

Digital temperature transmitter

Model T12.10, universally programmable, head mounting version

Model T12.30, universally programmable, rail mounting version

WIKA data sheet TE 12.03



for further approvals
see page 8

Applications

- Process industry
- Machine building and plant construction

Special features

- Universally configurable via Windows PC, sensor simulation not required
- Insulation voltage AC 1,500 V between sensor and current loop
- Signalling configurable for sensor break and sensor short-circuit
- For 100 % relative humidity, condensation allowed



Fig. left: Digital temperature transmitter model T12.10
Fig. right: Digital temperature transmitter model T12.30

Description

These temperature transmitters are designed for universal use in industrial applications. They offer high accuracy, galvanic isolation and protection against electromagnetic influences (EMI).

In addition to the different sensor types, e.g. sensors in accordance with DIN EN 60751, JIS C1606, DIN 43760, DIN EN 60584 or DIN 43710, customer-specific sensor characteristics can also be defined through the input of pairs of values.

The connection type is configurable, thus ensuring optimal connecting cable compensation. A cold junction compensation for thermocouples is built-in, while an external cold junction can also be used.

The configurable error signalling (e.g. sensor break, hardware errors, sensor over/under-range) ensures a high degree of monitoring functionality.

Configuration changes can be quickly and easily transmitted to the T12 using the WIKAI_T12 configuration software (free download at www.wika.com) and the communication interface (programming unit), which is available as an accessory. The bidirectional communication makes it possible to display the measured values also on the PC/notebook.

The programming unit provides voltage to the temperature transmitter model T12, so that no additional voltage supply is required to configure the T12.

The dimensions of the head-mounted transmitter match the form B DIN connecting 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.

The transmitters are delivered with a basic configuration or configured according to customer specifications.

