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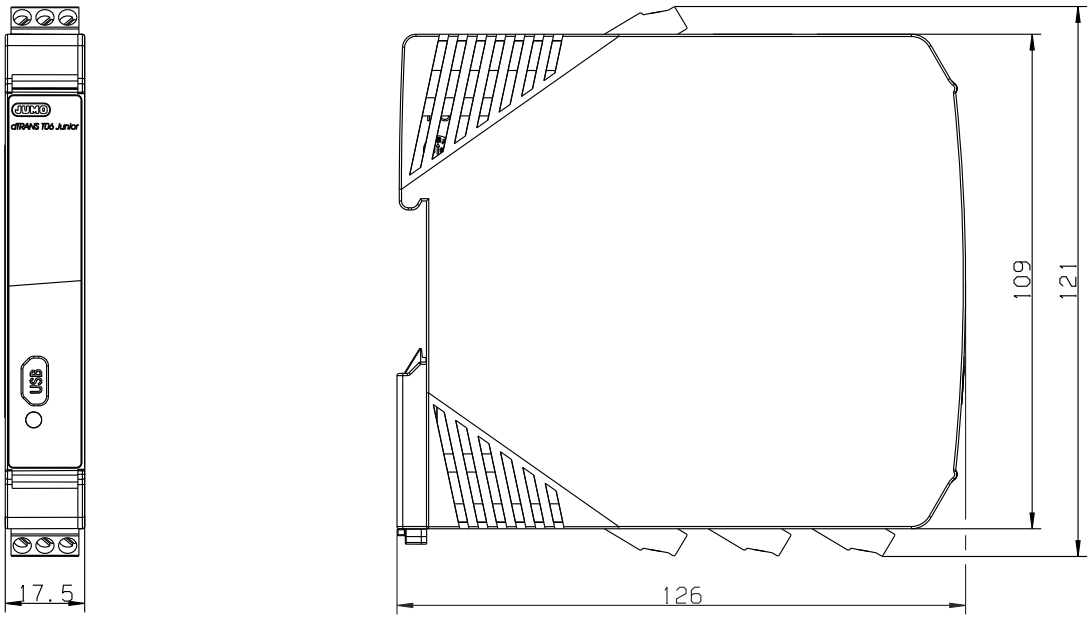
Dimensions



Order details

	(1)	Basic type
707070		dTRANS T06 Junior
	(2)	**Version**
8		Standard with default settings (Pt100 in 3-wire circuit, 0 to 100°C, 4 to 20 mA)
9		Customer-specific configuration (specifications in plain text)
	(3)	**Voltage supply**
29		DC 24 V, +10/-15 % (the device may only be connected to SELV or PELV electrical circuits)

	(1)	/	**(2)**	-	**(3)**
Order code		/		-	
Order example	707070	/	8	-	29

Scope of delivery

- JUMO dTRANS T06 Junior in the ordered version
- Operating manual

General accessories

Item	Part no.
Setup program dTRANS T06 Junior, multilingual	00728281
USB cable A connector to Micro-B connector, length 3 m	00616250
Screw-on end clamp for mounting rail	00528648

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JUMO dTRANS T06

Multifunctional Four-Wire Transmitter in Mounting Rail Case in Accordance with DIN EN 61508 and EN ISO 13849

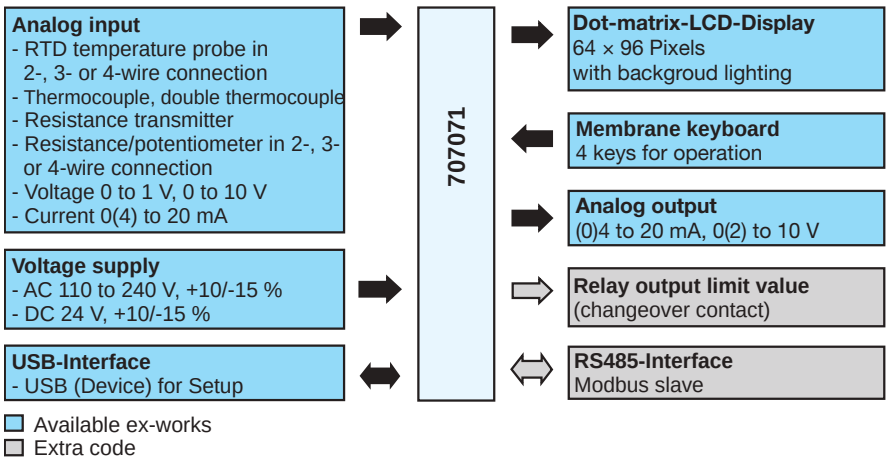
Brief description

The transmitter acquires the temperature through an RTD temperature probe or a thermocouple (double thermocouple). The transmitter can also acquire standard signals such as current 0(4) to 20 mA or voltage 0 to (1)10 V.
Additionally resistance/potentiometer with two-wire/three-wire/four-wire circuit can be acquired.
The output signal is galvanically isolated from the measurement input and voltage supply.
Depending on the measurement input, different linearization variants (linear, temperature-linear, customer-specific, etc.) are possible. Variants 0(4) to 20 mA and, alternatively, 0(2) to 10 V are available as output signals.
Process variables such as temperature or pressure are reliably emitted at the analog output and monitored for measuring overrange and underrange.
The Type 707071 is functionally expandable through the extra code, relay output and an RS485 interface.
Visualization of measured values is accomplished using a dot-matrix LCD display with white backlight. The operating status is signaled optically using a two-color LED (red/green).
If a malfunction occurs the transmitter sends a defined output signal according to the recommendation of NAMUR NE 43, which downstream systems can recognize.
Smooth operation is indicated by a permanent green LED; malfunction statuses are indicated by a permanent red LED.
The sensor type, measuring range, linearization, output signal, limit values, etc. can be configured via setup program.Alternatively, configuration is also possible via four keys on the device.
The 707071/8-XX-058 device fulfills the requirements of SIL 2 / SIL 3 in accordance with DIN EN 61508 and PL c / PL d in accordance with DIN EN ISO 13849 as well as the requirements of DIN EN 60730-2-9.
The systematic suitability for HW and SW is SC = 3. Depending on the architecture, SIL 2 / PL c for HFT = 0 (single device) and SIL 3 / PL d for HFT = 1 (two devices) is attainable.

Type 707071/...

Type 707071/...058

Block diagram



Special features

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

Approvals/approval marks (see "Technical data")

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Technical data

Analog input

Noise suppression, filter time, measuring value offset, and fine adjustment can be adjusted for all input variants.

RTD temperature probe

Designation	Standard	Measuring range	Measuring accuracy[a]	R_{100} / R_0	ITS
Pt50	GOST 6651-2009 A.2			1.3911	90
2/3-wire circuit		-200 to +850 °C	±0.5 K		
4-wire circuit		-200 to +850 °C	±0.3 K		
Pt100	IEC 60751:2008			1.3851	90
2/3-wire circuit		-100 to +200 °C	±0.2 K		
		-200 to +850 °C	±0.4 K		
4-wire circuit		-100 to +200 °C	±0.1 K		
		-200 to +850 °C	±0.2 K		
Pt500, Pt1000	IEC 60751:2008			1.3851	90
2/3-wire circuit		-100 to +200 °C	±0.2 K		
		-200 to +850 °C	±0.4 K		
4-wire circuit		-100 to +200 °C	±0.1 K		
		-200 to +850 °C	±0.2 K		
Ni100, Ni500, Ni1000	DIN 43760:1987-09			1.618	IPTS-68
2/3-wire circuit		-60 to +250 °C	±0.4 K		
3-wire circuit		-60 to +250 °C	±0.2 K		
Ni100	GOST 6651-2009 A.5			1.6172	90
2/3 wire circuit		-60 to +180 °C	±0.4 K		
3-wire circuit		-60 to +180 °C	±0.2 K		
Pt100	GOST 6651-2009 A.2			1.3911	90
2/3-wire circuit		-100 to +200 °C	±0.2 K		
		-200 to +850 °C	±0.4 K		
4-wire circuit		-100 to +200 °C	±0.15 K		
		-200 to +850 °C	±0.25 K		
Cu50	GOST 6651-2009 A.3			1.428	90
2/3-wire circuit		-180 to +200 °C	±0.5 K		
4-wire circuit		-180 to +200 °C	±0.3 K		
Cu100	GOST 6651-2009 A.3			1.428	90
2/3-wire circuit		-180 to +200 °C	±0.4 K		
4-wire circuit		-180 to +200 °C	±0.2 K		

Ambient temperature influence	≤ ±0.005 %/K deviation from 22 °C
Measuring current	< 0.3 mA
Sensor line resistance	≤ 50 Ω per wire in 3- and 4-wire circuits ≤ 100 ohm internal resistance in 2-wire circuits
Lead compensation	Not required for 3-wire circuit. In 2-wire circuits, lead compensation is performed in the software by entering a fixed line resistance.
Special features	- Can also be programmed in °F - Basic sensor type can be changed with sensor factor (e.g., Pt50 to Pt100)

[a] The accuracy specifications refer to the maximum measuring range. Smaller measuring ranges lead to reduced linearization accuracy.

Thermocouples

Designation	Standard	Measuring range	Measuring accuracy[a]	ITS
Fe-CuNi “L”	DIN 43710:1985-12	-200 to +900 °C	±0.1 %	68
Fe-CuNi “J”	DIN EN 60584-1:2014	-210 to +1200 °C	±0.1 % from -100°C	90
Cu-CuNi “U”	DIN 43710:1985-12	-200 to +600 °C	±0.1 % from -100°C	68
Cu-CuNi “T”	DIN EN 60584-1:2014	-200 to +400 °C	±0.1 % from -150°C	90
NiCr-Ni “K”	DIN EN 60584-1:2014	-200 to +1300 °C	±0.1 % from -50°C	90

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Designation	Standard	Measuring range	Measuring accuracy[a]	ITS
NiCr-CuNi “E”	DIN EN 60584-1:2014	-200 to +1000 °C	±0.1 % from -80°C	90
NiCrSi-NiSi “N”	DIN EN 60584-1:2014	-200 to +1300 °C	±0.1 % from -80°C	90
Pt10Rh-Pt “S”	DIN EN 60584-1:2014	-50 to 1768 °C	±0.15 % from -60°C	90
Pt13Rh-Pt “R”	DIN EN 60584-1:2014			
Pt30Rh-Pt6Rh “B”	DIN EN 60584-1:2014	-50 to 1820 °C	±0.15 % from 400°C	90
W5Re-W26Re “C”	ASTM E230M-11	0 to 2315 °C	±0.15 %	90
W5Re-W20Re “A1”	GOST R 8.585-2001	0 to 2500 °C	±0.15 %	90
W3Re-W25Re “D”	ASTM E1751M-09	0 to 2315 °C	±0.25 %	90
Chromel®-COPEL® "L"	GOST R 8.585-2001	-200 to +800 °C	±0.1 % from -80°C	90
Chromel®-Alumel ® "K"	GOST R 8.585-2001	-270 to +1372 °C	±0.1 % from -80°C	90
Platinel II	ASTM E1751M-09	0 to 1395 °C	±0.15 %	90

Ambient temperature influence	≤ ±0.005 %/K deviation from 22 °C, additionally the cold junction accuracy
Measuring range start/end	Freely programmable within the limits in steps of 0.1 K
Cold junction	Pt1000 internal, thermostat (fixed constant value), adjustable
Reference point accuracy (internal)	±1 K
Reference point temperature (fixed constant value)	-20 to +80 °C adjustable
Special features	Can also be programmed in °F

[a] The accuracy specifications refer to the maximum measuring range. Smaller measuring ranges lead to reduced linearization accuracy.

Standard signals

Designation	Measuring range	Measuring accuracy[a]	Ambient temperature influence
Voltage freely scalable Input resistance R_E > 500 kΩ Input resistance R_E > 1 MΩ	 DC 0 to 10 V DC 0 to 1 V (mV input)	 ±5 mV ±0.05 %	≤ ±0.005 %/K Deviation from 22°C
Current (voltage drop ≤ 2 V**)**, freely scalable	DC 0(4) to 20 mA	±20 µA	≤ ±0.005 %/K Deviation from 22°C
Galvanic isolation	See Chapter "Electrical data", page 4 and Chapter "Galvanic isolation", page 6		
Special features	Measuring range scaling, adjustable		

Limits in accordance with NAMUR recommendation NE 43 in case of deviation above/below measured range	**Signal type 4 to 20 mA**
Measurement information M	3.8 to 20.5 mA
Failure information A for deviation below measured value/short-circuit ("NAMUR Low")	≤ 3.6 mA
Failure information A for deviation above measured value/probe break ("NAMUR High")	≥ 21 mA

[a] The accuracy specifications refer to the maximum measuring range. Smaller measuring ranges lead to reduced linearization accuracy.

Resistance transmitter

Designation	Measuring range	Measuring accuracy[a]	Ambient temperature influence
Resistance transmitter	max. 10 kΩ	±10 Ω	≤ ±0.01 %/K Devation from 22 °C
Connection type	Resistance transmitter: 3-wire connection		
Sensor line resistance	max. 50 Ω per line		
Resistance values	Freely programmable within the limits in steps of 0.1 Ω		
Special features	Measuring range scaling, adjustable		

[a] The accuracy specifications refer to the maximum measuring range. Smaller measuring ranges lead to reduced linearization accuracy.

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Resistance/potentiometer

Designation	Measuring range	Measuring accuracy[a]	Ambient temperature influence
Sensor type resistance/potentiometer	max. 10 kΩ	±10 Ω	≤ ±0.01 %/K Devation from 22 °C

Connection type	Potentiometer with 2-, 3- or 4-wire connection
Sensor line resistance	≤ 50 Ω per line at 3- or 4-wire connection ≤ 100 Ω line resistance at 2-wire connection
Resistance values	Freely programmable within the limits in steps of 0.1 Ω
Special features	Measuring range scaling, adjustable

[a] The accuracy specifications refer to the maximum measuring range. Smaller measuring ranges lead to reduced linearization accuracy.

Measuring circuit monitoring

In the event of a malfunction, the outputs move to a defined (configurable) status.

Measuring probe	Out of range	Probe/cable break	Probe/cable short circuit
RTD temperature probe	is detected	is detected	is detected
Resistance transmitter	is detected	is detected	is not detected
Thermocouple (single)	is detected	is detected	is not detected
Double thermocouple	is detected	is detected	is detected
Voltage 0 to 10 V 0 to 1 V	 is detected is detected	 is not detected is not detected	 is not detected is not detected
Current 4 to 20 mA 0 to 20 mA	 is detected is detected	 is detected is not detected	 is detected is not detected

Analog output

Resolution D/A converter >15 bit	Load resistance R_{Load}	Accuracy	Burden influence
Voltage DC 0(2) to 10 V	≥ 500 Ω	≤ ±0.05 % referring to 10 V	≤ ±15 mV
Current DC 0(4) to 20 mA	≤ 500 Ω	≤ ±0.05 % referring to 20 mA	≤ ±0.02 %/100 Ω

Relay output

Designation	Function
Limit value relay output	Relay (changeover contact) Contact protection circuit: Fuse cut-out of 3.15 AT installed in pin branch 30000 switching operations at a switching capacity of AC 240 V, 3 A, 50 Hz (resistive load) or up to DC 30 V, 3 A. Minimum current DC 12 V, 100 mA.

Display

Type, resolution	Dot-matrix LCD display with 64 × 96 pixels
Brightness setting	Contrast can be adjusted on device, background lighting can be switched off via timeout

Electrical data

Voltage supply	DC 24 V, +10/-15 % or AC 110 to 240 V +10/-15 %, 48 to 63 Hz
Power consumption	At voltage supply 240 V: max. 3 W, 10 VA At voltage supply 24 V: max. 3 W
Inputs and outputs Conductor cross section	 Max. 2.5 mm^2, wire or strand with ferrule
Electrical safety	According to DIN EN 61010-1 Overvoltage category III, pollution degree 2

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Electromagnetic compatibility Interference emission Interference immunity	According to DIN EN 61326-1 Class A - For industrial applications only - Industrial requirements
Sampling rate	500 ms
Input filter	Digital filter, 2nd order; filter time constant can be set from 0 to 100 s

Environmental influences

Operating/storage temperature range	-10 to +70 °C / -20 to +80 °C
Resistance to climatic conditions	≤ 85 % relative humidity, annual average, no condensation

Housing

Site altitude	maximum 2000 m above MSL
Case type, material	Plastic case, polycarbonate (indoor use)
Flammability class	UL94 V0
Electrical connection	Via pluggable screw terminals
Cabling	Under operating conditions the temperature on the connectors can exceed 60 °C. This can destroy the cable isolation of the connection wires. The cabling must be temperature resistant up to 80 °C.
Mounting on	Mounting rail 35 mm × 7.5 mm in accordance with DIN IEC 60715
Close mounting	Permitted
Installation position	Vertical
Protection type	IP20 according to DIN EN 60529
Weight with screw terminals	Approx. 200 g

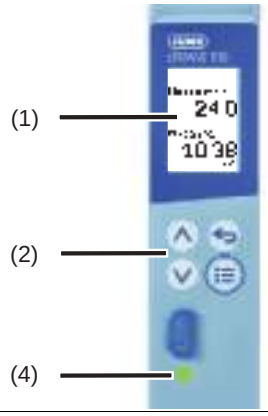
Approvals/approval marks

Approval mark	Test facility	**Certificate/certification number**	**Inspection basis**	**Valid for**
SIL2, SIL3	TÜV Nord (German Technical Inspection Agency)	SEBS-A.093409/14V1.0	DIN EN 61508 1-7	All modules
PL c / PL d	TÜV Nord (German Technical Inspection Agency)	SEBS-A.093409/14V1.0	DIN EN ISO 13849	All modules
c UL us	Underwriters Laboratories	2018-10-8-E201387	UL 61010-1	All modules
DNV·GL	DNV·GL	TAA00002C4	DNVGL-CG-0339	All modules

Connection possibilities of the sensors

JUMO probes according to data sheets 901006 and 902006 can be connected.
The values are described in safety manual 90000000T99Z000K000.

Display and control elements

Legend	**Comment**	
(1)	LCD display, black/white with background lighting 64 × 96 pixels	
(2)	4 keys for operating the device	
(4)	LED	

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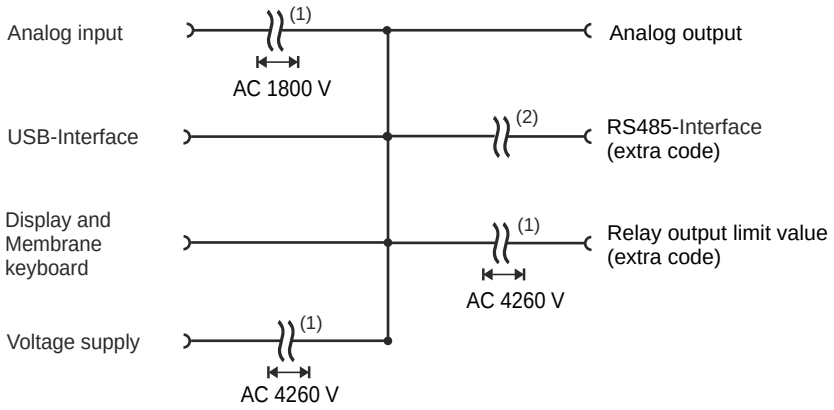
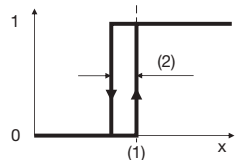
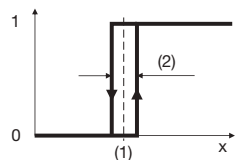
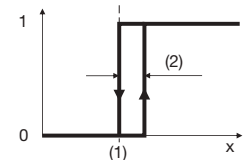
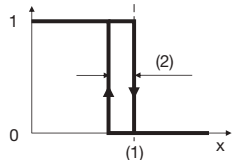
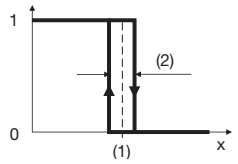
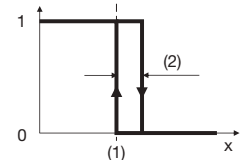
Galvanic isolation



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

Limit value monitoring

The relay output can be activated as follows depending on an adjustable limit value (1):

Switching behavior. left	**Switching behavior, symmetrical**	**Switching behavior, right**
Alarm function7 (AF7): ON electrical circuit from a fixed limit value  (1) Limit value (2) Switching differential	**Alarm function7 (AF7):** ON electrical circuit from a fixed limit value  (1) Limit value (2) Switching differential	**Alarm function7 (AF7):** ON electrical circuit from a fixed limit value  (1) Limit value (2) Switching differential
Alarm function8 (AF8): OFF electrical circuit from a fixed limit value  (1) Limit value (2) Switching differential	**Alarm function8 (AF8):** OFF electrical circuit from a fixed limit value  (1) Limit value (2) Switching differential	**Alarm function8 (AF8):** OFF electrical circuit from a fixed limit value  (1) Limit value (2) Switching differential

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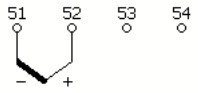
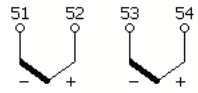
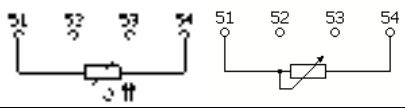
Connection elements

(11, 12, 13 14)	Voltage supply	(41, 42, 43, 44)	Analog output
(21, 22, 23, 24)	Limit value relay output	(51, 52, 53, 54)	Analog input
(31, 32, 33, 34)	RS485 interface		

Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical execution of the safety information/instructions contained in these documents are mandatory for installation, electrical connection, startup, and for safety during operation.

Analog input

Connection	Screw terminals	Symbol and terminal designation
Thermocouple	(51, 52)	
Double thermocouple (galvanically isolated)	(51, 52, 53, 54)	
RTD temperature probe or resistance/potentiometer 2-wire connection	(51, 52, 53, 54)	

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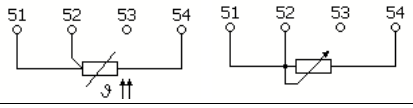
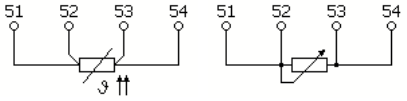
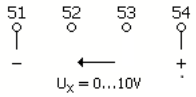
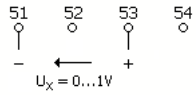
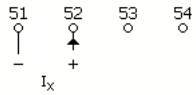
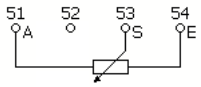
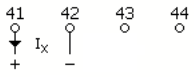
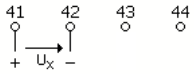
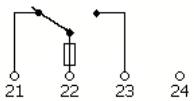
Connection	Screw terminals	Symbol and terminal designation
RTD temperature probe or resistance/potentiometer 3-wire connection	(51, 52, 53, 54)	
RTD temperature probe or resistance/potentiometer 4-wire connection	(51, 52, 53, 54)	
Voltage DC 0 to 10 V	(51, 52, 53, 54)	
Voltage DC 0 to 1 V (mV input)	(51, 52, 53, 54)	
Current DC 0(4) to 20 mA	(51, 52, 53, 54)	
Resistance transmitter A = Start E = End S = Slider	(51, 52, 53, 54)	

Analog output

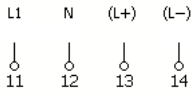
Connection	Screw terminals	Symbol and terminal designation
Current DC 0(4) to 20 mA (configurable)	(41, 42)	
Voltage DC 0(2) to 10 V (configurable)	(41, 42)	

Limit value relay output

Connection	Screw terminals	Symbol and terminal designation
Normally Closed Contact Pin (installed fine wire fuse 3.15 AT) Normally Open Contact	21 22 23	

Voltage supply (according to nameplate)

AC 240 V (DC 24 V)

Connection	Screw terminals	Symbol and terminal designation
AC:	L1 line conductor N neutral conductor	
DC: The device has only to be connected at SELV- or PELV-circuits	(L+) (L-)	

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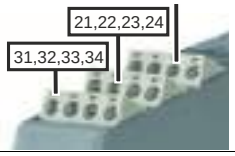
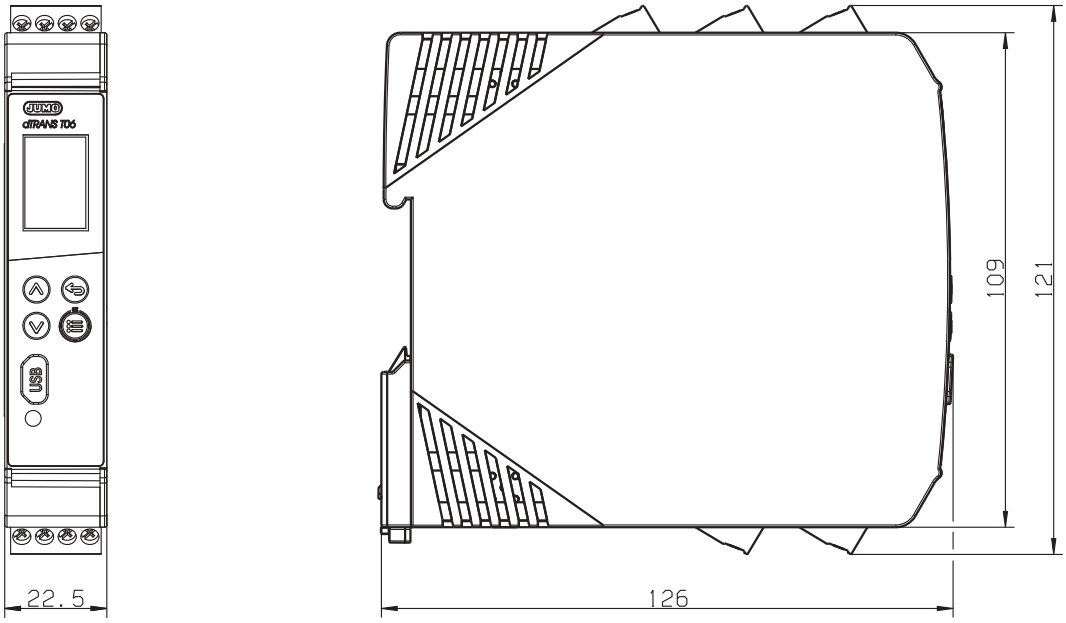
Interfaces

USB device, RS485

Connection	Socket, Screw terminals	Symbol and terminal designation
USB-interface device Micro-B, standard (5-pole)	(3)	
RS485-interface	(31, 32, 33, 34)	 31 TxD+/RxD+ Transmission/received data + 32 GND Ground 33 TxD-/RxD- Transmission/received data -

Dimensions



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Order details

	(1)	Basic type
707071		dTRANS T06
	(2)	**Version**
8		Standard with default settings
9		Customer-specific configuration (specifications in plain text)
	(3)	**Voltage supply**
23		AC 110 to 240 V, +10/-15 %, 48 to 63 Hz
29		DC 24 V, +10/-15 % (The device has only to be connected at SELV- or PELV-circuits)
	(4)	**Extra codes** [a]
000		None
018		RS485 interface Modbus RTU and limit value relay output
058		SIL and PL approval (yellow front foil)
062		DNV·GL approval

	(1)	/	**(2)**	-	**(3)**	/	**(4)**	
Order code		/		-		/		, ...[a]
Order example	707071	/	8	-	23	/	000	

[a] List extra codes in sequence and separate using commas.

Scope of delivery

- JUMO dTRANS T06 in the ordered version
- 1 operating manual

General accessories

Item	Part no.
Setup program dTRANS T06 series, multilingual	00668006
USB cable A-connector to Micro-B connector, length 3 m	00616250
Screw-on end clamp for mounting rail	00528648

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JUMO dTRANS T06 Ex

Multifunctional Four-Wire Transmitter in Mounting Rail Case with SIL and Ex Approval

Brief description

The JUMO dTRANS T06 Ex transmitter, type 707075, according to DIN EN 61508 SIL2 is intended to be installed on a mounting rail. It is used to acquire the temperature using an RTD temperature probe or thermocouple.
In the case of an RTD temperature probe, the sensor is connected using a 2, 3, or 4-wire connection technique. The measurement input also enables the user to connect resistance sensors (resistance transmitter) and resistance/potentiometers using a 2, 3, or 4-wire connection technique, and to acquire voltage signals from -100 mV to +1100 mV, the current unit signals 0 to 20 mA and 4 to 20 mA as well as the voltage unit signal 0 to 10 V.

The output signal provided is galvanically isolated from the intrinsically safe sensor circuit (associated apparatus). Depending on the measurement input, different linearization variants (linear, temperature-linear, customer-specific, etc.) are possible.
The variants 0(4) to 20 mA and, alternatively, 0 to 10 V are available as the output signal. The functionality of the JUMO dTRANS T06 Ex, type 707075, can be expanded through the option of an RS485 interface.
A graphic display is used to visualize the measured values. The operating status is signaled optically using a 2-color LED (red/green). Smooth operation is indicated through a permanent green LED; a malfunction status is indicated through a red LED.

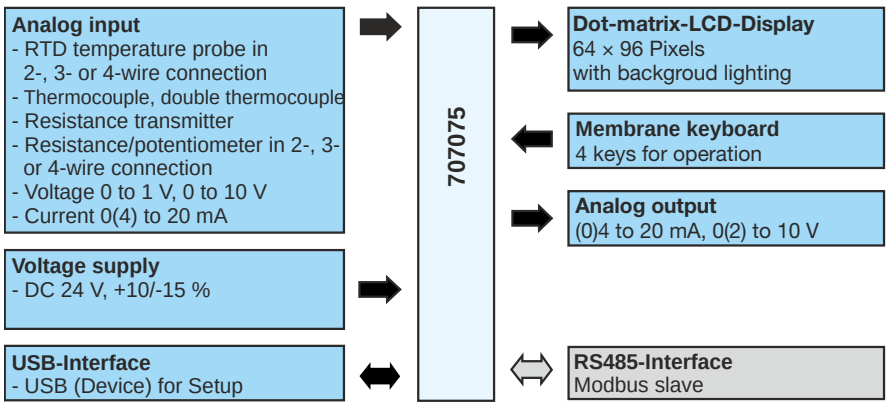
The sensor type, measuring range, linearization, output signal, limit values, etc. can be configured using a PC as well as the setup program. For this purpose, the device can be connected to the PC via a micro-USB port and a corresponding USB cable. Alternatively, the configuration is also possible via 4 keys.

The housing has a design width of 22.5 mm and is designed to be mounted on a DIN rail measuring 35 mm x 7.5 mm according to EN 60715. The electrical connection is established via screw terminals for conductor cross sections measuring 0.2 to 2.5 mm².

The device meets the requirements according to DIN EN 61508 SIL2. The systematic capability (SC 3) of the hardware and software corresponds to Safety Integrity Level (SIL3).
Depending on the architecture used, it is possible to achieve SIL2 or PL c for HFT=0 (single device) and SIL3 or PL d for HFT=1 (2 devices).

Type 707075/...

Block diagram



Available ex-works
Extra code

Special features

- universal input for a variety of sensors and standard signals
- SIL2/SIL3 according to DIN EN 61508 and PL c/d according to ISO 13849
- ATEX and IECEx approval
- customer-specific linearization
- intuitive operation and configuration on the instrument or via USB interface via setup program
- RS485 interface (option)
- intelligent additional functions such as min/max drag pointer, operating hours counter and output simulation
- Connection diagram can be called up on the LCD display

Approvals/approval marks (see "Technical data")

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Technical data

Analog input

Noise suppression, filter time, measuring value offset, and fine adjustment can be adjusted for all input variants.

