Digital temperature transmitter
Model T15.H, head mounting version
Model T15.R, rail mounting version

Applications

- Process industry
- Machine building and plant construction

Special features

- For the connection of Pt100 and Pt1000 sensors in a 2-, 3- or 4-wire connection
- For the connection of reed chains in a potentiometer circuit
- Parameterisation with the WIKAsoft-TT configuration software and electrical connection via quick connector magWIK
- Connection terminals also accessible from the outside
- Accuracy < 0.2 K / 0.1 %

Fig. left: head mounting version, model T15.H
Fig. right: rail mounting version, model T15.R

Description

These temperature transmitters are designed for universal use in plant and machine building, and also in the process industry. They offer high accuracy and excellent protection against electromagnetic influences (EMI). Via the WIKAsoft-TT configuration software and the model PU-448 programming unit, the model T15 temperature transmitters can be parameterised very easily, quickly and with a clear overview.

Besides the selection of the sensor type and the measuring range, the software enables the error signaling operation, damping and several measuring point descriptions to be stored. Furthermore, the WIKAsoft-TT software offers a line recording functionality where the temperature profile for the sensor connected to the T15 can be displayed.

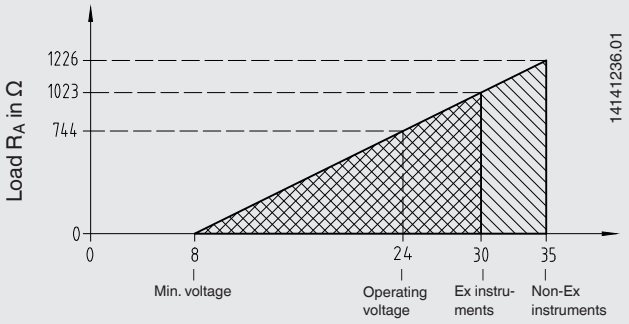
The model T15 transmitter also has diverse supervisory functionality, such as the monitoring of the sensor wire resistance and sensor-break detection in accordance with NAMUR NE89 as well as monitoring of the measuring range. Moreover, these transmitters have comprehensive cyclic self-monitoring functionality.

Specifications

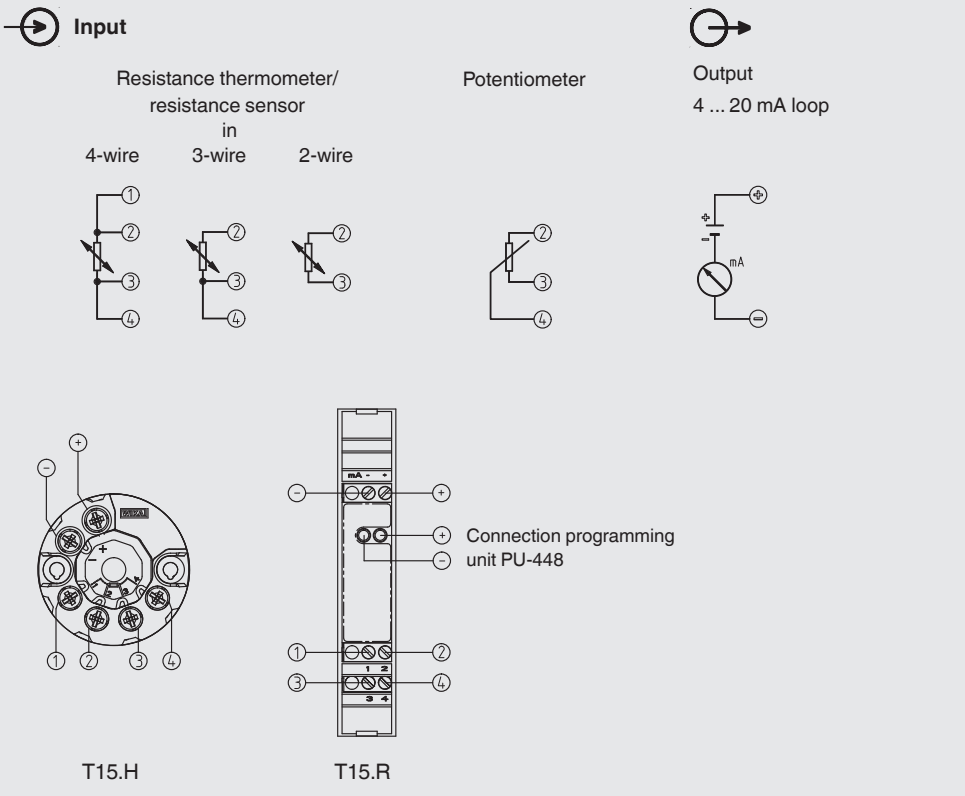
Power supply	
Power supply U_B	DC 8 … 35 V
Load R_A	$R_A \leq (U_B - 8\ V) / 0.0215\ A$ with R_A in Ω and U_B in V
Ex-relevant connection values	see “Safety-relevant characteristics (explosion-protected version)”

