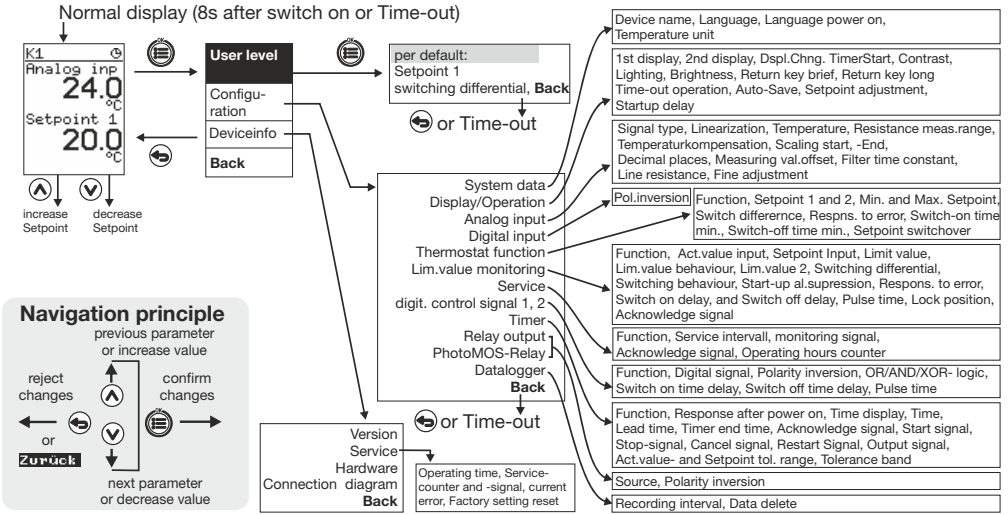
* Set a value that is at least 1K above the measured actual value and confirm with the OK key.

The relay switches OFF (K1 disappears from the display).

Information
All of the other parameters are outlined in the section on configuration in the detailed documentation.

6 Configuration

6.1 Overview

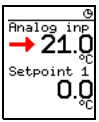
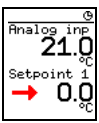


All parameters are freely accessible.
Default settings are shown in **(bold)**. All parameters are listed in the following tables.
Parameters which are not required are automatically hidden depending on the setting or hardware version.

6.2 System data

Parameter		Comment	Value range (default setting in **bold**)
6.2.1	**Device name**	The device name can only be changed via the setup.	**Name**
6.2.2	**Language**	German	**German**, English, French, Spanish
		English	
		French	
		Spanish	
6.2.3	**Language selection after "power on"**	Here you can select whether a language query is to appear when the device is switched on.	**On**, Off
6.2.4	**Temperature unit**	A unit for the measured value can be set here.	**°C**, °F
		°C	
		°F	

6.3 Display/operation

Parameter	Comment	Value range (default setting in **bold**)
6.3.1 Display 1 	It is set here which values appear in the normal display. ⇨ Chapter 6.1 "Overview"	- None **Analog input**, Setpoint value 1, 2 Current setpoint value Timer runtime Timer remaining running time Timer value Service counter Operating time
6.3.2 Display 2 		- None Analog input **Setpoint value 1** Setpoint value 2 Current setpoint value
6.3.3 Change of display when timer starts 	This value is shown at timer start at the bottom of the display. If "no function" is set, nothing will be shown and you can only see that the timer has been started due to the flashing clock at the top right in the left image.	**No function** Timer remaining running time Timer runtime

Parameter		Comment	Value range (default setting in **bold**)
6.3.4	**Contrast**	**Screen contrast:** Difference in brightness between black and white pixels	0 to **5** to 10
6.3.5	**Lighting**	The behavior for the backlight of the display is set here.	Off, **On**, During operation
		Always off: always switched off	
		Always on: always switched on	
		During operation: The background lighting is only switched on when the keys are operated and it lights up until the time for the timeout operation has expired.	
6.3.6	**Brightness**	The intensity of the backlight is set here in 10 brightness settings.	0 to **5** to 10
6.3.7	**Timeout lighting**	Only appears if "during operation" is set for lighting.	0 to **30** to 180 sec
6.3.8	**Short-press back button**	This button has the following special function if it is pressed briefly (< 3 s).	**No function** Display timer value
6.3.9	**Long-press back button**	This button has the following special function if it is pressed for a long time (> 2 s).	**No function** Display timer value
6.3.10	**Timeout operation**	After this time, the device returns to the normal display.	0 to **30** to 180 sec
6.3.11	**Auto save**	If a selected parameter flashes, it is only automatically taken over if "Yes" is set here; otherwise, it has to be acknowledged with .	**No** Yes

Parameter	Comment	Value range (default setting in **bold**)
6.3.12 Setpoint value adjustment	The setpoint value can be increased or reduced in the normal display in the default setting. ⇨ Chapter 6.1 "Overview" If this is not possible, "No" must be set here.	**Yes** No
6.3.13 Startup delay time	During the boot procedure, a hourglass runs with the set time. This prevents multiple devices from switching on at the same time.	**0** to 300 sec
6.3.14 Level inhibit	Access to the individual levels can be inhibited. Press and hold the ⓥ and ⓜ buttons at the same time for longer than 5 seconds to set the level inhibit. The corresponding degree of inhibition can be selected using the ⓐ and ⓥ buttons and confirmed using the ⓜ button.	**None** Configuration level Complete

6.4 Analog input, measurement input group 1 (type 701052/X-01...)

6.4.1 Signal type, RTD temperature probe in 2/3-wire circuit

6.4.2 Linearization	Comment	Measuring range (factory setting in **bold**)
Pt100	**IEC 60751:2008**	**-200 to +600 °C**
Pt1000	IEC 60751:2008	-200 to +600 °C
KTY2X-6	-	-50 to +150 °C
150 Ω to 3000 Ω	Customer table ⇨ Chapter 9.3 "Customer-specific linearization"	-
6.4.3 Resistance measuring range		400, 4000 Ω

