TE 42.01

Digital Temperature Transmitter

for PROFIBUS PA, Head Mounting

Electrical Temperature Measurement

Standard • Model T42.10.000
Ex class protection EEx ia • Model T42.10.002
Ex class protection EEx ib • Model T42.10.004

- **Field bus protocol PROFIBUS PA**
- **Configurable for connection to**
  - **RTDs**
  - **Thermocouples**
  - **Resistance sensor**
  - **mV-sensor**
- **Customer specific linearisation with max. 30 points for sensors with Ω- or mV-output**
- **Ex class protection, intrinsically safe per FISCO-Model**
  - **II 1G EEx ia IIB/IIC T4/T5/T6**
  - **II 2G EEx ib IIB/IIC T4/T5/T6**
- **EMC Conformity per**
  - **DIN EN 50 081-1**
  - **DIN EN 50 082-2**
  - **NAMUR NE 21**
- **Isolation voltage AC 1500 V between sensor and bus**
- **100% Rh protection, moisture condensation permissible**
- **Configurable via e.g. SIMATIC PDM or Freelance 2000**
- **Terminal connections with captive screws**
- **CE-Conformity**

Description

The digital temperature transmitter T42 range is designed for universal use in the process industry. The Profibus technology makes it possible to operate up to seven transmitters in parallel on one Profibus PA string via one segment coupler (ex class protection) in hazardous areas. For applications without requirements on the use in hazardous areas the number of transmitters which may be connected is yet considerably higher, depending on the segment coupler.

There is a wide range of possibilities with respect to configuration. For example, sensor type, sensor's mode of operation, scaling of the output signal and alarm limits are individually programmable. The configuration is made via a class 2 master and the definition of the profile in accordance with the Profibus guidelines. An appropriate tool for configuration is, for example, SIMATIC PDM or Freelance 2000.

High accuracy, galvanic isolation and excellent EMI protection are further features of these transmitters. The compact head mounting case fits in almost any DIN connecting head with form B.

The following sensors can be connected:

- RTDs per DIN IEC 751, JIS C 1606, DIN 43 760 in 2- , 3- and 4-lead connection, the connection system used is configurable and ensures an optimal lead wire compensation
- thermocouples per DIN IEC 584 resp. DIN 43 710 Cold junction compensation (CJC) is built-in, the use of an external CJC is selectable via configuration.
- resistance sensors up to 5000 Ω in 2- , 3- and 4-lead connection, configurable compensation of the connection cable
- mV-sensors up to 1200 mV

The variety of 15 sensor types enable registration of the temperature in a range from -270 °C up to 1820 °C.

The transmitters are delivered with a basic configuration. Alternatively, upon request, transmitters can be delivered with a customised configuration within the given limits.

Specifications — Model T42.10.000 / T42.10.002 / T42.10.004

Input	**configurable: type of sensor and measuring range**		Measuring range
RTDs	Pt 100	DIN IEC 751	-200 ... + 850 °C [1]
	JPt 100	JIS C 1606	-200 ... + 500 °C
	Ni 100	DIN 43760 : 1987-09	-60 ... + 250 °C
thermocouples	type T, Cu-CuNi	DIN IEC 584	-270 ... + 400 °C
	type E, NiCr-CuNi	DIN IEC 584	-270 ... +1000 °C
	type J, Fe-CuNi	DIN IEC 584	-210 ... +1200 °C
	type L, Fe-CuNi	DIN 43710 : 1985-12	-200 ... + 900 °C
	type K, NiCr-Ni	DIN IEC 584	-270 ... +1372 °C
	type N, NiCrSi-NiSi	DIN IEC 584	-270 ... +1300 °C
	type U, Cu-CuNi	DIN 43710 : 1985-12	-200 ... + 600 °C
	type R, PtRh-Pt	DIN IEC 584	-50 ... +1768 °C
	type S, PtRh-Pt	DIN IEC 584	-50 ... +1768 °C
	type B, PtRh-PtRh	DIN IEC 584	0 ... +1820 °C
resistance sensor			0 ... 700 Ω
			0 ... 1400 Ω
			0 ... 2900 Ω
			0 ... 5000 Ω
mV-sensor			- 140 ... + 140 mV
			- 290 ... + 290 mV
			- 400 ... + 590 mV
			- 400 ... + 1200 mV

