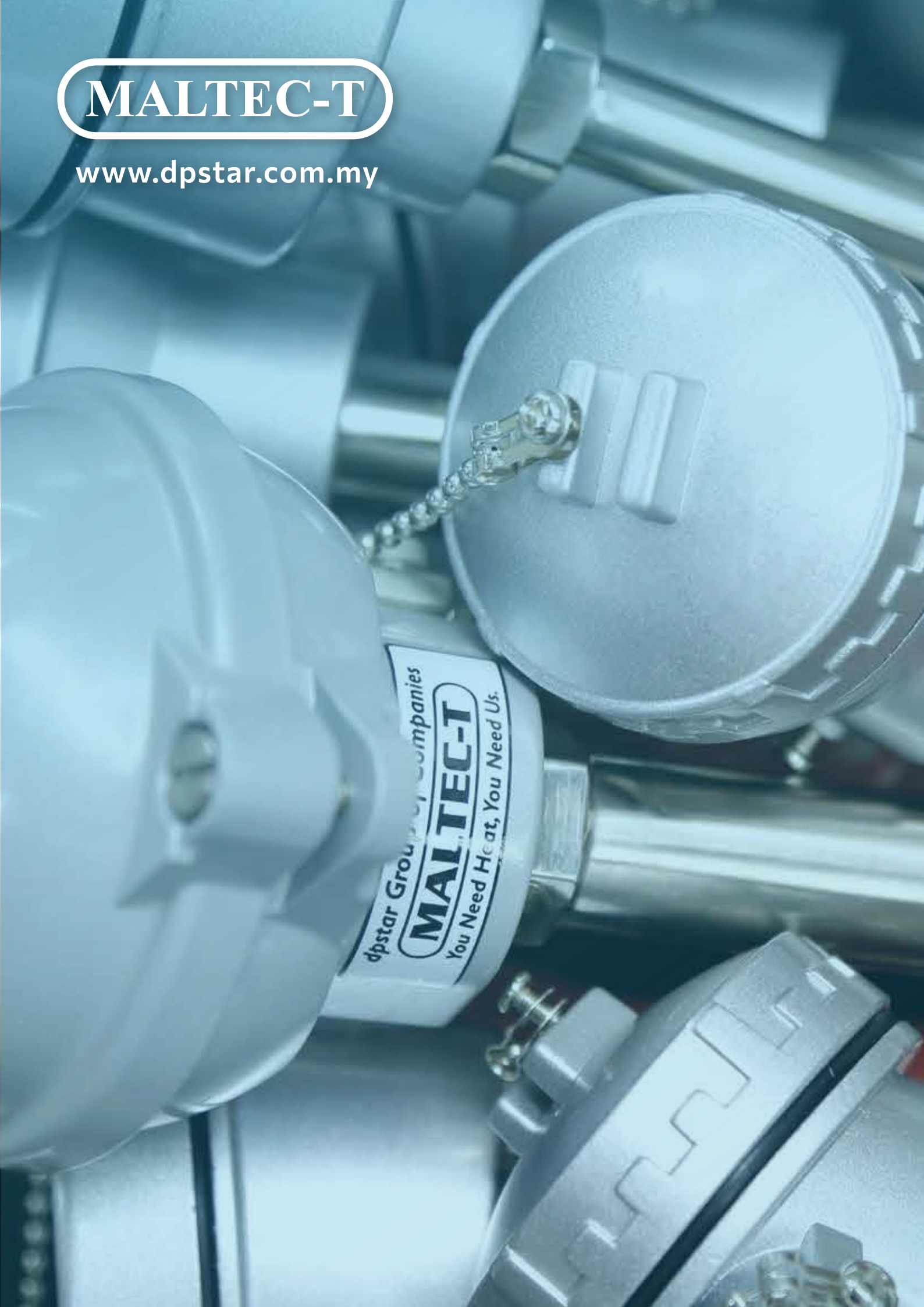
