



JUMO dTRANS T01 Programmable 2-wire transmitter

for use with resistance thermometers and thermocouples,
 for fitting into terminal head Form B to DIN 43 729



Brief description

The 2-wire transmitter uses a resistance thermometer, or a thermocouple, to acquire the temperature. With resistance thermometers, the probe can be connected in 2-/3- or 4-wire circuit. The version 956555/... (with Ex protection) is intended for installation within the hazardous area.

Probe type, connection circuit and range can be configured using the setup program.

The output signal 4 – 20mA (or inverted 20 – 4mA) is available in linearised form (linear with temperature).

The instrument is designed for industrial application and conforms to the directives of EN 61 010, as well as to the appropriate European Standards to ensure electromagnetic compatibility (EMC).

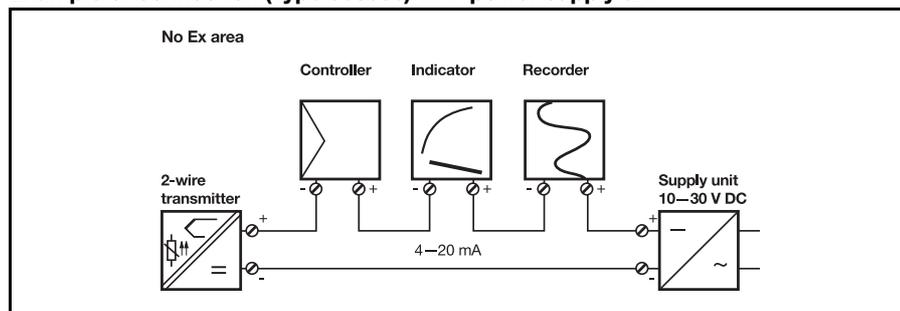
Version 956555/... (with Ex protection) conforms to the directives of EN 50 014, and to EN 50 020 "Electrical apparatus for use in hazardous areas" according to the Certificate of Conformity.



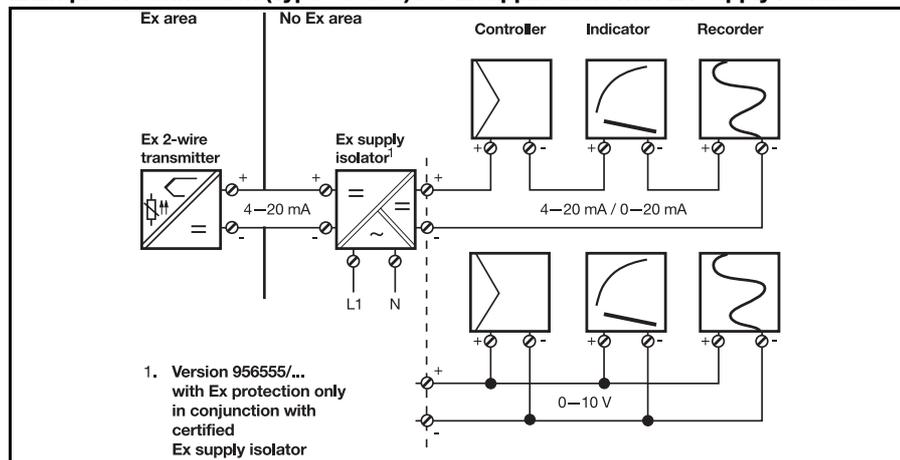
Type 956550/... (no Ex protection)
 Type 956555/... (Ex protection)

System diagrams

Example of connection (Type 956550) with power supply unit



Example of connection (Type 956555) for Ex application with Ex supply isolator



Features

- Type 956555/... in Ex version
 CE ₀₀₃₂ Ex II 1 G EEx ia IIC T6
 (under development)
- input and output electrically isolated
- freely configurable ranges
- customized linearisation for resistance thermometer and thermocouple
- configuration via Windows setup program

Technical data

Input for resistance thermometer

Designation	Range limits	Range	Accuracy ¹
Pt 100 EN 60 751	-200 to +850°C	-100 to +200°C -200 to +850°C	±0.2°C ±0.4°C
Pt 100 JIS	-200 to +649°C	-100 to +200°C -200 to +649°C	±0.2°C ±0.4°C
Pt 500 DIN	-200 to +250°C	-100 to +200°C -200 to +250°C	±0.2°C ±0.4°C
Pt 1000 DIN	-200 to +250°C	-100 to +200°C -200 to +250°C	±0.2°C ±0.4°C
Ni 100	-60 to +250°C	-60 to +250°C	±0.2°C
Ni 500	-60 to +150°C	-60 to +150°C	±0.2°C
Ni 1000	-60 to +150°C	-60 to +150°C	±0.2°C
Connection circuit	2-, 3- or 4-wire circuit		
Shortest span	10°C		
Sensor lead resistance - for 3-, 4-wire connection - for 2-wire connection	≤ 11Ω per conductor measuring resistance + ≤ 22Ω internal lead resistance		
Sensor current	< 0.6mA		
Sampling rate	> 1 measurement per second		
Input filter	1st order digital filter; filter constant adjustable from 0 – 125sec		
Features	can also be programmed in °F; range limits are freely programmable; input isolated from output		

