

JUMO eTRON T100

Electronic Thermostat with optional PID two-state controller function

c **PA**®
US



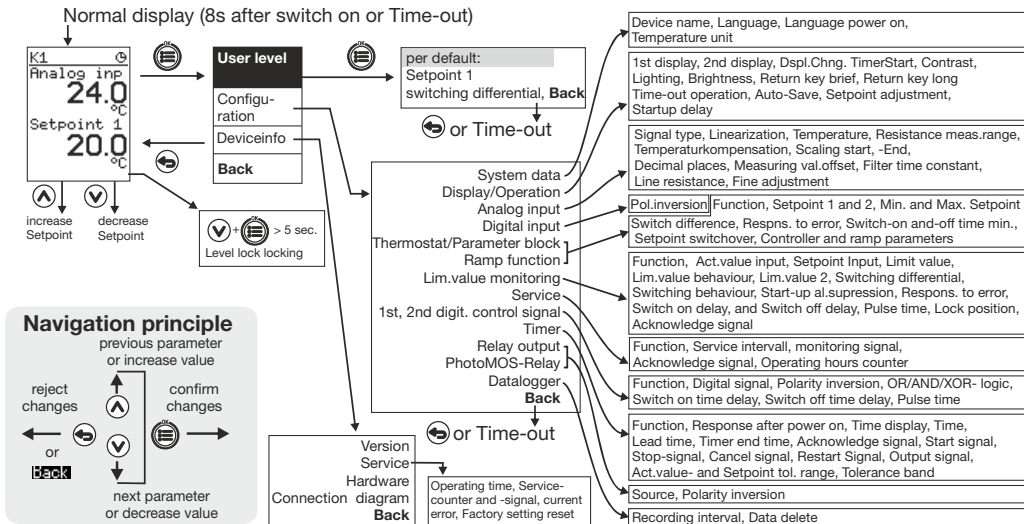
Operating instructions

70105200T90Z001K000

JUMO

V3.00/EN/00712587/2024-05-08

Operating overview



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1 Brief description

The electronic thermostat acquires the temperature via a RTD temperature probe, thermocouple, or current 0(4) to 20 mA. Depending on the set switching behavior, it can be used as a simple heating or cooling thermostat or, with extra code 033 as a two-point controller.




Using the timer function, it is possible to start and stop heating and cooling.



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

JUMO GmbH & Co.KG

Moritz-Juchheim-Str. 1, 36039 Fulda
Germany www.jumo.net

Typ: 701052/8-01-02-01/000

~AC 230V -15%/+10%, 48..63 Hz
max. 2,0 VA



JUMO GmbH & Co.KG

Moritz-Juchheim-Str. 1, 36039 Fulda
Germany www.jumo.net

Typ: 701052/8-01-05-01/000

~AC 115V -15%/+10%, 48..63 Hz
max. 2,0 VA



JUMO GmbH & Co.KG

Moritz-Juchheim-Str. 1, 36039 Fulda
Germany www.jumo.net

Typ: 701052/8-01-31-01/000

~AC 24V ±15%, 48..63 Hz,
max. 1,8 VA
DC 12..24V ±15%, max. 1,2 W



TN: 00718287

F-Nr.: 0000000001001010000



TN: 00718287

F-Nr.: 0000000001001010000



TN: 00718287

F-Nr.: 0000000001001010000



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^b	
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	
033	PID two-state controller function
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 %

b. Measuring input groups cannot be switched between each other

	(1)	/	(2)	-	(3)	-	(4)	-	(5)	/	(6)
Order code	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
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.

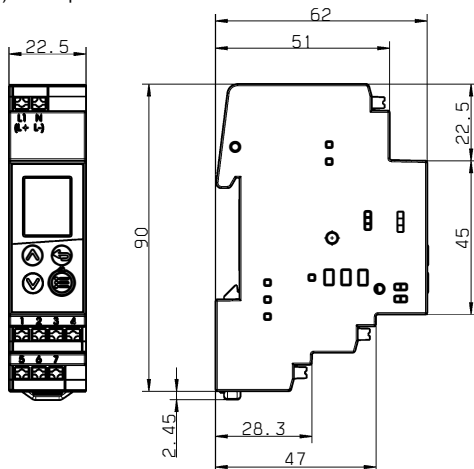
2.3 Care and treatment of the front cover

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!
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



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

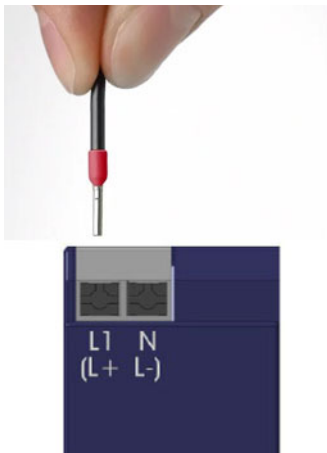
- Check to see if the device is installed in a manner appropriate to the application (temperature measurement) and that it is operated within the admissible plant parameters. When it comes to controlling heating processes, overtemperature protection or another form of safety equipment that is independent 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, in which the branch fuse of 20 A (type RK5 or better) is not exceeded..
- 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.
- Under operating conditions the temperature on the screw terminals can exceed 60° C.
This can destroy the cable isolation of the connection wires.
The cabling must be temperature resistant up to 80° C.

**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


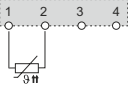
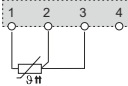
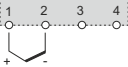
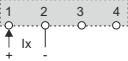
The connection is made via terminal blocks with PUSH IN technology.