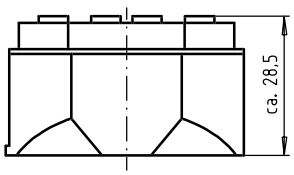
RTD / resistance sensor			
measuring deviation per DIN IEC 770, 23 °C ± 5 K			
	RTDs	MV ≤ 200 °C	± 0.08 K
		MV > 200 °C	± (0.08 K + 0.01 % (MV - 200 K))
	resistance-sensor		± 0.03 Ω or 0,01 % MV , whichever is greater
sensor current			approx. 0.2 mA
temperature coefficient T_C	RTDs		± (0.05 K + 0.015 % MV) / 10 K $_{T_{amb}}$
	resistance-sensor		± (0.01 Ω + 0.01 % MV) / 10 K $_{T_{amb}}$
lead wire connection			configurable: 2-lead , 3-lead , 4-lead
connection leads	effect		± 0.02 Ω / 10 Ω
	max. permissible resistance		30 Ω each lead, 3-lead symmetric
thermocouples			
measuring deviation per DIN IEC 770, 23 °C ± 5 K			
type	T, L, U	-150 °C < MV ≤ 0 °C	± (0.25 K + 0.15 % MV)
		MV > 0 °C	± (0.25 K + 0.015 % MV)
	E, J, K, N	-150 °C < MV ≤ 0 °C	± (0.4 K + 0.2 % MV)
		MV > 0 °C	± (0.4 K + 0.03 % MV)
	R, S	50 °C < MV ≤ 400 °C	± (1.2 K + 0.1 % (MV - 400 K))
		400 °C < MV ≤1600 °C	± (1.2 K + 0.015 % (MV - 400 K))
	B	400 °C < MV ≤ 1000 °C	± (1.3 K + 0.25 % (MV - 1000 K))
		MV > 1000 °C	± 1.3 K
additional error of cold junction compensation at 23 °C ± 5 K			± 0.8 K
temperature coefficient T_C			
type	T, L, U	MV > -150 °C	± (0.1 K + 0.02 % MV) / 10 K $_{T_{amb}}$
	E, J, K, N	MV > -150 °C	± (0.1 K + 0.035 % MV) / 10 K $_{T_{amb}}$
	R, S	50 °C < MV ≤ 1600 °C	± (0.3 K + 0.025 % (MV - 400 K)) / 10 K $_{T_{amb}}$
	B	MV > 400 °C	± (0.4 K + 0.02 % (MV - 1000 K)) / 10 K $_{T_{amb}}$
temperature coefficient T_C of cold junction compensation			± 0.1 K / 10 K $_{T_{amb}}$
connection leads	effect		± 0.1 µV / 10 Ω
	max. permissible resistance		250 Ω
mV-sensor			
measuring deviation per DIN IEC 770, 23 °C ± 5 K			± (10 µV + 0.03 % MV)
temperature coefficient T_C			± (2 µV + 0.03 % MV) / 10 K $_{T_{amb}}$
connection leads	effect		± 0.1 µV / 10 Ω
	max. permissible resistance		250 Ω

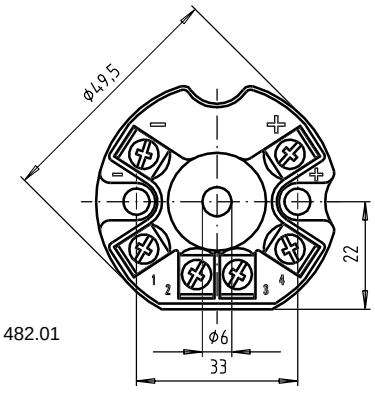
Communication	PROFIBUS PA , Profile 2.0
bus voltage	EN 61158-2/94
model T42.10.000 (without Ex-protection)	DC 9 … 32 V
models T42.10.002 and T42.10.004 (with Ex protection)	DC 9 … 25 V
bus connection	reverse polarity possible
max. current consumption	12.8 mA
default address	126

