Digital Temperature Transmitters
Model T12.10, Universally Programmable, Head Mounting
Model T12.30, Universally Programmable, Rail Mounting

Applications

- Process industry
- Machinery and plant construction

Special Features

- Universal configuration via Windows PC, simulation of the sensor not necessary
- Isolation voltage 1500 VAC between sensor and current loop
- Signalling configurable for sensor burnout and sensor short circuiting
- 100 % rel. humidity protection, moisture condensation permissible

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 the process industry. They offer a high accuracy, galvanic isolation and an excellent EMI protection.

Apart from the different sensor types, e.g. sensors in accordance with DIN EN 60 751, JIS C1606, DIN 43 760, DIN EN 60 584 or DIN 43 710, customer specific sensor-curves, through the input of value pairs, can also be defined.

The sensor connection arrangement is configurable, thus ensuring optimal lead wire compensation. Cold junction compensation for thermocouples is built-in, while external cold junction compensation can also be selected.

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

Configuration changes can be quickly and easily transmitted to the T12 using the WIKA_T12 configuration software (free download at www.wika.de) and the communication interface (programming unit), which is available as an accessory. Its two-way communication enables the measured values to be displayed on a PC/notebook. The programming unit provides voltage to the T12 transmitter, so that no additional 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 rail-mounted transmitters can be used for all standard rack systems in accordance with DIN EN 50 022-35.

The transmitters are delivered with either a basic configuration or configured according to customers‘ specifications.

Specifications of Model T12.10 head mounting and Model T12.30 rail mounting

Temperature Transmitter Input; configurable

Resistance sensor	Configurable measuring range [1]	Standard	α values	Minimum measuring span	Typical accuracy at 23 °C 5 K	
					Basic accuracy	Temperature coefficient
Pt100	-200 °C ... +850 °C	**IEC 60 751**: 1996	**α = 0.00385**	25 K	**≤ ± 0.2 °C [3]**	**≤ ± 0.026 °C / °C [4]**
Pt1000	-200 °C ... +850 °C	IEC 60 751: 1996	α = 0.00385		≤ ± 0.2 °C [3]	≤ ± 0.026 °C / °C [4]
JPt100	-200 °C ... +500 °C	JIS C1606: 1989	α = 0.03916		≤ ± 0.2 °C [3]	≤ ± 0.026 °C / °C [4]
Ni100	-60 °C ... +250 °C	DIN 43 760: 1987	α = 0.00618		≤ ± 0.2 °C [3]	≤ ± 0.026 °C / °C [4]
Resistance sensor	0 ... 5 kΩ			30 Ω	≤ ± 0.07 Ω [5]	≤ ± 0.026 Ω / °C [5]
Sensor current			max. 0.2 mA (Pt100)			
Connection type			**1 sensor** 2- /4- /**3-wire** (for further information, please refer to Designation of Terminal Connection)			
Max. wire resistance			30 Ω each wire, 3-wire symmetrically			

