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JUMO dTRANS T05

Programmable two-wire transmitter

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

Brief description

The transmitters record sensor signals from RTD temperature probes, thermocouples, resistance transmitters, or resistors/potentiometers. When using a resistor/potentiometer or RTD temperature probe, the sensor connection on the input side can be connected with a two-wire, three-wire, or four-wire circuit. Voltage signals in the range from -100 to +1100 mV can also be recorded. Depending on the selected measurement input, the linear and temperature-linear linearization variants and the possibility of easily configurable customer-specific linearization are available.

Type 707050 delivers 4 to 20 mA as an output signal. Type 707051 delivers 4 to 20 mA or 0 to 10 V as an output signal. The measurement input and the output signal are galvanically isolated from one another. The output signal can be reversed for both types.

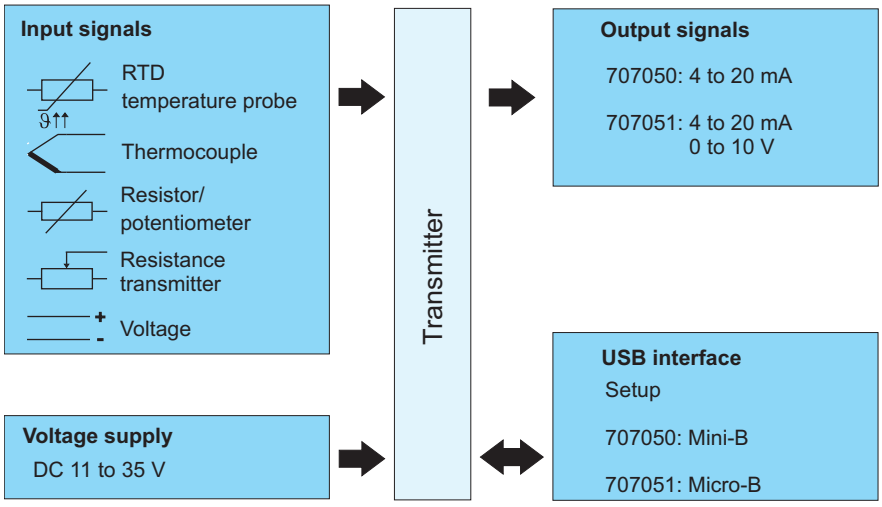
The transmitter configuration with respect to probe type, connection technology of the probe, measuring range (user configurable), and linearization is carried out by a setup program on the PC. The connection to the PC is established via a USB interface which does not require additional auxiliary voltage. Via the USB interface, the min./max. process value and the min./max. operating temperature recorded by the transmitter can be read and the sensor wiring can be checked online.

The operating status of the transmitter is indicated by a two-color control LED (red/green). The control LED is lit green during malfunction-free operation. A fault such as a probe break will be shown by the corresponding LED signaling.

Type 707050 (dTRANS T05 B)

Type 707051 (dTRANS T05 T)

Block diagram



Special features

- Measuring input for RTD temperature probe, thermocouple, resistor/potentiometer, resistance transmitter, and voltage
- Input and output are electrically isolated
- Control LED (red/green)
- Configuration directly via USB cable without additional auxiliary voltage
- Customer-specific linearization
- Detection of the min./max. process value (drag pointer function including point in time)
- Option to specify the temperature in °F for temperature sensors
- Type 707051 available with screw terminals or spring-cage terminals

Approvals and approval marks (see "Technical data")

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Technical data

Analog input

All analog inputs are equipped with a digital filter of second order (filter constant adjustable from 0 to 10 s) and have a sampling rate of > 2 measurements per second.

