JUMO exTHERM-DR

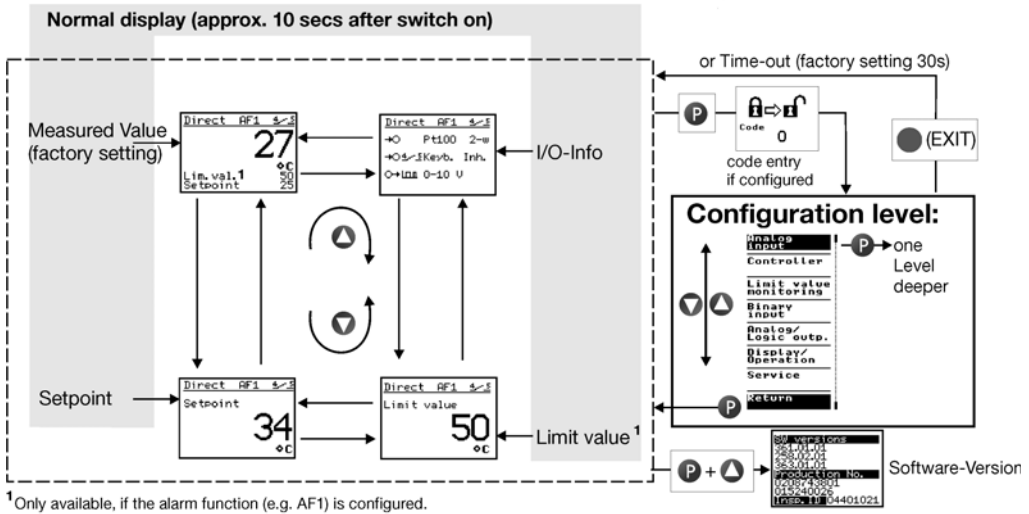
Two-State Controller with Ex (ia) Input
According to ATEX and IECEx

Operating Manual

70105500T90Z001K000

V2.01/EN/00644471

Operating overview



[1] Only available, if the alarm function (e.g. AF1) is configured.
This Limit value, is used as distace to the setpoint in case of alarm functions AF1...AF6 or fixed setpoint in case of alarm functions AF7 and AF8.

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1 Brief description

The device is tested according to ATEX directive 2014/34/EC as associated equipment with intrinsically safe output.
It meets the requirements of the following identification markings:

II (1) G [Ex ia Ga] IIC

II (1) D [Ex ia Da] IIIC

The input is intrinsically safe [Ex ia] so that relevant type-tested probes can be connected directly. Barriers are no longer required.

The measured value at the analog input can be recorded by various probes or standard signals.
It is compared with the setpoint value and switches the **relay output controller K1** (LED K1 lights up) depending on the controller function.
A limit value exceedance is signaled by the installed **relay output limit value K2** (LED K2 lights up).

1.1 Safety information

Symbol	Meaning	Explanation
	Note	This symbol is used to draw your attention to **something particular**.
	Caution	This symbol is used when **damage to equipment or data** may occur if the instructions are disregarded or not followed correctly!
	Caution	This symbol is used in conjunction with the signal word to indicate that **personal injury** may occur if the instructions are disregarded or not followed correctly.
	Read	This text contains important information which must absolutely be read before proceeding. 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	This symbol indicates that an **action to be performed** is described. The individual steps are marked by this asterisk.

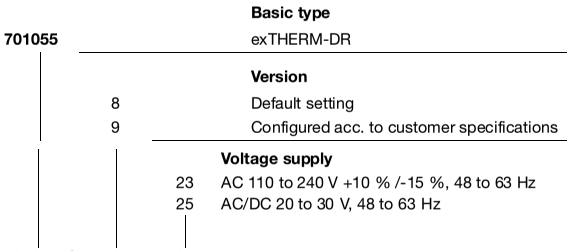
2 Identifying the device version

The nameplate is glued laterally to the device.

AC voltage supply 110 to 240 V:

AC/DC voltage supply 20 to 30 V:

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



2.1 Scope of delivery

- JUMO exTHERM-DR in the ordered version
- Operating manual 70105500T90Z000K000
- Protective cap ATEX for analog input

2.2 Device software versions

Display module version: 361.01.01
Analog channel 1 version: 258.02.01

2.3 Fabrication number

The fabrication number is displayed on the device.

* Press P + ▲ keys

Setup:
The first 8 digits are the order production number: 01939251
Digit 9 and 10 manufacturing site Fulda: 01
Digit 11 (second row) hardware version: 0
Digit 12 and 13 year: 20**14**
Digit 14 and 15 calendar week: 16
Digit 16 to 19 consecutive number: 0045

2.4 Service addresses

See back cover

This operating manual is the translation of the **German manual**.

It is valid for the following hardware and software versions:

Display module from version: 361.01.01
Analog channel 1 from version: 258.02.01
Unlocking module from version: 363.01.01

* Press P + △ keys

Keep the operating manual in a place that is accessible to all users at all times.

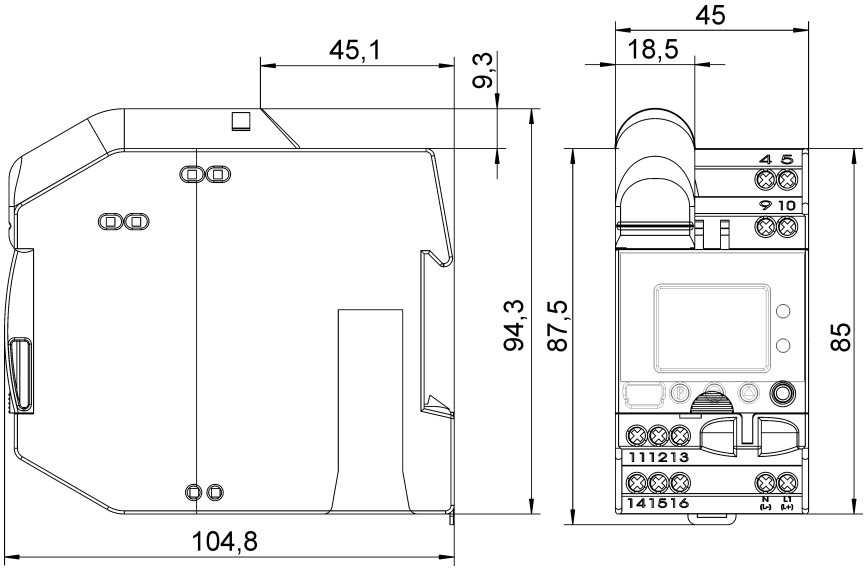
All the necessary settings are described in the operating manual. Manipulations that are not described in the operating manual or expressly forbidden will jeopardize your warranty rights and may render the safety function inoperative!

Any interference with the inside of the device is prohibited!

Repairs may be only 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.

3 Mounting

3.1 Dimensions

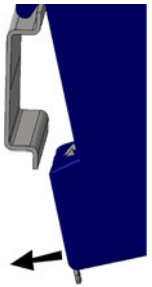


3.2 Mounting site, DIN-rail mounting

⚠ The device is not suitable for installation in potentially explosive areas.

⇨ Chapter 6.1 "Intended use"

The device is clipped to a 35 mm DIN-rail (DIN EN 60715) from the front and locked into place by pressing downwards.



⇨ The climatic conditions at the mounting site must meet the requirements specified in the technical data.

Chapter 9 "Technical data"

❑ The mounting site should be as vibration-free as possible to prevent the screw connections from working loose.

❑ The mounting site should be as free as possible from aggressive media (e.g. acids and lyes), as well as free from dust, flour, or other suspended matter to prevent blocking of the cooling slots!

3.3 Close mounting

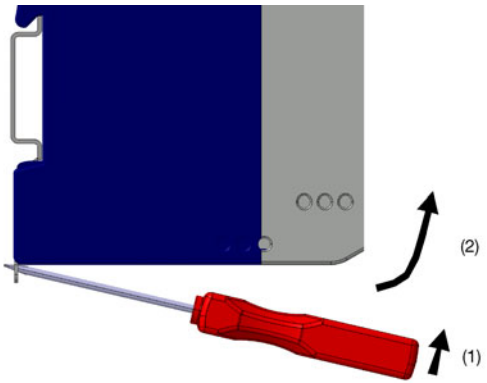
❑ Maintain the minimum distance of 20 mm to the top and the bottom.

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.

3.4 Dismounting

* Place screwdriver in release catch and press upwards (1).
* Swivel screwdriver and case upwards at the same time out of the DIN-rail (2).



3.5 Galvanic isolation

(1) Analog input

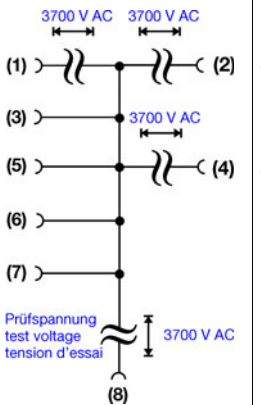
(3) Binary input

(5) Setup interface

(6) Display

(7) Analog output / Logic output

(8) Voltage supply



(2) Relay output Controller K1

(4) Relay output Limit value K2

3.6 Use of the setup interface

- The USB setup interface is only designed for service use over a limited period (such as the transfer of setup data or during startup).
- It is not suitable for unlimited operation of the interface in a fixed installation.

4 Electrical connection

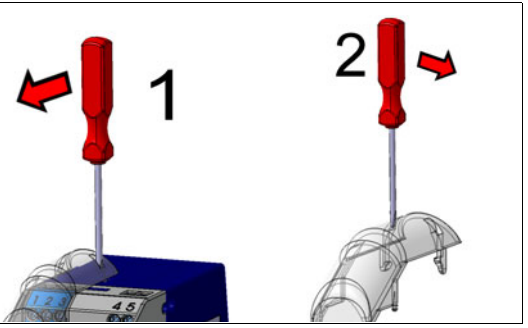
4.1 Installation notes

- ❏ Checking to see if the safety temperature limiter is installed in a manner appropriate to the application (temperature measurement) and that it is operated within the admissible plant parameters.
- ❏ The device is intended to be installed in switch 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 mains supply must be laid with shielded and twisted cables. Connect the screen on the device to ground.
- ❏ 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/3 A (resistive load).
- ❏ The electromagnetic compatibility conforms to the standards and regulations cited in the technical data.
  ⇨ Chapter 9 "Technical data"
- ❏ For startup we recommend that a trial run of the plant up to the temperature shutoff at the set limit is carried out.

Hybrid mixtures:
If a dangerous atmosphere could occur at the mounting site – an atmosphere that is potentially explosive due to a mixture of gases, steam, or mist and at the same time through combustible dusts – then the safety-related characteristic parameters of the gases, steam, or mist and the combustible dusts can change.
In such cases the suitability of the intended device is to be checked by an appropriate expert body.

The electrical connection and the configuration settings up to the startup must only be carried out by qualified personnel.

4.2 Removing the protective cap

1	* Insert the screwdriver into the right opening of the protective cap and pry up to the left.	
2	* Hold the protective cap and pry up the second catch in the left opening to the right.	

4.3 Connection diagram

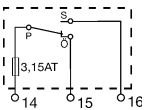
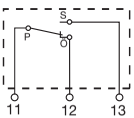
The connection is made via screw terminals.