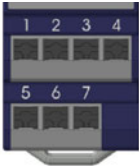
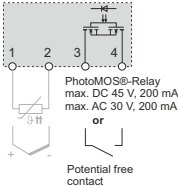
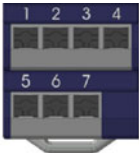
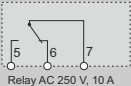


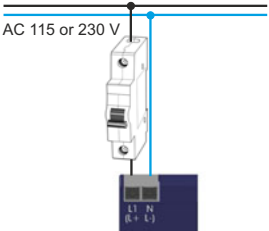
Conductor	Admissible cross section
Rigid or flexible	0.2 to 2.5 mm ²
Flexible with ferrule with or without plastic sleeve	0.25 to 2.5 mm ²
AWG	12 to 24
Stripping length	10 mm
Flammability class	V0

**Caution**

See special notes relating to the heat resistance of cables.

Screen	Connection	Symbol and terminal designation
4.2.1 Actual value of analog input		
 <p data-bbox="59 926 244 946">■ Default setting</p>	RTD temperature probe in 2-wire circuit	
	RTD temperature probe in 3-wire circuit	
	Thermocouple	
	Current 0(4) to 20 mA	

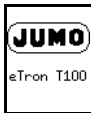
Screen	Connection	Symbol and terminal designation
4.2.2 Digital input or output (option)		
 <p>Note: If the PhotoMOS® relay or digital input option is selected, an RTD temperature probe cannot be connected in a 3-wire circuit.</p>	Digital input or PhotoMOS® relay K2	 <p>PhotoMOS®-Relay max. DC 45 V, 200 mA max. AC 30 V, 200 mA or Potential free contact</p>
4.2.3 Digital outputs		
 <p>Note: Only connect copper wires.</p> <p>■ Default setting</p>	Relay output K1 (zero-current state)	 <p>Relay AC 250 V, 10 A</p>

Screen	Connection	Symbol and terminal designation
4.2.4 Voltage supply (according to nameplate) ⇒ Chapter 2 "Identifying the device version"		
 <p>AC 115 or 230 V</p> <p>Note: Only connect copper wires.</p>	AC: L1 line conductor N Neutral conductor DC: (L+) (L-)	AC 115 V or AC 230 V 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:

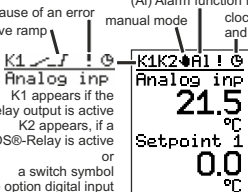



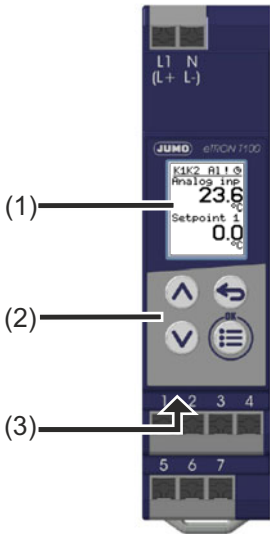






Then the actual value and setpoint value is displayed:



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

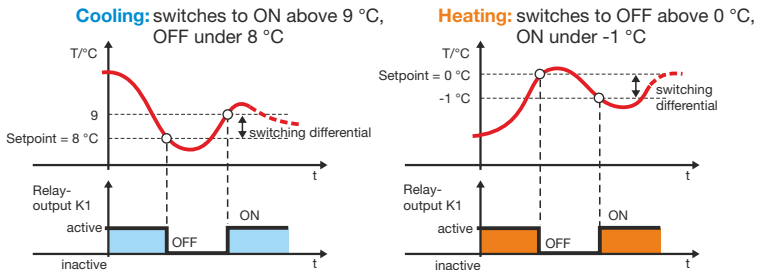
If a suitable temperature probe is connected, the device in the example shown here will display an actual value of 21.5 °C. The default setpoint value 1 is 0.0 °C.

Legend	Comment	Screen
1	<p>LCD display Black/white with background lighting, 64 x 80 pixels</p> <p>flashes in cause of an error active ramp</p> <p>(A) Alarm function flashes when a limit value is exceeded manual mode</p> <p>clock symbol appears, if timer is configured and flashes if the timer was started</p>  <p>Controller symbols:  manual mode  appears when configured, flashes when ramp is active  Tune (Self-optimization)</p>	
2	<p>Keys</p> <ul style="list-style-type: none">  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	<p>USB device For connection with the setup program.</p>	


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  or  until setpoint value 1 flashes.
- * Set a value that is at least 1K above the measured actual value and confirm with the  key.

