



MORE THAN SENSORS
AND AUTOMATION



JUMO Safety Performance

The compact solution for functional safety



Dear Reader,

In 1976 in Seveso, northern Italy, a dramatic accident involving toxic gas brought about a development, the results of which we know today as the terms "functional safety" or "SIL". At the time, a serious overheating reaction took place in a plant which had neither automatic cooling systems nor warning systems, releasing large amounts of dioxin. As a result of this catastrophe, the laws and regulations regarding the protection of people, living things, and the environment were tightened.

The first result was the standard IEC 61508 "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems" published in 1998, which has been applied as EN 61508 since 2002. For the first time, this standard comprehensively defined the safety requirements in automation technology.

While IEC 61508 is primarily aimed at the manufacturers of components for safety devices, IEC 61511 "Functional Safety - Safety Instrumented Systems for the Process Industry Sector" applies to the operators and planners of safety devices. IEC 61511 provides recommendations and guidelines for assessing the risk of damage in plants. It can also be used to help select safety-related components. The aim of these standards is to reduce the risk to an acceptable level.

But what do we actually mean when we talk about "functional safety" or "SIL" and "PL"? Functional safety refers to the part of system safety that depends on the correct functioning of safety-related subsystems and external devices to reduce risk.

The term "PL" stands for "Performance Level" and, according to EN ISO 13849, describes a discrete level that specifies the ability of safety-related parts of a control system to perform a safety function under foreseeable conditions. The performance level (PL) is therefore a reliability measure of a safety function.

The term "SIL" ("Safety Integrity Level") functions as a measure of the safety-related performance or reliability of an electrical or electronic control system. The primary focus of SIL is on the evaluation of the safety chain, also known as SIF (Safety Instrumented Function). This safety chain typically consists of the safety controller, the actuator, and the sensor. The SIS ("Safety Instrumented System") is made from one or more safety chains.

SIL and PL are gaining more and more importance in the process industry and in mechanical engineering. For this reason JUMO has developed a safety-oriented product portfolio for different measurands under the JUMO Safety Performance brand. This portfolio allows JUMO to now offer different compact solutions for different applications.

Additional information can be found at: <http://jsp-en.jumo.info>.

Table of contents



JUMO Safety Performance – the compact solution
for functional safety

4

Electronic products

10

Sensors

18





JUMO Safety Performance – the compact solution for functional safety

JUMO Safety Performance represents the highest level of safety. This brand unites all JUMO products that are suitable for safety-related plants. Included here are devices that are SIL and PL certified, but also passive elements that are suitable for use in SIL and PL measuring chains. These are labeled with "SIL qualified" and "PL qualified". The configuration of the components that has been especially adjusted to the process is important for a process-reliable application at the customer's site. The JUMO Safety Performance team of experts was created to assist users with all questions about SIL and PL.



JUMO safetyM STB/STW – compact single-channel (1002 D redundant structure) safety controller for Ex and non-Ex areas

Functional safety primarily focuses on the evaluation of a safety chain. Such a safety chain typically consists of an actuator, a logic unit, and a sensor. Safety-related solutions are normally made through a safety programmable logic controller. However, complex programming applications are required here and the inputs as well as outputs are coupled with card types and multichannel features. The disadvantage is that each application must be calculated and evaluated separately according to SIL. The JUMO safetyM STB/STW is an attractive alternative to the safety programmable logic controller. This safety limiter and monitor is equipped with 3 different functional outputs and enables the simple implementation of a compact safety solution.

Such a solution is especially well suited for smaller applications like special machines or individual applications with low signal density or low number of signals. Different temperature probes can be directly connected to the JUMO safetyM without transmitters. Other measurands such as pressure, level, or flow can be measured using a standard signal input. Another highlight of the JUMO Safety Performance applications is their possible use in explosion-protected areas. Configured compact solutions according to the ATEX directive are available for this purpose (see figure on page 7).