MV measuring value (temperature measuring values in °C) T_{amb} ambient temperature T_C temperature coefficient 1) increased up to 1000 °C

Ex-protection	EC Type Examination Certificate DMT 99 ATEX E 033 X		
model T42.10.002	II 1G EEx ia IIB / IIC T4 / T5 / T6		
model T42.10.004	II 2G EEx ib IIB / IIC T4 / T5 / T6		
permissible ambient temperature	-50 °C … +85 °C with T4 -50 °C … +70 °C with T5 -50 °C … +50 °C with T6		
maximum values for connection of the bus (connections + and –)	U_i = 25 V	L_i = negligible	C_i = negligible
suited to connect a power supply acc. to FISCO-Model with maximum values as listed	Power supply with trapezoid characteristic: U_0 = 24 V	I_0 = 250 mA	P_0 = 1.2 W
	Power supply with square wave characteristic: U_0 = 17.5 V	I_0 = 280 mA	P_0 = 4.9 W
maximum values for connection of the sensor circuit (connections 1 up to 4)	U_o = 8.6 V	I_o = 10 mA	P_o = 22 mW
	Group IIB:	C_o = 40 µF	L_o = 10 mH
	Group IIC:	C_o = 5 µF	L_o = 10 mH
Electromagnetic compatibility (EMC)	CE - Conformity per DIN EN 50081-1 (March 93) and DIN EN 50082-2 (February 96) NAMUR NE 21 (May 93)		
Special features			
isolation voltage (input versus bus connection)	AC 1500 V, 60 s		
ambient and storage temperature			
standard range	-40 … +85 °C		
climate application class	GPA DIN 40040		
maximum permissible humidity	100 % relative humidity (unlimited with isolated connection wires), moisture condensation permissible DIN IEC 68-2-30 Var. 2		
vibration	10 … 2000 Hz 5 g DIN IEC 68-2-6		
shock	DIN IEC 68-2-27		
salt fog	DIN IEC 68-2-11 g_N = 30		
warm-up time	approx. 5 Min.		
measured value update	approx. 2.5 / s		
temperature units	configurable: K, °C, °F, °R		
configuration and calibration data	permanently stored in EEPROM		
testing current to monitor sensor	nom. 1 µA during testing cycle, otherwise 0 µA		
self-monitoring	automatic execution of initial test after connection to power supply, thereafter monitoring for internal malfunction		
Case	head mounting design		
material	plastic		
ingress protection case	IP 66 / IP 67 IEC 529 / EN 60529		
terminal connections	IP 00 IEC 529 / EN 60529		
cross section of terminal connections	max. 2.5 mm² , screws captive		
weight	approx. 70 g		
dimensions	see drawings		

Dimensions in mm





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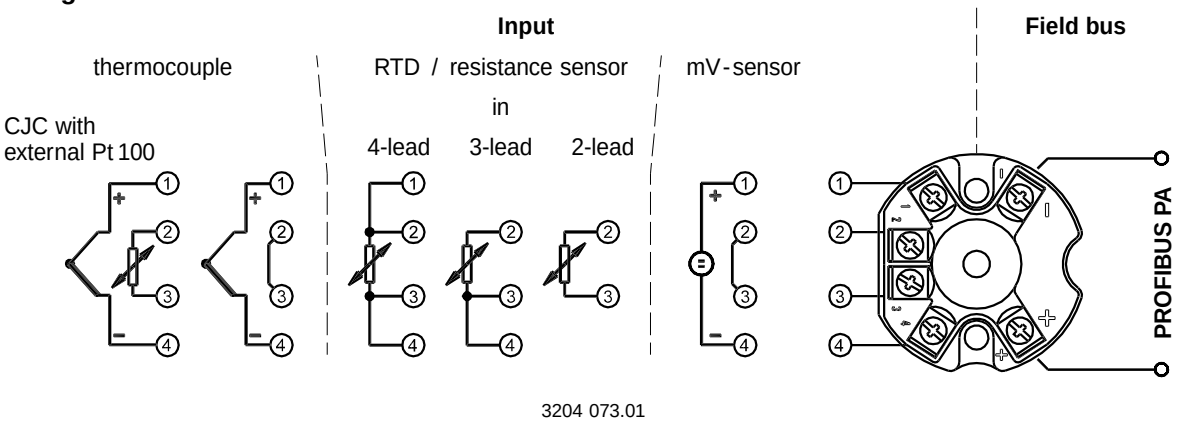
Accessories