Caution:
The protective cap must be removed prior to wiring and put back on when finished.
This is necessary for the proper operation of the probe in the Ex-area!

Wire	Admissible cross section
1-wire	$\leq$ 2.5 mm^2
Fine-strand, with ferrule	$\leq$ 1.5 mm^2

Tightening torque of the screws: max. 0.5 Nm

Legend	Comment	Screw terminals	Screw terminals
1, 2		**Analog input 1 (E1)**	**Analog input 2 (E2)**
	Thermocouple /		Terminals 6, 7, and 8 are not used.
	Resistance thermometer Pt100/Pt1000 in two-wire circuit		Terminals 6, 7, and 8 are not used.
	Enter the lead wire resistance for RTD temperature probes in two-wire circuit when using greater line lengths. ⇨ *Analog input*		
	RTD temperature probe Pt100/Pt1000 in three-wire circuit		Terminals 6, 7, and 8 are not used.
	4 to 20 mA		Terminals 6, 7, and 8 are not used.
4	**Digital input** Connection to a potential-free contact	Mass 	
5	**Analog output / logic output:** 0 to 20 mA 4 to 20 mA (default setting) 0(2) to 10 V		

Legend	Comment	Screw terminals	Screw terminals
9	**Voltage supply** Acc. to nameplate	**AC:** L1 line conductor N neutral conductor 	**DC:** (L+) (L-) 
10	**Relay output controller K1** **(zero-current state)** Relay (changeover contact) with fuse cut-out		
11	**Relay output limit value K2** **(zero-current state)** Relay (changeover contact)		

4.4 Checking wiring of the intrinsically safe electrical circuit

Caution:
The protective cap that is removed prior to wiring must be put back into place after wiring is complete so that the catches snap back into place!
This is necessary for the proper operation of the probe in the Ex-area!

Caution:
All screw terminals in the housing must always be tightened to the maximum torque of 0.5 Nm. This also applies to connections that are not required.

* Fine-strand lines in ferrules up to max. 1.5 mm^2 or single-strand lines up to max. 2.5 mm^2 can be inserted and tightened.
* Switch on the device and test whether the measured value of your choice (e.g. temperature or pressure) is displayed without any problems.
* Place the protective cap back in its position and make sure it is securely in place.

5 Startup of the device

5.1 Display and control elements

✱ When the voltage supply is set up, a testing routine starts during which all LEDs blink and the backlit display shows white pixels for 2 s and black pixels for 2 s.

After the testing routine is complete the device displays the measured value (default setting).

⇨ If an alarm or error message appears, refer to Chapter 11 "Alarm messages".

5.2 Setting the display after device is switched on

⇨ Chapter 8.7.4 "Normal display"

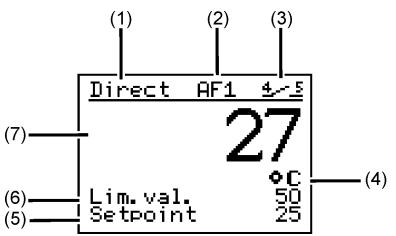
The main measured value appears on the screen in German (default setting). The example shows the screen layout of a controller with direct switching behavior at a setpoint value of 34 °C and limit value monitoring of 50 °C.

☞ If the measured value is within the hysteresis at "Power ON", the relay outputs **controller K1** and **limit value K2** are set to inactive.

(1) Control direction of the controller

(2) Alarm function

(3) Binary input

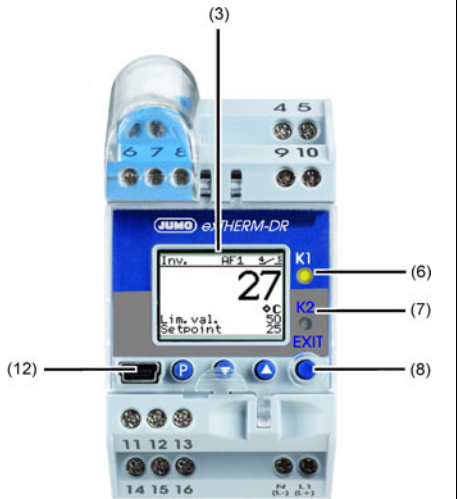


(7) Measured value

(6) Limit value

(5) Setpoint value

(4) Unit

Legend	Comment	
3	**LCD display** Black/white with background lighting 96 x 64 pixels.	
6	**LED K1 (yellow)** Lights up when the relay output controller K1 is active.	
7	**LED K2 (yellow)** Lights up when the relay output limit value K2 is active.	
8	**Keys** (can only be operated when the transparent hood is folded upward) Value increase / previous parameter Value reduction / previous parameter Programming (EXIT)	
12	**Setup interface**	

5.3 Selecting and editing parameters

In the normal display, the values are switched using ▼ or ▲ and are only displayed.

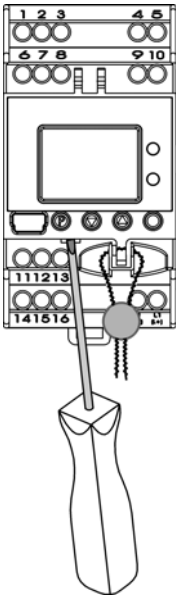
To edit a value, for example here the setpoint value, carry out steps 1 to 4

1	Press P		The first menu item "Analog inputs" is highlighted in black. The vertical line to the right shows the current position in the menu.
2	Use ▼ to select the controller Switch to submenu with P		
3	Press ▼ 1x until the setpoint value appears Press P (setpoint value flashes)		
4	Set the value of your choice with ▼ or ▲ Use P to acknowledge The value is adopted and saved.		Back to the normal display: With ● (EXIT) or menu item "back" or automatically after timeout
☞	If no key is pressed for 30 seconds (timeout) then the device automatically returns to normal display and the value is not stored. The duration of the timeout can be configured. ⇨ See Chapter "Operating overview" on the first inner page of this manual		

5.4 Canceling edit

● (EXIT) is used to cancel editing and the previous value remains.

5.5 Seal device



There is a lead-sealed see-through cover on top to prevent unintentional or unauthorized adjustment.

Two holes are provided to the left and right of the see-through cover through which wire can be guided for lead sealing to connect the cover to the case. The wire ends are secured with the seal.

Opening see-through cover for close mounting:
A screwdriver can be used to pry open the see-through cover.

6 ATEX

6.1 Intended use

The JUMO exTHERM-DR is a device designed in accordance with Directive 2014/34/EC, chapter 1, article 1, paragraph (b), for measuring temperatures, or other physical measurands such as pressure, directly through resistance sensors or thermocouple sensors, and using an adequate transformer and 4-20 mA current input.
The stipulations and requirements for use specified in this document must be taken into consideration. All specifications below with regard to probes or sensor technology relate to the probes listed in Chapter 9.14 to Chapter 9.16. If other probes are used, their suitability must first be tested.

☞ **Important information**:
Thermocouples should be evaluated with at least the requirements of EN 60584 or DIN 43710. RTD temperature probes should be evaluated with at least the requirements of EN 60751. Parameter values such as response rate, temperature stability, age drift, self-heating behavior, failure rates, fault models, etc. should likewise be taken into account.

The JUMO exTHERM-DR is associated apparatus that may only be used outside the Ex-zone.
Another use or one that goes beyond the specified use - with respect to use in potentially explosive areas - is considered as not being in accordance with regulations.

Liability for resulting damages cannot be assumed.

The JUMO exTHERM-DR has been manufactured in compliance with applicable standards and directives, as well as applicable safety regulations. Nevertheless, incorrect use may lead to bodily injury or property damage.

To avoid danger, the JUMO exTHERM-DR may only be used:

- for the intended use
- when in good order and condition
- under consideration of this operating manual

DANGER!
Ex approval becomes null and void in the event of incorrect use of the JUMO exTHERM-DR or non-compliance with the safety requirements of this operating manual.

6.1.1 Installation regulations

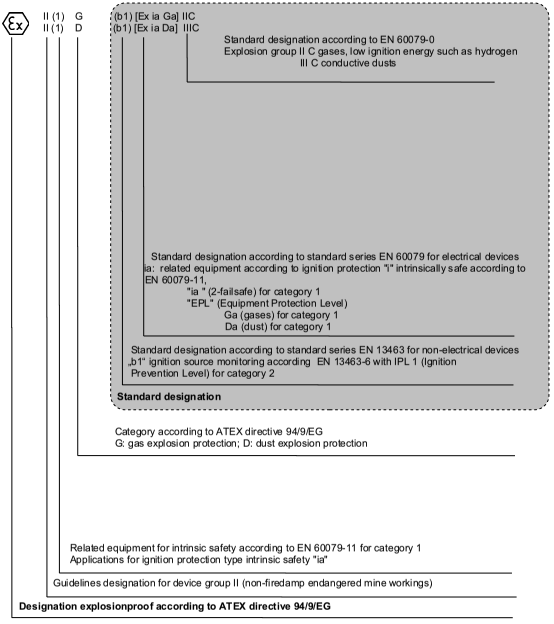
If electrical apparatus is used in plants and ambient conditions with greater safety requirements, the obligations of the applicable installation regulations according to EN 60079-14 "Explosive atmospheres – Part 14: Electrical installations design, selection and erection" are to be considered along with other applicable requirements.

6.2 Identification marking according to ATEX directive 2014/34/EC:

II (1) G [Ex ia Ga] IIC

II (1) D [Ex ia Da] IIIC

Figure 1: Explanation of the imprinted characters:



6.3 Meaning of the X character in the examination certificate

The particular conditions for which the X follows the test report numbers are as follows:

- Switching operations may only be performed on the intrinsically safe electrical circuits when the JUMO exTHERM-DR, including all supply lines, is de-energized.
- Voltage may only be applied to the JUMO exTHERM-DR, including all its supply lines, if the protective cap of the intrinsically safe electrical circuits has been fitted correctly

⇨ Chapter 4.2 "Removing the protective cap"

- For the JUMO probes in the ATEX test report, based on JUMO data sheet 901006 and 902006, a safe isolation between the sensor and fitting does not exist. As a result, for the safety evaluation, the sensor connections are to be considered grounded according to ATEX. This means that the user must ensure that during connection of the intrinsically safe electrical circuit through integration in the local potential (e.g. potential equalization or FB), the intrinsic safety of the JUMO exTHERM-DR is not reversed.
- The probe connection heads of the probes under consideration do not fulfill the material composition requirements from EN 60079-0 for EPL Ga. Corresponding impact protection must therefore be ensured on site for use in EPL Ga.

⇨ Chapter 9.13 "Note about probes in Chapter 9.14 up to Chapter 9.16"

6.4 Associated, intrinsically safe electrical apparatus according to EN 60079-11

6.4.1 Function of intrinsic safety

The ignition protection type intrinsic safety "i" makes use of the fact that a certain energy is required in order to ignite an explosive atmosphere. This is dependent upon the composition of the explosive atmosphere.
An electrical circuit is intrinsically safe if it prevents this energy level from being exceeded, thus preventing an ignition either through switching sparks or a thermal effect, under certain test conditions and taking into consideration certain safety margins.

