Frode Pedersen temperature sensors

Thermocouple assembly MT

Mineral insulated

Data sheet 1500

Application

- Mineral insulated thermocouples are used for measuring temperature where a flexible, rugged,corrosive resistant, and fast responsing sensor is needed.
- Used in solid, fluid and gas medias up to 1200°C
- Fields of application
  - Power plants - f.inst turbines and steam tubes.
  - Process industry - f.inst petrochemical, combustion, furnaces and heat treatment
  - Engines - exhaust and material

Technical features

- Thermocouple type T, J, K, and N according to IEC 584-1 (EN60584-1)
- Mineral insulated thermocouple consist of one or more thermocouple housed in a thin-walled flexible metal tube, firmly embedded in ceramic powder (MgO - purity >96%)
- Connected to the process by brazing, adjustable compression fittings or other mechanical brackets
- There is a wide range of the material for the sheath. The choice depends on the actual application (temperature and media)

Ordering

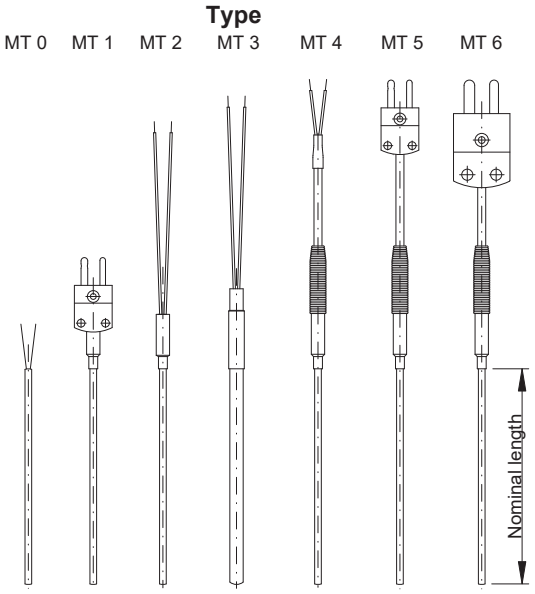
The requested sensor is selected from the table below
The colour code means:

Standard: Built of standard modules (short delivery time)

Variant: Modified standard modules

We are specialist in temperature measurement.
Please contact us and we will do our best to solve your specific measuring task

Type



Ordering information

Sensor

Specification number 1500- | | | | | | | | | | | | | | | | | | |

Type, electrical connection

MT 0	20mm bare thermocouple wire	0
MT 1	Mini compensation connector	1
MT 2	Flying leads (PVC insulated)	2
MT 3	Flying leads (PVC insulated)	3
MT 4	Compensation cable	4
MT 5	Compensation cable w.mini connector	5
MT 6	Compensation cable w. connector	6
MT 1a	Big compensation connector	a

Thermocouple / Sheath

Type IEC	Diam. mm	Temperature °C Max. recomended	Material Alloy	Temp. °C Cont.		
T	1.0	260	AiSi 316	800	2	2
T	3.0	315	1.4541	800	0	1
J	1.5	440	1.4571	800	0	2
J	3.0	520	1.4571	800	0	3
J	6.0	700	1.4571	800	0	4
K	2.0	800	1.4571	800	0	5
K	1.0	700	Inconel 600	1150	0	7
K	1.5	920	1.4841	1150	0	8
K	3.0	1000	1.4841	1150	0	9
K	6.0	1050	1.4841	1150	1	0
K	6.0	1100	Inconel 600	1100	1	2
N	2.0	1100	Pyrosil D	1250	1	3
N	3.0	1100	Pyrosil D	1250	1	4
N	6.0	1200	Pyrosil D	1250	1	5
K	1.5	800	1.4571	800	1	8
K	3.0	800	1.4571	800	1	9
N	3.0	1100	Inconel 600	1150	2	0
K	3.0	1000	Inconel 600	1100	2	1
K	1.5	800	1.4571	800	2	3

Cable length (meter)

0	0.0	00 for type MT 0, MT 1 and MT 1a. For MT2 and MT3 f.inst 0.1
0	1	1 meter
x	x.x	Special (Min 0.1 meter)

Cable type

0	None or MT0/1/1a. XP flying lead for MT2/MT3. PVC insulated, 105°C
1	XPP 2x0.22mm^2. PVC insulated, 105°C
2	XPFP 2x0.22mm^2. PVC insulated,inner foil screen, 105°C (Not T)[3]
3	XGLGLO 2x0.22mm^2. Fiberglass +steel braid, 200°C (Not T)
5	XSLSL 2x0,22mm^2. Silicone insulated, 200°C (Only K)
7	XTGLO 2x0,75mm^2.Teflon+Fibreglass+steel braid, 200°C (Only N)