Thermocouple	Configurable measuring range [1]	Standard	Minimum measuring span	Typical accuracy at 23 °C 5 K	
				Basic accuracy	Temperature coefficient
Type J (Fe-CuNi)	-100 °C ... +1200 °C	IEC 584: 1998-06	50 K or 2 mV whichever is greater	≤ ± 0.5 °C [6]	≤ ± 0.05 °C / °C [6]
Type K (NiCr-Ni)	-180 °C ... +1372 °C	IEC 584: 1998-06		≤ ± 0.5 °C [6]	≤ ± 0.05 °C / °C [6]
Type L (Fe-CuNi)	-100 °C ... +900 °C	DIN 43 760: 1985-12		≤ ± 0.5 °C [6]	≤ ± 0.05 °C / °C [6]
Type E (NiCr-Cu)	-100 °C ... +1000 °C	IEC 584: 1998-06		≤ ± 0.5 °C [6]	≤ ± 0.05 °C / °C [6]
Type T (Cu-CuNi)	-200 °C ... +400 °C	IEC 584: 1998-06		≤ ± 0.5 °C [6]	≤ ± 0.05 °C / °C [6]
Type N (NiCrSi-NiSi)	-180 °C ... +1300 °C	IEC 584: 1998-06	100 K	≤ ± 0.5 °C [6]	≤ ± 0.05 °C / °C [6]
Type U (Cu-CuNi)	-200 °C ... +600 °C	DIN 43 710: 1985-12	75 K	≤ ± 0.5 °C [6]	≤ ± 0.05 °C / °C [6]
Type R (PtRh-Pt)	-50 °C ... +1768 °C	IEC 584: 1998-06	200 K	≤ ± 0.5 °C [6]	≤ ± 0.2 °C / °C [6]
Type S (PtRh-Pt)	-50 °C ... +1768 °C	IEC 584: 1998-06	200 K	≤ ± 0.5 °C [7]	≤ ± 0.2 °C / °C [6]
Type B (PtRh-Pt)	0 °C ... +1820 °C [2]	IEC 584: 1998-06	200 K	≤ ± 0.5 °C [7]	≤ ± 0.2 °C / °C [7]
Type W3, W3Re/W25Re	0 °C ... +2300 °C	ASTM E988	200 K	≤ ± 0.5 °C [7]	≤ ± 0.2 °C / °C [7]
Type W5, W5Re/W26Re	0 °C ... +2300 °C	ASTM E988	200 K	≤ ± 0.5 °C [7]	≤ ± 0.2 °C / °C [7]
mV-Sensor	-10 mV ... +800 mV		4 mV	≤ ± 0.2 mV [8]	≤ ± 0.022 mV / °C [8]
Connection type		1 sensor (for further information, please refer to Designation of Terminal Connection)			
Max. wire resistance		250 Ω			
Cold junction compensation, configurable		compensation; internal or external with Pt100 or with thermostat or off			

1) Other units e.g. °F and K on request
2) Technical data valid only for configurated measuring range ≥ 400 °C
3) Based on 3-wire Pt100, Ni100, 150 °C FS
4) Based on 150 °C FS, ambient temperature range -40 °C … +85 °C
5) Based on R_{total} 1 kΩ (3-wire)
6) Based on 400 °C FS, ambient temperature range -40 °C … +85 °C for T12.10 or -20 °C ... +70 °C for T12.30
7) Based on 1000 °C FS, ambient temperature range -40 °C … +85 °C for T12.10 or -20 °C ... +70 °C for T12.30
8) Based on 400 mV FS, ambient temperature range -40 °C … +85 °C for T12.10 or -20 °C ... +70 °C for T12.30

bold: basic configuration

FS = Full scale of configured measuring range

User linerisation
Via software, customer-specific sensor curves can be stored in the transmitter, so that further sensor types can be used.
Number of data points: min. 2; max. 30

Analogue output / Output limits / Signalling / Isolation resistance

Analogue output, configurable	**linear to temperature per IEC 60 751** / JIS C1606 / DIN 43 760 (for resistance sensors) or linear to temperature per IEC 584 / DIN 43 710 (for thermocouples) **4 ... 20 mA** or 20 ... 4 mA, 2-wire design	
Output limits, configurable	lower limit	upper limit
to NAMUR NE 43	**3.8 mA**	**20.5 mA**
not active	3.6 mA	23 mA
customer specific, adjustable	from 3.6 mA up to 4.0 mA	from 20.0 mA up to 23 mA
Current value for Signalling, configurable	**down scale**	up scale
to NAMUR NE 43	**< 3.6 mA (3.5 mA)**	> 21.0 mA (21.5 mA)
default value	form 3.5 mA up to 12 mA	from 12 mA up to 23 mA
In simulation mode, independent form input signal, simulation value configurable form 3.5 mA to 23 mA		
Load R_A	$R_A \leq (U_B - 9\ V) / 0.023\ A$ with R_A in Ω and U_B in V	
Isolation voltage (input to analogue output)	1500 V AC, (50 Hz / 60 Hz); 60 s	
Power consumption with 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
Turn 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