6.5 Analog input, measurement input group 2 (type 701052/X-02...)

6.5.1 Signal type, thermocouple

6.5.2 Linearization	Comment	Measuring range (factory setting in **bold**)
Fe-CuNi "L"	**DIN 43710:1985-12**	**-200 to + 900 °C**
Fe-CuNi "J"	DIN EN 60584-1:2014	-210 to +1200 °C
NiCr-Ni "K"	DIN EN 60584-1:2014	-270 to +1300 °C
-15 to 75 mV	Customer table ⇨ Chapter 9.3 "Customer-specific linearization"	-
6.5.3 Temperature compensation	It is set here how the cold junction temperature is to be determined.	**Internal**, fixed at 0 °C

6.6 Analog input, measurement input group 3 (type 701052/X-03...)

6.6.1 Signal type, standard signal 0(4) to 20 mA

6.6.2 Linearization	Comment	Measuring range (factory setting in **bold**)
Linear	Linear: No sensor linearization	**Linear**, customer-specific
Customer-specific	Customer-specific: Via setup program ⇨ Chapter 9.3 "Customer-specific linearization"	
6.6.3 Temperature	None: Absolute: Relative:	**None**, absolute, relative
6.6.4 Scaling start	**Only with type 701052/X-03 with current input:** the set range can be scaled here. 4 to 20 mA -> 0 to 100 °C 0 to 20 mA -> 0 to 100 °C	-9999 to **0** to 9999 °C
6.6.5 Scaling end		-9999 to **100.0** to 9999 °C

6.7 Analog input, measurement input group 4 (type 701052/X-04...)

6.7.1 Signal type, NTC railway

6.7.2 Linearization	Comment	Measuring range (factory setting in **bold**)
NTC (5kΩ at 25 °C)	For railway applications	-55 to +150 °C
400 Ω to 40 kΩ	Customer table ⇨ Chapter 9.3 "Customer-specific linearization"	-

6.8 Analog input, measurement input group 5 (type 701052/X-05...)

6.8.1 Signal type, Ni1000 for railway

6.8.2 Linearization	Comment	Measuring range (factory setting in **bold**)
Ni1000	DIN 43760:1987-09	-60 to +250 °C
LG-Ni1000	Landis & Gyr TK5000 (Siemens HVAC)	-60 to +250 °C
150 Ω to 3000 Ω	Customer table ⇨ Chapter 9.3 "Customer-specific linearization"	-

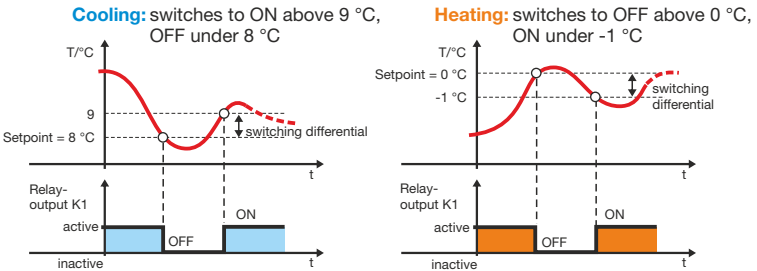
Parameter	Comment	Value range (default setting in **bold**)
6.8.3 Decimal places	**Automatic switching** None, one	**Auto,** XXXX, XXX.X

Parameter		Comment	Value range (default setting in **bold**)
6.8.4	**Measured value offset**	With the measured value offset, the linearized/scaled measured value can be shifted evenly by the value entered over the entire measuring range.	-9999 to **0.0** to 9999
6.8.5	**Filter time constant**	**Time constant of the digital input filter, 2nd order** If the input signal changes suddenly, approx. 26 % of the change is recorded following a period that corresponds to the filter time constant dF (2 × dF: approx. 59 %; 5 × dF: approx. 96 %). Value 0 means: filter switched off If the filter time is long: - Interfering signals are better absorbed - Measured value display responds more slowly to changes	0.0 to **0.6** to 100 sec
6.8.6	**Line resistance**	**Only applies to type 701052/X-01, 04, and 05 with resistance input:** Resistance of probe line (for 2-wire circuit)	**0.0** to 60 Ω
6.8.7	**Fine adjustment**	You can use the fine adjustment to correct the measured values of the analog input. This may become necessary if the scaling and measured value offset do not result in the desired display.	**Off**, On
6.8.8	**Actual start value**		-9999 to **0.0** to 9999
6.8.9	**Actual end value**		-9999 to **100.0** to 9999
6.8.10	**Target start value**		-9999 to **0.0** to 9999
6.8.11	**Target end value**		-9999 to **100.0** to 9999

6.9 Thermostat function

The functions heating or cooling always use the analog input as actual value and setpoint value 1.
A setpoint changeover to setpoint value 2 must be configured.

⇨ Chapter 6.9.10 "Setpoint changeover"



Parameter		Comment	Value range (default setting in **bold**)
6.9.1	**Function**	It is set here whether the thermostat function is to be "heating" or "cooling".	**Heating,** cooling
6.9.2	**Setpoint value 1**	The setpoint value 1 for heating or cooling is set here.	-9999 to **0** to 9999 °C
6.9.3	**Setpoint value 2**	The setpoint value 2 is set here.	-9999 to **0** to 9999 °C
6.9.4	**Minimum setpoint value**	Bottom setpoint limit	**-9999** to 9999 °C

Parameter		Comment	Value range (default setting in **bold**)
6.9.5	**Maximum setpoint value**	Top setpoint value limit	-9999 to **9999** °C
6.9.6	**Switching differential**	The switching differential of the thermostat function is set here.	-9999 to **1.0** to 9999
6.9.7	**Response in case of an error**	Behavior of the thermostat output in the event of a measured value error.	**Output off**, output on
6.9.8	**Min. switch-on duration**	It can be set here how long, for example, the cooling unit has to be switched on and switched off as a minimum. Please observe the instructions of the cooling unit manufacturer here.	0 to **9999** sec
6.9.9	**Min. switch-off duration**		0 to **9999** sec
6.9.10	**Setpoint changeover**	The default setting here is "no selection". This means that setpoint value 1 is used. A setpoint changeover can be triggered by the following digital signals: Example of setpoint changeover via timer: Set "timer output" as setpoint changeover - Set timer function to "on", enter start signal and timer time. - Start the timer - Once the timer is active, setpoint value 2 is used. If the timer time ends, it switched back to setpoint value 1.	**No selection** Digital input Thermostat output Limit value output Timer output Timer tolerance band signal Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button