Specifications

Input of the temperature transmitter; configurable						
Resistance sensor	Configurable measuring range ¹⁾	Standard	α values	Minimum measuring span	Typical measuring deviation at 23 °C 5 K	
					Basic accuracy	Temperature coefficient
Pt100	-200 ... +850 °C	IEC 60751: 1996	$\alpha = 0.00385$	} 25 K	$\leq \pm 0.2$ °C ³⁾	$\leq \pm 0.026$ °C / °C ⁴⁾
Pt1000	-200 ... +850 °C	IEC 60751: 1996	$\alpha = 0,00385$		$\leq \pm 0.2$ °C ³⁾	$\leq \pm 0.026$ °C / °C ⁴⁾
JPt100	-200 ... +500 °C	JIS C1606: 1989	$\alpha = 0,003916$		$\leq \pm 0.2$ °C ³⁾	$\leq \pm 0.026$ °C / °C ⁴⁾
Ni100	-60 ... +250 °C	DIN 43760: 1987	$\alpha = 0.00618$		$\leq \pm 0.2$ °C ³⁾	$\leq \pm 0.026$ °C / °C ⁴⁾
Resistance sensor	0 ... 5 k Ω			30 Ω	$\leq \pm 0.07$ Ω ⁵⁾	$\leq \pm 0.026$ Ω / °C ⁵⁾
Measuring current at the measurement				max. 0.2 mA (Pt100)		
Connection methods				1 sensor in 2- /4- /3-wire connection (for further information, please refer to assignment of connection terminals)		
Max. lead resistance				30 Ω each wire, 3-wire symmetric		
Thermocouple	Configurable measuring range ¹⁾	Standard	Minimum measuring span	Typical measuring deviation at 23 °C 5 K		
				Basic accuracy	Temperature coefficient	
Type J (Fe-CuNi)	-100 ... +1,200 °C	IEC 584: 1998-06	} 50 K or 2 mV greater value applies	$\leq \pm 0.5$ °C ⁶⁾	$\leq \pm 0.05$ °C / °C ⁶⁾	
Type K (NiCr-Ni)	-180 ... +1,372 °C	IEC 584: 1998-06		$\leq \pm 0.5$ °C ⁶⁾	$\leq \pm 0.05$ °C / °C ⁶⁾	
Type L (Fe-CuNi)	-100 ... +900 °C	DIN 43760: 1985-12		$\leq \pm 0.5$ °C ⁶⁾	$\leq \pm 0.05$ °C / °C ⁶⁾	
Type E (NiCr-Cu)	-100 ... +1,000 °C	IEC 584: 1998-06		$\leq \pm 0.5$ °C ⁶⁾	$\leq \pm 0.05$ °C / °C ⁶⁾	
Type T (Cu-CuNi)	-200 ... +400 °C	IEC 584: 1998-06	100 K	$\leq \pm 0.5$ °C ⁶⁾	$\leq \pm 0.05$ °C / °C ⁶⁾	
Type N (NiCrSi-NiSi)	-180 ... +1,300 °C	IEC 584: 1998-06	75 K	$\leq \pm 0.5$ °C ⁶⁾	$\leq \pm 0.05$ °C / °C ⁶⁾	
Type U (Cu-CuNi)	-200 ... +600 °C	DIN 43710: 1985-12	200 K	$\leq \pm 0.5$ °C ⁶⁾	$\leq \pm 0.2$ °C / °C ⁶⁾	
Type R (PtRh-Pt)	-50 ... +1,768 °C	IEC 584: 1998-06	200 K	$\leq \pm 0.5$ °C ⁷⁾	$\leq \pm 0.2$ °C / °C ⁶⁾	
Type S (PtRh-Pt)	-50 ... +1,768 °C	IEC 584: 1998-06	200 K	$\leq \pm 0.5$ °C ⁷⁾	$\leq \pm 0.2$ °C / °C ⁷⁾	
Type B (PtRh-Pt)	0 ... +1,820 °C ²⁾	IEC 584: 1998-06	200 K	$\leq \pm 0.5$ °C ⁷⁾	$\leq \pm 0.2$ °C / °C ⁷⁾	
Type W3, W3Re, W25Re	0 ... +2,300 °C	ASTM E988	200 K	$\leq \pm 0.5$ °C ⁷⁾	$\leq \pm 0.2$ °C / °C ⁷⁾	
Type W5, W5Re, W26Re	0 ... +2,300 °C	ASTM E988	200 K	$\leq \pm 0.5$ °C ⁷⁾	$\leq \pm 0.2$ °C / °C ⁷⁾	
mV sensor	-10 ... +800 mV		4 mV	$\leq \pm 0.2$ mV ⁸⁾	$\leq \pm 0.022$ mV / °C ⁸⁾	
Connection methods				1 sensor (for further information, please refer to assignment of connection terminals)		
Max. lead resistance				250 Ω		
Cold-junction compensation, configurable				internal compensation or external with Pt100, with thermostat or off		

1) Other units e. g. °F and K possible

2) Specifications valid only for measuring range between 400 ... 1,820 °C

3) Based on 3-wire Pt100 Pt100, Ni100, EV 150 °C

4) Based on EV 150 °C, in ambient temperature range -40 ... +85 °C

5) Based on R_{total} 1 k Ω (3-wire)

6) Based on EV 400 °C in ambient temperature range
-40 ... +85 °C for T12.10 or
-20 ... +70 °C for T12.30

7) Based on EV 1,000 °C in ambient temperature range
-40 ... +85 °C for T12.10 or
-20 ... +70 °C for T12.30

8) Based on EV 400 mV in ambient temperature range
-40 ... +85 °C for T12.10 or
-20 ... +70 °C for T12.30

EV = End value of the configured measuring range

User linearisation

Via software, customer-specific sensor characteristics can be stored in the transmitter, so that further sensor types can be used.