Load effect	±0.01 % of span / 100 Ω
Power supply effect	±0.005 % of 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 °C to +85 °C	Connection lead effects
Resistance thermometer (Pt100)	±0.2 K or ±(0.025 % FS + 0.1) K	±(0.025 % FS + 0.09) K / 10 K	4-wire: no effect (0 to 30 Ω each wire) 3-wire: ± 0.02 Ω / 10 Ω (0 to 30 Ω each wire) 2-wire: connection lead effects [4]
Resistance sensor	±0.07 Ω or ±0.03 % FS in Ω	±(0.025 % FS + 0.01) Ω / 10 K	
Thermocouples type T, E, J, L, K, N, U [3]	±0.5 K or ±0.05 % FS or ± 10 µV	±(0.05 % FS + 0.1) K / 10 K or ±0.5 K / 10 K	
type R, S, B, W3, W5 [3]	±0.5 K or ±0.05 % FS or ± 10 µV	±2 K / 10 K	0.5 µV / 10 Ω [5]
mV-sensor	±10 µV or ±0.05 % FS in mV	±(0.05 % FS + 0.02) mV / 10 K	0.1 µV / 10 Ω [5]
Cold Junction Compensation (CJC)	±1.0 K	±0.2 K / 10 K	
Output	±0.05 % of span	±0.1 % of span / 10 K	

Total measuring deviation: su of input + output per DIN EN 60 770, 23 °C ± 5 K

FS Full scale value of configurated measuring range
R_A Load
TC Temperature coefficient
T_{amb} Ambient temperature
U_B Loop power supply voltage, see power supply

1) The higher value applies
2) With extended ambient temperature range (-50 °C … +85 °C) the double value applies
3) Valid only for configured lower limit of range ≥ -150 °C
4) Manually compensation possible.
5) Within the range to 250 Ω wire resistance

Monitoring

Test current for sensor monitoring [6]	nom. 33 µA during test cycle, otherwise 0 µA
Sensor burnout monitoring	activated
Self monitoring	automatic performance of an initial test after connecting the power supply

6) Valid for thermocouple only.

Explosion protection / Power supply

Model	Approvals	Permissible ambient or storage temperature	Safety-related maximum vales for Sensor (connections 1 up to 4)	Current loop (connections ±)	Power supply U_B [1]
T12.10.000 T12.30.000	without	{-50 °C} -40 °C ... +85 °C -20 °C ... +70 °C	-	-	9 ... 36 V
T12.10.002 T12.30.002	**EG-type examination certificate:** **DMT98 ATEX E 008 X** **Zone 0, 1**: II 1G EEx ia IIB/IIC T4/T5/T6 intrinsically safe per directive 94/9/EG (ATEX)	{-50 °C} -40 °C ... +85 °C (T4) {-50 °C} -40 °C ... +75 °C (T5) {-50 °C} -40 °C ... +60 °C (T6) -20 °C ... +70 °C (T4) -20 °C ... +70 °C (T5) -20 °C ... +60 °C (T6)	U_o = DC 11.5 V I_o = 31 mA P_o = 87 mW IIB: C_o = 11 µF L_o = 8.6 mH IIC: C_o = 1.5 µF 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	{-50 °C} -40 °C ... +85 °C (T4) {-50 °C} -40 °C ... +75 °C (T5) {-50 °C} -40 °C ... +60 °C (T6) -20 °C ... +70 °C (T4) -20 °C ... +70 °C (T5) -20 °C ... +60 °C (T6)	U_{oc} = DC 11.5 V I_{sc} = 31 mA P_{max} = 87 mW C_a = 0.4 µF 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	{-50 °C} -40 °C ... +85 °C (T4) {-50 °C} -40 °C ... +75 °C (T5) {-50 °C} -40 °C ... +60 °C (T6) -20 °C ... +70 °C (T4) -20 °C ... +70 °C (T5) -20 °C ... +60 °C (T6)	U_{oc} = DC 11.5 V I_{sc} = 31 mA P_{max} = 87 mW C_a = 1.5 µF 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	**EG-type examination certificate:** **DMT99 E 088 X** **Zone 2**: II 3G EEx nL/nA IIC T4/T5/T6 energy-limited with respect to non-sparking equipment	{-50 °C} -40 °C ... +85 °C (T4) {-50 °C} -40 °C ... +75 °C (T5) {-50 °C} -40 °C ... +60 °C (T6) -20 °C ... +70 °C (T4) -20 °C ... +70 °C (T5) -20 °C ... +60 °C (T6)	U_o = DC 5 V I_o = 0.25 mA C_o = 1000 µF L_o = 1000 mH	U_i = DC 36 V C_i = 25 nF L_i = 0.65 mH	9 ... 36 V