RTD temperature probe

Designation	Standard	Measuring range	Measuring accuracy[a]	R_{100} / R_0	ITS
Pt50	GOST 6651-2009 A.2			1.3911	90
2/3-wire circuit		-200 to +850 °C	±0.5 K		
4-wire circuit		-200 to +850 °C	±0.3 K		
Pt100	IEC 60751:2008			1.3851	90
2/3-wire circuit		-100 to +200 °C	±0.2 K		
		-200 to +850 °C	±0.4 K		
4-wire circuit		-100 to +200 °C	±0.1 K		
		-200 to +850 °C	±0.2 K		
Pt500, Pt1000	IEC 60751:2008			1.3851	90
2/3-wire circuit		-100 to +200 °C	±0.2 K		
		-200 to +850 °C	±0.4 K		
4-wire circuit		-100 to +200 °C	±0.1 K		
		-200 to +850 °C	±0.2 K		
Ni100, Ni500, Ni1000	DIN 43760:1987-09			1.618	IPTS-68
2/3-wire circuit		-60 to +250 °C	±0.4 K		
3-wire circuit		-60 to +250 °C	±0.2 K		
Ni100	GOST 6651-2009 A.5			1.6172	90
2/3-wire circuit		-60 to +180 °C	±0.4 K		
3-wire circuit		-60 to +180 °C	±0.2 K		
Pt100	GOST 6651-2009 A.2			1.3911	90
2/3-wire circuit		-100 to +200 °C	±0.2 K		
		-200 to +850 °C	±0.4 K		
4-wire circuit		-100 to +200 °C	±0.15 K		
		-200 to +850 °C	±0.25 K		
Cu50	GOST 6651-2009 A.3			1.428	90
2/3-wire circuit		-180 to +200 °C	±0.5 K		
4-wire circuit		-180 to +200 °C	±0.3 K		
Cu100	GOST 6651-2009 A.3			1.428	90
2/3-wire circuit		-180 to +200 °C	±0.4 K		
4-wire circuit		-180 to +200 °C	±0.2 K		

Ambient temperature influence	≤ ±0.005 %/K deviation from 22 °C
Measuring current	< 0.3 mA
Sensor line resistance	≤ 50 Ω per line for 3 and 4-wire circuit ≤ 100 Ω line resistance for 2-wire circuit
Lead compensation	Not required for 3-wire circuit. In 2-wire circuits, lead compensation is performed in the software by entering a fixed line resistance.
Special features	- Can also be programmed in °F - Basic sensor type can be changed with sensor factor (e.g., Pt50 to Pt100)

[a] The accuracy specifications refer to the maximum measuring range.

Thermocouples

Designation	Standard	Measuring range	Measuring accuracy[a]	ITS
Fe-CuNi “L”	DIN 43710:1985-12	-200 to +900 °C	±0.1 %	IPTS-68
Fe-CuNi “J”	DIN EN 60584-1:2014	-210 to +1200 °C	±0.1 % from -100 °C	90
Cu-CuNi “U”	DIN 43710:1985-12	-200 to +600 °C	±0.1 % from -100 °C	IPTS-68
Cu-CuNi “T”	DIN EN 60584-1:2014	-200 to +400 °C	±0.1 % from -150 °C	90

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Designation	Standard	Measuring range	Measuring accuracy[a]	ITS
NiCr-Ni “K”	DIN EN 60584-1:2014	-200 to +1300 °C	±0.1 % from -80 °C	90
NiCr-CuNi “E”	DIN EN 60584-1:2014	-200 to +1000 °C	±0.1 % from -80 °C	90
NiCrSi-NiSi “N”	DIN EN 60584-1:2014	-200 to +1300 °C	±0.1 % from -80 °C	90
Pt10Rh-Pt “S”	DIN EN 60584-1:2014	-50 to 1768 °C	±0.15 % from -60 °C	90
Pt13Rh-Pt “R”	DIN EN 60584-1:2014			
Pt30Rh-Pt6Rh “B”	DIN EN 60584-1:2014	-50 to 1820 °C	±0.15 % from 400 °C	90
W5Re-W26Re “C”	DIN EN 60584-1:2014	0 to 2315 °C	±0.15 %	90
W5Re-W20Re “A1”	GOST R 8.585-2001	0 to 2500 °C	±0.15 %	90
W3Re-W25Re “D”	ASTM E1751M-15	0 to 2315 °C	±0.25 %	90
Chromel®-COPEL® "L"	GOST R 8.585-2001	-200 to +800 °C	±0.1 % from -80 °C	90
Chromel®-Alumel ® "K"	GOST R 8.585-2001	-270 to +1372 °C	±0.1 % from -80 °C	90
Platinel II	ASTM E1751M-15	0 to 1395 °C	±0.15 %	90

Ambient temperature influence	≤ ±0.005 %/K deviation from 22 °C, plus accuracy of the cold junction
Measuring range start/end	Freely programmable within the limits in increments of 0.1 K
Cold junction	Pt1000 internal, thermostat (fixed constant value), adjustable
Cold junction accuracy (internal)	±1 K
Cold junction temperature (fixed constant value)	-20 to +80 °C adjustable
Special features	Can also be programmed in °F

[a] The accuracy specifications refer to the maximum measuring range.

Standard signals

Designation	Measuring range	Measuring accuracy[a]	Ambient temperature influence
Voltage freely scalable Input resistance R_E > 500 kΩ Input resistance R_E > 1 MΩ	 DC 0 to 10 V DC 0 to 1 V (mV input)	 ±5 mV ±0.05 %	≤ ±0.005 %/K deviation from 22 °C
Current (voltage drop ≤ 2 V**)**, freely scalable	DC 0(4) to 20 mA	±20 µA	≤ ±0.005 %/K deviation from 22 °C

Galvanic isolation	See Chapter "Electrical data", page 4 and Chapter "Galvanic isolation", page 9	
Special features	Measuring range, scaling adjustable	
Limits according to recommendation of NAMUR NE 43 in case of deviation under/above measuring range		**Signal type 4 to 20 mA**
Measurement information M		3.8 to 20.5 mA
Failure information A for deviation below measured value/short circuit ("NAMUR Low")		≤ 3.6 mA
Failure information A for deviation above measured value/probe break ("NAMUR High")		≥ 21 mA

[a] The accuracy specifications refer to the maximum measuring range.

Resistance transmitter

Designation	Measuring range	Measuring accuracy[a]	Ambient temperature influence
Resistance transmitter	≤ 400Ω	±0.4 Ω	≤ ±0.01 %/K deviation from 22 °C
Resistance transmitter	400 to 4000 Ω	±4 Ω	≤ ±0.01 %/K deviation from 22 °C
Resistance transmitter	4000 to 10000 Ω	±10 Ω	≤ ±0.01 %/K deviation from 22 °C

Connection type	3-wire circuit
Sensor line resistance	Max. 50 Ω per line
Resistance values	Freely programmable within the limits in steps of 0.1 Ω
Special features	Measuring range scaling adjustable

[a] The accuracy specifications refer to the maximum measuring range.

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Resistance/potentiometer

Designation	Measuring range	Measuring accuracy[a]	Ambient temperature influence
Sensor type resistance/potentiometer	Max. 10 kΩ	±10 Ω	≤ ±0.01 %/K deviation from 22 °C

Connection type	Resistance with 2, 3, or 4-wire circuit
Sensor line resistance	≤ 50 Ω per line for 3 and 4-wire circuit ≤ 100 Ω line resistance for 2-wire circuit
Resistance values	Freely programmable within the limits in steps of 0.1 Ω
Special features	Measuring range scaling adjustable

[a] The accuracy specifications refer to the maximum measuring range.

Measuring circuit monitoring

In the event of a malfunction, the outputs take on defined (configurable) statuses.

Measuring probe	Out of range	Probe/cable break	Probe/cable short circuit
RTD temperature probe	Is detected	Is detected	Is detected
Resistance transmitter	Is detected	Is detected	Is not detected
Thermocouple (single)	Is detected	Is detected	Is not detected
Double thermocouple	Is detected	Is detected	Is detected
Voltage 0 to 10 V 0 to 1 V	 Is detected Is detected	 Is not detected Is not detected	 Is not detected Is not detected
Current 4 to 20 mA 0 to 20 mA	 Is detected Is detected	 Is detected Is not detected	 Is detected Is not detected

Analog output

Resolution of D/A converter >15 bit	Load resistance R_{Load}	Accuracy	Burden influence
Voltage DC 0(2) to 10 V	≥ 500 Ω	≤ ±0.05 % referring to 10 V	≤ ±15 mV
Current DC 0(4) to 20 mA	≤ 500 Ω	≤ ±0.05 % referring to 20 mA	≤ ±0.02 %/100 Ω

Display

Type, resolution	Dot-matrix LCD display with 64 × 96 pixels
Brightness setting	Contrast can be adjusted on device, backlight can be switched off via timeout

Electrical data

Voltage supply	DC 24 V, +10/-15 %
Power consumption	With voltage supply 24 V: max. 3 W
Inputs and outputs Conductor cross section	 Max. 2.5 mm^2, wire or strand with ferrule
Electrical safety	According to DIN EN 61010-1 Overvoltage category III, pollution degree 2
Electromagnetic compatibility Interference emission Interference immunity	According to DIN EN 61326-1 Class A - For industrial applications only - Industrial requirements
Sampling rate	500 ms
Input filter	Digital filter, 2nd order; filter time constant can be adjusted from 0 to 100 s

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6733 Myers Road
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Email: info.us@jumo.net
Internet: www.jumousa.com

Environmental influences

Operating temperature range Storage temperature range	-10 to +70 °C, -20 to +80 °C
Resistance to climatic conditions	≤ 85% relative humidity, annual average, no condensation

Housing

Site altitude	Maximum 2000 m above sea level
Housing type, material	Plastic housing, polycarbonate (use indoors only)
Flammability class	UL94 V0
Electrical connection	Via pluggable screw terminals
Electrical wiring	In line with the operating conditions, the temperature may exceed 60 °C at the terminals. As a result, the insulation of the cables connected at the terminals may be damaged. The affected cables must be heat-resistant up to at least 80 °C.
Mounting on	Mounting rail 35 mm × 7.5 mm according to DIN IEC 60715
Close mounting	Permitted
Installation position	Vertical
Protection type	IP20 according to DIN EN 60529
Weight with screw terminals	Approx. 200 g

Approvals/approval marks

Approval mark	Test facility	Certificate/certification number	Inspection basis	Valid for
SIL2	TÜV Nord (German Technical Inspection Agency)	SEBS-A.20140509.0933409	EN 61508 1-7	All modules
PL c			EN ISO 13849	
ATEX "i"		TÜV 19 ATEX 244073 X	Directive 2014/34/EU EN 60079-0 EN 60079-11	
ATEX "h"			Directive 2014/34/EU EN 80079-36 EN 80079-37	
ATEX safety device pursuant to "e" and "t"			IEC 60079-0, IEC 60079-11 ISO 80079-36, ISO 80079-37	
IECEx "i"		IECEx TUN 19.0005X	IEC 60079-0 IEC 60079-11	
IECEx "h"			ISO 80079-36 ISO 80079-37	

Connection possibilities for probes

JUMO probes according to data sheet 902820 can be connected. These probes have been type-tested for use in Ex areas. The values are described in the safety manual for RTD temperature probes and thermocouples for connection to the JUMO dTRANS T06 type 707075.
The probes must also have been qualified for use in the Ex area.

Electrical data for the probe input

The 707075 has the following maximum output data at the intrinsically safe input:				
U_o = 6.0 V	I_o = 13.3 mA	P_o = 19.9 mW	C_o = 39.32 µF	L_o = 0.2 H

Explanation of device identification markings

The device has approval according to ATEX and IECEX and can therefore also be used for measurements in Ex areas. However, the device itself has to be installed outside the Ex area. The inputs are intrinsically safe [Ex ia] so that relevant probes can be connected directly.

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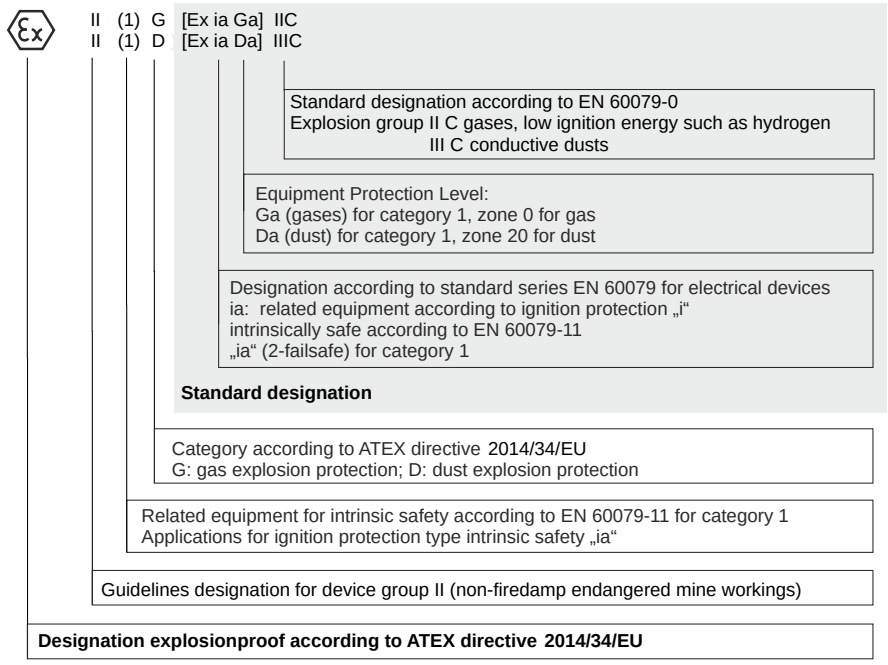
	II (1) G [Ex ia Ga] IIC
	II (1) D [Ex ia Da] IIIC
	II (2) G [Ex eb Gb] IIC
	II (1) D [Ex ta Da] IIIC
	II (2) D [Ex tb Db] IIIC
	II (1) G [Ex h Ga] IIC
	II (1) D [Ex h Da] IIIC

	[Ex ia Ga] IIC
	[Ex ia Da] IIIC
	[Ex h Ga] IIC
	[Ex h Da] IIIC

Barriers are no longer required.
The device is also certified according to DIN EN 50495 as an ignition source monitor as specified in the ATEX directive and can be used to monitor potentially explosive atmospheres containing gas or dust.

Identification marking for ATEX ignition protection type "i"



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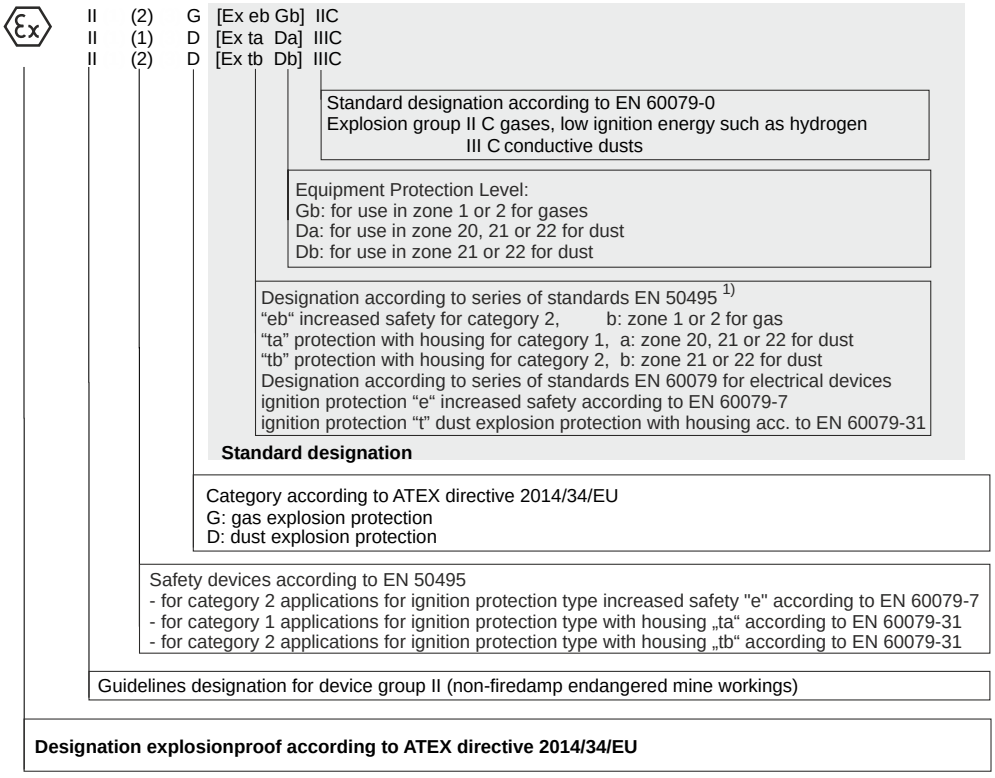
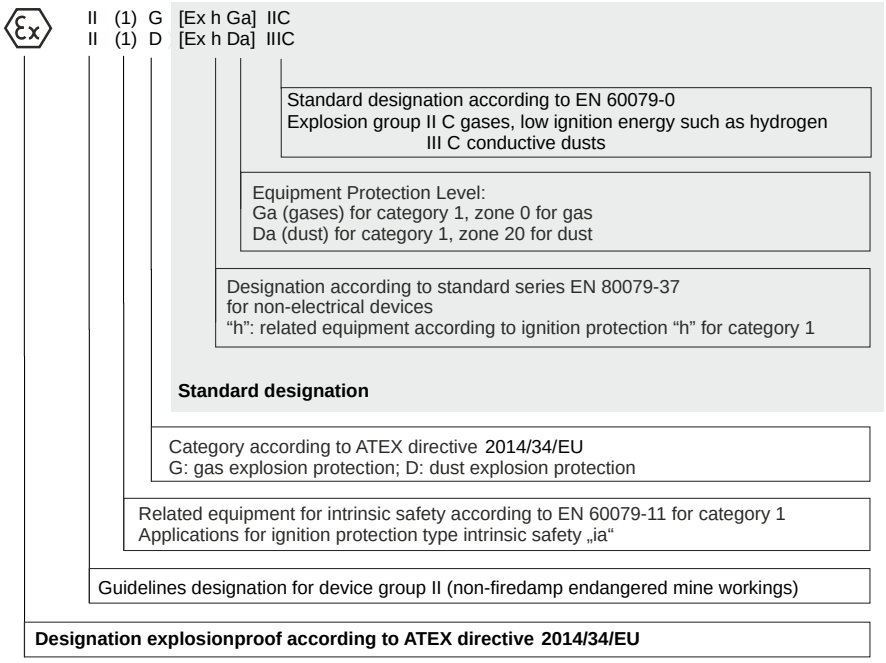
Identification marking for ATEX ignition protection type "e" and "t"



1.) The monitored electrical equipment is not a potential ignition source in normal operation

Identification marking for ATEX ignition protection type "h"



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Identification marking for IECEx ignition protection type "ia"

[Ex ia Ga] IIC Associated apparatus which is set up outside the gas atmosphere but the intrinsically safe electrical circuit "ia" (protection through 2 protective measures) leads into zone 0.

[Ex ia Da] IIIC Associated apparatus which is set up outside the dust atmosphere but the intrinsically safe electrical circuit "ia" (protection through 2 protective measures) leads into zone 20.

Standard designation according to IEC 60079-0
Explosion group II C gases, low ignition energy such as hydrogen
III C conductive dusts

Equipment Protection Level:
Ga (gases) for category 1
Da (dust) for category 1

Standard designation according to standard series IEC 60079 for electrical devices
ia: related equipment according to ignition protection „i“
intrinsically safe according IEC 60079-11, „ia“ (2-failsafe) for category 1

Identification marking for IECEx ignition protection type "h"

[Ex h Ga] IIC Associated apparatus which is set up outside the gas atmosphere

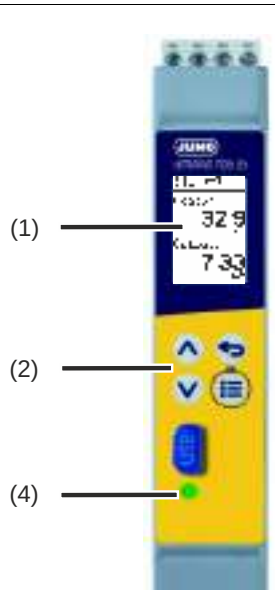
[Ex h Da] IIIC Associated apparatus which is set up outside the dust atmosphere

Standard designation according to IEC 60079-0
Explosion group II C gases, low ignition energy such as hydrogen
III C conductive dusts

Equipment Protection Level:
Ga (gases) for category 1, zone 0 for gas
Da (dust) for category 1, zone 20 for dust

Designation according to standard series EN 80079-37 for non-electrical devices
“h”: related equipment according to ignition protection “h” for category 1

Display and control elements

Legend	Comment	
(1)	Black and white dot-matrix LCD display with backlight, 64 x 96 pixels	
(2)	4 keys for operating the device	
(4)	LED	

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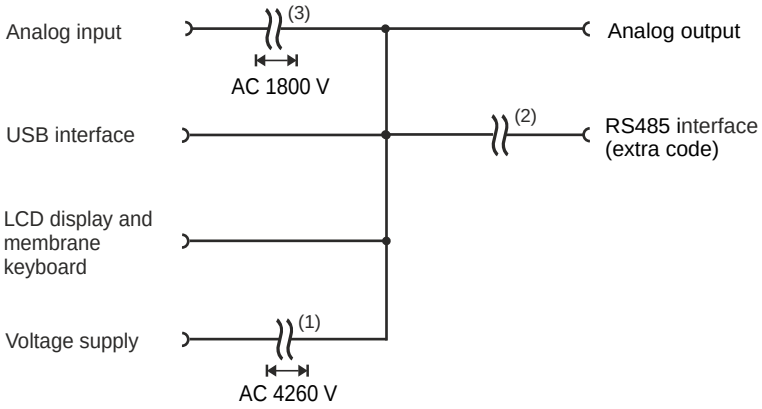
Galvanic isolation



(1) The voltage specifications correspond to the alternating test voltages (effective values) according to EN 61010-1:2011-07 for type testing.

(2) Functional galvanic isolation for the connection of SELV or PELV circuits.

(3) The voltage specification corresponds to the alternating test voltage (effective value) according to DIN EN 61010-1:2011-07 for type testing to connect SELV or PELV electrical circuits [secondary electrical circuits which are derived from supply current circuits with overvoltage category III (>150 V ≤ 300 V)].

Connection elements

(13, 14)	Voltage supply	(41, 42, 43, 44)	Analog output
(31, 32, 33, 34)	RS485 interface	(51, 52, 53, 54)	Analog input

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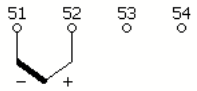
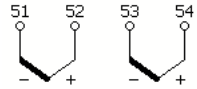
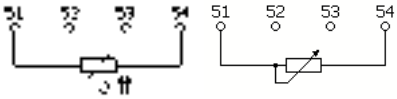
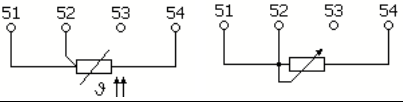
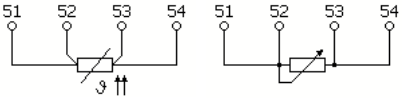
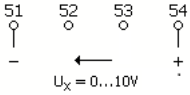
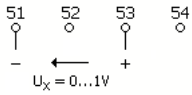
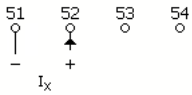
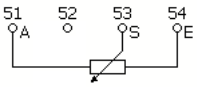
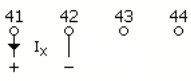
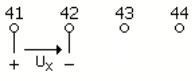
Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical execution of the safety information and warnings contained in these documents are mandatory for installation, electrical connection, startup, and for safety during operation.

Analog input

Connection	Screw terminals	Symbol and terminal designation
Thermocouple	(51, 52)	
Double thermocouple	(51, 52, 53, 54)	
RTD temperature probe or resistance/potentiometer 2-wire connection	(51, 52, 53, 54)	
RTD temperature probe or resistance/potentiometer 3-wire connection	(51, 52, 53, 54)	
RTD temperature probe or resistance/potentiometer 4-wire connection	(51, 52, 53, 54)	
Voltage DC 0 to 10 V	(51, 52, 53, 54)	
Voltage DC 0 to 1 V (mV input)	(51, 52, 53, 54)	
Current DC 0(4) to 20 mA	(51, 52, 53, 54)	
Resistance transmitter A = Start E = End S = Slider	(51, 52, 53, 54)	

Analog output

Connection	Screw terminals	Symbol and terminal designation
Current output DC 0(4) to 20 mA (configurable)	(41, 42)	
Voltage output DC 0(2) to 10 V (configurable)	(41, 42)	

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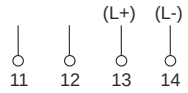
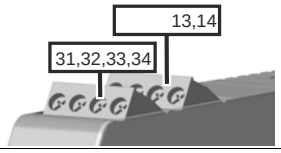
Voltage supply (according to nameplate)

DC 24 V

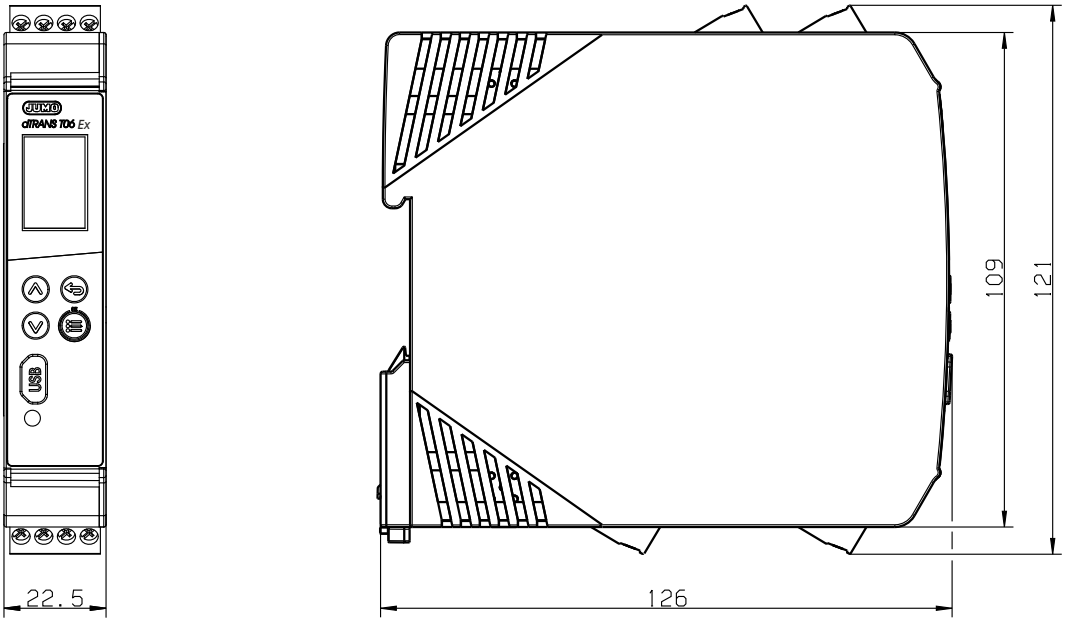
Connection	Screw terminals	Symbol and terminal designation
	(L+) (L-)	

Interfaces

Interfaces USB device, RS485

Connection	Screw terminals	Symbol and terminal designation		
USB interface (device) Micro-B connector, standard (5-pole)	(3)			
Serial interface RS485	(31, 32, 33, 34)		31 TxD+/RxD+ 32 GND 33 TxD-/RxD-	Transmission/received data + Ground Transmission/received data -

Dimensions



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Order details

	(1)	**Basic type**
707075		dTRANS T06 Ex with SIL and PL approval
	(2)	**Version**
8		Standard with default settings
9		Customer-specific configuration (specifications in plain text)
	(3)	**Voltage supply**
29		DC 24 V +10/-15 % SELV or PELV
	(4)	**Extra codes**
000		None
053		RS485 Modbus RTU

	(1)	/	**(2)**	-	**(3)**	-	**(4)**	
Order code		/		-		-		, ...
Order example	707075	/	8	-	29	-	053	

Scope of delivery

- JUMO dTRANS T06 Ex in the ordered version
- Operating manual

General accessories

Item	**Part no.**
Setup program, multilingual	00668006
USB cable A-connector to Micro-B connector, length 3 m, for type 707071	00616250
Screw-on end clamp for mounting rail	00528648

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JUMO dTRANS T07

Two-channel temperature transmitter with HART/Ex/SIL

for installation into terminal head form B and for installation on DIN rail

Brief description

The JUMO dTRANS T07 device series is a two-channel temperature transmitter with HART[1] communication. The devices are available in 2 versions: for installation in a B-head or for DIN-rail mounting. The variants with Ex and SIL approval (IEC 61508) for SIL 2/3 (hardware/software) enable secure use in demanding process applications.

The configurable transmitters transmit converted signals from RTD temperature probes and thermocouples (TC) as well as from resistor and voltage sensors to the galvanically isolated 4 to 20 mA current output. Internal sensor monitoring functions and device error detection enable a high degree of measuring point availability.

The optional plug-on display BD7 can be used to display the current measured value on the B-head variant.

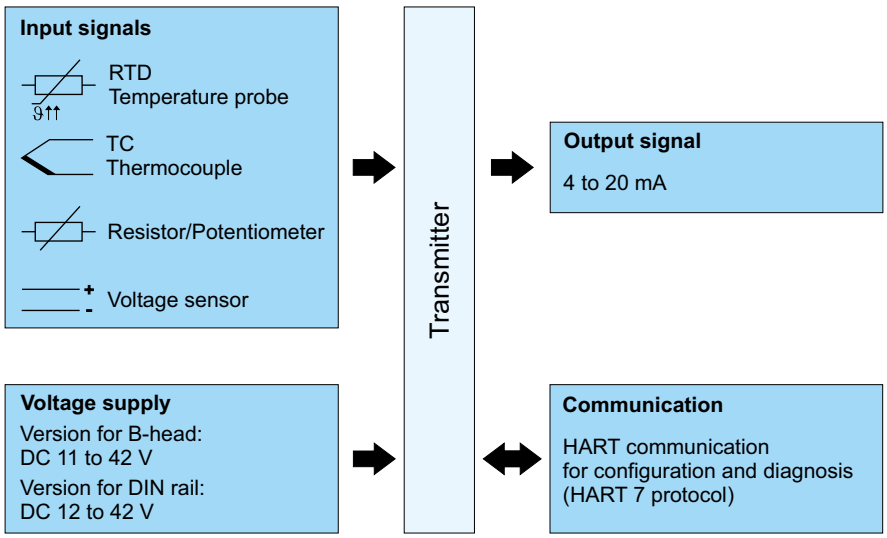
The JUMO dTRANS T07 device series is tailor-made for all industries like chemicals, oil, gas, and power plants & energy, as well all others in which safe and reliable temperature measurements are required.

Type 707080 (dTRANS T07 B)

Type 707082 (dTRANS T07 T)

[1] HART® is a registered trademark of the FieldComm Group™

Block diagram



Special features

- Two universal measurement inputs (RTD, TC, Ω, mV)
- High degree of accuracy (0.1 K with Pt100 sensor)
- Output 4 to 20 mA (single channel, loop powered)
- Two enclosure versions (B-head or DIN rail)
- HART 7 protocol with extension for "secure HART"
- SIL 2/3 hardware/software according to IEC 61508
- Reliable measurement operation through sensor monitoring and device hardware error detection
- Optional plug-on display BD7 for B-head device version

Approvals/approval marks (see "Technical data")

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Type overview

Type	Designation	Description
707080	dTRANS T07 B	For installation in terminal head, form B
707081	dTRANS T07 B SIL	For installation in terminal head, form B, with SIL approval
707082	dTRANS T07 T	For mounting on DIN rail
707083	dTRANS T07 T SIL	For mounting on DIN rail, with SIL approval
707085	dTRANS T07 B Ex	For installation in terminal head, form B, with Ex approval
707086	dTRANS T07 B EX SIL	For installation in terminal head, form B, with Ex and SIL approval
707087	dTRANS T07 T Ex	For mounting on DIN rail, with Ex approval
707088	dTRANS T07 T Ex SIL	For mounting on DIN rail, with Ex and SIL approval

Operating mode

The temperature transmitters in the dTRANS T07 series are two-wire transmitters with two measurement inputs and one analog output.

