Digital Temperature Transmitter

Universally Programmable, Rail Mounting

Electrical Temperature Measurement **Model T12.30**

Applications

- **Machinery, plant construction**
- **Process industry**

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**

Description

The digital temperature transmitter T12 range is designed for universal industrial use.
Comprehensive configuration possibilities like, for example, type of sensor, measuring range and error signalling, reliable accuracy, galvanic isolation and EMI protection characterise these transmitters. The rail mounting case fits to any standard rail per DIN EN 50 022-35.

During configuration any one of 17 types of sensors can be selected.
Measured temperatures are from - 200 °C up to + 2300 °C.

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, DIN 43 710 and ASTM E988 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 800 mV

Configuration is done by means of a standard DOS PC using the Configuration Set. With the Configuration Software the required parameters are defined. Data to the T12 is downloaded using a Communication Interface (Programming Unit). The bi-directional communication enables displaying the measured values on the PC.
Configuration sets are available as an optional extra.

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

Also available as head mounting version:
model T12.10, see data sheet TE 12.01.

Specification Model T12.30

Input configurable: type of sensor and measuring range			max. measuring range	minimum measuring span [1]
RTDs	Pt100 (α = 0,00385)	DIN EN 60 751	-200 ... + 850 °C	25 K
	JPt100 (α = 0,003916)	JIS C 1606 (1989)	-200 ... + 500 °C	25 K
	Ni100	DIN 43 760 (1987-09)	-60 ... + 250 °C	25 K
thermocouple	type T, Cu-CuNi	DIN EN 60 584	-200 ... + 400 °C	50 K
	type E, NiCr-CuNi	DIN EN 60 584	-100 ... +1000 °C	50 K
	type J, Fe-CuNi	DIN EN 60 584	-100 ... +1200 °C	50 K
	type L, Fe-CuNi	DIN 43 710 (1985-12)	-100 ... + 900 °C	50 K
	type K, NiCr-Ni	DIN EN 60 584	-180 ... +1372 °C	50 K
	type N, NiCrSi-NiSi	DIN EN 60 584	-180 ... +1300 °C	100 K
	type U, Cu-CuNi	DIN 43 710 (1985-12)	-200 ... + 600 °C	75 K
	type R, PtRh-Pt	DIN EN 60 584	-50 ... +1760 °C	200 K
	type S, PtRh-Pt	DIN EN 60 584	-50 ... +1760 °C	200 K
	type B, PtRh-PtRh	DIN EN 60 584	0 ... + 1820 °C [2]	200 K
	type W3, W3Re/W25Re	ASTM E988	0 ... + 2300 °C	200 K
	type W5, W5Re/W26Re	ASTM E988	0 ... + 2300 °C	200 K
resistance sensor			0 ... 5000 Ω	30 Ω
mV-sensor			-10 ... 800 mV	5 mV

RTDs / resistance sensor		
measuring deviation per DIN EN 60 770, 23 °C ± 5 K		
	RTDs	± 0.2 K or [3] ± (0.025 % FS + 0.1) K
	resistance sensor	± 0.07 Ω or [3] ± 0.03 % FS in Ω
sensor current		approx. 0.2 mA
temperature coefficient T_C	RTDs	± (0.025 % FS + 0.09) K / 10 K $_{T_{amb}}$
	resistance sensor	± (0.025 % FS + 0.01) Ω / 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 wire, 3-lead symmetric
signalling of sensor error		configurable
thermocouples		
measuring deviation [4] per DIN EN 60 770, 23 °C ± 5 K		± 0.5 K or [3] ± 0.05 % FS or [3] ± 10 µV
cold junction compensation		± 1.0 K
temperature coefficient T_C	type T, E, J, L, K, N, U	± (0.05 % FS + 0.1) K / 10 K $_{T_{amb}}$ or [3] ± 0.5 K / 10 K $_{T_{amb}}$
	type R, S, B, W3, W5	± 2 K / 10 K $_{T_{amb}}$
connection leads	effect	± 0.5 µV / 10 Ω
	max. permissible resistance	250 Ω
signalling of sensor error		configurable
mV-sensor		
measuring deviation per DIN EN 60 770, 23 °C ± 5 K		± 10 µV or [3] ± 0.05 % FS in mV
temperature coefficient T_C		± (0.05 % FS + 0.02) mV / 10 K $_{T_{amb}}$
connection leads	effect	± 0.5 µV / 10 Ω
	max. permissible resistance	250 Ω