Number of data points: minimum 2; maximum 30

bold: basic configuration

Analogue output, output limits, signalling, insulation resistance		
Analogue output, configurable	linear to temperature per IEC 60751, JIS C1606, DIN 43760 (for resistance sensors) or linear to temperature per IEC 60584, DIN 43710 (for thermocouples)	
	4 ... 20 mA or 20 ... 4 mA, 2-wire	
Output limits, configurable	lower limit	upper limit
per NAMUR NE43	3.8 mA	20.5 mA
not active	3.6 mA	23.0 mA
customer-specifically adjustable	3.6 ... 4.0 mA	20.0 ... 23.0 mA
Current value for signalling, configurable	downscale	upscale
per NAMUR NE43	< 3.6 mA (3.5 mA)	> 21.0 mA (21.5 mA)
Substitute value	3.5 ... 12.0 mA	12.0 ... 23.0 mA
In simulation mode, independent from input signal, simulation value configurable from 3.5 ... 23.0 mA		
Load R_A	$R_A \leq (U_B - 9 V) / 0.023 A$ with R_A in Ω and U_B in V	
Insulation voltage (input to analogue output)	AC 1,500 V, (50 Hz / 60 Hz); 60 s	
Power consumption at $U_B = 24 V$	max. 552 mW	

Rise time, damping, measuring rate

Rise time t_{90}	approx. 0.5 s
Damping , configurable	off ; configurable between 0.5 s and 60 s
Switch-on time (time to get the first measured value)	5 s
Measuring rate	Measured value update approx. 2/s

bold: basic configuration

Measuring deviation, temperature coefficient

Effect of load	± 0.01 % of measuring span / 100 Ω		
Power supply effect	± 0.005 % of measuring span / V		
Warm-up time	after approx. 5 minutes the instrument will function to the specified technical data (accuracy)		
Input	Measuring deviation ¹⁾ per DIN EN 60770, 23 °C ± 5 K	Temperature coefficient ²⁾ from -40 ... +85 °C	Lead resistance effects
Resistance thermometer (Pt100)	± 0.2 K or $\pm(0.025$ % EV + 0.1) K	$\pm(0.025$ % EV + 0.09) K / 10 K	4-wire: no effect (0 to 30 Ω each wire)
Resistance sensor	± 0.07 Ω or ± 0.03 % EV in Ω	$\pm(0.025$ % EV + 0.01) Ω / 10 K	3-wire: ± 0.02 Ω / 10 Ω (0 to 30 Ω each wire) 2-wire: resistor of the connection lead ⁴⁾
Thermocouple Type T, E, J, L, K, N, U ³⁾	± 0.5 K or ± 0.05 % EV or ± 10 μ V	$\pm(0.05$ % EV + 0.1) K / 10 K or ± 0.5 K / 10 K	
Type R, S, W3, W5	± 0.5 K or ± 0.05 % EV or ± 10 μ V	± 2 K / 10 K	0.5 μ V / 10 Ω ⁵⁾
Type B	400 °C < MV < 1820 °C: ± 1.7 K or ± 10 μ V	± 2 K / 10 K	0.5 μ V / 10 Ω ⁵⁾
mV sensor	± 10 μ V or ± 0.05 % EV in mV	$\pm(0.05$ % EV + 0.02) mV / 10 K	0.1 μ V / 10 Ω ⁵⁾
Cold junction	± 1.0 K	± 0.2 K / 10 K	
Output	± 0.05 % of measuring span	± 0.1 % of measuring span / 10 K	

Total measuring deviation addition: input + output per DIN EN 60770, 23 °C ± 5 K

EV End value of the configured measuring range

1) Greater value applies

2) The double value applies in case of extended ambient temperature range (-50 ... +85 °C)

3) Thermocouples types T, K, N, U: valid only for configured start of measuring range ≥ -150 °C

4) Can be compensated manually by measurement of the resistance value.

