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Technical Information
TI 077R/09/en
No.: 510 01792

Temperature head transmitter *iTEMP TC TMT 188*

Universal head transmitter for thermocouples (TC) for installation in a sensor head Form B



Application areas

- Fixed adjusted temperature head transmitter for converting TC input signals into a 4 to 20 mA analogue output signal
- Input:
  Thermocouple (TC)

Features and benefits

- Fixed adjusted measurement range for thermocouples (TC)
- 2 wire technology,
  4 to 20 mA analogue output
- High accuracy in total ambient temperature range
- Fault signal on sensor break or short circuit, presettable to NAMUR NE 43
- EMC to NAMUR NE 21, CE
- UL recognized component to UL 3111-1
- GL ship building approval
- Ex-Certification
  - ATEX Ex ia and dust zone 22 in compliance with EN 50281-1
  - FM IS
  - CSA IS
- Galvanic isolation

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Operation and system construction

Measurement principle	Electronic measurement and conversion of input signals in industrial temperature measurement.
Measurement system	The iTEMP TC TMT 188 temperature head transmitter is a two wire transmitter with an analogue output. It has measurement input for thermocouples (TC).

Input

Thermocouples (TC)

Type	Measurement range		min. measurem. range
B (PtRh30-PtRh6)	0 to +1820 °C	32 to 3308 °F	500 K (900 °F)
C (W5Re-W26Re) [3]	0 to +2320 °C	32 to 4208 °F	500 K (900 °F)
D (W3Re-W25Re) [3]	0 to +2495 °C	32 to 4523 °F	500 K (900 °F)
E (NiCr-CuNi)	-200 to +915 °C	-328 to 1679 °F	50 K (90 °F)
J (Fe-CuNi)	-200 to +1200 °C	-328 to 2192 °F	50 K (90 °F)
K (NiCr-Ni)	-200 to +1372 °C	-328 to 2501 °F	50 K (90 °F)
L (Fe-CuNi)[2]	-200 to + 900 °C	-328 to 1652 °F	50 K (90 °F)
N (NiCrSi-NiSi)	-270 to +1300 °C	-454 to 2372 °F	50 K (90 °F)
R (PtRh13-Pt)	0 to +1768 °C	32 to 3214 °F	500 K (900 °F)
S (PtRh10-Pt)	0 to +1768 °C	32 to 3214 °F	500 K (900 °F)
T (Cu-CuNi)	-200 to + 400 °C	-328 to 752 °F	50 K (90 °F)
U (Cu-CuNi) [2]	-200 to + 600 °C	-328 to 1112 °F	50 K (90 °F)
MoRe5-MoRe41 [1] accord. to IEC 584 Part 1	0 to +2000 °C	32 to 3632 °F	500 K (900 °F)
Cold junction	internal (Pt100)		
Cold junction accuracy	± 1 K		
Sensor current	30 mA		

Output

Output (analogue)

Output signal	4 to 20 mA
Transmission as	temperature linear
Max. load	$(V_{power\ supply} - 8\ V) / 0.025\ A$
Input current required	≤ 3.5 mA
Current limit	≤ 25 mA
Switch on delay	4 s (during power up I_a = 3.8 mA)
Reply time	1 s

Failure signal (fault monitoring)

Measurement range undercut	Linear drop to 3.8 mA
Exceeding measurement range	Linear rise to 20.5 mA
Sensor breakage; Sensor short circuit	≥ 21.0 mA

Electrical connection

Power supply	U_b = 8 to 35 V, polarity protected
Galvanic isolation (In/out)	$\hat{U}$ = 3.75 kV AC
Allowable ripple	$U_{ss} \leq 5$ V at $U_b \geq 13$ V, $f_{max.}$ = 1 kHz

Accuracy

Reference conditions	Calibration temperature 23 °C ± 5 K

Thermocouple (TC)

Type	Measurement accuracy
K, J, T, E, L, U N, C, D S, B, R MoRe5-MoRe41	typ. 0.5 K typ. 1.0 K typ. 2.0 K
Influence of the internal reference junction	Pt100 DIN IEC 751 Cl. B

[1] no reference
[2] according to DIN 43710
[3] according to ASTM E988

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Accuracy (continued)

Influence of power supply	≤ ±0.01%/V deviation from 24 V [1]
Load influence	≤ ±0.02%/100 Ω [1]
Temperature drift	Thermocouple (TC): T_d = ± (15 ppm/K * max. meas. range + 50 ppm/K * preset meas. range) * $\Delta\vartheta$ $\Delta\vartheta$ = Deviation of the ambient temperature according to reference condition.
Long term stability	≤ 0.1 K / Year [2] or ≤ 0.05% / Year [2] [3]