6.10 Digital input

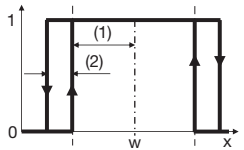
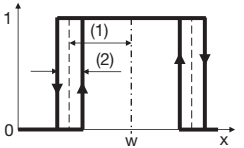
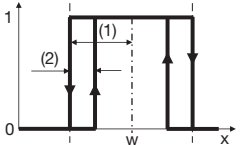
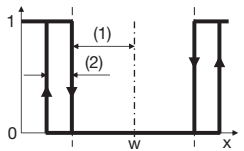
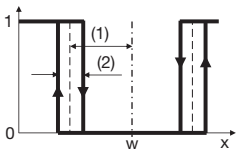
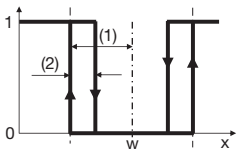
Parameter	Comment	Value range (default setting in **bold**)
6.10.1 Inversion	The switching status of the digital input is inverted here.	**Off**, On

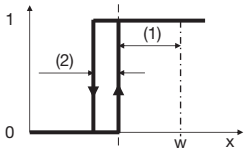
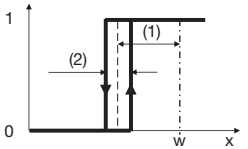
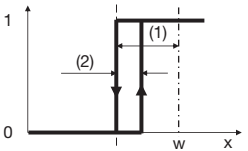
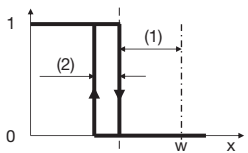
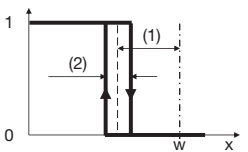
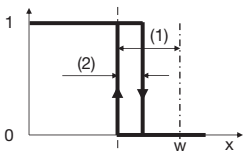
6.11 Limit value monitoring function

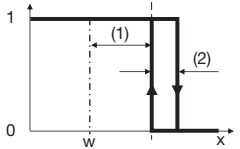
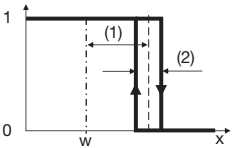
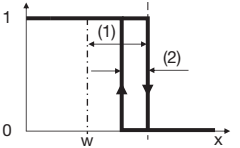
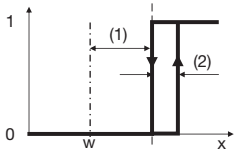
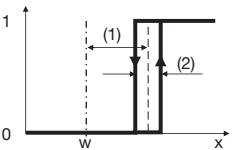
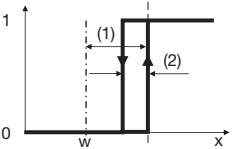
With this function, you can monitor the actual value x at the analog input with various switching functions.
The output signal ("0" or "1") can, for example, switch the relay output or the PhotoMOS® relay in the event of a limit value exceedance.

6.11.1 Switching functions in relation to setpoint value

AF1 and AF2 monitor whether the actual value x is in a symmetrical window around the setpoint value.

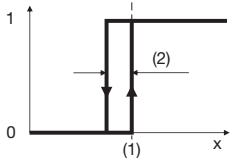
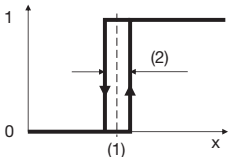
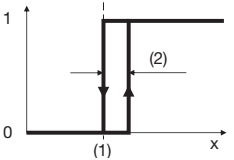
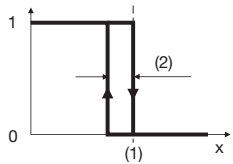
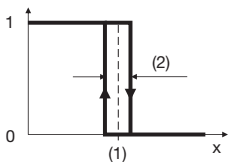
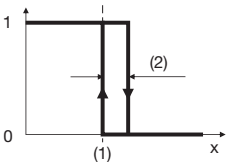
Switching behavior, left	Symmetrical	Right
Alarm function 1 (AF1): Window ON  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 1 (AF1):** Window ON  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 1 (AF1):** Window ON  (1) Distance from setpoint value, (2) Switching differential
Alarm function 2 (AF2): Window OFF  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 2 (AF2):** Window OFF  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 2 (AF2):** Window OFF  (1) Distance from setpoint value, (2) Switching differential

Alarm function 3 (AF3): OFF switching operation below set-point value  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 3 (AF3):** OFF switching operation below set-point value  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 3 (AF3):** OFF switching operation below set-point value  (1) Distance from setpoint value, (2) Switching differential
Alarm function 4 (AF4): ON switching operation below set-point value  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 4 (AF4):** ON switching operation below set-point value  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 4 (AF4):** ON switching operation below set-point value  (1) Distance from setpoint value, (2) Switching differential

Alarm function 5 (AF5): OFF switching operation above setpoint value  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 5 (AF5):** OFF switching operation above setpoint value  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 5 (AF5):** OFF switching operation above setpoint value  (1) Distance from setpoint value, (2) Switching differential
Alarm function 6 (AF6): ON switching operation above set-point value  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 6 (AF6):** ON switching operation above set-point value  (1) Distance from setpoint value, (2) Switching differential	**Alarm function 6 (AF6):** ON switching operation above set-point value  (1) Distance from setpoint value, (2) Switching differential

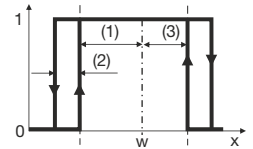
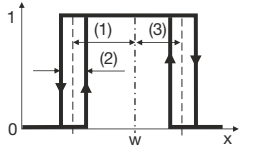
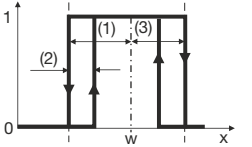
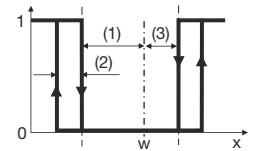
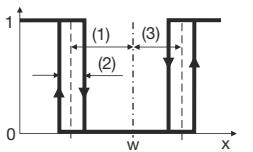
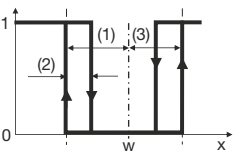
6.11.2 Switching functions in relation to limit value

AF7 and AF8 monitor (independently of the setpoint value) whether the actual value exceeds or falls below a fixed limit value.

