Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical information

iTEMP® TC TMT128

DIN rail mounted Temperature Transmitter for Thermocouples (TC)

Application

- Temperature transmitter with fixed measuring ranges for converting TC input signals into an analogue, scalable 4 to 20 mA output signal
- Input:
  Thermocouples (TC)

Features and benefits

- High accuracy: 0.08 % of span
- Breakdown information in event of sensor break or sensor short-circuit enables a quick maintenance intervention
- Galvanic isolation 2 kV (from the sensor input to the output)
- Long term stability: < 0.05 %/year
- Electromagnetic compatibility to IEC 61326 for use in noisy environments
- Ex approvals for high safety standards:
  - ATEX EEx ia, nA
  - CSA IS, NI
  - CSA GP
  - FM IS, NI
- GL Germanische Lloyd / marine approval
- UL recognized component to UL 3111-1

TI096R/09/en
No. 51004792

Endress+Hauser
People for Process Automation

Function and system design

Measuring principle

Electronic acquisition and conversion of input signals in industrial temperature measurement.

Measuring system

The iTEMP® TC TMT128 DIN rail temperature transmitter is a two-wire transmitter with analogue output and measuring input for thermocouples.

Input values

Measured variable

Temperature

Measuring range

Depending on the application, different measuring ranges can be ordered (see 'Product structure').

Input type

Input	Designation	Measuring range limits	Min. span
Thermocouples (TC)	B (PtRh30-PtRh6)	0 to +1820 °C (32 to 3308 °F)	500 K
	C (W5Re-W26Re)[1]	0 to +2320 °C (32 to 4208 °F)	500 K
	D (W3Re-W25Re)[1]	0 to +2495 °C (32 to 4523 °F)	500 K
	E (NiCr-CuNi)	-270 to +1000 °C (-454 to 1832 °F)	50 K
	J (Fe-CuNi)	-210 to +1200 °C (-346 to 2192 °F)	50 K
	K (NiCr-Ni)	-270 to +1372 °C (-454 to 2501 °F)	50 K
	L (Fe-CuNi)[2]	-200 to +900 °C (-328 to 1652 °F)	50 K
	N (NiCrSi-NiSi)	-270 to +1300 °C (-454 to 2372 °F)	50 K
	R (PtRh13-Pt)	-50 to +1768 °C (-58 to 3214 °F)	500 K
	S (PtRh10-Pt)	-50 to +1768 °C (-58 to 3214 °F)	500 K
	T (Cu-CuNi)	-270 to +400 °C (-454 to 752 °F)	50 K
	U (Cu-CuNi)[2]	-200 to +600 °C (-328 to 1112 °F)	50 K
	to IEC 60584 part 1		
	■ Internal cold junction (Pt100) ■ Accuracy of cold junction: ±1 K ■ Sensor current: = 350 nA		

1) to ASTM E988

2) to DIN 43710

Output

Output signal

Analog 4 to 20 mA

Breakdown information

Breakdown information to NAMUR NE 43
Breakdown information is created when the measuring information is invalid or not present anymore and gives a complete listing of all errors occuring in the measuring system.

		Signal (mA)
Under ranging	Standard	3.8
Over ranging	Standard	20.5
Sensor break; sensor short circuit	To NAMUR NE 43	≥ 21.0

Source impedance

Max. ($V_{power\ supply}$ - 12V) / 0.022 A (current output)
e. g. (24 V - 12 V)/0.022 A = 545.5 Ω

Transmission behavior

Temperature linear

Galvanic isolation

U = 2 kV AC (input/output)

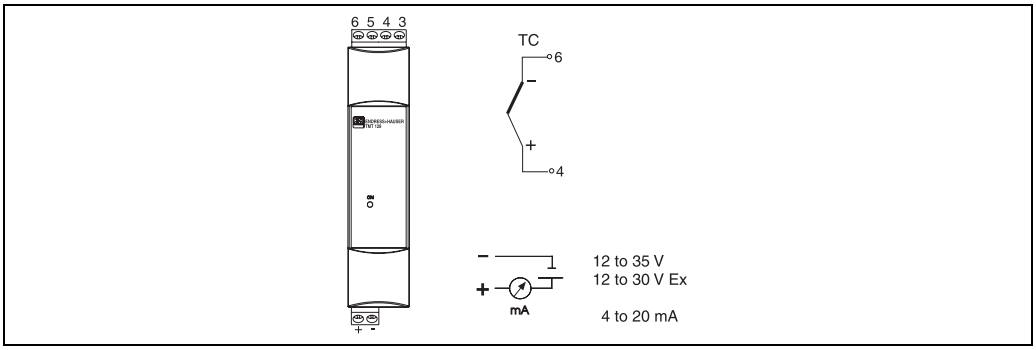
Induced current requirement ≤ 3.5 mA

Current limitation ≤ 23 mA

Switch-on delay 4 s (during switch-on procedure $I_a \leq 3.8$ mA)