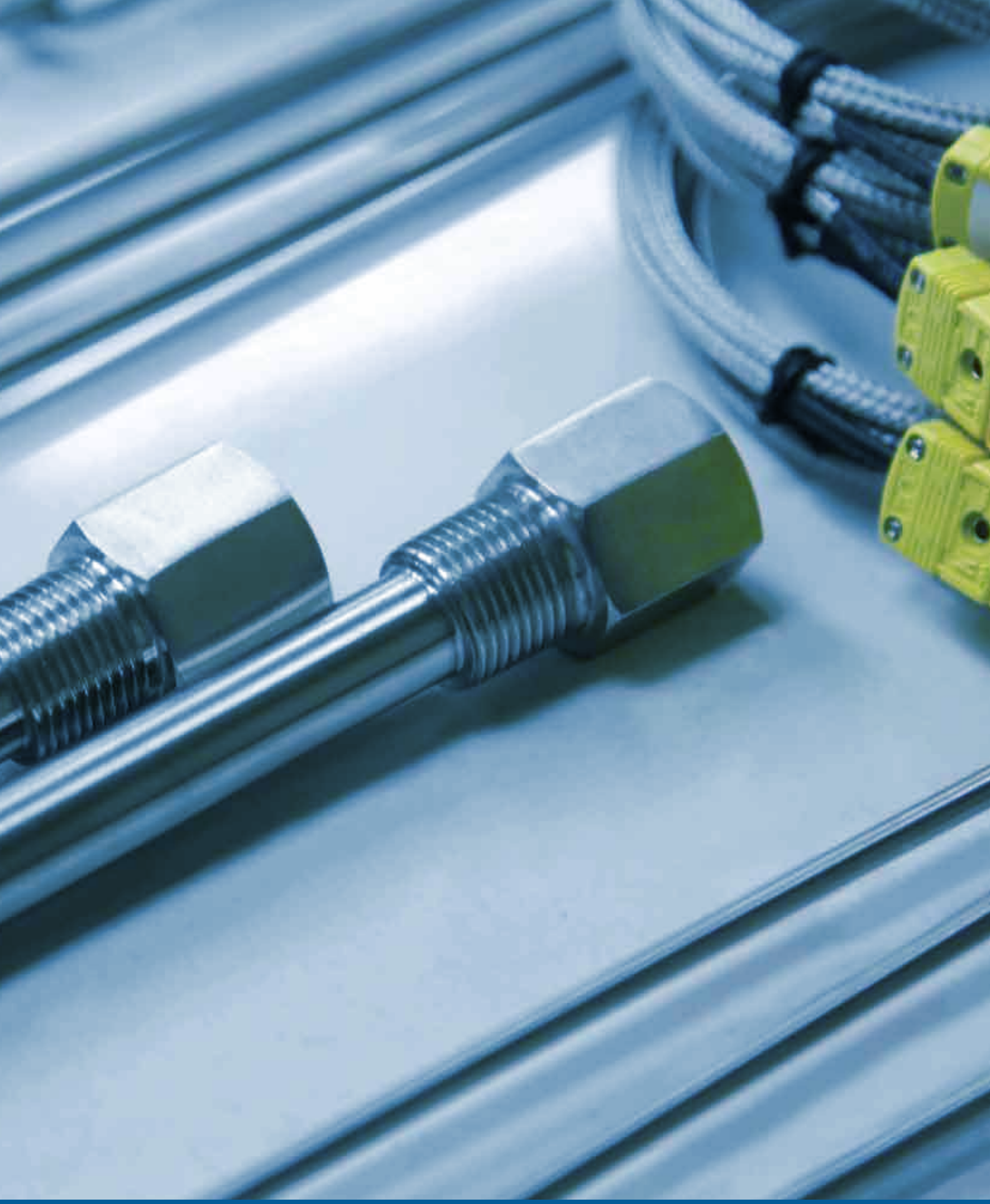