1. The accuracy refers to the maximum span.

Input for thermocouple

Designation	Range limits	Range	Accuracy ¹
Fe-Con L DIN 43 710	-200 to +900°C	-200 to +900°C	0.5°C typical
Fe-Con J EN 60 584	-210 to +1200°C	-150 to +1200°C	0.5°C typical
Cu-Con U DIN 43 710	-200 to +600°C	-200 to +600°C	0.5°C typical
Cu-Con T EN 60 584	-270 to +400°C	-200 to +400°C	0.5°C typical
NiCr-Ni K EN 60 584	-270 to +1372°C	-140 to +1372°C	0.5°C typical
NiCr-Con E EN 60 584	-270 to +1000°C	-150 to +1000°C	0.5°C typical
NiCrSi-NiSi N EN 60 584	-270 to +1300°C	-100 to +1300°C	1°C typical
Pt10Rh-Pt S EN 60 584	-50 to +1768°C	20 to 1768°C	2°C typical
Pt13Rh-Pt R EN 60 584	-50 to +1768°C	50 to 1768°C	2°C typical
Pt30Rh-Pt6Rh B EN 60 584	0 to 1820°C	400 to 1820°C	2°C typical
MoRe5-MoRe41	0 to 2000°C	500 to 2000°C	2°C typical
W3Re-W25Re D	0 to 2495°C	500 to 2495°C	1°C typical
W5Re-W26Re C	0 to 2320°C	500 to 2320°C	1°C typical
Shortest span	Type L, J, U, T, K, E, N: 50°C Type S, R, B: 500°C Type MoRe5-MoRe41: 500°C Type D, C: 500°C		
Cold junction	Pt100 internal or external cold junction (adjustable from 0 to 80°C)		
Cold junction accuracy	± 1°C		
Sampling rate	> 1 measurement per second		
Sensor current	350nA		
Input filter	1st order digital filter; filter constant adjustable from 0 to 125sec		
Features	can also be programmed in °F; range limits are freely programmable; input isolated from output		

1. The accuracy refers to the maximum span.

Measurement circuit monitoring

	Resistance thermometer	Thermocouple
Underrange	linear drop to 3.8mA (to NAMUR recommendation 43)	
Overrange	linear rise to 20.5mA (to NAMUR recommendation 43)	
Probe short-circuit / probe and lead break	$\leq 3.5\text{mA}$ or $\geq 21.0\text{mA}$ (configurable)	$\leq 3.5\text{mA}$ or $\geq 21.0\text{mA}$ (configurable) ²
Current limiting on probe short-circuit / break	$\leq 23\text{mA}$	

Output

	Resistance thermometer	Thermocouple
Output signal	proportional DC current 4 – 20mA, 20 – 4mA	
Isolation test voltage	between input and output $U_{\text{peak}} = 3.75\text{kVAC}$ 50Hz	
Transfer characteristic	linear with temperature	
	linearisation to customer specification	
	inversion of the output signal	
Burden (R_b)	$R_b = (U_b - 8\text{V}) / 0.022\text{A}$	
Burden error	$\leq \pm 0.02\%$ per $100\Omega^1$	
Calibration conditions / accuracy	24VDC at approx. $22^\circ\text{C} / \pm 0.05\%^1$ or better	
1st order digital filter	0 – 125sec configurable	
Step response 0 – 100 %	< 2sec (with filter constant 0sec)	
Switch-on delay	5sec (correct measurement after connecting the supply voltage)	

Customized linearisation

Number of calibration points	maximum 40
Interpolation	linear

Supply

Supply (U_b)	Type 956550: 8 – 35VDC (with reverse polarity protection) Type 956555: 8 – 30VDC (with reverse polarity protection)
Supply error	$\leq \pm 0.01\%$ per V deviation from 24V^1
Damping of ripple	40dB at 50/60Hz

Environmental influences

Operating temperature range	-40 to +85°C	
Storage temperature range	-40 to +100°C	
Temperature error	$\leq \pm 0.005\%$ per °C deviation from 22°C^1	$\leq \pm 0.005\%$ per °C deviation from 22°C^1 additional to cold junction accuracy
Climatic conditions	rel. humidity 95% max. with condensation	
Vibration strength	according to GL Characteristic 2	
EMC	EN 61326; to NAMUR recommendation NE 21	
IP protection (in terminal head / open mounting)	IP54 / IP00 (IEC 529)	