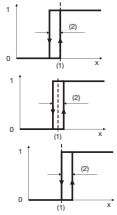
Switching behavior, left	Symmetrical	Right
Alarm function 7 (AF7): ON switching operation from a fixed limit value  (1) limit value, (2) switching differential	**Alarm function 7 (AF7):** ON switching operation from a fixed limit value  (1) limit value, (2) switching differential	**Alarm function 7 (AF7):** ON switching operation from a fixed limit value  (1) limit value, (2) switching differential
Alarm function 8 (AF8): OFF switching operation from a fixed limit value  (1) limit value, (2) switching differential	**Alarm function 8 (AF8):** OFF switching operation from a fixed limit value  (1) limit value, (2) switching differential	**Alarm function 8 (AF8):** OFF switching operation from a fixed limit value  (1) limit value, (2) switching differential

6.11.3 Unsymmetrical switching functions (with limit value 2)

If asymmetric is set for the limit value behavior, AF1 and AF2 monitor whether the actual value x is in an asymmetric window around the setpoint value.

Switching behavior, left	Symmetrical	Right
Alarm function 1 (AF1): Window ON  (1) Distance from setpoint value, (2) Switching differential,(3) Limit value 2	**Alarm function 1 (AF1):** Window ON  (1) Distance from setpoint value, (2) Switching differential (3) Limit value 2	**Alarm function 1 (AF1):** Window ON  (1) Distance from setpoint value, (2) Switching differential (3) Limit value 2
Alarm function 2 (AF2): Window OFF  (1) Distance from setpoint value, (2) Switching differential (3) Limit value 2	**Alarm function 2 (AF2):** Window OFF  (1) Distance from setpoint value, (2) Switching differential (3) Limit value 2	**Alarm function 2 (AF2):** Window OFF  (1) Distance from setpoint value, (2) Switching differential (3) Limit value 2

Parameter	Comment	Value range (default setting in **bold**)
6.11.4 Function	Switching behavior, as described in the images AF1 to AF8.	**No function** AF1, AF2, AF3, AF4, AF5 AF6, AF7, AF8
6.11.5 Actual value input	Actual value to be monitored (x axis)	**- None** Analog input Setpoint value 1
6.11.6 Setpoint value input	It is set here which signal is used as a setpoint value (w) for the alarm functions AF1 to AF6.	**- None** Analog input Setpoint value 1 Setpoint value 2 Current setpoint value
6.11.7 Limit value	For AF1 to AF6, this value is the distance from the set-point value, or for AF7 to AF8, it is a fixed switching point. In the images, (1) is the lower distance from the set-point value.	-9999 to **0** to 9999
6.11.8 Switching differential	The switching differential (2) determines the gap between the switch-on and switch-off threshold.	0 to **1** to 100 °C
6.11.9 Limit value behavior	If asymmetric is set here, limit value 2 also appears. This means that the two sides of the monitoring window can be set differently.	**Symmetrical**, Asymmetrical
6.11.10 Limit value 2	This value can only be set with the "asymmetric switching functions". In the images, (3) is the upper distance from the set-point value.	-9999 to **0** to 9999

Parameter	Comment	Value range (default setting in **bold**)
6.11.11 Switching behavior	It is set here on which side the set value for the switching differential is. 	**Left,** Symmetrical, Right
6.11.12 Startup alarm suppression	Off: The alarm function is always active. The limit value exceedance is also immediately transmitted to the output signal in the switch-on phase or in the event of parameter changes. ON: The AF output only becomes active when the 'valid range' has been reached for the first time. If, for example, the setpoint value is changed or the device is switched on, the limit value exceedance is not transmitted to the output signal.	**Off**, On
6.11.13 Behavior in the event of errors	It is set here which state the output is to adopt in the event of malfunction.	**Output off,** output on

Parameter	Comment	Value range (default setting in **bold**)
6.11.14 Switch-on delay	The relay only switches on or off after the entered time has elapsed.	**0** to 9999 sec
6.11.15 Switch-off delay		**0** to 9999 sec
6.11.16 Pulse time	Output is automatically deactivated after this time (in seconds)	**0** to 9999 sec
6.11.17 Lock	Off: Lock is not active. The output signal is reset once the actual value is back in the valid range. On: Lock is active. The lock can only be acknowledged if the actual value is back in the valid range.	**Off**, On
6.11.18 Acknowledgement signal	The following signals can acknowledge an active lock.	**No selection** Digital input Thermostat output Limit value output Timer output Timer tolerance band signal Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button

6.12 Service

Parameter	Comment	Value range (default setting in **bold**)
6.12.1 Function	Number of switching operations: Counts the switching frequency of a binary signal Time in hours: Counts the switch-on duration of a binary signal in hours Time in days: Counts the switch-on duration of a binary signal in days.	Number of switching operations Time in hours Time in days
6.12.2 Service interval	Limit value for the service counter or operating hours counter; when this limit value is exceeded, the service signal is set.	**0** to 9999
6.12.3 Monitoring signal	Signal whose number of low-high edges or the duration of the high status is to be acquired.	**No selection** Digital input Thermostat output Limit value output Timer output Timer tolerance band signal Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button
6.12.4 Acknowledgement signal	Signal with which the service signal can be acknowledge and reset. The service counter starts again at 0 after the acknowledgement.	
6.12.5 Operating hours counter	The counter adds up the operating hours during which the device was connected to the voltage supply. If the operating hours counter is switched off, the operating time is reset to 0.	**Off** Display in hours Display in days

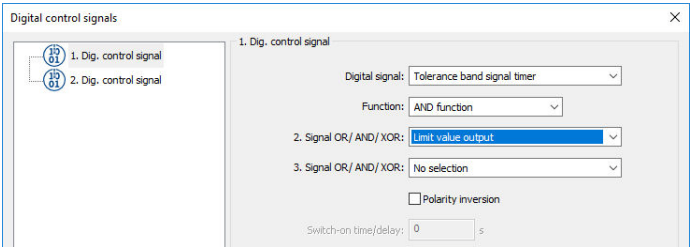
6.13 Digital control signals 1, 2

The device provides the option to configure up to 2 digital control signals individually and independently of one another.