6.4.1.1 Definitions of intrinsic safety

An intrinsically safe electrical circuit is a circuit in which neither a spark nor a thermal effect occurring under the conditions specified in EN 60079-11, which include uninterrupted operation and defined fault conditions, may cause the ignition of a certain potentially explosive atmosphere.

The energy of the electrical circuit is limited such that it cannot cause an ignition. This applies to both spark formation and thermal effects. The test conditions with specific potentially explosive atmospheres are specified. The tests comprise uninterrupted operation and defined fault conditions.

6.4.1.2 Electrical apparatus:

Electrical apparatus is the collective term for electrical components and electrical circuits or parts of electrical circuits generally found together within a single housing.

6.4.1.3 Intrinsically safe electrical apparatus:

Electrical apparatus in which all electrical circuits are intrinsically safe.

6.4.1.4 Associated, intrinsically safe electrical apparatus:

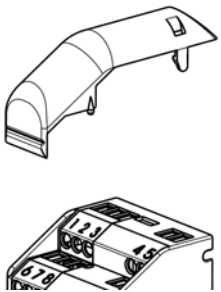
Electrical apparatus in which not all electrical circuits are intrinsically safe. In terms of construction, the non-intrinsically safe electrical circuits cannot have an effect on the intrinsically safe electrical circuits.
The associated apparatus is identified through brackets: e.g. II (1) G [Ex ia] II C.
Associated electrical apparatus can be used in potentially explosive areas provided it has the corresponding protection (ignition protection type according to EN 60079-0). In the event of insufficient protection, it must be used outside of the potentially

explosive area.

Example:
The JUMO exTHERM-DR is not in the potentially explosive area, however it is connected to a thermocouple in the potentially explosive area. Only the input circuit of the JUMO exTHERM-DR is intrinsically safe.

The screw terminals marked in blue and the connected lines are protected with a protective cap.

Figure 2: protective cap



⇨ Chapter 4.2 "Removing the protective cap"

6.4.2 Probe arrangement in the Ex-area

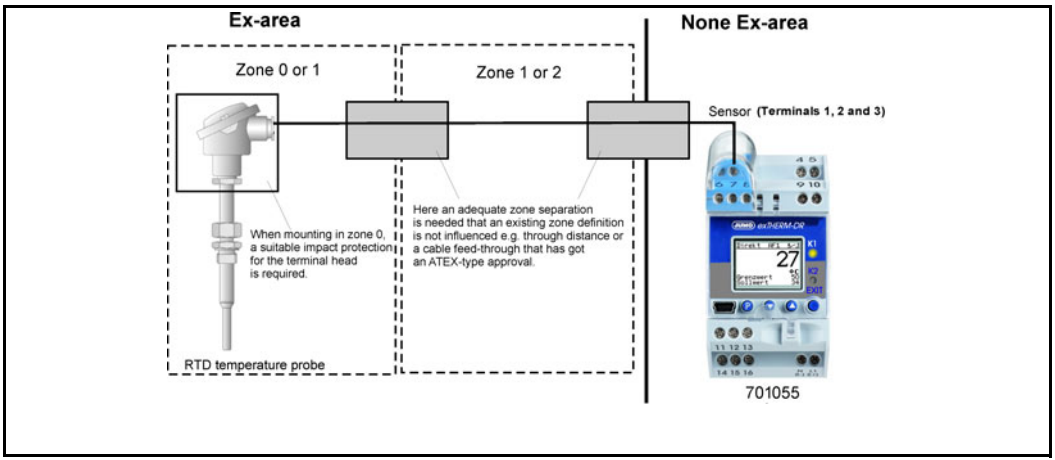
The JUMO exTHERM-DR has the following maximum output data at the intrinsically safe inputs:

U_o = 6.0 V; I_o = 41.2 mA; P_o = 61.8 mW; C_o = 36.3 µF; L_o = 20 mH

Example Pt100 with protection tube constant 80 K/W: temperature increase of 80 K/W x 61.8 mW = 4.9 K.

If a separate temperature increase for dust is specified in the technical data sheet from JUMO, this means that the protection fitting is completely covered in dust.

Figure 3:



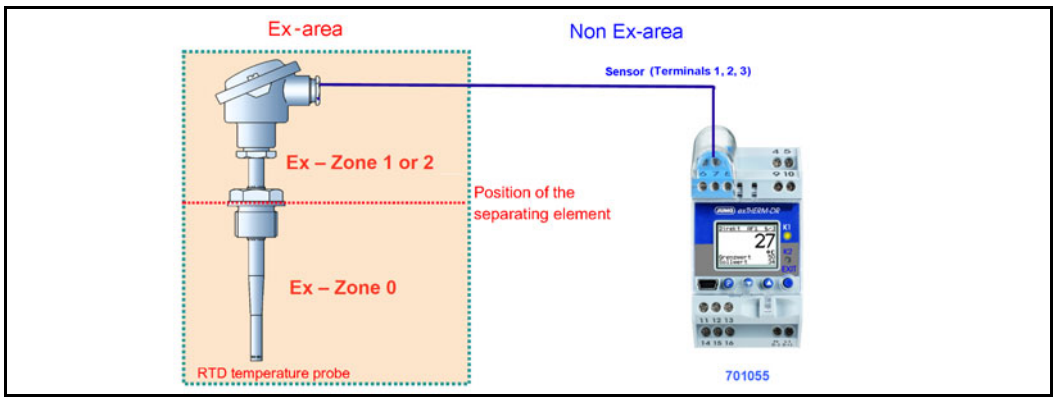
The sensor technology specified in Chapter 9.13 Chapter 9.14 and Chapter 9.15 does not have zone separation.

⇨ Please also see the notes in Chapter 9.12.

The type of zone separation as well as the cable selection must be implemented or selected in such a way that the defined zone classifications and their requirements continue to be in place.

Use of a probe with EPL "Gb" with an isolation element (DIN EN 60079-26). The figure shows a probe with active zone isolation according to DIN EN 60079-26. The terminal head my not be fitted in zone 0!
However, use in zone 0 is permitted below the isolation element. The same requirements as in figure 7 apply for the zone classification.

Figure 4:



6.4.3 Explanation of probe temperature classes

The listed probes can be classified in the temperature classes T1 to T6.

Table 1: Temperature classes

Temperature class	Maximum surface temperature of the apparatus[1]	Ignition temperature of the combustible materials
T1	450 °C	> 450 °C
T2	300 °C	>300 < 450 °C
T3	200 °C	>200 < 300 °C
T4	135 °C	>135 < 200 °C
T5	100 °C	>100 < 135 °C
T6	85 °C	>85 < 100 °C

Temperature classes

In EN 60079-0:2009, point 26.5.1.3, type-tested devices of group II (explosive gas atmospheres excluding mines susceptible to firedamp) require a safety margin for the highest measured surface temperature – 10 K for T1 and T2, and 5 K for T3, T4, T5 and T6.

In RTD temperature probes, a measuring current flows through the sensor element thus heating it up. In the event of a fault in the JUMO exTHERM-DR, a maximum power of 61.8 mW can also be introduced in the probe through the sensor electrical circuit. This also affects the thermocouple probes.

The maximum temperature rise was calculated through measurements.
The following values represent the worst-case scenario and apply to all probes:
The maximum temperature rise of Pt100 probes is **7.5°K**.
The maximum temperature rise of thermocouple probes is **0.9°K**.

1. Furthermore, the following safety margins must be adhered to:
   Category 1: According to EN 1127-1:2011, point 6.4.2 (hot surfaces), the temperatures of all surfaces of devices...for use in zone 0...which may come into contact with explosive atmospheres...must not exceed 80 % of the ignition temperature.
   The result is temperature class minus 20 %.

As described above, 10 °C must be subtracted in temperature classes T1 and T2 and 5 °C in temperature classes T3 to T6.

Example:
A thermocouple is to be used in the temperature class T4 (maximum temperature 135 °C, limit is to be reduced by 5 K for safety);
T_S Maximum admissible temperature at the probe head

T_S = 130 °C - 0.9 °C

T_S = **129.1 °C**

The maximum temperature (measuring or medium temperature) at the probe head must therefore not exceed a value of 129.1 °C.

The following table provides a summary of the calculations for all temperature classes:

Table 2:

	Medium and ambient temperature for applications that require category 2 devices		**Medium and ambient temperature for applications that require category 1 devices**	
	Sensor with PT100	**Sensor with thermocouple**	**Sensor with PT100**	**Sensor with thermocouple**
T1	439.1 °C	432.5 °C	349.1 °C	342.5 °C
T2	289.1 °C	282.5 °C	229.1 °C	222.5 °C
T3	194.1 °C	187.5 °C	154.1 °C	147.5 °C
T4	129.1 °C	122.5 °C	102.1 °C	95.5 °C
T5	94.1 °C	87.5 °C	74.1 °C	67.5 °C
T6	79.1 °C	72.5 °C	62.1 °C	55.5 °C

7 IECEx

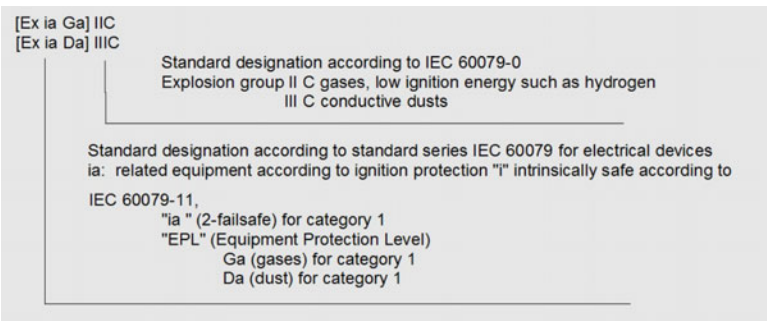
7.1 Intended use

The JUMO exTHERM-DR 701055 is associated apparatus that may only be used outside of the Ex zone. Another use or one that goes beyond the specified use - with respect to use in potentially explosive areas - is not considered to be an intended use.

7.2 Identification markings according to IECEx

[Ex ia Ga] IIC	Associated apparatus, that is installed outside the gas atmosphere but the intrinsically safe electrical circuit „ia“ (Protection through 2-safety precautions) leads into zone 0.
[Ex ia Da] IIIC	Associated apparatus, that is installed outside the dust atmosphere intrinsically safe electrical circuit „ia“ (Protection through 2-safety precautions) leads into zone 20.