Analogue output for measuring range		configurable: 4 … 20 mA or 20 … 4 mA, 2 wire design
with type of sensor RTDs		linear to temperature per DIN EN 60 751 / JIS C 1606 / DIN 43 760:1987-09
with type of sensor thermocouple		linear to temperature per DIN EN 60 584 / DIN 43 710:1985-12 / ASTM E988
by simulation mode		independent from input signal, simulation value configurable from 3.5 mA up to 23 mA
output limits configurable		
	application specification	configurable from 3.6 mA up to 23 mA
	NAMUR NE 43	lower limit: 3.8 mA upper limit: 20.5 mA
	not active	lower limit: 3.6 mA upper limit: 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
load effect		± 0.01 % of measuring span / 100 Ω
measuring deviation per DIN IEC 770, 23 °C ± 5 K		± 0.05 % of measuring span
temperature coefficient T_C		± 0.1 % of measuring span / 10 K $_{T_{amb}}$
damping		configurable: minimal 0.5 s , 1 s up to 60 s
measured value update		approx. 2 / s
power supply effect		± 0.005 % of measuring span / V
Total measuring deviation		sum of input + output per DIN EN 60 770, 23 °C ± 5 K
Signalling at analogue output		with sensor error and internal malfunction
NAMUR NE 43	up scale	> 21.0 mA
	down scale	< 3.6 mA
substitute value		configurable from 3.5 mA up to 23.0 mA

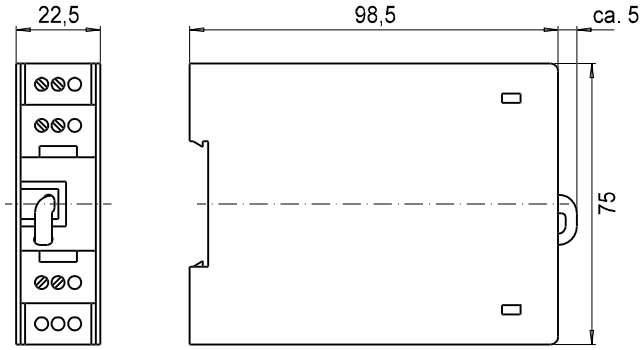
1) beginning of measuring range maximum 50 % of end of measuring range
2) technical data valid only for configurated measuring range ≥ 400 °C
3) whichever is greater
4) valid only for configurated measuring range with beginning ≥ -150 °C

FS full scale value of configurated measuring range
R_A load
T_{amb} ambient temperature
T_C temperature coefficient
U_B loop power supply voltage, see power supply