MALTEC-T
www.dpstar.com.my
MALTEC-T
You Need Heat, You Need Us.

MALTEC-T

THERMOCOUPLES | TEMPERATURE SENSORS
OEM, CUSTOMISED DESIGN,
SPECIAL PROJECTS,
CRITICAL APPLICATIONS &
MADE-TO-ORDER MANUFACTURER



Identity

MALTEC-T

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Identity

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History & Background

With 30 years of experience and under our trademark brand Maltec-H, we are proud to be the only manufacturer to have been accredited with the prestigious UL certificate in Malaysia, along with other certifications such as ISO 9001, CE, UKAS, and Standards. Our trademark brand Maltec-T is the only thermocouple that is CE certified in Malaysia. We are an industry leader in temperature sensor manufacturing for thermocouples, PT100 sensors, and all other types of customized temperature sensors. Lastly, through our brand Maltec-F we manufacture and fabricate float switches for level sensing.

Customers prefer us because we are able to customise, design, and manufacture. Further, our calibration lab allows us to develop the most accurate and reliable temperature sensors in the market for temperature related applications. Refineries, plants, industrial manufacturing, machine makers, equipment fabricators, and HVAC companies engage us for OEM manufacturing because of our cost competitiveness, our cutting edge technology, and our fast production capabilities.

We are able to make drawings through AutoCAD and so on to demonstrate to machine makers and end users alike the specifications, information, and designs of our products before it gets delivered. This is because we believe in providing only the best solutions that customers actually desire, because at Dpstar we believe that product quality is critical and we must deliver customer satisfaction that is unparalleled.

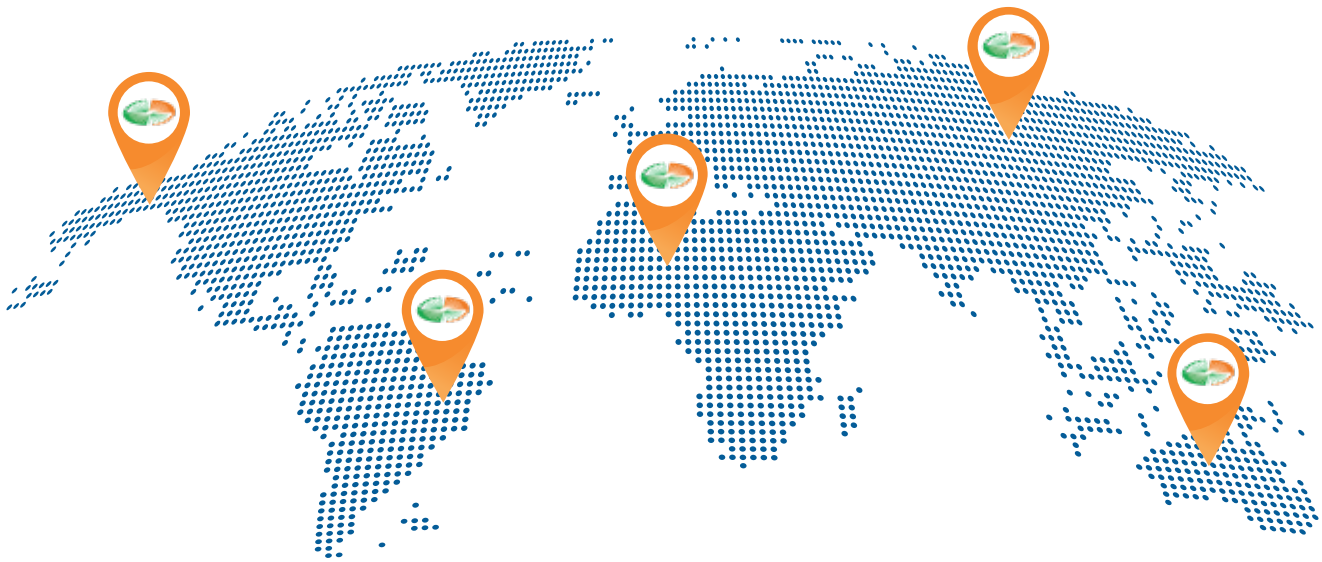
MALTEC-T

>30
Years
Experience

>15
Sales & Associate
Companies in Southeast Asia

>170
Dedicated
Employees

>30
Years Continuos
Sales Growth



MALTEC-T

Dpstar Capabilities & Competencies

30+ Years Experience

ISO 9001 Certified, UKAS, CE, UL

Custom Solutions

Satisfaction Guaranteed

Fastest Lead Times

Competitive Prices

Dpstar Group

Exceptional Quality

Dpstar guarantees our products quality to be one of the best in the industry. We strive to offer the highest quality products in the market and to work with customers to ensure complete satisfaction. Our mission is to consistently satisfy our customers' needs through high quality products and coupled with an excellent service. Our Research and Development department has expanded our range of possibilities by developing innovative solutions and our heater & thermocouple products.

