

Digital Temperature Transmitter

with HART® Protocol, Rail Mounting

Electronic Temperature Measurement

Standard • Model T32.30.000

Ex -class protection EEx ia • Model T32.30.002

Ex -class protection EEx ib • Model T32.30.004

- HART® Protocol
- Universally programmable for
 - RTDs
 - Thermocouples
 - Resistance-sensor
 - mV-sensor
- Output linear to temperature with input signal from RTDs and thermocouples
- Custom specific linearisation with max. 30 points for sensors with Ω - or mV-output
- Analogue output 4 ... 20 mA, invertable, 2 wire design
- Signalling individually configurable for possible errors of the sensor system
- Ex class protection, intrinsically safe
 - II 1 G EEx ia IIB/IIC T4/T5/T6
 - II 2 G EEx ib IIB/IIC T4/T5/T6
- EMC Conformity per
 - DIN EN 50 081-1
 - DIN EN 50 082-2
 - NAMUR NE 21
- Isolation voltage 1500 VAC between sensor and current loop
- Configurable via
 - HART® Communicator
 - PC, Windows-programme
- CE - Conformity



Important features of the T32-HART® transmitter range

The digital temperature transmitter T32 range is designed for universal use in the process industry.

Comprehensive individual configuration possibilities like, for example, type of sensor, measuring range and error signalling, high accuracy, galvanic isolation and excellent EMI protection characterize these transmitters. The rail mounting case fits to any standard rail per DIN EN 50 022-35.

During configuration, by means of a HART® Communicator model 275 or a FSK modem (eg VIATOR) via the RS 232-C of a standard DOS PC, any one of 15 types of sensors can be selected. Measured temperatures are from -270 °C up to 1820 °C.

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

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 resp. DIN 43 710 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 1200 mV

Specification

Model T32.30.000 / T32.30.002 / T32.30.004

Input	configurable: type of sensor and measuring range	max. measuring range	minimum measuring span
RTDs	Pt 100	DIN IEC 751	10 K or 3,8 Ω, whichever is greater
	JPt 100	JIS C 1606	
	Ni 100	DIN 43760 : 1987-09	
thermocouples	type T, Cu-CuNi	DIN IEC 584	50 K or 2 mV, whichever is greater
	type E, NiCr-CuNi	DIN IEC 584	
	type J, Fe-CuNi	DIN IEC 584	
	type L, Fe-CuNi	DIN 43710 : 1985-12	
	type K, NiCr-Ni	DIN IEC 584	
	type N, NiCrSi-NiSi	DIN IEC 584	
	type U, Cu-CuNi	DIN 43710 : 1985-12	
	type R, PtRh-Pt	DIN IEC 584	
	type S, PtRh-Pt	DIN IEC 584	
	type B, PtRh-PtRh	DIN IEC 584	
	resistance-sensor		
mV-sensor		-400 ... +1200 mV	2 mV up to 32 mV
RTDs / resistance-sensor			
measuring deviation per DIN IEC 770, 23 °C ± 5 K			
	RTDs		± 0.08 K
	resistance-sensor		± 0.03 Ω or ± 0.006 % FS in Ω, whichever is greater
sensor current			approx. 0.2 mA
temperature coefficient T_C	RTDs		± (0.02 % FS + 0.09) K / 10 K _{Tamb}
	resistance-sensor		± (0.02 % FS + 0.01) Ω / 10 K _{Tamb}
lead wire connection			configurable: 2-lead, 3-lead, 4-lead
connection leads	effect		± 0.02 Ω / 10 Ω
	max. permissible resistance		30 Ω each lead, 3-lead symmetric
signalling of sensor error			configurable
thermocouples			
measuring deviation ²⁾ per DIN IEC 770, 23 °C ± 5 K			± 0.3 K or ± 5 μV, whichever is greater
cold junction compensation at 23 °C ± 5 K			± 0.8 K
temperature coefficient T_C of cold junction compensation			± 0.1 K / 10 K _{Tamb}
temperature coefficient T_C	type T, E, J, L, K, N, U		± (0.03 % FS + 0.07) K / 10 K _{Tamb}
	type R, S, B		± (0.03 % FS + 0.4) K / 10 K _{Tamb}
connection leads	effect		± 0.1 μV / 10 Ω
	max. permissible resistance		250 Ω
signalling of sensor error			configurable
mV-sensor			
measuring deviation per DIN IEC 770, 23 °C ± 5 K			± 5 μV or ± 0.006 % FS in mV, whichever is greater
temperature coefficient T_C			± (0.03 % FS + 0.002) mV / 10 K _{Tamb}
connection leads	effect		± 0.1 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 IEC 751 / JIS C 1606 / DIN 43 760 : 1987-09	
with type of sensor thermocouple		linear to temperature per DIN IEC 584 / DIN 43 710 : 1985-12	
by simulation mode		independent from input signal, simulation value configurable from 3.5 mA up to 22.5 mA	
output limits configurable			
application specification		lower limit: from 3.6 mA up to 4.0 mA upper limit: from 20.0 mA up to 21.5 mA	
NAMUR NE 43		lower limit: 3.8 mA upper limit: 20.5 mA	
not active		lower limit: 3.6 mA upper limit: 21.5 mA	
load R_A		$R_A \leq (U_B - 12V) / 0.0225 A$ with R_A in Ω and U_B in V	
load effect		no measurable effect	
measuring deviation per DIN IEC 770, 23 °C ± 5 K		± 0.04 % of measuring span	
temperature coefficient T_C		± 0.1 % of measuring span / 10 K _{Tamb}	
damping		configurable: minimal 0.5 s, 1 s up to 60 s	
measured value update		approx. 3 / s	
power supply effect		no measurable effect	
Total measuring deviation		sum of input + output per DIN IEC 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	
configurable	up scale	12 mA up to 22.5 mA	
	down scale	3.5 mA up to 12 mA	