5) Within a range up to 250 Ω lead resistance

Monitoring

Test current for sensor monitoring ⁶⁾	nom. 33 μ A during test cycle, otherwise 0 μ A
Sensor break monitoring	activated
Self-monitoring	Initial test is carried out automatically after connecting the power supply

6) Only for thermocouple

Explosion protection, power supply

Model	Approvals	Permissible ambient and storage temperature	Safety-related maximum values for Sensor (connections 1 up to 4)	Current loop (connections ±)	Power supply U_B ¹⁾
T12.10.000, T12.30.000	without	-40 ... +85 °C -20 ... +70 °C	-	-	9 ... 36 V
T12.10.002, T12.30.002	EC-type examination certificate: DMT98 ATEX E 008 X Zones 0, 1: II 1G EEx ia IIB/IIC T4/T5/T6 Intrinsically safe per directive 94/9/EC (ATEX)	-40 ... +85 °C (T4) -40 ... +75 °C (T5) -40 ... +60 °C (T6) -20 ... +70 °C (T4) -20 ... +70 °C (T5) -20 ... +60 °C (T6)	$U_o = DC 11.5 V$ $I_o = 31 mA$ $P_o = 87 mW$ IIB: $C_o = 11 \mu F$ $L_o = 8.6 mH$ IIC: $C_o = 1.5 \mu F$ $L_o = 8.6 mH$	$U_i = DC 30 V$ $I_i = 100 mA$ $P_i = 705 mW$ $C_i = 25 nF$ $L_i = 0.65 mH$	9 ... 30 V
T12.10.006, T12.30.006	CSA File No. LR 105000-7 Intrinsically safe: Cl. I / Div. 1, Group A, B, C, D	-40 ... +85 °C (T4) -40 ... +75 °C (T5) -40 ... +60 °C (T6) -20 ... +70 °C (T4) -20 ... +70 °C (T5) -20 ... +60 °C (T6)	$U_{oc} = DC 11.5 V$ $I_{sc} = 31 mA$ $P_{max} = 87 mW$ $C_a = 0.4 \mu F$ $L_o = 8.65 mH$	$U_{max} = DC 30 V$ $I_{max} = 100 mA$ $P_{max} = 705 mW$ $C_i = 25 nF$ $L_i = 0.65 mH$	9 ... 30 V
T12.10.008, T12.30.008	FM approval: Installation drawing No. 3184731 Intrinsically safe: Cl. I / Div. 1, Group A, B, C, D	-40 ... +85 °C (T4) -40 ... +75 °C (T5) -40 ... +60 °C (T6) -20 ... +70 °C (T4) -20 ... +70 °C (T5) -20 ... +60 °C (T6)	$U_{oc} = DC 11.5 V$ $I_{sc} = 31 mA$ $P_{max} = 87 mW$ $C_a = 1.5 \mu F$ $L_a = 8.65 mH$	$U_{max} = DC 30 V$ $I_{max} = 100 mA$ $P_{max} = 705 mW$ $C_i = 25 nF$ $L_i = 0.65 mH$	9 ... 30 V
T12.10.009, T12.30.009	Zone 2: II 3G Ex nA IIC T4/T5/T6 II 3G Ex nL IIC T4/T5/T6 II 3G Ex ic IIC T4/T5/T6	-40 ... +85 °C (T4) -40 ... +75 °C (T5) -40 ... +60 °C (T6) -20 ... +70 °C (T4) -20 ... +70 °C (T5) -20 ... +60 °C (T6)	$U_o = DC 5 V$ $I_o = 0.25 mA$ $C_o = 1000 \mu F$ $L_o = 1000 mH$	$U_i = DC 36 V$ $P_i = 1 W$ $C_i = 25 nF$ $L_i = 0.65 mH$	9 ... 36 V

1) Power supply input protected against reverse polarity; load $R_A \leq (U_B - 9 V) / 0.023 A$ with R_A in Ω and U_B in V
{ } Items in curved brackets are options for additional price, not for T12.30 rail mounting version