Services & Test Facilities

- Welding robot
- Manufacturing record book
- Quality inspection plan
- Visual inspection
- Dimensional check
- WPS and PQR for welded Thermowells
- Batch certificate
- Certificate of origin
- Certificate of conformance
- Functional performance test
- Loop resistant test
- Insulation resistance test
- Dye penetration test
- Pressure test
- Calibration test
- From –200 °C up to 1.500 °C (RvA/ILAC)
- Calibration test for each instrument, mV, mA, Ohms and V (RvA/ILAC)
- Vacuum test
- Helium leak test
- PMI test

Quality & Warranty Guarantee

MALTEC-T

Customer satisfaction is our first priority. Dpstar understands the value of service and the needs of customers. Dpstar has a dedicated team to provide quotes within an hour, manufacture custom made designs in a day and delivery uncompromised quality goods to industries such as distributors of temperature sensors, heating products, food processing industries, plastic injection molding, and any other small or large organization requiring exceptional service. Proud to say that, our heaters and thermocouples have traveled quite a distance from our humble beginning – Malaysia. Whether you are from Middle East, Europe, Singapore, Thailand, Indonesia, Philippines or further, we are able to deliver your order to your doorstep.

Dpstar offers manufacturer's warranty on all our products. We are the only ONE in Asia that confidently provides a 1 Year Warranty. Our Mission is to consistently satisfy our customers' needs through high quality products and coupled with an excellent service.

"Customer satisfaction has always been our first priority"

Capabilities

Dpstar Capabilities

MALTEC-T

At Dpstar, we are able to assist you in achieving your business target. We simplify your operations by developing state-of-the-art automation solutions, custom-made according to your specific requirements. Setup in early 90's, Dpstar has played a major role as a renowned provider of Factory, Building and Process Automation Solutions for a wide range of applications and industries. We have proven and enviable track record of timely high-technological precision in supplying electronics and electrical engineering equipment for numerous projects around Malaysia. Dpstar is a responsive organization with an emphasis on dynamic innovation. From its catalogue of standard products to products that we custom made according to customer's specification, Dpstar pledged quality and excellent in all our products and services, and provide designs that are able to negate any process complications.

Through continuous investment in research and development, our engineering team is able to develop a pattern of constant innovation, in-line with our commitment towards achieving the finest. More than 150 employees currently work in Dpstar, in one production centre and ten sales offices through out Peninsular Malaysia. Our strength lies in our abilities and dare to innovate ahead of our time. From presale to implementation and beyond, Dpstar is committed in providing excellent services and solutions. Our automation solutions are constantly being improved, simplified and getting more powerful by the day. As a result, efficiency constantly increases and this spells benefits for organizations, system and factories everywhere.

Design Expertise

Dpstar design teams support our partners from conceptual design and feasibility study throughout the life cycle of the equipment. Contact our team today to discuss your specific needs.

Custom Sensors

Difficult Applications • Heavy Duty

- High Sensitivity Sensors
- Harsh Environments
- Special Coatings
- Multi Point Sensors
- Special Thermowells
- Special Connectors
- Heaty Duty

Engineering & Manufacturing

MALTEC-T

In being a leader in providing total solutions for industrial, building and process automation, Dpstar Group also have its own production centre, Dpstar Manufacturing Sdn. Bhd. Maltec-H and Maltec-T are our house brands for heaters and thermocouples that our factory manufacture to suit exacting automation needs. In preparation for a forecasted increase in the automation market, we have increased our intensive product development investment to ensure constant ground breaking initiatives. Our future activities will be fueled by our commitment to “Cutting Edge Technology” as we move into the future, we will proceed in line with the advances in resources and technologies.

