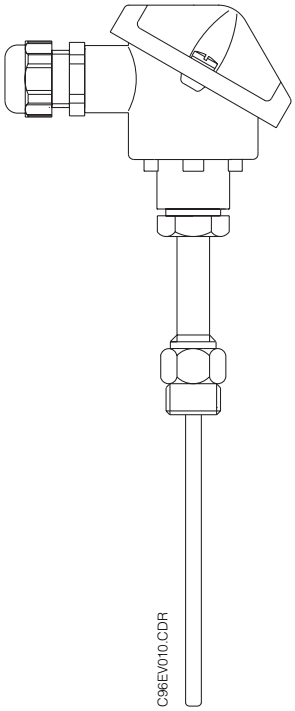
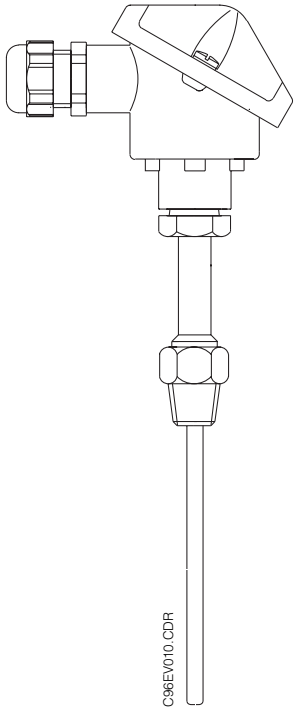
Technical
Information
TI 204T/02/en

Thermocouple Thermometer
omnigrad TSC288

Heavy duty - General purpose
M.I. replaceable inset
With extension neck
and male connection to thermowell



TSC288
with G/M thread



TSC288
with NPT thread

Description
TSC288 TC thermometer assembly is a thermocouple thermometer specifically designed for heavy duty applications that must be used in combination with bar stock and welded tube thermowells with female connection to thermometer (refer to TA500 series).
It includes a replaceable single or double TC inset, in mineral insulated cable, an extension neck and a terminal head.
From the TEC family, the inset is available either with flying leads for head transmitter mounting or with ceramic block. The neck and the insertion lengths can be chosen according to process requirements.

A wide choice of thermocouple types and terminal heads is available, other versions can be ordered according to specifications.

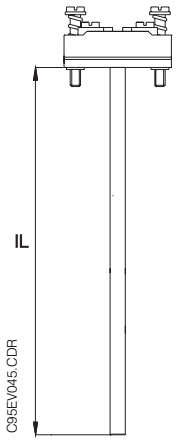
Application
TSC288 in combination with a thermowell is a heavy duty TC thermometer. It covers a wide variety of market requirements worldwide.
It is widely used in many heavy duty applications either in vessels or in pipes. Typical applications can be found in the chemical industry, petroleum refineries, power stations, boilers, incinerators and everywhere a standard mechanical resistance is sufficient.

Quality made by
Endress+Hauser

ISO 9001

Endress+Hauser
Nothing beats know-how

Technical data



TEC inset

Mineral Insulated Replaceable Inset

Thermocouple type: K (NiCr / NiAl) to IEC584 or ANSI MC96.1
J (Fe / CuNi) to IEC584 or ANSI MC96.1
T (Cu / CuNi) to IEC584 or ANSI MC96.1

Tolerances: Class 2 or Class 1 to IEC584-2
Standard or Special to ANSI MC96.1

Inset model	Sheath diameter	Max. oper. temperature *(1)*			Response time values *(2)*	
		Type K	Type J	Type T	Grounded junction	Insulated junction
TEC100	6 mm	1150°C	720°C	370°C	T_{50} = 2s	T_{50} = 2.5s
					T_{90} = 5s	T_{90} = 7s
TEC105	3 mm	1070°C	520°C	315°C	T_{50} = 0.5s	T_{50} = 1s
					T_{90} = 1.5s	T_{90} = 2.5s

Table A - Notes: ***(1)*** according to ASTM E 608 - ***(2)*** tested in moving water at 0.4 m/s

Insulation resistance: ≥ 1000 MΩ , test voltage 500 V at ambient temperature according to ASTM E 608
Electrical connections: flying leads or ceramic block
Stem: mineral insulated cable
Sheath: AISI 316 / W.1.4401 or INCONEL 600 / W.2.4816
Replacement: inset length IL is calculated as follows
IL = ML + N + 28 mm where
ML = Insertion length
N = Neck length