RTD temperature probes

Description	Standard	ITS	Connection type	Measuring range in °C		Measuring accuracy[a]
				Min.	Max.	
Pt100	IEC 60751:2008	ITS-90	Two/three-wire	-100	200	±0.2 K
Pt500			Two/three-wire	-200	850	±0.4 K
Pt1000			Four-wire	-100	200	±0.1 K
$T_K = 3.85 \times 10^{-3}$ 1/K			Four-wire	-200	850	±0.2 K
Pt100	GOST 6651-2009 A.2	ITS-90	Two/three-wire	-100	200	±0.2 K
$T_K = 3.917 \times 10^{-3}$ 1/K			Two/three-wire	-200	850	±0.4 K
			Four-wire	-100	200	±0.15 K
			Four-wire	-200	850	±0.25 K
Pt50			Two/three-wire	-200	850	±0.5 K
$T_K = 3.91 \times 10^{-3}$ 1/K			Four-wire	-200	850	±0.3 K
Ni100	DIN 43760	IPTS-68	Two/three-wire	-60	250	±0.4 K
$T_K = 6.18 \times 10^{-3}$ 1/K			Four-wire	-60	250	±0.2 K
Ni500			Two/three-wire	-60	250	±0.4 K
$T_K = 6.18 \times 10^{-3}$ 1/K			Four-wire	-60	250	±0.2 K
Ni1000			Two/three-wire	-60	250	±0.4 K
$T_K = 6.18 \times 10^{-3}$ 1/K			Four-wire	-60	250	±0.2 K
Ni100	GOST 6651-2009 A.5	ITS-90	Two/three-wire	-60	180	±0.4 K
$T_K = 6.17 \times 10^{-3}$ 1/K			Four-wire	-60	180	±0.2 K
Cu50	GOST 6651-2009 A.3	ITS-90	Two/three-wire	-180	200	±0.5 K
$T_K = 4.28 \times 10^{-3}$ 1/K			Four-wire	-180	200	±0.3 K
Cu100			Two/three-wire	-180	200	±0.4 K
$T_K = 4.28 \times 10^{-3}$ 1/K			Four-wire	-180	200	±0.2 K

[a] The accuracy values refer to the complete measuring range.

Connection type	Two-wire, three-wire, or four-wire circuit
Sensor line resistance	
for three/four-wire circuit	≤ 11 Ω per line
for two-wire circuit	Measuring resistance + ≤ 22 Ω inner line resistance
Sensor current	< 0.3 mA

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Thermocouples

Designation	Type	Standard	ITS	Measuring range in °C		Measuring accuracy[a]
				Min.	Max.	
Pt13Rh-Pt	R	IEC 584-1	ITS-90	-50	1768	± 0.15 % from +50 °C
Pt10Rh-Pt	S	IEC 584-1	ITS-90	-50	1768	± 0.15 % from +20 °C
Pt30Rh-Pt6Rh	B	IEC 584-1	ITS-90	0	1820	± 0.15 % from +400 °C
Fe-CuNi	J	IEC 584-1	ITS-90	-210	1200	± 0.1 % from -100 °C
Cu-CuNi	T	IEC 584-1	ITS-90	-270	400	± 0.1 % from -150 °C
NiCr-CuNi	E	IEC 584-1	ITS-90	-270	1000	± 0.1 % from -80 °C
NiCr-Ni	K	IEC 584-1	ITS-90	-270	1372	± 0.1 % from -80 °C
NiCrSi-NiSi	N	IEC 584-1	ITS-90	-270	1300	± 0.1 % from -80 °C
Fe-CuNi	L	DIN 43710	IPTS-68	-200	900	± 0.1 %
Cu-CuNi	U	DIN 43710	IPTS-68	-200	600	± 0.1 % from -100 °C
Chromel-Copel (Ni9.5Cr-Cu44Ni)	L	GOST R 8.585-2001	ITS-90	-200	800	± 0.1 % from -80 °C
Chromel-Alumel		GOST R 8.585-2001	ITS-90	-270	1372	± 0.1 % from -80 °C
W5Re-W20Re	A1	GOST R 8.585-2001	ITS-90	0	2500	± 0.15 %
W5Re-W26Re	C	ASTM E230/E230M-11	ITS-90	0	2315	± 0.15 %
W3Re-W25Re	D	ASTM E1751/E1751M-09	ITS-90	0	2315	± 0.25 %
PL II (Platinel[b] II)		ASTM E1751/E1751M-09	ITS-90	0	1395	± 0.15 %

Cold junction	Pt1000 internal or external cold junction; temperature adjustable 0 to 80 °C
Cold junction accuracy	± 1 K

[a] The accuracy values refer to the complete measuring range.