In House Capabilities

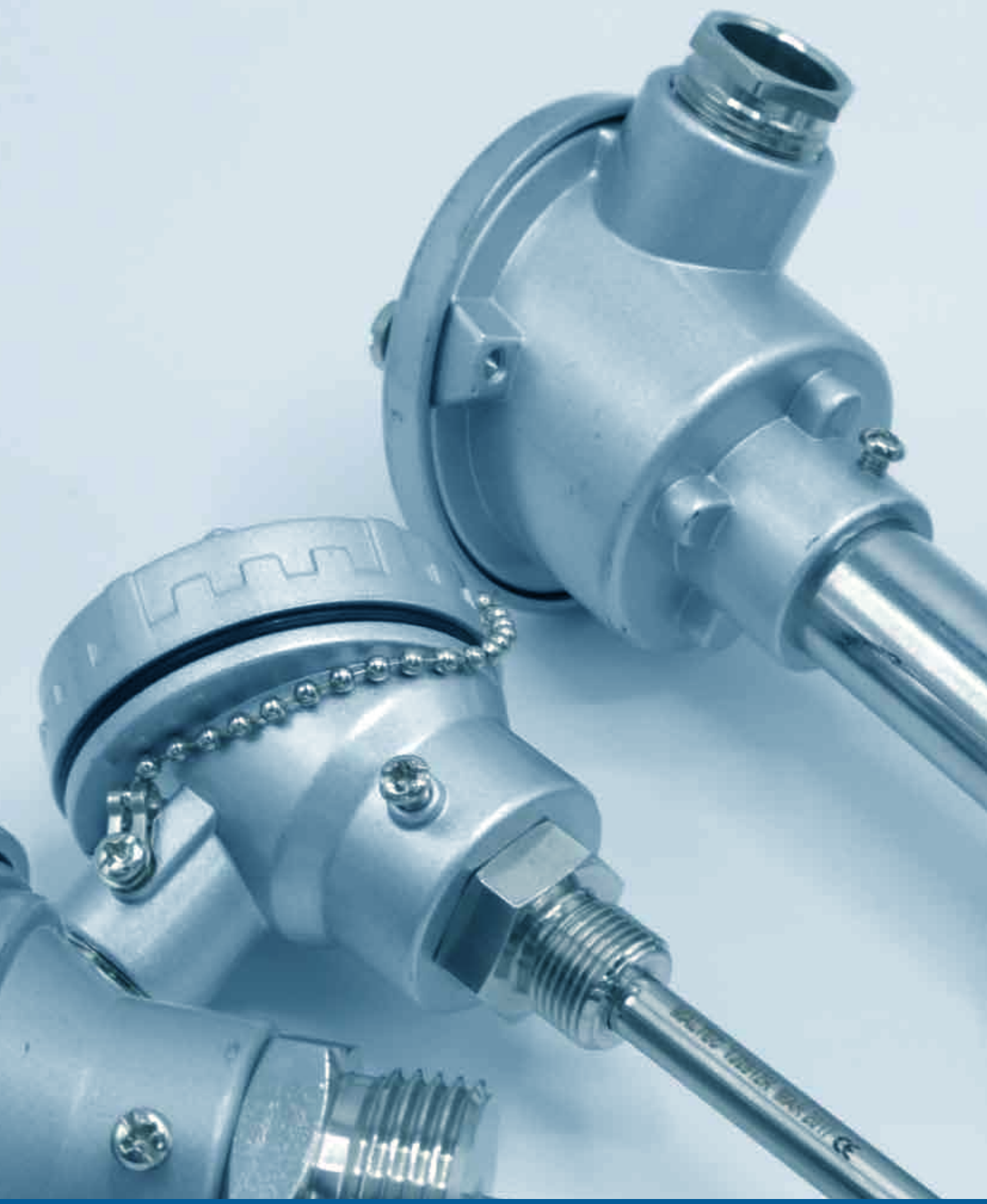
- Testing
- X-Ray
- Insulation resistance
- High voltage dielectric
- Harmonic test
- Waveform test
- Load test (power controls)
- Functional

Complete Supply

- In house manufacturing
- Technical design support
- Dedicated project teams
- After sales support services
- On site commissioning and start up assistance