Load diagram

The permissible load depends on the loop supply voltage.



Designation of connection terminals



Temperature transmitter input				
	Sensor type	**Max. configurable measuring range (MR)**	**Standard**	**Minimum measuring span (MS)**
Resistance sensor	Pt100	-200 ... +850 °C (-328 ... +1,562 °F)	IEC 60751:2008	10 K (50 °F) or 3.8 Ω (greater value applies)
	Pt1000	-200 ... +850 °C (-328 ... +1,562 °F)	IEC 60751:2008	
Potentiometer [1]	Reed chains	0 ... 100 % (≙ min. 1 ... max. 50 kΩ)		10 % (≙ min. 1 kΩ)
Measuring current at the measurement	Max. 0.2 mA (Pt100/Pt1000) Max. 0.1 mA (Reed)			
Connection methods	1 sensor in 2-, 3-, 4-wire connection (for further information, please refer to “Designation of connection terminals”)			
Max. lead resistance	50 Ω each wire in 3- or 4-wire connection			

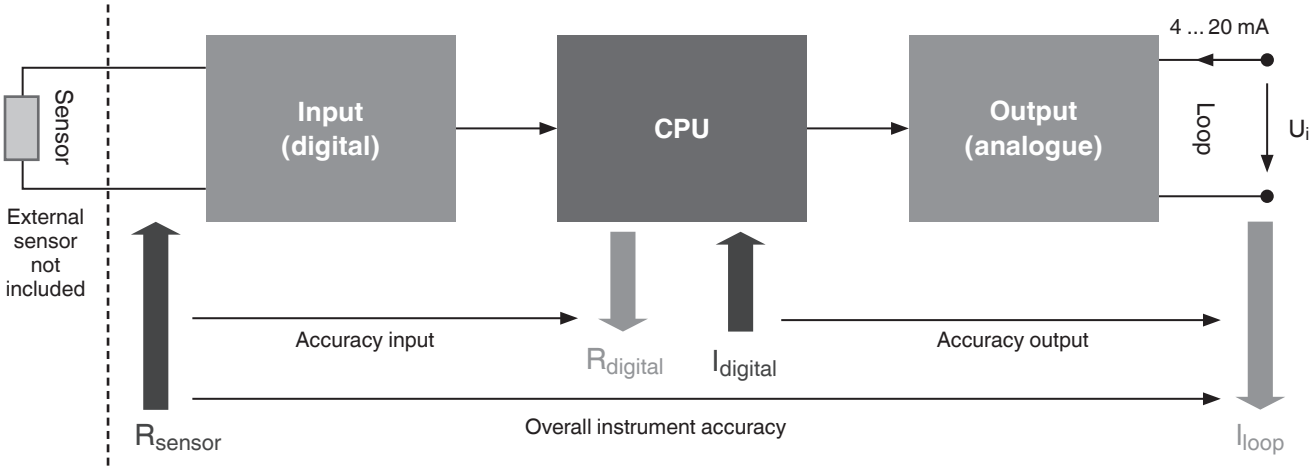
1) R_{total}: 10 ... 50 kΩ

Basic configuration	
Sensor	Pt100
Connection method	3-wire connection
Measuring range	0 ... 150 °C
Error signalling	Downscale
Damping	Off