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

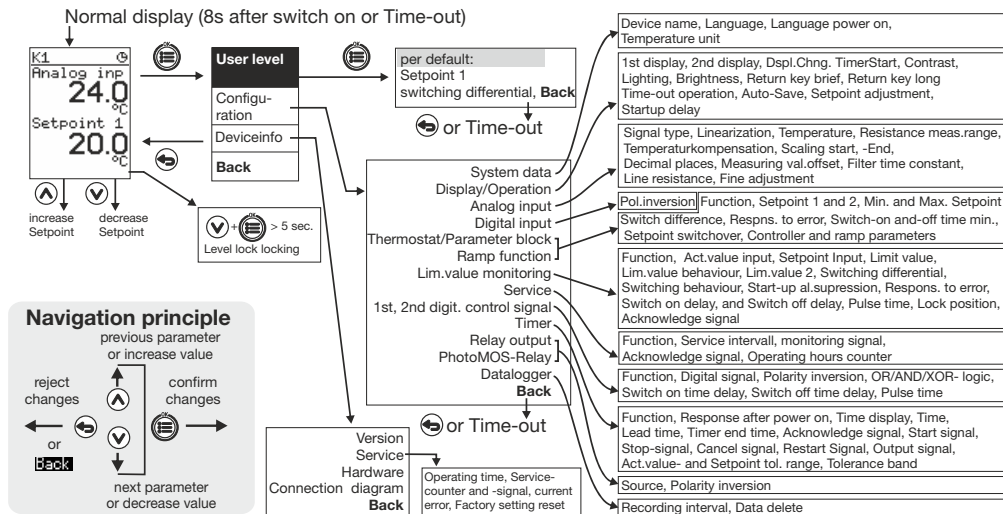


Information

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)
<p>6.3.1 Display 1</p> 	<p>It is set here which values appear in the normal display. ⇒ Chapter 6.1 "Overview"</p>	<p>- None Analog input, Setpoint value 1, 2 Current setpoint 1. Controller output Output level display Ramp end value Current ramp setpoint value Timer runtime Timer remaining running time Timer value Service counter Operating time</p>
<p>6.3.2 Display 2</p> 		<p>- None Analog input Setpoint value 1 Setpoint value 2 Current setpoint 1. Controller output Output level display Ramp end value Current ramp setpoint value Timer runtime Timer remaining running time Timer value Service counter Operating time</p>

Parameter	Comment	Value range (default setting in bold)
<p>6.3.3 Change of display when timer starts</p> 	<p>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.</p>	<p>No function Timer remaining running time Timer runtime</p>
<p>6.3.4 Contrast</p>	<p>Screen contrast: Difference in brightness between black and white pixels</p>	<p>0 to 5 to 10</p>
<p>6.3.5 Lighting</p>	<p>The behavior for the backlight of the display is set here.</p> <p>Always off: always switched off</p> <p>Always on: always switched on</p> <p>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.</p>	<p>Off, On, During operation</p>
<p>6.3.6 Brightness</p>	<p>The intensity of the backlight is set here in 10 brightness settings.</p>	<p>0 to 5 to 10</p>
<p>6.3.7 Timeout lighting</p>	<p>Only appears if "during operation" is set for lighting.</p>	<p>0 to 30 to 180 sec</p>

Parameter	Comment	Value range (default setting in bold)
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. If "0" is set here, timeout is switched off.	0, 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
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  .	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.	-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 (5k Ω at 25 °C)	For railway applications	-55 to +150 °C
400 Ω to 40 k Ω	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

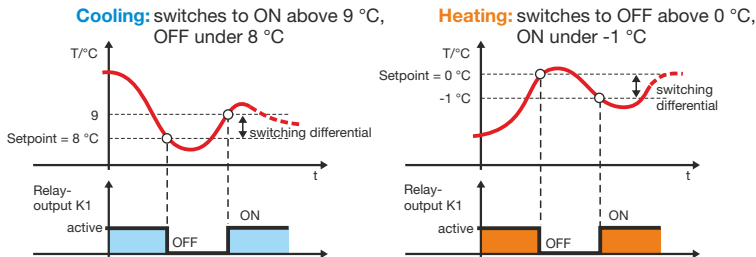
6 Configuration

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	<p>Time constant of the digital input filter, 2nd order</p> <p>If the input signal changes suddenly, approx. 26 % of the change is recorded following a period that corresponds to the filter time constant dF ($2 \times dF$: approx. 59 %; $5 \times dF$: approx. 96 %). Value 0 means: filter switched off</p> <p>If the filter time is long:</p> <ul style="list-style-type: none"> - 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	<p>Only applies to type 701052/X-01, 04, and 05 with resistance input:</p> <p>Resistance of probe line (for 2-wire circuit)</p>	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 6.9.7 "Setpoint changeover"



Parameter	Comment	Value range (default setting in bold)
6.9.1 Controller type	Here you can set whether the device should work as a thermostat or two-point controller	Thermostat , 2-P controller
6.9.2 Function	It is set here whether the thermostat function is to be "heating" or "cooling".	Heating , cooling
6.9.3 Setpoint value 1	The setpoint value 1 for heating or cooling is set here.	-9999 to 0 to 9999 °C
6.9.4 Setpoint value 2	The setpoint value 2 is set here.	-9999 to 0 to 9999 °C
6.9.5 Minimum setpoint value	Bottom setpoint limit	-9999 to 9999 °C

6 Configuration

Parameter	Comment	Value range (default setting in bold)
6.9.6 Maximum setpoint value	Top setpoint value limit	-9999 to 9999 °C
6.9.7 Setpoint change-over	<p>The default setting here is "no selection". This means that setpoint value 1 is used.</p> <p>A setpoint changeover can be triggered by the following digital signals:</p> <p><u>Example of setpoint changeover via timer:</u> <u>Set "timer output" as setpoint changeover</u></p> <ul style="list-style-type: none"> - 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. 	<p>No selection</p> <p>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</p>
6.9.8 Switching differential	The switching differential of the thermostat function is set here.	-9999 to 1.0 to 9999
6.9.9 Response in case of an error	Behavior of the thermostat output in the event of a measured value error.	Output off , output on
6.9.10 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
6.9.11 Min. switch-off duration		0 to 9999 sec

6.10 2-P controller

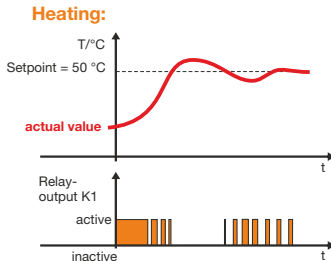
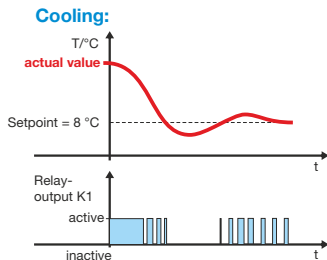
The 2-Point controller always uses the analog input as actual value and setpoint 1. A setpoint changeover to setpoint 2 has to be configured. Control direction „direct“ is for cooling, control direction „inverse“ (factory setting) is for heating.