SIL classifications of the compact solution

Based on decades of experience in temperature measurement technology and safety controllers, JUMO has already developed a safety-related compact solution for the temperature measurand which does not require further verifications or calculations. Here, the safety controller JUMO safetyM is combined with JUMO RTD temperature probes or thermocouples. The manufacturer's declaration issued by JUMO establishes a certified SIL 3 and PL e compact solution. Compact solutions for the measurands pressure and level can be designed up to SIL 2 and PL d depending on the choice of sensor technology and actuators. This calculation is done by the user. The JUMO Safety Performance team of experts supports the user with the calculations for compliance with the specified directives.



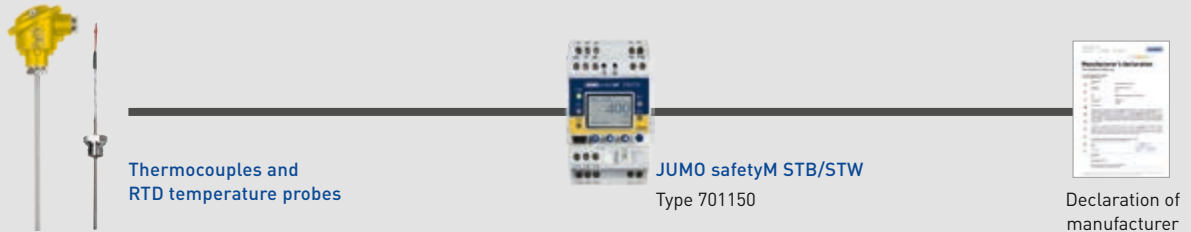
Your benefits in a nutshell:

- Certified measuring chain protection up to SIL 3 and PL e possible
- Highest degree of flexibility for the configuration of the SIL components through comprehensive delivery program
- Safe monitoring and shutoff of systems
- Selectable security features (e.g. limiter or monitor function according to DIN 14597)
- Suitable for different measurands such as temperature, pressure, and level
- Variable, manufacturer-independent selection of sensor technology and actuators
- Certified measuring chain individually adaptable to the process requirement
- SIL calculation is no longer necessary by the user when the JUMO safetyM is used in combination with temperature probes
- Also available as explosion-protected compact solution according to ATEX directive in the different ignition protection types such as [Ex i] and [Ex e]
- Individual assessment of the safety chain by the experienced JUMO Safety Performance team of experts

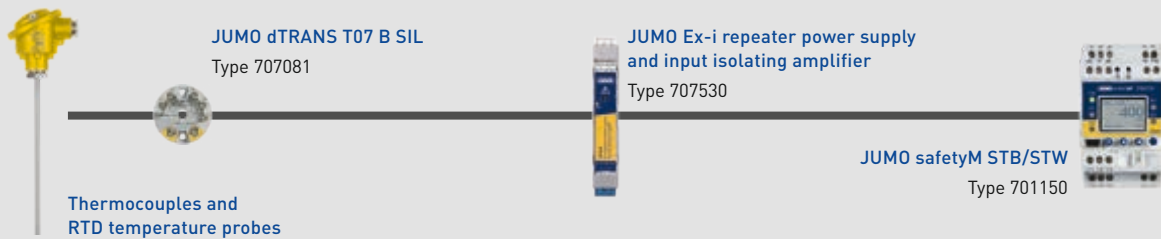


Safety-related switch-off up to SIL 3

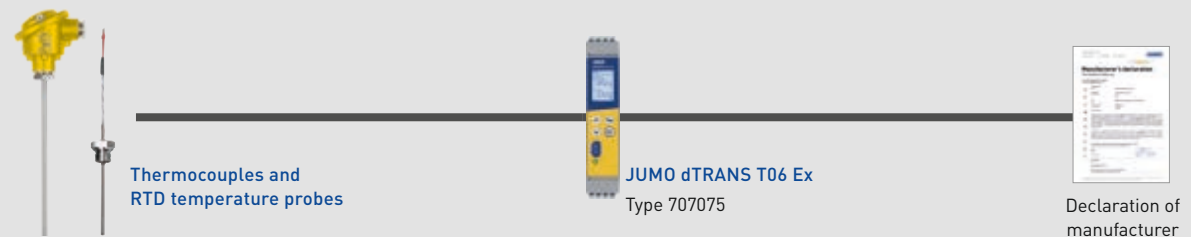
Certified compact system for temperature



