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JUMO safetyM TA

Multifunctional safety limiter with fault tolerance

Brief description

The JUMO safetyM TA is a multifunctional safety limiter with fault tolerance; it can be used for monitoring measurands such as temperature, pressure, flow, or filling level.

The measurement input is user configurable and can be used for:

- RTD temperature probe
- Single and double thermocouples
- Standard signals

When used with suitable sensors or current signals, the JUMO safetyM TA is able to acquire process values and switch a plant or machine to a safe operating state via actuators. A relay that operates according to the quiescent current principle serves as an actuator.
The user can configure the safety function's safety architecture according to their safety requirements and the required level of availability. In addition to the classic 1oo2D S safety architecture, a 1oo2D voter and 2oo2 architecture are also available.

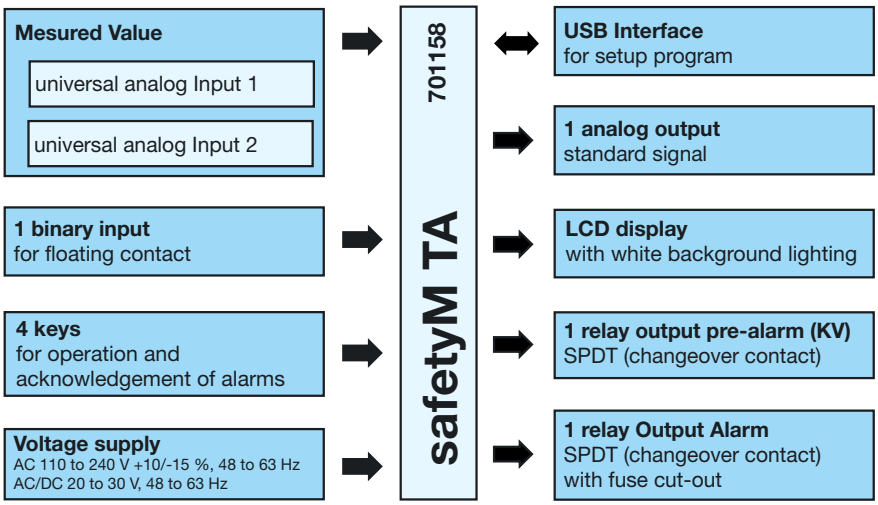
Furthermore, the device is equipped with one analog output, another KV relay output, and one digital input. This enables additional functions to be used, such as a pre-alarm or the output of measured value or error information.

LEDs and a dot-matrix LCD serve to visualize measured values and device information. The device can be configured via a setup program or via the four keys on the device.



Type 701158/...058

Block diagram



Special features

- Flexible configuration of various security functions
- 1oo2D Voting-Function
- STB /STW according DIN EN 14597
- 2oo2 Function
- Limit value monitoring Min. or Max. or Min. and Max.
- Adjustable time for degraded operation
- SIL 2/SIL 3 according DIN EN 61508 and PL c/PL e according DIN EN ISO 13849
- Universal input for pressure, flow, temperature, and fluid level
- Increased plant availability
- Prevention of unwanted shutdowns
- Extensive approvals

Approval marks and certificates

Performance Level PL

Safety Integrity Level SIL

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Description

Inputs and outputs

The measuredvalue at the analog input can be acquired via various temperature probes or standard signals. Limit value violations are detected and signaled via the LEDS K1 and K2 (red) and display. The alarm relay output alarm (Klemme 14 und 16) switches the plant to a safe operating state (Alarm range).

In addition, an additional KV relay (changeover contact), a digital input (for a potential-free contact), and an analog output are available.

Interface USB

The device is equipped with a USB device interface (USB mini socket on the front) which is intended for connection to a PC and is used exclusively for the setup program.

Setup-Program

The setup program offers users a simple and convenient way to configure the device using a PC. It can be used to create, edit, and save data records, transfer them to the device, and read them from there.Know-how protection is implemented with password protection (code).When know-how protection is active, the read configuration is not displayed in the setup. A setup file with active know-how protection cannot be imported into any device; the protection must be removed first.

CRC Information

CRC is used to detect errors in digital data. CRC stands for Cyclic Redundancy Check. It is a type of hash function that automatically detects even small changes in the raw data.The CRC checksum, the number of configuration changes to the diagnostic channel and the security channel are displayed on the device and in the setup program and can be compared with each other.

Service

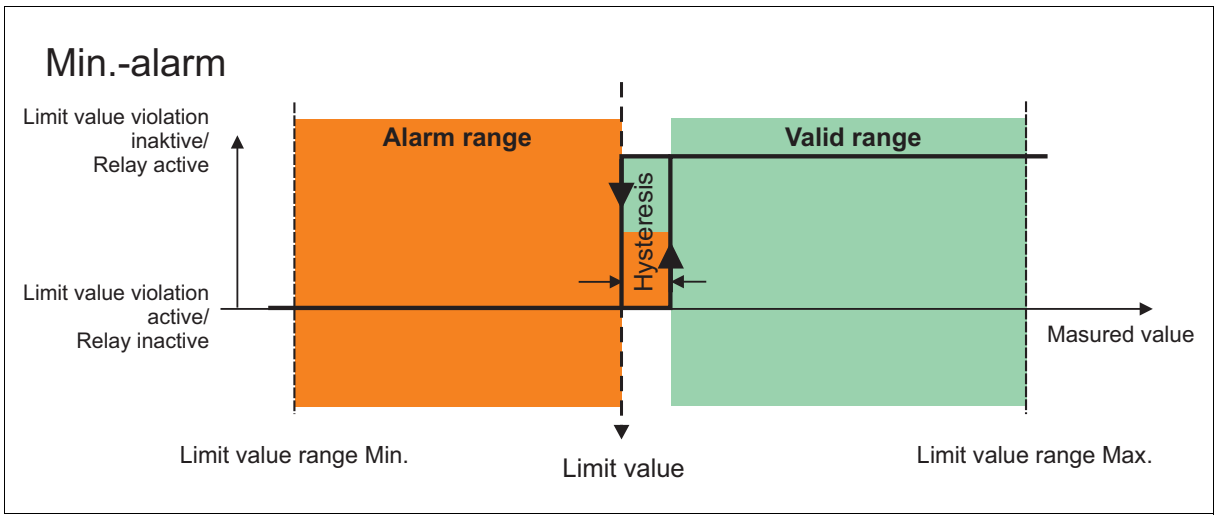
The switching cycles of relays K1 and K2 are counted. When the adjustable limit value is reached, a binary signal is activated which must be acknowledged.