[b] Platinel is a registered trademark of Engelhardt Corp.

Resistance transmitter and resistance/potentiometer

Designation	Measuring range	Measuring accuracy
Resistance transmitter	to 10000 Ω	±10 Ω
Resistance/potentiometer	≤ 400 Ω	±400 mΩ
	≥ 400 to ≤ 4000 Ω	±4 Ω
	> 4000 to ≤ 10000 Ω	±10 Ω
Connection type	Resistance transmitter: three-wire circuit (A = Start, S = Slider, E = End) Resistance/potentiometer: two-wire circuit, three-wire circuit, and four-wire circuit	
Sensor line resistance	≤ 11 Ω per line for two-wire circuit, three-wire circuit, and four-wire circuit	

Direct voltage

Designation	Measuring range	Accuracy[a]	Input resistance
Input for mV generator	-100 to +1100 mV	±0.05 %	$R_E \geq 1$ MΩ

[a] The accuracy specification refers to the complete measuring range.

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Measuring circuit monitoring

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

Measuring probe	Out of range	Probe/line break	Probe/line short circuit
RTD temperature probe	Is detected	Is detected	Is detected
Thermocouple	Is detected	Is detected	Is not detected
Resistance transmitter	Is detected	Is detected	Is not detected
Resistance/potentiometer	Is detected	Is detected	Is not detected
Voltage DC 0 to 1 V	Is detected	Is detected	Is not detected

Output

	Type 707050	Type 707051
Output signal	Load-independent direct current: Free setting: 4 to 20 mA or 20 to 4 mA	Load-independent direct current: Free setting: 4 to 20 mA or 20 to 4 mA
		Voltage signal: Free setting: 0 to 10 V or 10 to 0 V
Electrical isolation Test voltage	Between input and output: Û = 3.75 kV/50 Hz	Between input and output: Û = 1.875 kV/50 Hz
Transmission behavior	Linear, temperature-linear Customer specific Reversion of the output signal	
Step response 0 to 100 %	< 2 s (with filter constant 0 s)	
Switch-on delay	5 s (correct measured value after the supply voltage is applied)	
	Current output	
Load (R_b)	$R_b = (U_b - 11\ V) \div 0.022\ A$	
Load error	≤ ±0.02 %/100 Ω	
Calibration conditions/accuracy	DC 24 V at approx. 22 °C/±0.05 %[a]	
	Voltage output	
Load resistance	≥ 2 kΩ	
Load influence	± 15 mV	
Residual ripple	± 1 % referring to 10 V, 0 to 90 kHz	
Calibration conditions/accuracy	DC 24 V at approx. 22 °C/±0.05 %[b]	

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

[b] All specifications refer to the measuring range end value of 10 V

Interfaces

	Type 707050	Type 707051
USB device	To operate the setup program	
Type	USB interface 2.0; Full-speed	
Connection port	Mini-B	Micro-B

Customer-specific linearization

Method	Features
Value pairs	Max. number: 40 Interpolation: linear
Formula	Number of coefficients: 5 Polynomial: 4th order

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Voltage supply

	Type 707050	**Type 707051**
Voltage supply (U_b)	DC 11 to 35 V (with reverse voltage protection[a]) Only for operation in SELV, PELV current circuits according to DIN EN 50178	
Voltage supply error	≤ ± 0.01 %/V deviation from 24 V[b]	
Requirement	The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".	