Compact system for temperature



Certified system solution for temperature



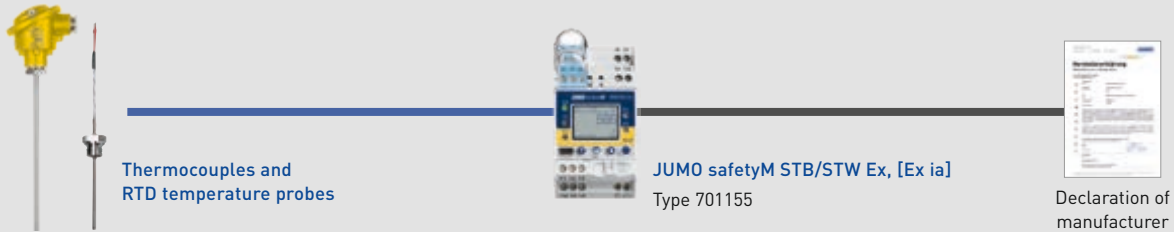
General comment for the displayed safety-related compact solutions on page 6 and 7:

- The JUMO safetyM STB/STW has an output signal to control the downstreamed safety actuator systems.
- Additional output signal suitable for downstreamed visualization, controlling, and documentation.

* Auxiliary energy for power supply is required separately.

Safety-related switch-off up to SIL 3 in ATEX version (ignition protection type [Ex ia] and [Ex e])

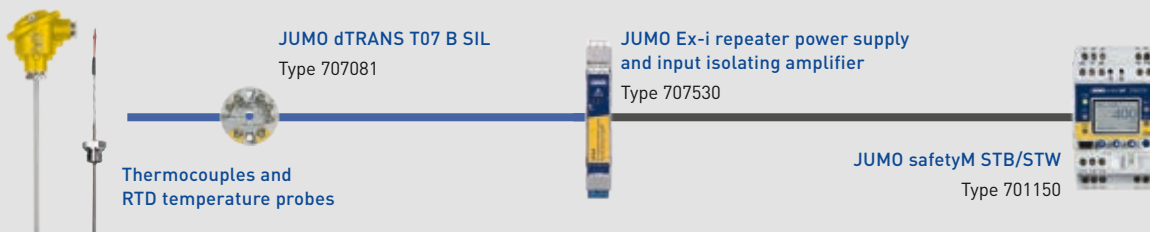
Certified compact system for temperature



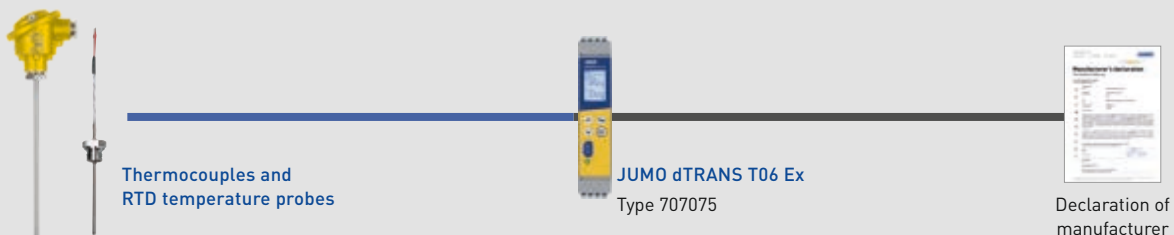
Certified compact system for temperature