1) Power supply input protected against reverse polarity; Load RA ≤ (UB - 9 V) / 0.023 A with RA in Ω and UB in V
{ } Items in curved brackets are optional extras for additional price, not for rail mounting T12.30

Ambient conditions

Climate class DIN EN 60 654-1	T12.10: Cx (-40 … +85 °C, 5 % up to 95 % relative air humidity) T12.30: Bx (-20 ... +70 °C, 5 % up to 95 % relative air humidity)
Maximum permissible humidity	T12.10: 100 % relative humidity (unlimited with isolated sensor connection wires) moisture condensation permissible DIN IEC 68-2-30 Var. 2 T12.30: 90 % relative humidity (DIN IEC 68-2-30 Var. 2)
Vibration	10 ... 2000 Hz 5 g DIN IEC 68-2-6
Shock	DIN IEC 68-2-27 gN = 30
Salt mist	DIN IEC 68-2-11
Electromagnetic compatibility (EMC)	EMV directive 89/336/EWG EN 61326

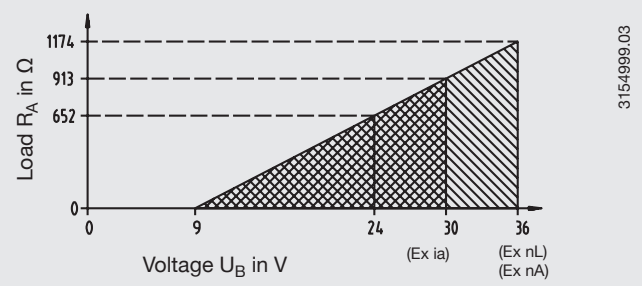
Case

Transmitter model	Material	Weight	Ingress protection [2] Case (terminal connections)	Terminal connections (Screws captive)
T12.10 head mounting	Plastic PBT, glass-fibre reinforced	0.07 kg	IP 66 / IP 67 (IP 00)	wire cross-section max. 1.5 mm²
T12.30 rail mounting	Plastic	0.2 kg	IP 40 (IP 20)	wire cross-section max. 2.5 mm²