[a] Prerequisite for use of the voltage output of type 707051 is a voltage supply of at least 15 V

[b] All specifications refer to the measuring range end value of 20 mA

Environmental influences

	Type 707050	**Type 707051**
Operating temperature range	-40 to +85 °C	-10 up to +70 °C
Storage temperature range	-40 to +100 °C	-10 up to +70 °C
Temperature influence		
RTD temperature probes	≤ ±0.005 %/K deviation from 22 °C[a]	
Resistance transmitter	≤ ±0.01 %/K deviation from 22 °C[a]	
Resistance/potentiometer	≤ ±0.01 %/K deviation from 22 °C[a]	
Thermocouple	≤ ±0.005 %/K deviation from 22 °C[a] (plus accuracy of the cold junction)	
Direct current	≤ ±0.01 %/K deviation from 22 °C[a]	
Long-term stability	≤ 0.1 K/year[b] or ≤ 0.05 %/year[c]	
Resistance to climatic conditions		
In terminal head, form B	Rel. humidity ≤ 95 %, with condensation	
Open assembly	Rel. humidity ≤ 95 %, without condensation	
On DIN-rail		Rel. humidity ≤ 95 %, without condensation
Climate class	3K8H acc. to DIN EN 60721-3-3	3K8H acc. to DIN EN 60721-3-3
Vibration resistance		
DIN EN 60068-2-6	Max. 2 g at 10 to 2000 Hz	Max. 2 g at 10 to 55 Hz
DIN EN 60068-2-27	Shock; 10 g/6 ms	Shock; 10 g/6 ms
Germanischer Lloyd	Characteristic line 2	-
Electromagnetic compatibility (EMC)	According to DIN EN 61326-1	
Interference emission	Class B	
Interference immunity	Industrial requirement	
IP protection type		
In terminal head, form B	IP54/IP65 (depending on the version)	
Open assembly	IP00	
On DIN-rail		IP20

[a] All specifications refer to the measuring range end value of 20 mA or 10 V.

[b] Under calibration conditions.

[c] % refers to the set measuring span. The greater value of the long-term stability applies.

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Case

	Type 707050	**Type 707051**
Material	Polycarbonate UL 94 V2 (potted)	Polybutylene terephthalate UL 94 V0
Terminal type	Screw terminals:	Screw terminals:
Wire type	Rigid and flexible wires ≤ 1.75 mm^2; Max. torque 0.6 Nm	Rigid and flexible wires 0.2 to 2.5 mm^2 AWG/kcmil min. 26, max. 12 Stripping length: 12 mm Torque 0.5 to 0.6 Nm
		Spring-cage terminals: Rigid and flexible wires 0.2 to 2.5 mm^2 AWG/kcmil min. 26, max. 12 Stripping length: 8 mm
Installation type	In terminal head form B (DIN EN 50446); In surface-mounted housing (see extra code); In control cabinet (mounting element required; see accessories)	On TH 35-7.5 DIN rail or TH 35-15 (DIN EN 60715);
Installation position	Any	
Weight	~ 35 g	~ 50 g

Approvals and approval marks

c UL us	
Test facility	Underwriters Laboratories
Certificate/certification number	E201387
Inspection basis	UL 61010-1 (3rd ed.), CAN/CSA-22.2 No. 61010-1 (3rd ed.)
Valid for	All versions; not in conjunction with extra code 243
Please note	The device is approved if the approval mark is pictured on the device.