Compact system for temperature



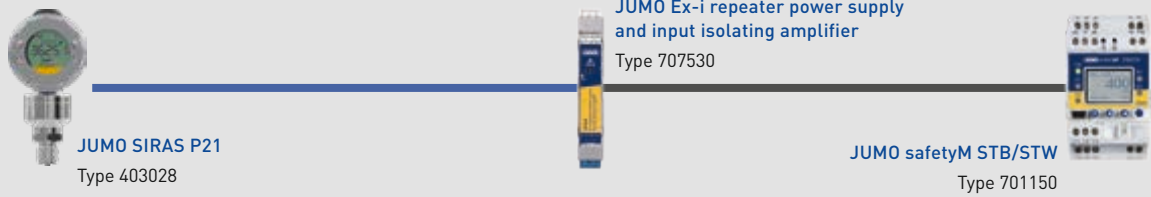
Certified system solution for temperature





Safety-related switch-off in SIL 2 in non-Ex version

Certified compact system for pressure



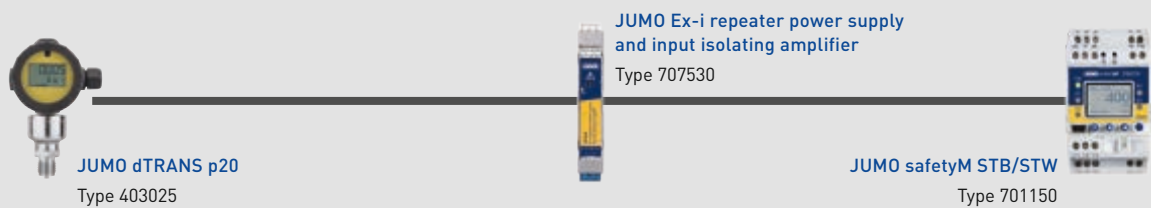
Compact system for pressure*



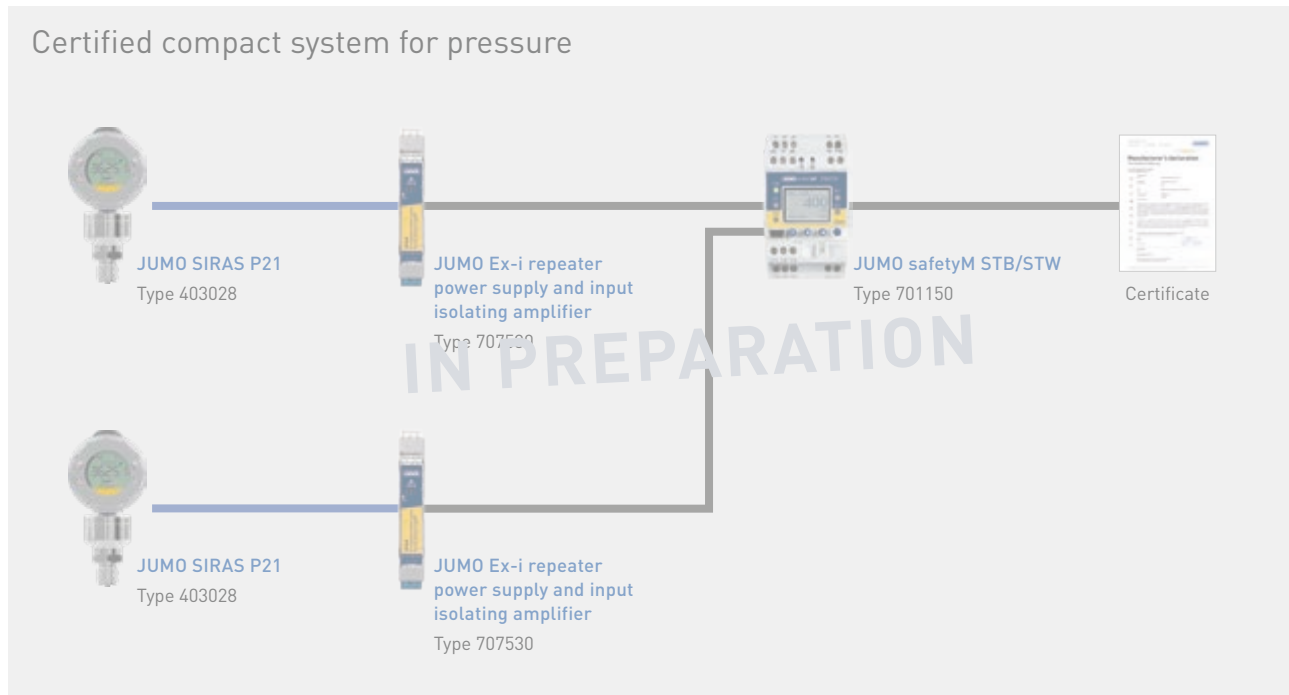
Compact system for pressure*



Compact system for pressure