Tolerance acc. to IEC 584-1 (EN60584-1)

	Class	TC	Valuei [2]	Apply in range
0	Class 2	K and N	2,5°C ell.0,0075 x t_{actual} (°C)	-40+1200°C
1	Class 2	J	2,5°C ell.0,0075 x t_{actual} (°C)	-40+750°C
2	Class 2	T	1,0°C ell.0,0075 x t_{actual} (°C)	-40+350°C
3	Class 1	K og N	1,5°C ell.0,004 x t_{actual} (°C)	-40+1000°C
4	Class 1	T	0,5°C ell.0,004 x t_{actual} (°C)	-40+350°C

Note 2: The highest value apply

Hot Junction

0	Insulated from outer sheath
1	Grounded (thermocouple bonded to outer sheath)

Nominal length (mm)

0 0 1 5 0	150
0 0 3 0 0	300
0 0 5 0 0	500
0 1 0 0 0	1000
x x x x x	Interim lengths (Min. 50, max. 30.000)

Note 1 Length >800mm is delivered coiled

Number of thermocouples

0	1

Accessories

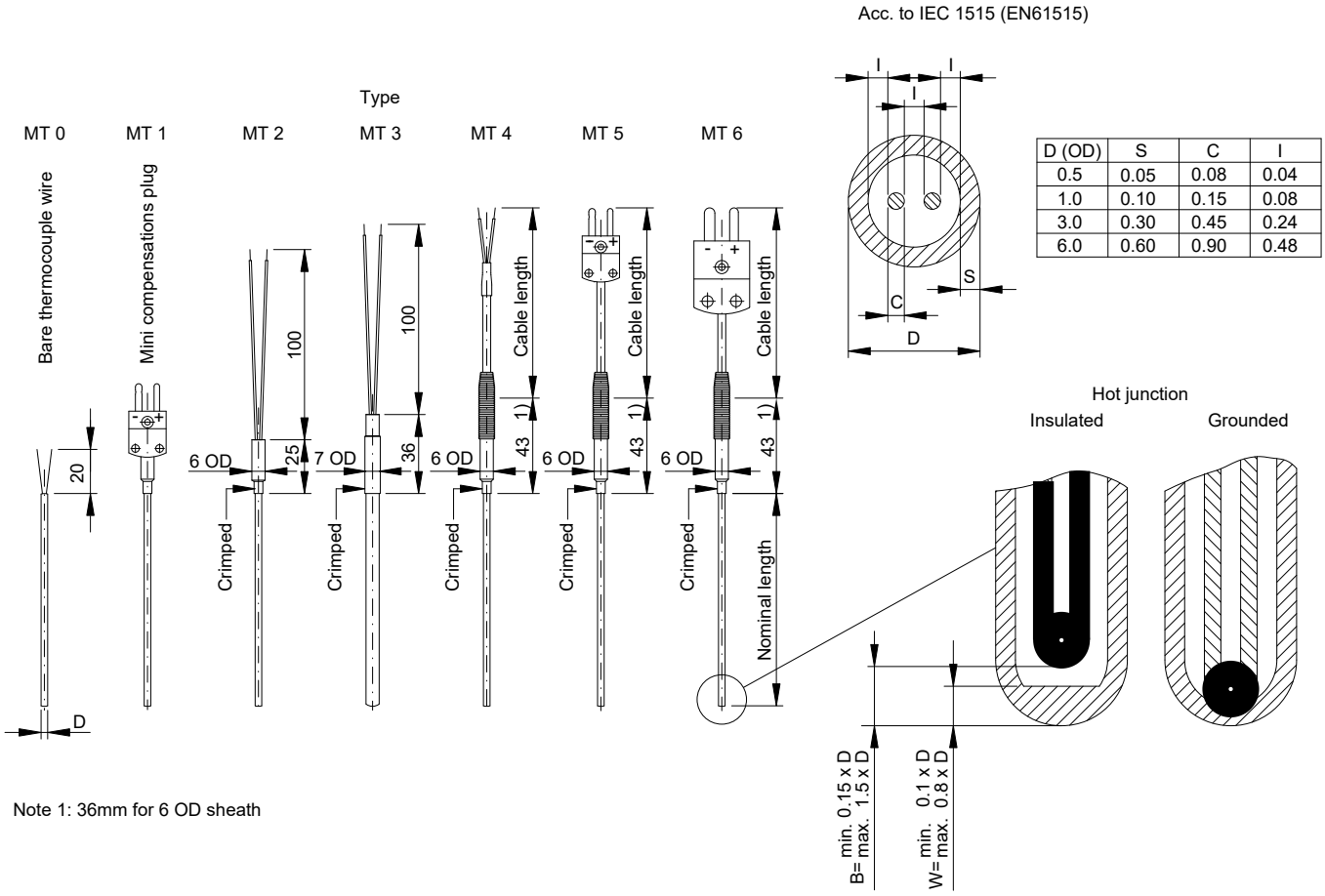
Process connection See data sheet 9113
Compensation cable: See data sheet 9150