Electrical connection

The connection is made via screw terminals.

Switching behavior

When a min. alarm has been set up, a limit value violation occurs when a limit value is undershot. Depending on the system function, the alarm relay output drops out. The limit value violation is lifted as soon as the process value rises back above the limit value by an amount equal to the hysteresis. Depending on the acknowledgement behavior, the channel/device can be manually acknowledged or can change state automatically.

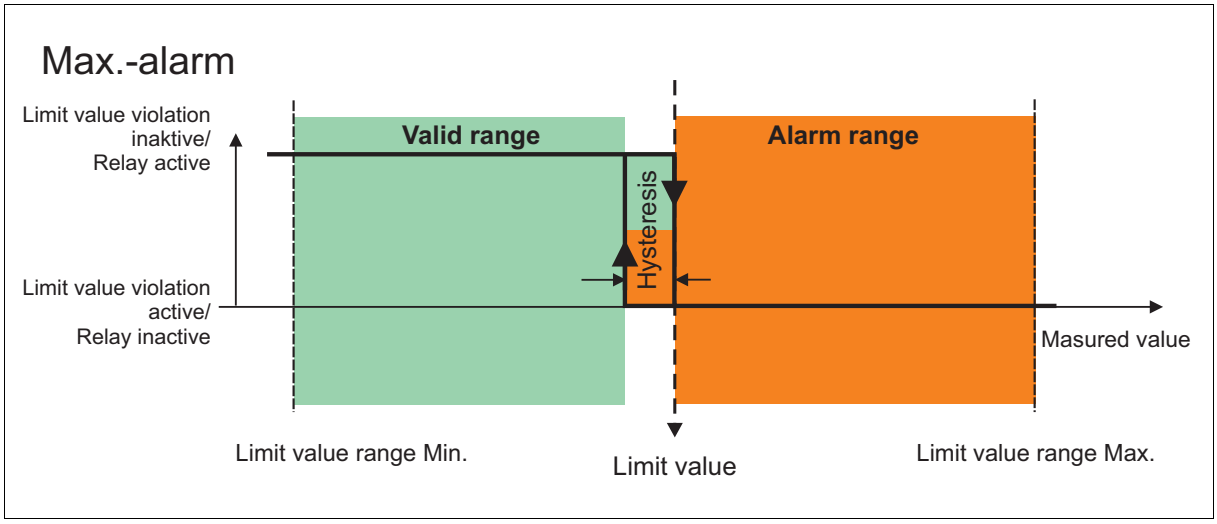


When a max. alarm has been set up, a limit value violation occurs when a limit value is exceeded. Depending on the system function, the alarm relay output drops out. The limit value violation is lifted as soon as the process value falls back below the limit value by an amount equal to the hysteresis. Depending on the acknowledgement behavior, the channel/device can be manually acknowledged or can change state automatically.

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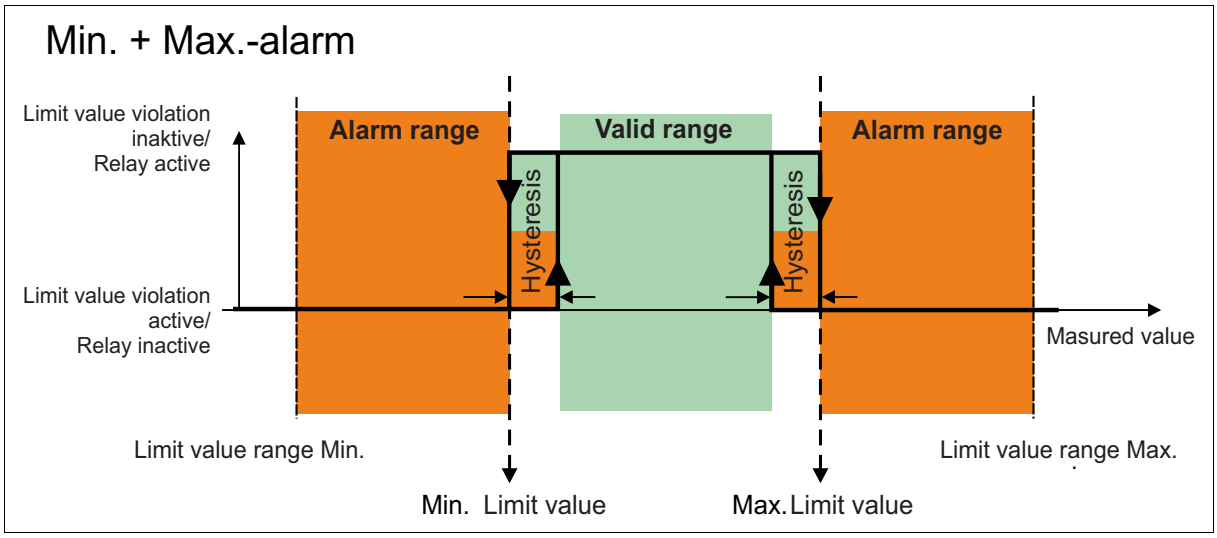


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When a min. + max. alarm has been set up, a limit value violation occurs when a min. limit value is undershot or a max. limit value is exceeded. Depending on the system function, the alarm relay output drops out. The limit value violation is lifted as soon as the process value rises back above the min. limit value by an amount equal to the hysteresis or falls back below the max. limit value by an amount equal to the hysteresis. Depending on the acknowledgement behavior, the channel/device can be manually acknowledged or can change state automatically.