Safety-related switch-off up to SIL 3 in non-Ex and ATEX version (ignition protection type [Ex ia])



General comment for the displayed safety-related compact solutions on page 8 and 9:

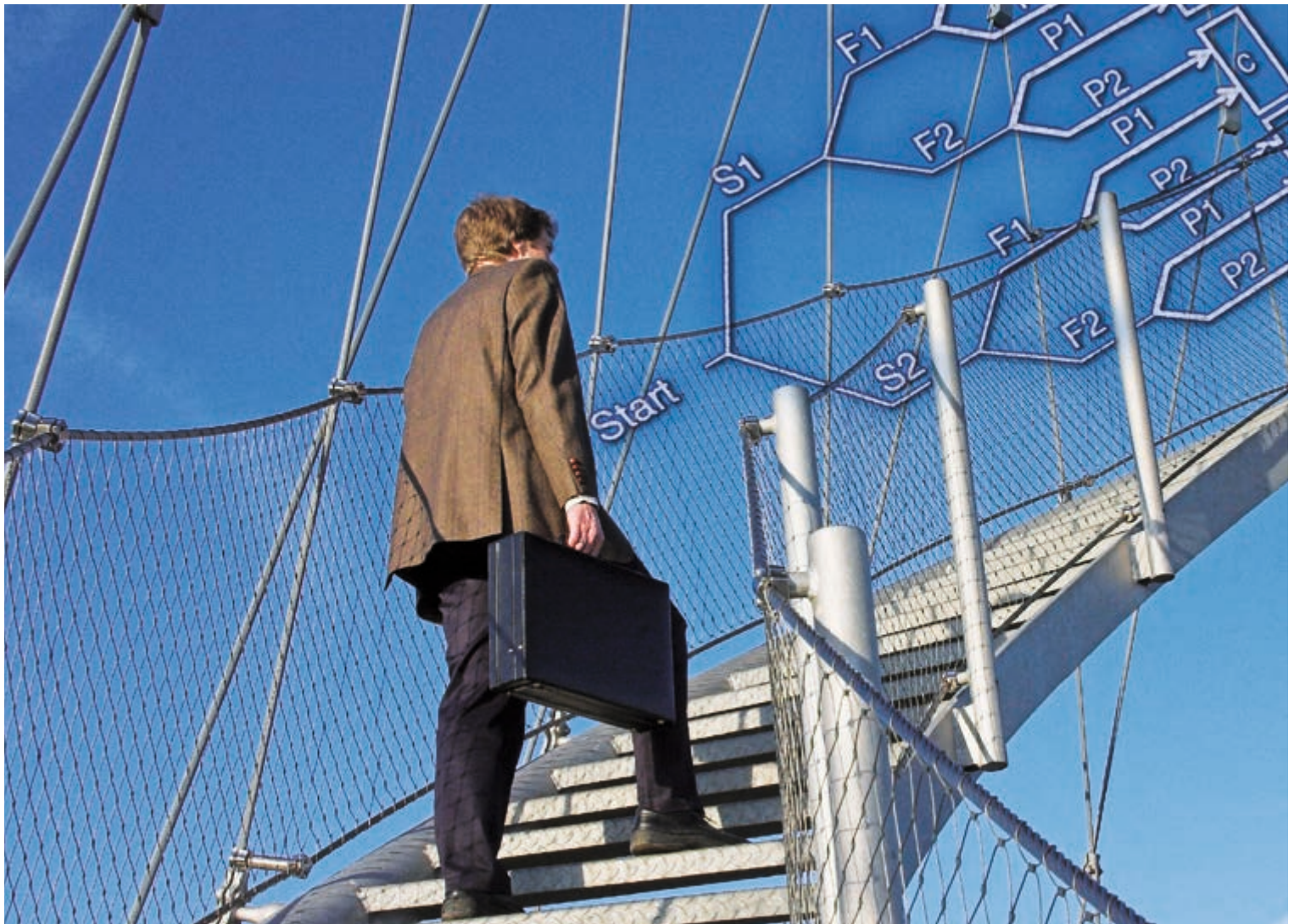
- The JUMO safetyM STB/STW has an output signal to control the downstreamed safety actuator systems.
- Additional output signal suitable for downstreamed visualization, controlling, and documentation.