AMETEK®
SENSORS, TEST & CALIBRATION

TECHNICAL DATA

All dimensions in mm

Dimensions



D (OD)	S	C	I
0.5	0.05	0.08	0.04
1.0	0.10	0.15	0.08
3.0	0.30	0.45	0.24
6.0	0.60	0.90	0.48

Note 1: 36mm for 6 OD sheath

Properties for MI sheath material

Application	W.no. 1.4571 AISI 316Ti max. 800°C	W.no. 1.4841 AISI 314 max. 1150°C	W.no. 1.4845 AISI 310 max. 1150°C	Pyrosil D Alloy TD max. 1250°C	W.no. 2.4816 Inconel 600 max. 1100°C 2)
Liquids	Recommended	Suitable	Suitable	Suitable	Suitable
Acid	Recommended	Not recommended	Not recommended	Not recommended	Suitable
Sulphur atmospheres	Suitable	Not recommended	Not recommended	Not recommended	Not recommended
Clorine atmospheres	Suitable	Suitable	Suitable	Suitable	Recommended
Oxidizing atmospheres	Recommended	Recommended 1)	Recommended	Recommended	Recommended
Reducing atmospheres	Not recommended	Not recommended	Not recommended	Suitable	Suitable
Carburizing atmospheres	Not recommended	Suitable	Suitable	Recommended	Recommended

Bending radius
Min. bending radius is
5 x D @ repeatable bendings
2 x D @ stationary bending

Note 1: Not recommended for continous operation in the range 425°C to 850°C
Note 2: For type S/R thermocouple the maximum recommended operating temperature is 900°C, due to drift caused by contamination from the sheath

Insulation resistance and test voltage acc. to IEC 1515 (EN61515)

Depending of elevated temperature and diam. D (mm).

Thermo-couple	Test temperature °C	Insulation resistance [M ohm x m] minimum		
		0,5<D≤1,6	1,6<D≤3,2	3,2<D
		U test 50VDc	U test 100VDc	U test 100VDc
T, J, K, N	300 ±15	250	500	1000
J, K, N	500 ±15	25	50	100
K, N	800 ±15	0,25	0,5	1
K, N	1000 ±15	-	0,01	0,02

At T: 20 ±15°C. (ambient temp.)

Diameter	Number of thermocouple			
	1		2	
	U	Rmin	U	Rmin
mm	Volt	M ohm x m	Volt	M ohm x m
< 1	75 ±25	100		
1 - 1.5	75 ±25	500		
2 - 6	500 ±50	1000	250 ±50	1000

Note:
The insulation resistance is dependent upon the length of the cable. Therfore, it is listed as a length related resistance in Mohm x m for length > 1 meter and Mohm for length <1 meter

Response time Hot junction insulated Hot junction grounded

Sheath diameter	Response time in seconds (guidelines)				Response time in seconds (guidelines)			
	In water @ 0.2m/sec.		In air @ 2m/sec.		In water @ 0.2m/sec.		In air @ 2m/sec.	
	$t_{0.5}$	$t_{0.9}$	$t_{0.5}$	$t_{0.9}$	$t_{0.5}$	$t_{0.9}$	$t_{0.5}$	$t_{0.9}$
0.5	0.06	0.13	1.8	5.52	0.03	0.10	1,8	5,85
1.0	0.15	0.5	3	10	0.06	0.18	3	10
1.5	0.21	0.6	8	25	0.13	0.4	8	25
3.0	1.2	2.9	23	80	0.22	0.75	23	80
6.0	4	9.6	60	200	0.55	2.6	55	185

Note:
The 0.5/0.9 time is the time that it takes the sensor to reach 50%/90% of the final value of a temperature change of a medium.
If media and velocity are different from the ones stated, the time can change significantly.

AMETEK DENMARK A/S Gydevang 32-34, 3450 Allerød, DK, Tlf: 48168000, E-mail: jofra@ametek.com,
Web: www.jofra.com

SS-FP-MT1500-UK. Version 202510