Acknowledgement (reset)

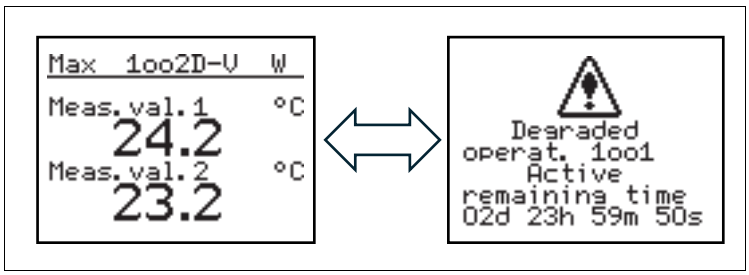
The method of acknowledgement (reset) differs for limiters and monitors. In the case of the limiter function, the relay has to be acknowledged manually, while in the case of the monitor function, acknowledgement takes place automatically. The device can be reset manually using the "Reset" key or the digital input (unlock). In both cases, the process value must be lower or higher than the set limit value by an amount equal to the set switching differential, i.e. in the valid range.
In the case of 1oo2D voter and 2oo2 structures, the device changes from the "safe operating state" to "degraded operation" or "OK" and from "degraded operation" to "OK" depending on the acknowledgement behavior setting.

- **Limiter initial startup**:
  Regardless of the alarm relay output's switching status prior to a power failure, the safety limiter remains in the safe operating state once power is restored.
  This default setting serves to ensure that the device is in a safe operating state when the voltage supply is switched on for the first time.
  Any errors that have arisen remain stored in the event of power off.
- **Limiter**:
  The device must be manually reset using the keypad or the digital input as soon as the main measured value is back within the valid range.
  Any errors that have arisen remain stored in the event of power off.
- **Monitor**:
  The device is automatically reset as soon as the main measured value is back within the valid range.

System functions

1oo2D Voter

The 1oo2D voter system function is based on the 1oo2D S system function. The 1oo2D voter system function allows for degraded operation for a limited time period in order to increase system availability.This means that the safety system is able to evaluate the individual errors and – depending on the error – continue operating the system so that the plant process can be ended in a controlled manner for the repair.



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2oo2

The 2oo2 system function increases system availability even further, albeit with a reduced SIL level. The system does not switch to the safe operating state until both of the channels detect a limit value violation.With this system function, the safety system is also able to evaluate the individual errors and – depending on the error – continue operating the system so that the plant process can be ended in a controlled manner for the repair if necessary.

1oo2D S

The system function 1oo2D S is an extended function of the STB/STW system function
and has the following features:

Switching behavior

- Min. alarm:
- Max. alarm:
- Min. + max. alarm:
  The switching behavior is based on
  DIN 12880:2007-05 Electrical laboratory devices – Heating ovens and incubators

Safe operating state

The safe operating state is when the alarm relay output between terminals 14 and 16 is switched off (quiescent current principle).

Safety temperature limiter (STB)

The STB is a safety-component device; it is permanently locked after activation. A manual reset (acknowledgement) using the RESET key or digital input is only possible once the probe temperature has dropped below / risen above the limit value by an amount equal to the switching differential.

The user can configure whether monitoring should take place when the temperature drops below the limit value or when it rises above it.

Modes of operation:

- Minimum requirements: 2B, 2J, 2V, 2K, 2P and adjustable with special tools
- Additional requirements fulfilled: 2N, 2F, 2D

STB safe operating state:

The safe operating state is when the alarm relay output between terminals 14 and 16 is switched off (quiescent current principle).

The safe operating state is maintained until manual acknowledgement is performed in the device's valid range.

The transparent, sealable protective cover prevents unauthorized operation.
The RESET key can be accessed for manual acknowledgement with the aid of a tool (e.g. a pen).

Safety temperature monitor (STW)

The STW is a safety-component device. If the probe temperature drops below or rises above the set limit value by an amount equal to the switching differential, the STW resets automatically (acknowledgement). The user can configure whether the reset should take place when the temperature drops below the limit value or when it rises above it.

Modes of operation:

- Minimum requirements: 2B, 2K, 2P
- Additional requirements fulfilled: 2N, 2D

STW safe operating state:

The safe operating state is when the alarm relay output between terminals 14 and 16 is switched off (quiescent current principle).

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Sensor connection possibilities and achievable SIL

System function STB/STW and 1oo2D S

The device is designed for the connection of various RTD temperature probes and thermocouples. The table below shows the connection options along with the achievable SIL:

Variant	Connected sensors	Architecture		Achievable SIL			
		Sensor	Logic				
1	1 × Pt100 2-wire circuit single sensor	1oo1	1oo2D	2			
1a	2 × Pt100 / Pt1000 2-wire circuit	1oo2	1oo2D	3			
2	2 × Pt100 / Pt1000 3-wire circuit	1oo2	1oo2D	3			
3	2 × thermocouple	1oo2	1oo2D	3			
4	1 × Pt100 / Pt1000 2 and 3-wire circuit 1 × thermocouple	1oo2	1oo2D	3			
5	STB/STW without sensors, 1oo2D architecture: no probe or use of 4 to 20 mA (means that the sensor is not taken into account for the calculation)	Sensors connected by the plant operator: architecture 1oo1 or 1oo2 according to connection	1oo2D	SIL (architecture) of the sensor used (HW only)	Systematic Capability (SC) of the sensor used	Max. achievable SIL of the system with 1oo1 sensor architecture	Max. achievable SIL of the system with 1oo2 sensor architecture
				1	1	1	1
				1	2	1	2
				2	2	2	2
				2	3	2	3
				3	3	3	3