Thermowell connection

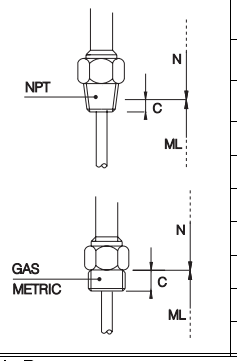
Engaging thread	Threaded	C (mm)
	1/2" NPT	8
	3/4" NPT	8,5
	1" NPT	10
	M14 x 1,5	14
	M18 x 1,5	14
	M20 x 1,5	14
	G 3/8"	13
	G 1/2"	20
	G 3/4"	20
	G 1"	25

Table B

Protecting tube

Version: TA500 thermowell series
Insertion length: insertion length ML is calculated as follows
ML = A - D where
A = Thermowell nominal length
D = Thermowell bottom thickness

Terminal head

Version: refer to Order key
Protection class: typical IP55
Electrical connections: PG11, PG16, 1/2" NPT, G 1/2"
depending on head version

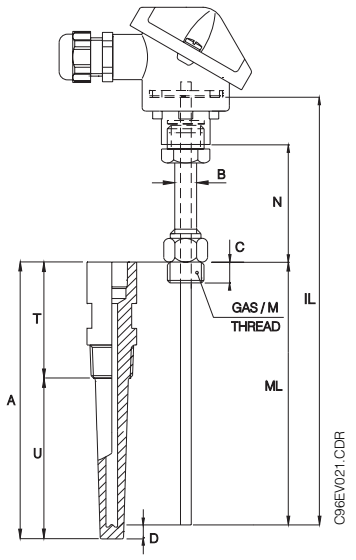
Built-in transmitter

(*)	Features	Model
G	Analogue output with I/O isolation	PC Programmable- TMD831
J	Hart, Analogue with I/O isolation	Hart protocol - TMD832
L	Profibus-PA with I/O isolation	Fieldbus - TMD834
0 1 9 |	None Ordered separately Built-in transmitter as specified	Others
	Product designation for built-in transmitter	

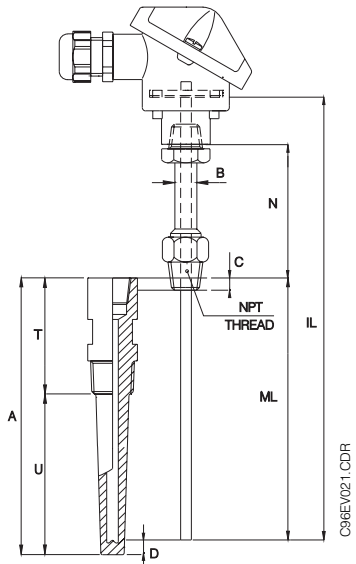
Table C - Note ***(*)*** : refer to Order key

Order key

- Each TSC288 TC thermometer must be ordered with corresponding thermowell selected from TA500 series.
- For inset replacement see Technical data.
- Accuracy statement is referred to the replaceable inset only as defined by IEC 584-2 without any protecting thermowell which may introduce thermal drift due to process connection heat dissipation in conjunction to short immersion lenghts. For a correct temperature measurement the thermowell immersion length must be 20 times its diameter. Shorter immersion lengths can be supplied but the thermometer requires an external (thermowell connection, neck and connection head) thermal insulation.



TSC288
with G/M thread



TSC288
with NPT thread

TSC288- **Thermocouple Thermometer** - Heavy duty - General purpose
M.I. replaceable inset - With extension neck -
Male connection to thermowell

Thermowell connection
C - G 3/8"
D - G 1/2"
F - G 3/4"
H - G 1"
N - 1/2" NPT
P - 3/4" NPT
Q - 1" NPT
V - M14 x 1,5
W - M18 x 1,5
Z - M20 x 1,5
Y - .... thermowell connection to specification

Neck length N
B - N = 63 mm
C - N = 83 mm
D - N = 103 mm
E - N = 128 mm
F - N = 145 mm
G - N = 175 mm
X - ..... mm neck length N to specification (min.75mm-max.300mm)
Y - ..... mm special neck length N

Neck tube material and diameter B
G - AISI 316Ti, Ø 9 mm
J - AISI 316Ti, Ø 11 mm
L - AISI 316Ti, Ø 13 mm
Y - ..... special version

ML Insertion length
A - 100 mm
B - 140 mm
C - 200 mm
D - 260 mm
X - ..... mm insertion length ML to specification (min.50mm-max.990mm) ***(3)***
Y - ..... mm special insertion length ML

Thermocouple type - O.D. - Material - Colours to IEC584 or ANSI MC96.1
See Table D

Electrical connections
2 - Flying leads
3 - 1 TC Ceramic block ***(4)***
4 - 2 TC Ceramic block ***(4)***