Ambient conditions

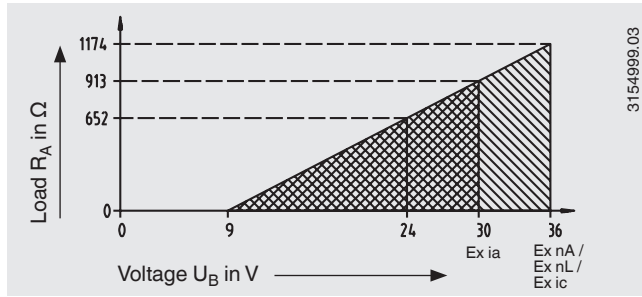
Climate class DIN EN 60654-1	T12.10: Cx (-40 ... +85 °C, 5 % to 95 % relative humidity) T12.30: Bx (-20 ... +70 °C, 5 % to 95 % relative humidity)
Maximum permissible humidity	T12.10: 100 % relative humidity (unlimited with insulated sensor connecting cables) Condensation permissible DIN IEC 68-2-30 var. 2 T12.30: 90 % relative humidity (DIN IEC 68-2-30 var. 2)
Vibration	10 ... 2,000 Hz, 5 g, DIN IEC 68-2-6
Shock	DIN IEC 68-2-27, 30 g
Salt fog	DIN IEC 68-2-11
EMC directive	2004/108/EC, DIN EN 61326 emission (group 1, class B) and interference immunity (industrial application), and also per NAMUR NE21

Case	T12.10 head mounting version	T12.30 rail mounting version
Material	Plastic, PBT, glass-fibre reinforced	Plastic
Weight	0.07 kg	0.2 kg
Ingress protection ²⁾	IP 00 Electronics completely potted	IP 20
Connection terminals (captive screws)	Wire cross-section max. 1.5 mm ²	Wire cross-section max. 2.5 mm ²

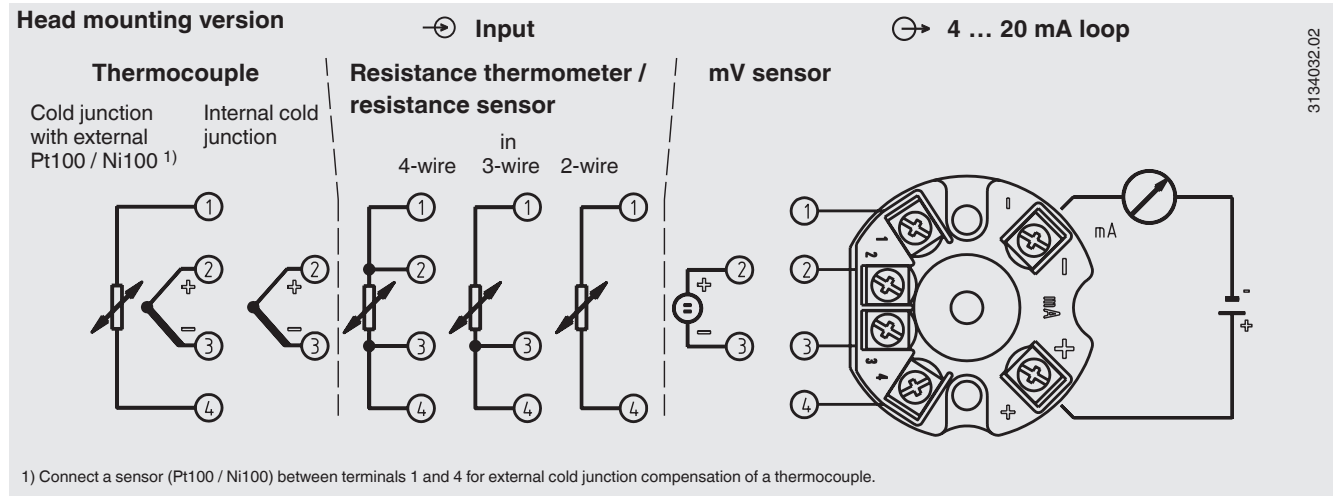
2) Ingress protection per IEC 60529 / EN 60529

