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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.

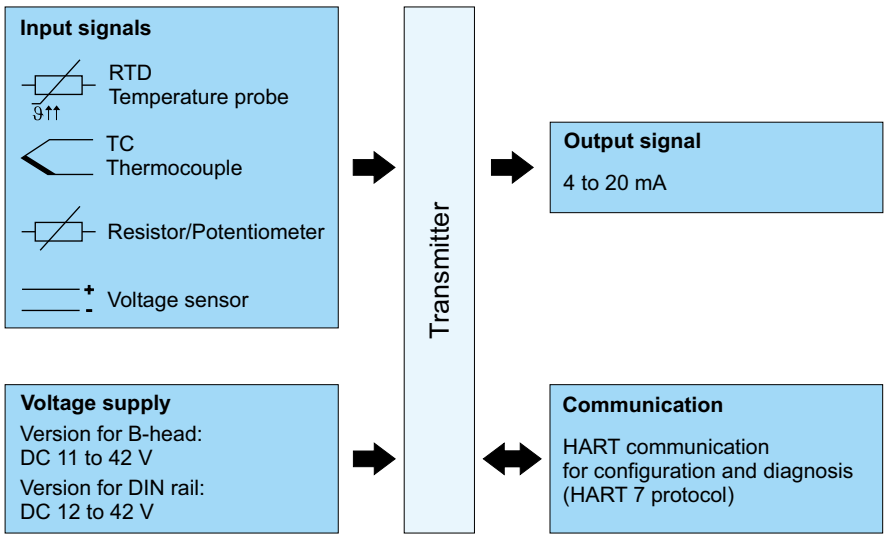
The JUMO dTRANS T07 device series is tailor-made for all industries like chemicals, oil, gas, and power plants & energy, as well all others in which safe and reliable temperature measurements are required.

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.

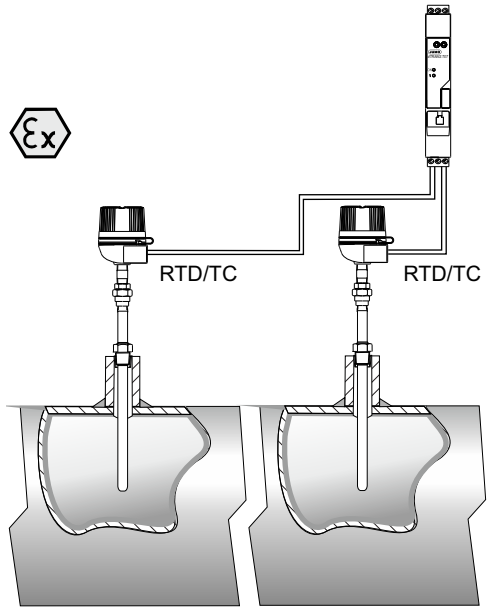
The devices transmit both converted signals from RTD temperature probes and thermocouples, but also resistance and voltage signals via the HART communication and as a 4 to 20 mA current signal.

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

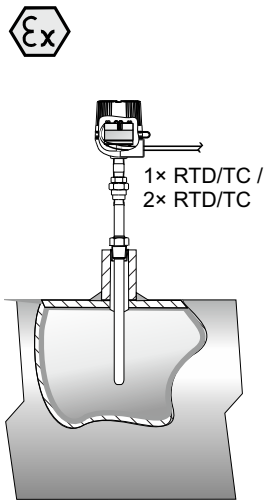
Example 1:

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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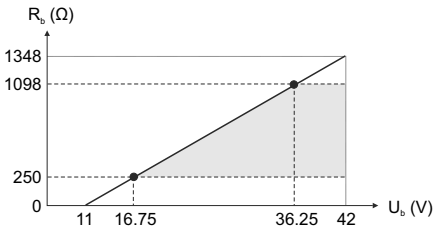
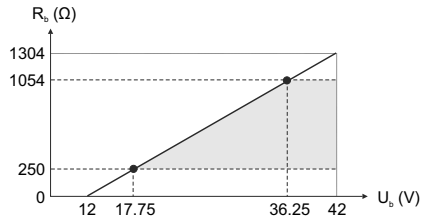
Output