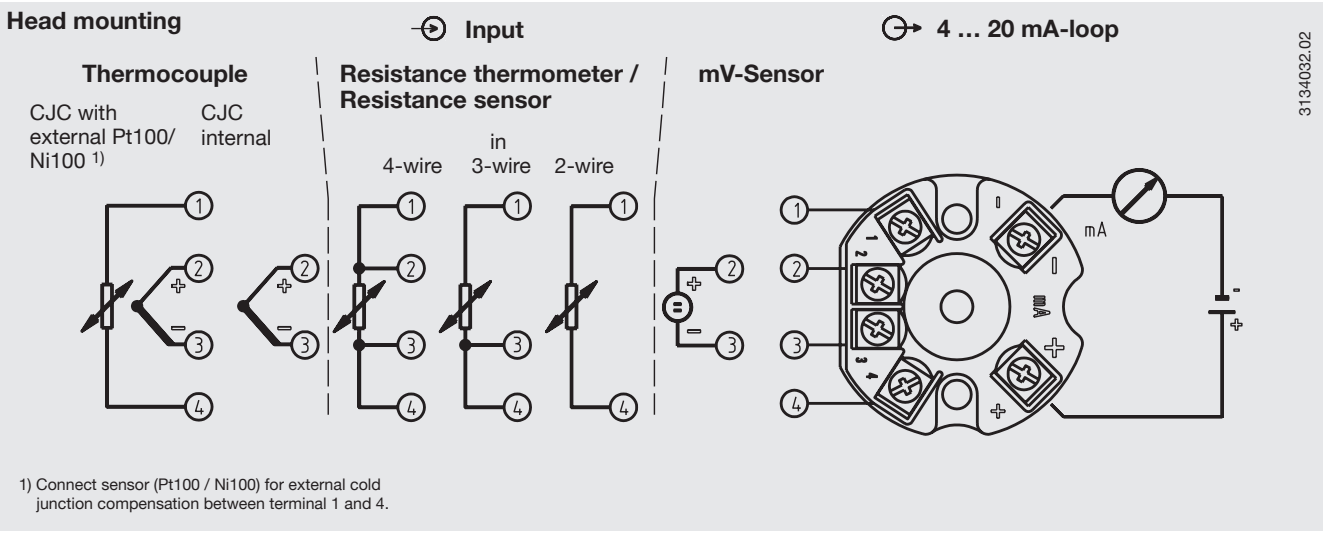
2) Ingress protection per IEC 529 / EN 60 529

Load diagram

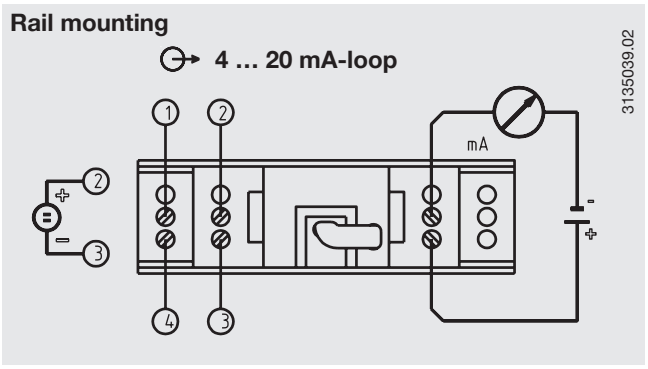
The permissible load is dependent upon the loop power supply voltage.