Load diagram

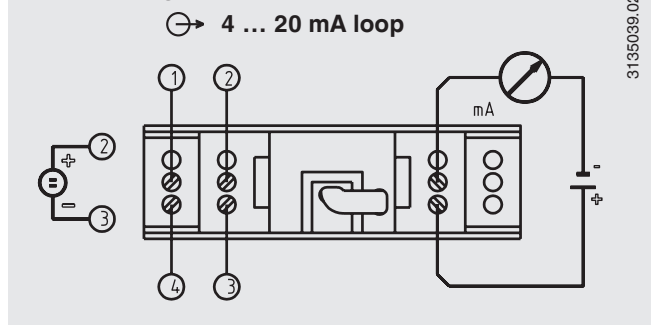
The permissible load depends on the loop supply voltage.



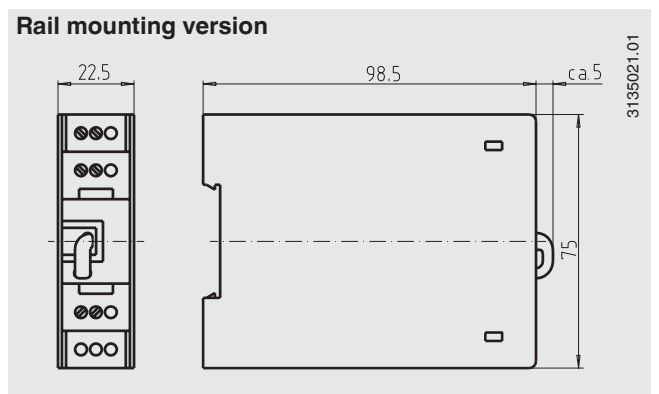
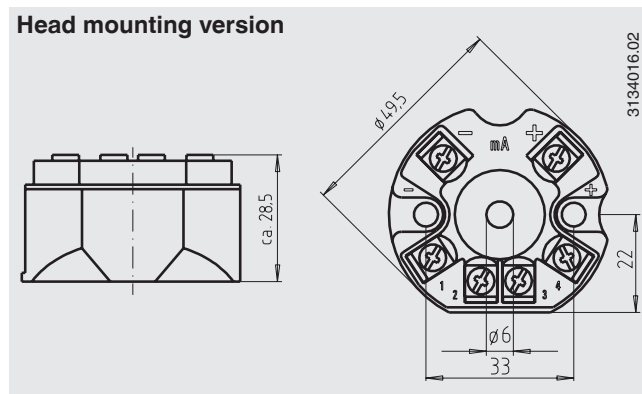
Assignment of connection terminals