Housing

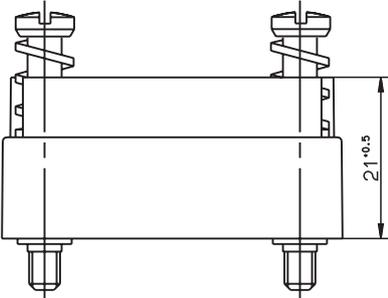
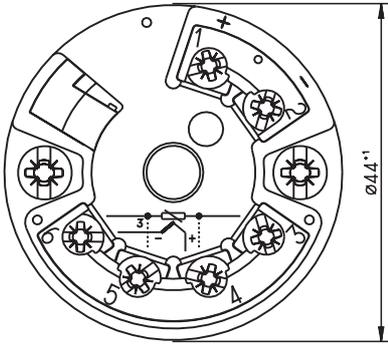
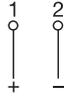
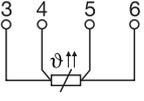
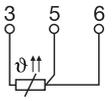
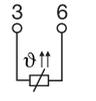
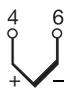
Material	polycarbonate (encapsulated with PUR)
Screw connection	$\leq 1.75\text{mm}^2$; max. tightening torque 0.6Nm
Mounting	screws and compression springs
Operating position	any
Weight	40g approx.

Version 956555/... with Ex protection (under development)

The transmitter head must be mounted in such a way as to obtain at least IP20 protection according to IEC 529, also for the connecting parts.

1. All specified values refer to 20mA full scale
2. Probe short-circuit recognition is not possible for thermocouples

Connection diagram

<p>956550/... 956555/...</p>  	Connection for		Terminals		
		Supply 8 – 35V DC 8 – 30V DC (Ex) ¹	+1	$R_B = \frac{U_b - 8V}{22mA}$	
		Current output 4 – 20mA	-2	$R_B = \text{burden resistance}$ $U_b = \text{supply voltage}$	
	Ex version only in conjunction with certified Ex transmitter supply unit				
	Analogue inputs				
	Resistance thermometer in 4-wire circuit	3 4 5 6	$R_L \leq 11\Omega$ $R_L = \text{lead resistance per conductor}$		
	Resistance thermometer in 3-wire circuit	3 5 6	$R_L \leq 11\Omega$ $R_L = \text{lead resistance per conductor}$		
	Resistance thermometer in 2-wire circuit	3 6	$R_L \leq 11\Omega$ $R_L = \text{lead resistance per conductor}$		
	Thermocouple	+4 -6			
Ex version: Please note connection data of the Ex input-current circuit!					

1. For Type 956555 only up to 30V. Must only be connected to a certified intrinsically safe circuit.

Setup interface

The setup interface is available for configuring the transmitter from a PC. The connection is through the PC interface with TTL/RS232 converter and adapter. The connection of the setup circuit must only be used outside the hazardous area. It is not permissible to configure the transmitter in the hazardous (Ex) area. The protective cover must be closed after programming.

Configurable parameters:

- TAG number (10 characters)
- sensor type
- connection circuit (2-/3-/4-wire)
- external and internal cold junction
- customized linearisation
- range limits
- output signal rising/falling (inversion)
- digital filter
- action on probe break/short circuit
- recalibration (fine calibration)
- lead resistance for 2-wire circuit

If no power supply unit (supply isolator) is available, the 2-wire transmitter can also be configured using a 9V block battery.

Fine calibration

Fine calibration means correction of the output signal. The signal can be adjusted within $\pm 5\%$ of the 20 mA end value. Fine calibration is performed using the setup program. Values for 4 mA (zero), 20 mA (full scale) and offset can be calibrated separately via the setup program.

Ordering details: JUMO dTRANS T01**Programmable 2-wire transmitter****(1) Basic version**

	956550	programmable 2-wire transmitter, no Ex protection	
	956555	programmable 2-wire transmitter, Ex protection (under development)	
	(2) Input (programmable)		
x	x	888	factory-set (Pt100 DIN vI)
x	x	999	configuration to customer specification ¹
	(3) Output (proportional DC current - programmable)		
x	x	888	factory-set (4 – 20mA)
x	x	999	configuration to customer specification (20 – 4mA)
	(4) Probe break/short-circuit		
x	x	888	factory-set (positive protection)
x	x	999	configuration to customer specification (negative protection)

Ordering code	(1)	(2)	(3)	(4)
Ordering example	956550	/ 888	- 888	- 888

1. With configuration to customer specification, the probe type and the range have to be specified in plain text

Standard accessories

- 1 Operating Instructions 95.6550 or 1 Operating Instructions 95.6555
- fixing items (2 screws, 2 compression springs)

Accessories

- PC setup program, multilingual
- PC interface cable with TTL/RS232 converter and adapter
- supply units 1-way and 4-way (Data Sheet 95.6024)
- isolating amplifier and supply isolator (Data Sheet 95.6055)
- Ex transmitter supply unit (Data Sheet 95.6056)