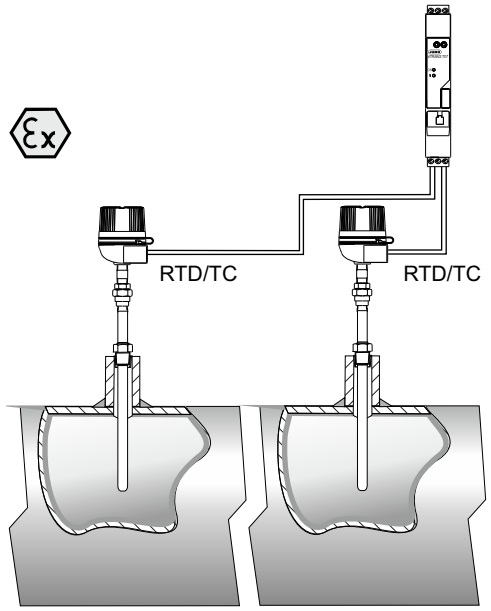
The devices transmit both converted signals from RTD temperature probes and thermocouples, but also resistance and voltage signals via the HART communication and as a 4 to 20 mA current signal.

They can be installed as intrinsically safe equipment in potentially explosive areas and serve primarily for instrumentation in the form B terminal head in accordance with DIN EN 50446 or as a DIN rail device for installation in the control cabinet on a TH 35 DIN rail in accordance with DIN EN 60715.

Application examples

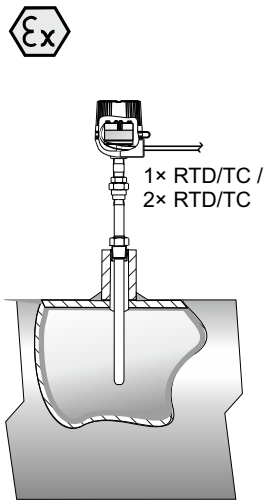
Example 1:

Two sensors with measurement input (RTD or TC) in remote installation on a DIN rail device with the following advantages: drift warning, sensor backup function and temperature-dependent sensor switching



Example 2:

Integrated transmitter in the terminal head – 1 x RTD/TC or 2 x RTD/TC as redundancy



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Functions

Standard diagnostic functions

- Wire breakage, short-circuit of the sensor lines
- Wiring faults
- Internal device errors
- Measuring range exceeded (too high or too low)
- Ambient temperature limits exceeded (too high or too low)

Corrosion detection in accordance with NAMUR NE89

Corrosion of sensor connection wires can falsify the measured values. The transmitters offer the option of detecting corrosion on thermocouples and RTD temperature probes with four-wire connection before the measured values are affected. The transmitters prevent incorrect measured values from being read out and can output a warning via the HART protocol if conductor resistances exceed plausible limits.

Undervoltage detection

The undervoltage detection prevents the continuous output of an incorrect analog output value by the devices (due to damaged or incorrect voltage supply or due to a damaged signal cable). If the voltage drops below the minimum required voltage supply then the analog output value drops for approx. 5 s to < 3.6 mA. Afterwards the devices attempt to output the normal analog output value again. If the voltage supply is still too low, this process is repeated cyclically.

Two-channel functions

These functions increase the reliability and availability of the measured values:

- The sensor backup switches to the second sensor if the primary sensor fails.
- Drift warning or alarm if the deviation between sensor 1 and sensor 2 is less than or greater than a defined limit value.
- Temperature-dependent switching between sensors that are used in different measuring ranges.
- Average value measurement or differential measurement from two sensors.
- Average value measurement with sensor redundancy

Not all modes are available for SIL operation ⇨ SIL safety manual for dTRANS T07 series (SIL designs).

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Technical data

Analog input

General information

Measurand	Temperature (temperature-linear transmission behavior), resistance and voltage.
Measuring range	It is possible to connect two mutually independent sensors.[a]. The measurement inputs are not galvanically isolated from each other.

[a] With a 2-channel measurement, the same measurement unit must be configured on both channels (e.g. both °C, °F, or K). Mutually independent 2-channel measurement of resistance/potentiometer (ohm) and voltage sensor (mV) is not possible. In this case, either both channels must be configured to "ohm" or both channels must be configured to "mV" .

RTD temperature probe

Standard	Designation[a]	α	Measuring range limits	Minimum measuring span
IEC 60751:2008	Pt100 (1)	0.003851 K^{-1}	-200 to +850 °C	10 K
	Pt200 (2)		-200 to +850 °C	
	Pt500 (3)		-200 to +500 °C	
	Pt1000 (4)		-200 to +250 °C	
JIS C1604:1984	Pt100 (5)	0.003916 K^{-1}	-200 to +510 °C	10 K
DIN 43760 IPTS-68	Ni100 (6)	0.006180 K^{-1}	-60 to +250 °C	10 K
	Ni120 (7)		-60 to +250 °C	
GOST 6651-94	Pt50 (8)	0.003910 K^{-1}	-85 to +1100 °C	10 K
	Pt100 (9)		-200 to +850 °C	
OIML R84: 2003, GOST 6651-2009	Cu50 (10)	0.004280 K^{-1}	-180 to +200 °C	10 K
	Cu100 (11)		-180 to +200 °C	
	Ni100 (12)	0.006170 K^{-1}	-60 to +180 °C	
	Ni120 (13)		-60 to +180 °C	
OIML R84: 2003, GOST 6651-94	Cu50 (14)	0.004260 K^{-1}	-50 to +200 °C	10 K
-	Pt100 (Callendar–Van Dusen) nickel polynomial copper polynomial	-	The measuring range limits are defined by entering the limit values, which depend on the coefficients A to C and R0.	10 K
	• Connection type: two-wire, three-wire or four-wire connection, sensor current: ≤ 0.3 mA • On a two-wire circuit compensation for the wire resistance is possible (0 to 30 Ω) • On three-wire and four-wire connections: sensor wire resistance of up to 50 Ω max. per wire			

[a] The digits after the designations are used to clarify distinctions, e.g. for distinguishing the same sensors on the basis of different standards. They are also used for configuration and safe parameterization of the transmitter.

Resistance/potentiometer (Ω)

Standard	Designation	α	Measuring range limits	Minimum measuring span
-	Resistance (Ω)	-	10 to 400 Ω	10 Ω
			10 to 2000 Ω	10 Ω

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Thermocouples (TC)

Standard	Designation[a]	Measuring range limits		Minimum measuring span
		Possible temperature range	Recommended temperature range	
IEC 60584, part 1	Type A (W5Re-W20Re) (30)	0 to +2500 °C	0 to +2500 °C	50 K
	Type B (PtRh30-PtRh6) (31)	+40 to +1820 °C	+500 to +1820 °C	50 K
	Type E (NiCr-CuNi) (34)	-270 to +1000 °C	-150 to +1000 °C	50 K
	Type J (Fe-CuNi) (35)	-210 to +1200 °C	-150 to +1200 °C	50 K
	Type K (NiCr-Ni) (36)	-270 to +1372 °C	-150 to +1200 °C	50 K
	Type N (NiCrSi-NiSi) (37)	-270 to +1300 °C	-150 to +1300 °C	50 K
	Type R (PtRh13-Pt) (38)	-50 to +1768 °C	+50 to +1768 °C	50 K
	Type S (PtRh10-Pt) (39)	-50 to +1768 °C	+50 to +1768 °C	50 K
	Type T (Cu-CuNi) (40)	-260 to +400 °C	-150 to +400 °C	50 K
IEC 60584, part 1 ASTM E988-96	Type C (W5Re-W26Re) (32)	0 to +2315 °C	0 to +2000 °C	50 K
ASTM E988-96	Type D (W3Re-W25Re) (33)	0 to +2315 °C	0 to +2000 °C	50 K
DIN 43710	Type L (Fe-CuNi) (41)	-200 to +900 °C	-150 to +900 °C	50 K
	Type U (Cu-CuNi) (42)	-200 to +600 °C	-150 to +600 °C	50 K
GOST R8.8585-2001	Type L (NiCr-CuNi/Chromel-Copel) (43)	-200 to +800 °C	-200 to +800 °C	50 K
-	• Internal cold junction (Pt100) • External cold junction: adjustable value from -40 to +85 °C • Maximum sensor wire resistance 10 kΩ (if the sensor wire resistance is greater than 10 kΩ then an error message will be output in accordance with NAMUR NE89)			

[a] The digits after the designations are used to clarify distinctions, e.g. for distinguishing the same sensors on the basis of different standards. They are also used for configuration and safe parameterization of the transmitter.

Voltage sensor (mV)

Standard	Designation	α	Measuring range limits	Minimum measuring span
-	Millivolt sensor (mV)	-	-20 to 100 mV	5 mV

Connection combinations

If both sensor inputs are assigned then the following connection combinations are possible:

		Sensor input 1			
		RTD or resistance/potentiometer, two-wire	RTD or resistance/potentiometer, three-wire	RTD or resistance/potentiometer, four-wire	Thermocouple (TC), voltage sensor
Sensor input 2	RTD or resistance/potentiometer, two-wire	☑	☑	☐	☑
	RTD or resistance/potentiometer, three-wire	☑	☑	☐	☑
	RTD or resistance/potentiometer, four-wire	☐	☐	☐	☐
	Thermocouple (TC), voltage sensor	☑	☑	☑	☑

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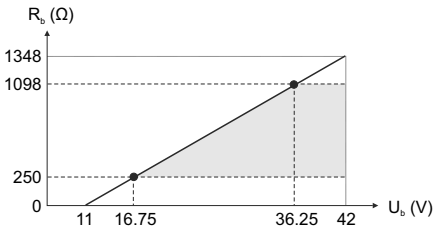
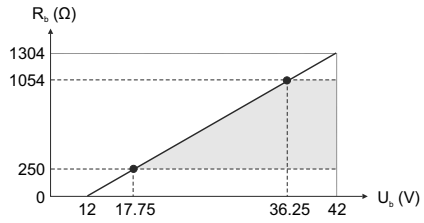
Output

Output signal	4 to 20 mA, 20 to 4 mA (invertible)	
Signal coding	FSK ±0.5 mA via current signal	
Data transmission speed	1200 baud	
Galvanic isolation	U = AC 2 kV (input/output)	
Failure information in accordance with NAMUR NE43	Is generated if the measurement information is invalid or missing. A complete list of all errors that have occurred in the measurement device is emitted.	
Measuring range underflow	Linear drop from 4.0 to 3.8 mA	
Measuring range overflow	Linear rise from 20.0 to 20.5 mA	
Failure (sensor breakage, sensor short circuit, ...)	≤ 3.6 mA ("low") or ≥ 21 mA ("high") can be selected. The alarm setting "high" is adjustable between 21.5 mA and 23 mA and thus offers the flexibility required to meet the requirements of different control systems. In SIL mode only the alarm setting "low" is possible.	
Burden	Head transmitter: $R_{b\ max.} = (U_{b\ max.} - 11\ V) / 0.023\ A$ (current output) 	DIN rail device: $R_{b\ max.} = (U_{b\ max.} - 12\ V) / 0.023\ A$ (current output) 
Linearization/transmission behavior	Temperature-linear, resistance-linear, voltage-linear	
Mains frequency filter	50/60 Hz	
Filter	Digital 1st-order filter: 0 to 120 s	
Protocol-specific data		
HART version	7	
Device address in multidrop mode[a]	Software setting addresses 0 to 63	
Device description files (DD)	Information and files freely available on the Internet from: www.jumo.net	
Burden (communication resistance)	At least 250 Ω	
Write protection for device parameters		
Hardware	On the optional BD7 plug-in display of the head transmitter via DIP switch	
Software	Via password	
Switch-on delay	• Approx. 10 s[b] Until the start of HART communication; I_a ≤ 3.8 mA during switch-on delay • Approx. 28 s until the first valid measured value signal is present at the current output; I_a ≤ 3.8 mA during the switch-on delay	

[a] Not possible in SIL mode; refer to the safety manual for the JUMO dTRANS T07 series (SIL versions).

[b] Does not apply to SIL mode; refer to the safety manual for the JUMO dTRANS T07 series (SIL versions).

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Features

Physical input measuring range of the sensors

Cu50, Cu100, RTD polynomial, Pt50, Pt100, Ni100, Ni120	10 to 400 Ω
Pt200, Pt500, Pt1000	10 to 2000 Ω
Thermocouple types: A, B, C, D, E, J, K, L, N, R, S, T, U	-20 to 100 mV

Response time

The update of the measured value depends on the sensor type and the circuit type, and is in the following ranges:

RTD temperature probe	0.9 to 1.3 s (depending on the circuit type two/three/four-wire)
Thermocouples (TC)	0.8 s
Reference temperature	0.9 s

When recording step responses, it must be taken into account that, where applicable, the times for the measurement of the second channel and the internal reference measuring point are added to the stated times.

Reference conditions

Calibration temperature	+25 °C ±3 K
Voltage supply	DC 24 V
Electrical circuit	Four-wire circuit for resistance calibration

Measurement deviation

Measurement deviation according to DIN EN 60770 and the reference conditions stated above. The specifications for the measurement deviation correspond to ±2 σ (Gaussian normal distribution). The specification includes nonlinearities and repeatability.

Typical measurement deviation for RTD temperature probes

Standard	Designation	Measuring range	Typical measurement deviation (±)	
			Digital value[a]	Value at the current output
IEC 60751:2008	Pt100 (1)	0 to +200 °C	0.08 °C	0.1 °C
IEC 60751:2008	Pt1000 (4)		0.08 °C	0.1 °C
GOST 6651-94	Pt100 (9)		0.07 °C	0.09 °C

[a] Measured value transferred via HART®.

Typical measurement deviation for thermocouples (TC)

Standard	Designation	Measuring range	Typical measurement deviation (±)	
			Digital value[a]	Value at the current output
Thermocouples (TC) compliant with the standard				
IEC 60584, part 1	Type K (NiCr-Ni) (36)	0 to +800 °C	0.31 °C	0.39 °C
IEC 60584, part 1	Type S (PtRh10-Pt) (39)		0.97 °C	1.0 °C
GOST R8.8585-2001	Type L (NiCr-CuNi) (43)		2.18 °C	2.2 °C

[a] Measured value transferred via HART®.

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Maximum measurement deviation for RTD temperature probes

Standard	Designation	Measuring range	Measurement deviation (±)		
			Digital[a]		D/A[b]
			Maximum[c]	Related to the measured value[d]	
IEC 60751:2008	Pt100 (1)	-200 to +850 °C	≤ 0.12 °C	0.06 °C + 0.006 % × (MV - MRS)	0.03 % (≙ 4.8 µA)
	Pt200 (2)	-200 to +850 °C	≤ 0.28 °C	0.12 °C + 0.015 % × (MV - MRS)	
	Pt500 (3)	-200 to +500 °C	≤ 0.15 °C	0.05 °C + 0.014 % × (MV - MRS)	
	Pt1000 (4)	-200 to +250 °C	≤ 0.09 °C	0.03 °C + 0.013 % × (MV - MRS)	
JIS C1604:1984	Pt100 (5)	-200 to +510 °C	≤ 0.09 °C	0.05 °C + 0.006 % × (MV - MRS)	
DIN 43760 IPTS-68	Ni100 (6)	-60 to +250 °C	≤ 0.05 °C	0.05 °C - 0.006 % × (MV - MRS)	
	Ni120 (7)	-60 to +250 °C	≤ 0.05 °C	0.05 °C - 0.006 % × (MV - MRS)	
GOST 6651-94	Pt50 (8)	-85 to +1100 °C	≤ 0.21 °C	0.10 °C + 0.008 % × (MV - MRS)	
	Pt100 (9)	-200 to +850 °C	≤ 0.11 °C	0.05 °C + 0.006 % × (MV - MRS)	
OIML R84: 2003, GOST 6651-2009	Cu50 (10)	-180 to +200 °C	≤ 0.12 °C	0.10 °C + 0.006 % × (MV - MRS)	
	Cu100 (11)	-180 to +200 °C	≤ 0.06 °C	0.05 °C + 0.003 % × (MV - MRS)	
	Ni100 (12)	-60 to +180 °C	≤ 0.06 °C	0.06 °C - 0.006 % × (MV - MRS)	
	Ni120 (13)	-60 to +180 °C	≤ 0.05 °C	0.05 °C - 0.006 % × (MV - MRS)	
OIML R84: 2003, GOST 6651-94	Cu50 (14)	-50 to +200 °C	≤ 0.11 °C	0.10 °C + 0.004 % × (MV - MRS)	

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

Maximum measurement deviation for resistors/potentiometers

Standard	Designation	Measuring range	Measurement deviation (±)		
			Digital[a]		D/A[b]
			Maximum[c]	Related to the measured value	
-	Resistance Ω	10 to 400 Ω	33 mΩ	21 mΩ + 0.003 % × (MV - MRS)	0.03 % (≙ 4.8 µA)
		10 to 2000 Ω	310 mΩ	35 mΩ + 0.010 % × (MV - MRS)	

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

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Maximum measurement deviation for thermocouples (TC)

Standard	Designation	Measuring range	Measurement deviation (±)		
			Digital[a]		D/A[b]
			Maximum[c]	Related to the measured value[d]	
IEC 60584-1	Type A (30)	0 to +2500 °C	≤ 1.33 °C	0.80 °C + 0.021 % × (MV - MRS)	0.03 % (≙ 4.8 µA)
	Type B (31)	+500 to +1820 °C	≤ 1.43 °C	1.43 °C - 0.060 % × (MV - MRS)	
IEC 60584-1/ ASTM E988-96	Type C (32)	0 to +2000 °C	≤ 0.66 °C	0.55 °C + 0.055 % × (MV - MRS)	
ASTM E988-96	Type D (33)		≤ 0.75 °C	0.85 °C - 0.008 % × (MV - MRS)	
IEC 60584-1	Type E (34)	-150 to +1000 °C	≤ 0.22 °C	0.22 °C - 0.006 % × (MV - MRS)	
	Type J (35)	-150 to +1200 °C	≤ 0.27 °C	0.27 °C - 0.005 % × (MV - MRS)	
	Type K (36)		≤ 0.35 °C	0.35 °C - 0.005 % × (MV - MRS)	
	Type N (37)	-150 to +1300 °C	≤ 0.48 °C	0.48 °C - 0.014 % × (MV - MRS)	
	Type R (38)	+50 to +1768 °C	≤ 1.12 °C	1.12 °C - 0.030 % × (MV - MRS)	
	Type S (39)		≤ 1.15 °C	1.15 °C - 0.022 % × (MV - MRS)	
	Type T (40)	-150 to +400 °C	≤ 0.35 °C	0.35 °C - 0.040 % × (MV - MRS)	
DIN 43710	Type L (41)	-150 to +900 °C	≤ 0.29 °C	0.29 °C - 0.009 % × (MV - MRS)	
	Type U (42)	-150 to +600 °C	≤ 0.33 °C	0.33 °C - 0.028 % × (MV - MRS)	
GOST R8.8585-2001	Type L (43)	-200 to +800 °C	≤ 2.20 °C	2.20 °C - 0.015 % × (MV - MRS)	

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

Maximum measurement deviation for voltage sensor (mV)

Standard	Designation	Measuring range	Measurement deviation (±)		
			Digital[a]		D/A[b]
			Maximum[c]	Related to the measured value[d]	
-	-	-20 to +100 mV	10,7 µV	7,7 µV + 0.0025 % × (MV – MRS)	4.8 µA

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

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Calculation examples for measurement deviations

Sample calculation 1 with Pt100 (1) and the following parameters:

- Measured value (MV) = +200 °C
- Ambient temperature = +25 °C (same as reference conditions)
- Voltage supply = DC 24 V (same as reference conditions)

Measurement deviation digital = 0.06 °C + 0.006 % × (200 °C – (-200 °C))	0.084 °C
Measurement deviation D/A = 0.03 % × 200 °C	0.06 °C

This results in:

Measurement deviation of digital value (HART)	**0.084 °C**
Measurement deviation of analog value (current output) $\sqrt{(\text{measurement deviation digital}^2 + \text{measurement deviation D/A}^2)}$	**0.103 °C**

Sample calculation 2 with Pt100 (1) and the following parameters:

- Measured value (MV) = +200 °C
- Ambient temperature = +35 °C (10 K higher than reference conditions)
- Voltage supply = DC 30 V (6 V higher than reference conditions)

Measurement deviation digital = 0.06 °C + 0.006 % × (200 °C – (-200 °C))	0.084 °C
Measurement deviation D/A = 0.03 % × 200 °C	0.06 °C
Influence of the ambient temperature[a] Digital = (35 – 25) × (0.002 % × 200 °C – (-200 °C)), at least 0.005 °C	0.08 °C
Influence of ambient temperature[a] D/A = (35 – 25) × (0.001 % × 200 °C)	0.02 °C
Influence of voltage supply[a] digital = (30 – 24) × (0.002 % × 200 °C – (-200 °C)), at least 0.005 °C	0.048 °C
Influence of voltage supply[a] D/A = (30 – 24) × (0.001 % × 200 °C)	0.012 °C

[a] See table "Operating influences", page 11.

This results in:

Measurement deviation of digital value (HART) = $\sqrt{(\text{measurement deviation digital}^2 + \text{influence of ambient temperature digital}^2 + \text{influence of voltage supply digital}^2)}$	**0.126 °C**
Measurement deviation of analog value (current output) = $\sqrt{(\text{measurement deviation digital}^2 + \text{measurement deviation D/A}^2 + \text{influence of ambient temperature digital}^2 + \text{influence of ambient temperature D/A}^2 + \text{influence of voltage supply digital}^2 + \text{influence of voltage supply D/A}^2)}$	**0.141 °C**

The specifications for the measurement deviation correspond to 2 σ (Gaussian normal distribution).

Different measurement deviations apply in SIL mode ⇨ SIL safety manual for dTRANS T07 series (SIL designs).

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Operating influences

The specifications for the measurement deviation correspond to 2 σ (Gaussian normal distribution).

Operating influences 'ambient temperature' and 'voltage supply' for RTD temperature probes

Standard	Designation	Ambient temperature: Effect (±) per 1 °C change			Voltage supply: Effect (±) per 1 V change		
		Digital[a]		D/A[b]	Digital[a]		D/A[b]
		Maximum[c]	Related to the measured value[d]		Maximum[c]	Related to the measured value[d]	
IEC 60751:2008	Pt100 (1)	≤ 0.02 °C	0.002 % × (MV – MRS), at least 0.005 °C	0.001 %	≤ 0.12 °C	0.002 % × (MV – MRS), at least 0.005 °C	0.001 %
	Pt200 (2)	≤ 0.026 °C			≤ 0.26 °C		
	Pt500 (3)	≤ 0.014 °C	0.002 % × (MV – MRS), at least 0.009 °C		≤ 0.14 °C	0.002 % × (MV – MRS), at least 0.009 °C	
	Pt1000 (4)	≤ 0.01 °C	0.002 % × (MV – MRS), at least 0.004 °C		≤ 0.01 °C	0.002 % × (MV – MRS), at least 0.004 °C	
JIS C1604:1984	Pt100 (5)	≤ 0.01 °C	0.002 % × (MV – MRS), at least 0.005 °C		≤ 0.01 °C	0.002 % × (MV – MRS), at least 0.005 °C	
DIN 43760, IPTS-68	Ni100 (6)	≤ 0.005 °C			≤ 0.005 °C		
	Ni120 (7)	≤ 0.005 °C			≤ 0.005 °C		
GOST 6651-94	Pt50 (8)	≤ 0.03 °C	0.002 % × (MV – MRS), at least 0.01 °C		≤ 0.03 °C	0.002 % × (MV – MRS), at least 0.01 °C	
	Pt100 (9)	≤ 0.02 °C	0.002 % × (MV – MRS), at least 0.005 °C		≤ 0.02 °C	0.002 % × (MV – MRS), at least 0.005 °C	
OIML R84: 2003, GOST 6651-2009	Cu50 (10)	≤ 0.008 °C			≤ 0.008 °C		
	Cu100 (11)	≤ 0.008 °C	0.002 % × (MV – MRS), at least 0.004 °C		≤ 0.008 °C	0.002 % × (MV – MRS), at least 0.004 °C	
	Ni100 (12)	≤ 0.004 °C			≤ 0.004 °C		
	Ni120 (13)	≤ 0.004 °C			≤ 0.004 °C		
OIML R84: 2003, GOST 6651-94	Cu50 (14)	≤ 0.008 °C			≤ 0.008 °C		

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

Operating influences 'ambient temperature' and 'voltage supply' for resistors/potentiometers (Ω)

Standard	Designation	Ambient temperature: Effect (±) per 1 °C change			Voltage supply: Effect (±) per 1 V change		
		Digital[a]		D/A[b]	Digital[a]		D/A[b]
		Maximum[c]	Related to the measured value[d]		Maximum[c]	Related to the measured value[d]	
-	10 to 400 Ω	≤ 6 mΩ	0.015 % × (MV – MRS), at least 1.5 mΩ	0.001 %	≤ 6 mΩ	0.015 % × (MV – MRS), at least 1.5 mΩ	0.001 %
-	10 to 2000 Ω	≤ 30 mΩ	0.015 % × (MV – MRS), at least 15 mΩ		≤ 30 mΩ	0.015 % × (MV – MRS), at least 15 mΩ	

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

Operating influences 'ambient temperature' and 'voltage supply' for thermocouples (TC)

Standard	Designation	Ambient temperature: Effect (±) per 1 °C change			Voltage supply: Effect (±) per 1 V change		
		Digital[a]		D/A[b]	Digital[a]		D/A[b]
		Maximum[c]	Related to the measured value[d]		Maximum[c]	Related to the measured value[d]	
IEC 60584-1	Type A (30)	≤ 0.14 °C	0.0055 % × (MV – MRS), at least 0.03 °C	0.001 %	≤ 0.14 °C	0.0055 % × (MV – MRS), at least 0.03 °C	0.001 %
	Type B (31)	≤ 0.06 °C			≤ 0.06 °C		
IEC 60584-1/ ASTM E988-96	Type C (32)	≤ 0.09 °C	0.0045 % × (MV – MRS), at least 0.03 °C		≤ 0.09 °C	0.0045 % × (MV – MRS), at least 0.03 °C	
ASTM E988-96	Type D (33)	≤ 0.08 °C	0.004 % × (MV – MRS), at least 0.035 °C		≤ 0.08 °C	0.004 % × (MV – MRS), at least 0.035 °C	
IEC 60584-1	Type E (34)	≤ 0.03 °C	0.003 % × (MV – MRS), at least 0.016 °C		≤ 0.03 °C	0.003 % × (MV – MRS), at least 0.016 °C	
	Type J (35)	≤ 0.02 °C	0.0028 % × (MV – MRS), at least 0.02 °C		≤ 0.02 °C	0.0028 % × (MV – MRS), at least 0.02 °C	
	Type K (36)	≤ 0.04 °C	0.003 % × (MV – MRS), at least 0.013 °C		≤ 0.04 °C	0.003 % × (MV – MRS), at least 0.013 °C	
	Type N (37)	≤ 0.04 °C	0.0028 % × (MV – MRS), at least 0.02 °C		≤ 0.04 °C	0.0028 % × (MV – MRS), at least 0.02 °C	
	Type R (38)	≤ 0.06 °C	0.0035 % × (MV – MRS), at least 0.047 °C		≤ 0.06 °C	0.0035 % × (MV – MRS), at least 0.047 °C	
	Type S (39)	≤ 0.05 °C			≤ 0.05 °C		
	Type T (40)	≤ 0.01 °C			≤ 0.01 °C		
DIN 43710	Type L (41)	≤ 0.02 °C			≤ 0.02 °C		
	Type U (42)	≤ 0.01 °C			≤ 0.01 °C		
GOST R8.8585-2001	Type L (43)	≤ 0.01 °C			≤ 0.01 °C		

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

Operating influences 'ambient temperature' and 'voltage supply' for voltage sensors (mV)

Standard	Designation	Ambient temperature: Effect (±) per 1 °C change			Voltage supply: Effect (±) per 1 V change		
		Digital[a]		D/A[b]	Digital[a]		D/A[b]
		Maximum[c]	Related to the measured value		Maximum[c]	Related to the measured value	
-	-20 to 100 mV	≤ 3 µV		0.001 %	≤ 3 µV		0.001 %

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

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Long-term drift

Long-term drift of RTD temperature probe

Standard	Designation	Long-term drift (±)[a]		
		After 1 year	**After 3 years**	**After 5 years**
		Related to the measured value		
IEC 60751:2008	Pt100 (1)	≤ 0.016 % × (VM - DEM) or 0.04 °C	≤ 0.025 % × (VM - DEM) or 0.05 °C	≤ 0.028 % × (VM - DEM) or 0.06 °C
	Pt200 (2)	0.25 °C	0.41 °C	0.50 °C
	Pt500 (3)	≤ 0.018 % × (VM - DEM) or 0.08 °C	≤ 0.03 % × (VM - DEM) or 0.14 °C	≤ 0.036 % × (VM - DEM) or 0.17 °C
	Pt1000 (4)	≤ 0.0185 % × (VM - DEM) or 0.04 °C	≤ 0.031 % × (VM - DEM) or 0.07 °C	≤ 0.038 % × (VM - DEM) or 0.08 °C
JIS C1604:1984	Pt100 (5)	≤ 0.015 % × (VM - DEM) or 0.04 °C	≤ 0.024 % × (VM - DEM) or 0.07 °C	≤ 0.027 % × (VM - DEM) or 0.08 °C
DIN 43760, IPTS-68	Ni100 (6)	0.04 °C	0.05 °C	0.06 °C
	Ni120 (7)	0.04 °C	0.05 °C	0.06 °C
GOST 6651-94	Pt50 (8)	≤ 0.017 % × (VM - DEM) or 0.07 °C	≤ 0.027 % × (VM - DEM) or 0.12 °C	≤ 0.030 % × (VM - DEM) or 0.14 °C
	Pt100 (9)	≤ 0.016 % × (VM - DEM) or 0.04 °C	≤ 0.025 % × (VM - DEM) or 0.07 °C	≤ 0.028 % × (VM - DEM) or 0.07 °C
OIML R84: 2003, GOST 6651-2009	Cu50 (10)	0.06 °C	0.09 °C	0.11 °C
	Cu100 (11)	≤ 0.015 % × (VM - DEM) or 0.04 °C	≤ 0.024 % × (VM - DEM) or 0.06 °C	≤ 0.027 % × (VM - DEM) or 0.06 °C
	Ni100 (12)	0.03 °C	0.05 °C	0.06 °C
	Ni120 (13)	0.03 °C	0.05 °C	0.06 °C
OIML R84: 2003, GOST 6651-94	Cu50 (14)	0.06 °C	0.09 °C	0.10 °C

[a] The higher value is valid.

Long-term drift for resistors/potentiometers (Ω)

Standard	Designation	Long-term drift (±)[a]		
		After 1 year	**After 3 years**	**After 5 years**
		Related to the measured value		
-	10 to 400 Ω	≤ 0.0122 % × (MV - MRS) or 12 mΩ	≤ 0.02 % × (MV - MRS) or 20 mΩ	≤ 0.022 % × (MW - MBA) or 22 mΩ
-	10 to 2000 Ω	≤ 0.015 % × (MV - MRS) or 144 mΩ	≤ 0.024 % × (MV - MRS) or 240 mΩ	≤ 0.03 % × (MV - MRS) or 295 mΩ

[a] The higher value is valid.