Power supply U_B				
model T12.30.000 (without Ex-protection)		DC 9 … 36 V		
model T12.30.002 (with Ex, intrinsically safe ia)		DC 9 … 30 V		
model T12.30.006 (with Ex-protection per CSA)		DC 9 … 30 V		
model T12.30.008 (with Ex-protection per FM)		DC 9 … 30 V		
model T12.30.009 (with Ex, energy-limited and non sparking)		DC 9 … 36 V		
input power supply protection		reverse polarity		
Ex-protection per Directive 94/9/EC ATEX intrinsically safe per EN 50 020		EC Type Examination Certificate DMT 98 ATEX E 008 X		
model T12.30.002		II 1G EEx ia IIB / IIC T4 / T5 / T6		
permissible ambient temperature		-20 °C … +70 °C with T4 -20 °C … +70 °C with T5 -20 °C … +60 °C with T6		
maximum values for connection of the current loop circuit (connections + and –)		U_i = DC 30 V	I_i = 100 mA	P_i = 705 mW
		C_i = 25 nF	L_i = 0.65 mH	
maximum values for connection of the sensor circuit (connections 1 up to 4)		U_o = DC 11.5 V	I_o = 31 mA	P_o = 87 mW
		Group IIB:	C_o = 11 µF	L_o = 8.6 mH
		Group IIC:	C_o = 1.5 µF	L_o = 8.6 mH
Ex-protection, Intrinsic Safety per CSA		CSA LR 105000-5		
model T12.30.006		Intrinsically Safe: Class I, Division 1, Group A, B, C and D		
max. permissible ambient temperature		70 °C, 70 °C, 60 °C for T-Code T4, T5, T6 respectively		
maximum values for connection Entity Parameters	*current loop circuit* Input Terminals (+, -)	V_{max} = 30 Vdc	I_{max} = 100 mA	P_{max} = 705 mW
		C_i = 25 nF	L_i = 0.65 mH	
	sensor circuit Output Terminals (1, 2, 3, 4)	V_{oc} = 11.5 Vdc	I_{sc} = 31 mA	P_{max} = 87 mW
		C_a = 0.4 µF	L_a = 8.6 mH	
Ex-protection, Intrinsic Safety per FM		Installation Drawing No. 3184731		
model T12.30.008		Intrinsically Safe: Class I, Division 1, Group A, B, C and D		
permissible ambient temperature		temperature code T4 -20 °C … +70 °C temperature code T5 -20 °C … +70 °C temperature code T6 -20 °C … +60 °C		
maximum values for connection Entity Parameters	*current loop circuit* Power Loop (Terminals + and -)	V_{max} = 30 Vdc	I_{max} = 100 mA	P_{max} = 705 mW
		C_i = 25 nF	L_i = 0.65 µH	
	sensor circuit Sensor Circuit (Terminals 1 to 4)	V_{oc} = 11.5 Vdc	I_{sc} = 31 mA	P_{max} = 87 mW
		C_a = 1.5 µF	L_a = 8.6 mH	
Special features				
isolation voltage (input versus analogue output)		1500 VAC, 60 s		
ambient and storage temperature		-20 … +70 °C		
climate class		Bx (-20 ... +70 °C, 5 % up to 95 % relative humidity) DIN EN 60 654-1		
maximum permissible humidity		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 g_N = 30		
salt fog		DIN IEC 68-2-11		
configuration and calibration data		permanently stored in EEPROM		
testing current to monitor sensor		nom. 33 µA during testing cycle, otherwise 0 µA		
self-monitoring		automatic execution of initial test after connection to power supply, thereafter monitoring due to internal malefunction		
warm-up time		approx. 5 Min. 1)		
power consumption with U_B 24 V		max. 552 mW		
communication interface		Programming Unit PU348 (see accessories)		
Case		rail mounting case for standard rail per DIN EN 50 022-35		
material		plastic		
ingress protection	case	IP 56 IEC 529 / DIN EN 60 529		
	terminal connections	IP 20 IEC 529 / DIN EN 60 529		
cross section of terminal connections		0.25 mm² up to 2.5 mm²		
weight		max. 0.2 kg		
dimensions		see drawings		

1) Time, after turn on, until the instrument will function within specified repeatability

Dimensions in mm



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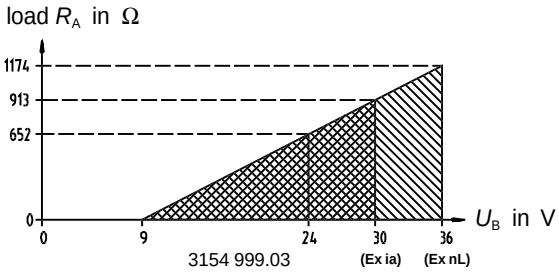
Load diagram