⇒ Chapter 6.10.7 "Signal setpoint changeover"

⇒ In Chapter 6.18 "Relay output" or Chapter 6.19 "PhotoMOS® relay" the controller output has to be set as „Source“!

If $XP = 0$, the controller behaves as with thermostat function (switching differential is effective).

If $XP > 0$, the set controller structure is effective (factory-set PID).



Parameter	Comment	Value range (default setting in bold)
6.10.1 Controller type	Here you can set whether the device should operate as a thermostat or a two-point controller.	Thermostat , 2-P-controller
6.10.2 Control direction	Direct: The controller output level is positive if the actual value is greater than the setpoint (cooling). Inverse: The controller output level is positive if the actual value is smaller than the setpoint (heating).	Inverse , Direct

Parameter	Comment	Value range (default setting in bold)
6.10.3 Setpoint value 1	The setpoint value 1 for heating or cooling is set here.	-9999 to 0 bis 9999 °C
6.10.4 Setpoint value 2	The setpoint value 2 is set here.	-9999 to 0 bis 9999 °C
6.10.5 Minimum setpoint value	Bottom setpoint limit	-9999 to 9999 °C
6.10.6 Maximum setpoint value	Top setpoint value limit	-9999 to 9999 °C
6.10.7 Signal setpoint changeover	<p>The default setting here is "no selection". This means that setpoint value 1 is used.</p> <p>A setpoint changeover can be triggered by the following digital signals:</p> <p>Example of setpoint changeover via timer:</p> <ul style="list-style-type: none"> - 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. 	<p>No selection</p> <p>Digital input Thermostat output Limit value output Timer output Timer tolerance band timer Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button 1. Controller output End signal ramp Tolerance band signal ramp</p>
6.10.8 Manual mode	<p>Free: Switchover to manual mode is possible (e.g. via button operation or binary signal)</p> <p>Locked: Switchover to manual mode is locked.</p>	Free, Locked

Parameter	Comment	Value range (default setting in bold)
6.10.9 Manual/auto switching signal	Selection of a signal for switching to manual mode.	No selection Digital input Thermostat output Limit value output Timer output Timer tolerance band timer Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button
6.10.10 Locking signal manual mode	Selection of a signal for locking manual mode.	1. Controller output End signal ramp Tolerance band signal ramp
6.10.11 Y for manual mode	Here you can select which output level should be effective in manual mode.	Y manual mode , Current value
6.10.12 Y manual mode	Here you can set the output level in manual mode if „Y manual mode“: is set above.	0 to 100 %
6.10.13 Y for error	Here you can select which output level is to be output in the event of an error.	Current value , Y replacement value
6.10.14 Y replacement value	This is a fixed value that becomes effective in the event of an error if in Chapter 6.10.13 „Y replacement value“ is set.	0 to 100 %
6.10.15 Auto tuning	Setting if it's allowed to switched on self-optimization.	Free , Locked

Parameter	Comment	Value range (default setting in bold)
6.10.16 Controller output type	Setting on which output the controller should act. ⇒ Relay see Chapter 6.18.1 ⇒ or semiconductor/logic see Chapter 6.19.1	Relay , semiconductor/logic
6.10.17 Takeover switching period	Acceptance of the switching period duration C_y after completion of self-tuning Yes: The determined value is accepted. No: The determined value is not accepted.	Yes , No
6.10.18 Start/Stop Signal autotuning	Selection of a signal for start/stop of autotuning. Self-optimization is started by a rising edge. If self-tuning is active, it is stopped by a rising edge	No selection Digital input Thermostat output Limit value output Timer output
6.10.19 Lock autotuning	Selection of a signal for locking the autotuning function.	Timer tolerance band timer Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button 1. Controller output End signal ramp Tolerance band signal ramp

6.11 Parameter block

Parameter	Comment	Value range (default setting in bold)
6.11.1 Controller structure 1	Transmission behavior of the controller	PID , PI, PD, I, P
6.11.2 Xp1	Size of the proportional band. The controller structure is not effective with $X_p = 0$ (behavior identical to limit value monitoring function).	0 to 9999
6.11.3 Tv1	Influences the differential component of the controller output signal. The greater the derivative time, the more effect the differential component has.	0 to 80 to 9999
6.11.4 Tn1	Influences the integral component of the controller output signal. The greater the reset time, the less effect the integral component has.	0 to 350 to 9999
6.11.5 Cy1	The cycle time should be chosen such that the energy supply to the process is as continuous as possible without overloading the switching elements.	0 to 20 to 9999
6.11.6 Y0	Working point correction for a P or PD controller (correction value for the output level). If the actual value has reached the setpoint value, the output level corresponds to the working point Y0.	-100 to 0 to 100
6.11.7 Y1	Maximum output value limit (only effective if $X_p > 0$)	0 to 100
6.11.8 Y2	Minimum output value limit (only effective if $X_p > 0$)	0 to 100
6.11.9 Tk1	Limitation of the switching frequency. Recommended setting if a relay is used as a controller output: > 0.15 s	0 to 9999

6.12 Ramp function

The ramp function turns a setpoint step into a ramp-shaped rising or falling setpoint curve. This enables a smooth start-up, e.g. during a setpoint changeover. To monitor the actual value, a tolerance band can be placed around the setpoint curve, whereby a digital signal (Tolerance band signal ramp) is activated when it is left.