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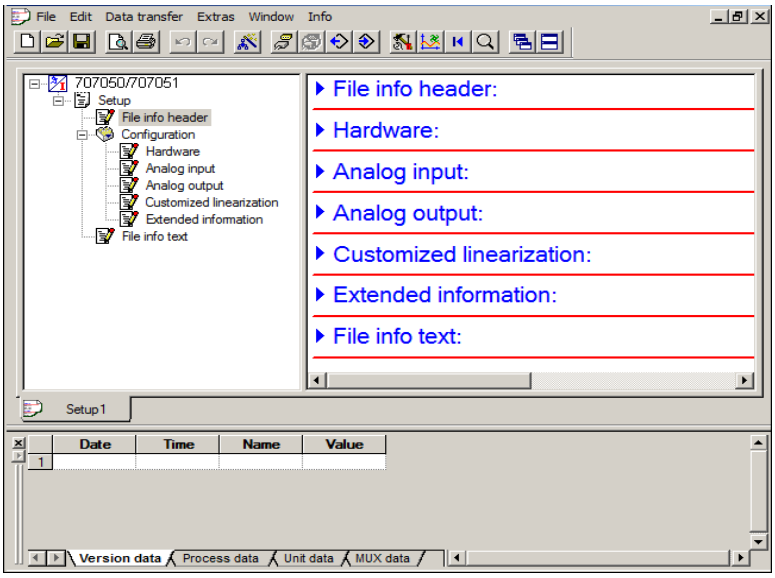
Setup program

The transmitter is configured on the PC with the setup program. The transmitter is connected to the PC via a USB cable. The transmitter interface is a Mini-B (707050) or Micro-B (707051) USB port. This supports standard 2.0 "Full-Speed". Once configuration of the transmitter is complete, make sure that the hinged cover is located back on the transmitter's USB interface.



Configurable parameters

Sensor type	
Connection type two, three or four-wire circuit for RTD temperature probe or resistance/potentiometer	
Linearization	
Customer-specific linearization	
Noise suppression	
Sensor factor for thermocouple/RTD temperature probe	
Line resistance for two-wire circuit	
External or internal cold junction for thermocouple	
Scaling	
Digital filter	
Offset	
Unit	
Response after probe break/short-circuit	
Behavior when leaving the scaling range	
Output signal increasing or decreasing (reversion)	
Output functions, current Type 705050 and type 705051	4 to 20 mA 4 to 20 mA scalable (start/end) Constant current source
Output functions, voltage Only type 705051	0 to 10 V 0 to 10 V scalable (start/end) Constant voltage source
TAG number (10-digit) and description (20-digit)	
Installation date	
Version, process, and device data of the transmitter can be displayed	

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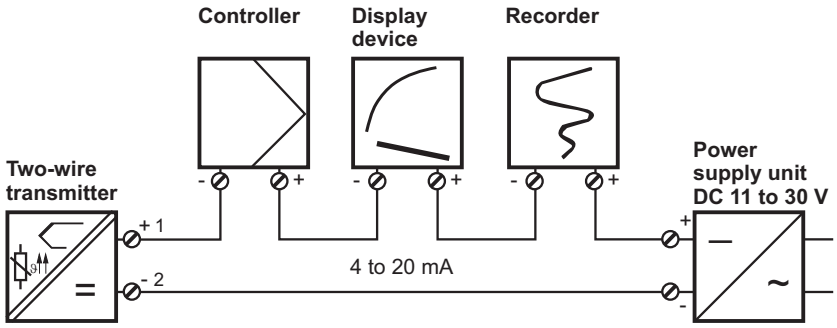
Hardware and software requirements

A PC with USB interface is required to operate the setup program. Details about supported operating systems (Microsoft® Windows®), required hard disk drive space, and memory can be found under information about the setup program on the manufacturer's website (search for 707050, in the search results click the link to the product, go to software, and look for further information about the setup program).