Application conditions

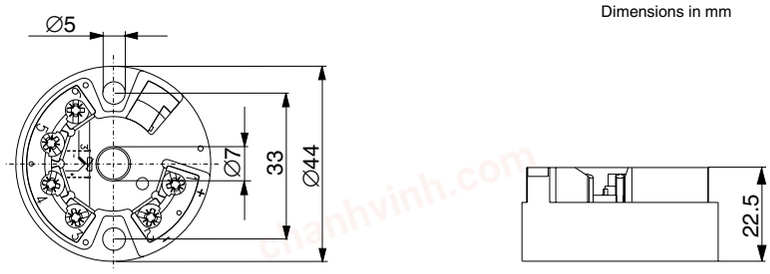
Installation conditions

Installation angle	No limit
Installation area	Connection head accord. to DIN 43 729 Form B; TAF 10 field housing

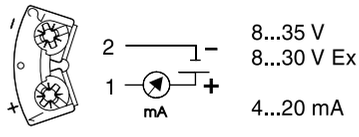
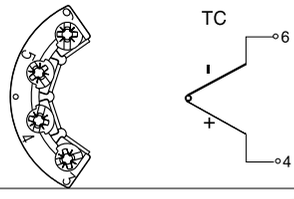
Ambient conditions

Ambient temperature	-40 to +85 °C (for Ex-areas see Ex-certification)
Storage temperature	-40 to +100 °C
Climatic class	To EN 60 654-1, Class C
Moisture condensation	Allowable
Ingress protection	IP00 / IP66 installed
Vibration protection	4g / 2 to 150 Hz according to IEC 60 068-2-6
EMC immunity	Interference immunity and interference emission according to EN 61 326-1 and NAMUR NE 21

Mechanical construction

Dimensions	
Weight	approx. 40 g
Materials	Housing: PC Potting: PUR
Terminals	Cable up to max. 1.75 mm² (secure screws)

Terminal connections

Power supply and current output	SETUP socket
	

Certification

CE mark	The measurement system fulfils the requirements demanded by the EU regulations. Endress+Hauser acknowledges successful unit testing by adding the CE mark.
Ex-certification	For further details on the available Ex versions (ATEX, CSA, FM, etc.), please contact your nearest 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.
UL recognized	UL recognized component to UL 3111-1
GL approval	GL Germanische Lloyd ship building approval

[1] All data is related to a measurement end value (FSD) of 20 mA.
[2] Accord. to reference conditions.
[3] % is related to the adjusted measurement range (the value to be applied is the greater).

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How to order

iTEMP TC TMT 188 head transmitter

Head transmitter for temperature measurement, connection to thermocouples (TC), internal reference junction, 2-wire technology with 4 to 20 mA analogue output, In/Out galvanic isolation, failure mode according to NE 43, for mounting in Form B head to DIN 43729, UL recognized component, ship building approval GL.

Certification

A - Version for non Ex areas, UL recognized, ship building approval GL
B - ATEX II 1G EEx ia IIC T4/T5/T6
C - FM IS, Class I, div. 1+2, Group A, B, C, D
D - CSA IS, Class I, div. 1+2, Group A, B, C, D
E - ATEX II 3G EEx nA IIC T4/T5/T6
F - ATEX II 3D
G - ATEX II 1G EEx ia IIC T6, II 3D
H - ATEX II 3G EEx nA IIC T6, II 3D

Temperature sensor

B - Typ B	(0 °C	...+1820 °C	min. 500 K)
C - Typ C	(0 °C	...+2320 °C	min. 500 K)
D - Typ D	(0 °C	...+2495 °C	min. 500 K)
E - Typ E	(-200 °C	...+915 °C	min. 50 K)
J - Typ J	(-200 °C	...+1200 °C	min. 50 K)
K - Typ K	(-200 °C	...+1372 °C	min. 50 K)
L - Typ L	(-200 °C	...+900 °C	min. 50 K)
N - Typ N	(-270 °C	...+1300 °C	min. 50 K)
R - Typ R	(0 °C	...+1768 °C	min. 500 K)
S - Typ S	(0 °C	...+1768 °C	min. 500 K)
T - Typ T	(-200 °C	...+400 °C	min. 50 K)
U - Typ U	(-200 °C	...+600 °C	min. 50 K)

Measurement range

AA -	(0 °C	...100 °C)
AB -	(0 °C	...150 °C)
AK -	(0 °C	...200 °C)
AC -	(0 °C	...250 °C)
AL -	(0 °C	...300 °C)
AD -	(0 °C	...400 °C)
AE -	(0 °C	...600 °C)
AF -	(0 °C	...900 °C)
AG -	(0 °C	...1000 °C)
AH -	(0 °C	...1200 °C)
AI -	(0 °C	...1400 °C)
AJ -	(0 °C	...1600 °C)
JA -	(-50 °C	...200 °C)

Model

A - Standard model
B - Works calibration certificate, 6 test points

TMT188-					⇐ Order-Code

Further Documentation

Operation instructions		KA 120R/09/a3	No. 510 03186
	ATEX II 1G	XA 004R/09/a3	No. 510 01908
	ATEX II 3G	XA 010R/09/a3	No. 510 03356
	ATEX II 3D	XA 026R/09/a3	No. 510 05563
System information		SI 008R/09/en	No. 510 01361

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