System function 1oo2D voter

Variant	Connected sensors	Architecture		Achievable SIL		
		Sensor	Logic			
11a	2× Pt100 / Pt1000 in 2-wire circuit	1oo2	1oo2D	3[a]		
12	2× Pt100 / Pt1000 in 3-wire circuit	1oo2	1oo2D	3[a]		
13	2 × thermocouples	1oo2	1oo2D	3[a]		
14	1 × Pt100 / Pt1000 2 and 3-wire circuit and 1× thermocouple	1oo2	1oo2D	3[a]		
15	JUMO safetyM TA without 1oo2D sensor architecture: No probe or use of 4 to 20 mA (means that the sensor is not taken into account for the calculation)	1oo2D sensors connected by the plant operator: architecture 1oo2		SIL (architecture) of the sensor used (HW only)	Systematic Capability (SC) of the sensor used	Max. achievable SIL of the system with 1oo2 sensor architecture
				1	1	1
				1	2	2
				2	2	2
				2	3	3
				3	3	3

[a] Dependent on the degradation time (DELAY)

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2oo2 system function

Variant	Connected sensors	Architecture		Achievable SIL		
		Sensor	Logic			
21a	2× Pt100 / Pt1000 in 2-wire circuit	2oo2	2oo2D	1		
22	2× Pt100 / Pt1000 in 3-wire circuit	2oo2	2oo2D	1		
25	JUMO safetyM TA without 2oo2D sensor architecture: No probe or use of 4 to 20 mA (means that the sensor is not taken into account for the calculation)	2oo2D sensors connected by the plant operator: architecture 2oo2		SIL (architecture) of the sensor used (HW only)	Systematic Capability (SC) of the sensor used	Max. achievable SIL of the system with 2oo2 sensor architecture
				1	1	1

NOTE!

Variants 1 to 4, 11a to 14 and 21a to 22 have been assessed with thermocouples according to data sheet 901006 and RTD temperature probes according to data sheet 902006.
No sensors were included for variant 5, 15 and 25. In this case, the plant operator selects the sensors. For this reason, the plant operator is responsible for evaluating the achieved SIL.

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Sensor connection possibilities and achievable PL

System function STB/STW and 1oo2D S

The device always has the same setup. Various possibilities are available for sensor connection. Together with the achievable PL, these are shown in the following table:

Variant	Connected sensors	Architecture		Achievable PL		
		Sensor	Logic			
1	1 × Pt100 2-wire circuit single sensor	1oo1	1oo2D	d		
1a	2 × Pt100 / Pt1000 2-wire circuit	1oo2	1oo2D	e		
2	2 × Pt100 / Pt1000 3-wire circuit	1oo2	1oo2D	e		
3	2 × thermocouples	1oo2	1oo2D	e		
4	1× Pt100 / Pt1000 2 and 3-wire circuit 1× thermocouple	1oo2	1oo2D	e		
5	STB/STW without sensor 1oo2D architecture no probe or use of the input 4 to 20 mA (means that the sensor is not taken into account for the calculation)	Sensors connected by the plant operator: architecture 1oo1 or 1oo2 according to connection	1oo2D	PL of the sensor used	Max. achievable PL of the system with 1oo1 sensor architecture DC ≥ 90 %	Max. achievable PL of the system with 1oo2 sensor architecture DC ≥ 90 %
				b	d	e
				c	d	e
				d	d	e
				e	e	e

NOTE!

Variants 1 to 4 were assessed with JUMO probes according to data sheet 901006 and 902006. No sensors were included for variant 5. In this case, the plant operator selects the sensors. For this reason, the plant operator is responsible for evaluating the achieved SIL.

Calculation of PL low voltage AC 230 V and extra low voltage DC 24 V

Variant	$MTTF_d$	DC_{avg}	CCF	PL
1	100 years[a] (337 years)	90 %	80	d
1a	100 years[a] (337 years)	90 %	80	e
2	100 years[a] (340 years)	90 %	80	e
3	100 years[a] (317 years)	91 %	80	e
4	100 years[a] (313 years)	91 %	80	e
5	100 years[a] (327 years)	91 %	80	

[a] The $MTTF_d$ value of a subsystem must be limited to 100 years according to the requirements of DIN EN ISO 13849-1.

Failure rates for AC 230 V and AC/DC 24 V

Variant	$MTTF_D$ [h]	DC_{avg} [%]	PFH	PL
1	100 years[a] (338 years)	90	$6.59 \times e^{-9}$	d
1a	100 years[a] (338 years)	90	$3.07 \times e^{-9}$	e
2	100 years[a] (341 years)	90	$3.07 \times e^{-9}$	e
3	100 years[a] (317 years)	90	$3.13 \times e^{-9}$	e

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Variant	$MTTF_D$ [h]	DC_{avg} [%]	PFH	PL
4	100 years[a] (313 years)	90	$3.23 \times e^{-9}$	e
5	100 years[a] (319 years)	90	$3.05 \times e^{-9}$	

[a] The $MTTF_d$ value of a subsystem must be limited to 100 years according to the requirements of DIN EN ISO 13849-1.

NOTE!

Variants 1 to 4 were assessed with JUMO probes according to data sheet 901006 and 902006. No sensors were included for variant 5. In this case, the plant operator selects the sensors. For this reason, the plant operator is responsible for evaluating the achieved PL.

System function 1oo2D voter

Failure rates for AC 230 V and AC/DC 24 V

At a maximum degradation time of 72 h

Variant	$MTTF_D$ [h]	DC_{avg} [%]	PFH	PL
11a	100 years[a] (338 years)	90	3.02×10^{-9}	e
12	100 years[a] (341 years)	90	3.02×10^{-9}	e
13	100 years[a] (317 years)	90	3.08×10^{-9}	e
14	100 years[a] (313 years)	90	3.18×10^{-9}	e
15	100 years[a] (319 years)	90	2.99×10^{-9}	

[a] The $MTTF_d$ value of a subsystem must be limited to 100 years according to the requirements of DIN EN ISO 13849-1.

NOTE!

Variants 11a to 14 were assessed with JUMO probes according to data sheet 901006 and 902006. No sensors were included for variant 15. In this case, the plant operator selects the sensors. For this reason, the plant operator is responsible for evaluating the achieved PL.