Power supply

Electrical connection



Temperature transmitter terminal assignment

Supply voltage U_b= 12 to 35 V, reverse polarity protection

Residual ripple Permitted residual ripple $U_{ss} \leq 3$V at $U_b \geq 15$V, $f_{max.} = 1$ kHz

Accuracy

Response time 1 s

Reference operating conditions Calibration temperature: +25 °C (77 °F) ± 5 K

Maximum measured error

	Designation	**Accuracy**[1]
Thermocouples (TC)	K, J, T, E, L, U N, C, D S, B, R	typ. 0.5 K or 0.08% typ. 1.0 K or 0.08% typ. 2.0 K or 0.08%

1) % refer to the set span. The highest value is valid.

Influence of supply voltage
- ≤ ±0.01%/V deviation from 24 V
  Percentages refer to the full scale value.

Influence of ambient temperature (temperature drift)
- Thermocouple (TC):
  T_d= ±(50 ppm/K * max. measuring range + 50 ppm/K * of set measuring range) * Δ ϑ

  Δ ϑ = deviation of the ambient temperature from the reference operating condition (25 °C (77 °F) ± 5 K).

Influence of load
- ± 0.02%/100 Ω
  Values refer to the full scale value.

Long-term stability
- ≤ 0.1 K/year or ≤ 0.05%/year

Values under reference operating conditions. % refer to the set span. The larger value applies.

Installation conditions

Installation instructions

Installation location
No restrictions

Environmental conditions

Ambient temperature limits
-40 to +85 °C (-40 to 185 °F), for Ex-area, see Ex-certificate

Storage temperature
-40 to +100 °C (-40 to 212 °F)

Climate class
As per IEC 60654-1, Class C

Degree of protection
IP 20

Shock resistance
4g / 2 to 150 Hz as per IEC 60068-2-6

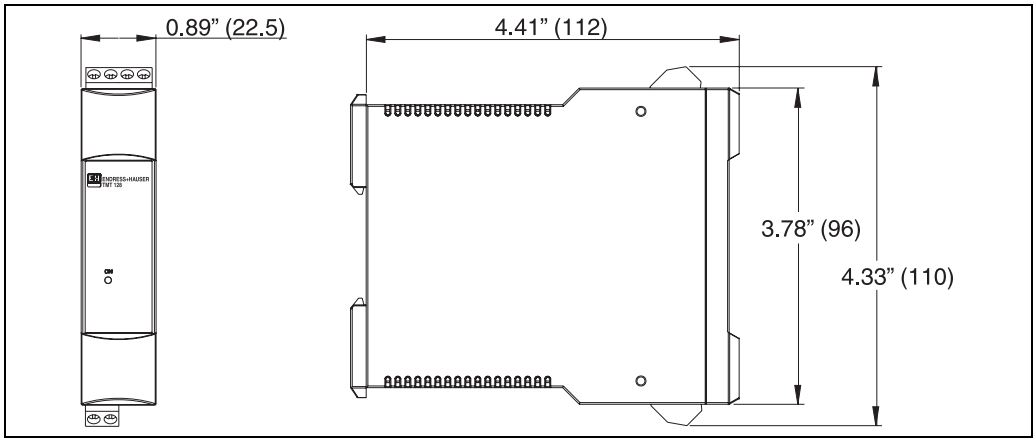
Vibration resistance
see 'Shock resistance'

Electromagnetic compatibility (EMC)
Shock resistance and interference emission as per IEC 61326 and NAMUR NE 21.

Condensation
permitted

Mechanical construction

Design, dimensions



Values in inch (mm)

Weight
approx. 90 g (3.18 oz)

Material	Housing: PC/ABS, UL 94V0
Terminals	Pluggable screw terminal, max. 2,5 mm^2 (0.0039 in^2) solid, or strand with wire end sleeve.

Human interface

Display elements	Illuminated yellow LED (2 mm, 0.08 in) signals device operation.
Operating elements	There are no operating elements available on the device.