Industries Served

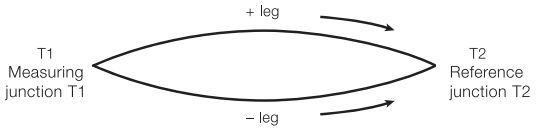
- Agriculture
- Automotive
- Chemicals/Petrochemicals
- Electronic & Semiconductor
- Food & Beverage
- Furnaces and Incinerators
- Glass Manufacturing
- HVAC
- Ovens and Kilns
- Packaging & Printing
- Petrochemical, Oil and Gas
- Pharmaceuticals
- Plastics & Rubber Industry
- Power Generation
- Pulp/Paper/Wood
- Textiles
- Waste & Wastewater



Production

1. Operating Principles

A thermocouple consists of two wires, each made of a different metal, welded together at one end to form a circuit as shown in Fig.16. When a temperature different is produced between T1 and T2 by heating one end or by other means, a thermoelectromotive force specific to the metals used is produced in the circuit. This pair of wires is called a thermocouple and this effect, named after its discoverer, is know as the Zeebeck effect. The effect is used to measure temperature. Three laws have been established concerning thermocouple characteristics. The first is the law of homogeneous. The second is the law of intermediate metals that no thermoelectromotive force is produced even when a different metal is inserted in the circuit as long as the temperature of its junctions is the same. The third is the law of successive or intermediate temperature that when the circuit has an intermediate junction, its thermoelectromotive force is added if the material used is the same.



Principles of Thermocouple Construction (Fig.16)

2. Thermocouple Type and Their Features (JIS-C 1602-1981) (Table 10)

Material symbol	Main materials		Operating temp. range (°C)		Features
	+ leg	- leg	In normal application	In overheated application	
B	Pt 70, Rh 30	Pt 94, Rh 6	1500	1700	Operates at the highest temperature of all JIS types.
R	Pt 87, Rh 13	Pt 100	1400	1600	The most widely used platinum type.
S	Pt 90, Rh 10	Pt 100	1400	1600	Widely used in Europe and U.S.A. All platinum type themocouples are vulnerable to reducing atmosphere.
K	Ni, Cr	Ni, A	650~1000	850~1200	Extensively used because of wide operating temperature range, but vulnerable to reducing atmosphere.
E	Ni, Cr	Ni, Cu	450~700	500~800	Produces highest thermoelectromotive force of all JIS types.
J	Fe	Ni, Cu	400~600	500~750	Resistant to reducing atmosphere, but + leg has a tendency to oxidize.
T	Cu	Ni, Cu	200~300	250~350	Resistant to reducing atmosphere. Retains good characteristics down to relatively low temperature (300°C).

3. Non JIS Thermocouples (Table 11)

Material symbol	Main materials		Operating temp. range (°C)		Features
	+ leg	- leg	In normal application	In overheated application	
PR 13	Pt 87.3, Rh12.7	Pt 100	1400	1600	Dropped from JIS in 1981, Same characteristics as R type.
PR 20-40	Pt 60, Rh 40	Pt 80, Rh 20	1700	1900	Operates at the highest temperature of all platinum types.
WRe 0-26	W	W 74, Re 26	2000	2200	Very vulnerable to oxidizing atmosphere. Used in vaccum or inert gas.
WRe 5-26	W 95, Re 5	W 74, Re 26	2100	2300	+ leg contains 5% Re to increase strength.
AF	Ni, Cr	Au, Fe	+100~-269		Gold, iron - chromel thermocouple. Used in cryogenic application.
N	Ni, Cr	Ni, Si	650~1100	700~1200	Developed to replace the K thermocouple. Stable.
Ni-Mo	Ni	Ni 82, Mo 18	1000	1200	Used in high temperature up to 1200°C. Not for use in oxidizing aimosphere.
PN	Pt, Pd, Au	Pd, Au	1200	1300	Similar thermoelectromotive force to the K thermocouple. Used at relatively high temperature.