Analogue output, output limits, signalling		
Analogue output, configurable	Linear to temperature per IEC 60751	
Output limits per NAMUR NE43	Lower limit 3.8 mA	Upper limit 20.5 mA
Current value for signalling, configurable per NAMUR NE43	Downscale < 3.6 mA (3.5 mA)	Upscale > 21.0 mA (21.5 mA)

Time response	
Switch-on time (time to get the first measured value)	Max. 3 s
Warm-up time	After max. 4 minutes the instrument will function to the specifications (accuracy)
Response time	< 0.4 s
Damping	Configurable between 1 s and 60 s
Typical measuring rate	Measured value update with 2- and 4-wire connection, approx. 20/s with 3-wire connection/potentiometer, approx. 5/s

Accuracy specifications

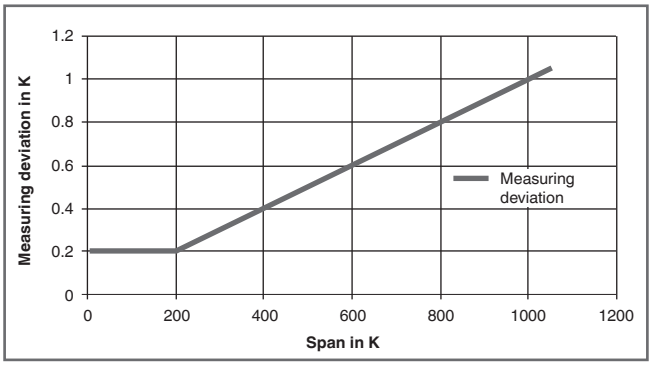


The product-specific accuracy specifications refer to the overall instrument ($Error_{overall} = Error_{input} + Error_{output}$). To determine the overall error, all possible types of error must be considered.
These are summarised in the following table.

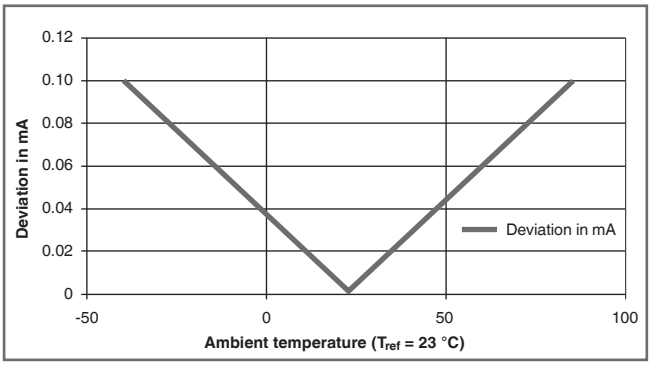
Special features				
Reference conditions	Calibration temperature T_{ref} = 23 °C ±3 K Power supply U_{i_ref} = 24 V Atmospheric pressure = 860 ... 1,060 hPa All accuracy specifications refer to the reference conditions.			
Accuracy specifications	Measuring deviation per DIN EN 60770, NE145 [2]	Mean temperature coefficient (TC) every 1 K ambient temperature deviation from T_{ref}	Influence of power supply every 1 V voltage change from U_{i_ref}	Long-term drift in line with IEC 61298-2 per year
Pt100, Pt1000	0.2 K or 0.1 % (greater value applies) MS < 200 K: 0.2 K MS > 200 K: 0.1 % of MS → see chart "Measuring deviation via span"	≤ ±0.01 % of the MS → see chart "Deviation of the current span via ambient temperature range"	±0.005 % of the MS	< 0.1 % of the MS
Potentiometer	Relative accuracy: 0.2 % ($R_{part}/R_{overall}$ in %) Absolute accuracy: 1 % ($R_{part}/R_{overall}$ in Ω)	≤ ±0.01 % of the MS	±0.005 % of the MS	< 0.1 % of the MS

2) In the event of interference caused by high-frequency electromagnetic fields in a frequency range from 80 to 400 MHz, an increased measuring deviation of up to 0,8 % is expected. During transient interferences (e.g. burst, surge, ESD) take into account an increased measuring deviation of up to 1,5 %.