6 Configuration

Parameter	Comment	Value range (default setting in bold)
6.12.1 Ramp function	These two values are used to set the ramp gradient for the current setpoint. The setting K/min, K/h or K/d means that the controller does not execute a setpoint jump when the setpoint is changed, but reaches the new setpoint with the set ramp gradient.	Off per minute per hour per day
6.12.2 Gradient		0 to 999
6.12.3 Tolerance band	Width of the permissible actual value deviation around the setpoint	0 to 9999
6.12.4 Signal ramp stop	This signal stops the current ramp setpoint.	No selection Digital input Thermostat output Limit value output Timer output Timer tolerance band timer
6.12.5 Signal ramp off	This signal switches off the ramp function. The setpoint value is set immediately to the specified end value.	Timer end signal Timer stop signal
6.12.6 Signal ramp re-start	This signal restarts the ramp at the current actual value.	1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button 1. Controller output End signal ramp Tolerance band signal ramp

6.13 Digital input

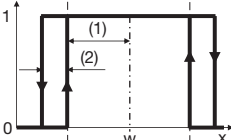
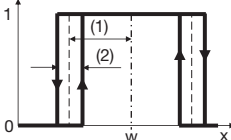
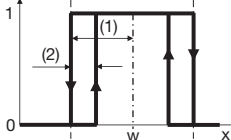
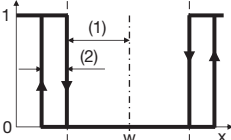
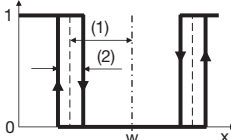
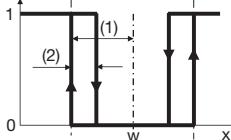
Parameter	Comment	Value range (default setting in bold)
6.13.1 Inversion	The switching status of the digital input is inverted here.	Off , On

6.14 Limit value monitoring function

With this function, you can monitor the actual signal at the actual value 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.

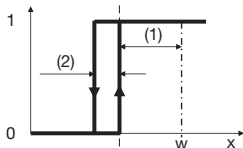
6.14.1 Switching functions in relation to setpoint value

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

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

Alarm function 3 (AF3):

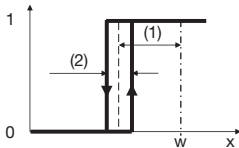
OFF switching operation below set-point value



(1) Distance from setpoint value,
(2) Switching differential

Alarm function 3 (AF3):

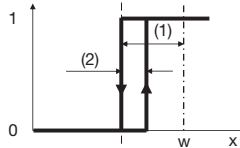
OFF switching operation below set-point value



(1) Distance from setpoint value,
(2) Switching differential

Alarm function 3 (AF3):

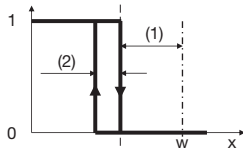
OFF switching operation below set-point value



(1) Distance from setpoint value,
(2) Switching differential

Alarm function 4 (AF4):

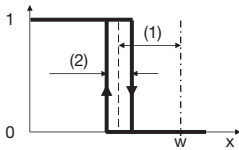
ON switching operation below set-point value



(1) Distance from setpoint value,
(2) Switching differential

Alarm function 4 (AF4):

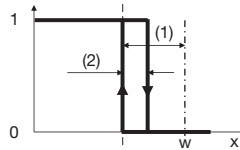
ON switching operation below set-point value



(1) Distance from setpoint value,
(2) Switching differential

Alarm function 4 (AF4):

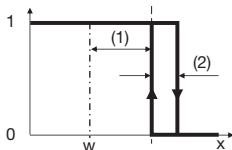
ON switching operation below set-point value



(1) Distance from setpoint value,
(2) Switching differential

Alarm function 5 (AF5):

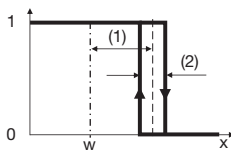
OFF switching operation above setpoint value



- (1) Distance from setpoint value,
(2) Switching differential

Alarm function 5 (AF5):

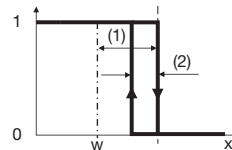
OFF switching operation above setpoint value



- (1) Distance from setpoint value,
(2) Switching differential

Alarm function 5 (AF5):

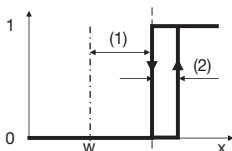
OFF switching operation above setpoint value



- (1) Distance from setpoint value,
(2) Switching differential

Alarm function 6 (AF6):

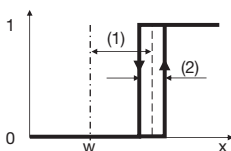
ON switching operation above setpoint value



- (1) Distance from setpoint value,
(2) Switching differential

Alarm function 6 (AF6):

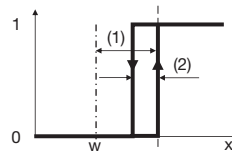
ON switching operation above setpoint value



- (1) Distance from setpoint value,
(2) Switching differential

Alarm function 6 (AF6):

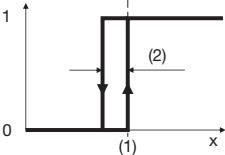
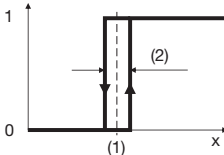
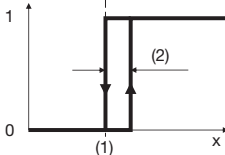
ON switching operation above setpoint value



- (1) Distance from setpoint value,
(2) Switching differential

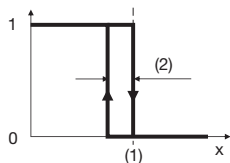
6.14.2 Switching functions in relation to limit value