Certificates and approvals

CE-Mark	The device meets the legal requirements of the EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.
Hazardous area approvals	For further details on the available Ex versions (ATEX, CSA, FM, etc.), please contact your nearest E+H sales organisation. All relevant data for hazardous areas can be found in separate Ex documentation. If required, please request copies from us or your E+H sales organisation.
GL	Ship building approval (Germanischer Lloyd)
Other standards and guidelines	■ IEC 60529: Degree of protection provided by housing (IP-Code) ■ IEC 61010: Safety requirements for electrical measurement, control and laboratory use. ■ IEC 61326: Electromagnetic compatibility (EMC requirements) ■ NAMUR Standards working group for measurement and control technology in the chemical industry. (www.namur.de)
UL	Recognized component to UL 3111-1

Ordering information

Product structure

TMT128	iTEMP TC DIN rail TMT128
	for temperature measurement with TC Analog output 4 to 20 mA; 2-wire techn.; Galvanic isolation; Failure mode to NAMUR NE 43; 22.5 mm wide; for 35 mm top hat DIN rail according to IEC 60715; UL recognized, ship building approval GL

	Approval	
	A	Version for non hazardous areas
	B	ATEX II2(1)G EEx ia IIC T4/T5/T6
	C	FM IS,NI,Class I,Div.1+2,Group ABCD
	D	CSA IS,NI,Class I,Div.1+2,Group ABCD
	E	ATEX II3G EEx nA IIC T4/T5/T6
	I	FM+CSA IS,NI,Class I,Div.1+2,Group ABCD
	J	CSA General Purpose

		Temperature sensor	
		B	Type B (400 to 1820 °C, 752 to 3308 °F, min. span 500 K)
		C	Type C (500 to 2320 °C, 932 to 4208 °F, min. span 500 K)
		D	Type D (500 to 2495 °C, 932 to 4523 °F, min. span 500 K)
		E	Type E (-200 to 1000 °C, -328 to 1832 °F, min. span 50 K)
		J	Type J (-200 to 1200 °C, -328 to 2192 °F, min. span 50 K)
		K	Type K (-200 to 1372 °C, -328 to 2501 °F, min. span 50 K)

			Temperature sensor		
		L	Type L (-200 to 900 °C, -328 to 1652 °F, min. span 50 K)		
		N	Type N (-100 to 1300 °C, -148 to 2372 °F, min. span 50 K)		
		R	Type R (-50 to 1768 °C, -58 to 3214 °F, min. span 500 K)		
		S	Type S (-50 to 1768 °C, -58 to 3214 °F, min. span 500 K)		
		T	Type T (-200 to 400 °C, -328 to 752 °F, min. span 50 K)		
		U	Type U (-200 to 600 °C, -328 to 1112 °F, min. span 50 K)		
			Measuring Range		
			AA	0 to 100 °C (32 to 212 °F)	
			AB	0 to 150 °C (32 to 302 °F)	
			AC	0 to 250 °C (32 to 482 °F)	
			AD	0 to 400 °C (32 to 752 °F)	
			AE	0 to 600 °C (32 to 1112 °F)	
			AF	0 to 900 °C (32 to 1652 °F)	
			AG	0 to 1000 °C (32 to 1832 °F)	
			AH	0 to 1200 °C (32 to 2192 °F)	
			AI	0 to 1400 °C (32 to 2552 °F)	
			AJ	0 to 1600 °C (32 to 2912 °F)	
			AK	0 to 200 °C (32 to 392 °F)	
			AL	0 to 300 °C (32 to 575 °F)	
			AM	0 to 500 °C (32 to 932 °F)	
			DE	-10 to 200 °C (14 to 392 °F)	
			JA	-50 to 200 °C (-58 to 392 °F)	
			LA	-40 to 140 °F	
			NA	0 to 100 °F	
			NB	0 to 200 °F	
			NC	0 to 300 °F	
			ND	0 to 500 °F	
			NE	0 to 750 °F	
			NG	0 to 1000 °F	
			NI	0 to 1500 °F	
			NK	0 to 2500 °F	
			NL	0 to 3200 °F	
				Additional Option	
				A	Standard model
				B	Works calibration certificate (6 test points)
				K	Standard model, North American region
TMT128-					⇒ **Order code (complete)**

Accessories

No accessories are required for this device.

Documentation

- ❑ Brochure 'Temperature measurement' (FA006T09en)
- ❑ Operating short manual "iTEMP® RTD/TC DIN rail TMT127/128" (KA140R09a3)
- ❑ Ex-Supplementary documentation: ATEX Safety instructions II2(1)G (XA013R09a3) and II3G (XA018R09a3)

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