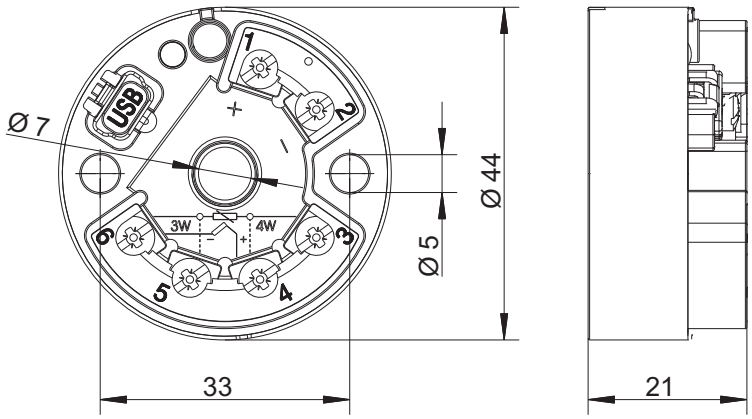
Connection diagram

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 example dTRANS T05 B



Terminal assignment and dimensions (mm) dTRANS T05 B



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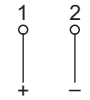
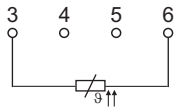
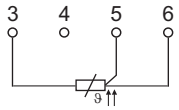
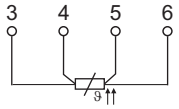
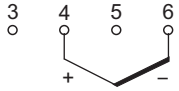
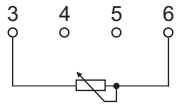
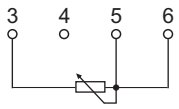
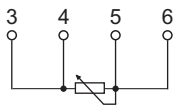
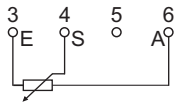
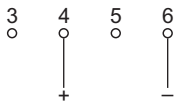
Type 707050		
Connection for	**Terminal assignment**	
Voltage supply Type 707050 DC 11 to 35 V Current output 4 to 20 mA	$R_B = (U_b - 11\ V) \div 22\ mA$ R_B = Load resistance U_b = Voltage supply	
Analog inputs		
RTD temperature probe two-wire circuit	$R_L \leq 11\ \Omega$ R_L = Lead resistance per wire	
RTD temperature probe three-wire circuit (3W)	$R_L \leq 11\ \Omega$ R_L = Lead resistance per wire	
RTD temperature probe four-wire circuit (4W)	$R_L \leq 11\ \Omega$ R_L = Lead resistance per wire	
Thermocouple		
Resistor/potentiometer two-wire circuit	$R_L \leq 11\ \Omega$ R_L = Lead resistance per wire	
Resistor/potentiometer three-wire circuit (3W)	$R_L \leq 11\ \Omega$ R_L = Lead resistance per wire	
Resistor/potentiometer four-wire circuit (4W)	$R_L \leq 11\ \Omega$ R_L = Lead resistance per wire	
Resistance transmitter	E = End S = Slider A = Start	
Voltage 0 to 1 V		
Interface		
USB device	Mini-B, standard (5-pin)	

