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Analogue Temperature Transmitter
Model T31.10, Process Industry Series, Head Mounting

Applications

- Chemical industry
- Pharmaceutical industry
- Food industry

Special Features

- Fixed measuring ranges
- Potentiometer free
- Ex-protection
  II 1G EEx ia IIB / IIC T4 / T5 / T6
  II 2G EEx ib IIB / IIC T4 / T5 / T6
  II 3G EEx nL/nA IIC T4 / T5 / T6
- High accuracy
- Compact

Analogue Temperature Transmitter Model T31.10

Description

The series T31 analogue temperature transmitters are designed for use in process industry to meet difficult and demanding conditions.

In the development phase, particular consideration was given to reliability and a practical design. These transmitters feature fixed measurement ranges without the use of potentiometers and are intrinsically safe. Industrial standard accuracy and effective protection against electro-magnetic influences are further performance features of these temperature transmitters. The compact transmitter fits any DIN connection head with Form B.

The transmitters are manufactured and tested in-house, using a largely automated production line and following the most stringent quality procedures. Prior to delivery all transmitters have to pass in-circuit and functional tests. Extensive type examinations and long-term tests with excellent results are evidence of the high reliability of this transmitter series.

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Specifications	Model T31.10
Input	Pt100 DIN EN 60 751 3 wire
Possible measuring ranges	From -200 °C to +650 °C in full digit °C values
minimum span	40 K
maximum span	650 K
Standard measuring ranges	-200 … 0 °C -200 … +50 °C 0 … 50 °C 0 … 150 °C 0 … 400 °C -50 … 0 °C -50 … +50 °C 0 … 60 °C 0 … 200 °C 0 … 650 °C -40 … 0 °C -30 … +60 °C 0 … 100 °C 0 … 250 °C -20 … +60 °C 0 … 120 °C 0 … 300 °C
Special measuring ranges	On request
Linearisation	Linear to temperature per DIN EN 60 751
Sensor current	Approx. 0.8 mA
Connection leads effect	≤ ± 0.22 K / 10 Ω [1]
permissible load resistance	10 Ω symmetric
Analogue output	4 … 20 mA 2 wire design linear to temperature
Load R_A	$R_A \leq (U_B - 11.5\ V) / 0.02\ A$ with R_A in Ω and U_B [2] in V
Adjustment accuracy (factory adjusted)	± 0.15 % of measuring range or ± 0.3 K, the maximum value is valid [3]
Linearity error	± 0.1 % of measuring range or ± 0.2 % of measuring range with initial values lower than -120 °C
Temperature influence zero	0.1 % of measuring range / 10 K or 0.1 K / 10 K, the maximum value is valid
span	0.1 % of measuring range / 10 K or 0.1 K / 10 K, the maximum value is valid
Rising time t_{90}	< 30 ms
Switch-on delay, electric	< 1 s
Power supply effect	0.01 % / V related to U_B [2] 20 V
With sensor burnout	Upscale, ≥ 22.5 mA
With sensor short circuit	Downscale, ≤ 3.6 mA [4]
Power supply	DC 11.5 … 30 V by the 4 ... 20 mA-loop
Max. permissible ripple	10 %
Ex-protection per Directive 94/9/EC ATEX Intrinsic Safety per EN 50 020	EC Type Test DMT 02 ATEX E 106 X
Model T31.10.1P2	II 1G EEx ia IIB / IIC T4 / T5 / T6
Model T31.10.1P4	II 2G EEx ib IIB / IIC T4 / T5 / T6
Permissible ambient temperature	-50 °C … +85 °C with T4
	-50 °C … +75 °C with T5
	-50 °C … +60 °C with T6
Maximum values for connection of the	U_i = DC 30 V I_i = 100 mA P_i = 800 mW
current loop circuit (connections + and -)	C_i = 6.2 nF L_i = 110 µH
Maximum values for connection of the	U_O = DC 6.4 V I_O = 100 mA P_O = 426 mW
sensor circuit (connections 1 up to 3)	Group II B: C_O = 500 µF L_O = 10 mH
	Group II C: C_O = 10 µF L_O = 3 mH
Ex-protection per Directive 94/9/EC energy-limited resp. non sparking equipment per EN 50 021	EC Type Test DMT 99 E 088 X
Model T31.10.1P9	II 3G EEx nL/nA IIC T4 / T5 / T6
Permissible ambient temperature	-40 °C … +85 °C with T4
	-40 °C … +70 °C with T5
	-40 °C … +50 °C with T6
Maximum values for connection of the	U_i = DC 30 V
current loop circuit (connections + and -)	C_i = 1.2 nF L_i = 100 µH
Maximum values for connection of the	U_O = DC 2.5 V I_O = 1.2 mA
sensor circuit (connections 1 up to 3)	C_O = 1000 µF L_O = 1000 mH
Electromagnetic compatibility (EMC)	IEC: 801-2 {3}, 801-3 {3}, 801-4 {3}, 801-6 {3} degree of severity in { } (corresponds with NAMUR 5.93 requirement)
Measurement uncertainty	max. ± 1 % of measuring range [5]
Protection and other features	
Electrical protection class	Reverse power supply, overvoltage protection 36 V
Ambient and storage temperature	-40 … +85 °C
Maximum permissible humidity	100 % relative humidity (unlimited with isolated sensor connection wires) moisture condensation permissible DIN EN 60 068-2-30 Var. 2
Climate class	Cx (-40 … +85 °C, 5 % up to 95 % relative humidity) DIN EN 60 654-1
Vibration	10 … 2000 Hz 5 g DIN EN 60 068-2-6
Shock	DIN EN 60 068-2-27 g_N = 15
Info data	TAG-No., Descriptor and Message storable into transmitter via configuration
Configuration and calibration data	Permanently stored in EEPROM
Case	Head mounting design
Material	Plastic, PBT, glass fibre reinforced [6]
Ingress protection case	IP 50 IEC 529 / EN 60 529
terminal connections	IP 00 IEC 529 / EN 60 529
Cross section of terminal connectors	Max. 2.5 mm² , screws captive
Weight	Approx. 0.04 kg