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

Switching behavior, left	Symmetrical	Right
<p data-bbox="55 200 433 296">Alarm function 7 (AF7): ON switching operation from a fixed limit value</p>  <p data-bbox="55 536 471 560">(1) limit value, (2) switching differential</p>	<p data-bbox="502 200 880 296">Alarm function 7 (AF7): ON switching operation from a fixed limit value</p>  <p data-bbox="502 536 918 560">(1) limit value, (2) switching differential</p>	<p data-bbox="958 200 1336 296">Alarm function 7 (AF7): ON switching operation from a fixed limit value</p>  <p data-bbox="958 536 1374 560">(1) limit value, (2) switching differential</p>

Alarm function 8 (AF8):

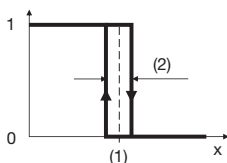
OFF switching operation from a fixed limit value



(1) limit value, (2) switching differential

Alarm function 8 (AF8):

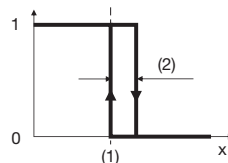
OFF switching operation from a fixed limit value



(1) limit value, (2) switching differential

Alarm function 8 (AF8):

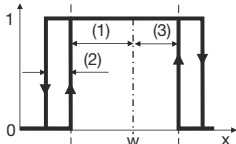
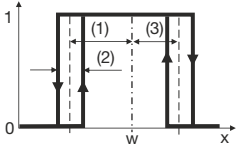
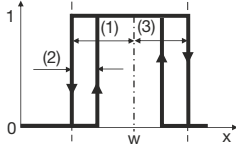
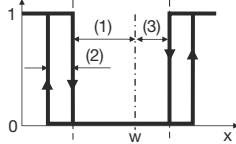
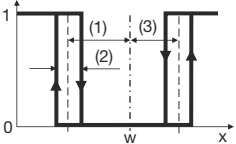
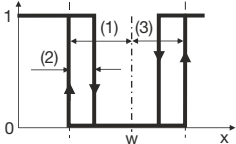
OFF switching operation from a fixed limit value



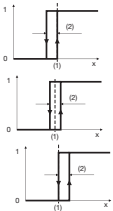
(1) limit value, (2) switching differential

6.14.3 Unsymmetrical switching functions (with limit value 2)

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

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

Parameter	Comment	Value range (default setting in bold)
6.14.4 Function	Switching behavior, as described in the images AF1 to AF8.	No function AF1, AF2, AF3, AF4, AF5 AF6, AF7, AF8
6.14.5 Actual value input	Actual value to be monitored (x axis)	- None Analog input Setpoint 1 Setpoint 2 Current Setpoint 1.Controller output Output level display Ramp end value Current ramp setpoint value Timer runtime Timer Remaining time Timer value Service counter Operating time
6.14.6 Setpoint value input	It is set here which signal is used as a setpoint value (w) for the alarm functions AF1 to AF6.	
6.14.7 Limit value	For AF1 to AF6, this value is the distance from the setpoint value, or for AF7 to AF8, it is a fixed switching point. In the images, (1) is the lower distance from the setpoint value.	-9999 to 0 to 9999
6.14.8 Switching differential	The switching differential (2) determines the gap between the switch-on and switch-off threshold.	0 to 1 to 100 °C
6.14.9 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

Parameter	Comment	Value range (default setting in bold)
6.14.10 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
6.14.11 Switching behavior	It is set here on which side the set value for the switching differential is. 	Left, Symmetrical, Right
6.14.12 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 Configuration

Parameter	Comment	Value range (default setting in bold)
6.14.13 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
6.14.14 Switch-on delay	The relay only switches on or off after the entered time has elapsed.	0 to 9999 sec
6.14.15 Switch-off delay		0 to 9999 sec
6.14.16 Pulse time	Output is automatically deactivated after this time (in seconds)	0 to 9999 sec
6.14.17 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

Parameter	Comment	Value range (default setting in bold)
6.14.18 Acknowledgement signal	The following signals can acknowledge an active lock.	No selection Digital input Thermostat output 1. Controller output End signal ramp Tolerance band signal ramp 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 Service

Parameter	Comment	Value range (default setting in bold)
6.15.1 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 Configuration

Parameter	Comment	Value range (default setting in bold)
6.15.2 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
6.15.3 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
6.15.4 Acknowledgement signal	Signal with which the service signal can be acknowledge and reset. The service counter starts again at 0 after the acknowledgement.	1. Controller output End signal ramp Tolerance band signal ramp 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
6.15.5 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

6.16 Digital control signals 1, 2

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

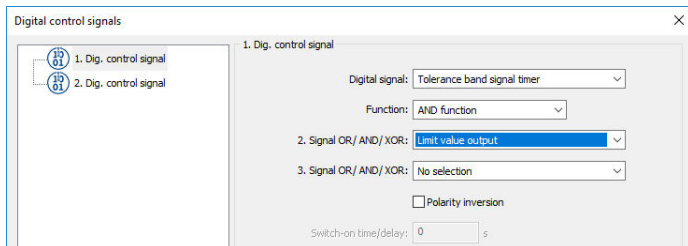
Parameter	Comment	Value range (default setting in bold)
6.16.1 Function	<p><u>Pulse:</u> A pulse-like signal is output as long as the input signal is active (high).</p> <p><u>Delay:</u> The output signal follows the course of the input signal, whereby the transfer from low to high status and vice versa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