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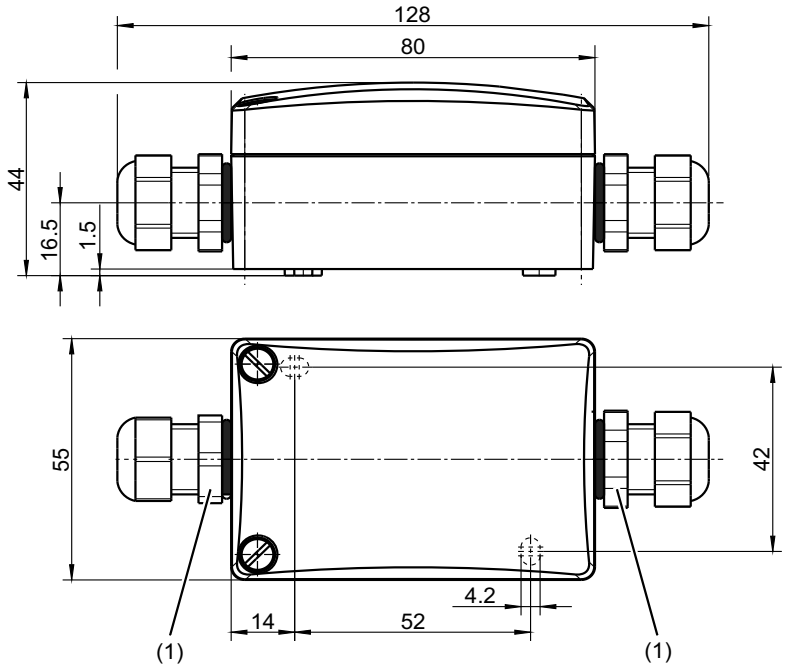
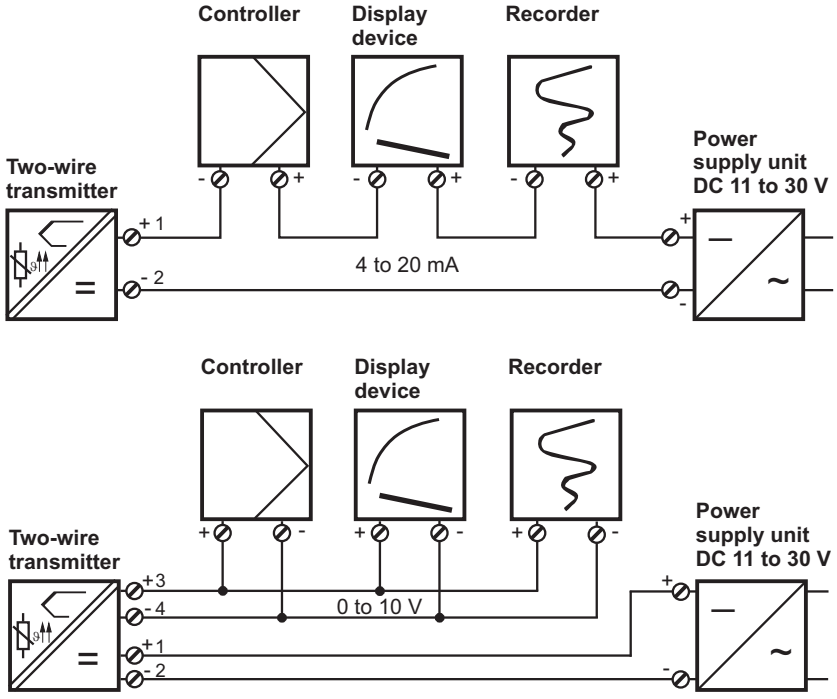
Surface-mounted housing for dTRANS T05 B

(protection type IP65 according to DIN EN 60529)



(1) Tightening torque of the Pg screw connection 1.4 Nm (+0.1 Nm)

Connection example dTRANS T05 T



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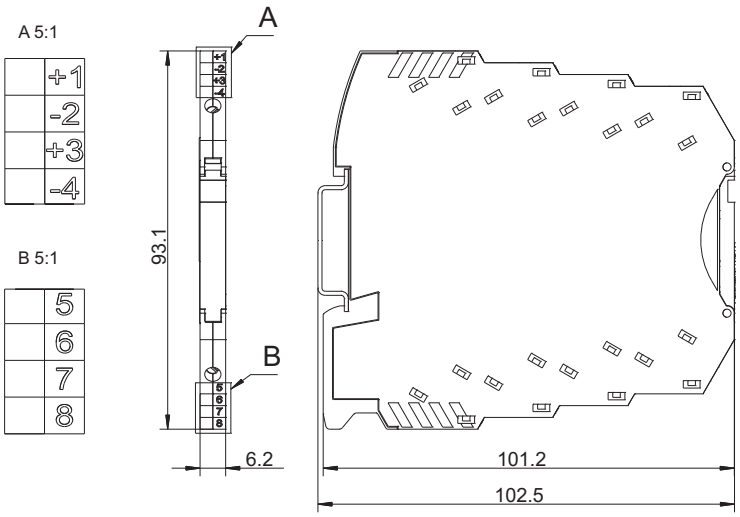
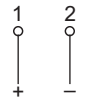
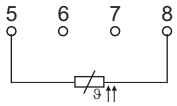
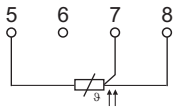
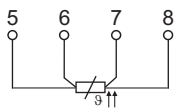
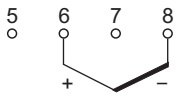
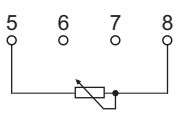
Connection assignment and dimensions (mm) dTRANS T05 T