4. Temperature Tolerance of Thermocouples (Table 12)

Material symbol	Former symbol	Measuring temp. range	Class	Tolerance *
B	-	600°C up to 1700°C	Class 0.5	± 4°C or ± 0.5% of measuring temp.
R	-	0°C up to 1600°C	Class 0.25	± 1.5°C or ± 0.25% of measuring temp.
S				
K	CA	0°C up to 1000°C	Class 0.4	± 1.5°C or ± 0.4% of measuring temp.
		0°C up to 1200°C	Class 0.75	± 2.5°C or ± 0.75% of measuring temp.
		-200°C up to 0°C	Class 1.5	± 2.5°C or ± 1.5% of measuring temp.
E	CRC	0°C up to 800°C	Class 0.4	± 1.5°C or ± 0.4% of measuring temp.
		0°C up to 800°C	Class 0.75	± 2.5°C or ± 0.75% of measuring temp.
		-200°C up to 0°C	Class 1.5	± 2.5°C or ± 1.5% of measuring temp.
J	IC	0°C up to 750°C	Class 0.4	± 1.5°C or ± 0.4% of measuring temp.
		0°C up to 750°C	Class 0.75	± 2.5°C or ± 0.75% of measuring temp.
T	CC	0°C up to 350°C	Class 0.4	± 0.5°C or ± 0.45% of measuring temp.
		0°C up to 350°C	Class 0.75	± 1°C or ± 0.75% of measuring temp.
		-200°C up to 0°C	Class1.5	± 1°C or ± 1.5% of measuring temp.

** Tolerance is the maximum allowable difference between the temperature converted from the thermoelectromotive force according to the reference thermoelectromotive force table and the actual temperature of the measuring junction, it is the large of the two values.*

Base Metal Thermocouples with Thermowells / Protection Tubes

MALTEC-T

Base metal thermowell assemblies are manufactured from drilled bar stock and have threaded NPT process connections or flanges for direct immersion into high pressure or corrosive applications. Base Metal Thermocouple types are composed of common, inexpensive metals such as nickel, iron and copper. The thermocouple element can be constructed of ceramic insulated thermocouple wires or mineral insulated cable for increased durability.

Type	J, K, T, E, N
Element size (MI)	3.0, 3.2, 4.8, 6.0, 6.4, 8.0 mm, Other sizes on request
Element size (Non-MI)	1.6, 2.0, 3.0, 3.2, 4.8, 6.0, 8.0, 9.5, 10 mm, Other sizes on request
Sheath Material	SS304, SS316, SS310, Inconel
Thermowell Material	HRS 446, INCONEL-600/601/800, Nickel, Hastalloy Titanium, Tantalum Sleeve, Ceramic 610 & C -799, Silicon Carbide, Monel etc
Configuration	Simplex/ Duplex/Multipoint

MI Thermocouple

Mineral insulated thermocouples consist of an outer metal sheath which protects the thermocouple elements from damage and contamination, this sheath is malleable so mineral insulated thermocouples can be easily bent and formed into a variety of shapes to suit your application. The inner thermocouple elements are insulated with magnesium oxide powder, tightly packed so no air is trapped inside, this provides great thermal conductivity. This construction provides an incredibly durable temperature sensor that can be adapted to a wide variety of applications.

Type	J, K, T, E, N, R, S
Element size (MI)	0.25, 0.5, 1.0, 1.5, 3.0, 4.5, 6.0, 8.0 mm Other sizes on request
Sheath Material	SS321, SS316, SS310, HRS 446, Inconel 600, Nimonic, Pyrosil, Platinum etc.
Configuration	Simplex/Duplex/Multipoint
Configuration	• Miniature Thermocouples with minimum 0.25 mm Dia • Swaged Tip Thermocouples • Tube Temperature Skin Type Thermocouples • Special Sensors as per ASTM-E235 for critical application • High Wall Thickness

Noble Metal Thermocouple

MALTEC-T

Noble Metal Thermocouples are manufactured with precious or noble metals like Platinum and Rhodium. Noble metal thermocouples can be used in oxidizing or inert applications and must be used with a ceramic protection tube surrounding the thermocouple element. Noble Metal thermocouples are designed for high temperature applications, where it is essential that the thermocouple withstands the damaging effects of oxidation and corrosion.