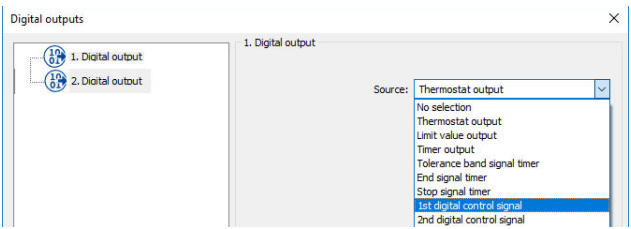
Parameter	Comment	Value range (default setting in **bold**)
6.13.1 Function	Pulse: A pulse-like signal is output as long as the input signal is active (high). Delay: The output signal follows the course of the input signal, whereby the transfer from low to high status and vice versa is delayed. Pulse function: The output signal is activated for the duration of the pulse time for the rising edge of the input signal. Rising edge: The output signal is activated for the duration of a sampling interval for the rising edge of the input signal. Falling edge: The output signal is activated for the duration of a sampling interval for the falling edge of the input signal. OR function: Logical OR connection of a maximum of 3 digital signals AND function: Logical AND connection XOR function: Logical XOR connection	**Without function** Pulse Delay Pulse function Rising edge Falling edge OR function AND function XOR function

Parameter		Comment	Value range (default setting in **bold**)
6.13.2	**Digital signal**	The following signals from this digital selector can be used as an input for the control signals 1, 2. **Note:** Signals (in brackets) are not suitable as an input signal here.	**No selection** Digital input Thermostat output Limit value output Timer output Timer tolerance band signal Timer end signal Timer stop signal (1st digital control signal) (2nd digital control signal) Service signal Short-press back button Long-press back button
6.13.3	**2nd signal OR/ AND/XOR**	Only appears if OR, AND, or XOR has been set under function. This signal is linked with the digital signal above and the 3rd signal, depending on the function.	
6.13.4	**3rd signal OR/ AND/XOR**	Only appears if OR, AND, or XOR has been set under function. This signal is linked with the digital signal above and the 2nd signal, depending on the function.	
6.13.5	**Inversion**	No: digital control signal 1, 2 is not inverted. Yes: digital control unit 1, 2 is inverted.	**No**, Yes
6.13.6	**Switch-on time/ delay**	In the case of the pulse function: Pulses only occur after the switch-on time has passed. In the case of the delay function: Delay time (in seconds) for the transition from low to high status	**0** to 9999
6.13.7	**Switch-off time/ delay**	In the case of the pulse function: Pulses only disappear after the switch-off time has passed. In the case of the delay function: Delay time (in seconds) for the transition from high to low status	**0** to 9999
6.13.8	**Pulse time**	The pulse signal is active for this period of time.	**0** to 9999 s

Example:
In the case of timer-controlled temperature regulation, it is to be monitored whether the actual value exceeds 100 °C. For this purpose, it is monitored with the tolerance band of the timer and a fixed limit value is programmed symmetrically at 100 °C with AF7. "Timer tolerance band signal" and "limit value output" are to have a logical AND relationship.



The 1st digital control signal is to be output on the PhotoMOS® relay and trigger an alarm horn once both conditions are met (timer tolerance band exceeded AND actual value over 100 °C).



6.14 Timer

Parameter		Comment	Value range (default setting in **bold**)
6.14.1	**Function**	The timer is switched on here.	**Off**, On
6.14.2	**Behavior after power on**	Setting as to what a running timer is to do for example after a power failure and subsequent power on.	**Cancellation**, continuation, restart
6.14.3	**Time display**	Setting of the time base	**hh:mm:ss** dd:hh:mm
6.14.4	**Timer time**	This is how long the timer is running for.	**00:00:00,** 23:59:59
6.14.5	**Lead time**	Waiting period after timer start until the timer actually starts running and the timer output signal is active.	**0** to 9999 s
6.14.6	**Timer end time**	Time period after timer end in which the "timer end signal" is switched to active (e.g. for control of an acoustic signal). -1: the timer is active until acknowledged	-1 to **0** to 9999 s
6.14.7	**Acknowledgement signal**	Acknowledgement signal: signal with which the timer end signal is acknowledged and reset.	**No selection** Digital input Thermostat output Limit value output Timer output Timer tolerance band signal Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button
6.14.8	**Start signal**	A signal is selected here which starts the timer.	
6.14.9	**Stop signal**	A signal is selected here with which you can stop the timer at any time up to the timer time has expired. The timer is stopped for as long as the stop signal is active. If the stop signal becomes inactive again, the timer continues from the remaining running time.	