6 Configuration

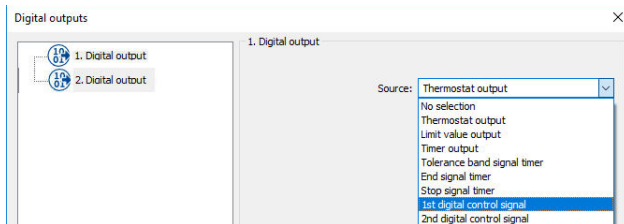
Parameter	Comment	Value range (default setting in bold)
6.16.2 Digital signal	The following signals from this digital selector can be used as an input for the control signals 1, 2. Note: Signals (in brackets) are not suitable as an input signal here.	No selection Digital input Thermostat output 1. Controller output End signal ramp Tolerance band signal ramp
6.16.3 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.	Limit value output Timer output Timer tolerance band signal
6.16.4 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.	Timer end signal Timer stop signal 1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button
6.16.5 Inversion	No: digital control signal 1, 2 is not inverted. Yes: digital control unit 1, 2 is inverted.	No, Yes
6.16.6 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
6.16.7 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
6.16.8 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).



6.17 Timer

Parameter	Comment	Value range (default setting in bold)
6.17.1 Function	The timer is switched on here.	Off , On
6.17.2 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
6.17.3 Time display	Setting of the time base	hh:mm:ss dd:hh:mm
6.17.4 Timer time	This is how long the timer is running for.	00:00:00 , 23:59:59
6.17.5 Lead time	Waiting period after timer start until the timer actually starts running and the timer output signal is active.	0 to 9999 s
6.17.6 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

Parameter	Comment	Value range (default setting in bold)
6.17.7 Acknowledgement signal	Acknowledgement signal: signal with which the timer end signal is acknowledged and reset.	No selection Digital input Thermostat output
6.17.8 Start signal	A signal is selected here which starts the timer.	1. Controller output End signal ramp
6.17.9 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.	Tolerance band signal ramp Limit value output Timer output Timer tolerance band signal Timer end signal Timer stop signal
6.17.10 Cancellation signal	A signal is selected here which immediately stops and ends the timer. It can no longer continue, but can only be restarted.	1st digital control signal 2nd digital control signal Service signal Short-press back button Long-press back button
6.17.11 Restart signal	A signal is selected here which restarts the timer.	
6.17.12 Output signal	Signal level of the timer output	High active , low active
6.17.13 Tolerance band actual value	The actual value for the tolerance band monitoring is set here.	No selection Analog input Setpoint value 1 Setpoint value 2
6.17.14 Tolerance band set-point value	The setpoint value for the tolerance band monitoring is set here.	Current setpoint value 1. Controller output Output level display Ramp end value Current ramp setpoint value Timer runtime Timer remaining running time Timer value Service counter Operating time

Parameter	Comment	Value range (default setting in bold)
6.17.15 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 6.16 "Digital control signals 1, 2"	0 to 9999

6.18 Relay output

Parameter	Comment	Value range (default setting in bold)
6.18.1 Source	This signal is output at the relay output.	No selection Digital input Thermostat output 1. Controller output End signal ramp Tolerance band signal ramp 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
6.18.2 Inversion	The signal is inverted	No , Yes

6.19 PhotoMOS® relay

Parameter	Comment	Value range (default setting in bold)
6.19.1 Source	This signal is issued at the PhotoMOS® relay.	No selection Digital input Thermostat output 1. Controller output End signal ramp Tolerance band signal ramp 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
6.19.2 Inversion	The signal is inverted	No, Yes


6.20 Data logger

Parameter	Comment	Value range (default setting in bold)
6.20.1 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
6.20.2 Delete data	Deletes the recorded data records in the data logger.	No , Yes


7 Device information

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	<p>The first 8 digits are the production order number: 02472588</p> <p>Digit 9 and 10 manufacturing site Fulda: 01</p> <p>Digit 11 (second row) device version: 0</p> <p>Digit 12 and 13 year: 2018</p> <p>Digit 14 and 15 calendar week: 11</p> <p>Digit 16 to 19 consecutive number: 0003</p>	-
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.	 The image shows a monochrome LCD display with a rectangular border. The text is arranged vertically: 'Service' at the top, 'Operating time' in the middle, and '659 h' at the bottom. The '659' is significantly larger and bolder than the other text.
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.

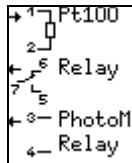
Hardware Power sply 230 V	Hardware Input RTD temp. probe	Hardware Option No	Hardware Railway No	Hardware Extra code controller Yes
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7.4 Connection diagram

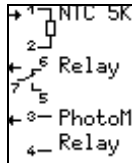
The terminal assignment is displayed here as well as which extra codes are installed in the device.

Examples:

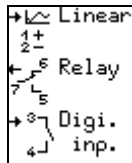
Pt100 input



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 %	≤ 0.3×10 ⁻³ 1/K	68
Fe-CuNi "J"	DIN EN 60584-1:2014	-210 to +1200 °C	±0.4 % from -100 °C	≤ 0.3×10 ⁻³ 1/K	90
NiCr-Ni "K"	DIN EN 60584-1:2014	-270 to +1300 °C	±0.4 % from -80 °C	≤ 0.3×10 ⁻³ 1/K	90
Customer table		-15 to 75 mV	±0.4 %	≤ 0.3×10 ⁻³ 1/K	-