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Failure rates for AC 230 V and AC/DC 24 V

At a maximum degradation time of 168 h

Variant	$MTTF_D$ [h]	DC_{avg} [%]	PFH	PL
11a	100 years[a] (338 years)	90	3.02×10^{-9}	d
12	100 years[a] (341 years)	90	3.02×10^{-9}	d
13	100 years[a] (317 years)	90	3.08×10^{-9}	d
14	100 years[a] (313 years)	90	3.18×10^{-9}	d
15	100 years[a] (319 years)	90	3.00×10^{-9}	

[a] The $MTTF_d$ value of a subsystem must be limited to 100 years according to the requirements of DIN EN ISO 13849-1.

NOTE!

Variants 11 to 14 were assessed with JUMO probes according to data sheet 901006 and 902006. No sensors were included for variant 15. In this case, the plant operator selects the sensors. For this reason, the plant operator is responsible for evaluating the achieved PL.

2oo2 system function

Failure rates and SFF for AC 230 V and AC/DC 24 V

Maximum SIL 1

Variant	λ_s [Fit]	λ_{dd} [Fit]	λ_{du} [Fit]	SFF [%]	PFH (1/h)	PFD_{avg}
21a	791.3	306.38	31.55	96	6.08×10^{-8}	2.71×10^{-3}
22	794.26	303.42	31.55	96	6.08×10^{-8}	2.71×10^{-3}
25	873,02	313,49	33,51	96	$6,68\times10^{-8}$	$2,98\times10^{-3}$

NOTE!

Variants 21a to 22 have been assessed with thermocouples according to data sheet 901006 and RTD temperature probes according to data sheet 902006. No sensors were included for variant 25. In this case, the plant operator selects the sensors. For this reason, the plant operator is responsible for evaluating the achieved SIL.

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Technical data

Inputs

Analog input

RTD temperature probe

Designation	Standard	ITS	Measuring range	Accuracy in 2/3-wire circuit[a]
Pt100	IEC 60751:2023	ITS-90	-200 °C to +850 °C	0.5 % / 0.1 %
Pt1000	IEC 60751:2023	ITS-90	-200 °C to +850 °C	0.5 % / 0.1 %

[a] The accuracy refers to the maximum measuring range.

General specifications	
Connection type	2-wire circuit 3-wire circuit
Ambient temperature influence	≤ 50 ppm/K
Maximum line resistance	2-wire circuit: 15 Ω 3-wire circuit: 30 Ω
Error tolerance time	≤ 5 s: time taken into account for all diagnostic tests
Sampling rate	210 ms
Input filter	Digital filter 2nd order; filter constant can be set from 0 s to 100 s
Special features	Individual probe, Pt100, 2-wire Display can also be programmed in °F

Thermocouples

Designation	Type	Standard	ITS	Measuring range	Accuracy[a]
Fe-CuNi	L	DIN 43710:1985-12	IPTS-68	-200 °C to +900 °C	±0.4 %
Fe-CuNi	J	DIN EN 60584-1:2014-07	ITS-90	-200 °C to +1200 °C	±0.4 %
Cu-CuNi	U	DIN 43710:1985-12	IPTS-68	-200 °C to +600 °C	±0.4 %
Cu-CuNi	T	DIN EN 60584-1:2014-07	ITS-90	-200 °C to +400 °C	±0.4 %
NiCr-Ni	K	DIN EN 60584-1:2014-07	ITS-90	-200 °C to +1372 °C	±0.4 %
Pt10Rh-Pt	S	DIN EN 60584-1:2014-07	ITS-90	-50 °C to +1768 °C	±0.4 %
Pt13Rh-Pt	R	DIN EN 60584-1:2014-07	ITS-90	-50 °C to +1768 °C	±0.4 %
Pt30Rh-Pt6Rh	B	DIN EN 60584-1:2014-07	ITS-90	0 °C to 1820 °C	±0.4 %[b]
NiCrSi-NiSi	N	DIN EN 60584-1:2014-07	ITS-90	-100 °C to +1300 °C	±0.4 %[b]
W3Re-W25Re	D	ASTM E1751M-2020	ITS-90	0 °C to 2495 °C	±0.4 %
W5Re-W26Re	C	DIN EN 60584-1:2014-07	ITS-90	0 °C to 2315 °C	±0.4 %

[a] Accuracy refers to the maximum measuring range.

[b] The accuracy specification is only guaranteed as of 300 °C.

General specifications	
Connection type	Thermocouple
Ambient temperature influence	≤ 100 ppm/K
Cold junction	Pt100 internal
Cold junction accuracy	±1 K
Sampling rate	210 ms
Error tolerance time	≤ 5 s: time taken into account for all diagnostic tests
Input filter	Digital filter 2nd order; filter constant can be set from 0 s to 100 s
Special features	Display can also be programmed in °F

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Standard signal

Signal	Measuring range	Voltage drop	Accuracy[a]
Current	4 mA to 20 mA	< 2 V	±0.2 %

[a] Accuracy refers to the maximum measuring range.

General specifications	
Ambient temperature influence	≤ 150 ppm/K
Scaling	Can be freely programmed within the limits
Sampling rate	210 ms
Error tolerance time	≤ 5 s: time taken into account for all diagnostic tests
Input filter	Digital filter 2nd order; filter constant can be set from 0 s to 100 s
Special features	Individual probe 4 mA to 20 mA

Measuring circuit monitoring

Measuring probe	Measuring range underflow	Measuring range overflow	Short-circuit of probe	Break of probe / line
RTD temperature probe in 3-wire circuit	is detected appears in the display <<<<<	is detected appears in the display >>>>>	is detected appears in the display <<<<<	is detected appears in the display >>>>>
Double thermocouple			Detected via difference. In the “1oo2 DEV” state, it is detected based on the rate of change of the measured value.	
Thermocouple				
Current 4 mA to 20 mA			is detected appears in the display <<<<<	