Long-term drift for thermocouples (TC)

Standard	Designation	Long-term drift (±)[a]		
		After 1 year	**After 3 years**	**After 5 years**
		Related to the measured value		
IEC 60584-1	Type A (30)	≤ 0.048 % × (MV - MRS) or 0.46 °C	≤ 0.072 % × (MV - MRS) or 0.69 °C	≤ 0.1 % × (MV - MRS) or 0.94 °C
	Type B (31)	1.08 °C	1.63 °C	2.23 °C
IEC 60584-1/ ASTM E988-96	Type C (32)	≤ 0.038 % × (MV - MRS) or 0.41 °C	≤ 0.057 % × (MV - MRS) or 0.62 °C	≤ 0.078 % × (MV - MRS) or 0.85 °C
ASTM E988-96	Type D (33)	≤ 0.035 % × (MV - MRS) or 0.57 °C	≤ 0.052 % × (MV - MRS) or 0.86 °C	≤ 0.071 % × (MV - MRS) or 1.17 °C

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Standard	Designation	Long-term drift (±)[a]		
		After 1 year	After 3 years	After 5 years
		Related to the measured value		
IEC 60584-1	Type E (34)	≤ 0.024 % × (MV - MRS) or 0.15 °C	≤ 0.037 % × (MV - MRS) or 0.23 °C	≤ 0.05 % × (MV - MRS) or 0.31 °C
	Type J (35)	≤ 0.025 % × (MV - MRS) or 0.17 °C	≤ 0.037 % × (MV - MRS) or 0.25 °C	≤ 0.051 % × (MV - MRS) or 0.34 °C
	Type K (36)	≤ 0.027 % × (MV - MRS) or 0.23 °C	≤ 0.041 % × (MV - MRS) or 0.35 °C	≤ 0.056 % × (MV - MRS) or 0.48 °C
	Type N (37)	0.36 °C	0.55 °C	0.75 °C
	Type R (38)	0.83 °C	1.26 °C	1.72 °C
	Type S (39)	0.84 °C	1.27 °C	1.73 °C
	Type T (40)	0.25 °C	0.37 °C	0.51 °C
DIN 43710	Type L (41)	0.20 °C	0.31 °C	0.42 °C
	Type U (42)	0.24 °C	0.37 °C	0.50 °C
GOST R8.8585-2001	Type L (43)	0.22 °C	0.33 °C	0.45 °C

[a] The higher value is valid.

Long-term drift for voltage sensor (mV)

Standard	Designation	Long-term drift (±)[a]		
		After 1 year	After 3 years	After 5 years
		Related to the measured value		
-	-20 to 100 mV	≤ 0.027 % × (MV - MRS) or 5.5 µV	≤ 0.041 % × (MV - MRS) or 8.2 µV	≤ 0.056 % × (MV - MRS) or 11.2 µV

[a] The higher value is valid.

Long-term drift for analog output

Long-term drift[a] (±)		
After 1 year	After 3 years	After 5 years
0.021 %	0.029 %	0.031 %

[a] Percentages related to the configured span of the analog output signal.

Influence of the reference point

Pt100 DIN IEC 60751 class B (internal cold junction on thermocouples (TC)).

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Sensor calibration

Sensor transmitter matching	RTD sensors are among the most linear of all temperature measuring elements. Nonetheless, it is still necessary to linearize the output. For significant improvement of the temperature measurement accuracy, the device enables the use of two methods: • **Callendar–Van Dusen coefficient (Pt100 RTD temperature probe)** The Callendar–Van Dusen equation is described as follows: $R_T = R_0 [1 + AT + BT^2 + C (T–100) T^3]$ Coefficients A, B, and C are used to adapt sensors (platinum) and transmitters in order to improve the accuracy of the measuring system. The coefficients for a standard sensor are specified in IEC 60751. If no standard sensor is available or if you require even higher accuracy, the coefficients for each sensor can be calculated specifically with the help of sensor calibration. • **Linearization for copper/nickel RTD temperature probes** The equation for the polynomial for copper/nickel is described as follows: $R_T = R_0 (1 + AT + BT^2)$ The coefficients A and B serve to linearize nickel or copper RTD temperature probes. The exact values for the coefficients are taken from the calibration data and are specific to every sensor. The sensor-specific coefficients are then transmitted to the transmitter. Sensor/transmitter matching with one of the methods stated above significantly improves the accuracy of the temperature measurement of the overall system. This results from the fact that the transmitter uses the specific data of the connected sensor rather than the standardized sensor curve data for calculation of the measured temperature.
Single-point calibration (offset)	Shift of the sensor value
Two-point calibration (sensor trimming)	Correction (slope and offset) of the measured sensor value at the input of the transmitter.

Calibration of the current output

Correction of the 4 or 20 mA current output value (not possible in SIL operation).

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Voltage supply

Devices without Ex-approval

Voltage supply	(protected against polarity reversal)
Head transmitter	DC 11 V ≤ V_{cc} ≤ 42 V (standard)
	DC 11 V ≤ V_{cc} ≤ 32 V (SIL operation)
DIN rail device	DC 12 V ≤ Vcc ≤ 42 V (standard)
	DC 12 V ≤ Vcc ≤ 32 V (SIL operation)
Current consumption	
Typical	3.6 to 23 mA
Minimum current consumption	3.5 mA (4 mA in multidrop mode, not possible in SIL operation)
Current limit	≤ 23 mA
Residual ripple	Permanent residual ripple U_{ss} ≤ 3 V with U_b ≥ 13.5 V, f_{max} = 1 kHz

Head transmitters with Ex-approval

	Sensor circuit			Auxiliary energy circuit
Max. voltage U_0	DC 7,6 V			--
Max. current I_0	13 mA			--
Max. power P_0	24.7 mW			--
Max. voltage U_i	--			30 V
Max. current I_i	--			130 mA
Max. power P_i	--			800 mW
Max. internal inductance L_i	negligible			negligible
Max. internal capacitance C_i	negligible			negligible
Gas group	Ex ia IIC	Ex ia IIB	Ex ia IIA	--
Max. external inductance L_o	10 mH	50 mH	50 mH	--
Max. external capacitance C_o	1 µF	4.5 µF	6.7 µF	--

DIN rail devices with Ex-approval

	Sensor circuit			Auxiliary energy circuit
Max. voltage U_0	DC 9 V			--
Max. current I_0	13 mA			--
Max. power P_0	29.3 mW			--
Max. voltage U_i	--			30 V
Max. current I_i	--			130 mA
Max. power P_i	--			770 mW
Max. internal inductance L_i	negligible			negligible
Max. internal capacitance C_i	negligible			negligible
Gas group	Ex ia IIC	Ex ia IIB	Ex ia IIA	--
Max. external inductance L_o	5 mH	20 mH	50 mH	--
Max. external capacitance C_o	0.93 µF	3.8 µF	4.8 µF	--

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Environmental influences

Ambient temperature for all devices **without** Ex-approval

Standard operation	-40 to +85 °C
SIL operation	-40 to +70 °C

Ambient temperature for head transmitters **with** Ex-approval (**without** display)

Temperature class	**Ambient temperature zone 1**	**Ambient temperature zone 0**
T6	-40 to +58 °C	-40 to +46 °C
T5	-40 to +75 °C	-40 to +60 °C
T4	-40 to +85 °C	-40 to +60 °C

Ambient temperature for head transmitters **with** Ex-approval (**with** display[a])

Temperature class	**Ambient temperature zone 1**	**Ambient temperature zone 0**
T6	-40 to +55 °C	--
T5	-40 to +70 °C	--
T4	-40 to +85 °C	--

[a] At temperatures below -20 °C the display may react sluggishly; at temperatures below -30 °C the display may no longer be readable.

Ambient temperature for DIN rail devices **with** Ex-approval

Temperature class	**Ambient temperature zone 1**	**Ambient temperature zone 0**
T6	-40 to +46 °C	--
T5	-40 to +61 °C	--
T4	-40 to +85 °C	--

Storage temperature	
Head transmitter	-50 to +100 °C
DIN rail device	-40 to +100 °C
Altitude	Up to 4000 m above mean sea level in accordance with IEC 61010-1, CAN/CSA C22.2 No. 61010-1
Climate class	
Head transmitter	Climate class C1 in accordance with EN 60654-1
DIN rail device	Climate class B2 in accordance with EN 60654-1
Humidity	
Condensation in accordance with IEC 60 068-2-33	Permissible for head transmitter in terminal head form B, not permissible for DIN rail device
Maximum relative humidity	95 % in accordance with IEC 60068-2-30
Protection type	
Head transmitter	IP00
Head transmitter in the field enclosure	IP66/67 (NEMA Type 4x encl.)
DIN rail device	IP20
Shock and vibration resistance	Shock resistance in accordance with KTA 3505 (section 5.8.4 Shock test)
Head transmitter	2 to 100 Hz at 4 g (increased vibration stress)
DIN rail device	2 to 100 Hz at 0.7 g (general vibration stress)
Electromagnetic compatibility (EMC)	In accordance with all relevant requirements of the IEC/EN 61326 series and the NAMUR EMC Recommendation (NE21). Details can be found in the declaration of conformity. All tests were passed both with and without the digital HART communication running. Maximum measurement deviation < 1 % of the measuring range
Interference immunity	Industrial requirement
Interference emission	Class B – Households and small businesses
Measurement category	Measurement category II in accordance with IEC 61010-1. The measurement category is intended for measurements in electrical circuits that are electrically connected directly to the low-voltage network.
Pollution degree	Pollution degree 2 in accordance with IEC 61010-1

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Case

All materials used are RoHS compliant.

	Versions for B-head mounting	**Versions for DIN-rail mounting**
Material of enclosure body	Polycarbonate (PC), corresponds to UL94, V-2 UL recognized	
Material of connection terminals	Nickel-plated brass with gold-plated contacts	
Potting material	WEVO PU 403 FP / FL	-
Terminal design	Screw terminals	
Wire design	Rigid or flexible[a]	
Conductor cross section	≤ 2.5 mm^2 (14 AWG)	
Mounting types	In terminal head, form B	On DIN-rail
	In field enclosure (wall or pipe mounting)	
	On DIN rail (with mounting element)	
Installation position	Any	
Weight	~ 40 to 50 g	~ 100 g

[a] Recommendation: do not use ferrules.

Approvals/approval marks

Approval mark		**Valid for**	**Test facility**	**Certificates/ Certification numbers**	**Inspection basis**
ATEX	II1G Ex ia IIC T6…T4 Ga	Type 707085/... Type 707086/...	Buero Veritas	EPS 17 ATEX 1 129 X	EN 60079-0:2012 +A11:2013 EN 60079-11:2012
	II2G Ex ia IIC T6…T4 Gb				
	II2(1)G Ex ib [ia Ga] IIC T6…T4 Gb	Type 707087/... Type 707088/...			
IECEx	Ex ia IIC T6…T4 Ga	Type 707085/... Type 707086/...	Buero Veritas	IECEx EPS 17.0075X	IEC 60079-0:2011 Edition:6.0 IEC 60079-11:2011 Edition 6.0
	Ex ia IIC T6…T4 Gb				
	Ex ib [ia Ga] IIC T6…T4 Gb	Type 707087/... Type 707088/...			
SIL	2/3	Type 707081/... Type 707083/... Type 707086/... Type 707088/...	TÜV Süd	Z10 17 05 01028 0001	IEC 61508:2010
c UL us		All types	Underwriters Laboratories	E201387	UL 61010-1, CAN/ CSA-22.2 No. 61010-1

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Operation

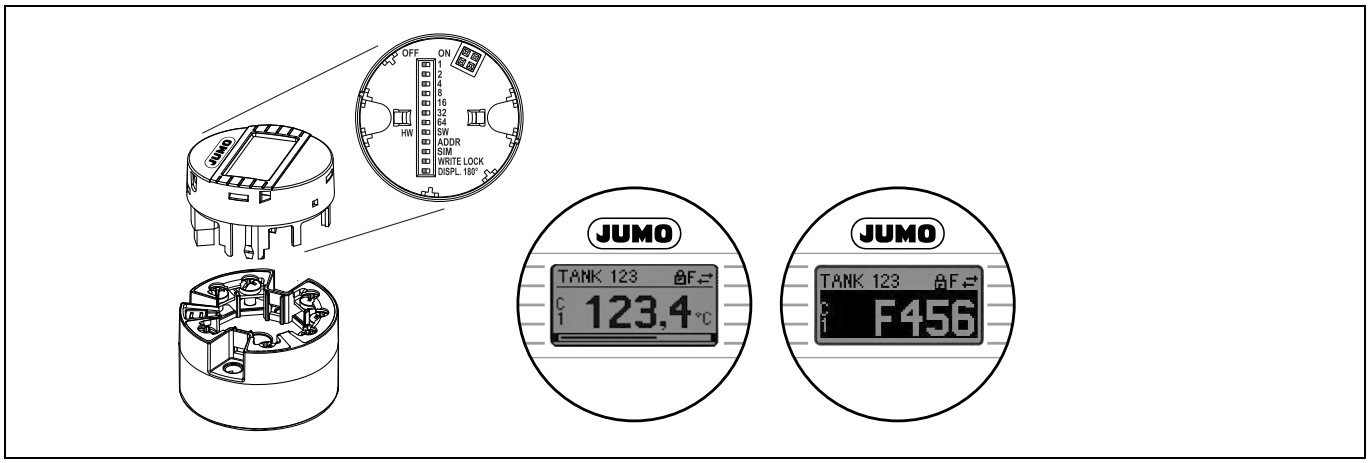
Operation on the device

Operation of the head transmitter

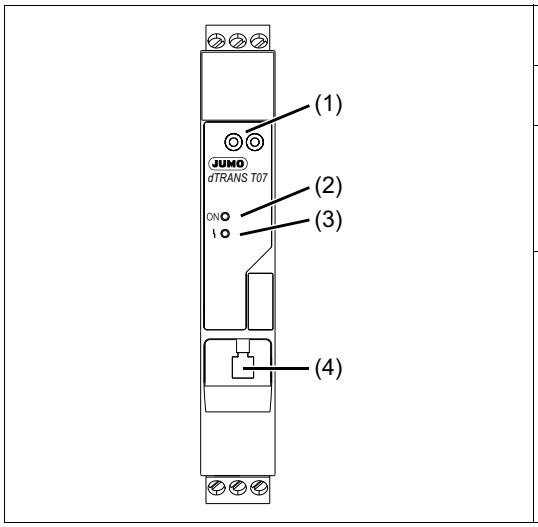
There are no display and control elements on the head transmitter. As an option, it is possible to use the plug-on display BD7 together with the head transmitter.

The plug-on display provides plain text information and uses an optional bar graph to show the current measured value and the designation of the measurement point. In the event that a fault is present in the measurement chain, this is indicated on the display with the channel designation and error number.

DIP switches are located on the rear of the plug-on display BD7. These are used to adjust hardware settings such as write protection.



Operation of the DIN rail device



(1)	HART communication ports (2 mm) for startup and parameterization with a field communicator	
(2)	Power LED	If the LED lights up green, this signals that the voltage supply is OK.
(3)	Status LED	Off: No diagnostic message
		Illuminated red: Category F diagnostic message
		Flashing red: Category C, S or M diagnostic message
(4)	Internal service interface	Not intended for use

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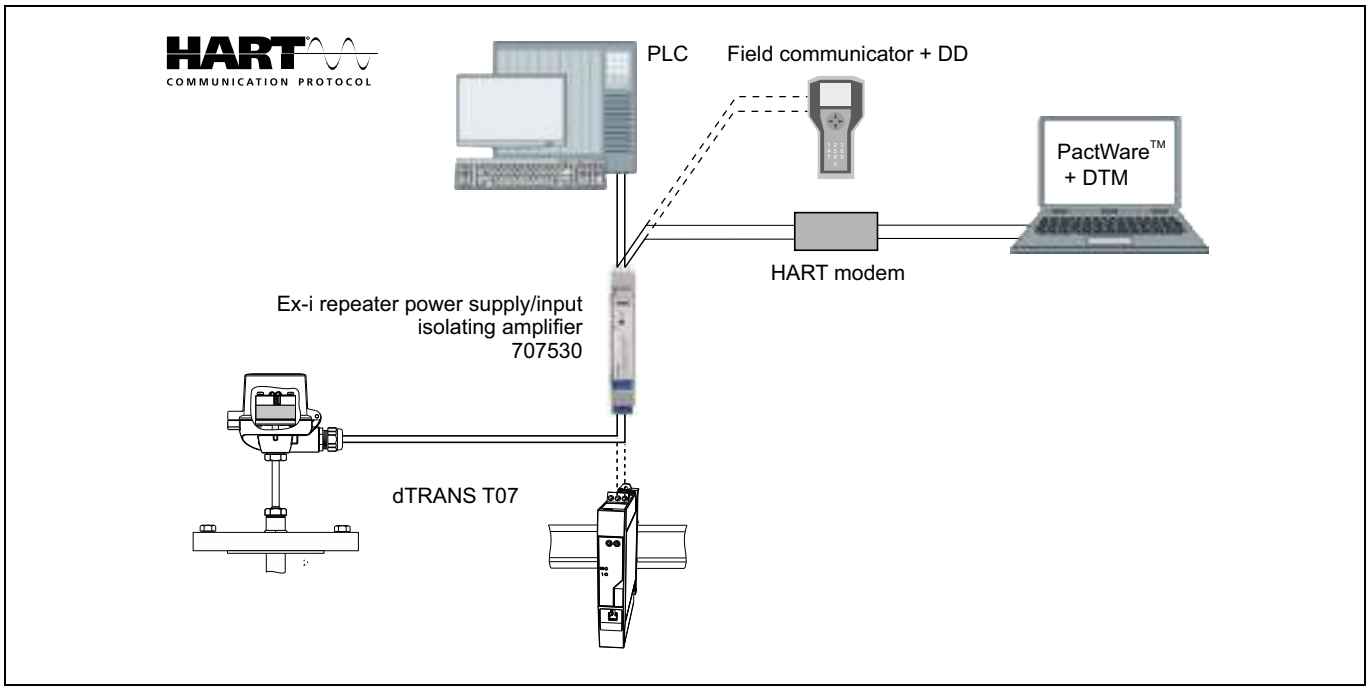
Remote control/configuration

The devices are configured via the HART® communication. To do this, either a field communicator with a device-specific JUMO DD (Device Description) file can be used, or a PC/laptop with installed PACTWare™ user interface and JUMO DTM (Device Type Manager) driver.



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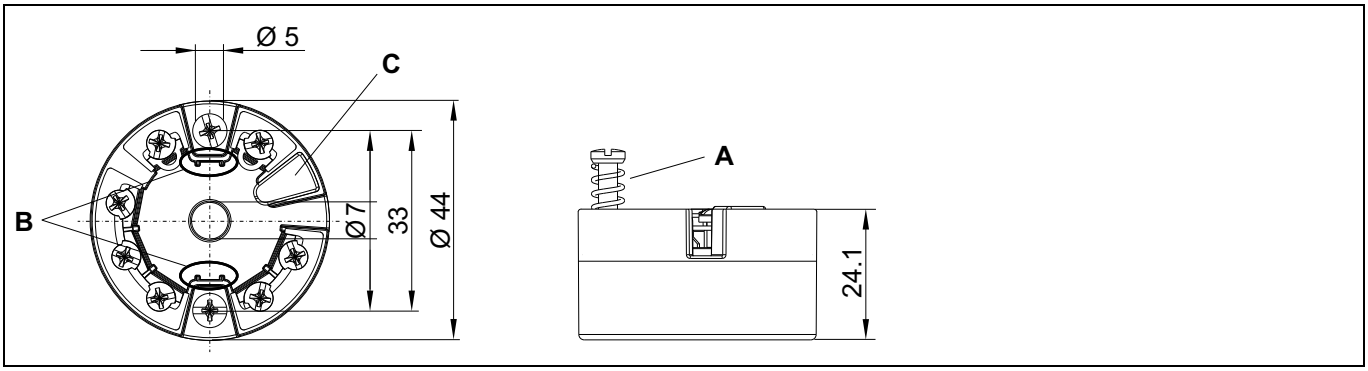
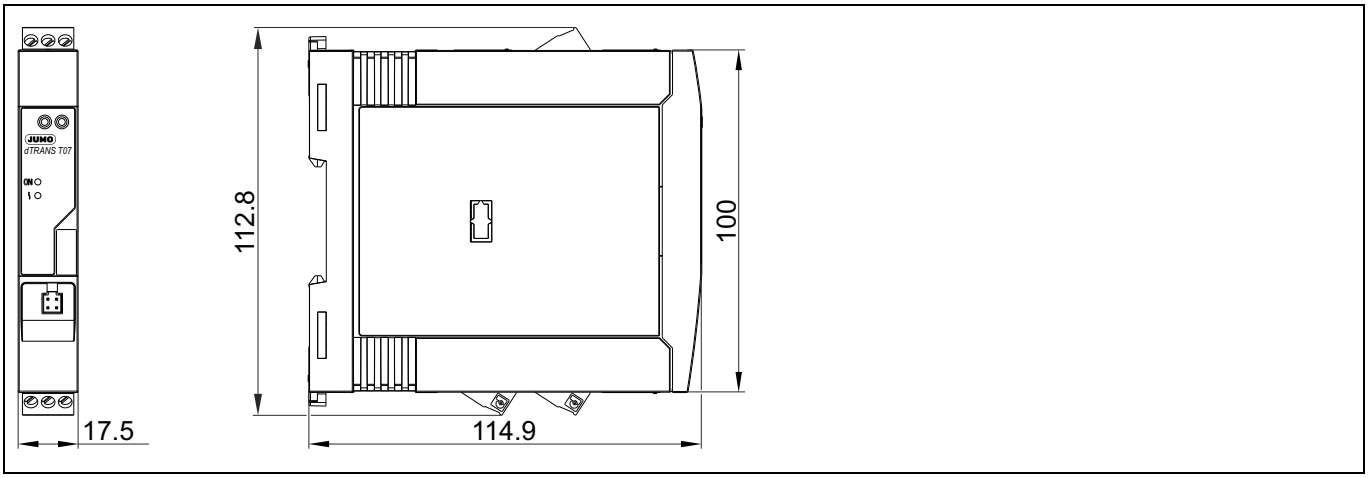
Dimensions

Head transmitter

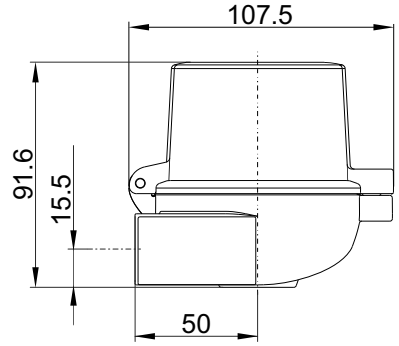


A Spring deflection mounting screws ≥ 5 mm (not with US-M4 mounting screws)
B Mounting elements for plug-on display BD7
C internal service interface (not intended for use)

DIN rail device



Terminal head for dTRANS T07

AB 7 with display window in the cap	**Specifications**	
	Cable inlets	1
	Ambient temperature	-50 to +150 °C without cable fitting
	Material	
	Enclosure	Aluminum, polyester powder coating
	Seals	Silicone
	Cable inlet screw connections	M20 × 1.5
	Protective fitting connection	M24 × 1.5
	Color	
	Head	Light gray
	Cap	Light gray
	Weight	420 g

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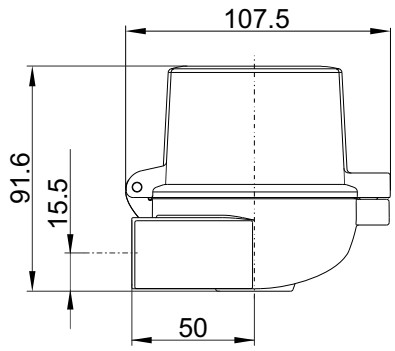
Field enclosure for dTRANS T07

FG 7 with display window in the cap	**Specifications**	
	Cable inlets	2
	Ambient temperature	-50 to +150 °C without cable fitting
	Material	
	Enclosure	Aluminum, polyester powder coating
	Seals	Silicone
	Cable inlet screw connections	M20 × 1.5 (2×)
	Color	
	Head	Light gray
	Cap	Light gray
	Weight	420 g

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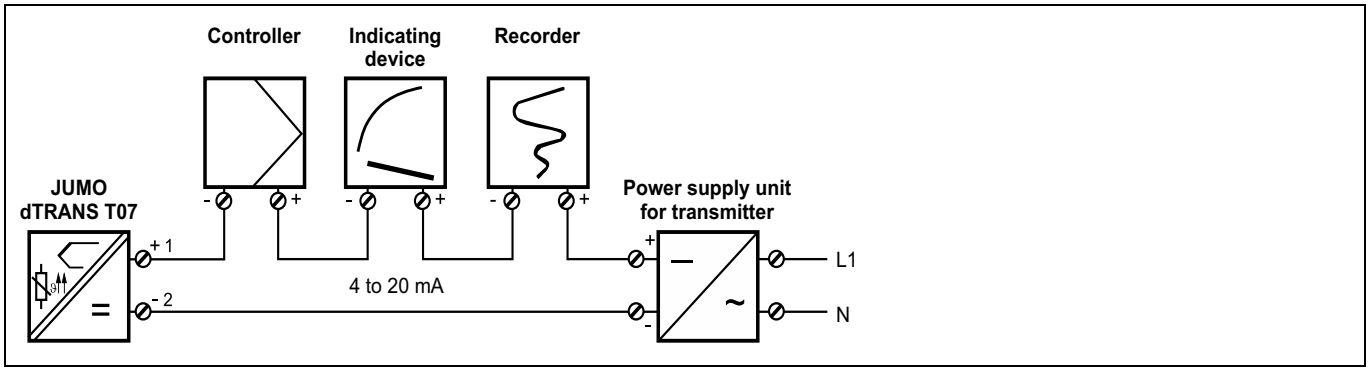
Connection diagram

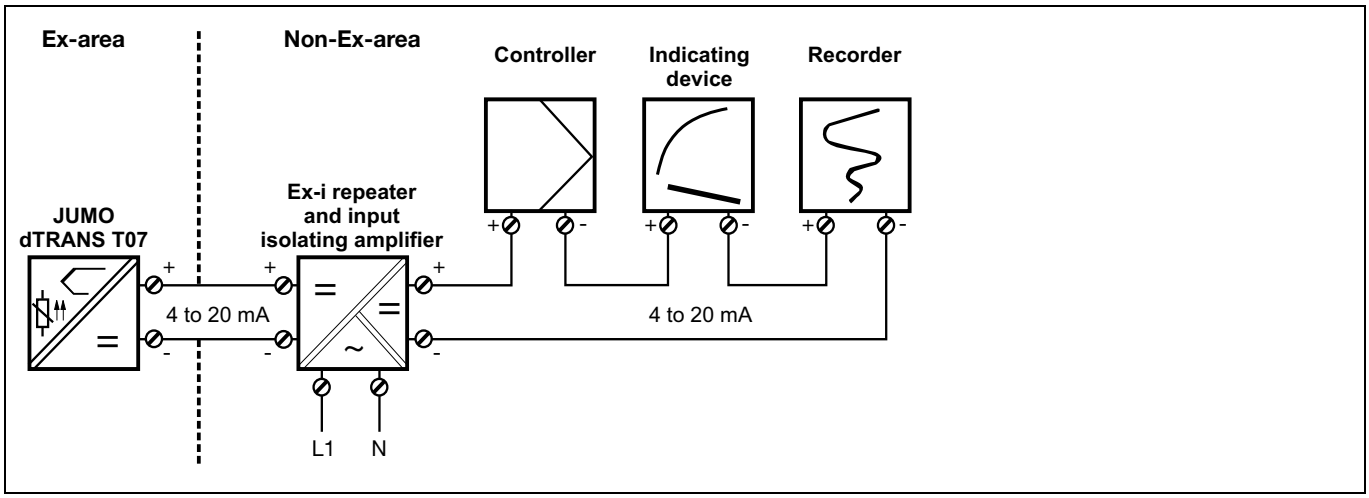
The connection diagram in the data sheet provides preliminary information about the connection possibilities. Only use the operating manual for the electrical connection. The knowledge and the correct technical execution of the safety information/instructions contained in these documents are a prerequisite for installation, electrical connection, and startup as well as for safety during operation.

Connection examples

Types without Ex-approval (707080 to 707083)



Types with Ex-approval (707085 to 707088)



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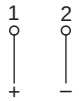
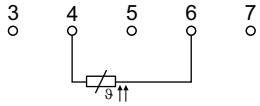
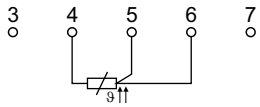
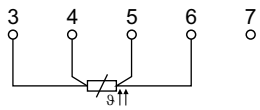
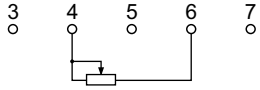
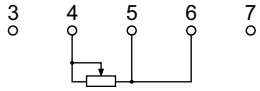
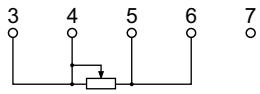
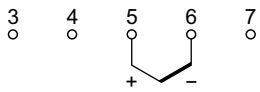
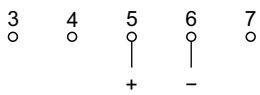
Terminal assignment for the head transmitter

For the connection, it is possible to use both rigid and flexible wires with a conductor cross section ≤ 2.5 mm^2.

From a sensor wire length of 30 m a shielded wire must be used. The use of shielded wires is generally recommended.

Connection for	Explanations	Terminals
Voltage supply DC 11 to 42 V (standard) DC 11 to 32 V (SIL) Current output 4 to 20 mA HART communication	R_b max. = (U_b max. – 11 V) ÷ 0.023 A R_b = load resistance U_b = voltage supply Burden ≥ 250 Ω required in the signal circuit	

Analog input (sensor input) 1

RTD temperature probe 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
RTD temperature probe 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
RTD temperature probe 4-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
Resistance/potentiometer 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 4-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Thermocouple		
Voltage sensor		

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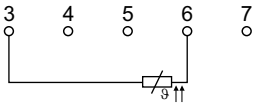
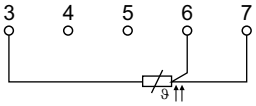
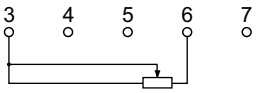
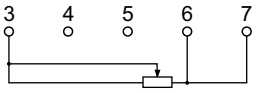
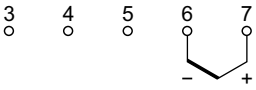
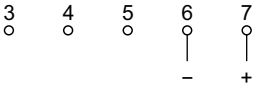
Connection for	Explanations	Terminals
Analog input (sensor input) 2		
RTD temperature probe 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
RTD temperature probe 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
Resistance/potentiometer 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Thermocouple		
Voltage sensor		

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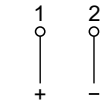
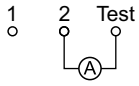
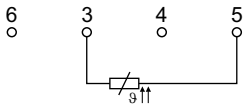
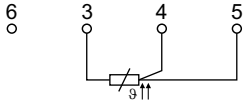
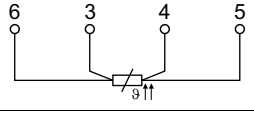
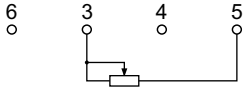
Terminal assignment for DIN rail devices

For the connection, it is possible to use both rigid and flexible wires with a conductor cross section ≤ 2.5 mm^2.

From a sensor wire length of 30 m a shielded wire must be used. The use of shielded wires is generally recommended.