Description



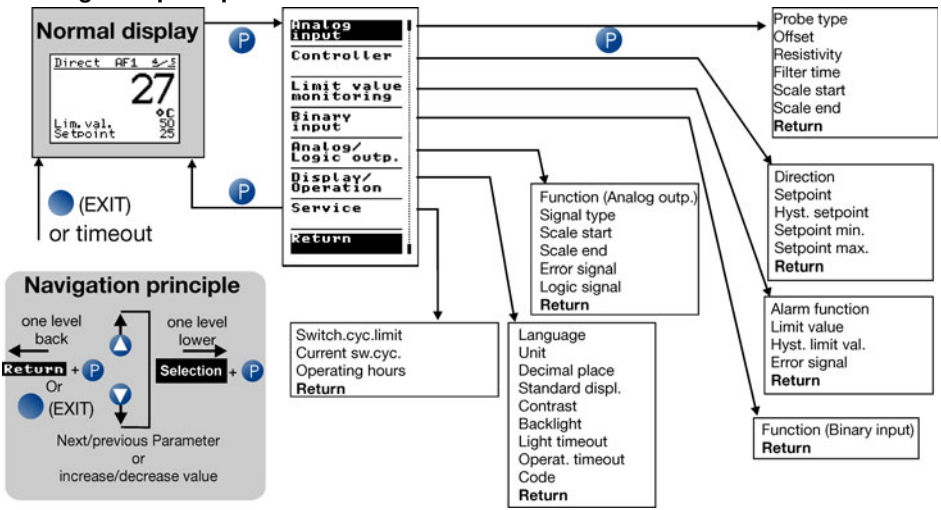
7.3 Extract of important device data

Item	Descripition	Reference
Manufacturer's name	JUMO GmbH & Co. KG	⇨ last page
Address	Moritz-Juchheim-Straße 1 36039 Fulda Germany	
Test item description and Model/type reference	JUMO exTHERM-DR 701055	⇨ Chapter 2 "Identifying the device version"
IECEx-Code	[Ex ia Ga] IIC [Ex ia Da] IIIC	⇨ Chapter 7.2 "Identification markings according to IECEx"
Assembled ExTR documents and additional reference material	IECEx Test Report Cover IECEx Test Report: IEC 60079-0 Edition 6 IECEx Test Report: IEC 60079-11, Edition 6	⇨ listed approvals
Certificate No	IECEx TUN 16.0022X	⇨ Chapter 15 "Certificates"
Ingress protection	Min IP20	⇨ Chapter 9.10 "Housing"
Rated ambient temperature range (°C)	0 °C … +55 °C	⇨ Chapter 9.9 "Environmental influences"

Item	Description	Reference
Specific Conditions of Use	1.) The switching on the intrinsically safe circuits may be performed only if the JUMO exTHERM-DR including all supply lines is de-energized. 2.) To energize the JUMO exTHERM-DR including all supply lines, the protective cap of the intrinsically safe circuits shall be correctly mounted. 3.) The sensors listed under the specifications of JUMO GmbH & Co KG based on the JUMO-datasheet 901006 and 902006 have no safe isolation to the armature. The sensor connections are therefore to be considered as grounded for the safety assessment. This means that the user must ensure in case of connection of the intrinsically safe circuit to the local potential (eg PA resp. FB) that the intrinsic safety of the JUMO exTHERM-DR is not repealed. 4.)The sensor connection heads do not meet the requirements of the material composition of IEC 60079-0 for applications that require devices of category 1. The device has to be installed in such a way that any ignition hazards caused by impact or friction can be excluded“.	⇨ Chapter 4.2 "Removing the protective cap" and Chapter 4.3 "Connection diagram"

8 Configuration level

8.1 Navigation principle



All the parameters are freely accessible ex works, but they can be locked via the setup program.

⇨ Chapter 10.3 "Forgotten the code?"

Parameters of the configuration level which are not required are automatically hidden depending on the setting.

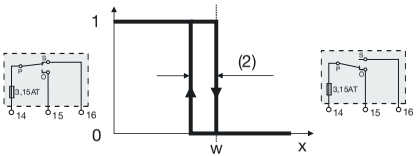
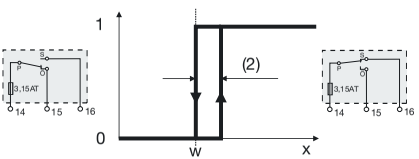
8.2 Analog input

8.2.1 Sensor type for analog input	Comment	Limits for underrange/ overrange
Pt100 three-wire	in three-wire circuit IEC 60751:2008	-205 °C / +855 °C
Pt1000 three-wire	in three-wire circuit IEC 60751:2008	-205 °C / +855 °C
Pt100 two-wire	in two-wire circuit IEC 60751:2008	-205 °C / +855 °C
Pt1000 two-wire	in two-wire circuit IEC 60751:2008	-205 °C / +855 °C
W3Re-W25Re "D"	Thermocouple ASTM E1751M-09 (up to 2315 °C): 2009	-5 to +2500°C
W5Re-W26Re "C"	Thermocouple ASTM E230M-11: 2011	-5 to +2320°C
Cu-CuNi "T"	Thermocouple DIN EN 60584-1: 1996-10	-205 to +405°C
Fe-CuNi "J"	Thermocouple DIN EN 60584-1: 1996-10	-205 to +1205°C
Cu-CuNi "U"	Thermocouple DIN 43710: 1985-12	-205 to +605°C
Fe-CuNi "L"	Thermocouple DIN 43710: 1985-12	-205 to +905°C
NiCr-Ni "K"	Thermocouple DIN EN 60584-1: 1996-10	-205 to +1377°C
Pt10Rh-Pt "S"	Thermocouple DIN EN 60584-1: 1996-10	-55 to +1773°C
Pt13Rh-Pt "R"	Thermocouple DIN EN 60584-1: 1996-10	-55 to +1773°C
Pt30Rh-Pt6Rh "B"	Thermocouple DIN EN 60584-1: 1996-10	295 to 1825°C
NiCrSi-NiSi "N"	Thermocouple DIN EN 60584-1: 1996-10	-105 to +1305°C
4 to 20 mA	Standard signal	3.6 to 21 mA

Default setting

Parameters	Comment	Value range (default setting in **bold**)
8.2.2 Offset	Using Offset1, a measured value at the analog input can be corrected by the value entered over the entire measuring range.	-999.9 to **0.0** to 999.9
8.2.3 Lead wire resistance	**Lead wire resistance analog input 1 in two-wire circuit** This value is used to compensate the resistance of the probe line and depends on the line length. Enter the ohmic resistance of the probe line here to achieve the best possible temperature measurement.	**0.0** to 30.0 ohm
8.2.4 Filter time	**Time constant of the digital input filter 2nd order for analog input 1** 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
8.2.5 Scaling start	Here, the user selects which value (i.e. pressure) should be displayed at 4 mA.	-9999 to **0** to 9999
8.2.6 Scaling end	Here, the user selects which value (i.e. pressure) should be displayed at 20 mA.	-9999 to**100** to 9999

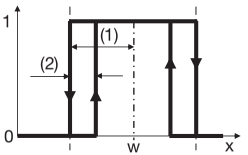
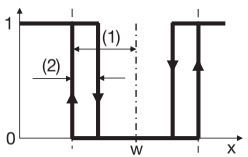
8.3 Controller

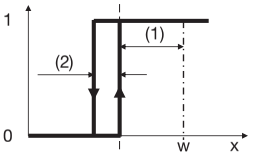
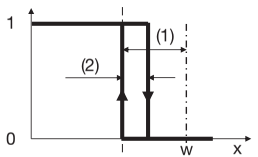
Parameters	Comment	Value range (default setting in **bold**)
8.3.1 Control direction	**Inverse:** heating function If the measured value is below the setpoint value + hysteresis, relay output controller K1 switches on. If the measured value exceeds the setpoint value, the relay switches off.  (2) Hysteresis w Setpoint value	**Inverse,** direct
	Direct: cooling function If the measured value exceeds the setpoint value + hysteresis, relay output controller K1 switches on. If the measured value is below the setpoint value, the relay switches off.  (2) Hysteresis w Setpoint value	

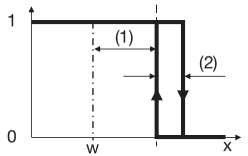
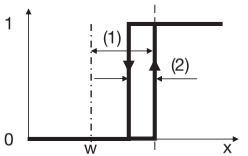
Parameters	Comment	Value range (default setting in **bold**)
8.3.2 Setpoint value	The setpoint value determines the switching point (1) in the figures above.	Setpoint value max. to **0** to setpoint value min.
8.3.3 Hysteresis setpoint value	The hysteresis determines the gap between switch-off and switch-on threshold (2) in the figures above.	0 to **2** to 100
8.3.4 Setpoint value min.	This value is the lower input limit for the setpoint value.	**-9999** to setpoint value
8.3.5 Setpoint value max.	This value is the upper input limit for the setpoint value.	Setpoint value to **9999**

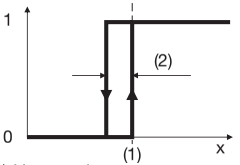
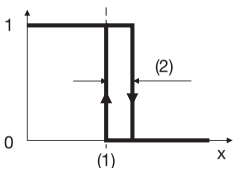
8.4 Limit value monitoring

The relay output limit value K2 can be set for monitoring of the following functions.

Parameters	Comment	Value range (default setting in **bold**)
8.4.1 Alarm function	**AF1**: ON circuit in the window around the setpoint value  (1) Limit value is gap compared to setpoint value w (2) Hysteresis	**No function,** AF1 to AF8
	AF2: OFF circuit in the window inversely around the setpoint value  (1) Limit value is gap compared to setpoint value w (2) Hysteresis	

Parameters	Comment	Value range (default setting in **bold**)
	AF3: ON circuit before reaching the setpoint value  (1) Limit value is gap compared to setpoint value w (2) Hysteresis	
	AF4: OFF circuit before reaching the setpoint value  (1) Limit value is gap compared to setpoint value w (2) Hysteresis	

Parameters	Comment	Value range (default setting in **bold**)
	AF5: OFF circuit after exceeding the setpoint value  (1) Limit value is gap compared to setpoint value w (2) Hysteresis	
	AF6: ON circuit after exceeding the setpoint value  (1) Limit value is gap compared to setpoint value w (2) Hysteresis	

Parameters	Comment	Value range (default setting in **bold**)
	AF7: ON circuit from a fixed limit value  (1) Limit value (2) Hysteresis	
	AF8: OFF circuit from a fixed limit value  (1) Limit value (2) Hysteresis	
8.4.2 Limit value	As shown in the figures, the limit value is: - for the functions AF1 to AF6, the gap compared to the set-point value - for the functions AF7 and AF8, it is a fixed switching point	-9999 to **0** to 9999

Parameters	Comment	Value range (default setting in **bold**)
8.4.3 Hysteresis limit value	The hysteresis determines the gap between switch-on and switch-off threshold (2) in the figures AF1 to AF8.	0 to **2** to 9999
8.4.4 Error signal	Active means: the relay output picks up in the event of a fault. Inactive means: the relay output drops out in the event of a fault. ⇨ Chapter 12 "Error messages"	**Active**, inactive

8.5 Digital input

Parameter	Comment	Value range (default setting in **bold**)
8.5.1 Function	This sets the function that should be controlled by the binary input.	
	The binary input does not have a function	**No function**
	Protection against unauthorized key operation	Keyboard lock
	Configuration level is locked.	Level inhibit

8.6 Analog/logic output

Parameters	Comment	Value range (default setting in **bold**)
8.6.1 Function	This setting specifies the signal that should be output at the analog output.	**Measured value,** Setpoint value, Logic output
	Measured value: The value measured at the analog input is output.	
	Setpoint value: The setpoint value is output.	
	Logic output: With this setting, the switching status of the relay output controller K1 or limit value K2 is also output as a binary signal 0/10V. The output now no longer functions as an analog output. This is set in Chapter 8.6.6. The relay outputs retain their switching function.	
8.6.2 Signal type	4 to 20 mA	**4 to 20 mA,** 0 to 20 mA 2 to 10 V 0 to 10 V
	0 to 20 mA	
	2 to 10 V	
	0 to 10 V	
8.6.3 Scaling start	⇨ Figure in Chapter 8.6.7	-9999 to **-200** to 9999
8.6.4 Scaling end	⇨ Figure in Chapter 8.6.7	-9999 to **800** to 9999