Sensor	Limit for measuring range underflow / overflow	Comment
Pt100	-205 °C to +855 °C	2-wire and 3-wire circuit
Pt1000	-205 °C to +855 °C	2-wire and 3-wire circuit
Fe-CuNi "L"	-205 °C to +905 °C	–
Fe-CuNi "J"	-205 °C to +1205 °C	–
Cu-CuNi "U"	-205 °C to +605 °C	–
Cu-CuNi "T"	-205 °C to +405 °C	–
NiCr-Ni "K"	-205 °C to +1377 °C	–
Pt10Rh-Pt "S"	-55 °C to +1773 °C	–
Pt13Rh-Pt "R"	-55 °C to +1773 °C	–
Pt30Rh-Pt6Rh "B"	0 °C to 1825 °C	–
NiCrSi-NiSi "N"	-105 °C to +1305 °C	–
W3Re-W25Re "D"	-5 °C to +2500 °C	–
W5Re-W26Re "C"	-5 °C to +2320 °C	–
4 mA to 20 mA	3.6 mA to 21 mA	–

Digital inputs

Operating mode	Potential-free contact
Function	Unlock, keyboard lock, level inhibit can be configured

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Outputs

Analog output

Voltage	
Output signal	DC 0 V to 10 V or 2 V to 10 V
Residual ripple	±0.5 %
Load resistance	≥ 500 Ω
Load influence	±15 mV
Current[a]	
Output signal	DC 0 mA to 20 mA or 4 mA to 20 mA
Residual ripple	±0.5 % at 300 Ω
Burden	≤ 500 Ω
Burden influence	±0.05 mA/100 Ω
Accuracy[b]	±0.5 %
Ambient temperature influence	≤ 150 ppm/K

[a] Zero-point calibration at 270 Ω

[b] Accuracy refers to the measuring range end value.

Digital outputs

Alarm relay output

Type	Changeover contact
Contact life	30000 switching cycles
Switching capacity	AC 230 V, 3 A, 50 Hz (resistive load) or maximum DC 30 V, 3 A[a]
Minimum current	DC 12 V, 100 mA
Contact protection circuit	Fuse cut-out, 3.15 AT installed in the pole branch

[a] The 8 A contact load specified by the manufacturer is therefore reduced by 60 %. The exclusion of faults for contact welding is observed.

KV relay output

Type	Changeover contact (without contact protection)
Contact life	30000 switching cycles
Switching capacity	AC 250 V, 3 A, 50 Hz (resistive load) or maximum DC 30 V, 3 A
Minimum current	DC 12 V, 100 mA

Interfaces

Connector type	Mini USB B (socket)
Standard	Low-Speed, Full-Speed
Max. line length	3 m
Power supply via USB	Not possible

The device is equipped with a USB device interface that is provided for the connection to a PC as standard. This interface is only intended for using the setup program, which can be used to configure the device.

NOTE!

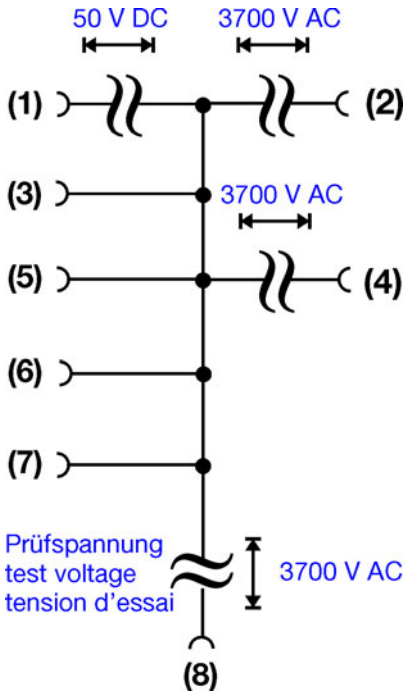
The USB interface is only designed for use for the purpose of servicing and startup over a limited period as the device enters a safe operating state while configuration data is being transferred.

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Electrical isolation

(1) Analog inputs (3) Digital input (5) USB interface (6) Display (7) Analog output (8) Voltage supply		(2) Alarm relay output (4) KV relay output

Environmental influences

Ambient temperature range	
Storage	-30 °C to +70 °C
Operation	0 °C to 55 °C
Site altitude	Max. 2000 m above sea level
Temperature influence	≤ ±0.005 %/K deviation from 23 °C[a] for RTD temperature probes
	≤ ±0.015 %/K deviation from 23 °C[a] for thermocouple and current
Terminal temperature range	If the terminal temperature range between -20 °C and +80 °C is exceeded or undershot, the device displays the "Terminal temperature" error message. The output changes to a safe operating state (quiescent current principle). The message cannot be acknowledged until the terminal temperature has moved back into the admissible range.
Climatic environmental influences	According to DIN EN 60721-3-3 with extended temperature range
Resistance to climatic conditions	≤ 85 % relative air humidity without condensation
Class	3K22
Protection type	According to DIN EN 60529 IP20
Electromagnetic compatibility (EMC)	According to DIN EN 60730-1:2025-05
Interference emission	Class B[b]
Interference immunity	Functionally safe according to DIN EN 60730-1

[a] All specifications refer to the measuring range end value.