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

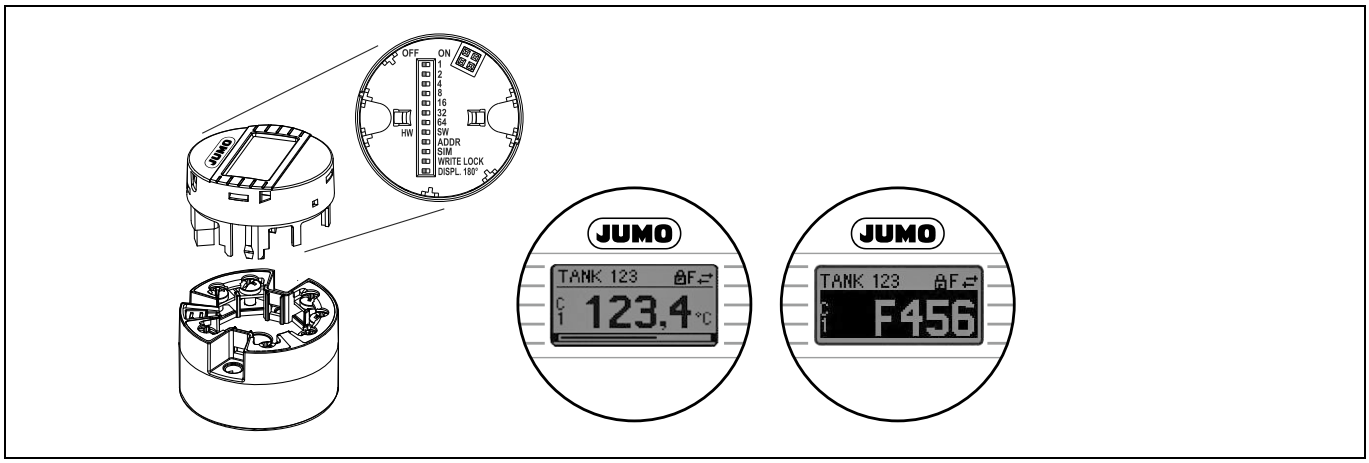
Operation on the device

Operation of the head transmitter

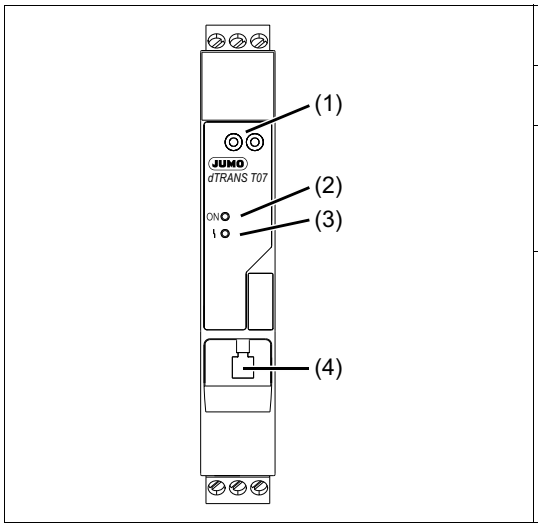
There are no display and control elements on the head transmitter. As an option, it is possible to use the plug-on display BD7 together with the head transmitter.

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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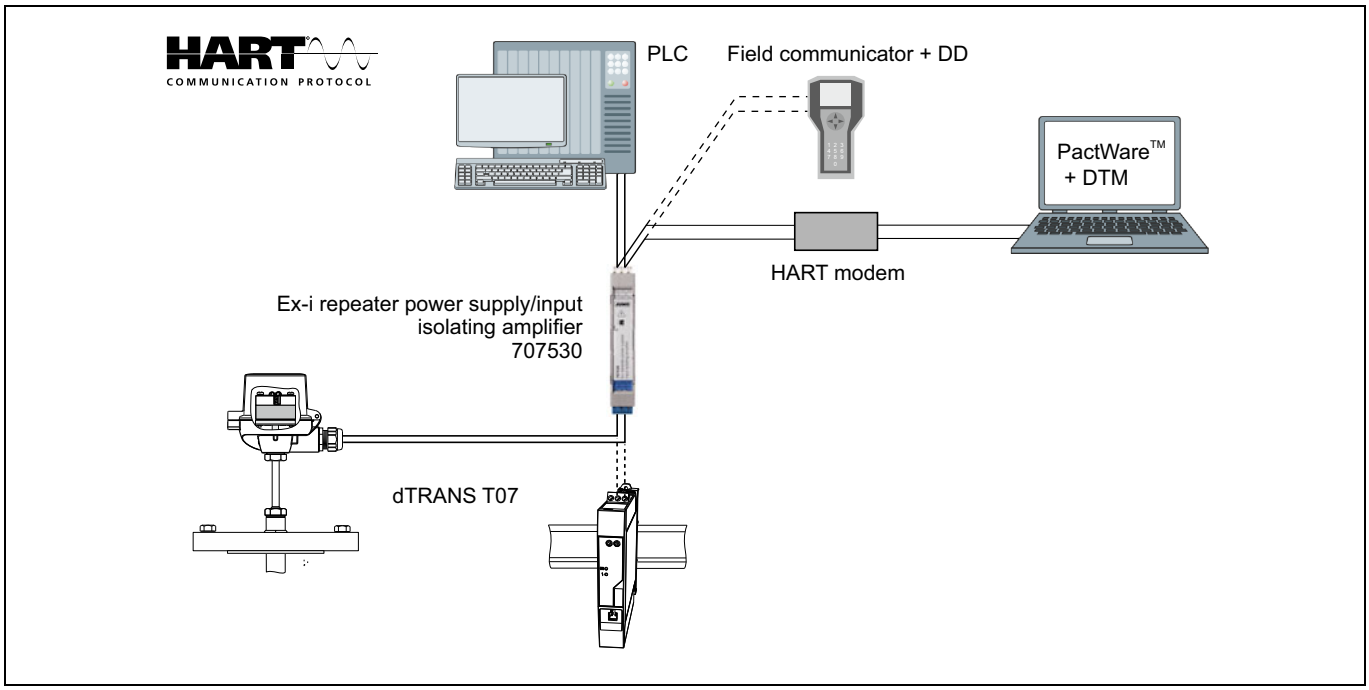
Remote control/configuration