1) The lead resistance is recorded as fault in case of Pt100 in 2 wire connection
2) U_B = Loop supply voltage, see power supply
3) Values valid at ambient temperature: 23 °C ± 5 °C
terminal voltage of energy supply: 24 V , load: 100 Ohm
4) Temperature measured value, in case of short circuiting between leads no. 2 and no. 3 (operation of Pt100 in 2 wire connection)
5) With measurement spans < 100 K : 2 % for 801-6 and 801-2
6) Press-fitted, brass threaded inserts M 3 on underside

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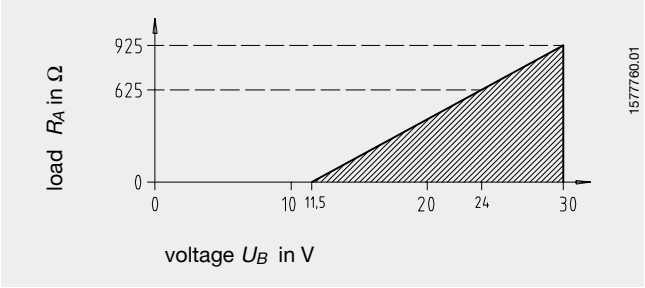
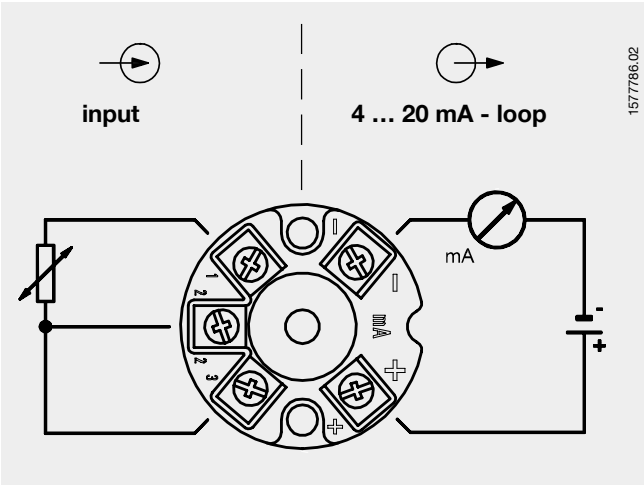
Load diagram

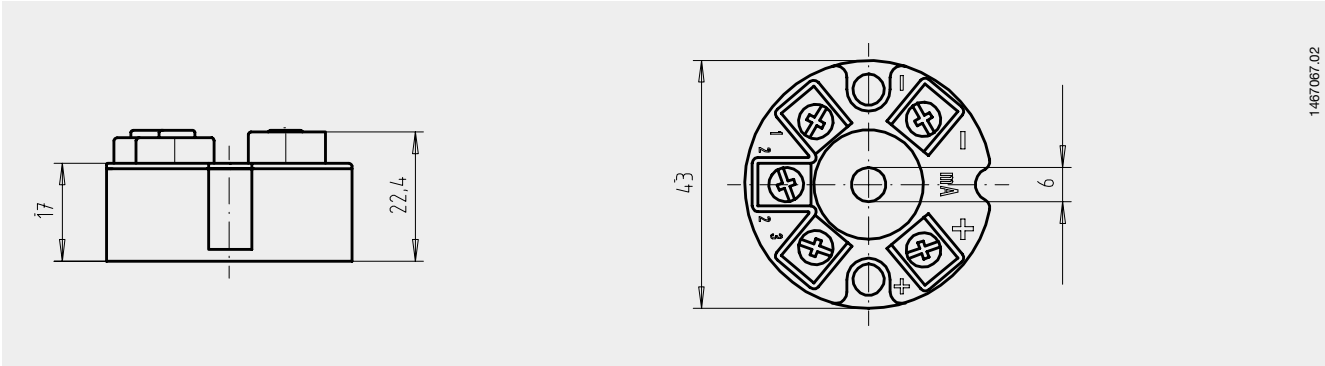
The permissible load is dependent upon the loop power supply voltage.