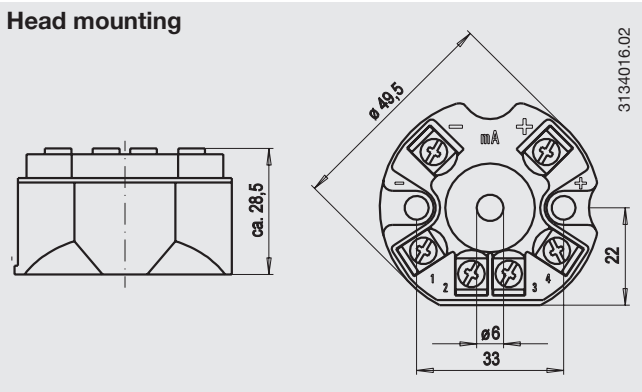
Designation of Terminal Connections

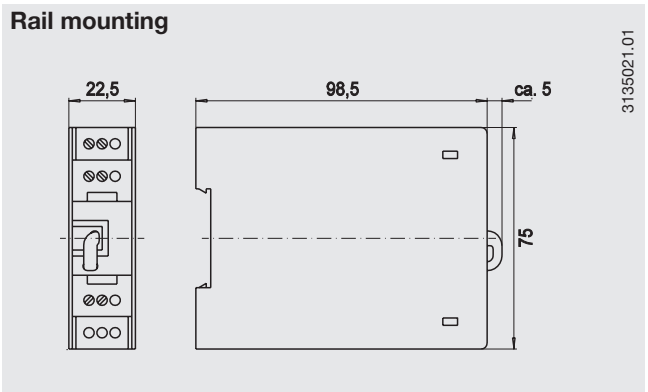


1) Connect sensor (Pt100 / Ni100) for external cold junction compensation between terminal 1 and 4.



Dimensions in mm





Accessories

WIKA Configuration Software WIKA_T12 (multi-lingual, Online Help): free-of-charge download via www.wika.de

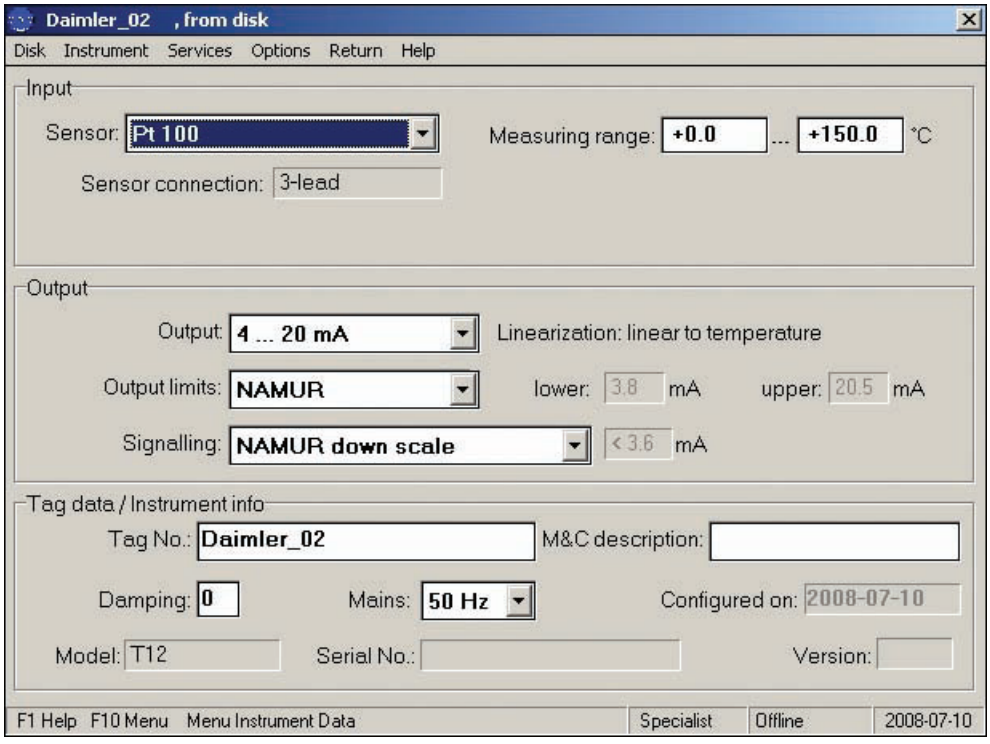
Field housing, adapter

Model	Design	Special features	Dimensions	Order No.
Field housing 	Plastic (ABS)	Field case, IP 65, for mounting of a head mounting transmitter, permissible ambient temperature range: -40 °C ... +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 60 715 (DIN EN 50 022) or TS 32 per DIN EN 50 035	60 x 20 x 41,6 mm	3593789
Adapter 	Steel tin galvanized	suitable for TS 35 per DIN EN 60 715 (DIN EN 50 022)	49 x 8 x 14 mm	3619851