M.I. inset feature IEC584-2 (ANSI MC96.1)
1 - Std. purity, Class 2, Hot junction grounded
2 - Std. purity, Class 1, Hot junction grounded
3 - High purity, Class 2, Hot junction grounded
4 - High purity, Class 1, Hot junction grounded
5 - Std. purity, Class 2, Hot junction insulated
6 - Std. purity, Class 1, Hot junction insulated
7 - High purity, Class 2, Hot junction insulated
8 - High purity, Class 1, Hot junction insulated

Head type
A1 - TA20A, M24x1,5, Pg16, Al, IP55
A2 - TA20A, M24x1,5, 1/2" NPT, Al, IP55
A3 - TA20A, M24x1,5, Pg16, Al, IP68
B1 - TA20B, M24x1,5, Pg16, PA, IP55
C1 - TA20C, M24x1,5, Pg16, Al, IP65
C2 - TA20C, M24x1,5, 1/2" NPT, Al, IP65
D1 - TA20D, M24x1,5, Pg16, Al, IP55 ***(4)***
D2 - TA20D, M24x1,5, 1/2"NPT, Al, IP55 ***(4)***
E1 - TA20E, M24x1,5, Pg16, Al, IP55
F1 - TA20F, M24x1,5, Pg16, PP, IP55
U1 - TA20U, M24x1,5, Pg16, POM, IP65
W1 - TA20W, M24x1,5, Pg16, Al, IP65
W2 - TA20W, M24x1,5, 1/2" NPT, Al, IP55
X3 - TA20X, M24x1,5, Pg11, AISI, IP65
YY - Special as specified

Built-in transmitter *(4)*
Analogue, µP-PCP, Hart protocol or Profibus-PA type available: see Table C

TSC288-										Complete Order Code

Notes:
(3) Max length 990 mm when standard **bar stock** thermowell is required.
Max length 4000 mm when standard **pipe** thermowell is required.
Max length 50000 mm when **NO standard** thermowell is required.
(4) Contemporary selection of ceramic block and built-in transmitter is allowed with TA20D head only.

Order key (continued)

Thermocouple type - O.D. - Material - Colours to IEC584 or ANSI MC96.1

TC type K - Millimiters O.D. - IEC584
AB - Single TC Ø 3 mm INCONEL 600 / W.2.4816 - IEC
AF - Single TC Ø 6 mm INCONEL 600 / W.2.4816 - IEC
AL - Double TC Ø 3 mm INCONEL 600 / W.2.4816 - IEC
AQ - Double TC Ø 6 mm INCONEL 600 / W.2.4816 - IEC

TC type K - Millimiters O.D. - ANSI MC96.1
DB - Single TC Ø 3 mm INCONEL 600 / W.2.4816 - ANSI
DF - Single TC Ø 6 mm INCONEL 600 / W.2.4816 - ANSI
DL - Double TC Ø 3 mm INCONEL 600 / W.2.4816 - ANSI
DQ - Double TC Ø 6 mm INCONEL 600 / W.2.4816 - ANSI

TC type J - Millimiters O.D. - IEC584
BA - Single TC Ø 3 mm AISI 316 / W.1.4401 - IEC
BE - Single TC Ø 6 mm AISI 316 / W.1.4401 - IEC
BK - Double TC Ø 3 mm AISI 316 / W.1.4401 - IEC
BP - Double TC Ø 6 mm AISI 316 / W.1.4401 - IEC

TC type J - Millimiters O.D. - ANSI MC96.1
EA - Single TC Ø 3 mm AISI 316 / W.1.4401 - ANSI
EE - Single TC Ø 6 mm AISI 316 / W.1.4401 - ANSI
EK - Double TC Ø 3 mm AISI 316 / W.1.4401 - ANSI
EP - Double TC Ø 6 mm AISI 316 / W.1.4401 - ANSI

TC type T - Millimiters O.D. - IEC584
CA - Single TC Ø 3 mm AISI 316 / W.1.4401 - IEC
CE - Single TC Ø 6 mm AISI 316 / W.1.4401 - IEC
CK - Double TC Ø 3 mm AISI 316 / W.1.4401 - IEC
CP - Double TC Ø 6 mm AISI 316 / W.1.4401 - IEC

TC type T - Millimiters O.D. - ANSI MC96.1
FA - Single TC Ø 3 mm AISI 316 / W.1.4401 - ANSI
FE - Single TC Ø 6 mm AISI 316 / W.1.4401 - ANSI
FK - Double TC Ø 3 mm AISI 316 / W.1.4401 - ANSI
FP - Double TC Ø 6 mm AISI 316 / W.1.4401 - ANSI
YY - ..... to specification

Product designation for TC type

Table D

Supplementary Documentation

TEC100 Ø 6 mm M.I. inset
Technical Information TI074T/02/en
TEC105 Ø 3 mm M.I. inset
Technical Information TI075T/02/en
TA20 terminal heads
Technical Information TI072T/02/en
TA500 series specific product T.I.

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