Measuring deviation via span



Deviation of the current span via ambient temperature range



Monitoring	
Sensor break monitoring	Configurable Standard: downscale
Sensor short-circuit	Configurable Standard: downscale
Measuring range monitoring	Monitoring of the set measuring range for upper/lower deviations configurable Standard: deactivated
Drag pointer (internal temperature of the electronics)	Comparative value in relation to the permissible ambient temperature

Case	T15.H head mounting version	T15.R rail mounting version
Material	Plastic PBT, glass-fibre reinforced	Plastic
Weight	45 g	0.2 kg
Ingress protection	IP 00 Electronics completely potted	IP 20
Connection terminals, captive screws, wire cross-section ■ Solid wire ■ Wire with end splice	 0.14 ... 2.5 mm² (AWG 24 ... 14) 0.14 ... 1.5 mm² (AWG 24 ... 16)	 0.14 ... 2.5 mm² (AWG 24 ... 14) 0.14 ... 2.5 mm² (AWG 24 ... 14)
Screwdriver	Cross head (Pozidrive tip), size 2 (ISO 8764)	Slotted, 3 x 0.5 mm (ISO 2380)
Tightening torque	0.4 Nm	0.4 Nm

Ambient conditions	
Permissible ambient temperature range	{-50} -40 ... +85 {+105} °C {-58} -40 ... +185 {+221} °F
Climate class per IEC 654-1:1993	Cx (-40 ... +85 °C, 5 ... 95 % r. h.)
Maximum permissible humidity ■ Model T15.H per IEC 60068-2-38:2009 ■ Model T15.R per IEC 60068-2-30:2005	 Test max. temperature variation 65 °C / -10 °C, 93 % ±3 % r. h. Test max. temperature 55 °C, 95 % r. h.
Vibration resistance per IEC 60068-2-6:2008	Test Fc: 10 ... 2,000 Hz; 10 g, amplitude 0.75 mm
Shock resistance per IEC 68-2-27:2009	Acceleration / shock width 30 g / 11 ms 100 g / 6 ms
Salt fog per IEC 68-2-52:1996, IEC 60068-2-52:1996	Severity level 1
Condensation	Model T15.H: acceptable Model T15.R: acceptable in vertical mounting position
Free fall in line with IEC 60721-3-2:1997, DIN EN 60721-3-2:1998	Drop height 1.5 m
Electromagnetic compatibility (EMC) per DIN EN 55011:2010, DIN EN 61326-2-3:2013, NAMUR NE21:2012, GL 2012 VI Part 7	Emission (group 1, class B) and interference immunity (industrial application) [HF field, HF cable, ESD, Burst, Surge]

{ } Items in curved brackets are options for an additional price, not for ATEX versions of the head mounting version and not for T15.R rail mounting version

Safety-relevant characteristics (explosion-protected version)

■ Models T15.x-AI, T15.x-AC

Intrinsically safe connection values for the current loop (4 ... 20 mA)
Protection level Ex ia IIC/IIB/IIA, Ex ia IIIC or Ex ic IIC/IIB/IIA

Parameters	Models T15.x-AI, T15.x-AC	Model T15.x-AI
	Gas hazardous application	Dust hazardous application
Terminals	+ / -	+ / -
Voltage U_i	DC 30 V	DC 30 V
Current I_i	130 mA	130 mA
Power P_i	800 mW	750/650/550 mW
Effective internal capacitance C_i	18.4 nF	18.4 nF
Effective internal inductance L_i	3.91 µH	3.91 µH

Sensor circuit

Parameters	Model T15.x-AI	Model T15.x-AC
	Ex ia IIC/IIB//IIA Ex ia IIIC	Ex ic IIC/IIB//IIA
Terminals	1 - 4	1 - 4
Voltage U_o	DC 30 V	DC 30 V
Strength of current I_o	6.1 mA	6.1 mA
Power P_o	46 mW	46 mW
Characteristics	Linear	

Due to distance requirements of the applied standards, the IS power and signal circuit and the IS sensor circuit shall be considered as being galvanically connected to each other.