Parameter	Comment	Value range (default setting in **bold**)
6.14.10 Cancellation signal	A signal is selected here which immediately stops and ends the timer. It can no longer continue, but can only be restarted.	**No selection** Digital input Thermostat output Limit value output Timer output Timer tolerance band signal Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button
6.14.11 Restart signal	A signal is selected here which restarts the timer.	
6.14.12 Output signal	Signal level of the timer output	**High active,** low active
6.14.13 Tolerance band actual value	The actual value for the tolerance band monitoring is set here.	**No selection** Analog input Setpoint value 1, 2 Current setpoint value Timer runtime Timer remaining running time Timer value Service counter Operating time
6.14.14 Tolerance band set-point value	The setpoint value for the tolerance band monitoring is set here.	
6.14.15 Tolerance band	The tolerance band range for the setpoint value to be monitored is set here. In the case it is exceeded, the digital signal "timer tolerance band signal" can be further processed, e.g. as a control signal. ⇨ Chapter 6.13 "Digital control signals 1, 2"	**0** to 9999

6.15 Relay output

Parameter	Comment	Value range (default setting in **bold**)
6.15.1 Source	This signal is output at the relay output.	No selection Digital input **Thermostat output** Limit value output Timer output Timer tolerance band signal Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button
6.15.2 Inversion	The signal is inverted	**No**, Yes

6.16 PhotoMOS® relay

Parameter	Comment	Value range (default setting in **bold**)
6.16.1 Source	This signal is issued at the PhotoMOS® relay.	**No selection** Digital input Thermostat output Limit value output Timer output Timer tolerance band signal Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button
6.16.2 Inversion	The signal is inverted	**No**, Yes

6.17 Data logger

Parameter	Comment	Value range (default setting in **bold**)
6.17.1 Recording rate	It is set here after how many minutes the device records a data record. The data record consists of: Measured value (value from analog input), Digital input (digital 1), Relay output (digital 2), PhotoMOS® relay (digital 3), Thermostat output (digital 4) and power on	**0** to 60 min
6.17.2 Delete data	Deletes the recorded data records in the data logger.	**No**, Yes

7.1 Version

Information is displayed here.

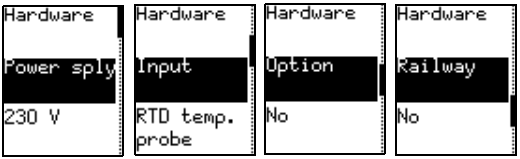
Parameter	Comment	Value range (default setting in **bold**)
7.1.1 Device software version	The device software version is displayed here.	
7.1.2 Fabrication number	The first 8 digits are the production order number: 02472588 Digit 9 and 10 manufacturing site Fulda: 01 Digit 11 (second row) device version: 0 Digit 12 and 13 year: 20**18** Digit 14 and 15 calendar week: 11 Digit 16 to 19 consecutive number: 0003	-
7.1.3 Hardware version	Display of the current hardware version	-
7.1.4 Hardware index	Display of the current hardware index	-

7.2 Service

Parameter	Comment	Value range (default setting in **bold**)
7.2.1 Operating time	Display of the counter reading of the operating hours counter.	
7.2.2 Service counter	Display of the counter reading of the service counter.	-
7.2.3 Service signal	Off: Service interval not configured or interval time not yet exceeded. On: Signal is output once the configured service interval has been exceeded.	Off, On
7.2.4 Current error	Errors are displayed here.	-
7.2.5 Reset default setting	Resets the device to the JUMO standard configuration.	

7.3 Hardware

The extra codes installed in the device are displayed here.

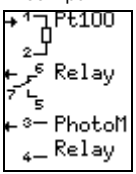


7.4 Connection diagram

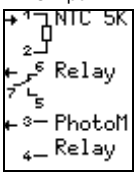
The terminal assignment is displayed here as well as which extra codes are installed in the device.

Examples:

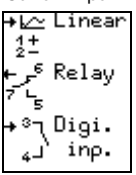
Pt100 input



NTC input



Current input



8 Technical data

8.1 Analog input

8.1.1 Measurement input group 1 (RTD temperature probe)

Designation	Standard	Measuring range	Measuring accuracy[a]	Ambient temperature influence	ITS
Pt100, Pt1000 in two/three-wire circuit	IEC 60751:2008	-200 to +600 °C	≤ 0.25 %	≤ 0.1×10^{-3} 1/K	90
KTY 2X-6 in two-wire circuit		-50 to +150 °C	≤ 1 %	≤ 0.1×10^{-3} 1/K	-
Customer table		150 Ω to 3000 Ω	≤ 0.25 %	≤ 0.1×10^{-3} 1/K	-

Measuring current	Approx. 0.5 mA
Sensor line resistance	≤ 30 Ω per line for two and three-wire circuit
Lead compensation	Not required for 3-wire circuit. In 2-wire circuits, lead compensation is performed in the software by entering a fixed line resistance.
Special features	Can also be programmed in °F

a The accuracy specifications refer to the maximum measuring range. Smaller measuring spans lead to reduced linearization accuracy.

8.1.2 Measurement input group 2 (thermocouple)

Designation	Standard	Measuring range	Measuring accuracy[b]	Ambient temperature influence[c]	ITS
Fe-CuNi “L”	DIN 43710:1985-12	-200 to +900 °C	±0.4 %	≤ 0.1×10^{-3} 1/K	68
Fe-CuNi “J”	DIN EN 60584-1:2014	-210 to +1200 °C	±0.4 % from -100 °C	≤ 0.1×10^{-3} 1/K	90
NiCr-Ni “K”	DIN EN 60584-1:2014	-270 to +1300 °C	±0.4 % from -80 °C	≤ 0.1×10^{-3} 1/K	90
Customer table		-15 to 75 mV	±0.4 %	≤ 0.1×10^{-3} 1/K	-

Measuring range start/end	Freely programmable within the limits in increments of 0.1 K
Cold junction	Internal measurement via Pt1000 or external constant 0 °C
Cold junction accuracy (internal)	±1 K
Special features	Can also be programmed in °F

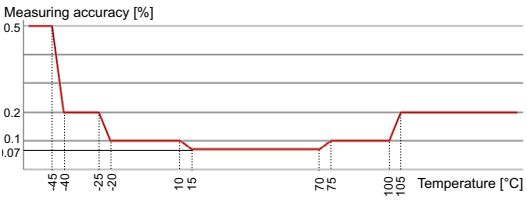
b The accuracy specifications refer to the maximum measuring range. Smaller measuring spans lead to reduced linearization accuracy.
c The ambient temperature influence is valid if it is in the range of -20 to +55 °C.