Designation of terminal connectors



Dimensions in mm



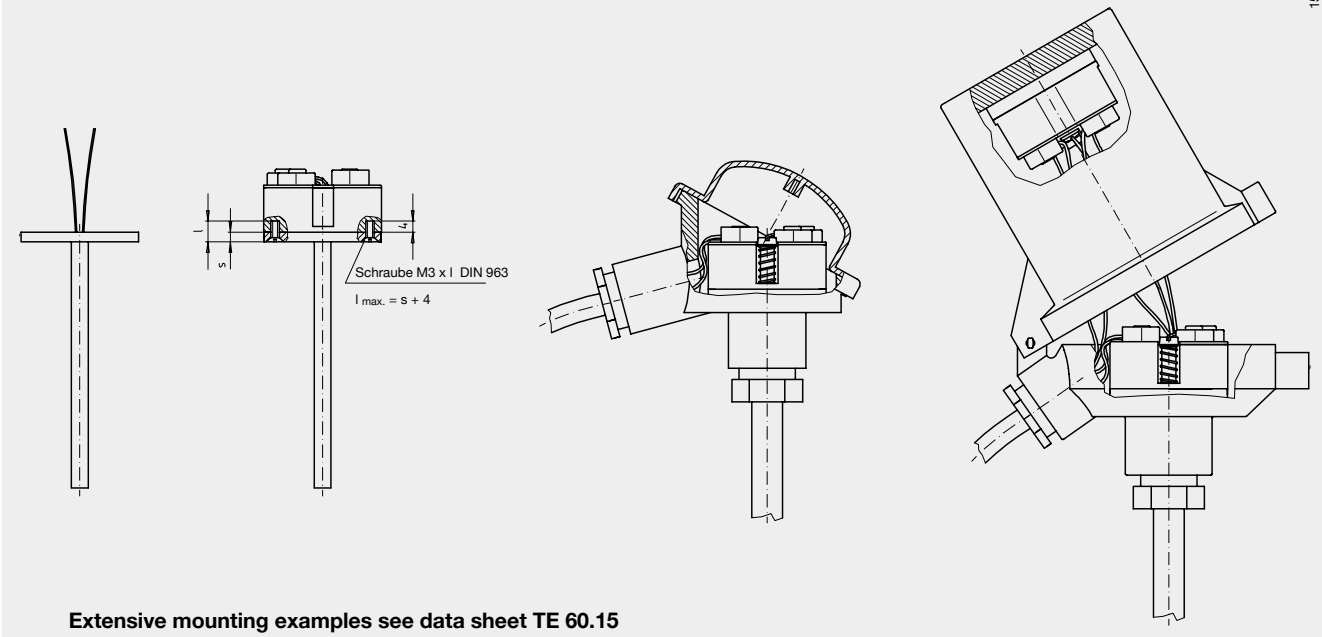
Mounting examples

Pt100

Pt100 with mounted T31.10

Mounting of the T31.10 in a DIN B connection head

Mounting of two T31.10 in a DIN B connection head



Extensive mounting examples see data sheet TE 60.15

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Ordering information

Field No.		Code	Features	
			Explosion protection	
		2	II 1G EEx ia IIC T4/T5/T6 acc. to Directive 94/9/EC (ATEX)	
		4	II 2G EEx ib IIC T4/T5/T6 acc. to Directive 94/9/EC (ATEX)	
1		9	II 3G EEx nL/nA IIC T4/T5/T6 acc. to Directive 94/9/EC	
			Measuring range	
			Standard measuring range [1]	
2		??	Special measuring range [2]	*please state as additional text*

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

1) Standard measuring ranges and their code

Standard measuring ranges	Code
-200 °C ... 0 °C	L1
-200 °C ... +50 °C	LA
-50 °C ... 0 °C	E1
-50 °C ... +50 °C	EA
-40 °C ... 0 °C	D1
-30 °C ... +60 °C	CC
-20 °C ... +60 °C	BB
0 °C ... +50 °C	1A
0 °C ... +60 °C	1C
0 °C ... 100 °C	1E
0 °C ... 120 °C	1F
0 °C ... 150 °C	1H
0 °C ... 200 °C	1L
0 °C ... 250 °C	1M
0 °C ... 300 °C	1N
0 °C ... 400 °C	1Q
0 °C ... 650 °C	1V

2) Special measuring ranges

Special measuring ranges	Span
-200 °C ... +650 °C	Min. 40 K, max. 650 K
-328 °F ... +1202 °F	Min. 72 °F, max. 1170 °F

The special measuring ranges are freely selectable taking the minimum/maximum values specified for measuring range and span into account.

Order code:

	1	2	3
T31.10 - 1P	☐ -	☐	- ☐

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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WIKA Alexander Wiegand GmbH & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg
Telefon 0 93 72/132-0
Telefax 0 93 72/132-406
E-Mail info@wika.de
www.wika.de