Configuration set for T12

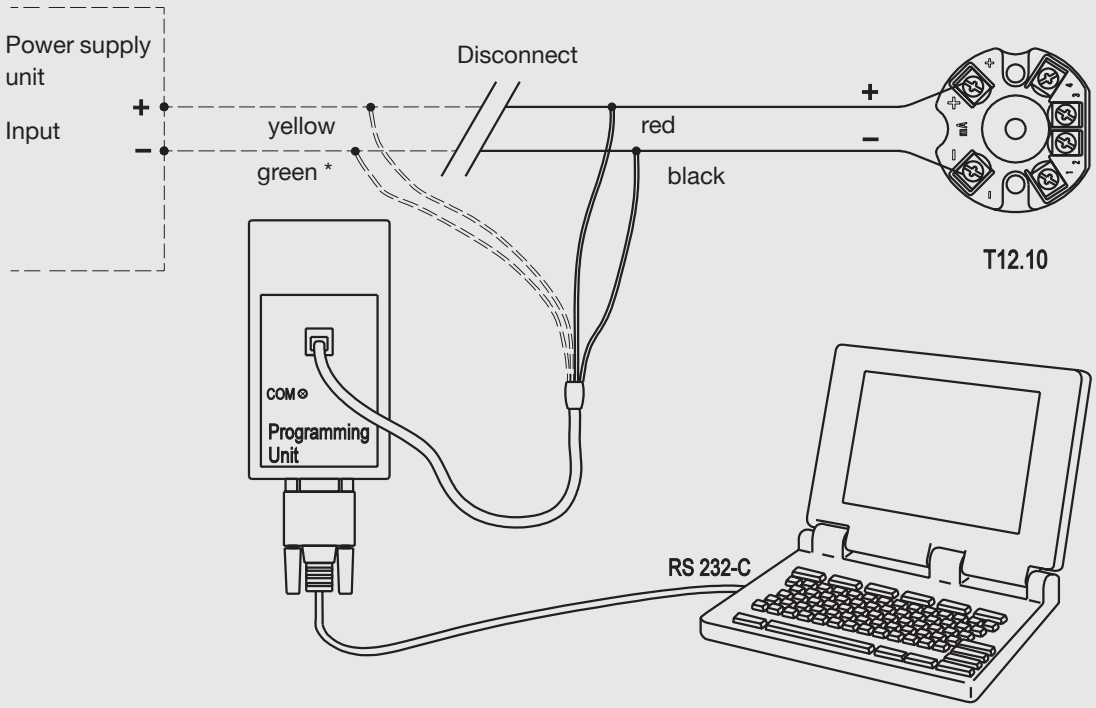
Model	Description	Order No.
Configuration set 	■ Programming Unit for the connection to a Windwos PC, incl. 9 V battery ■ Connection cable, RS232-C (9-pin sub -D - plug) ■ Two additional connection cables Programming Unit ◄► Transmitter T12	3634842