This figure shows the type 707051 mounted on a TH 35-7.5 DIN rail. The dimension specifications are only valid for mounting on this DIN rail, and change accordingly if a TH 35-15 DIN rail is used.

Type 707051		
Connection for	**Terminal assignment**	
Voltage supply Type 707051 DC 11 to 35 V Current output 4 to 20 mA	$R_B = (U_b - 11\ V) \div 22\ mA$ R_B = Load resistance U_b = Voltage supply	
Voltage output 0 to 10 V		
Analog inputs		
RTD temperature probe Two-wire circuit	$R_L \leq 11\ \Omega$ R_L = Line resistance per wire	
RTD temperature probe Three-wire circuit (3W)	$R_L \leq 11\ \Omega$ R_L = Line resistance per wire	
RTD temperature probe Four-wire circuit (4W)	$R_L \leq 11\ \Omega$ R_L = Line resistance per wire	
Thermocouple		
Resistance/potentiometer Two-wire circuit	$R_L \leq 11\ \Omega$ R_L = Line resistance per wire	

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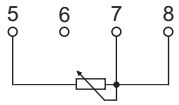
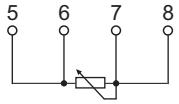
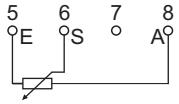
Type 707051		
Connection for	**Terminal assignment**	
Resistance/potentiometer Three-wire circuit (3W)	$R_L \leq 11\ \Omega$ R_L = Line resistance per wire	
Resistance/potentiometer Four-wire circuit (4W)	$R_L \leq 11\ \Omega$ R_L = Line resistance per wire	
Resistance transmitter	E = End S = Slider A = Start	
Voltage 0 to 1 V		
Interface		
USB device	Micro-B, standard (5-pole)	

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Order details

			(1)	**Basic type**
		707050		dTRANS T05 B – Two-wire transmitter for installation in terminal head, form B
		707051		dTRANS T05 T – Two-wire transmitter for mounting on DIN-rail
			(2)	**Configuration**
x	x	8		Default settings (0 to 100 °C, Pt100 three-wire circuit, 4 to 20 mA)
x	x	9		Customer-specific setting
			(3)	**Electrical connection type**
x	x	06		Screw terminals
	x	07		Spring-cage terminals
			(4)	**Extra codes**
x	x	000		None
x		243		Transmitter in surface-mounted housing

	(1)		(2)		(3)		(4)
Order code		/		-		/	
Order example	707050	/	8	-	06	/	000

Stock versions

Order code	Part no.
707050/8-06/000 – 0 to 100 °C Pt100 (3W)	00582219
707051/8-06/000 – 0 to 100 °C Pt100 (3W)	00582220
707051/8-07/000 – 0 to 100 °C Pt100 (3W)	00582221

Scope of delivery

1 transmitter in the version ordered
For type 707050: including fastening material (2 screws, 2 pressure springs, and 2 retaining washers)
1 operating manual

Accessories

Description	Part no.
Setup program on CD-ROM, multilingual	00574959
USB cable, A-connector to Mini-B connector, length 3 m, for type 707050	00506252
USB cable, A-connector to Micro-B connector, length 3 m, for type 707051	00616250
USB cable set (mini/micro USB), length 3 m	00639360
Mounting element for mounting of type 707050 on mounting rail	00352463
Screw-on end clamp for mounting rail	00528648