Connection for	Explanations	Terminals
Voltage supply DC 12 to 42 V (standard) DC 12 to 32 V (SIL) Current output 4 to 20 mA HART® communication	R_b max. = (U_b max. – 12 V) ÷ 0.023 A R_b = load resistance U_b = voltage supply Burden ≥ 250 Ω required in the signal circuit	
Ammeter	For testing the output current	
HART® communication	On the front of the unit, for field communicator or similar	

Analog input (sensor input) 1

RTD temperature probe 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
RTD temperature probe 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
RTD temperature probe 4-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	

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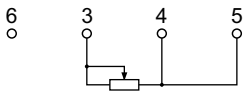
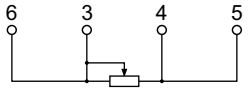
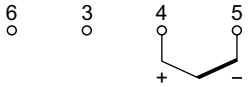
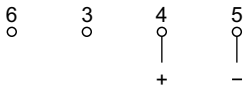
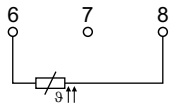
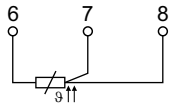
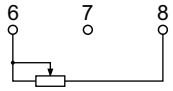
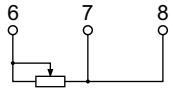
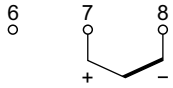
Connection for	Explanations	Terminals
Resistance/potentiometer 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 4-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Thermocouple		
Voltage sensor		

Analog input (sensor input) 2

RTD temperature probe 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
RTD temperature probe 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
Resistance/potentiometer 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Thermocouple		
Voltage sensor		

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Order details

								(1)	**Basic type**
								707080	dTRANS T07 B – Two-wire transmitter for installation in terminal head, form B
								707081	dTRANS T07 B SIL – Two-wire transmitter with SIL approval for installation in terminal head, form B
								707082	dTRANS T07 T – Two-wire transmitter for mounting on DIN rail
								707083	dTRANS T07 T SIL – Two-wire transmitter with SIL approval for mounting on DIN rail
								707085	dTRANS T07 B Ex – Two-wire transmitter with Ex approval for installation in terminal head, form B
								707086	dTRANS T07 B Ex SIL – Two-wire transmitter with Ex and SIL approval for installation in terminal head, form B
								707087	dTRANS T07 T Ex – Two-wire transmitter with Ex approval for mounting on DIN rail
								707088	dTRANS T07 T Ex SIL – Two-wire transmitter with Ex and SIL approval for mounting on DIN rail
								(2)	**Configuration**
X	X	X	X	X	X	X	X	8	Default settings (0 to 100 °C, Pt100 three-wire circuit, 4 to 20 mA)
								(3)	**Electrical connection type**
X	X	X	X	X	X	X	X	06	Screw terminals

	(1)		(2)		(3)
Order code		/		-	
Order example	707080	/	8	-	06

Scope of delivery

	Type							
	707080	707081	707082	707083	707085	707086	707087	707088
Transmitter in the version ordered	X	X	X	X	X	X	X	X
Operating manual	--	--	--	--	--	--	--	--
SIL safety manual	--	X	--	X	--	X	--	X
Ex safety manual	--	--	--	--	X	X	X	X
Mounting materials (for mounting in the terminal head)	X	X	--	--	X	X	--	--
Quick start guide	X	X	X	X	X	X	X	X

Accessories

Designation	**Part no.**
BD7 plug-in display for dTRANS T07 BD7	00672701
AB7 terminal head for dTRANS T07 B	00672702
FG7 field housing with display window for dTRANS T07 B	00672705
MW7 wall mounting set for field housing	00672707
MR7 tube mounting set for field housing	00672708
HART modem USB	00443447
Mounting element for mounting type 707080 B on DIN rail TH 35	00352463
End holder (screwable) for DIN rail TH 35	00528648

Ex-i repeater power supply/input isolating amplifier type 707530/38	00577948

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JUMO dTRANS T09

Cable transmitter for temperature

Brief description

The cable transmitter for Pt100 or Pt1000 sensors is ideal for simple retrofitting of plants. You can choose between analog output (4 to 20 mA) or IO-Link interface.

The cable transmitter's high level of vibration and shock resistance makes it reliable and durable. The connection is made on the input and output side via M12 plug connectors.

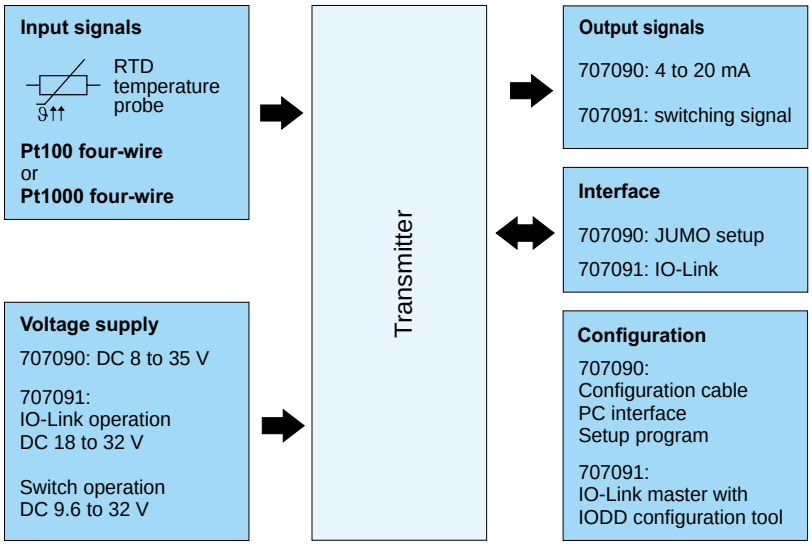
JUMO dTRANS T09 AS: cable transmitter for temperature with analog output (707090)

JUMO dTRANS T09 DS: cable transmitter for temperature with IO-Link interface (707091)

Type 707090, JUMO dTRANS T09 AS
Cable transmitter for temperature with analog output 4 to 20 mA

Type 707091, JUMO dTRANS T09 DS
Cable transmitter for temperature with IO-Link interface

Block diagram



Special features

- Efficient retrofitting and simple digitization of plants with only a short plant downtime
- Analog output
  or IO-Link interface
- Reduced mounting and commissioning costs (Plug and Play)
- Stainless steel case
  Protection type: IP66, IP67, and IP69
- High degree of vibration and shock resistance
- Pre-assembled lines (accessories)

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Technical data

JUMO dTRANS T09 AS, type 707090 (two-wire 4 to 20 mA)

Input

RTD temperature probe	Pt100 (DIN EN 60751:2009 / IEC 60751:2008) in four-wire circuit or Pt1000 (DIN EN 60751:2009 / IEC 60751:2008) in four-wire circuit[a]		
Measuring range limits	-50 to +260 °C		
Smallest measuring span	10 K		
Sampling rate	1 measurement per second		
Input filter	Digital filter 1st order, filter constant can be set		
	Calibration accuracy of the electronic components	**Temperature influence of the electronic components**	**Measuring current**
Pt100	0.2 K or 0.13 %[b,c]	≤ ±(15 ppm/K × [measuring range end value + 200] + 50 ppm/K × set measuring range) × Δϑ[d]	≤ 600 µA
Pt1000	0.1 K or 0.08 %[b,c]		≤ 105 µA
Sensor line resistance	≤ 11 Ω per line		

[a] If feature Pt100 is selected, the connection of a Pt1000 sensor is not possible. Likewise, if feature Pt1000 is selected, the connection of a Pt100 sensor is not possible. See order details.

[b] % specifications refer to the set measuring span. The greater value is valid.

[c] The deviation of the temperature sensor must be added to ensure the measuring accuracy of the transmitter.

[d] Δϑ = deviation of the ambient temperature from the reference temperature (25 °C).

Measuring circuit monitoring

Underrange	Linear drop up to 3.8 mA	(according to NAMUR recommendation 43)
Overrange	Linear drop up to 20.5 mA	
Probe short-circuit/ probe and line break	≤ 3.6 mA or ≥ 21.0 mA (configurable)	
Current limiting in the event of a probe short circuit or probe break	≤ 25 mA	

Output

Output signal	Load-independent direct current 4 to 20 mA
Transmission behavior	Temperature linear
Maximum burden (R_B)	$R_B = (U_b - 8\ V) \div 23\ mA$, max. 600 Ω
Burden influence	≤ ±0.02 % per 100 Ω[a]
Voltage supply influence	≤ ±0.01 % per V deviation from 24 V[a]
Setting time after switch-on or reset	≤ 5 s

[a] % specifications refer to the measuring range end value of 20 mA.

Electrical data

Voltage supply (U_b)	DC 8 to 35 V (pin 1 = +, pin 3 = -)
Electrical safety	Protection rating III according to DIN EN 61140
Galvanic isolation	No galvanic isolation between sensor and output
Reverse voltage protection	Yes
Requirement	The auxiliary energy of the transmitter must meet SELV requirements. Optionally, an energy-limited electrical circuit according to DIN EN 61010-1 can be used.

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JUMO dTRANS T09 DS, type 707091 (IO-Link interface)

Input

RTD temperature probe	Pt100 (DIN EN 60751:2009 / IEC 60751:2008) in four-wire circuit or Pt1000 (DIN EN 60751:2009 / IEC 60751:2008) in four-wire circuit[a]		
Measuring range limits	-50 to +260 °C		
Sampling rate	160 ms		
Input filter	Digital filter 2nd order, filter constant can be set		
	Calibration accuracy of the electronic components	**Temperature influence of the electronic components**	**Measuring current**
Pt100	≤ ±0.08 %[b,c]	≤ 0.003 % pro K[d]	≤ 1 mA
Pt1000	≤ ±0.1 %[b,c]	≤ 0.0025 % pro K[d]	≤ 500 µA
Sensor line resistance	≤ 11 Ω per line		
Galvanic isolation	No galvanic isolation between sensor and output		
Resolution	14-bit		

[a] If feature Pt100 is selected, the connection of a Pt1000 sensor is not possible. Likewise, if feature Pt1000 is selected, the connection of a Pt100 sensor is not possible. See order details.

[b] % specifications refer to the set measuring span.

[c] The deviation of the temperature sensor must be added to ensure the measuring accuracy of the transmitter.

[d] Deviation of the ambient temperature from the reference temperature (25 °C).

Measuring circuit monitoring

Process data invalid	IO-Link event configurable; appears in the process value as an error value
Overrange	
Underrange	
Device is defective	

Output

Number	1 output in IO-Link operation (output signal according to IO-Link communication standard version 1.1, see section "Interface ", Page 4) 2 outputs for switch operation (SIO mode; SIO = standard IO)
Switching functions configurable	Hysteresis function or window function Normally closed contact or normally open contact Output p-switching (PNP) or n-switching (NPN) Switch-on and switch-off delay
Switching current	≤100 mA per output
Voltage drop at switching transistor	≤ 2 V
Short-circuit proof	Yes (clocked)
Reverse polarity protected	Yes
Current limiting	Yes
Hysteresis	
For hysteresis function	Configurable
For window function	Fixed setting (symmetrical; ±0.25 % of the measuring range)
Switch-on, switch-off delay	0 to 100 s

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Interface

Communication interface	IO-Link device V 1.1 (downward compatible to V 1.0)
Communication mode (data transfer rate)	COM3 (230.4 kBaud)
IO Device Description (IODD)	The IODD can be localized and downloaded on the JUMO website in the product area for this device or at www.io-link.com with the "IODDfinder".
Max. line length acc. to IO-Link standard	20 m
Output mode	
Switching output type	Transistor switching output can be configured as NPN, PNP, or Push/Pull
Short-circuit proof	Yes (clocked)
Resistant to overload	Yes
Protected against polarity reversal	Yes
Ampacity of the switching outputs	100 mA in each case
Voltage drop of the switching outputs	Max. 2 V in each case

Electrical data

Voltage supply	
In IO-Link operation	DC 18 to 32 V
In switch operation	DC 9.6 to 32 V
Nominal voltage	DC 24 V
Current consumption	
In idle mode	≤ 12 mA (at nominal voltage)
In IO-Link operation	≤ 20 mA (at nominal voltage)
In switch operation	≤ 200 mA (at nominal voltage and with 2 switching outputs)
Electrical safety	Protection rating III according to DIN EN 61140
Intended use	Temperature measurement in industrial plants
Requirement	The auxiliary energy of the transmitter must meet SELV requirements. Optionally, an energy-limited electrical circuit according to DIN EN 61010-1 can be used.

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JUMO dTRANS T09 AS and DS

General Information

Electrical connection (input side)	Machine connector M12 × 1, 4-pole, according to DIN EN 61076-2-101 (socket version with union nut)
Electrical connection (output side)	Machine connector M12 × 1, 4-pole, according to DIN EN 61076-2-101 (pin version)
Housing	Stainless steel
Protection type with mating connector	IP66, IP67, and IP69 according to DIN EN 60529
Measuring range limits	-50 to +260 °C
Installation position	Any
Weight	JUMO dTRANS T09 AS, type 707090 = ca. 35 g JUMO dTRANS T09 DS, type 707091 = ca. 43 g
Potential equalization	
Functional bonding conductor FB[a]	⏚

[a] The temperature sensor must be connected to the potential equalization system of the plant via the process connection. Suitable shielded lines must also be used to ensure continuous shielding.

Environmental influences

Transmitter

Ambient temperature	-40 to +85 °C
Storage temperature	-40 to +85 °C
Resistance to climatic conditions	
During operation	≤ 100 % relative humidity without condensation on device outer case
During storage	≤ 90 % relative humidity without condensation
Climate class	3K7 according to DIN EN 60721-3-3
Vibration strength	10 g at 10 to 2 000 Hz according to DIN EN 60068-2-6
Shock resistance	20 g for 11 ms according to DIN EN 60068-2-27 50 g for 1 ms according to DIN EN 60068-2-27
Calibration/reference conditions	DC 24 V at 25 °C ±5 °C (77 °F ±9 °F)
Electromagnetic compatibility (EMC)	DIN EN 61326
Interference emission	Class B[a]
Interference immunity	Industrial requirement

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

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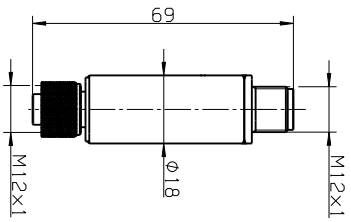
Dimensions

Basic types

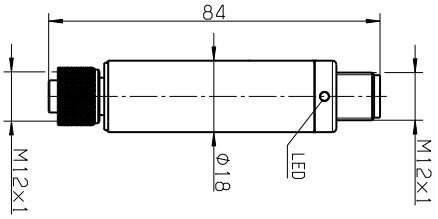
Type 707090,
JUMO dTRANS T09 AS



Cable transmitter for temperature with analog output 4 to 20 mA

*

Type 707091,
JUMO dTRANS T09 DS



Cable transmitter for temperature with IO-Link interface

*

* Figure with connection line (not included in scope of delivery, see accessories)

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Connection diagram

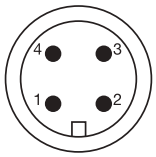
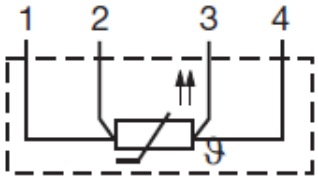
The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Input
M12 plug connector
(A-coded, socket)

Output
M12 plug connector,
(A-coded, pin)

Input

RTD temperature probe

Electrical connection	M12, A-coded, socket, 4-pole according to DIN EN 61076-2-101	Terminal assignment
RTD temperature probe in four-wire circuit	 Top view of the M12 plug connector from the associated RTD temperature probe!	

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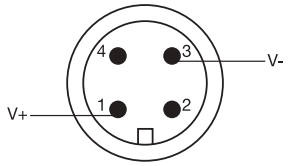
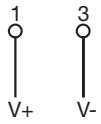
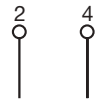
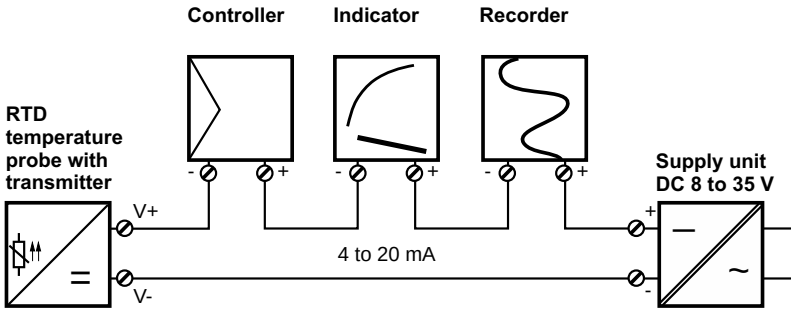
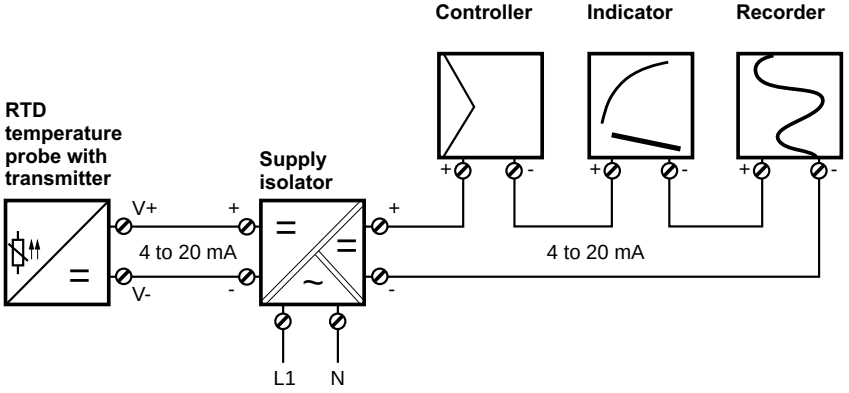
Output

JUMO dTRANS T09 AS, type 707090 (two-wire 4 to 20 mA)

Machine connector M12 × 1, 4-pole, according to DIN EN 61076-2-101 (A-coded, pin)	**Electrical connection**	**Terminal assignment**
	Voltage supply DC 8 to 35 V  Current output 4 to 20 mA 	
Warning: do not connect pin 2 and pin 4 to voltage!	Setup communication via special configuration line (see accessories) (only for configuration – continuous operation is not admissible)	

Connection example with power supply unit	

Connecting example with supply isolator	

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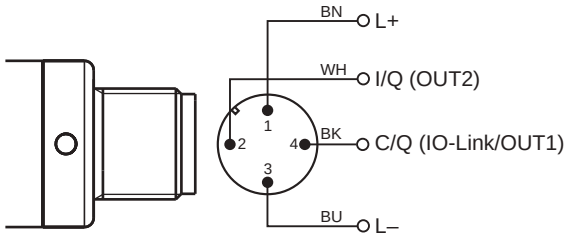
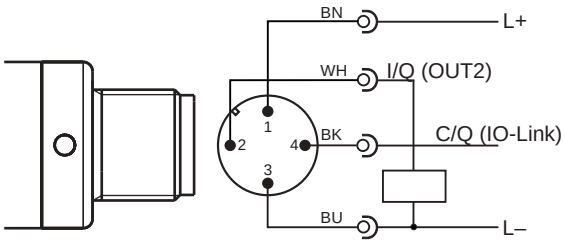
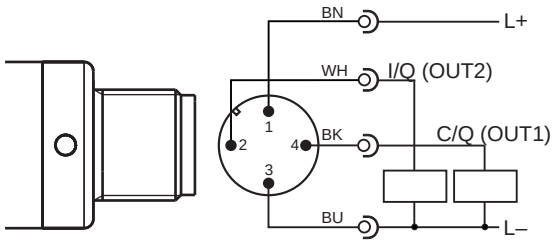
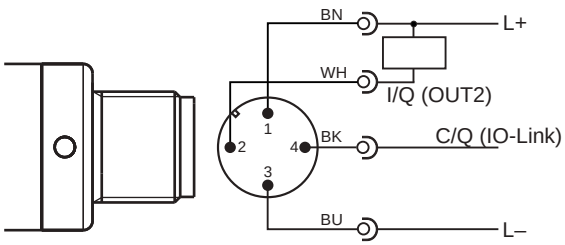
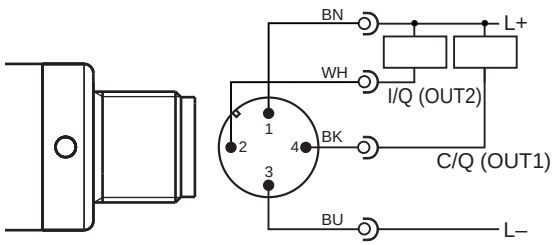
JUMO dTRANS T09 DS, type 707091 (IO-Link interface)

Connection	**Terminal assignment**	
		
Switch operation		
Voltage supply[a] DC 9.6 to 32 V	1 BN (brown)[b] 3 BU (blue)	L+ L-
Switching output 1	4 BK (black)	C/Q = OUT1
Switching output 2	2 WH (white)	I/Q = OUT2
IO-Link operation		
Voltage supply[a] DC 18 to 32 V	1 BN (brown) 3 BU (blue)	L+ L-
IO-Link	4 BK (black)	C/Q = IO-Link
Switching output 2	2 WH (white)	I/Q = OUT2

[a] The auxiliary energy of the transmitter must meet SELV requirements. Optionally, an energy-limited electrical circuit according to DIN EN 61010-1 can be used.

[b] The color coding is **only** valid for A-coded standard cables!

Connection example

IO-Link operation with 1 switching output	**Switch operation with 2 switching outputs**
p-switching (PNP)	p-switching (PNP)
	
n-switching (NPN)	n-switching (NPN)
	

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Setup program

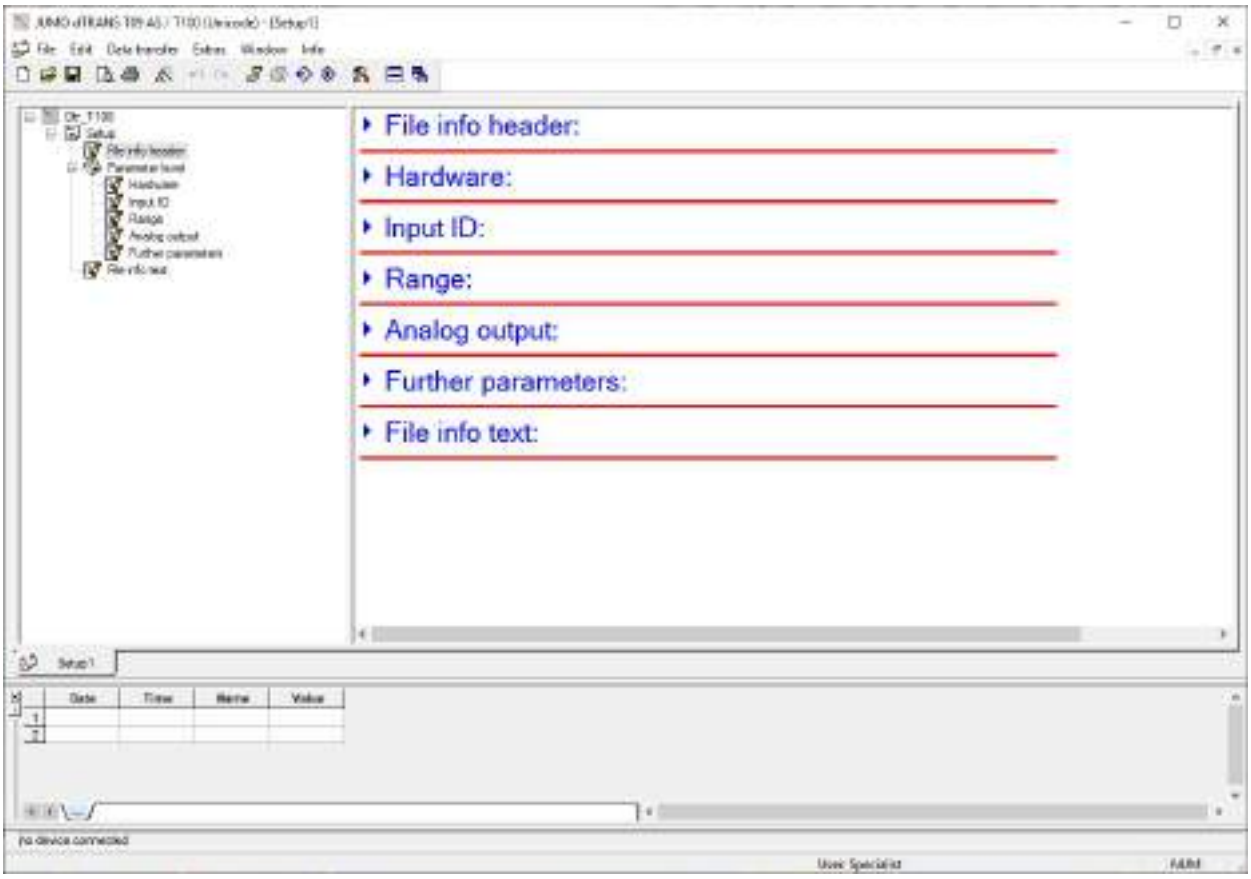
JUMO dTRANS T09 AS, type 707090 (two-wire 4 to 20 mA)

The setup program is used for the configuration of the programmable two-wire transmitter using a PC.
For this purpose the following is required:

- Please only use the configuration line, 4-pole with connector and socket M12 × 1, and Western plug RJ-45 with part no. 00484692.
- PVC connecting line, length 2 000 mm
- PC interface with USB/TTL converter
- and USB line

(see also accessories for the programmable two-wire transmitter)

The two-wire transmitter must be connected to a voltage supply for configuration.
If no power supply unit or supply isolator is available, it can also be supplied using a 9 V block battery.



Configurable parameters

Measurement point detection	TAG number
Measuring range configurable in °C/°F	• Offset • Measuring range start • Measuring range end
Analog output	• Reversion of the output • Signal for probe break/short-circuit
Other parameters	• Filter time constant • Unit

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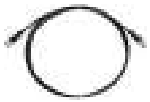
Areas of application

JUMO dTRANS T09, cable transmitter for temperature

Connection
Directly or via cable



- JUMO dicoTEMP 100 (type 608740)
- All RTD temperature probes with M12 connectors
- JUMO Dtrans T100 without electronic components (type 902815)
- JUMO VIBROtemp with M12 connector (type 902040)
- RTD temperature probes with connecting line
- and more

Application options:

Type 608740

Type 902815

Type 902040

Order details

	(1)	Basic type
707090		JUMO dTRANS T09 AS Cable transmitter for temperature with analog output of 4 to 20 mA
707091		JUMO dTRANS T09 DS Cable transmitter for temperature with IO-Link interface
	(2)	**Configuration**
8		Default setting
9		Customer-specific setting
	(3)	**Measurement input**[a]
1011		1× Pt100 in four-wire circuit
1013		1× Pt1000 in four-wire circuit

[a] If feature Pt100 is selected, the connection of a Pt1000 sensor is not possible. Likewise, if feature Pt1000 is selected, the connection of a Pt100 sensor is not possible. In the JUMO dTRANS T09 AS version the output is scaled to 0 to 100 °C per default.

	(1)		(2)		(3)
Order code		/		-	
Order example	707090	/	8	-	1011

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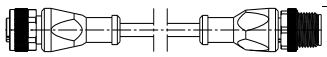
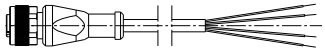
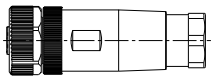
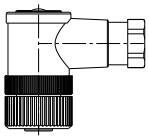
Accessories

General Information

Designation			Part no.
Connection cable	JUMO M12 connecting cable, 5-pole	 500 mm	00638312
		1 500 mm	00638313
Connecting line	PVC connecting line, with socket M12 × 1, 2 000 mm		00404585
Cable socket M12 × 1 for self-assembly	straight, without connecting line, 5-pole		00419130
	Angled, without connecting line, 5-pole		00419133

JUMO dTRANS T09 AS, type 707090

Designation		Part no.
Required configuration tools:	Setup program on CD-ROM, multilingual	00485016
	PC interface with USB/TTL converter and USB line	00456352
	Configuration line, 4-pole with connector and socket M12 × 1, and Western plug RJ-45	00484692
Power supply units for transmitter, single and 4-fold (data sheet 707500)		- -
Isolation amplifier and supply isolator for the galvanic isolation of standard signals and voltage supply for two-wire transmitters (data sheet 707530)		00577948

JUMO dTRANS T09 DS, type 707091

Designation	Part no.
IO-Link master upon request	- -
Device data (IODD) on www.jumo.de or on http://ioddfinder.io-link.com.	- -

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Power Supply Units for Transmitters

For mounting according to DIN EN 60715 on to
DIN rail 35 mm × 7.5 mm
DIN rail 15 mm
G-rail

Brief description

The power supply units are used for the stabilized voltage supply of transmitters. They provide a DC 24 V voltage supply that is galvanically isolated from the mains.