Measuring range start/end	Freely programmable within the limits in increments of 0.1 K
Cold junction	Internal temperature measurement 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 k Ω at 25 °C) for railway applications	-55 to +150 °C		Deviation of 22 °C in the following ranges: -55 °C to 100 °C: $\leq 0.1 \times 10^{-3}$ 1/K 100 °C to 130 °C: $\leq 0.2 \times 10^{-3}$ 1/K 130 °C to 150 °C: $\leq 0.45 \times 10^{-3}$ 1/K
Customer table	400 Ω to 40 k Ω	$\leq 0.15\%$	$\leq 0.1 \times 10^{-3}$ 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	$\leq 0.2 \%$	$\leq 0.1 \times 10^{-3}$ 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 PhotoMOS® relay (option)	For connection to a commercial switch or contact Switch-on resistance < 1 k Ω , switch-off resistance > 50 k Ω
Relay output	Max. DC 45 V, 200 mA, max. AC 30 V, 200 mA
	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

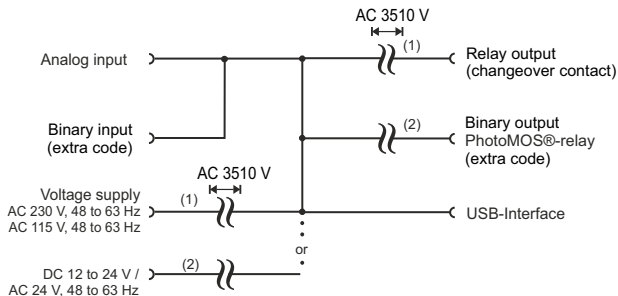
Weight	Approx. 110 g
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8.6 Electrical data

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. 1.2 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 61010-1:2020 Overvoltage category III, pollution degree 2
Analog inputs	connection only to SELV (secondary circuits)
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 DIN EN 61010-1:2020 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 61326-1:2022, DIN EN 50121-1:2017/50121-3-2: 2017 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	E201387	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. 43 hours
5 min	Approx. 218 hours
15 min	Approx. 27 days
30 min	Approx. 54.5 days
60 min	Approx. 3 months, 16 days

8.11 Controller

The following table shows the parameters of a parameter block in the case of an activated two-state controller (extra code). The transmission behavior is specified by the selection of the controller structure and determined by the configuration of the parameters for the proportional band (P component), derivative time (D component), and reset time (I component).

Parameter	Value range	Default setting	Unit	Meaning
Controller structure 1	P, I, PD, PI, PID	PID		Transmission behavior of the controller
Proportional band Xp1	0 to 9999	0	Physical unit of the controlled variable	Size of the proportional band The controller structure is not effective with $X_p = 0$ (behavior identical to limit value monitoring function).
Derivative time Tv1	0 to 9999	80	s	Influences the differential component of the controller output signal. The greater the derivative time, the more effect the differential component has.
Reset time Tn1	0 to 9999	350	s	Influences the integral component of the controller output signal. The greater the reset time, the less effect the integral component has.
Cycle time Cy1	0 to 9999	20	s	The cycle time should be chosen such that the energy supply to the process is as continuous as possible without overloading the switching elements.
Switching differential Xd1	0 to 999	1	Physical unit of the controlled variable	Hysteresis for proportional band $X_p = 0$

Parameter	Value range	Default setting	Unit	Meaning
Working point Y0	-100 to +100	0	%	Working point correction for a P or PD controller (correction value for the output level). If the actual value has reached the setpoint value, the output level corresponds to the working point Y0.
Maximum Output value limit Y1	0 to 100	100	%	Maximum output value limit (only effective if $X_p > 0$)
Minimum Output value limit Y2	0 to 100	0	%	Minimum output value limit (only effective if $X_p > 0$)
Minimum relay switch-on duration Tk1	0 to 9999	0	s	Limitation of the switching frequency

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
 - Microsoft¹ Windows7 (32-bit) -> 1 GB RAM
 - Microsoft¹ Windows7 (64-bit) -> 2 GB RAM
- * Connect the device to the PC using the USB cable

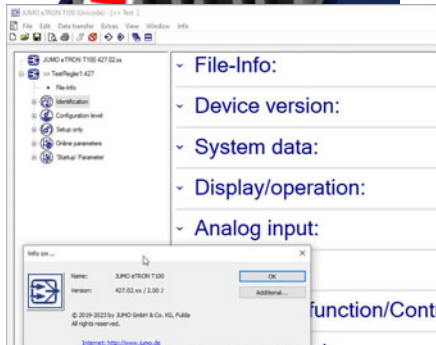
9.2 Displaying the device software version

- * Press the  key
- * Use  to switch to device info and press 
- * Press  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*.

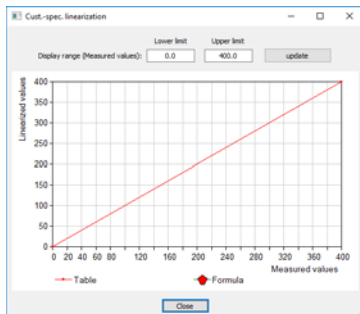
1. Microsoft® is a registered trademark of the Microsoft Corporation



function/Cont

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).



Cust.-spec. linearization

Measuring range start: 0.0000

Measuring range end: 100.00

Type of linearization: Grid points

Basic values

	Measurement value (X)	Linearized value (Y)
1	0	0
2	400	400
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

Note: Temperature values must be entered in °C.

Formula

$y = 0 \cdot x^4 + 0 \cdot x^3 + 0 \cdot x^2 + 0 \cdot x + 0$

Display graphic Update graphic OK Cancel

10 Error messages


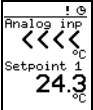

10.1 Error messages

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 28. 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

11 What to do, if ...

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

12 China RoHS

	 					
产品组别 Product group: 701052	产品中有害物质的名称及含量 China EEP Hazardous Substances Information					
部件名称 Component Name						
	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)	○	○	○	○	○	○
<p>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.</p> <p>○：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.</p> <p>×：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.</p>						



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