Screenshot Configuration Software

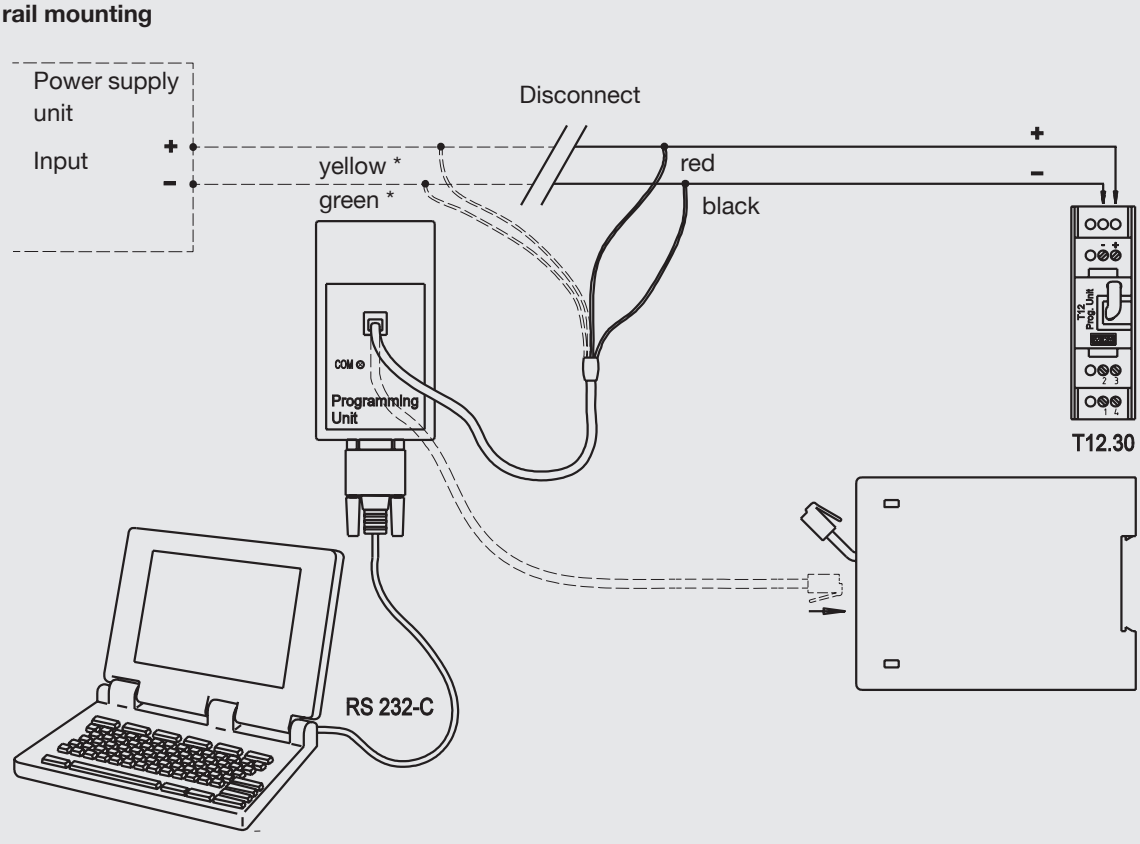


Connection of Programming Unit PU348

T12.10 head mounting



T12.30 rail mounting



Yellow* and green* are connected only if configuration of the transmitter is to be made when the transmitter is on-line. When configuring in the workshop, an external power supply is not required as the Programming Unit provides the power.

Ordering information

Field No.		Code	Features	
			Model	
		T12.10	T12.10, head mounting	
1		**T12.30**	T12.30, rail mounting	
			Explosion protection	
		0	without	
		2	II 1G EEx ia IIC T4/T5/T6 acc. directive 94/9/EG (ATEX)	
		6	CSA Class I, Division 1, Group A, B, C, D	
		8	FM Class I, Division 1, Group A, B, C, D	
2		**9**	II 3G EEx nL/nA IIC T4/T5/T6	
			Measuring range	
		GK	basic configuration [1]	
3		**KK**	customer's specification [2]	*please state as additional text*
			Ambient temperature	
		S	standard -40 °C ... +85 °C	*not for T12.30*
		N	extended -50 °C ... +85 °C	*not for Ex, not for T12.30*
4		**R**	standard -20 °C ... +70 °C	*only for T12.30*

		Additional order info			
		YES	**NO**		
5		**T**	**Z**	additional text	*Please state in clearly understandable text!*

1) Input signal: Pt100 in 3-wire connection, Measuring range: 0 ... 150 °C,
Output signal: 4 ... 20 mA, Output limits: NAMUR (lower limit: 3.8 mA upper limit: 20.5 mA),
Signalling of sensor error: NAMUR down scale (3.5 mA), Damping: off, Mains: 50 Hz, Write protection: not active

2) Please pay attention to the limits of measuring ranges on page 2.

Order code:

1			2	3	4	5
T12.	–	**00**		–		–	

Additional text:

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

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