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



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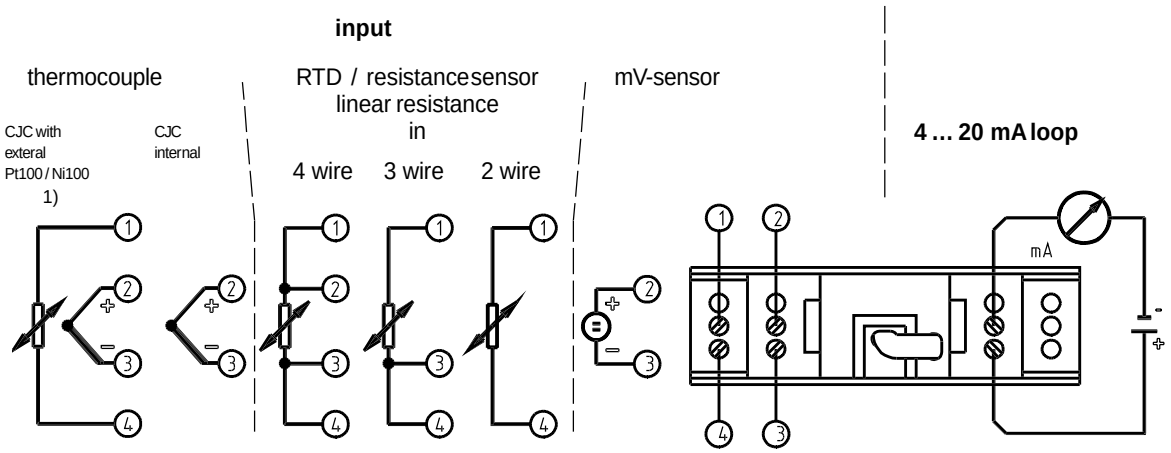
Designation of terminal connectors



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

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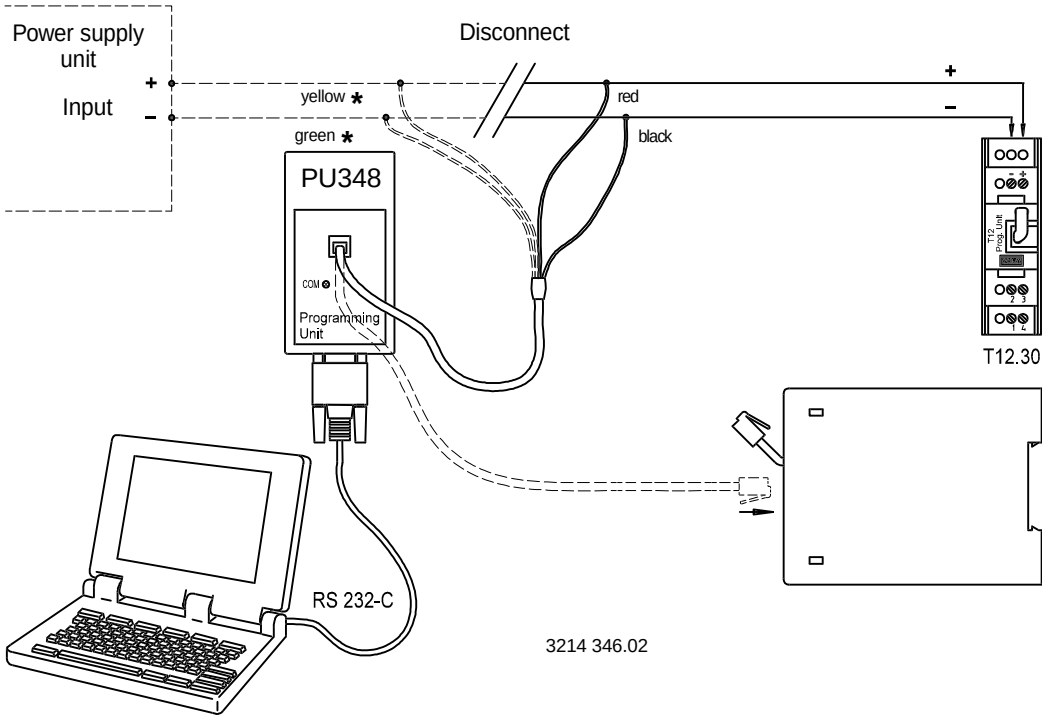
Connection of Programming Unit PU348

* Yellow and green are connected only if configuration of the T12.30 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.