8.1.3 Measurement input group 3 (standard signal)

Designation	Measuring range	Measuring accuracy[d]	Ambient temperature influence
Current (voltage drop ≤ 2.5 V), freely scalable	0 to 20 mA 4 to 20 mA	≤ 0.125 %	≤ 0.1×10^{-3} 1/K, deviation of 22 °C
Customer table	0 to 20 mA	≤ 0.125 %	
Special features	Scaling adjustable		

d The accuracy specifications refer to the maximum measuring range. Smaller measuring spans lead to reduced linearization accuracy.

8.1.4 Measurement input group 4 (NTC railway)

Designation	Measuring range	Measuring accuracy	Ambient temperature influence
NTC resistance (5 kΩ at 25 °C) for railway applications	-55 to +150 °C		Deviation of 22 °C in the following ranges: -55 °C to 100 °C: ≤ 0.1×10 $^{-3}$ 1/K 100 °C to 130 °C: ≤ 0.2×10 $^{-3}$ 1/K 130 °C to 150 °C: ≤ 0.45×10 $^{-3}$ 1/K
Customer table	400 Ω to 40 kΩ	≤ 0.15%	≤ 0.1×10 $^{-3}$ 1/K
Connection type	Two-wire circuit		
Measuring current	Approx. 0.1 mA		

8.1.5 Measurement input group 5

Designation		Measuring range	Measuring accuracy[e]	Ambient temperature influence	ITS
Ni1000	DIN 43760:1987-09	-60 to +250 °C	≤ 0.2 %	≤ 0.1×10 $^{-3}$ 1/K, deviation of 22 °C	68

Designation		Measuring range	Measuring accuracy[e]	Ambient temperature influence	ITS
LG-Ni1000	Landis & Gyr TK5000 (Siemens HVAC)	-60 to +250 °C	≤ 0.2 %	≤ 0.1×10^{-3} 1/K, deviation of 22 °C	
Customer table		150 Ω to 3000 Ω	≤ 0.25%		
Sensor line resistance	≤ 30 Ω per line				
Connection type	Two-wire circuit				
Special features	Can also be programmed in °F				

e The accuracy specifications refer to the maximum measuring range. Smaller measuring spans lead to reduced linearization accuracy.

8.2 Measuring circuit monitoring

In the event of a malfunction, the outputs change to defined (configurable) statuses.

Measuring probe	Probe/cable break	Probe/cable short circuit
RTD temperature probe	Is detected	Is detected
KTY 2X-6	Is detected	Is detected
Thermocouple (single)	Is detected	Is not detected
Current 4 to 20 mA 0 to 20 mA	 Is detected Is not detected	 Is detected Is not detected
NTC railway applications	Is detected	Is detected
Ni1000, LG-Ni1000	Is detected	Is detected

8.3 Digital input and digital output

Designation	Function
Potential-free contact (option) or	For connection to a commercial switch or contact Switch-on resistance < 1 kΩ, switch-off resistance > 50 kΩ
PhotoMOS® relay (option)	Max. DC 45 V, 200 mA, max. AC 30 V, 200 mA
Relay output	Relay (changeover contact) AC 250 V, 10 A (resistive load) 150000 switching operations at rated load

8.4 Display

Type, resolution	Dot matrix LCD display with 64 × 80 pixels
Settings	Contrast, brightness, and backlight function

8.5 Housing

Site altitude	Maximum 2000 m above sea level
Housing type, material	Plastic housing, polycarbonate according to DIN EN 45545 (halogen free, use indoors only)
Flammability class	UL94 V0
Electrical connection	Via terminal blocks with PUSH IN technology
Mounting on	Mounting rail 35 mm × 7.5 mm according to DIN IEC 60715
Close mounting	Permitted
Installation position	Vertical
Protection type	IP20 according to DIN EN 60529

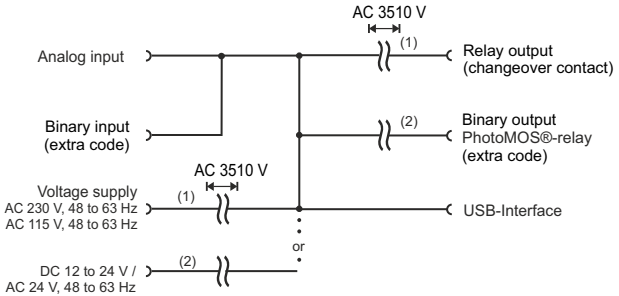
Weight	Approx. 110 g

8.6 Electrical data

Voltage supply	AC 230 V, +10/-15 %, 48 to 63 Hz or AC 115 V, +10/-15 %, 48 to 63 Hz or
	DC 12 to 24 V +15/-15 %[f] / AC 24 V +15/-15 %, 48 to 63 Hz (The device may only be connected to SELV or PELV electrical circuits)
Power consumption	With voltage supply 230 V: max. 1.5 W, 2.0 VA With voltage supply 115 V: max. 1.5 W, 2.0 VA With voltage supply DC 12 to 24 V: max. 0.7 W With voltage supply AC 24 V +15/-15 %: max. 0.8 W, 1.8 VA
Inputs and outputs Conductor cross section	Max. 2.5 mm^2, wire or stranded wire with ferrule
Electrical safety	According to DIN EN 61010-1 Overvoltage category III, pollution degree 2
Sampling rate	250 ms
Input filter	Digital filter, 2nd order; filter time constant can be adjusted from 0 to 100.0 s
Accuracy of timer and operating hours counter	1 %

f The only DC voltage supply approved for railway applications (extra code 950) is DC 24 V +15/-15 %

8.7 Galvanic isolation



(1) The voltage specifications correspond to the test voltages (alternating voltage, rms values) according to EN 61010-1:2011-07 for the type test.
(2) Functional galvanic isolation for the connection of SELV or PELV circuits.

8.8 Environmental influences

Operating, storage temperature range	-40 to +55 °C (display to min. -10 °C), -40 to +70 °C
Resistance to climatic conditions	≤ 85% relative humidity, annual average, no condensation
Electromagnetic compatibility Interference emission Interference immunity	According to DIN EN 61326-1, DIN EN 50121-1/50121-3-2 Class B[g] Industrial requirement

g The product is suitable for industrial use as well as for households and small businesses.