* Auxiliary energy for power supply is required separately.



Always one step ahead:

The electronic JUMO Safety Performance products



JUMO safetyM STB/STW and STB/STW Ex

Safety temperature limiter and monitor

- Ignition source monitoring according to EN 50495 SIL 2 and EN 13463 IPL 2
- Ignition protection type [Ex ia] with intrinsically safe inputs or [Ex e] with increased safety
- 1oo2D structure for a high degree of process reliability
- Approvals for DIN EN 14597, SIL 3, PL e, GL, PED
- LCD display with background lighting and plain text display
- Universal input for a large number of measuring signals and measurands



Analog inputs

RTD temperature probes: Pt100, Pt1000

Thermocouples: Fe-CuNi "L", Fe-CuNi "J", Cu-CuNi "U", Cu-CuNi "T", NiCr-Ni "K", NiCrSi-NiSi "N", Pt10Rh-Pt "S", Pt13Rh-Pt "R", Pt30Rh-Pt6Rh "B", W3Re-W25Re "D"

Direct current: 4 to 20 mA

Analog inputs: configurable by user

Analog output

Current: 4 to 20 mA, 0 to 20 mA

Voltage: 2 to 10 V, 0 to 10 V

Analog output: can be used as actual value output for main measured value, measured value 1, measured value 2, difference between measured value 1 and measured value 2

Digital input

Connection: 1 potential-free contact – for unlocking, keyboard lock, level inhibit

Relay outputs

Relay output KV – can be used as a pre-alarm

Relay output – limit value alarm evaluated for temperature limiter

Voltage supply

AC/DC 20 to 30 V, 48 to 63 Hz, AC 110 to 240 V +10 %/-15 %, 48 to 63 Hz

Approvals

ATEX, IECEx, SIL, PL

For further information: data sheet 701150, 701155



JUMO dTRANS T06 and JUMO dTRANS T06 Ex

Multifunctional four-wire transmitter in mounting rail case

- Simple DIN-rail mounting with removable connection terminals
- Universal input for a large number of sensors
- Comprehensive self and sensor diagnostics
- Highest degree of accuracy and long-term stability
- Intelligent additional functions such as drag indicator and service counter
- SIL 2 or SIL 3 according to IEC 61508-1/2/3:2010
- Easy-to-use configuration via keys and display or USB interface
- Higher process quality and efficiency
- Increased plant safety and reliability



Analog inputs

RTD temperature probes:

Pt50, Pt100, Pt500, Pt1000, Ni100, Ni500, Ni1000, Cu50, Cu100, two/three/four-wire circuit

Thermocouples:

L, J, U, T, K, E, N, S, R, B, C, A1, D, L, Chromel® COPEL® "L", Chromel® Alumel® "K", Platinel II

Analog output

Current: 0(4) to 20 mA (invertible); voltage: 0(2) to 10 V (invertible)

Installation

Mounting rail or DIN rail 35 × 7.5 mm

Calibration accuracy

±0.05 %

Voltage supply

Type 707071: AC 110 to 240 V, DC 24 V (four-wire transmitter); type 707075: DC 24 V (four-wire transmitter)