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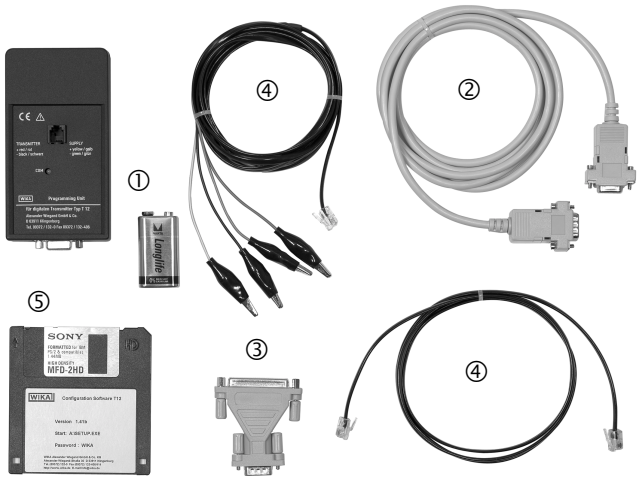
Accessories

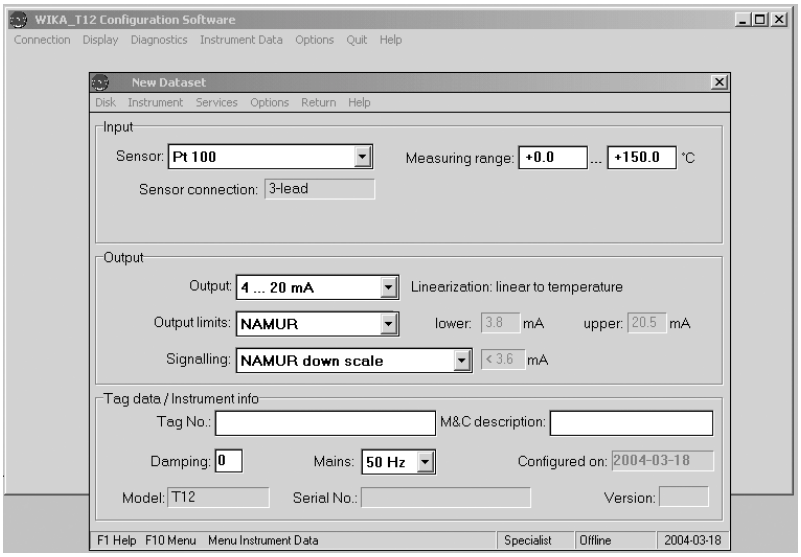
Configuration Set



The Configuration Set contains:

① Programming Unit (Communication Interface) incl. 9 V battery
② Connection cable, RS 232-C (9-pin sub-D-plug)
③ Plug adapter (25-pin to 9-pin sub-D-plug)
④ Two connection cables Programming Unit ↔ T12
⑤ Configuration Software (multi-lingual, Online Help) (free of charge download from the WIKA Homepage **www.wika.de**)

Screenshot Configuration Software



Ordering informationen for temperature transmitter Model T12.30

Field No.		Code	Features
			Model
1		**T12.30**	T12.30, rail mounting
			Explosion protection
		0	without
		2	II 1G EEx ia IIC T4/T5/T6 acc. to directive 94/9/EC (ATEX)
		6	CSA Class I, Division 1, Group A, B, C and D
		8	FM Class I, Division 1, Group A, B, C and 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
4		**R**	Standard -40 °C ... +85 °C

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

Order code:

1		2	3	4	5
	– **00**		–		–

Additional text:

Accessories for model T12 *(please order separately)*	Order No.
Configuration Software T12 on 3.5" disk *3)*	36 60141
Configuration-Set for T12 *3)*	36 34842

1) Input signal: Pt 100 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

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

3) Free of charge download from the WIKA Homepage **www. wika.de**

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