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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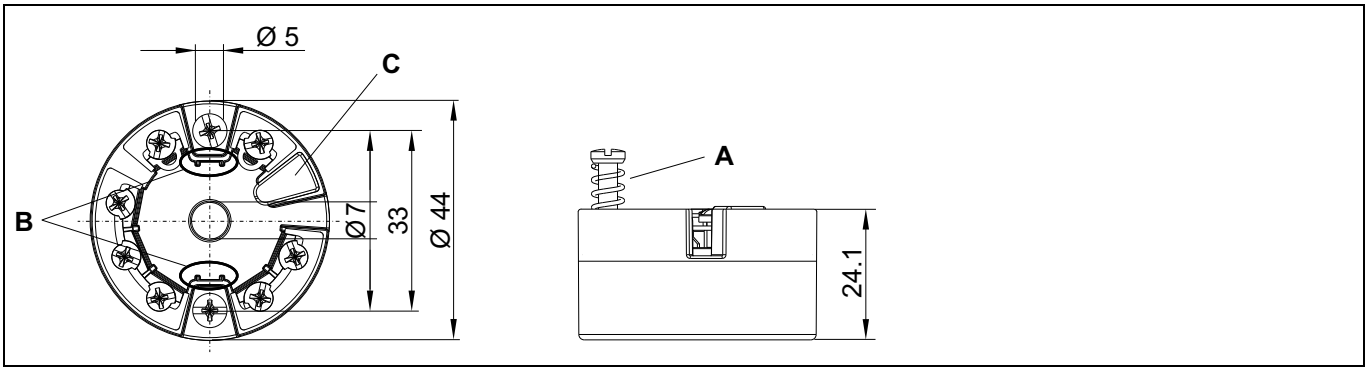
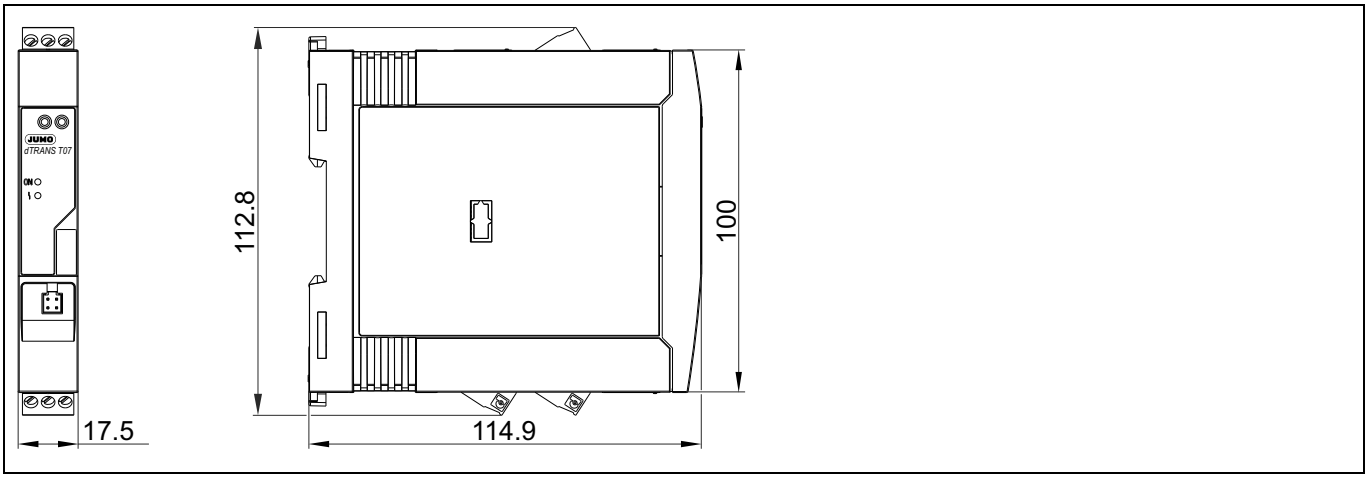
Dimensions