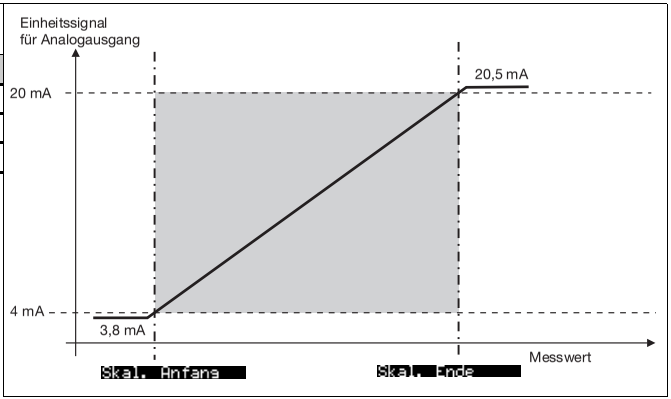
Parameters	Comment	Value range (default setting in **bold**)
8.6.5 Error signal	If, for the measured value 1, the value is exceeded, not reached, or a diagnostic error occurs, the current or voltage value set on the analog output is output as a so-called error signal.	
	For signal type 4 to 20 mA	**3.4** or 21.2 mA
	For signal type 0 to 20 mA	**0** or 21.2 mA
	For signal type 2 to 10 V	**1.7** or 10.4 V
	For signal type 0 to 10 V	**0** or 10.4 V
8.6.6 Logic output	This setting only appears if "Logic output" is set under Chapter 8.6.1. This sets whether the switching status of the controller (K1) or switching status of the limit value (K2) is output.	**Controller (K1)** Limit value (K2)

8.6.7 Behavior when leaving the scaling range

The standard signal range of the analog output is limited as follows according to the recommendation of Namur NE 43:

Signal type	Lower limit	Upper limit
0: 4 to 20 mA	3.8 mA	20.5 mA
1: 0 to 20 mA	0 mA	20.5 mA
2: 2 to 10 V	1.8 V	10.2 V
3: 0 to 10 V	0 V	10.2 V

Default setting



8.7 Display/operation

Parameters	Comment	Value range (default setting in **bold**)
8.7.1 National language	German	**German**, English, French
	English	
	French	
8.7.2 Unit	A unit for the measured value can be assigned here.	**°C**, °F, %, text
	°C	
If the unit is changed to °F, the measured value is converted. All other values referring to the measured value (e.g. limit value) remain unchanged.	°F	
	%	
	Text: Via the setup program, 2 characters can be entered here for another unit, e.g. Pa (Pascal).	
8.7.3 Decimal place	No decimal place	**No decimal place,** One decimal place
	One decimal place	
8.7.4 Normal display	This sets the view that appears after the voltage supply is switched on. ⇨ Chapter "Operating overview"	**Measured value**, Limit value, Setpoint value, I/O info
8.7.5 Contrast	**Screen contrast:** Difference in brightness between black and white pixels	0 to **5** to 10

Parameters	Comment	Value range (default setting in **bold**)
8.7.6 Lighting	Here, the background lighting of the display is set.	Off, **On**, During operation
	Off: Always switched off	
	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 light has expired.	
8.7.7 Timeout light	Here, a waiting period for the switch-off of the background lighting is set.	0 to **30** to 100 sec
8.7.8 Timeout operation	Here, the waiting period is set for the return from the configuration to normal display.	0 to **30** to 100 sec
8.7.9 Code	To prevent unintentional changes to configuration data, a code for locking the configuration level can be set here. 0 means: code request switched off ☞ If the code is forgotten, a new code can be transferred to the device via the setup program. ⇨ Chapter 10.3 "Forgotten the code?"	**0** to 9999

Parameters	Comment	Value range (default setting in **bold**)
8.8.1 Limit switching operation 	**Limit value for relay output controller K1** Here, the limit value for the admissible relay switching operations is set. If the counter value for **Current switching operations** is greater than this value, the display values flash and the relay output controller K1 drops out. If the (EXIT) key is pressed, the corresponding error message appears. The relay output limit value K2 and the analog output react as configured under "Error signal" in Chapter 8.4.4 and Chapter 8.6.5. If "0" is set the function is inactive.	**0** to 99999
8.8.2 Current switching operations	**Switching operation counter for relay output controller K1** Here, the switching operations for the relay are only counted if the top **limit value for relay switching operations** is not set to "0" and is thus inactive. The value can then be adjusted as required and therefore adapted accordingly to the plant. The switching operation counter remains at 99999.	**0** to 99999

Parameters	Comment	Value range (default setting in **bold**)
8.8.3 Operating hours	**Operating hours counter** The counter adds up the operating hours during which the device was connected to the voltage supply. The value cannot be changed and can be used as a measure of how long the device was actually in operation after leaving the factory.	**0** to 99999

9 Technical data

9.1 Analog inputs

RTD temperature probes

Designation	Measuring range	Accuracy 2/3-wire circuit[1]	Ambient temperature influence
Pt100 IEC 60751:2008	-200 to +850°C	0.5 % / 0.1 %	50 ppm/K
Pt1000 IEC 60751:2008	-200 to +850°C	0.5 % / 0.1 %	50 ppm/K
Connection type	Maximum lead wire resistance in two-wire circuit 15 Ω, three-wire circuit 30 Ω		
Sampling rate	210 ms		
Error tolerance time	≤ 5 s time taken into account for all diagnostic tests		
Input filter	Digital filter, 2nd priority; filter constant can be set from 0 to 100 s		
Special features	Individual probe Pt100 two-wire, display can also be programmed in °F		

Thermocouples

Designation	Measuring range	Accuracy[1]	Ambient temperature influence
Fe-CuNi "L" DIN 43710: 1985-12	-200 to +900 °C	0.4 %	100 ppm/K
Fe-CuNi "J" DIN EN 60584-1:1996-10	-200 to +1200°C	0.4 %	100 ppm/K

Cu-CuNi "U" DIN 43710:1985-12	-200 to +600 °C	0.4 %	100 ppm/K
Cu-CuNi "T" DIN EN 60584-1:1996-10	-200 to +400°C	0.4 %	100 ppm/K
NiCr-Ni "K" DIN EN 60584-1:1996-10	-200 to +1372 °C	0.4 %	100 ppm/K
Pt10Rh-Pt "S" DIN EN 60584-1:1996-10	-50 to +1768°C	0.4 %	100 ppm/K
Pt13Rh-Pt "R" DIN EN 60584-1:1996-10	-50 to +1768°C	0.4 %	100 ppm/K
Pt30Rh-Pt6Rh "B" DIN EN 60584-1:1996-10	0 to 1820°C	0.4 %[2]	100 ppm/K
NiCrSi-NiSi "N" DIN EN 60584-1:1996-10	-100 to 1300°C	0.4 %[2]	100 ppm/K
W3Re-W25Re "D" ASTM E1751M-09 (up to 2315 °C): 2009	0 to 2495°C	0.4 %	100 ppm/K
W5Re-W26Re "C" ASTM E230M-11: 2011	0 to 2315 °C	0.4 %	100 ppm/K
Cold junction	Pt100 internal		
Cold junction accuracy	± 1 K		
Sampling rate	210 ms		
Input filter	Digital filter, 2nd priority; filter constant can be set from 0 to 100 s		

1. The accuracy refers to the maximum measuring range.
2. The accuracy values are first guaranteed from 300°C.

Direct current

Measuring range	Accuracy	Ambient temperature influence
4 to 20 mA, voltage drop < 2 V	0.2 %	150 ppm/K
Scaling	Can be freely programmed within the limits	
Sampling rate	210 ms	
Input filter	Digital filter, 2nd priority; filter constant can be set from 0 to 100 s	
Special features	Individual probe 4 to 20 mA	

9.2 Analog output

	Signal type	Accuracy	Residual ripple	Load influence	Temperature influence	Load resistance
Current	4 to 20 mA	≤ 0.5 %	± 0.5 % at 300 Ω	± 0.05 mA / 100 Ω	150 ppm/K	≤ 500 Ω
	0 to 20 mA					
Voltage	2 to 10 V	≤ 0.5 %	± 0.5 %	± 15 mV	150 ppm/K	≥ 500 Ω
	0 to 10 V					
Logic output	Binary signal 0 / 10 V	≤ 0.5 %	± 0.5 %	± 15 mV	150 ppm/K	≥ 500 Ω

9.3 Digital input

Connection	Function
1 potential-free contact	Keyboard lock, level inhibit configurable

9.4 Relay outputs

Relay output controller K1	Relay (changeover contact) **Contact protection circuit:** fuse cut-out 3.15 AT, installed in the N/O contact arm 30000 switching operations at a switching capacity of AC 230 V / 3 A, 50 Hz (resistive load) or up to DC 30 V / 3 A. Minimal current: DC 12 V / 100 mA.
Relay output limit value K2	Relay (changeover contact) without contact protection 30000 switching operations at a switching capacity of AC 250 V / 3 A, 50 Hz (resistive load) or up to DC 30 V / 3 A. Minimal current: DC 12 V / 100 mA.

9.5 Measuring circuit monitoring

	RTD temperature probes	Thermocouples	Current 4 to 20 mA
Overrange and underrange	is detected in the display, ">>>>" flashes for overrange and "<<<<" for underrange.		
Probe/cable break	is detected ">>>>" flashes in the display; relay output controller K1 is inactive		">>>>" flashes in the display; relay output controller K1 is inactive
Probe short circuit	is detected "<<<<" flashes in the display; relay output controller K1 is inactive	is not detected	"<<<<" flashes in the display; relay output controller K1 is inactive

9.6 Voltage supply

Voltage supply	AC/DC 20 to 30 V, 48 to 63 Hz AC 110 to 240 V, +10/-15 %, 48 to 63 Hz
Power consumption	12 VA
Power loss	12 W

9.7 Test voltages according to EN 60730, part 1

Input and output against voltage supply	
- With a voltage supply AC 110 to 240 V +10 % /-15 %	3.7 kV/50 Hz
- With a voltage supply AC/DC 20 to 30 V, 48 to 63 Hz	3.7 kV / 50 Hz

9.8 Electrical safety

	Clearances / creepage distances
Mains voltage to electronic components and probes	≥ 6 mm / ≥ 8 mm
Mains voltage to relays	≥ 6 mm / ≥ 8 mm
Relays to electronic components and probes	≥ 6 mm / ≥ 8 mm
Electrical safety	according to DIN EN 60730-1, overvoltage category III, pollution degree 2
Protection rating I	With internal isolation from SELV electrical circuits

9.9 Environmental influences

Ambient temperature range	0 to +55 °C
Storage temperature range	-30 to +70 °C
Temperature influence	≤ ± 0.005 % / K dev. from 23 °C [1] for RTD temperature probes
	≤ ±0.01 %/K dev. from 23 ×C[1] for thermocouple and current
Resistance to climatic conditions	85 % rel. humidity without condensation (3K3 with extended temperature range according to DIN EN 60721-3-3)
EMC	Standards from the standard series DIN EN 61326

Interference emission	Class B
Interference immunity	according to DIN EN 60730

1.All specifications refer to the measuring range end value

9.10 Housing

Material	Polycarbonate
Flammability class	UL 94 V0
Electrical connection	On the front via screw terminals up to max. 2.5 mm ^{2}
Mounting	On 35 mm DIN-rail according to EN 60715
Installation position	Vertical
Weight	approx. 230 g
Protection type	IP 20 according to DIN EN 60529

9.11 Approvals / approval marks

Approval mark	Test facility	Certificates/certification numbers	Inspection basis	Valid for
ATEX	TÜV Nord (German Technical Inspection Agency)	TÜV 15 ATEX 163874 X	Directive 94/9/EC	All device versions
IECEx	TÜV Nord (German Technical Inspection Agency)	IECEx TUN 16.0022X	IEC 60079-0 IEC 60079-11	All device versions

9.12 Note about suitable probes

The probes in type sheet 902820, 902821 with JUMO declaration of manufacturer and other approved probes can be connected.