Special features

- Universal input for a large number of sensors and standard signals
- Intuitive operation and configuration on the device or through USB interface with setup program
- **Type 707071:** RS485 interface Modbus RTU and relay output limit value (option)
- **Type 707075:** RS485 interface Modbus RTU (option)
- Intelligent additional functions such as min./max. drag indicator and output simulation
- SIL 2 or SIL 3 according to DIN EN 61508 and PL c or PL d according to ISO 13849 (type 707071: option; type 707075: standard)
- Sensor matching for RTD temperature probes
- Customer-specific linearization
- High level of galvanic signal isolation
- Service and operating hours counter
- Connection diagram retrievable in the display

Approvals

Type 707071: SIL and PL, cUL, DNV GL; **type 707075:** SIL and PL, ATEX and IECEx

For further information: data sheet 707071, 707075

JUMO dTRANS T07

Two-channel temperature transmitter

- High degree of accuracy as of 0.1 K with Pt100 sensor
- SIL 2 hardware and SIL 3 for software according to IEC 61508:2010
- Reliable measurement operation through sensor monitoring and device hardware error detection



Analog inputs

2 sensor inputs for

RTD temperature probes:

Pt50, Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120, Cu50, Cu100, two-wire/three-wire/four-wire electrical circuit

or

thermocouples:

A, B, C, D, E, J, K, L, N, R, S, T, U

Analog output

Current: 4 to 20 mA

Installation

In terminal head form B,
on mounting rail or DIN rail 35 × 7.5 mm

Calibration accuracy

±0.05 %

Voltage supply

DC 12 to 32 V

Special features

- 2 universal measurement inputs (RTD, TC, Ω , mV)
- Output 4 to 20 mA (single channel, loop powered)
- 2 enclosure versions (B-head or DIN rail)
- Optional plug-in display BD7 for B-head device version

Approvals

ATEX, IECEx, cULus

For further information: data sheet 707080



JUMO Ex-i repeater power supply and input isolating amplifier

For intrinsically safe [Ex i] transmitters

- For operation of intrinsically safe [Ex i] transmitters and [Ex i] mA current sources installed in Ex areas
- SIL 2 approval
- Wide-range power supply



Input

0(4) to 20 mA
Supply isolation amplifier operation or input isolating amplifier operation

Output

0(4) to 20 mA
0(1) to 5 V

Installation

On mounting rail or DIN rail 35 × 7.5 mm

Comparison accuracy

±0.05 % (typical)

Voltage supply

AC/DC 24 to 230 V

Special features

- Active or passive current output
- LED for power status
- Wide-range power supply

For further information: data sheet 707530

JUMO Ex-i isolating switch amplifier

Two-channel isolating switch amplifier for Ex applications

- Safe transfer of switching signals even from Ex areas
- High degree of process reliability due to intrinsically safe inputs, galvanic three-way isolation, and line fault detection
- Space-efficiency in the control cabinet through two-channel version
- Less storage costs due to wide-range power supply
- Reduction in startup time through coded screw terminals and simple configuration with DIP switches
- ATEX and IECEx approval, device installation in zone 2 possible, sensor in zone 0
- Extended ambient temperature range from -40 to +60 °C



Input

2 channel version, intrinsically safe, designed for ignition protection type Ex i [Ex ia]; NAMUR proximity sensors according to EN 60947-5-6; unconnected switching contacts (not for safety-related applications, SIL 2); switching contacts wired for resistance

Output

2 relay outputs, 1 changeover contact per channel

Installation

On mounting rail 35 × 7.5 mm

Voltage supply

AC/DC 24 to 230 V

Special features

- Use of the sensor up to Ex zone 0, galvanic three-way isolation, 2 channels, wide range power supply; line fault detection (line break, short circuit), phase reversal option (switching output)

For further information: data sheet 707540



JUMO exTHERM-AT

Explosion-protected surface-mounted thermostat

- Can be directly applied in Ex zones 1 and 2 or 21 and 22
- Switching capacity 16 A as a standard feature, optionally 25 A
- Admissible ambient temperature: -60 to +70 °C
- Thermowell for Ex zone 0 available as an accessory
- Single thermostat and double thermostat
- Approvals according to ATEX, IECEx, and SIL 2