Head transmitter

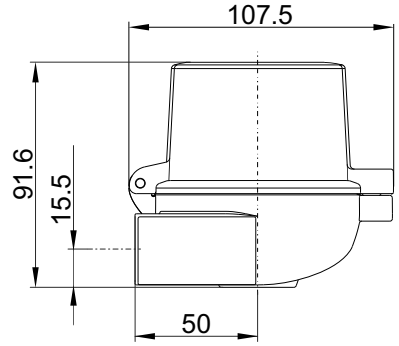


A Spring deflection mounting screws ≥ 5 mm (not with US-M4 mounting screws)
B Mounting elements for plug-on display BD7
C internal service interface (not intended for use)

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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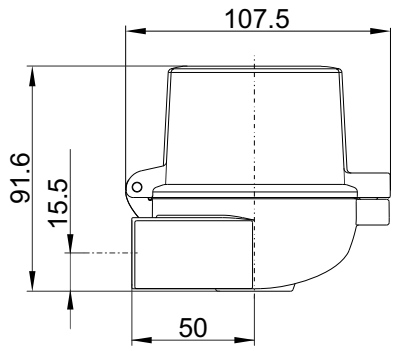
Field enclosure for dTRANS T07

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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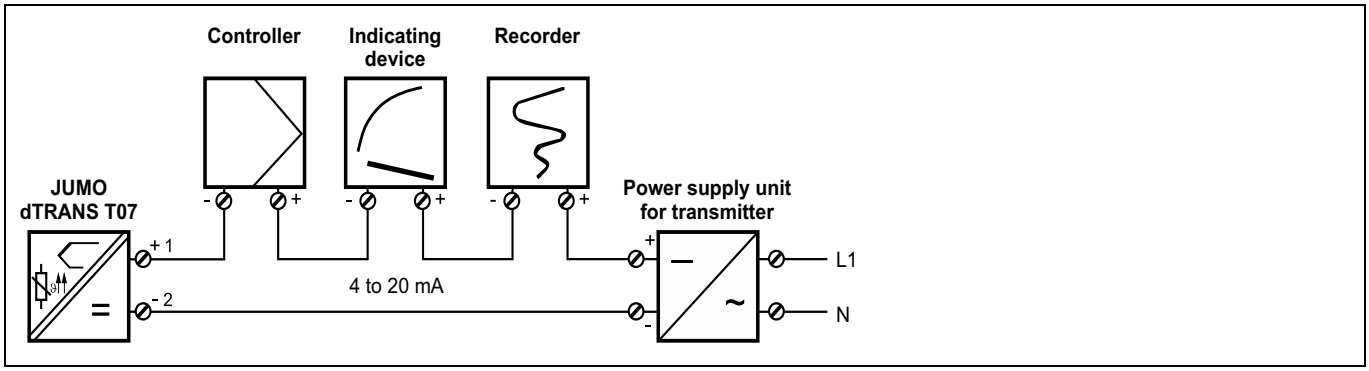
Connection diagram