The intrinsically safe supply and signal circuit and the intrinsically safe sensor circuit must be considered as galvanically connected to each other (with regard to explosion protection).

Ambient temperature range

Application	Ambient temperature range	Temperature class	Power P_i
Group II	-40 °C ≤ T_a ≤ +85 °C	T4	800 mW
	-40 °C ≤ T_a ≤ +70 °C	T5	800 mW
	-40 °C ≤ T_a ≤ +55 °C	T6	800 mW
Group IIIC	-40 °C ≤ T_a ≤ +40 °C	N / A	750 mW
	-40 °C ≤ T_a ≤ +75 °C	N / A	650 mW
	-40 °C ≤ T_a ≤ +100 °C	N / A	550 mW

N / A = not applicable

Comments:
U_o: Maximum voltage of any conductor against the other three conductors
I_o: Maximum output current for the least favourable connection of the internal current limiting resistors
P_o: U_o x I_o divided by 4 (linear characteristic)

Model T15.x-AN

Power and signal circuit (4 ... 20 mA loop)

Protection level Ex nA IIC/IIB/IIA

Parameters	Model T15.x-AN
	Gas hazardous application
Terminals	+ / -
Voltage U_i	DC 35 V
Current I_i	21.5 mA

Sensor circuit

Protection level Ex nA IIC/IIB/IIA

Parameters	Model T15.x-AN
Terminals	1 - 4
Power P_o	3.3 V x 0.1 mA 0.33 mW DC 3.3 V (maximum voltage limited at V9) 0.1 mA (maximum current limited at D10)

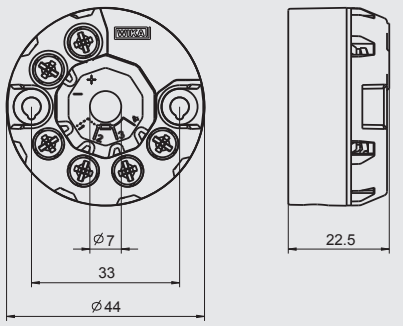
Ambient temperature range

Application	Ambient temperature range	Temperature class
Group II	-40 °C ≤ T_a ≤ +85 °C	T4
	-40 °C ≤ T_a ≤ +70 °C	T5
	-40 °C ≤ T_a ≤ +55 °C	T6

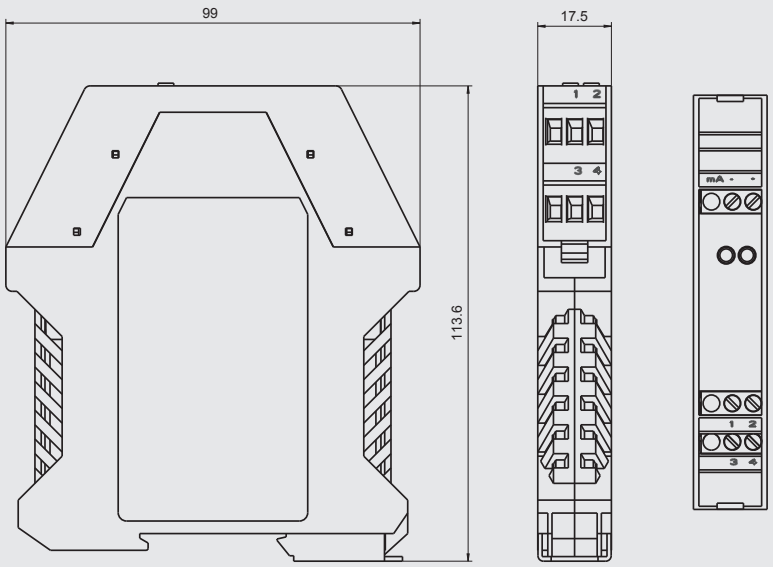
N / A = not applicable

Dimensions in mm

Head mounting version, model T15.H



Rail mounting version, model T15.R



The dimensions of the head-mounted transmitter match the form B DIN connection heads with extended mounting space, e.g. WIKA model BSS.