9.13 Note about probes in Chapter 9.14 up to Chapter 9.16

The following should be noted:

- A safe isolation between the sensor and fitting does not exist. As a result, the sensor connections are to be considered grounded for the safety evaluation.
- Among other things the EN 60079-0 requires of the EPL Ga that the mass fraction of aluminum must be less than 10 % for the manufacturing of metallic housings. The terminal head of the probes used by JUMO contains more than 10 % aluminum. The terminal head for the use of EPL Ga (zone 0) must therefore be secured by a suitable impact protection. The impact protection must securely prevent friction sparks, contact-breaking sparks, and impact sparks. Otherwise there is a risk of ignitable sparks.

No other precautions have to be taken when used in EPL Gb (zone 1).

9.14 Probes for the operating medium air

Note: because of the high response accuracy, **the use of thermowells** (immersion sleeves) **is not admissible**.

Current type designation	Probe type	Temperature range	Nom. length mm	Process connection
RTD temperature probe data sheet 902006				
902006/65-228-1003-1-15-500-668/922	1 × Pt100	-170 to +700 °C	500	
902006/65-228-1003-1-15-710-668/922			710	
902006/65-228-1003-1-15-1000-668/922			1000	
902006/55-228-1003-1-15-500-254/922	1 × Pt100	-170 to +700 °C	500	
902006/55-228-1003-1-15-710-254/922			710	
902006/55-228-1003-1-15-1000-254/922			1000	
902006/65-228-2003-1-15-500-668/922	2 × Pt100	-170 to +700 °C	500	Stop flange displaceable
902006/65-228-2003-1-15-710-668/922			710	
902006/65-228-2003-1-15-1000-668/922			1000	
902006/55-228-2003-1-15-500-254/922	2 × Pt100	-170 to +700 °C	500	Displaceable screw connection G1/2
902006/55-228-2003-1-15-710-254/922			710	
902006/55-228-2003-1-15-1000-254/922			1000	
Thermocouples data sheet 901006				
901006/65-547-2043-15-500-668/922	2 × NiCr-Ni, type "K"	-35 to +800 °C	500	Stop flange displaceable
901006/65-547-2043-15-710-668/922			710	
901006/65-547-2043-15-1000-668/922			1000	
901006/65-546-2042-15-500-668/922	2 × Fe-CuNi, type "L"	-35 to +700 °C	500	
901006/65-546-2042-15-710-668/922			710	
901006/65-546-2042-15-1000-668/922			1000	
901006/66-550-2043-6-500-668/922	2 × NiCr-Ni, type "K"	-35 to +1000 °C	500	
901006/66-550-2043-6-355-668/922			355	
901006/66-550-2043-6-250-668/922			250	
901006/66-880-1044-6-250-668/922	1 × PT10Rh-PT, type "S"	0 to 1300 °C	250	
901006/66-880-1044-6-355-668/922			355	
901006/66-880-1044-6-500-668/922			500	
901006/66-880-2044-6-250-668/922	2 × PT10Rh-PT, type "S"	0 to 1300 °C	250	Stop flange displaceable
901006/66-880-2044-6-355-668/922			355	
901006/66-880-2044-6-500-668/922			500	

Current type designation	Probe type	Temperature range	Nom. length mm	Process connection
901006/66-953-1046-6-250-668/922	1 × PT30Rh-PT6Rh, type "B"	600 to 1500 °C	250	
901006/66-953-1046-6-355-668/922			355	
901006/66-953-1046-6-500-668/922			500	
901006/66-953-2046-6-250-668/922	2 × PT30Rh-PT6Rh, type "B"	600 to 1500 °C	250	
901006/66-953-2046-6-355-668/922			355	
901006/66-953-2046-6-500-668/922			500	

9.15 Probes for water and oil

Note: because of the high response accuracy, **the use of thermowells** (immersion sleeves) **is not admissible**.

Current type designation	Probe type	Temperature range	Nom. length mm	Process connection
RTD temperature probe data sheet 902006				
902006/10-226-1003-1-9-250-104/922	1 × Pt100	-40 to +480 °C	250	Screw connection G1/2
902006/10-226-2003-1-9-250-104/922	2 × Pt100		250	
902006/54-227-2003-1-15-710-254/922	2 × Pt100	-170 to 550 °C	65 to 670	Displaceable screw connection G1/2
902006/54-227-1003-1-15-710-254/922	1 × Pt100		65 to 670	
902006/10-402-1003-1-9-100-104/922	1 × Pt100	-170 to 400 °C	100	Screw connection G1/2
902006/10-402-2003-1-9-100-104/922	2 × Pt100		100	
Thermocouples data sheet 901006				
901006/54-544-2043-15-710-254/922	2 × NiCr-Ni, type "K"	-35 to 550 °C	65 to 670	Displaceable screw connection G1/2
901006/54-544-1043-15-710-254/922	1 × NiCr-Ni, type "K"		65 to 670	
901006/54-544-2042-15-710-254/922	2 × FeCuNi, type "L"		65 to 670	
901006/54-544-1042-15-710-254/922	1 × FeCuNi, type "L"		65 to 670	

Note: because of the high response accuracy, **only use thermowells** (immersion sleeves) **that are included** in the scope of deliver

Current type designation	Probe type	Temperature range	Nom. length mm	Process connection
RTD temperature probe data sheet 902006				
902006/53-505-2003-1-12-190-815/922	2 × Pt100	-40 to +400 °C	190	
902006/53-507-2003-1-12-100-815/922	2 × Pt100 (arranged beneath each other in the sheath)	-40 to +480 °C	100	
902006/53-507-2003-1-12-160-815/922			160	
902006/53-507-2003-1-12-190-815/922			190	
902006/53-507-2003-1-12-220-815/922			220	
902006/53-507-1003-1-12-100-815/922	1 × Pt100	-40 to +480 °C	100	Weldable sleeve
902006/53-507-1003-1-12-160-815/922			160	
902006/53-507-1003-1-12-220-815/922			220	
902006/53-505-1003-1-12-190-815/922	1 × Pt100	-40 to +400 °C	190	
902006/53-505-3003-1-12-100-815/922	3 × Pt100	-40 to +400 °C	100	
902006/53-505-3003-1-12-160-815/922			160	
902006/53-505-3003-1-12-220-815/922			220	
902006/40-226-1003-1-12-220-815/922	1 × Pt100	-170 to +480 °C	220	Weldable sleeve
902006/40-226-1003-1-12-160-815/922			160	
902006/40-226-1003-1-12-100-815/922			100	
Thermocouples data sheet 901006				
901006/53-543-1042-12-220-815/922	1 × Fe-CuNi type "L"	-35 to 480 °C	220	Weldable sleeve
901006/53-543-2042-12-220-815/922	2 × Fe-CuNi type "L"		220	

9.16 Probes for air, water, and oil

Note: because of the high response accuracy, **the use of thermowells** (immersion sleeves) **is not admissible**.

Current type designation	Probe type	Temperature range	Nom. length mm	Process connection
RTD temperature probe data sheet 902006				
902006/10-390-1003-1-8-250-104/22	1 × Pt100	max. 300 °C	250	Screw-in threat G1/2
Thermocouples data sheet 901006				
901006/45-551-2043-2-xxxx-11-xxxx	2 × NiCr-Ni, type "K"	max. 1150 °C	50 to 2000	

Note:
The probes according to type sheet 901006 and 902006 are also certified for the PED.

10 Setup program

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

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

10.1 Minimum hardware and software prerequisites:

- PC Pentium III or higher
- 128 MB RAM, 16 MB free on hard disk
- CD-ROM drive
- Free USB interface, mouse connection
- Microsoft[1] Windows 2000/XP

✱ Connect the device to the PC using the USB cable

10.2 Displaying the device software version

✱ Simultaneously press the P and ▲ keys and hold down

This version is also recognized by the setup program and displayed under *Info* ⟹ *Information about setup.*

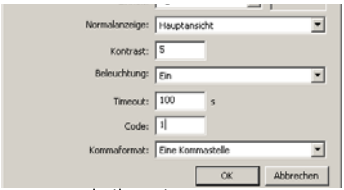
The software versions of the device and the setup program must be compatible as otherwise an error message will appear!

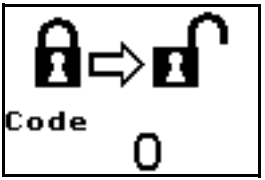
1. Microsoft is a registered trademark of Microsoft Corporation

10.3 Forgotten the code?

If you forget the code, it can be read out via the USB interface and the setup program.

✱ Use *Data transfer* ⟹ *from device*.





The read-out code now appears in the setup program.

It can be kept as it is or changed.

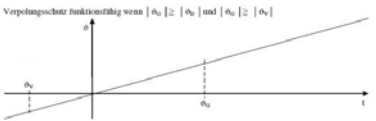
If "0" is set and transferred to the device, the code interrogation is deactivated and the configuration level is freely accessible.

10.4 Special function: thermocouple reverse polarity protection

If the polarity of a thermocouple is reversed, measured values are shown that do not reflect the real situation, for example negative temperatures may be displayed instead of the expected positive temperatures.

This may lead to the set limit value never being reached. For this purpose, an additional limit value is defined at -205 °C by default, which triggers the relay output controller K1 if the value falls below this.

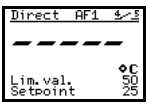
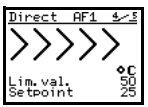
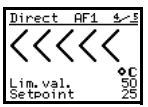
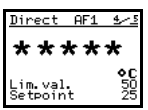
A suitable value must be selected here so that it is possible to detect potential reverse polarity.



Grenzwert einstellbar: ϑ_0 -9999°C bis +9999°C z.B. -50°C
Grenzwert Verpolungsschutz einstellbar: ϑ_V -205°C bis +200°C z.B. 100°C
Grenzwert Differenzmessung einstellbar: ϑ_D 0°C bis 100°C
Im Falle der unsymmetrischen Verpolung der Sensorik, schaltet der STB die Anlage beim Erreichen des Differenzgrenzwertes die Anlage sicher ab.
Im Falle der symmetrischen Verpolung wird dem STB fallende Temperatur auf den redundanten Kanälen signalisiert. Wird der Verpolungsgrenzwert erreicht, schaltet der STB sicher die Anlage ab.