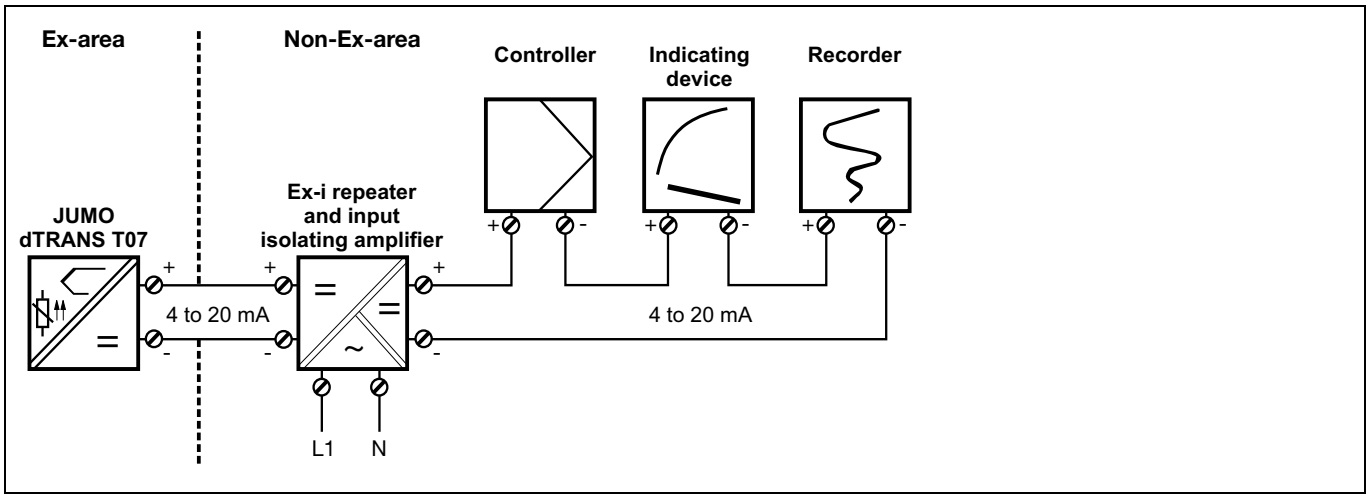
The connection diagram in the data sheet provides preliminary information about the connection possibilities. Only use the operating manual for the electrical connection. The knowledge and the correct technical execution of the safety information/instructions contained in these documents are a prerequisite 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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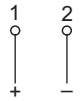
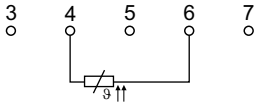
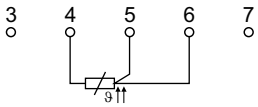
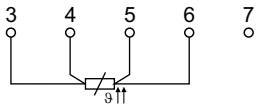
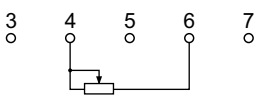
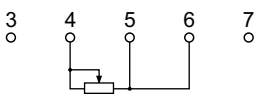
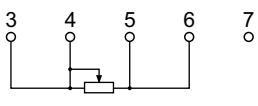
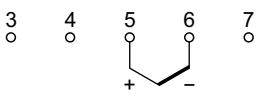
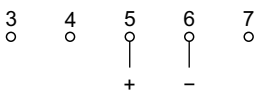
Terminal assignment for the head transmitter

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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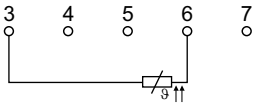
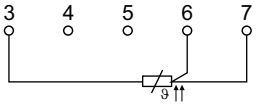
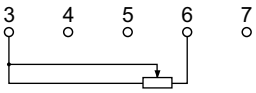
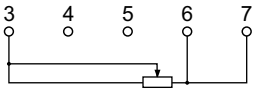
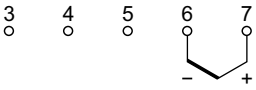
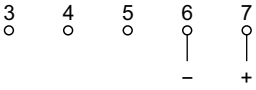
Connection for	Explanations	Terminals
Analog input (sensor input) 2		
RTD temperature probe 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
RTD temperature probe 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
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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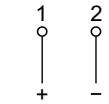
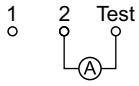
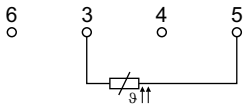
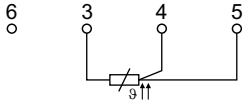
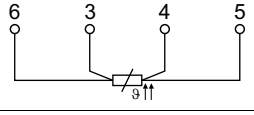
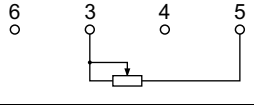
Terminal assignment for DIN rail devices

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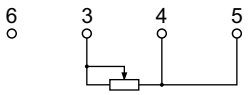
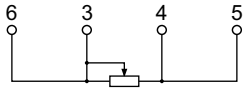
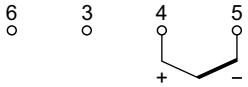
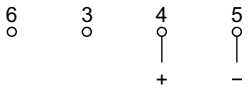
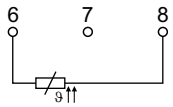
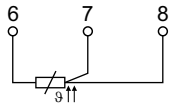
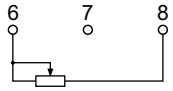
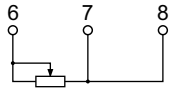
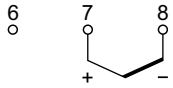
Connection for	Explanations	Terminals
Resistance/potentiometer 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 4-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Thermocouple		
Voltage sensor		

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