Rail mounting version






Dimensions in mm





Accessories

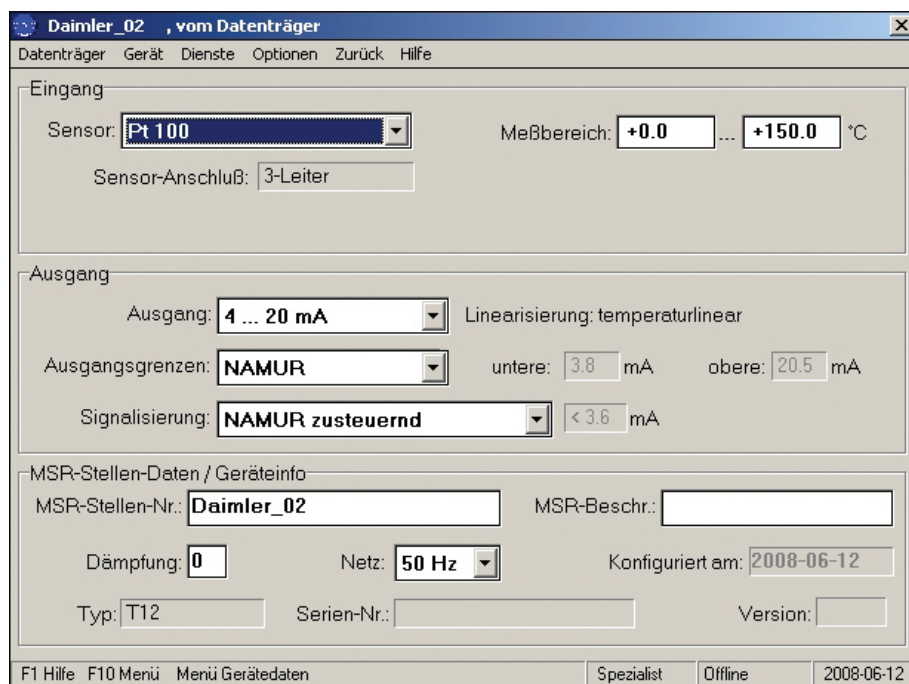
Field case, adapter

Model	Version	Special features	Dimensions	Order no.
Field case 	Plastic (ABS)	Field case, IP 65, for mounting a head mounting version of a transmitter, permissible ambient temperature range: -40 ... +80 °C 82 x 80 x 55 mm (W x L x H), with two cable glands M16 x 1.5	80 x 82 x 55 mm	3301732
Adapter 	Plastic / stainless steel	suitable for TS 35 per DIN EN 60715 (DIN EN 50022) or TS 32 per DIN EN 50035	60 x 20 x 41.6 mm	3593789
Adapter 	Steel tin galvanized	suitable for TS 35 per DIN EN 60715 (DIN EN 50022)	49 x 8 x 14 mm	3619851

Configuration set

Model	Special features	Order no.
Programming unit Model PU-448 	<ul style="list-style-type: none"> ■ Easy to use ■ LED status/diagnostic displays ■ Compact design ■ No extra power supply is needed for either the programming unit or for the transmitter ■ Measurement of the loop current of model T12 transmitters possible 	11606304
Magnetic quick connector Model magWIK 	<ul style="list-style-type: none"> ■ Replacement for crocodile clips and HART® terminals ■ Fast, safe and tight electrical connection ■ For all configuration and calibration processes 	14026893

Software



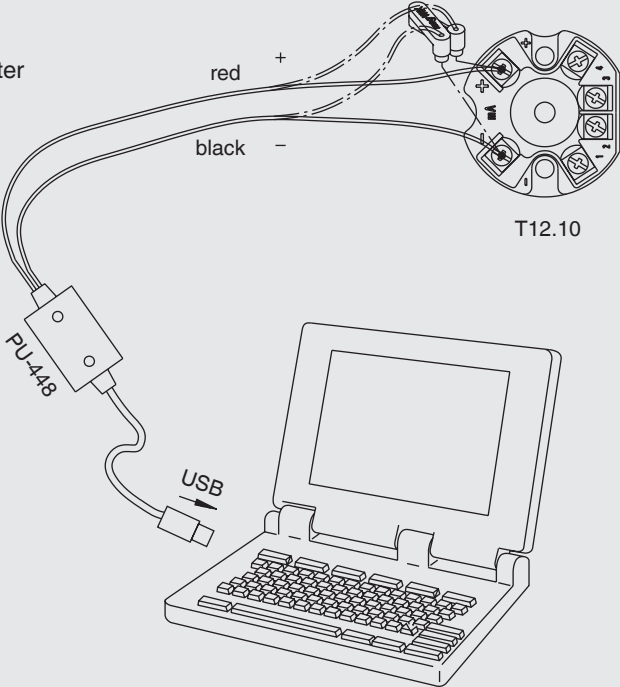
The screenshot shows the 'Daimler_02' configuration window. The 'Eingang' (Input) section has 'Sensor' set to 'Pt 100' and 'Meßbereich' (Measurement range) set to '+0.0 ... +150.0 °C'. The 'Ausgang' (Output) section has 'Ausgang' (Output) set to '4 ... 20 mA', 'Linearisierung' (Linearization) set to 'temperaturlinear', 'Ausgangsgrenzen' (Output limits) set to 'NAMUR' with 'untere' (lower) at 3.8 mA and 'obere' (upper) at 20.5 mA, and 'Signalisierung' (Signalization) set to 'NAMUR zusteuend' with '< 3.6 mA'. The 'MSR-Stellen-Daten / Geräteinfo' (MSR Station Data / Device Info) section has 'MSR-Stellen-Nr.' (MSR Station No.) set to 'Daimler_02', 'MSR-Beschr.' (MSR Description) empty, 'Dämpfung' (Attenuation) set to '0', 'Netz' (Network) set to '50 Hz', and 'Konfiguriert am' (Configured on) set to '2008-06-12'. The 'Typ' (Type) is 'T12', 'Serien-Nr.' (Serial No.) is empty, and 'Version' is empty. The status bar at the bottom shows 'Spezialist', 'Offline', and '2008-06-12'.