1) increased up to 1000 °C

2) valid only for configured measuring range with beginning ≥ -150 °C

FS full scale value of configured measuring range
 U_b loop power supply voltage, see power supply

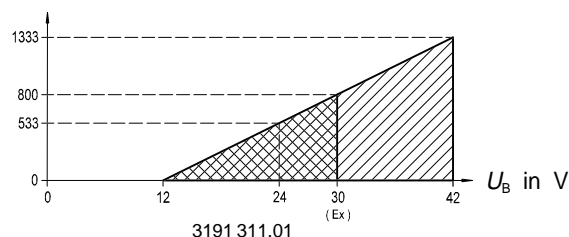
R_A load
 T_C temperature coefficient
 T_{amb} ambient temperature

Power supply U_B		
model T32.30.000 (without Ex-protection)		DC 12 ... 42 V
models T32.30.002 , T32.30.004 (with Ex-protection)		DC 12 ... 30 V
input power supply protection		reverse polarity
Ex-protection		EC Type Test DMT 98 ATEX E 007 X
model T32.30.002		II 1G EEx ia IIB / IIC T4 / T5 / T6
model T32.30.004		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 current loop circuit (connections + and -)	$U_i = 30 \text{ V}$ $C_i = 7.8 \text{ nF}$	$I_i = 130 \text{ mA}$ $L_i = 100 \text{ }\mu\text{H}$ $P_i = 800 \text{ mW}$
maximum values for connection of the sensor circuit (connections 1 up to 4)	$U_o = 11.5 \text{ V}$ Group II B: Group II C:	$I_o = 12.3 \text{ mA}$ $C_o = 11 \text{ }\mu\text{F}$ $C_o = 1.6 \text{ }\mu\text{F}$ $P_o = 35.2 \text{ mW}$ $L_o = 1 \text{ mH}$ $L_o = 1 \text{ mH}$
Electromagnetic compatibility (EMC)		CE - Conformity per DIN EN 50081-1 (March 93) and DIN EN 50082-2 (February 96) NAMUR NE 21 (May 93)
Special features		
isolation voltage (input versus analogue output)		1500 VAC, 60 s
ambient and storage temperature		-25 ... +70 °C
climate application class		HSG DIN 40040
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. 1 μA during testing cycle, otherwise 0 μA
self-monitoring		automatic execution of initial test after connection to power supply, thereafter monitoring due to internal malfunction
warm-up time		approx. 5 Min.
power consumption with U_B 24 V		max. 540 mW
communication		HART Protocol optional: burst-modus
connection for communication and configuration		2 mm jack for lamellar plug at front of case (5 mm center distance) or via the 4 ... 20 mA-loop
guarantee		5 years for performance
Case		rail mounting case for standard rail per DIN EN 50 022-35
material		plastic
degree of protection	case	IP 40 IEC 529 / EN 60529
	terminal connections	IP 20 IEC 529 / EN 60529
cross section of terminal connections		0.25 mm ² up to 2.5 mm ²
weight		max. 0.2 kg
dimensions		see drawings