Type 707500/..., 022 **Type 707500/..., 055**

Technical data

General data

Operating temperature range
-10 to +50 °C

Storage temperature range
-20 to +70 °C

Resistance to climatic conditions
Rel. humidity ≤ 75 %
annual average, without condensation

Installation position
Vertical

Electrical connection
Via screw terminal for wire or stranded wire with up to 2.5 mm^2 conductor cross section

Electrical safety
Acc. to EN 61010-1
Overvoltage category II
Pollution degree 2

Protection type
IP20 acc. to DIN EN 60529

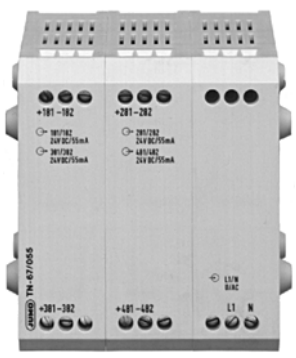
Output voltage
DC 24 V (stabilized)

Short-circuit resistance
707500/..., 022: short-circuit protection
707500/..., 055: limited short-circuit protection
707501/..., 025: limited short-circuit protection
707502/..., 055: limited short-circuit protection

Power consumption
707500/..., 022: ca. 1.5 VA
707500/..., 055: ca. 3 VA
707501/..., 025: ca. 8 VA
707502/..., 055: ca. 15 VA

Weight
707500/..., 022: 125 g
707500/..., 055: 210 g
707501/..., 025: 450 g
707502/..., 055: 600 g

Type 707501/..., 025



Type 707502/..., 055

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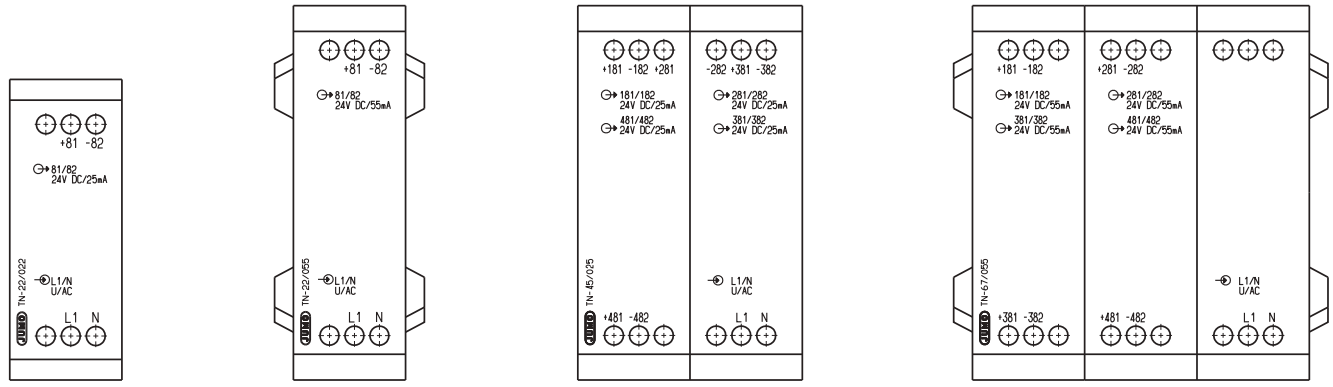
Connection diagram



707500/..., 022 **707500/..., 055** **707501/..., 025** **707502/..., 055**

707500/..., 022 and 707500/..., 055

Connection for		**Terminal assignment**		
Voltage supply	AC	L1 N	Line conductor Neutral conductor	L1 N L1 N
Output	DC	81+ 82-	DC 24 V at 707500/..., 022: 22 mA at 707500/..., 055: 55 mA	81 82 + -

707501/..., 025 and 707502/..., 055

Connection for		**Terminal assignment**		
Voltage supply	AC	L1 N	Line conductor Neutral conductor	L1 N L1 N
Output	DC	181+ 182-	DC 24 V at 707501/..., 025: 25 mA at 707502/..., 055: 55 mA	181 182 + -
		281+ 282-	DC 24 V at 707501/..., 025: 25 mA at 707502/..., 055: 55 mA	281 282 + -
		381+ 382-	DC 24 V at 707501/..., 025: 25 mA at 707502/..., 055: 55 mA	381 382 + -
		481+ 482-	DC 24 V at 707501/..., 025: 25 mA at 707502/..., 055: 55 mA	481 482 + -

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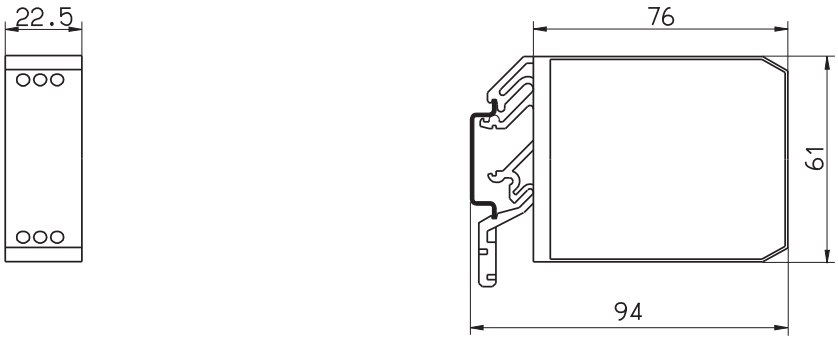
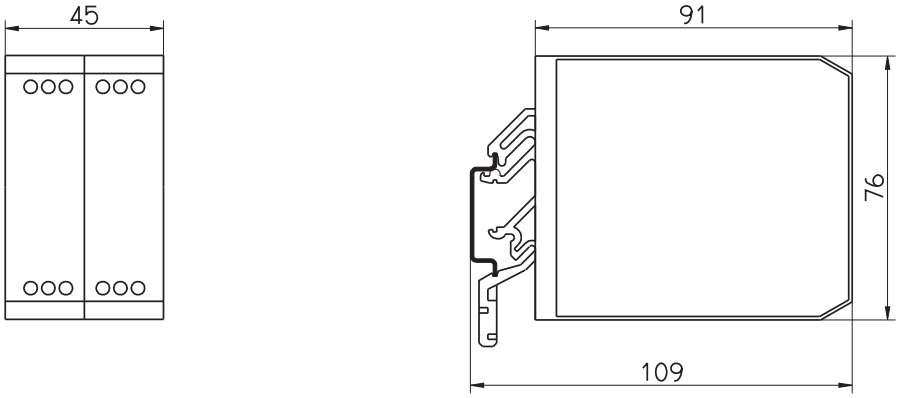
Dimensions

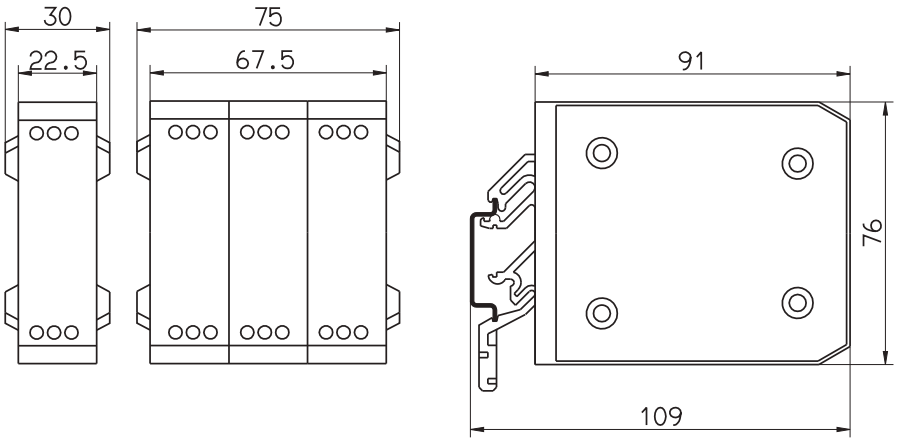
707500/..., 022



707501/..., 025



707500/..., 055
707502/..., 055



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Order details: power supply units for transmitters

					(1) Basic type
				707500	Power supply unit TN-22 1× DC 24 V ±10 % Dimensions: 22.5 mm × 61 mm × 76 mm
				707500	Power supply unit TN-22 1× DC 24 V ±10 % Dimensions: 30 mm × 76 mm × 91 mm
				707501	Power supply unit TN-45 4× DC 24 V ±10 % Dimensions: 45 mm × 76 mm × 91 mm
				707502	Power supply unit TN-67 4× DC 24 V ±10 % Dimensions: 75 mm × 76 mm × 91 mm
					(2) Voltage supply
x	x	x	x	02	AC 230 V +10/-15 %, 48 to 63 Hz
x	x	x	x	04	AC 115 V +10/-15 %, 48 to 63 Hz
					(3) Maximum current
x				022	22 mA
		x		025	25 mA
	x		x	055	55 mA

	(1)		(2)		(3)
Order code		/		,	
Order example	707502	/	02	,	055

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JUMO Ex-i Power Supply/Input Isolating Amplifier

Brief description

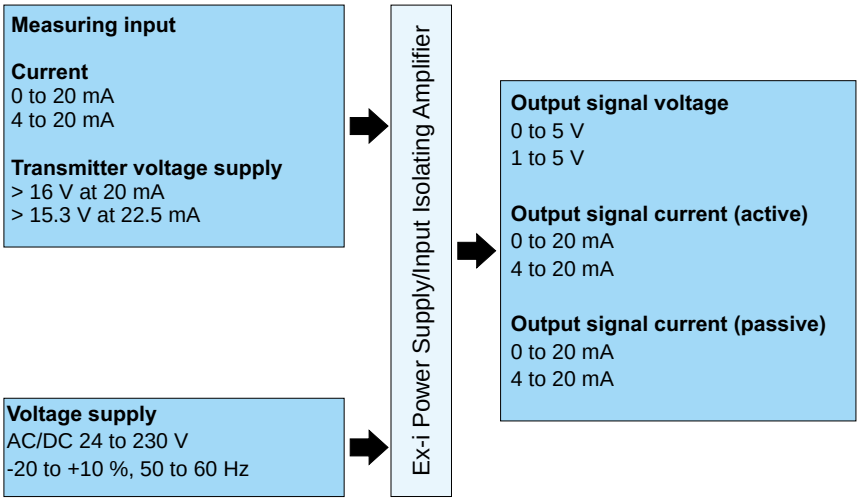
The JUMO Ex-i power supply/input isolating amplifier 707530 is designed for operating intrinsically safe transmitters (Ex-i) and mA current sources installed in potentially explosive (Ex) areas. The connected 2-wire transmitters are supplied with energy and analog 0/4 to 20 mA measured values are transmitted from the potentially explosive area to the non-explosive area.

The external connection defines whether the device operates in supply isolating amplifier mode or isolating amplifier mode. The output of the module can be operated in active or passive mode. Digital (HART) communication signals can be superimposed over the analog measured value on the Ex or non Ex side and transmitted bidirectional.

To increase the HART impedance in low-resistance systems an additional resistor can be activated in the output circuit using the switch on the device's front. The device provides a 3-way electrical isolation and the energy supply is designed as wide range power supply (24 to 230 V).

Type 707530

Block diagram



Special features

- HART capable
- SIL2 approval
- Wide range power supply

Approvals/approval marks (see "Technical data")

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36039 Fulda, Germany
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Email: mail@jumo.net
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JUMO Instrument Co. Ltd.
JUMO House
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Internet: www.jumousa.com

Technical data

Measuring input

Input signal current	0 to 20 mA 4 to 20 mA
Transmitter supply voltage	> 16 V (at 20 mA) > 15.3 V (at 22.5 mA)

Measuring outout

Signal output	Current output
Output signal voltage	0 to 5 V (internal resistance, 250 Ω, 0,1 %) 1 to 5 V (internal resistance, 250 Ω, 0,1 %)
Output signal current	0 to 20 mA (active) 4 to 20 mA (active) 0 to 20 mA (passive, external source voltage 14 to 26 V) 4 to 20 mA (passive, external source voltage 14 to 26 V)
Burden/output load current output	< 600 Ω (at 20 mA) < 525 Ω (at 22.5 mA)

General information

Number of channels	1
Transmission error max.	< 0,1 % (of end value)
Transmission error typical	< 0,05 % (of end value)
Temperature coefficient max.	< 0,01 %/K
Ambient temperature (operation)	-20 to +60 °C (any installation position)
Ambient temperature (storage/transport)	-40 to +80 °C
Admissible air humidity (operation)	10 to 95 % (no condensation)
Step response (10 to 90 %)	< 600 µs (for step 4 to 20 mA)
Status display	LED green (voltage supply)
Width	17.5 mm
Height	99 mm
Depth	114.5 mm
Flammability class according to UL 94	V0
Material of case	Polyamide (PA 6.6)
Color	Gray
EMC	EN 61326-1

Voltage supply

Range of voltage supply	AC/DC 24 to 230 V, -20 to +10 %, 50 to 60 Hz
Current consumption	< 80 mA (at DC 24 V)
Power consumption	< 1,6 W

Data communication (bypass)

HART function	Yes
Supported protocols	HART

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Connection

Conductor cross section rigid min.	0.2 mm^2
Conductor cross section rigid max.	2.5 mm^2
Conductor cross section flexible min.	0.2 mm^2
Conductor cross section flexible max.	2.5 mm^2
Conductor cross section AWG/kcmil min.	24
Conductor cross section AWG/kcmil max.	14
Stripping length	7 mm
Thread	M3
Connection type	Screw connection
Tightening torque min.	0.5 Nm
Tightening torque max.	0.6 Nm

Electrical isolation

Operating mode	Repeater power supply operation and input isolating amplifier operation
Input/output Peak value according to EN 60079-11	375 V_{peak}
Input/supply Peak value according to EN 60079-11	375 V_{peak}
Input/output/supply Test voltage Rated insulation voltage (overvoltage category II, pollution degree 2, safe isolating according to EN 61010-1)	 AC 2.5 kV, 50 Hz, 1 min. 300 V_{eff}

Safety data

	Supply isolation amplifier operation	Input isolating amplifier operation
Max. voltage U_o	25.2 V	-
Max. current I_o	93 mA	-
Max. power P_o	587 mW	-
Max. voltage U_i	-	30 V
Max. current I_i	-	150 mA
Max. internal inductance L_i	-	negligible
Max. internal capacitance C_i	-	negligible
Gas group	IIC	-
Max. external inductance L_o	2 mH	-
Max. external capacitance C_o	107 nF	-
Max. voltage U_m for output	AC 253 V (DC 125 V)	-
Max. voltage U_m for supply	AC/DC 253 V	-

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Approvals/approval marks

Approval marks	Testing agency	Certificates/ certification numbers	Inspection basis	Valid for
⟨Ex⟩ II (1) G [Ex ia Ga] IIC/IIB ⟨Ex⟩ II (1) D [Ex ia Da] IIIC ⟨Ex⟩ II 3 (1) G Ex nA [ia Ga] IIC/IIB T4 Gc	DEKRA EXAM	BVS 12 ATEX E 090 X	EN 60079-0:2012 + A11:2013 EN 60079-11:2012 EN 60079-15:2010	
SIL2	DEKRA EXAM	BVS PB 04/12	EN 61508	
UL us	Underwriters Laboratories	E354603 C.D.-No 83135047	UL 61010-1 UL 913	USA

Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Input (Ex-i)

Connection for	Terminals
Supply isolating amplifier mode (2-wire transmitter)	4.1 (+) and 4.2 (-)
Input isolating amplifier mode (4-wire transmitter or power sources)	4.2 (+) and 4.3 (-)

Output of current without HART communication

Connection for	Terminals	DIP-switch position[a]	
		S1	S2
Source (passiv input card)	3.1 (+) and 3.2 (-)	I	II
Sink (active input card)	3.2 (+) and 3.3 (-)	I	II

[a] The two DIP-switches are located at the front of the device. Settings made to the device with DIP-switches must occur in a voltage-free state.

Output of current with HART communication

Connection for	Electrical circuit impedance	Connection		DIP-switch position[a]	
		of the input card at terminal	of the HART communicator	S1	S2
Source (passiv input card)	≥ 250 Ω	3.1 (+) and 3.2 (-)	3.1 and 3.2	I	II
	< 250 Ω	3.1 (+) and 3.2 (-)	3.2 and 3.3	I	I
Sink (active input card)	≥ 250 Ω	3.2 (+) and 3.3 (-)	3.2 and 3.3	I	II
	< 250 Ω	3.2 (+) and 3.3 (-)	-	I	II

[a] The two DIP-switches are located at the front of the device. Settings made to the device with DIP-switches must occur in a voltage-free state.

Output Voltage

Connection for	Connection of the input card at the terminal	DIP-switch position[a]	
		S1	S2
Source – passive input card	3.1 (+) and 3.2 (-)	II	II

[a] The two DIP-switches are located at the front of the device. Settings made to the device with DIP-switches must occur in a voltage-free state.

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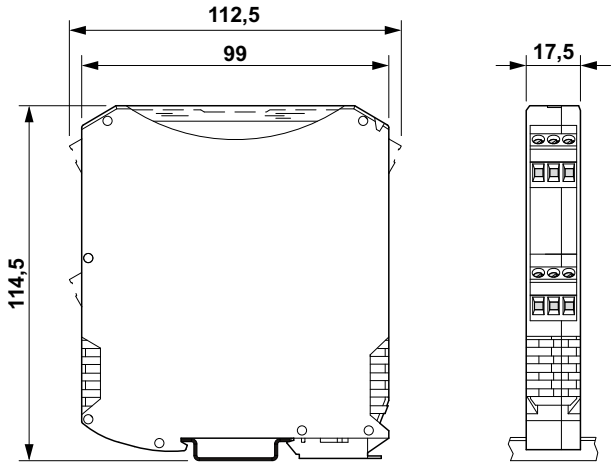
Voltage supply

Connection for	Connection at terminals
AC/DC 24 to 230 V, 50/60 Hz	1.1 and 1.2

Dimensions



Order details

	(1)	Basic type
707530		Ex-i power supply/input isolating amplifier
	(2)	**Voltage supply**
38		AC/DC 24 to 230 V, -20 to +10 %, 50 to 60 Hz

	(1)		(2)
Order code		/	
Order example	707530	/	38

Scope of delivery

1 Ex-i power supply/input isolating amplifier in the ordered version
1 Operating manual

Accessories

Description	Part no.
JUMO dTRANS T01 Ex	00372362
JUMO dTRANS T01 Ex HART	00391004

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JUMO Ex-i Isolating Switch Amplifier

Brief description

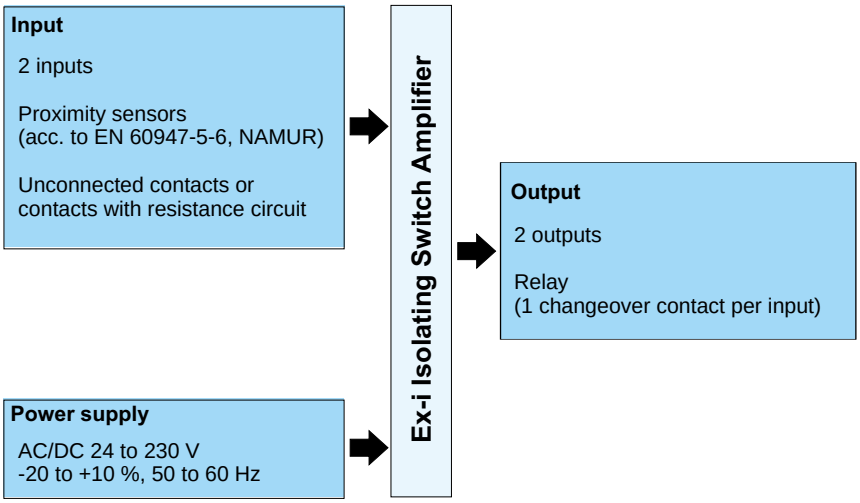
JUMO Ex-i isolating switch amplifier ensures reliable, galvanic isolation and safe transfer of switch signals in a wide range of applications.

The intrinsically safe isolating switch amplifier is also suitable for use in Ex areas. It can be mounted in Ex zone 2 and used with a sensor in zone 0.

The JUMO Ex-i isolating switching amplifier is ideal for JUMO NESOS float switches with 2 switch contacts and also supports NAMUR proximity sensors. In addition, it features an extended ambient temperature range from -40 to +60 °C. The two-channel version eliminates the need for a second isolating switch amplifier so that it saves costs as well as space in the control cabinet.

Type 707540

Block diagram



Special features

- Intrinsically safe inputs for contacts or NAMUR proximity sensors
- 2 channels
- Output: 1 changeover relay (PDT) per channel
- Galvanic three-way isolation
- Wide-range power supply
- Line fault detection (line break, short circuit)
- Configuration with DIP switches
- Phase reversal option (switching output)
- Coded screw terminals for conductor cross sections from 0.2 to 2.5 mm²
- Extended ambient temperature range from -40 to +60 °C

Approvals and approval marks (see "Technical data")

*

* in development

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Technical data

Input

Input signals	Intrinsically safe, ⚠CAT II (250 V against ⏚)
NAMUR proximity sensors	in accordance with EN 60947-5-6
Switch contacts	Unconnected
Switch contacts	With resistance circuit
Number	2
Switching points	
Blocking	< 1.2 mA
Conducting	> 2.1 mA
Short-circuit current	~ 8 mA
Switching hysteresis	< 0.2 mA
Non-load voltage	~ 8 V DC
Line fault detection	
Break	0.05 mA < I_{IN} < 0.35 mA
Short-circuit	100 Ω < R_{Sensor} < 360 Ω

Output

Output data	Relay output, ⚠CAT II (250 V against ⏚)
Quantity	2
Contact type	1 PDT per channel
Maximum switching voltage	250 V AC (2 A, 60 Hz) / 120 V DC (0.2 A) / 30 V DC (2 A)
Maximum switching capacity	500 VA
Recommended minimum load	5 V / 10 mA
Mechanical service life	10^7 cycles
Switching frequency	≤ 20 Hz (load-dependent)

General data

Supply voltage range	24 to 230 V AC/DC (-20 to +10 %, 50 to 60 Hz)
Max. current consumption	≤ 42 mA (24 V DC), ≤ 80 mA (20 V AC), maximal ≤ 80 mA
Power dissipation	≤ 1.3 W
Power consumption	≤ 1.1 W
Step response	
N/O contact: ON/OFF	~ 6 ms
N/O contact: OFF/ON	~ 6 ms
N/C contact: ON/OFF	~ 4 ms
N/C contact: OFF/ON	~ 10 ms
Ambient temperature range	
Operation	-40 to +60 °C
Storage/transport	-40 to +80 °C
Humidity	10 to 95 %, non-condensing
Maximum altitude for use above sea level	≤ 2000 m
Degree of protection	IP20 in accordance with DIN EN 60529 (not assessed by UL)
Inflammability class in acc. with UL 94	V0 (housing)
Housing type	PA 6.6-FR gray (indoor use)
Electromagnetic compatibility	In accordance with DIN EN 61326-1
Interference emission	Class A – only for industrial use –
Noise immunity	Industrial requirement

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Connection

Conductor cross section rigid min.	0.2 mm^2
Conductor cross section rigid max.	2.5 mm^2
Conductor cross section flexible min.	0.2 mm^2
Conductor cross section flexible max.	2.5 mm^2
Conductor cross section AWG/kcmil min.	24
Conductor cross section AWG/kcmil max.	14
Stripping length	7 mm
Thread	M3
Connection type	Screw connection
Tightening torque min.	0.5 Nm
Tightening torque max.	0.6 Nm

Electrical isolation

Input/output	
Peak value acc. to EN 60079-11	375 V
Overvoltage category	III
Degree of pollution	2
Input/power supply	
Peak value acc. to EN 60079-11	375 V
Rated insulation voltage	300 V_{eff}
Test voltage	2.5 kV AC (50 Hz, 1 min.)
Overvoltage category	II
Degree of pollution	2
Safe isolation acc. to IEC/EN 61010-1	
Output 1/output 2/input, power supply	
Rated insulation voltage	300 V_{eff}
Test voltage	2.5 kV AC (50 Hz, 1 min.)
Overvoltage category	III
Degree of pollution	2
Safe isolation acc. to IEC/EN 61010-1	

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Safety data in accordance with ATEX and IECEx

Intrinsically safe sensor input					
Max. output voltage U_o	9.56 V				
Max. output current I_o	10.3 mA				
Max. output power P_o	25 mW				
Group	IIB/IIIC				
Max. external inductance L_o	1000 mH				
Max. external capacitance C_o	26 µF				
Additional text	Simple circuit				
Group	IIB/IIIC				
Max. external inductance L_o	100 mH	5 mH	1 mH	10 µH	
Max. external capacitance C_o	1 µF	1 µF	1 µF	1 µF	
Additional text	Mixed circuit				
Group	IIC				
Max. external inductance L_o	300 mH				
Max. external capacitance C_o	3.6 µF				
Additional text	Simple circuit				
Group	IIC				
Max. external inductance L_o	100 mH	50 mH	5 mH	1 mH	10 µH
Max. external capacitance C_o	510 nF	580 nF	600 nF	600 nF	600 nF
Additional text	Mixed circuit				
Max. internal inductance L_i	Negligible				
Max. internal capacitance C_i	11 nF				
Safety-related maximum voltage U_m					
Supply terminals	253 V AC/DC				
Output terminals	250 V AC / 120 V DC				

Approvals and approval marks

ATEX	IBExU 20 ATEX 1107 X, issue 0 (2020-10-21) ⇨ "Special conditions for use:", Page 4
Identification marking	Ⓔx II (1) G [Ex ia Ga] IIC Ⓔx II (1) D [Ex ia Da] IIIC Ⓔx I (M1) [Ex ia Ma] I Ⓔx II 3(1) G Ex ec nC [ia Ga] IIC T4 Gc
IECEx	IECEx IBE 20.0029 X, issue 0 (2020-10-21) ⇨ "Special conditions for use:", Page 4
Identification marking	[Ex ia Ga] IIC [Ex ia Da] IIIC [Ex ia Ma] I Ex ec nC [ia Ga] IIC T4 Gc
UL, USA / Canada	Class I Div 2 IS for Class I, II, III Div 1
Shipbuilding approval (DNV GL)	B, B, A, A Required protection according to the Rules shall be provided upon installation on board
Safety Integrity Level (SIL)	IEC 61508 (in development)

Special conditions for use:

- For installation in category 3, zone 2 potentially explosive areas, the Ex-i isolated switch amplifier must be installed in housing that satisfies the requirements of EN 60079-7 (at least IP54) or another recognized type of protection.
- The connections of non-intrinsically safe circuits must not be connected or disconnected in zone 2 when the power is connected.
- The DIP switches may only be used if no explosive atmosphere is present.

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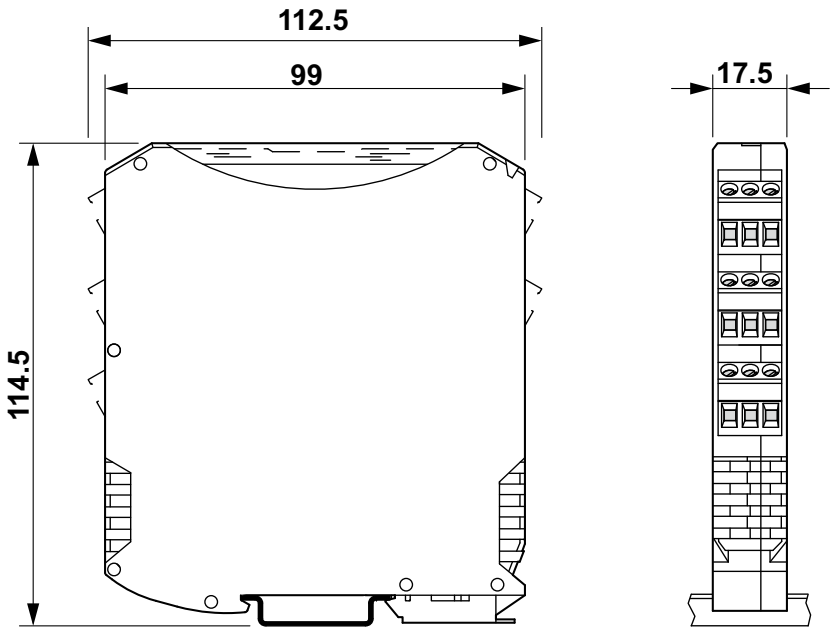
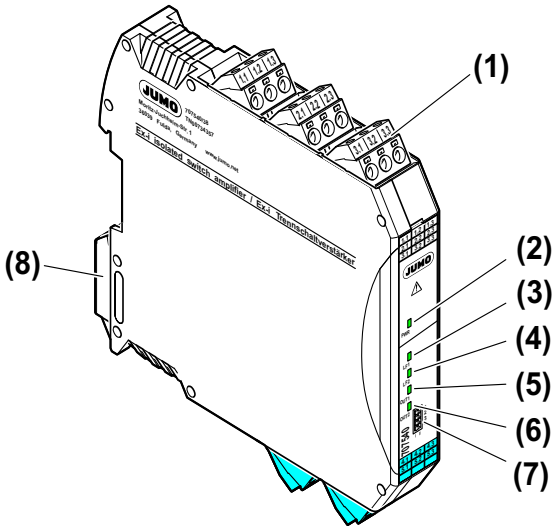
Dimensions



Display and control elements



(1) Pluggable screw connection terminal block
(2) Green “PWR” LED, power supply
(3) Red "LF1" LED, line fault on sensor line 1
(4) Red "LF2" LED, line fault on sensor line 2
(5) Yellow "OUT1" LED, status of relay 1
(6) Yellow "OUT2" LED, status of relay 2
(7) Switch DIP 1 to DIP 4
(8) Snap-on foot for DIN rail mounting

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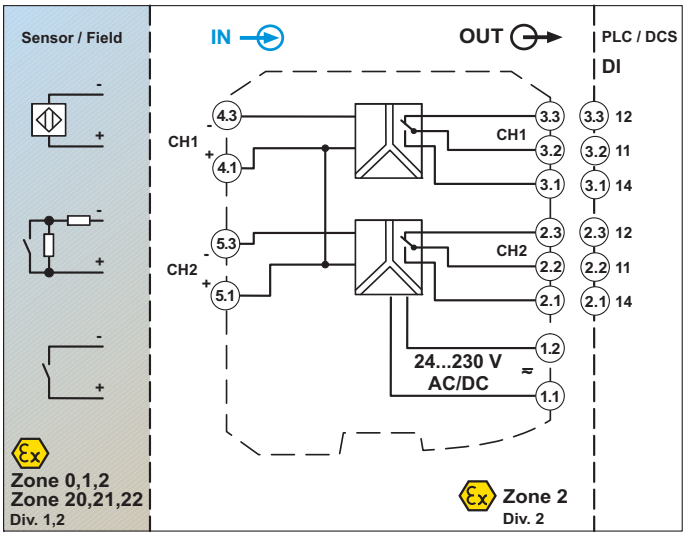
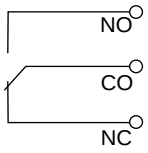
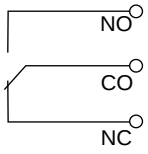


Input (Ex-i)

Connection for	Terminals
NAMUR proximity sensors or switch contacts (with resistance circuit)	
Channel 1	4.1 (+) and 4.3 (-)
Channel 2	5.1 (+) and 5.3 (-)

Output

Connection for	Terminals
1 relay (PDT) per channel	
Channel 1 	NO = 3.1 CO = 3.2 NC = 3.3
Channel 2 	NO = 2.1 CO = 2.2 NC = 2.3

NO = Normally Open
CO = Change Over
NC = Normally Closed

Voltage supply

Connection for	Terminals
AC/DC 24 to 230 V	1.1 and 1.2

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Configuration

By default upon delivery, all DIP switches are in the “I” position.

Effective direction (switch DIP 1 = channel 1, DIP 3 = channel 2)

I = Normal phase (operating current behavior)

II = Inverse phase (closed circuit current behavior)

Line fault detection (switch DIP 2 = channel 1, DIP 4 = channel 2)

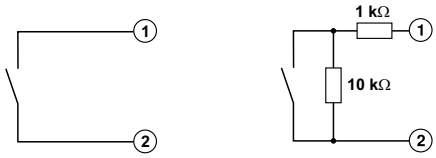
= Line fault detection disabled - not permitted for safety-related applications

II = Line fault detection enabled

If a line fault occurs, the relay trips and the red LED "LF" flashes (NE 44).

NOTE

For switch contacts with an open circuit, line fault detection (LF) must be disabled or the corresponding resistance circuit must be provided directly at the contact.



Operating mode table

Sensor in input		Input circuit	DIP switch				Output		LED	
			Channel 1		Channel 2		Relay contact			
Switch	NAMUR	State	1	2	3	4	N/O contact	N/C contact	OUT	LF
Open	Blocking / open	OK	I	I	I	I	Open	Closed		–
Closed	Conducting / closed	OK	I	I	I	I	Closed	Open	X	–
Open	Blocking / open	OK	II	I	II	I	Closed	Open	X	–
Closed	Conducting / closed	OK	II	I	II	I	Open	Closed		–
	Blocking / open	OK	I	II	I	II	Open	Closed		
	Conducting / closed	OK	I	II	I	II	Closed	Open	X	
	Any	Wire break	I	II	I	II	Open	Closed		X
	Any	Short-circuit	I	II	I	II	Open	Closed		X
	Blocking / open	OK	II	II	II	II	Closed	Open	X	
	Conducting / closed	OK	II	II	II	II	Open	Closed		
	Any	Wire break	II	II	II	II	Open	Closed		X
	Any	Short-circuit	II	II	II	II	Open	Closed		X

NAMUR: proximity sensor in accordance with EN 60947-5-6 or switch contact with resistance circuit

X: LED on or flashing

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Order details

	(1)	Basic type
707540		Ex-i isolating switch amplifier
	(2)	**Power supply**
38		AC/DC 24 to 230 V, -20 to +10 %, 50 to 60 Hz

	(1)		(2)
Order code		/	
Order example	707540	/	38

Scope of delivery

1 device in the ordered version
1 operating manual and 1 EU declaration of conformity

Accessories

		
JUMO NESOS R01 LS float switch in miniature form, Data sheet 408301	JUMO NESOS R02 LS standard version float switch, Data sheet 408302	JUMO NESOS R03 LS float switch with chamber, Data sheet 408303
		
JUMO NESOS R04 LS float switch in curved version, Data sheet 408304	JUMO NESOS R40 LSH horizontal float switch Data sheet 408340	

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JUMO TYA 432
Thyristor Power Switch

Type 709010/1-50-480

Brief description

Thyristor power switches are required for contactless switching of alternating current consumers. A typical application is the switching of ohmic-inductive loads at a high switching frequency. This applies especially to the industrial sector in areas such as the plastic packaging industry, air conditioning and heat technology, and industrial furnace construction.
The control and power sections are galvanically isolated by optocouplers.
The control signal range is compatible with the logic outputs of JUMO controllers.
The power section operates as a zero voltage switch. As a result, it is switched on at zero voltage and switched off at zero current, irrespective of the time when the control signal changes. This way, interference voltage is avoided. A varistor is internally integrated on the output side to protect against voltage peaks from the mains voltage.
The input status is displayed by an LED.