8.9 Approvals/approval marks

Approval mark	Test facility	Certificate/certification number	Inspection basis	Valid for
c UL us	Underwriters Laboratories	Approval submitted	UL 61010-1	All modules

8.10 Data logger

The configuration and the data logger data are saved in the EEPROM. They are retained after a power failure.

Recording rate	Recording duration
1 min	Approx. 1 day, 20 hours
5 min	Approx. 9 days, 8 hours
15 min	Approx. 28 days, 2 hours
30 min	Approx. 1 month, 25 days
60 min	Approx. 3 months, 9 days

9 Setup program

The program and the connecting cable are available as accessories and offer the following possibilities:

- Simple and convenient parameterization and archiving via PC
- Easy parameter duplication for identical types of devices

9.1 Hardware and software minimum requirements

- PC Pentium III or higher
- 500 MB free hard disk space
- CD-ROM drive
- Free USB interface, mouse connection
- Microsoft[1] Windows7 (32-bit) -> 1 GB RAM
- Microsoft[1] Windows7 (64-bit) -> 2 GB RAM

✱ Connect the device to the PC using the USB cable

9.2 Displaying the device software version

✱ Press the OK key

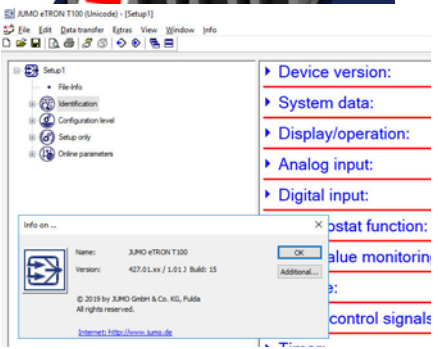
✱ Use ⌄ to switch to device info and press OK

✱ Press OK button and the software version appears.

The software versions of the device and the setup program must be compatible. Only the last two digits may be different, otherwise an error message appears!

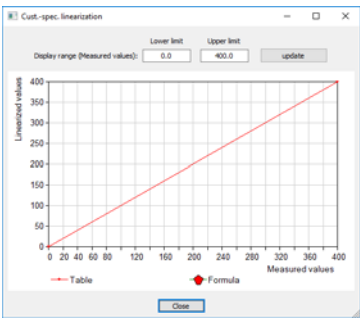
The version of the setup program appears under *Info* ⟹ *Info about set-up*.

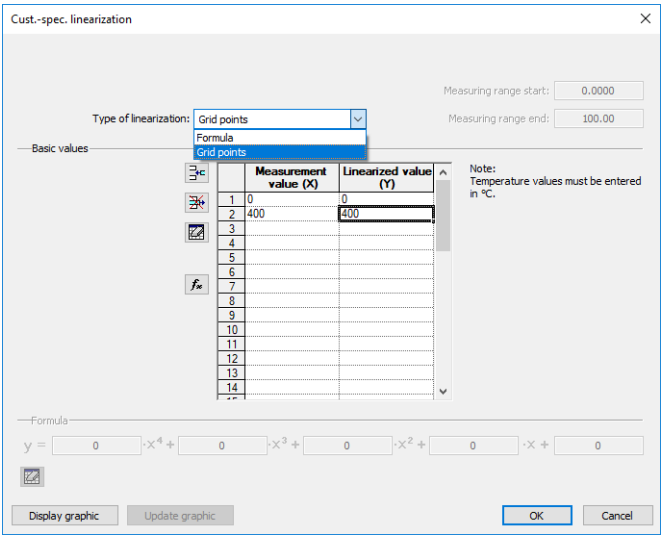
1. Microsoft® is a registered trademark of the Microsoft Corporation



9.3 Customer-specific linearization

A formula or 40 pairs of values (grid points) can be entered in the customer-specific linearization sub-menu.
In this example, the measuring range of 0 to 400 ohms is output linearly as a resistance value (not as a temperature).





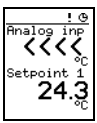
10 Error messages

10.1 Error messages

Display	Origin	Cause/remedy
Device not calibrated	Internal	✱ Return the device
Measured value	Internal	✱ The message cannot be acknowledged until it is within the admissible range again.
USB communication	Internal	✱ Restart device / return device.
EEPROM	Internal	✱ Restart device / return device.

10.2 Measured value recording

Display	Cause/remedy
<<<<	Underrange / check sensor configuration, check measuring chain
>>>>	Overrange / check sensor configuration, check measuring chain
- - - -	Value incorrectly configured (display 1: no selection set) See "1. Anzeige" on page 26. Value invalid, division by zero, probe short circuit or probe break ✱ Restart device, otherwise return device
++++	Error when recording the terminal temperature or with compensation signal ✱ Restart device, otherwise return device
****	Value cannot be displayed, display overrun ✱ Restart device, otherwise return device

Description	Cause	Remedy
The following appears in the display: 	**Setup program transmits data.** After data transmission, it returns back to the normal state.	✱ Wait until data transmission has finished
Arrow in display 	The analog input has a measured value error ⇨ Chapter 10.2 "Measured value recording"	✱ Check sensor and wiring at analog input.
Hourglass in display 	The device works with start time delay. ⇨ Chapter 6.3.13 "Startup delay time"	✱ If this behavior is not desired, the start time delay should be reconfigured.

12 China RoHS

产品组别 Product group: 701052 部件名称 Component Name	产品中有害物质的名称及含量 China EEP Hazardous Substances Information					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
外壳 Housing (Gehäuse)	○	○	○	○	○	○
过程连接 Process connection (Prozessanschluss)	○	○	○	○	○	○
螺母 Nuts (Mutter)	○	○	○	○	○	○
螺栓 Screw (Schraube)	○	○	○	○	○	○

本表格依据SJ/T 11364的规定编制。
This table is prepared in accordance with the provisions SJ/T 11364.
○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
Indicate the hazardous substances in all homogeneous materials' for the part is below the limit of the GB/T 26572.

×：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。
Indicate the hazardous substances in at least one homogeneous materials' of the part is exceeded the limit of the GB/T 26572.

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