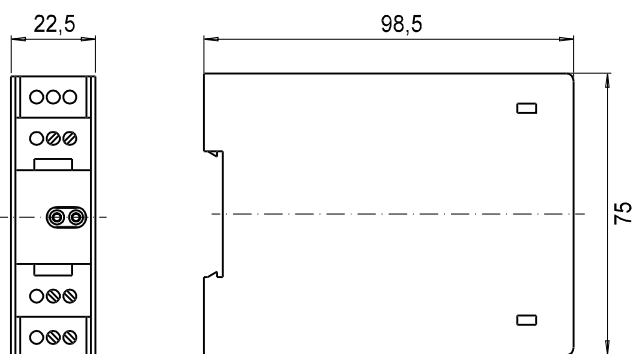
Load diagram

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

load R_A in Ω



Dimensions in mm

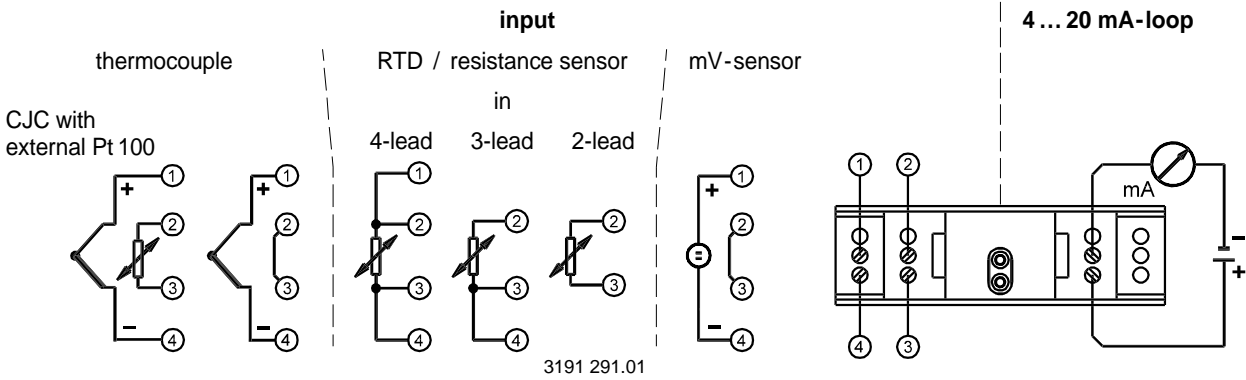


Configuration-Set (accessory)

The Configuration-Set contains

- Configuration Software (3,5" disk, Online Help)
- HART® adapter (modem)
- plug adapter (9-pin / 25-pin plug)

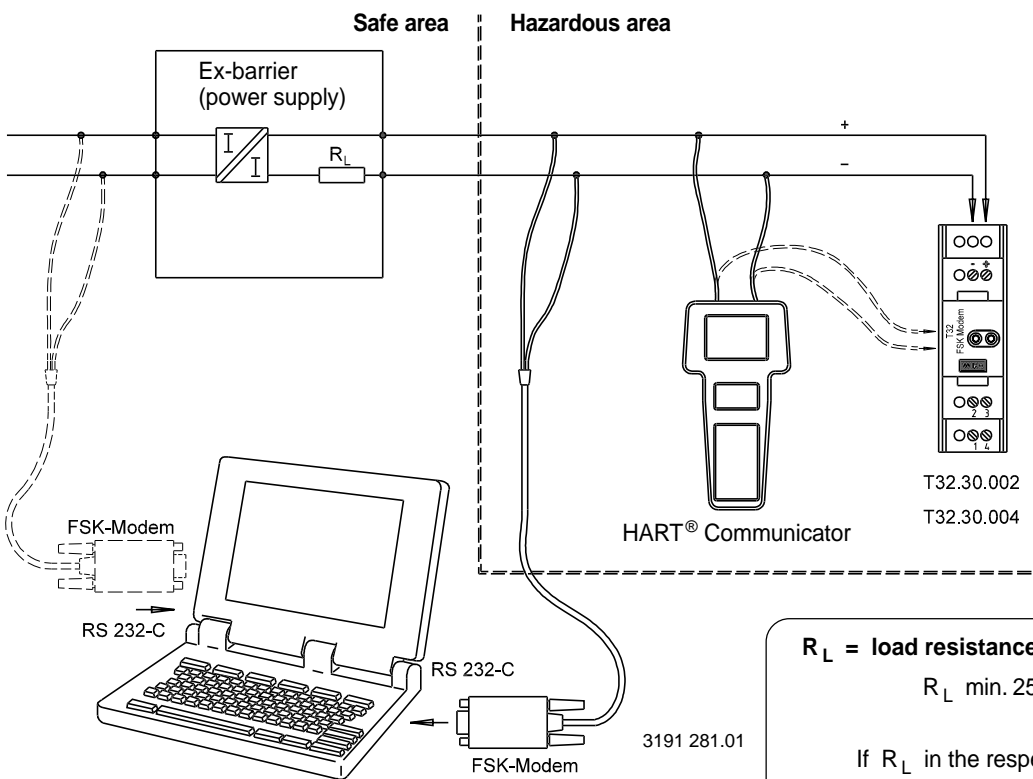
Designation of terminal connectors



Wiring scheme

Following must be observed, particularly with applications in hazardous area:

- the wiring scheme
- The total of all output values of all simultaneously connected instruments (Ex-barrier, FSK modem, HART® Communicator) must not exceed the permissible maximum values of the T32.



R_L = load resistance for HART® Communication

R_L min. 250 Ω , max. 1100 Ω

If R_L in the respective circuit is < 250 Ω ,
 R_L must be increased to min. 250 Ω
by connecting external resistors.

Ordering information

Order code per price list

Basic configuration: Input signal: Pt 100 in 3-lead 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 (< 3.6 mA), Damping: 1 s

Use the sheet "customer's specification" of the price list, when ordering temperature transmitter configured to customer specification.
Parameters which are not given will be set corresponding to the basic configuration.

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



INGENIEROS ASOCIADOS DE CONTROL S.L.
Telf.: 913831390
comercial@ac-si.es