11 Alarm messages

They can appear as follows:

Alarm display	Cause	Remedy
5 flashing horizontal lines: 	**Measured value error** No valid value can be displayed	✱ Check error messages on the screen ✱ Contact the JUMO Service department ⇨ For service addresses see back cover
	**Measured value overrange** The measured value is too high, is outside the measuring range or the probe is broken.	✱ Check the probe and connecting cable for damage or short-circuit. ⇨ Chapter 4.3 "Connection diagram" ✱ Check that the correct probe is set and/or connected. ⇨ Chapter 8.2 "Analog input"
	**Measured value underrange** The measured value is too low, is outside the measuring range or a short-circuit occurred at the probe.	
5 flashing asterisks 	**Display overflow** Value cannot be displayed	✱ Check error messages on the screen ✱ Contact the JUMO Service department ⇨ For service addresses see back cover

12 Error messages

These error messages are displayed one below the other.

Error display (Err)	Origin	Cause/remedy
	Internal	The set limit value for relay switching operations has been reached ✱ Increase limit value of the relay switching operations ⇨ Chapter 8.8.1 "Limit switching operation"
Terminal temp.	Internal	The internal Pt100 is defective[1], or the terminal temperature has fallen outside the admissible range (-10 to 80 °C). Acknowledgement is not possible until it is within the valid range again.
Reference volt.[1]	Internal	The reference voltage is outside the valid range. Acknowledgement is not possible until it is within the admissible range again.
Calibration const.[1]	Internal	A calibration constant is outside the valid range. Acknowledgement is not possible until it is within the admissible range again.
Configuration	Internal	Configuration data outside the value range. Acknowledgement is not possible until it is within the admissible range again.
Measured value	Internal	The measured value 1 is outside the valid range. Acknowledgement is not possible until it is within the admissible range again.

Error display (Err)	Origin	Cause/remedy
Measured value missing	Internal	When the error status "Measured value" is signaled by the channel, the diagnosis function tries to show the precise error on the basis of the read measured value.
Probe short-circ.	External	
Meas.overr.		
Meas.underr.		
Probe break		
Operating access[1]	Internal	The diagnosis function communicates with the exTHERM-DR. Acknowledgement is not possible until communication has finished.
Setup access	Internal	The setup program communicates with the exTHERM-DR. Acknowledgement is not possible until communication has finished.
CRC calibr.[1]	Internal	Checksum error of the EEPROM calibration data. Acknowledgement is not possible until it is within the admissible range again.
CRC config.[1]	Internal	Checksum error of the EEPROM configuration data. Acknowledgement is not possible until it is within the admissible range again.
Registry [1]	Internal	A registry error has occurred. Acknowledgement not possible until the error has been remedied.
RAM defective[1]	Internal	A RAM error has occurred. Acknowledgement not possible until the error has been remedied.
ROM defective[1]	Internal	A ROM error has occurred. Acknowledgement is not possible until it is within the admissible range again.
Program sequence[1]	Internal	A program sequence error has occurred. Acknowledgement not possible until the error has been remedied.

Error display (Err)	Origin	Cause/remedy
Watchdog[1]	Internal	A watchdog reset has occurred. Acknowledgement is possible.
Overvoltage[1]	Internal	The uncontrolled secondary supply voltage is too high. Acknowledgement is possible.
Frequency[1]	Internal	Error of the independent time base. Acknowledgement is possible
EEPROM defective[1]	Internal	Error during internal communication with the EEPROM. Acknowledgement is possible.
Stack[1]	Internal	Error in the memory area reserved for the stack. Acknowledgement is not possible until it is within the admissible range again.
AD converter[1]	Internal	Error during internal communication with the A/D converter. Acknowledgement is possible
Simulation[1]	Internal	Error during the measured value simulation. Acknowledgement is possible.
Zero point[1]	Internal	The zero point voltage of the A/D converter is too low. Acknowledgement is possible.

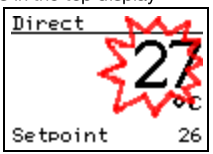
Error display (Err)	Origin	Cause/remedy
Diagnosis function		
FLASH defective[1]	Internal	An error was detected during the cyclic memory test of the ROM.
RAM defective[1]	Internal	An error was detected during the cyclic memory test of the RAM.
CRC config.[1]	Internal	An error was detected by the checksum test (CRC16) in the configuration of the diagnosis function.
CRC calib.[1]	Internal	An error was detected by the checksum test (CRC16) in the calibration data of the diagnosis function.
Configuration	Internal	The configuration contains invalid data.
SW version[1]	Internal	The software versions are invalid.
Editing	Internal	An error has occurred during editing.
V too low	Internal	The internal voltage supply value has fallen below the permitted range.
V too high	Internal	The permitted range of the internal voltage supply has been exceeded.
Int. communic.[1]	Internal	An error has occurred during internal communication.
Switching operations	Internal	The configured limit of the switching operations of relay output controller K1 has been exceeded. The error can be remedied by reducing the current counter or increasing the limit. (So that the switching operations are not accidentally set to 0 in the event of further errors).
USB communic.	Internal	An error has occurred during USB communication.

1.) If the error cannot be acknowledged despite repeated switching off and on, the device must be repaired by JUMO.

✱ Return the device

⇨ For service addresses see back cover

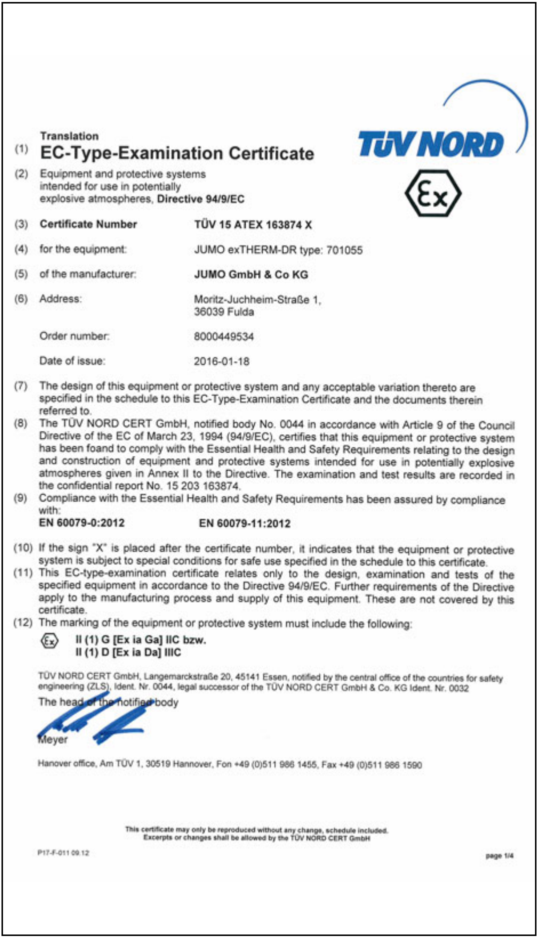
13 What to do, if ...

Description	Cause	Remedy
The measured value flashes in the top display 	- The device has detected an error.	✱ In the normal display, press the EXIT key to see the error message. ⇨ Chapter 12 "Error messages"
Relay output controller K1 does not switch, meaning that the contact between terminal 14 and 16 is not closed although the LED lights up yellow.	- The integrated fuse cut-out is defective, caused by an excessive relay current.	✱ Use a continuity test device to measure terminal 14 and 16 of the relay when the LED K1 lights up yellow. ✱ The device must be repaired by JUMO if no continuity can be measured. ⇨ For service addresses see back cover
... the display is dark	- Display shut-down after timeout was activated	✱ Press any key or switch off timeout. ⇨ Chapter 8.7.8 "Timeout operation"

14 Behavior of Outputs

Operating status	Relay output controller K1	Relay output limit value K2	Analog output
Initialization			
Initialization phase after mains voltage – ON (for approx. 10 seconds)	Inactive	Inactive	0 mA, 0 V
Setup communication			
During reading-writing of the configuration (for approx. 5 seconds)	Inactive	Limit value monitoring active ⇨ Chapter 8.4	Scaled analog signal is output ⇨ Chapter 8.6
Standard operation			
System in error-free state after initialization phase	Setpoint value monitoring active ⇨ Chapter 8.3	Monitoring of limit value depending on configuration ⇨ Chapter 8.4	Scaled analog signal is output ⇨ Chapter 8.6
External error			
Probe break, probe short circuit (e.g. input 1)	Inactive	Configured error signal is output ⇨ Chapter 8.4.4	Configured error signal is output ⇨ Chapter 8.6.5

Operating status	Relay output controller K1	Relay output limit value K2	Analog output
Internal error			
Internal error, diagnostic channel	Inactive	Configured error signal is output	
Internal error, safety channel	Inactive	Configured error signal is output	



Translation

(1) EC-Type-Examination Certificate

TÜV NORD

(2) Equipment and protective systems
intended for use in potentially
explosive atmospheres, **Directive 94/9/EC**

(3)	**Certificate Number**	**TÜV 15 ATEX 163874 X**
(4)	for the equipment:	JUMO exTHERM-DR type: 701055
(5)	of the manufacturer:	**JUMO GmbH & Co KG**
(6)	Address:	Moritz-Juchheim-Straße 1, 36039 Fulda
	Order number:	8000449534
	Date of issue:	2016-01-18

(7) The design of this equipment or protective system and any acceptable variation thereto are specified in the schedule to this EC-Type-Examination Certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, notified body No. 0044 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been foand to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive. The examination and test results are recorded in the confidential report No. 15 203 163874.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2012 **EN 60079-11:2012**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment or protective system must include the following:

Ex **II (1) G [Ex ia Ga] IIC bzw.**
II (1) D [Ex ia Da] IIIC

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

Meyer

Hanover office, Am TÜV 1, 30519 Hannover, Fon +49 (0)511 986 1455, Fax +49 (0)511 986 1590

This certificate may only be reproduced without any change, schedule included.
Excerpts or changes shall be allowed by the TÜV NORD CERT GmbH

P17-F-011 09.12

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(13) **SCHEDULE**

(14) **EC-Type-Examination Certificate No. TÜV 15 ATEX 163874 X**

(15) Description of equipment

The JUMO exTHERM-DR type: 701055 is a microprocessor-based designed as a two point controller, in the following called controller. The controller has the task to regulate a channel.
The device has to be mounted on a mounting rail outside the hazardous area. It has a universal input. The inputs can measure the resistance thermometer PT100/PT1000, temperature element and a 4...20mA standard signal.
The device has two relay outputs, one binary input and one analog output with (0) 4...20mA or (0) 2...10V. The used universal input will be read out by the diagnostic-/display unit.
For the visualization of the measured values, for configuration and for display of error reports a graphic display and LED are available. The device can be configured with a PC- program about a USB interface.
The connection of the sensors, of the relays, of the binary inputs, of the analog output and of the power supply is via printed circuit terminal for a cross section up to 2,5 mm².