The transmitters in rail mounting cases are suitable for all standard rails in accordance with IEC 60715.

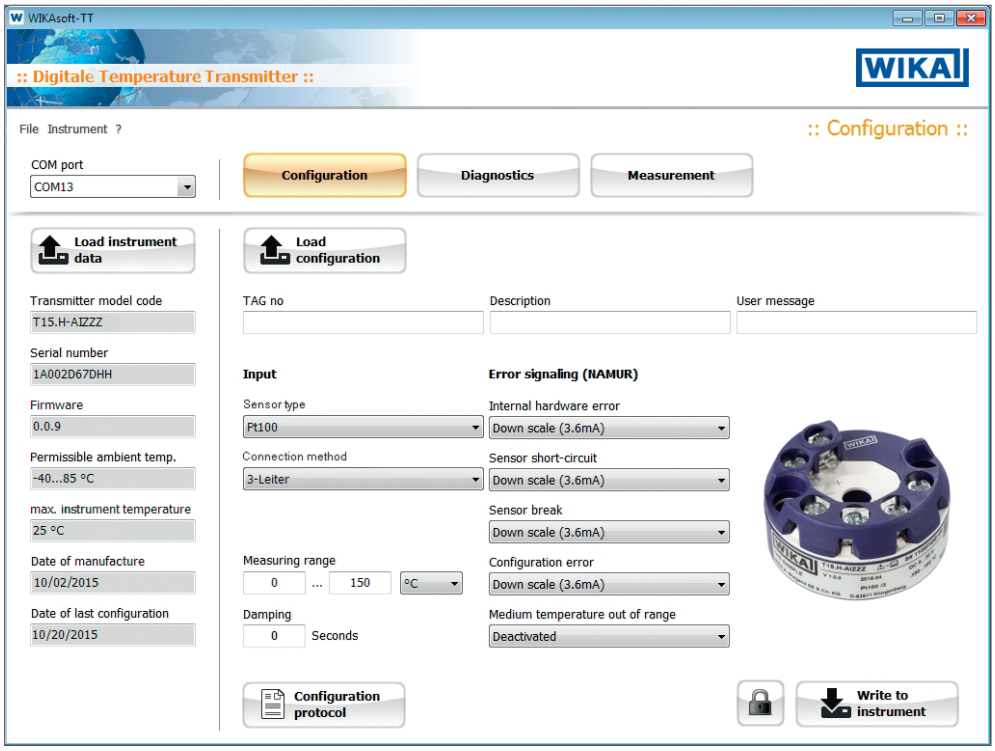
Connecting PU-448 programming unit

Head mounting version, model T15.H

Rail mounting version, model T15.R

Attention:
For direct communication via the serial interface of a PC/notebook, a model PU-448 programming unit is needed (see “Accessories”).

Configuration software WIKAsoft-TT



Accessories

WIKA configuration software: free download from www.wika.com

Model	Version	Order number
Programming unit Model PU-448 	■ Simple operation ■ LED status/diagnostic displays ■ Compact design ■ No further voltage supply is needed for either the programming unit or for the transmitter	11606304
Magnetic quick connector magWIK 	■ Replacement for crocodile clips and HART® terminals ■ Fast, safe and tight electrical connection ■ For all configuration and calibration processes	14026893

Approvals (option)

Logo	Description	Country
CE Ex	**EC declaration of conformity** ■ EMC directive 2004/108/EC EN 61326 emission (group 1, class B) and interference immunity (industrial application) ■ ATEX directive 94/9/EC	European Community
IEC IECEx	**IECEx** Hazardous areas	IECEx member states

Certificates (option)

- 2.2 test report
- 3.1 inspection certificate

Approvals and certificates, see website

Ordering information
Model / Explosion protection / Additional approvals / Permissible ambient temperature / Configuration / Certificates / Options

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