- **Load currents 25 A and 50 A (max.)**
- **Load voltages 240 V and 480 V**
- **Control voltage DC 4 to 32 V**
- **UL approval (E223137)**

Technical data

Load circuit

Type	**709010/1-25-240**	**709010/1-50-480**
Load voltage	24 to 265 V_{eff}	42 to 530 V_{eff}
Load current (maximal)	25 A_{eff}	50 A_{eff}
Load current (minimal)	150 mA_{eff}	
Fuse maximum load integral $I^2 \cdot t$ (t = 10ms)	≤ 310 $A^2 \cdot s$	≤ 1800 $A^2 \cdot s$
Frequency	45 to 65 Hz	
Peak blocking voltage	≥ 650 V_s	≥ 1400 V_s
Leakage current	≤ 3 mA	
cos φ	> 0.5 at 230 V_{eff}	> 0.5 at 480 V_{eff}

Control

Control signal range	DC 4 to 32 V
Switch-on voltage	Higher than DC 2.75 V for 709010/1-25-240 Higher than DC 3.75 V for 709010/1-50-480
Switch-off voltage	Lower than DC 2 V
Input current	≤ 10 mA at DC 32 V
Response delay	≤ 0.5 · pulse period

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General specifications

Operating mode	Zero point control
Galvanic isolation	Between the control and power section through optocouplers; insulation voltage ≥ 4 kV
Thermal resistance Barrier housing	0.8 K/W for 709010/1-25- 240 0.5 K/W for 709010/1-50- 480
Admissible ambient temperature	–20 to +70 °C
Storage temperature	-40 to +100 °C
Resistance to climatic conditions	95 % relative air humidity, non-condensing
Electrical connection	By means of screw terminals (load: □ 16 mm^2 (max.)/control: □ 2.5 mm^2 (max.))
Electromagnetic compatibility	DIN EN 61000 - 6 - 4 DIN EN 61000 - 6 - 2
Electrical safety	Overvoltage category III Pollution degree 3 (from outside) Pollution degree 2 (in housing)
Housing	Noryl 6FN 1
Protection type	IP20
Weight	60 g

Reduction tables

The maximal thermal resistance between the thyristor power switch's base plate and the surrounding environment $R_{(thSA)}$ is determined depending on the load currents and the various ambient temperatures. The matrix below should be used for this purpose. You can also use this matrix to check the power loss for a given nominal current.

Example:
Current I = 15 A resistive load
T_A = 40 °C (measured during operation when installed in a control cabinet)
Selected thyristor power switch: 709010/1-25- 240
The matrix shows that the maximal thermal resistance of the heat sink is 3.8 K/W.

Important information:
Use a silicone-based heat-conducting paste between the heat sink and the thyristor power switch. If you use a silicone-free heat-conducting paste, please check to make sure that the chemical silicone replacement does not affect the Noryl SE 1 GFN 1 in the plastic housing. A recommended heat-conducting paste based on silicone is, for example, Dow Cornering.
In order to ensure operational safety at maximal output, please pay close attention to the thermal requirements listed in the reduction tables.

709010/1-25-240

Load current [A] \ Thermal resistance [°C/W]	20	30	40	50	60	70	Power loss [W]
25.0	2.70	2.34	1.98	1.61	1.25	0.89	28
22.5	3.10	2.69	2.28	1.86	1.45	1.04	24
20.0	3.61	3.13	2.65	2.18	1.70	1.23	21
17.5	4.26	3.70	3.14	2.59	2.03	1.47	18
15.0	5.14	4.47	3.80	3.14	2.47	1.80	15
12.5	6.38	5.56	4.73	3.91	3.09	2.27	12
10.0	8.25	7.19	6.14	5.08	4.02	2.97	9
7.5	11.4	9.94	8.49	7.04	5.59	4.14	7
5.0	17.7	15.4	13.2	11.0	8.74	6.51	4
2.5	-	-	-	-	18.2	13.6	2

Thermal resistance junction-environment, R_{thJA}	< 20.0	°C/W
Thermal resistance junction-baseplate, R_{thJC}	< 0.80	°C/W
Thermal resistance baseplate-heat sink, R_{thCS}	< 0.20	°C/W
Max. permissible baseplate temperature	100	°C
Max. permissible junction temperature	125	°C

709010/1-50-480

Load current [A] \ Thermal resistance [°C/W]	20	30	40	50	60	70	Power loss [W]
50.0	1.03	0.86	0.70	0.53	0.37	0.20	61
45.0	1.27	1.09	0.90	0.71	0.52	0.33	53
40.0	1.54	1.32	1.10	0.89	0.67	0.45	48
35.0	1.85	1.59	1.34	1.08	0.82	0.57	39
30.0	2.26	1.95	1.65	1.34	1.03	0.72	33
25.0	2.85	2.47	2.08	1.70	1.32	0.94	26
20.0	3.73	3.24	2.75	2.26	1.77	1.27	20
15.0	5.22	4.54	3.86	3.19	2.51	1.83	15
10.0	8.21	7.16	6.11	5.05	4.00	2.95	10
5.0	17.2	15.0	12.9	10.7	8.51	6.33	5

Thermal resistance junction-environment, R_{thJA}	< 20.0	°C/W
Thermal resistance junction-baseplate, R_{thJC}	< 0.50	°C/W
Thermal resistance baseplate-heat sink, R_{thCS}	< 0.20	°C/W
Max. permissible baseplate temperature	100	°C
Max. permissible junction temperature	125	°C

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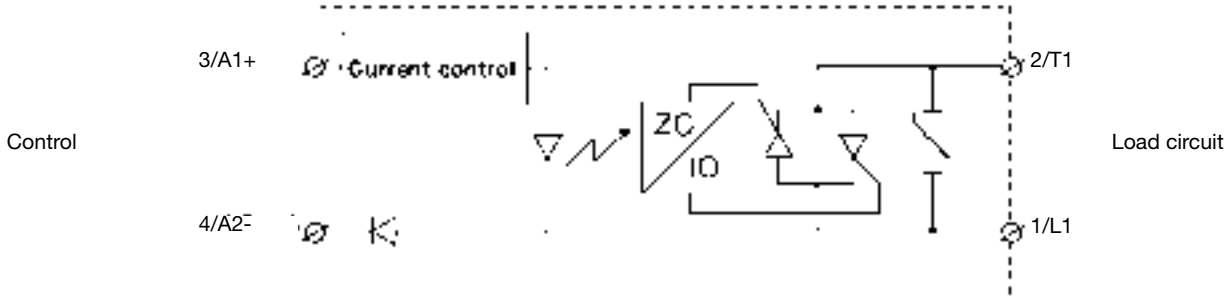
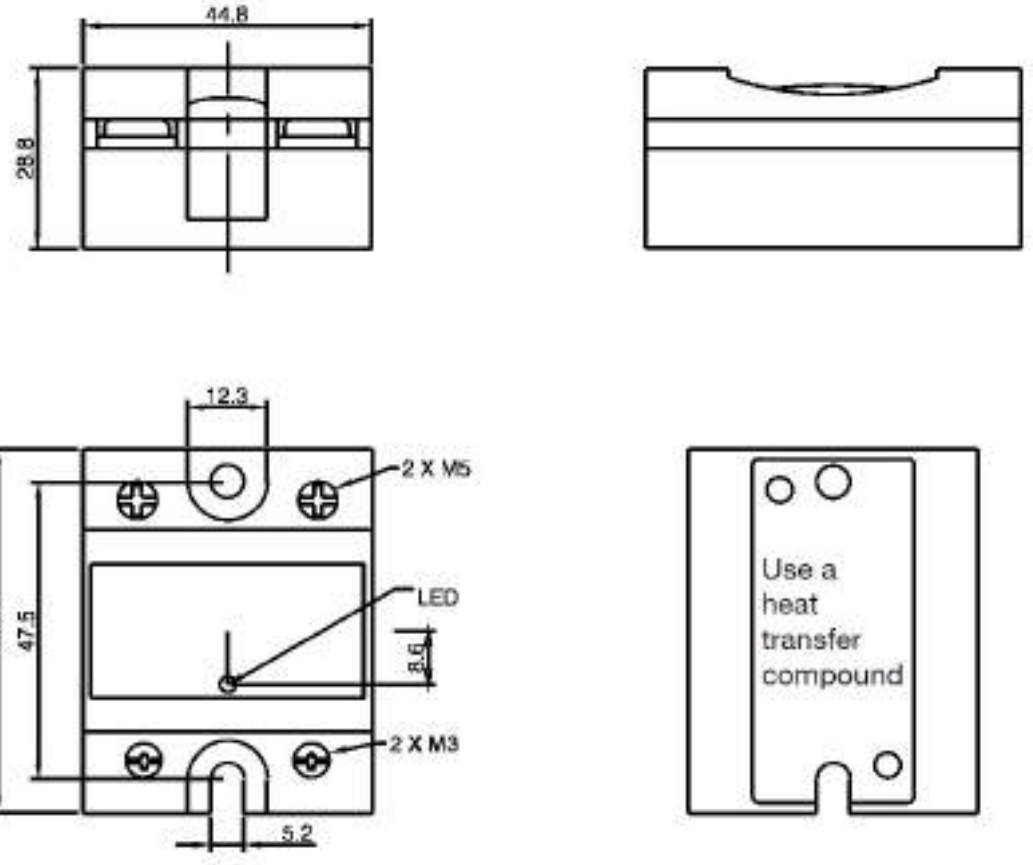
Connection



Dimensions



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Order details

	(1)	Basic type
709010		TYA 432
	(2)	**Circuit type**
1		einphasig
	(3)	**Load current**
25		25 A
50		50 A
	(4)	**Load voltage**
240		AC 240 V
480		AC 480 V

Note:

Load current and load voltage cannot be combined arbitrarily. Only the stock versions are available.

Order code

(1) / **(2)** - **(3)** - **(4)**

[ ] / [ ] - [ ] - [ ]

Stock versions

Type	Load voltage	Load current	Part no.
709010/1-25-240	24 to 265 V_{eff}	25 A_{eff}	00673976
709010/1-50-480	42 to 530 V_{eff}	50 A_{eff}	00673981

In order to ensure fault-free operation and improved availability in applications with thyristor power switches, we recommend using a corresponding semiconductor fuse (e.g. by the company Ferraz).

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JUMO TYA 432 Thyristor power switch with integrated heat sink to be snapped onto a DIN rail or for screw connection

Brief description

Thyristor power switches are required for contactless switching of alternating current consumers. A typical application is the switching of ohmic-inductive loads at a high switching frequency. This applies especially to the industrial sector in areas such as the plastic packaging industry, air conditioning and heat technology, and industrial furnace construction.
The control and power sections are galvanically isolated by optocouplers. The control signal area is compatible with the logic outputs of the JUMO controllers.

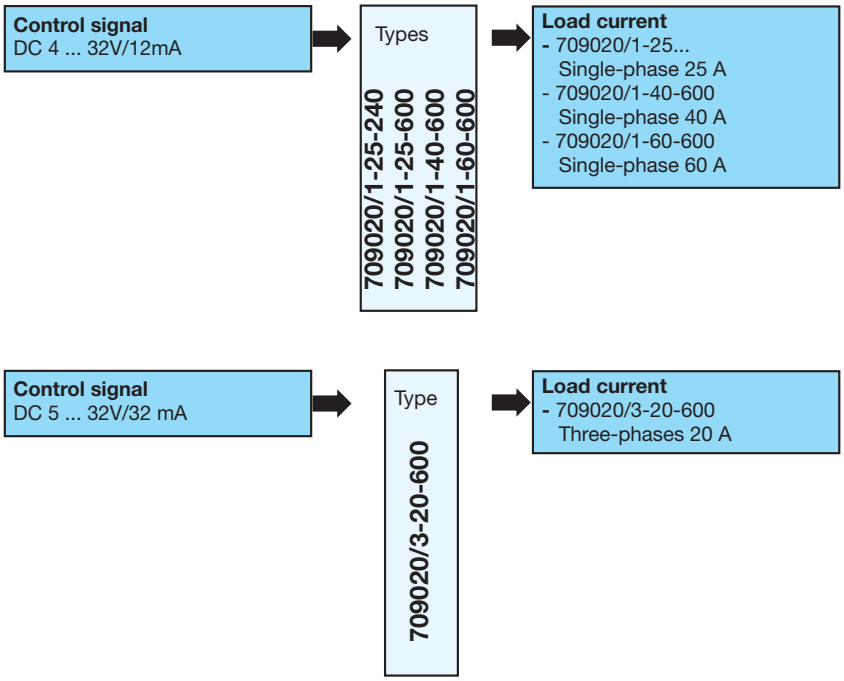
The power section operates as a zero voltage switch. As a result, switching always takes place at zero voltage, irrespective of the time when the control signal changes. This reduces grid disturbances. The input status is indicated by a green LED.

Type 709020/1-25-240
Type 709020/1-25-600

Type 709020/1-40-600
Type 709020/1-60-600

Type 709020/3-20-600

Block diagram



Special features

- Load currents 25, 40, 60 and 3x20 A
- Load voltages 240 V and 600 V (max.)
- Control voltage DC 4 … 32 V
- UL, cUL approval)

Approvals / approval marks (see "Technical data")

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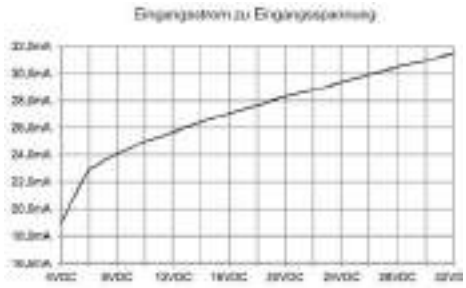
Technical data

Power section

Type	**709020/1-25-240** **709020/1-25-600**	**709020/1-40-600**	**709020/1-60-600**	**709020/3-20-600**
Device illustration				
Operating voltage	AC 24...240 V	AC 42...600 V		
Load current (maximum)	25 A (at 40 °C)	40 A (at 40 °C)	60 A (at 40 °C)	20 A (at 40 °C)
Load current (minimum)	AC 250 mA_{eff}	AC 400 mA_{eff}		AC 250 mA
Load voltage	AC 24…240 V_{eff} AC 42…600 V_{eff}	AC 42…600V_{eff}		
Peak blocking voltage	1600 V_s	1200 V_s		
Leakage current	< AC 3 mA_{eff}			< AC 5 mA_{eff}

Control section

Type	**709020/1-25-240** **709020/1-25-600**	**709020/1-40-600**	**709020/1-60-600**	**709020/3-20-600**
Control signal range	DC 4…32 V			DC 5…32 V
Status LED	If control voltage is applied, the LED constantly lights green			
Switch-on voltage	DC 3.8 V			DC 4.8 V
Switch-off voltage	DC 1 V			
Input current	12 mA at DC 32 V			32 mA at DC 32 V
Input current and -voltage				
Response delay	1 pulse period			< 1 pulse period

General information

Type	**709020/1-25-240** **709020/1-25-600**	**709020/1-40-600**	**709020/1-60-600**	**709020/3-20-600**
Operating mode	Zero point control			
Switching type	1-pole, switched	1-pole, switched	1-pole, switched	3-pole, switched
Galvanic isolation	Between the control and load circuit through optocouplers; insulation voltage 4 kV_{eff}			
Admissible ambient temperature	–40…+80 °C			–40…+70 °C
Admissible storage temperature	–40…+100 °C			

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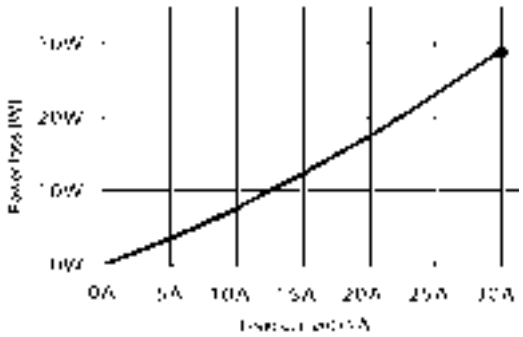
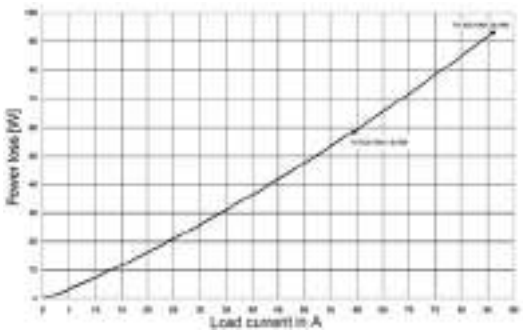
Electrical connection	Via screw terminals			
Max. conductor cross section (rigid) Control section: Power section:	2x0.5...2.5 mm^2 2x2.5...6 mm^2			
Flammability class, housing	UL 94 VO			
Protection type	IP20			
Weight	260 g	515 g	970 g	600 g
Frequency range	45 to 65 Hz			
Fuse maximum load integral $I^2 \cdot t$ (t=10 ms)	1800 $A^2 \cdot s$ 6600 $A^2 \cdot s$	6600 $A^2 \cdot s$		1800 $A^2 \cdot s$

Approvals / approval marks

Approval mark	Test facility	**Certificate / certification number**	**Inspection basis**	**Valid for**
c UL us	Underwriters Laboratories	473841	UL 508	All modules

Reduction characteristic curves

Type	Power loss depending on the load current
709020/1-25-240 **709020/1-25-600**	
709020/1-40-600 **709020/1-60-600**	

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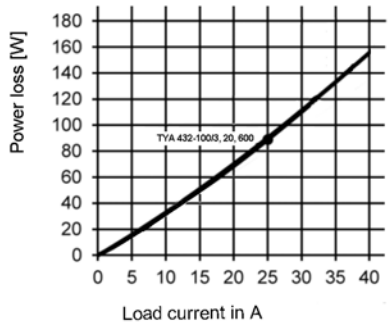
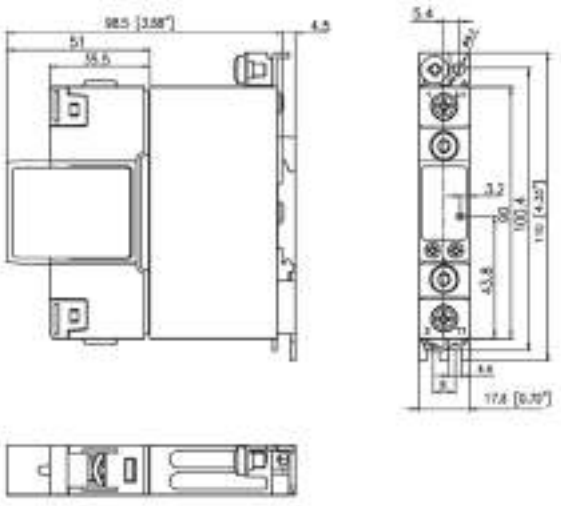
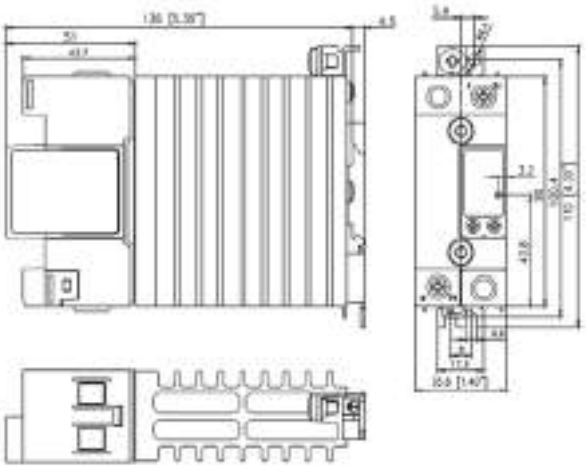
709020/3-20-600	

Dimensions

Type	Drawing
709020/1-25-240 **709020/1-25-600**	
709020/1-40-600	

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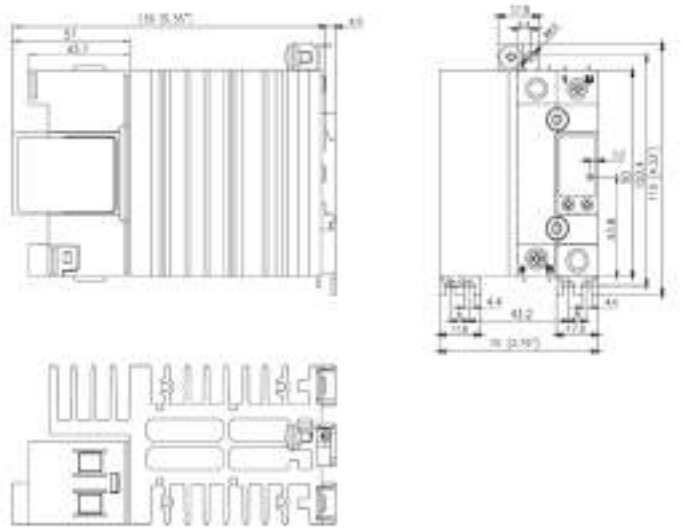
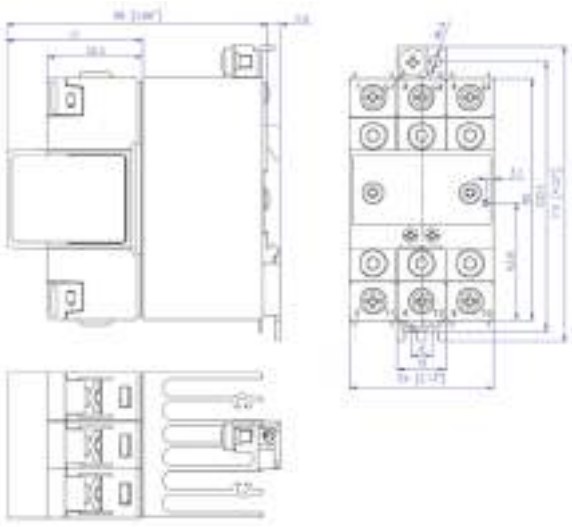
Type	Drawing
709020/1-60-600	
709020/3-20-600	

Permissible load current depending on the ambient temperature and the device distance

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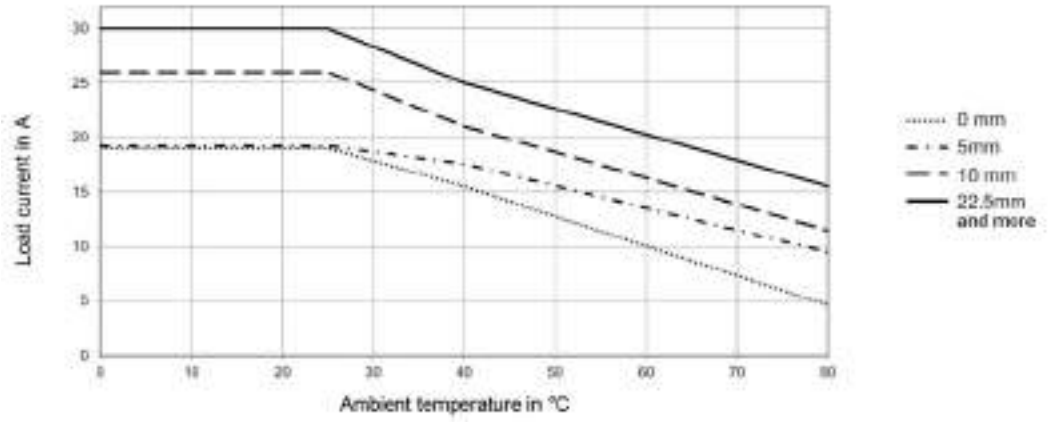
709020/1-25-240 **709020/1-25-600**	

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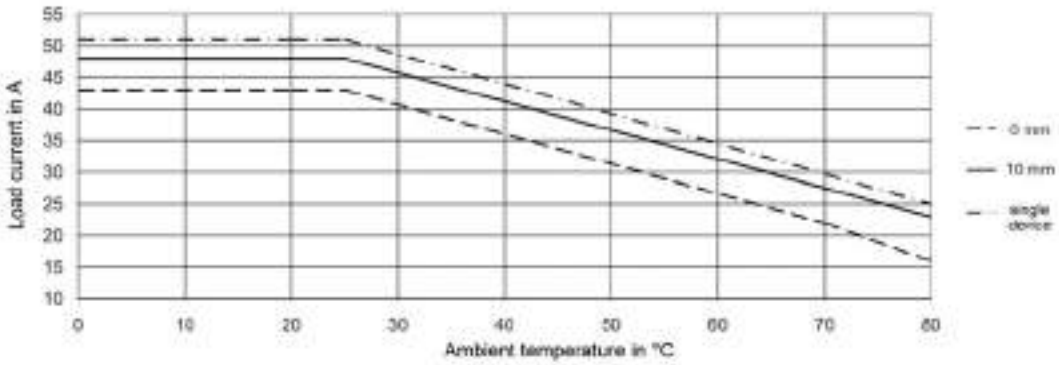
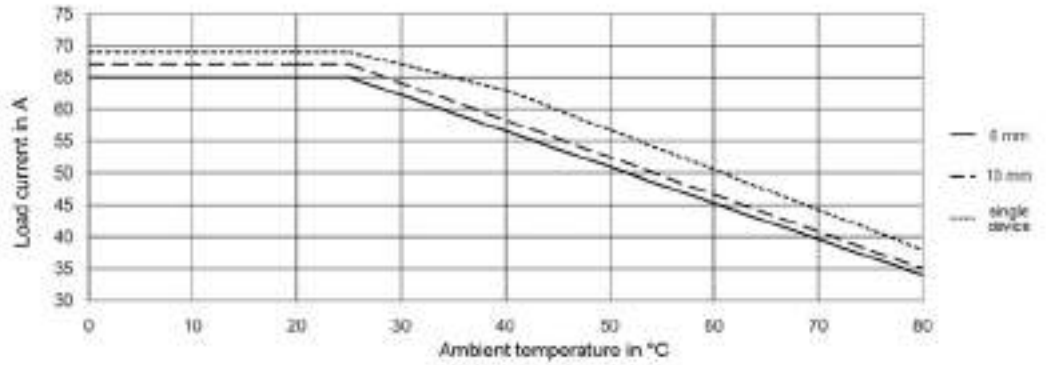
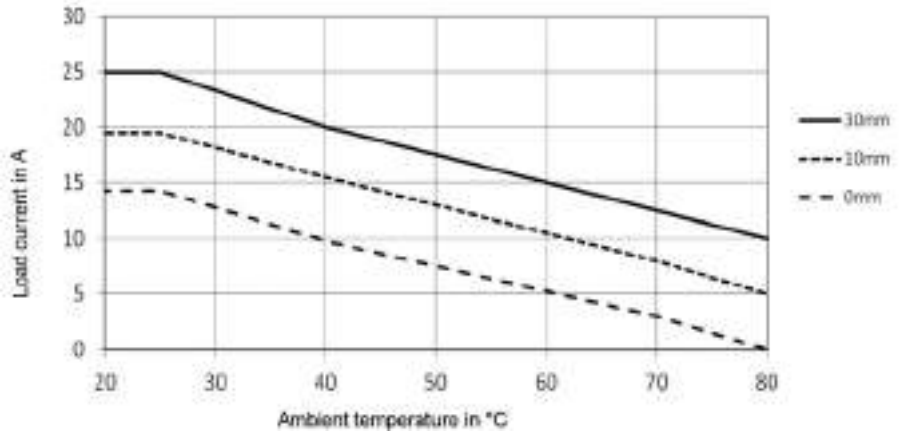
709020/1-40-600	
709020/1-60-600	
709020/3-20-600	

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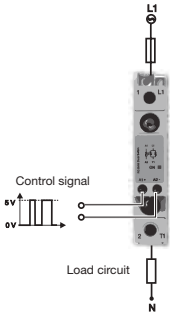
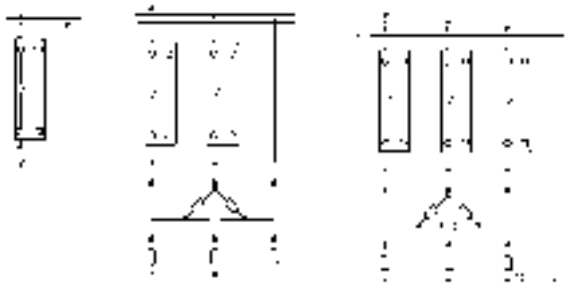
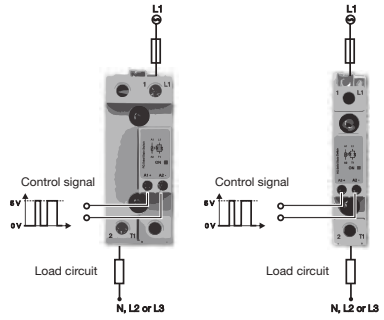
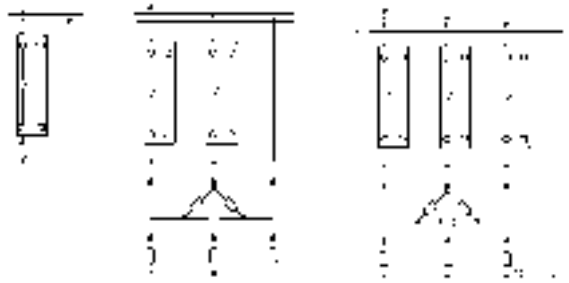
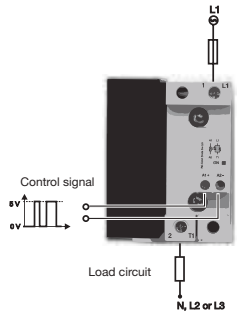
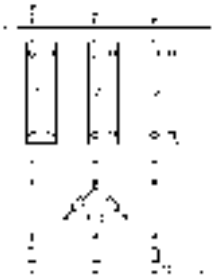
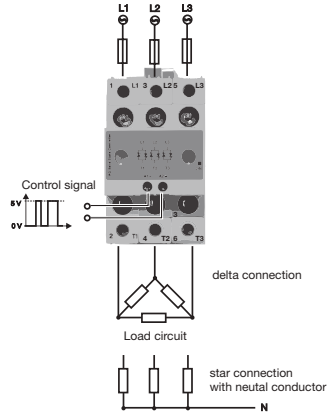
Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical execution of the safety information/instructions contained in these documents are mandatory for mounting, electrical connection, startup, and for safety during operation.

Control section and power section

Type	Switching type	Wiring
709020/1-25-240		
709020/1-25-600 **709020/1-40-600**		
709020/1-60-600		
709020/3-20-600		

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Scope of delivery

- 1 thyristor power switch in the version ordered
- 1 data sheet

Order details

	(1)	**Basic type**
709020		TYA 432
	(2)	**Circuit type**
1		Single-phase
3		Three-phase
	(3)	**Load current**
20		20 A
25		25 A
40		40 A
60		60 A
	(4)	**Load voltage**
240		AC 240 V
600		AC 600 V

Note:

Load current and load voltage cannot be combined arbitrarily. Only the stock versions are available.