Technical data:

Permissible ambient temperature range during operation: 0°C up to +55°C
Permissible ambient temperature range for storage: -30°C up to +70°C

For type 701055 / 8-23/

Supply circuit..... (Terminal N and L1)	U_N = 110 up to 240 V AC +10% / -15%, 48 up to 63 Hz U_M = 250 V

For type 701055 / 8-25/

Supply circuit ..... (Terminal L- and L+)	U_N = 20 up to 30 V DC or AC, 48 up to 63 Hz U_M = 250 V

For all types

Universal input ..... (Terminal 1, 2, 3)	in type of protection intrinsic safety Ex ia IIC resp. IIIC Maximum values: U_O = 6 V I_O = 41,2 mA P_O = 61,8 mW C_o = 36,3 µF L_o = 20 mH The interface universal input is galvanically isolated from all other interfaces
Binary connection..... (Terminal 4 and 5)	U_M = 250 V
Analog output..... (Terminal 9 and 10)	U_M = 250 V
Relay output..... (Terminal 11, 12, 13)	U_M = 250 V I_{max} = 3 A
Relay output	U_M = 250 V

Schedule EC-Type Examination Certificate No. TÜV 15 ATEX 163874 X

(Terminal 14, 15, 16) I_{max} = 3 A

Generally, all type approved temperature sensors, such as the JUMO PROCESStemp (Product group 902820) can be operated at the universal input of the JUMO exTHERM-DR.

For listed below temperature sensors, which are to be regarded as simple apparatus and which can be operated with the device, the limit values for the maximum allowable upper limit of the ambient temperature for the corresponding temperature class can be taken from the following table.

Temperature class	Upper limit of the media- and ambient temperature For applications that require devices of category 2		Upper limit of the media- and ambient temperature For applications that require devices of category 1	
	Temperature sensor with PT100	Temperature sensor with temperature element	Temperature sensor with PT100	Temperature sensor with temperature element
T1	432,5 °C	439,1 °C	342,5 °C	349,1 °C
T2	282,5 °C	289,1 °C	222,5 °C	229,1 °C
T3	187,5 °C	194,1 °C	147,5 °C	154,1 °C
T3	122,5 °C	129,1 °C	95,5 °C	102,1 °C
T5	87,5 °C	94,1 °C	67,5 °C	74,1 °C
T6	72,5 °C	79,1 °C	55,5 °C	62,1 °C

The following temperature sensors with PT100 resistance thermometer can be operated with the device.

Type designation of the manufakturer	Place holder xxx
902006/65-228-1003-1-15-xxx-668/922 902006/55-228-1003-1-15-xxx-254/922 902006/65-228-2003-1-15-xxx-668/922 902006/55-228-2003-1-15-xxx-254/922	500, 710 and 1000
902006/10-402-1003-1-9-xxx-104/922 902006/10-402-2003-1-9-xxx-104/922	100
902006/10-226-1003-1-9-xxx-104/922 902006/10-226-2003-1-9-xxx-104/922	250
902006/54-227-1003-1-15-xxx-254/922 902006/54-227-2003-1-15-xxx-254/922	710
902006/53-505-2003-1-12-xxx-815/922 902006/53-505-1003-1-12-xxx-815/922	190
902006/53-507-2003-1-12-xxx-815/922	100, 160, 190 and 220
902006/53-507-1003-1-12-xxx-815/922 902006/53-505-3003-1-12-xxx-815/922 902006/40-226-1003-1-12-xxx-815/922	100, 160 and 220

Schedule EC-Type Examination Certificate No. TÜV 15 ATEX 163874 X

The following temperature sensors with temperature element can be operated with the device.

Type designation of the manufakturer	Place holder xxx
901006/65-547-2043-15-xxx-668/922 901006/65-546-2042-15-xxx-668/922	500, 710 and 1000
90.1006/66-550-2043-6-xxx-668/922 90.1006/66-880-1044-6-xxx-668/922 90.1006/66-880-2044-6-xxx-668/922 90.1006/66-953-1046-6-xxx-668/922 90.1006/66-953-2046-6-xxx-668/922	250, 355 and 500
901006/54-554-2043-15-xxx-254/922 901006/54-554-1043-15-xxx-254/922 901006/54-554-2042-15-xxx-254/922 901006/54-554-1042-15-xxx-254/922	710
901006/53-543-1042-12-xxx-815/922 901006/53-543-2042-12-xxx-815/922	220

(16) Test documents are listed in the test report No. 15 203 163874

(17) Special conditions for safe use

1. The switching on the intrinsically safe circuits may be performed only if the JUMO exTHERM-DR including all supply lines is de-energized.

2. To energize the JUMO exTHERM-DR including all supply lines, the protective cap of the intrinsically safe circuits shall be correctly mounted.

3. The sensors listed under the specifications of JUMO GmbH & Co KG based on the JUMO-datasheet 901006 and 902006 have no safe isolation to the armature. The sensor connections are therefore to be considered as grounded for the safety assessment. This means that the user must ensure in case of connection of the intrinsically safe circuit to the local potential (eg PA resp. FB) that the intrinsic safety of the JUMO exTHERM-DR is not repealed.

4. The sensor connection heads do not meet the requirements of the material composition of EN 60079-0:2012 for EPL Ga. The device has to be installed in such a way that any ignition hazards caused by impact or friction can be excluded"

(18) Essential Health and Safety Requirements
No additional ones

JUMO GmbH & Co. KG
Moritz-Juchheim-Straße 1
36039 Fulda, Germany

EU-Konformitätserklärung

EU-Declaration of Conformity / Déclaration UE de conformité

Dokument-Nr. CE 545
Document No. / Document n°

Hersteller JUMO GmbH & Co. KG
Manufacturer / Etabli par

Anschrift Moritz-Juchheim-Straße 1, 36039 Fulda
Address / Adresse

Produkt Beschreibung JUMO exTHERM-DR
Product / Produit Typ/ Serie 701055/...
Typenblatt-Nr. 701055

Wir erklären in alleiniger Verantwortung, dass das bezeichnete Produkt die Anforderungen der Europäischen Richtlinien erfüllt.
We hereby declare in sole responsibility that the designated product fulfills the requirements of the European directives.
Nous déclarons sous notre seule responsabilité que le produit remplit les directives européennes.

Richtlinie *Directive / Directive*			Datum der Erstanbringung des CE-Zeichens auf dem Produkt *Date of first application of the CE mark to the product Date de 1ère application du sigle CE sur le produit*
2004/108/EG	[EMV-Richtlinie (EMC)]	bis 19.04.2016	15
2014/30/EU	[Elektromagn. Verträglichkeit (EMC)]	ab 20.04.2016	15
94/9/EG	[Explosionsschutz-Richtlinie (ATEX)]	bis 19.04.2016	15
2014/34/EU	[Explosionsschutz (ATEX)]	ab 20.04.2016	15

EU-Baumusterprüfbescheinigung
Type examination / Tests échantillon

TÜV 15 ATEX 163874 X

Angewendete Normen/Spezifikationen
Standards/Specifications applied / Normes/Spécifications appliquées

EN 60730-1	Ausgabe: 2011
EN 60730-2-9	Ausgabe: 2010
EN 60079-0	Ausgabe: 2012
EN 60079-11	Ausgabe: 2012

Anerkannte Qualitätssicherungssysteme der Produktion
Recognized quality assurance systems used in production / Organisme notifié agréé

nach Explosionsschutz-Richtlinie (ATEX)
TÜV NORD CERT GmbH, Am TÜV 1, 30519 Hannover, Germany
Kennnummer 0044
Identification No. 0044, N° d'identification 0044

Firma */ Company / Société*
Aussteller: JUMO GmbH & Co. KG, Fulda
Issued by: / Etabli par:

Ort, Datum: Fulda, 2016-01-05
Place, date: / Lieu, date:

Rechtsverbindliche Unterschrift
Legally binding signature
Signature juridiquement valable

Bereichsleitung Verkauf
ppa. Wolfgang Vogl

Kommanditgesellschaft, Sitz: 36039 Fulda, Amtsgericht Fulda, HRA 302 USt.-Id.-Nr. DE 112411234; Persönlich haftende Gesellschafterin: M. K. JUCHHEIM GmbH, Sitz: 36039 Fulda, Amtsgericht Fulda, HRB 17; Geschäftsführer: Dipl.-Ing. Bernhard Juchheim, Dipl.-Kfm. Michael Juchheim

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx TUN 16.0022X	issue No.:0
Status:	**Current**	
Date of Issue:	**2017-07-05**	Page 1 of 3

Certificate history:

Applicant:
JUMO GmbH & Co. KG
Moritz-Juchheim-Straße 1
36039 Fulda
Germany

Equipment: **JUMO exTHERM-DR**
Optional accessory: 701055 / * - *

Type of Protection: **Intrinsic safety**

Marking:
[Ex ia Ga] IIC
[Ex ia Da] IIIC

Approved for issue on behalf of the IECEx Certification Body: Christian Roder

Position: Deputy head of Certification Body

Signature:
(for printed version)

Date: 2017-07-07

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

TÜV NORD

IECEx Certificate of Conformity

Certificate No.: IECEx TUN 16.0022X

Date of Issue: **2017-07-05** Issue No.: **0**

Manufacturer: **JUMO GmbH & Co. KG**
Moritz-Juchheim-Straße 1
36039 Fulda
Germany

Additional Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Edition: 6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-11 : 2011 Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
DE/TUN/ExTR15.0047/00

Quality Assessment Report:

DE/TUN/QAR13.0005/04

IECEx Certificate of Conformity

Certificate No.: IECEx TUN 16.0022X

Date of Issue: **2017-07-05** Issue No.: **0**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

Description

The JUMO exTHERM-DR mentioned above are either a microprocessor-based designed as a two point controller, in the following called controller. The controller has the task to regulate a channel.
The device has to be mounted on a mounting rail outside the hazardous area. It has a universal input.
The inputs can measure the resistance thermometer PT100/PT1000, temperature element and a 4...20 mA standard signal.
The device has two relay outputs, one binary input and one analogue output with (0) 4...20 mA or (0) 2...10 V.
The used universal input will be read out by the diagnostic-/display unit.
For the visualization of the measured values, for configuration and for display of error reports a graphic display and LED are available. The device can be configured with a PC- program about a USB interface.
The connection of the sensors, of the relays, of the binary inputs, of the analogue output and of the power supply is via printed circuit terminal for a cross section up to 2,5 mm².

For all other data see attachment.

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. The switching on the intrinsically safe circuits may be performed only if the JUMO exTHERM-DR including all supply lines is de-energized.

2. To energize the JUMO exTHERM-DR including all supply lines, the protective cap of the intrinsically safe circuits shall be correctly mounted.

3. The sensors listed under the specifications of JUMO GmbH & Co KG based on the JUMO-datasheet 901006 and 902006 have no safe isolation to the armature. The sensor connections are therefore to be considered as grounded for the safety assessment. This means that the user must ensure in case of connection of the intrinsically safe circuit to the local potential (eg PA resp. FB) that the intrinsic safety of the JUMO exTHERM-DR is not repealed.

4. The sensor connection heads do not meet the requirements of the material composition of IEC 60079-0:2011 for applications that require devices of category 1. The device has to be installed in such a way that any ignition hazards caused by impact or friction can be excluded".

Annex: 17 217 192795_Attachment to IECEx TUN 16.0022X.pdf

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