Features

Single thermostat and double thermostat

Versions

- Temperature monitor (TW)
- Safety temperature monitor (STW)
- Safety temperature limiter (STB)

Switching element

Flameproof enclosed panel-mounted thermostat

Switching capacity

16 A, 230 V, optionally 25 A, 230 V

Maximum control range and limit value

500 °C

Approvals

ATEX, EAC, IECEx, UKCA-Ex, CCC-Ex, PESO, SIL

For further information: data sheet 605055

JUMO Safety Performance

Compact solution Electronic products Sensors



Measure with certainty

The JUMO Safety Performance sensors



Thermocouples and RTD temperature probes

- Over 40 different SIL and PL qualified temperature probes
- Head and cable probe as thermocouple or RTD temperature probe
- Approvals according to ATEX and IECEx



Thermocouples

- For temperatures of up to 1500 °C
- Available as single or double thermocouple
- Thermocouples J, L, K, S, B*

RTD temperature probe

- For temperatures of up to 700 °C
- Pt100, Pt500, Pt1000
- Available as single, double, or triple RTD temperature probe

Process connection

- Thread, flange, compression fitting, hygienic process connections

For further information: see data sheet

Thermocouples for types:

901006, 901020, 901030, 901050, 901110, 901120, 901150, 901190, 901210, 901220, 901230, 901240, 901250, 901350, 901820

RTD temperature probes for types:

902006, 902020, 902023, 902030, 902040, 902044, 902050, 902120, 902123, 902130, 902150, 902153, 902190, 902210, 902220, 902230, 902240, 902250, 902350, 902520, 902524, 902550, 902554, 902810, 902815, 902820, 902821, 902830

* According to DIN 43710, DIN EN 60584, and ANSI MC96.1 or ASTM E230.



JUMO dTRANS p20

Process pressure transmitter

- Optional explosion protection [Ex ia] according to ATEX
- Linearity 0.05 %
- Turn down 1:50
- Simple operation with rotary knob
- Stainless steel case
- Optional high-temperature version up to 200 °C
- Display scaling with selectable units of measurement
- Display of sensor temperature
- For pressure, differential pressure, and level applications
- Display of minimum and maximum pressures



Input

403025/26: 60 to 600 bar (relative; absolute)
403022/23: 1 mbar to 100 bar DP

Output

4 to 20 mA two-wire

Accuracy (linearity)

403025/26: 0.05 %
403022/23: 0.07 %

Process connection

403025/26: thread, hygienic connections, JUMO PEKA, diaphragm seals
403022/23: 2x 1/4"-18 NPT; diaphragm seals

Medium temperature

403025/26: -40 to +200 °C
403022/23: -40 to +110 °C

Special features

- Programmable and highly precise
- Stainless steel case
- SIL 2, ATEX

For further information: data sheet 403025/26, 403022/23

JUMO SIRAS P21 AR/DP

Process pressure transmitters with SIL

- Long-term stability of < 0.1 % per year
- Linearity: 0.05 %
- -1 to +100 bar rel., 0 to 100 bar abs.
- Safety Integrity Level [SIL 2/3], PL c/d
- Implementation of safety measuring chains SIL 2/3
- Certification according to DIN EN 61508 (SIL), DIN EN 13849 (PL), and PED (PED 2014/68/EU in combination with JUMO safetyM STB/STW and transmitter power supply unit)



Input

403028: 600 mbar to 100 bar (rel.; abs.)
403024: 1 bar to 100 bar DP

Output

4 to 20 mA two-wire

Accuracy (linearity)

403028: 0.05 %
403024: 0.07 %

Process connection

403028: thread
403024: 2x 1/4"-18 NPT

Medium temperature

-40 to +110 °C

Special features

- Measuring chain certified according to PED
- Programmable and highly precise
- Stainless steel case
- SIL 3, IECEx

For further information: data sheet 403028, 403024



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