	(1)	/	**(2)**	-	**(3)**	-	**(4)**
Order code		/		-		-	

Stock versions

Order code	**Part no.**
709020/1-25-240	00637965
709020/1-25-600	00638036
709020/1-40-600	00638037
709020/1-60-600	00638038
709020/3-20-600	00638040

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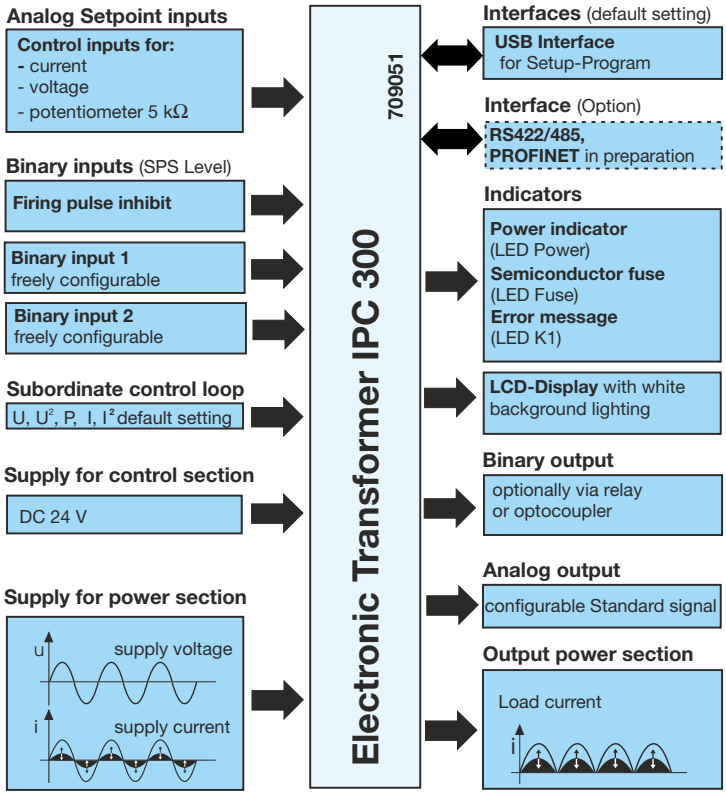
JUMO IPC 300 Electronic Transformer
70, 100, 200 A

Brief description

The JUMO IPC 300 is a power converter for controlling resistive heating loads. Due to its way of operating, the device is also referred to as an electronic transformer with a pulsating direct voltage at the output.
The microprocessor-controlled power controller displays all parameters in an LCD display with background lighting. It can be operated using the four keys at the front.
It combines the advantages of a conventional variable AC transformer (such as amplitude control and sinusoidal network load) with the advantages of a thyristor power controller (such as current limiting, load monitoring, subordinate control loops, etc.). The converter can be used in all areas where large resistive loads have to be switched.
No galvanic isolation exists between the voltage supply and the load voltage.
In addition to the power converter itself, a choke and a mains filter are essential for operation. Only the chokes and mains filters specified by JUMO may be used.
Amplitude control ensures that current consumption is sinusoidal and reduces the distortion power factor. Synchronous clock pulse control and reactive power compensation are not required.

Type 709051/X-XX-100…

Function overview



Special features

- Protective mains operation under high-powered resistive loads (no flickering)
- Operation of low-voltage heating elements directly at the supply network without adaptation transformer
- Minimal harmonics in the mains voltage of the device and low weight due to omission of a power transformer
- Short-circuit control when switching on
- Mains current in proportion with the required power (amplitude control)
- Control independent of the resistive characteristics of the heating elements
- Reduction of the phase control reactive power
- Compact dimensions
- Free selection of the subordinate control loop
  U, U^2, P, I, I^2
- Ageing process compensation for SiC heating elements
- Heating element diagnosis
- Resistance limitation, protection of molybdenum disilicide heating elements against overheating in the upper temperature range
- Integrated semiconductor fuses to protect the IPC in the event of an earth short
- For universal use for mains voltages up to AC 400 V

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Technical data

Control

Control signal	0(4) to 20 mA	R_i = 50 Ω	
	0(2) to 10 V	R_i = 25 kΩ	
	0(1) to 5 V	R_i = 12 kΩ	Manual control through an external 5-kΩ potentiometer
Base load settings	0 to 100 %		

Voltage supply

	Type 709051-X-XX-70 and 100	Type 709051-X-XX-200
Voltage supply for control electronics	DC 24 V +15 %/ -20 % SELV	
Power consumption of the control electronics	max. 25 W	
Voltage supply for power section	AC 20 to 400 V +15 %/ -20 %, 48 to 63 Hz	
Load voltage $U_{L\ eff}$ ≂≂≂ (freely adjustable)	at AC 400 V supply to power section. Load voltage up to max. DC 380 V at AC 230 V supply , max. DC 210 V at AC 115 V supply , max. DC 90 V	
Load current $I_{L\ eff}$ ≂≂≂	DC 70 A / 100 A	DC 200 A
maximum power in 230 V mains voltage	$U_{Mains\ voltage}$ 230 V, I_{Load} 70 A: **14.7 kW** $U_{Mains\ voltage}$: 230 V, I_{Load} 100 A: **21 kW**	$U_{Mains\ voltage}$: 230 V, I_{Load} 200 A: **21 kW** **Reason:** the mains current is limited to 100 A through the EMI filter.
maximum power in 400 V mains voltage	$U_{Mains\ voltage}$: 400 V, I_{Load} 70 A: **26.6 kW** $U_{Mains\ voltage}$: 400 V, I_{Load} 100 A: **38 kW**	$U_{Mains\ voltage}$: 400 V, I_{Load} 200 A: **38 kW** **Reason:** the mains current is limited to 100 A through the EMI filter.
Load type	Resistive loads	

General specifications

Circuit variants	Single-phase operation	
Operating modes	Amplitude control	
Subordinate control loop	U, U^2, I , I^2 and P control configurable as a standard feature	
Current limiting	In operation, the load current can be configured in the range of 10 to 100 % I_N on the front panel. This limits the effective value of the load current.	
Load monitoring	Detection of partial load failure or load short-circuit	
R control	Setting range from R_{Nom} to 10x R_{Nom} , R_{Nom} = nominal voltage / nominal current	
SiC reserve	Message indicated when the voltage reserve for SiC heating rods is exhausted	
Analog output	Standard signal 0/4 to 20 mA, 0/2 to 10 V or 0/1 to 5 V Output value configurable	
Control accuracy	The regulation will eliminate voltage supply variations within the tolerance range (+15 %/ -20 %) with an accuracy of ± 0.5 %	
Electrical connection	Control cables via pluggable screw terminals for conductor cross sections 0.5 to 2.5 mm^2	
	in power section screw terminals 10 mm^2 to 50 mm^2	in power section screw terminals U, PE. N(V) : 10 mm^2 to 50 mm^2 Screw terminals C, D 1D, 1C: 30 mm^2 to 95 mm^2
Semiconductor fuse	The I^2t value (Switch-off integral) of the fuse integrated into the device must be less than 20,000 A^2s.	
Protection type	IP 20 according to EN 60529	
Protection rating	Protection rating I, with isolated control circuitry for connection to SELV circuits	
Admissible ambient temperature range	5 to 40 °C (3K3 according to EN 60721-3-3)	
Admissible storage temperature range	-10 to +70 °C (1K3 according to EN 60721-3-1)	
Cooling	forced convection, maximum inlet air temperature 35°C	
Resistance to climatic conditions	rel. humidity ≤ 5 to 85 % annual average, without condensation 3K3 according to EN 60721	
Installation position	Vertical	
Operating conditions	The power controller is designed as a built-in device according to: EN 50178, pollution degree 2, overvoltage category Ü III	
Site altitude	The site altitude is ≤ 2000 m above MSL.	

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Electromagnetic compatibility	according to DIN 61326 Interference emission: class A - only for industrial use. Interference immunity: industrial requirements	
Test voltage	According to EN 50178	
Creepage distances	Control electronics to load circuit ≥ 5.5 mm, control electronics to housing ≥ 5.5 mm, device can be connected to SELV circuits. SELV = Separate Extra Low Voltage (safe low voltage)	
Leakage current	The leakage current of the IPC power converter used with an EMI filter in the supply cable (excluding the leakage current in the load) is less than 3 mA.	
Housing	Metal case	
Standard accessories	1 operating manual	
Binary output: relay (changeover contact) without contact protection circuit	30,000 electrical circuits at a switching capacity of 3 A/230 V 50 Hz resistive load	
Optocoupler output	I_{Cmax} = 2 mA, U_{CEOmax} = 32 V	
Dimensions: (length x width x height)	(348.6 × 300 × 217) mm	(403.5 × 300 × 257.5) mm
Weight	approx.16 kg	approx. 21.5 kg

Chokes

Type	**Dimensions**	**Connection cross section**	**Connection, Tightening torque**	**Weight**	**Part no.**
L = 0.6 mH / I_N = 75 A Protection type IP 10 according to EN 60529	Height: 135 mm Diameter: 155 mm	4 to 25 mm^2	Screw terminals, max. 4 to 4.5 Nm	7.5 kg	00392474
L = 0.6 mH / I_N = 100 A Protection type IP 10 according to EN 60529	Height: 208 mm Width: 200 × 200 mm	10 to 50 mm^2	Screw terminals, max. 6 to 8 Nm	approx. 20 kg	00415759
L = 0.6 mH / I_N = 200 A Protection type IP 10 according to EN 60529	Height: 190 mm Width: 200 x 385 mm	35 to 95 mm^2	Screw terminals, max. 15 to 20 Nm	approx. 37 kg	00436848

EMI filter

For voltage supply to power section						
Nominal voltage, Nominal current	Dimensions (length × width × height)	Connection cross section	Tightening torque	Weight	Admissible ambient temperature	Part no.
AC 115V/250V/440V, I_{Nom} = 16A	(255 x 60 x 125) mm	0.25 to 4 mm^2	0.6 to 0.8 Nm	approx. 4 kg	40°C	00399527
AC 115V/250V/440V, I_{Nom} = 20A	(289 x 70 x 140) mm	0.5 to 10 mm^2	1.5 to 1.8 Nm	approx. 5.5 kg	40°C	00438775
AC 115V/250V/440V, I_{Nom} = 32A	(324 x 90 x 160) mm	0.5 to 10 mm^2	1.5 to 1.8 Nm	approx. 9.5 kg	40°C	00409831
AC 115V/250V/440V, I_{Nom} = 63A	(380 x 117 x 190) mm	0.5 to 16 mm^2	2 to 2.3 Nm	approx. 17 kg	40°C	00409990
AC 115V/250V/440V, I_{Nom} = 100A	(445 x 150 x 220) mm	10 to 50 mm^2	6 to 8 Nm	approx. 26 kg	40°C	00431997

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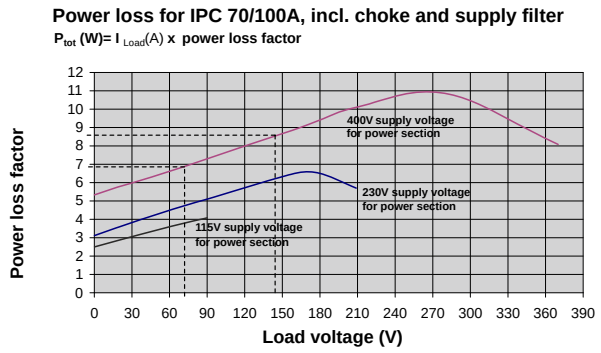
Power loss (W)

Note:
Power loss occurs in the form of waste heat at the heat sink of the power converter, at the mains filter, and at the choke.
It has to be discharged at the mounting site (e.g. in the control cabinet) according to the climatic conditions.

Type 709051/X-XX-100-XX/XXX and



Resistive loads and molybdenum disilicide heating elements:
Heating element data: load voltage = 140 V; load current = 90 A

Type 709051/8-01-100-XX/XXX
Nominal data of the power controller: load voltage = 150 V; load current = 100 A;
Voltage supply to the power section = 400 V

Determine the max. load voltage actually taken (e.g. 140 V) and find the point intersecting with the curve for the voltage supply in the power section. The Y axis shows the attendant power loss factor of 8.5, for example.

The power loss (W) is obtained by multiplying this power loss factor by the load current (e.g. 90 A)
that flows at max. load voltage (e.g. 140 V) through the load resistance

Power loss = 90 (A) × power loss factor

Power loss = 90(A) × 8.5 = **765W**

SiC heating elements
SiC heating element data: new: 70 V/90 A, old 140 V/45 A; P = 6,300W

Type 709051/8-01-100-XX/XXX
Nominal data of the power controller: load voltage = 150 V; load current = 100 A;
Voltage supply to the power section = 400 V; P control, P = 6,300W

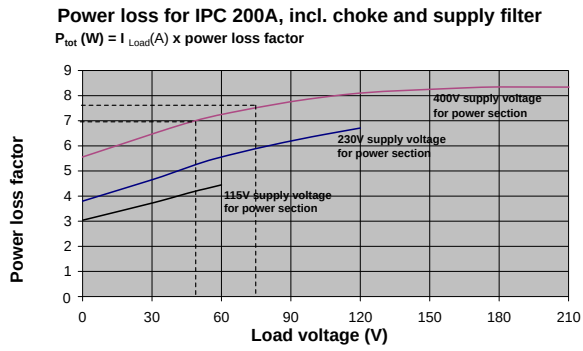
Determine the maximum load voltage actually taken (e.g. 70 V) of the **new** SiC heating element and find the point intersecting with the curve for the voltage supply in the power section. The Y axis shows the attendant power loss factor of 6.8, for example.

The power loss (W) is obtained by multiplying this power loss factor by the load current (e.g. 90 A)
that flows at max. load voltage (e.g. 70 V) through the **new** SiC heating element

Power loss = 90 (A) × power loss factor

Power loss = 90(A) × 6.8 = **612 W**

Type 709051/X-XX-200-XX/XXX



Resistive loads and molybdenum disilicide heating elements:
Heating element data: load voltage = 75 V; load current = 130 A

Type 709051/8-01-200-XX/XXX
Nominal data of the power controller: load voltage = 90 V; load current = 200 A;
voltage supply to the power section = 400 V

Determine the max. load voltage actually taken (e.g. 75 V) and find the point intersecting with the curve for the voltage supply in the power section. The Y axis shows the attendant power loss factor of 7.5, for example.

The power loss (W) is obtained by multiplying this power loss factor by the load current (e.g. 130 A) that flows through the load resistance at max. load voltage (e.g. 75 V)

Power loss = 130 (A) × power loss factor

Power loss = 130(A) × 7.5 = **975W**

SiC heating elements
SiC heating element data: new: 45 V/200 A, old 90 V/100 A; P = 9,000 W

Type 709051/8-01-200-XX/XXX
Nominal data of the power controller: load voltage = 90 V; load current = 200 A; voltage supply to the power section = 400 V; P control, P=9,000W

Determine the maximum load voltage actually taken (e.g. 45 V) of the **new** SiC heating element and find the point intersecting with the curve for the voltage supply in the power section. The Y axis shows the attendant power loss factor of 6.8, for example.

The power loss (W) is obtained by multiplying this power loss factor by the load current (e.g. 200 A) that flows at max. load voltage (e.g. 45 V) through the **new** SiC heating element

Power loss = 200(A) x power loss factor

Power loss = 200(A) × 6.8 = **1,360W**

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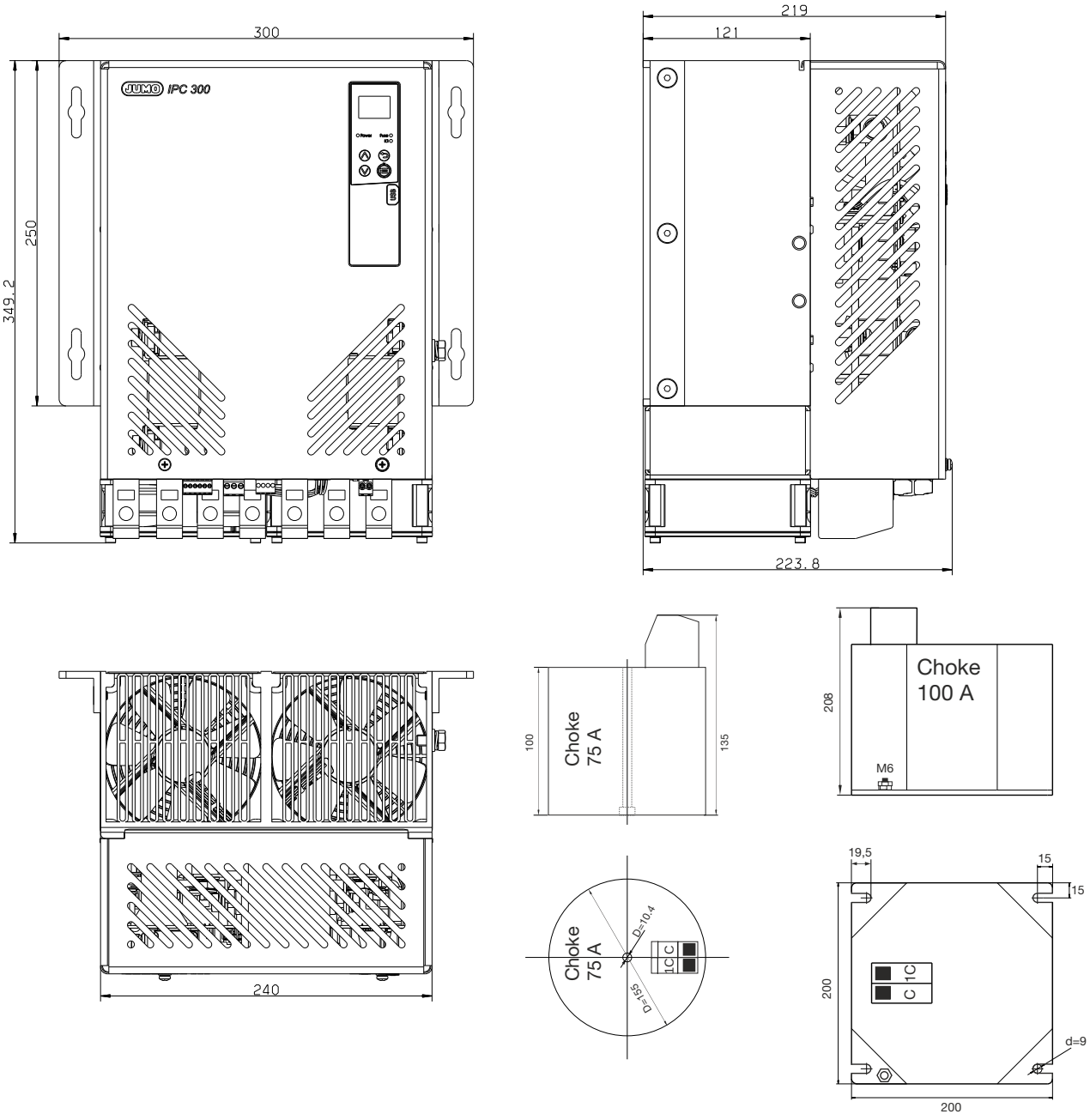
Dimensions

Type 709051/X-XX-100-XX/XXX

Note:

	Tightening torque
Screws in power section 100A (hex key width SW5 mm)	max. 5 to 8 Nm
Gray screw terminals of the control electronics	X8_1, X8_2, X10_1, X10_2: 0.2 to 0.25 Nm X1, X16: 0.4 to 0.5 Nm
75 A choke screw terminals 100 A choke screw terminals	4 to 4.5 Nm 6 to 8 Nm



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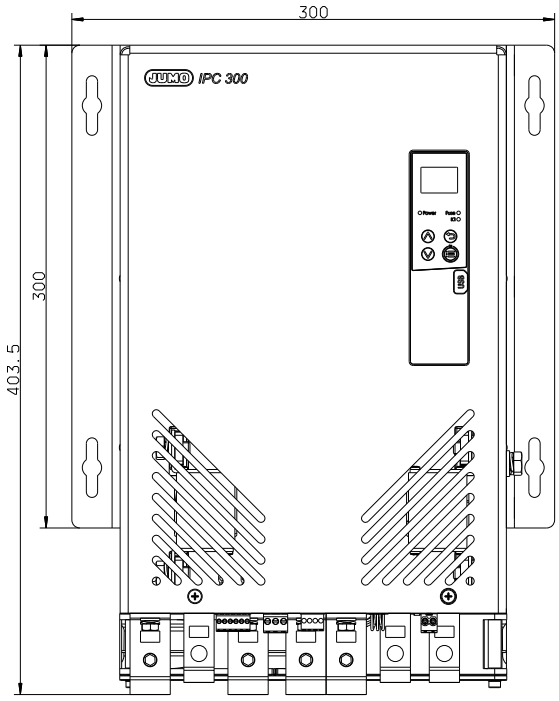
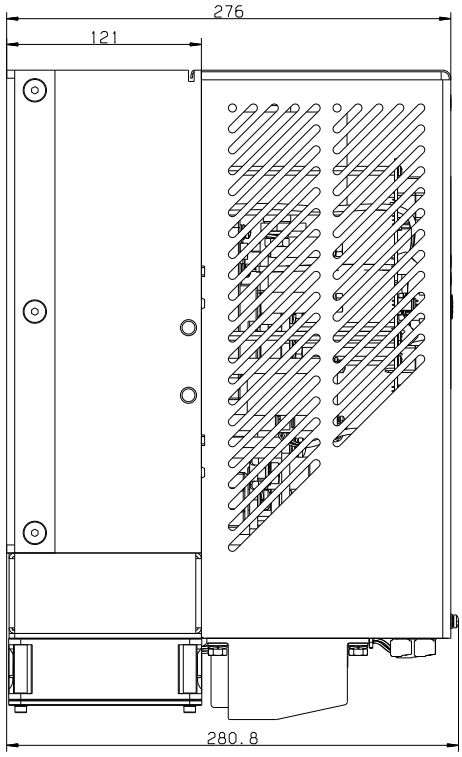
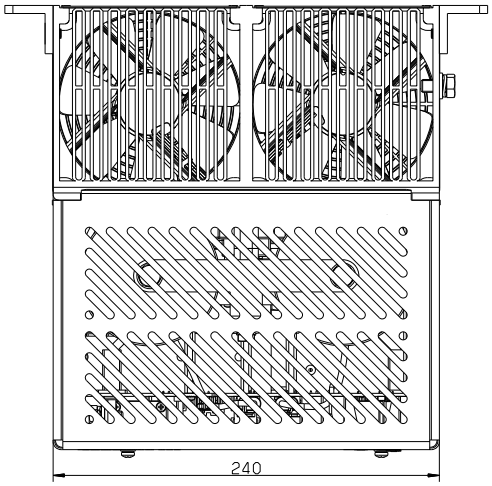
Type 709051/X-XX-200-XX/XXX

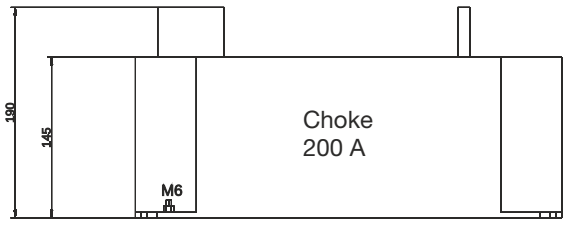
Note:

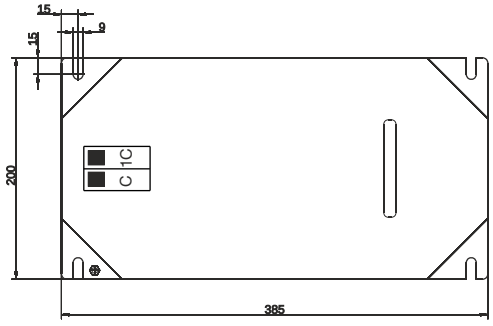
	Tightening torque
Screw terminals U, PE, N(V) hex key width SW5 mm Screw terminals C, D, 1D, 1C hex key width SW6 mm	6 to 8 Nm 15 to 20 Nm
Gray screw terminals of the control electronics	X8_1, X8_2, X10_1, X10_2: 0.2 to 0.25 Nm X1, X16: 0.4 to 0.5 Nm
200 A choke screw terminals	15 to 20 Nm











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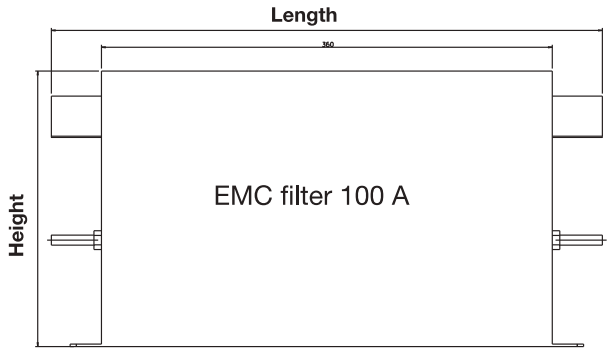
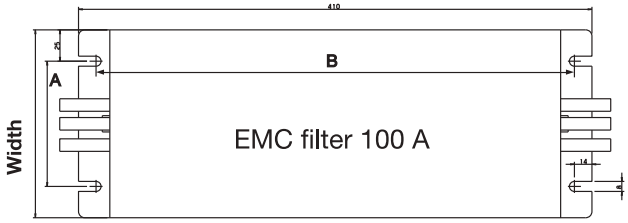
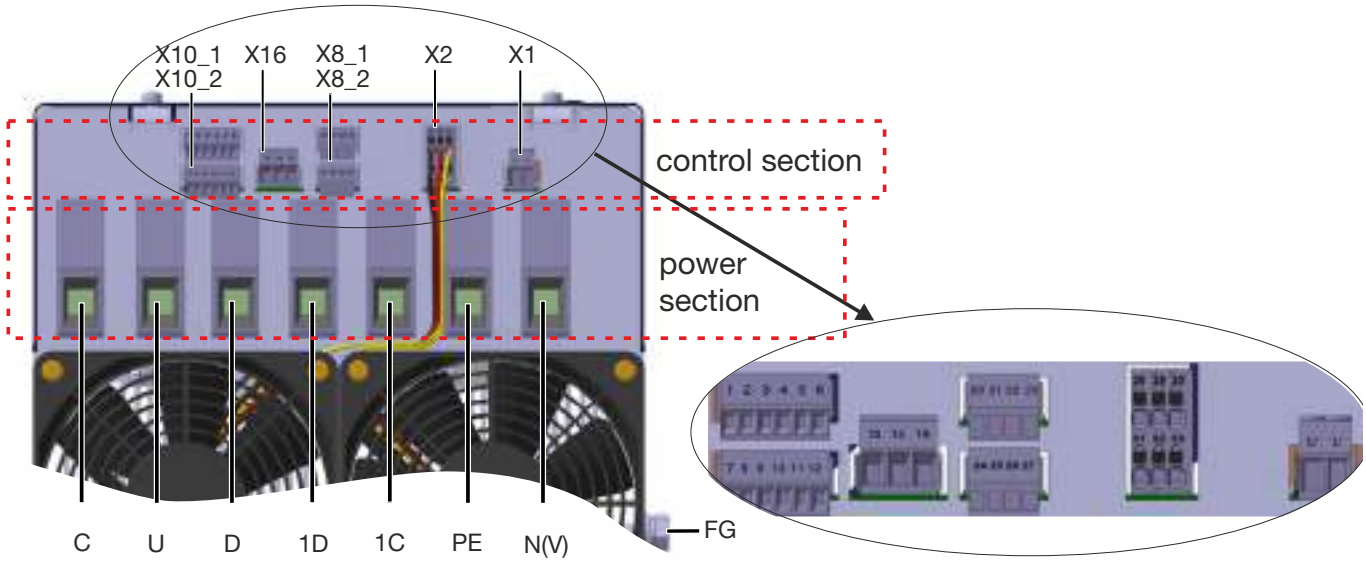
EMI filter current	**Length** in mm	**Width** in mm	**Height** in mm	**Fastening holes** Spacings in mm		**Tightening torque**	**Connection cross section** in mm^2
for the power section				**A**	**B**		
16A	255	60	125	25	240	0.6 to 0.8 Nm	0.25 to 4
20 A	289	70	140	50	295	1.5 to 1.8 Nm	0.5 to 10
32 A	324	90	160	50	295	1.5 to 1.8 Nm	0.5 to 10
63 A	380	117	190	65	330	2 to 2.3 Nm	0.5 to 16
100 A	445	150	220	100	385	6 to 8 Nm	10 to 50





Connection diagram

Type 709051/X-XX-070... or type 709051/X-XX-100...



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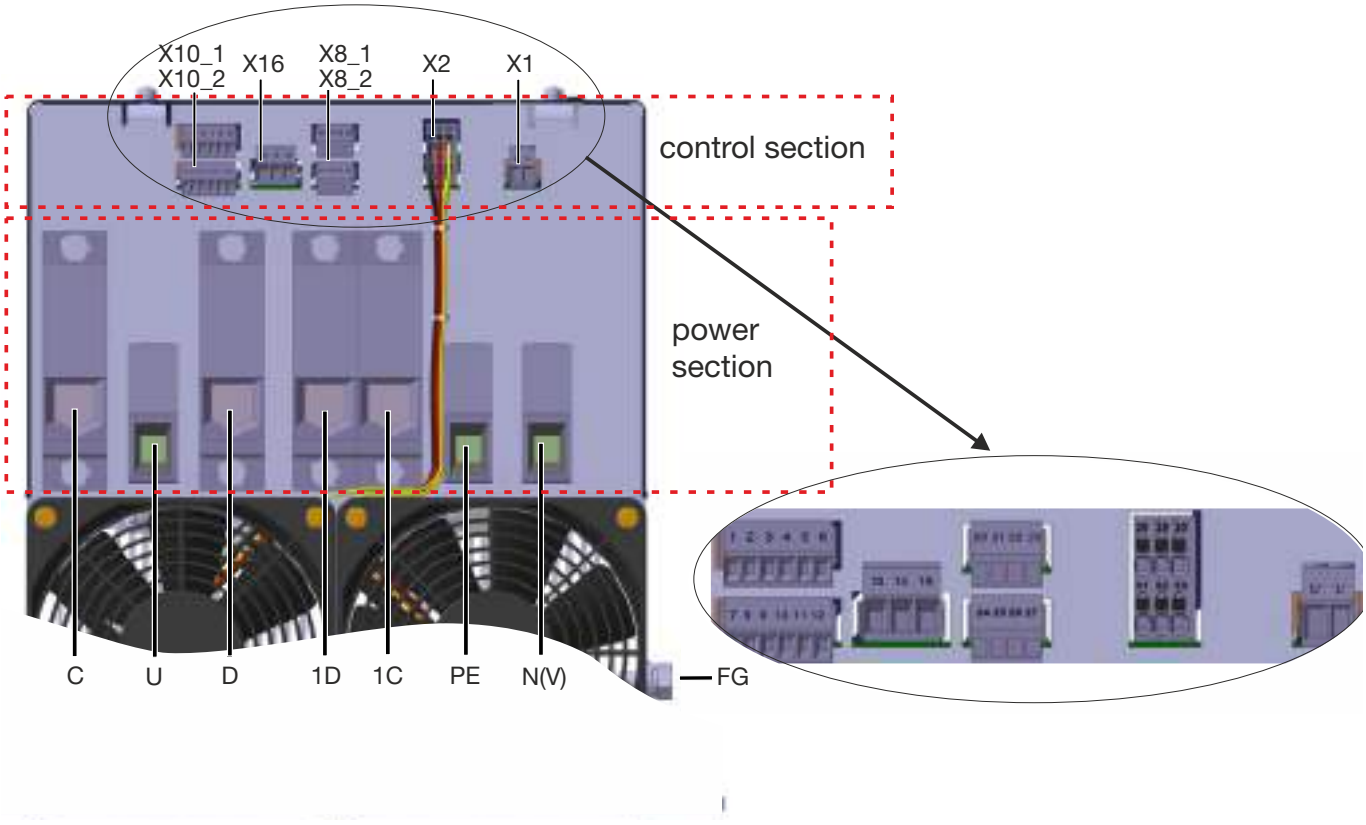
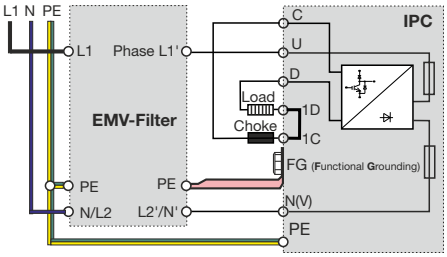
Type 709051/X-XX-200



Power section

Connection for	Screw terminals (fixed)	Connection
Voltage supply for power section via EMI filter	U N(V)	
Protective conductor connection	PE	
Functional equipotential bonding	FB	
Choke connection	C 1C	
Load connection	D + 1D -	

Control electronics

Connection for	Screw terminal X1 (pluggable)	Connection
Voltage supply for control section DC 24 V	(L+) (L-)