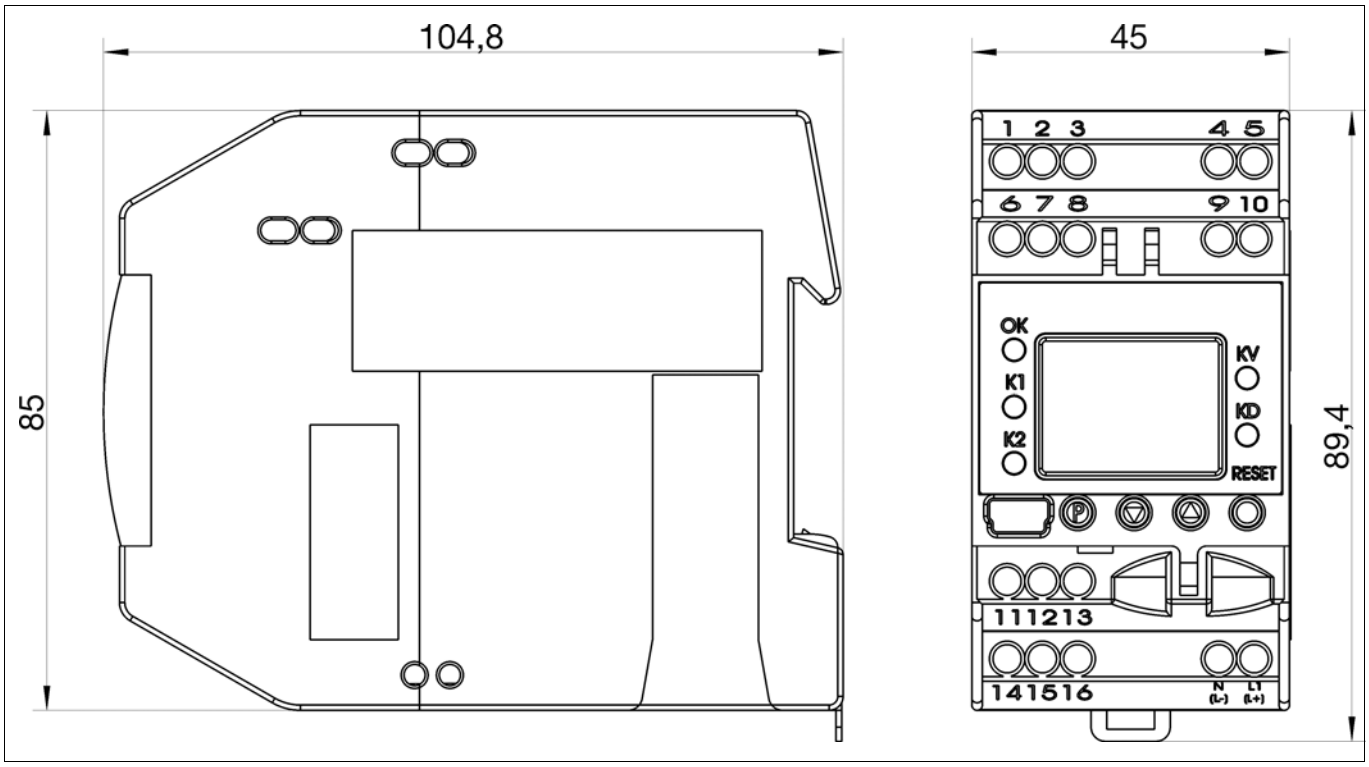
[b] The product is suitable for industrial use as well as for households and small businesses.

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Dimensions



Electrical data

Voltage supply	AC/DC 20 V to 30 V, 48 Hz to 63 Hz AC 110 V to 240 V, +10 % / -15 %, 48 Hz to 63 Hz
Power consumption, power loss	Maximum 12 W
Power consumption, power loss in special operating modes[a]	5 W

[a] Special operating modes are: 10 mA analog output, display backlight off, alarm relay output switched on, KV relay output switched off, sensor 2 × Pt100

Test voltage according to EN 60730-1

Test voltages according to EN 60730, Part 1

Input and output to voltage supply	
When AC voltage supply is 100 V to 240 V	3.7 kV / 50 Hz
When AC / DC voltage supply is 20 V to 30 V	3.7 kV / 50 Hz

Air gaps and creepage distances

	Air gap	**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

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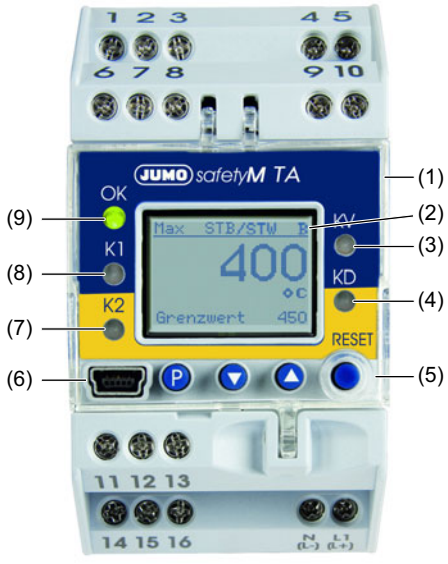
Case

Material	Polycarbonate
Flammability class	UL94 V0
Electrical connection	On the front via screw terminals up to max. 2.5 mm²
Mounting	On 35 mm DIN rail according to DIN EN 60715
Installation position	Vertical
Weight	Approx. 230 g

Approval marks and certificates

	Designation	DNV®
	Test facility	DNV®
	Certificate no.	TAA000017J
	Inspection basis	DNV GL rules for classification - Ships, offshore units, and high speed and light craft
	Valid for	Devices with extra code 062

Display and control elements



1	Cover	2	LCD display
3	LED KV	4	LED KD
5	Keys ⇨ see below	6	USB interface
7	LED K2	8	LED K1
9	LED OK		

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Connection elements



Element	Connection	Terminals
1	Analog input 1	1 to 3
2	Analog input 2	6 to 8
4	Digital input	4 and 5
5	Analog output	9 and 10
9	Voltage supply	N1 and L1 or L- und L+
10	Alarm relay output	14 to 16
11	KV relay output	11 to 13

The connection is made via screw terminals.

One-wire conductor	Cross section ≤ 2.5 mm²
Fine-strand conductor, with ferrule	Cross section ≤ 1.5 mm²
Tightening torque for screws	Max. 0.5 Nm

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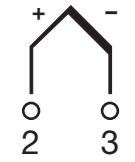
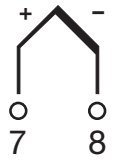
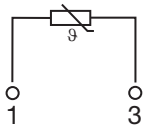
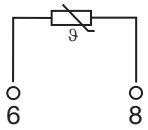
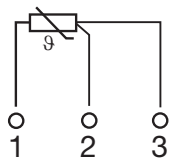
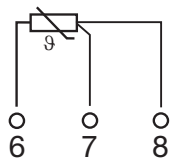
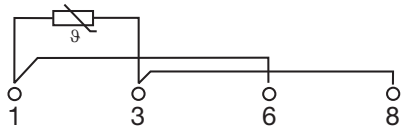
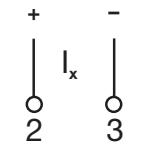
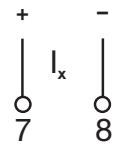
Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Analog input