WIKA_T12 configuration software (multilingual, online help) as a free download from www.wika.com

Connecting programming unit model PU-448

Model T12.10, head mounting version

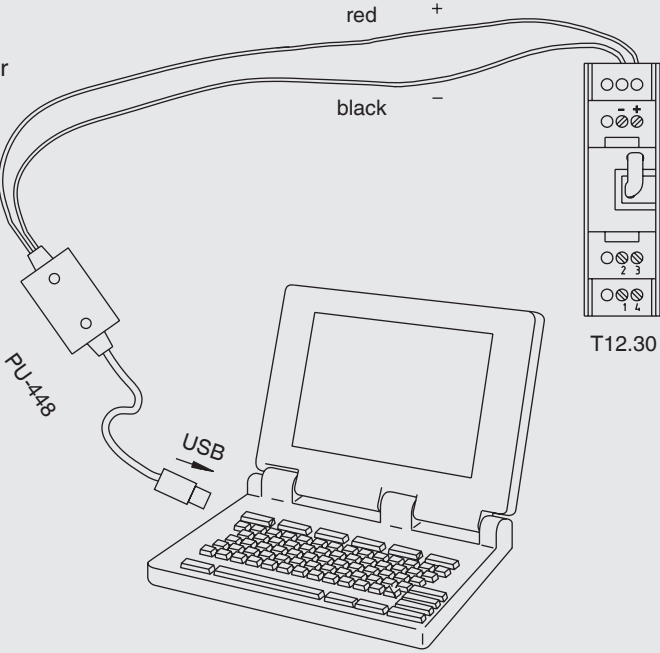
Connection PU-448 ↔ temperature transmitter
(option: magWIK quick connector)



3214338.04

Model T12.30, rail mounting version

Connection PU-448 ↔ temperature transmitter



3214338.04

CE conformity

EMC directive

2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (industrial application)

ATEX directive (option)

94/9/EC

Approvals (option)

- **NEPSI**, ignition protection type “i” - intrinsic safety, China
- **CSA**, ignition protection type “i” - intrinsic safety, Canada
- **GOST-R**, import certificate, ignition protection type “i” - intrinsic safety, ignition protection type “iD” - dust protection through intrinsic safety, ignition protection type “n”, Russia
- **GOST**, metrology/measurement technology, Russia
- **INMETRO**, Institute of Metrology, Brazil

Certificates (option)

- 2.2 test report
- 3.1 inspection certificate
- DKD/DAkkS certificate

Approvals and certificates, see website

Ordering information

Model / Version (head mounting or rail mounting version) / Explosion protection / Sensor type / Configuration / Permissible ambient temperature / Certificates / Options

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