Mounting material

To use for mounting
- in the top of a connection head
- on a measuring insert, spring-loaded
- on a standard rail

Designation of terminal connectors



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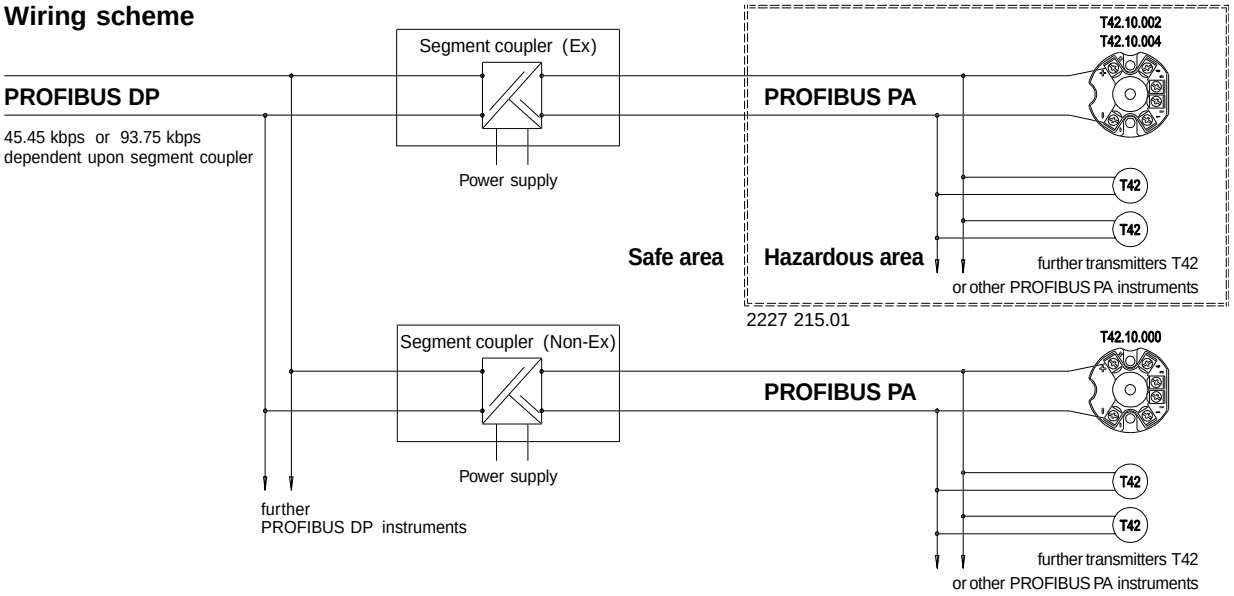
Wiring scheme



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Order code for temperature transmitter Model T42

Field No.		Code	Features	
			Explosion protection	
		0	without	
		2	II 1G EEx ia IIC T4/T5/T6	
1		**4**	II 2G EEx ib IIC T4/T5/T6	
			Measuring range	
		PB	basic configuration *1)*	
2		**PK**	customer's specification *2)*	*please state as additional text*

		Additional order info			
		YES	**NO**		
3		**T**	**Z**	additional text	*Please state as clearly understandable text !*

1) Pt 100, 3 wire, 0 ... 150 °C
2) Please pay attention to the limits of measuring ranges on page 2.

Order code:

	1	2	3
T42.10 – 00		–	–

Additional text: _____

Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing.
Modifications may take place and materials specified may be replaced by others without prior notice.

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9035923 03/2004 GB