Analog input: standard feature (terminals 1 to 8)

Element	Description	Assignment		Comment
		Analog input 1 (E1)	Analog input 2 (E2)	
1, 2	Thermocouple Double thermocouple			When connecting double thermocouples, the measuring circuits (E1) and (E2) must be isolated. This means that neither thermocouple may have an electrical connection to the protection fitting and they also must not be electrically connected to each other.
	RTD temperature probe Pt100 / Pt1000 in 2-wire circuit			In the case of RTD temperature probes in a 2-wire circuit, the line resistance must be entered under "analog inputs" when using greater line lengths.
	RTD temperature probe Pt100 / Pt1000 in 3-wire circuit			–
	RTD temperature probe Pt100 in 2-wire circuit, single sensor for both analog inputs			When only one probe is connected, the maximum **SIL** and **PL** are reduced. However, the internal 2-channel structure (1oo2D) in the device remains intact. Both channels measure the same signal due to the simplified external circuitry.
	4 to 20 mA			The device has a passive 4 to 20 mA input and works as a current sink. An external current source is required for operation.
	4 to 20 mA for both analog inputs			When only one probe is connected, the maximum **SIL** and **PL** are reduced. However, the internal 2-channel structure (1oo2D) in the device remains intact. Both channels measure the same sensor due to the simplified external circuitry.

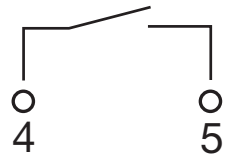
Digital input

Digital input: standard feature (terminals 4 and 5)

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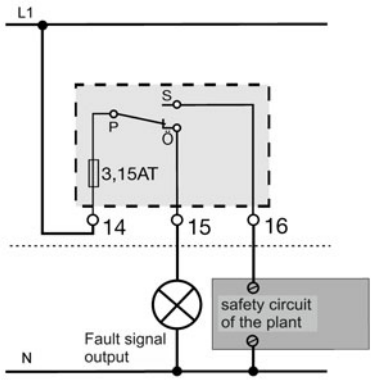
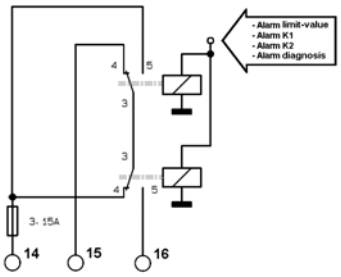
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Element	Description	Assignment	Comment
4	Digital input	 Ground	Connection to potential-free contact

Alarm relay output

Alarm relay output: standard feature (terminals 14 and 16)

Element	Description	Assignment	Comment
10	Alarm relay output (zero-current state)	  Internal circuitry	Relay (changeover contact) with fuse cut-out

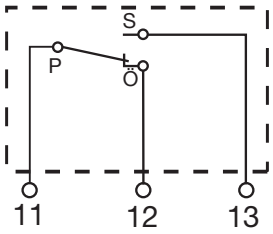
KV relay output

KV relay output: standard feature (terminals 11 to 13)

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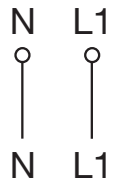
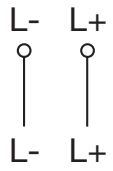
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Element	Description	Assignment	Comment
11	KV relay output		Relay (changeover contact) The KV relay output is not part of the safety function.

Voltage supply

(Terminals N1 and L1 or L- and L+)

Element	Description	Assignment		Comment
		AC	DC	
9	Voltage supply	 L1 – Line conductor N – Neutral conductor	 L- L+	Voltage supply specification on the nameplate

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Order details

	(1)	Basic type
701158		JUMO safetyM TA with analog input, digital input, alarm relay output, KV relay output, and analog output
	(2)	**Version**
0		Standard version
1		Customer-specifically modified hardware
2		Customer-specifically modified software
3		Customer-specifically modified hardware and software
	(3)	Voltage supply
23		AC 110 V to 240 V, +10/-15 %, 48 Hz to 63 Hz
25		AC/DC 20 V to 30 V, 48 Hz to 63 Hz
	(4)	**Extra code**
058		SIL and PL approval (always present)
	(5)	**Extra code**
062		DNV® approval
919		AMS2750[a]

[a] The thermocouple type and the required measuring points (calibration points) must be defined for the calibration certificate. The device must be used as a permanently installed field device. Use as a mobile field testing device for SAT and TUS tests is not admissible. This type suffix is only available in conjunction with customer-specifically modified software code 2 (version = 2).

Designation	AMS measuring range
Fe-CuNi "L"	-200 to +900 °C
Fe-CuNi "J"	-200 to 1200 °C
Cu-CuNi "U"	-200 to +600 °C
Cu-CuNi "T"	-200 to +400 °C
NiCr-Ni "K"	-200 to +1372 °C
Pt10Rh-Pt "S"	-50 to +1768 °C
Pt13Rh-Pt "R"	-50 to +1768 °C
Pt30Rh-Pt6Rh "B"	0 to 1820 °C
NiCrSi-NiSi "N"	-100 to 1300 °C
W3Re-W25Re "D"	0 to 2495 °C
W5Re-W26Re "C"	0 to 2315 °C

Explanation on (2) version	
0	Standard with default settings means: everything that can be ordered in the order code shown
1	Customer-specifically modified hardware means: everything that **cannot** be ordered in the order code shown, e.g. customer-specific front film
2	Customer-specifically modified software means: Device differs from the standard JUMO configuration (highlighted **bold** in the BTA) if the customer wants to have another measurement input configured, for example.
3	Combination of 1 and 2

	(1)		(2)		(3)		(4)		(5)
Order code		/		-		/		/	
Order example	701158	/	0	-	23	/	058	/	062

Scope of delivery

- 1 device in the ordered version
- 1 quick start guide

Accessories

Designation	Material number
Setup-Program (JUMO)	30076442
USB-cable, USB Type A plug-to USB Type Mini-B plug, 3 m	506252

Further information and the free setup program are available in the Homepage download center.