Type	R, S, B
Element Diameter	0.30, 0.35, 0.4, 0.45, 0.5 mm, Other sizes on request
Sheath Material	Recrystallized Alumina Ceramic(C-799), 610, Inconel, Silicon Carbide, Platinum etc
Configuration	Simplex/Duplex/Multipoint
Configuration	• Hot Blast & Stove Dome Thermocouples • Tri Level Thermocouples • Crown Thermocouples

Refractory Thermocouples

Refractory Thermocouples are designed for use in oxidizing, neutral and reducing environments. Refractory Metal Thermocouples are manufactured with wire that is made from the exotic metals tungsten and Rhenium. These metals are expensive, difficult to manufacture and wires made with these metals are very brittle. Applications in all type of furnaces can be measured with these types of sensors. All standard refractory metal and noble metal thermocouple alloys are available in High-Temperature Thermocouples are defined as sensors used at temperatures of 2300°C and beyond.

Type	G, C, D
Element Diameter	1.6, 3.2, 6.4, 8.0 mm
Sheath Material	Tantalum, Molybdenum, Inconel 600, Ceramic etc
Configuration	SS316 or INCONEL
Configuration	Magnesium Oxide, Aluminium Oxide, Beryllium Oxide, Hafnium Oxide

MT 1003

Thermocouple, complete with small aluminium enclosure (IP65 rating), 304, 316, Inconel stainless steel sheath, constructed using mineral insulated cable, ungrounded junction.

Calibration	Diameter	Part No. Ø	length
K	3mm	MT 1003 - K - 030 -	
K	6mm	MT 1003 - K - 060 -	
K	8mm	MT 1003 - K - 080 -	
J/T/E	5mm	MT 1003 - J - 050 -	
J/T/E	6mm	MT 1003 - J - 060 -	
J/T/E	8mm	MT 1003 - J - 080 -	

Insert part number when ordering diameter and length, eg. 6mm diameter 250mm long = MT 1003 - K - 060 - 0250

MT 1004

Thermocouple, complete with large aluminium enclosure (IP65 rating), 304, 316, Inconel stainless steel sheath, constructed using mineral insulated cable, ungrounded junction.

Calibration	Diameter	Part No. Ø	length
K	6mm	MT 1004 - K - 060 -	
K	8mm	MT 1004 - K - 080 -	
K	12mm	MT 1004 - K - 120 -	
J/T/E	6mm	MT 1004 - J - 060 -	
J/T/E	8mm	MT 1004 - J - 080 -	
J/T/E	12mm	MT 1004 - J - 120 -	

Insert part number when ordering diameter and length, eg. 6mm diameter 250mm long = MT 1004 - K - 060 - 0250

MT 1003a

As for Model 101 complete with 1/2” BSP small enclose 316 stainless steel fixed nipple, sanitary weld.

Calibration	Diameter	Part No. Ø	length
K/J/T/E	3mm	MT 1003a - 030 -	
K/J/T/E	6mm	MT 1003a - 060 -	
K/J/T/E	8mm	MT 1003a - 080 -	

Insert part number when ordering diameter and length, eg. 3mm diameter 250mm long = MT 1003a - 030 - 0250

Thermocouples 1000 Series

MT 1004a

As for Model 102 complete with 1/2" BSP large enclose 316 stainless steel fixed nipple, sanitary weld.

Calibration	Diameter	Part No. Ø length
K/J/T/E	6mm	MT 1004a - 060 -
K/J/T/E	8mm	MT 1004a - 080 -
K/J/T/E	12mm	MT 1004a - 120 -

Insert part number when ordering diameter and length, eg. 6mm diameter 250mm long = MT 1004a - 060 - 0250

Thermocouples 2000 Series

MT 2002

Thermocouple, complete with 2 metres PVC lead. Fiber glass, screen braided, fiber, teflon, silicone, 304, 316, Inconel stainless steel sheath, constructed using mineral insulated cable, undergrounded junction.

Calibration	Diameter	Part No. Ø length
K	1mm	MT 2002 - K - 010 -
K	1.5mm	MT 2002 - K - 015 -
K	3mm	MT 2002 - K - 030 -
J/T/E	3mm	MT 2002 - J - 030 -
J/T/E	4.5mm	MT 2002 - J - 045 -
J/T/E	6mm	MT 2002 - J - 060 -

Insert part number when ordering diameter and length, eg. 6mm diameter 250mm long = MT 2002 - K - 060 - 0250

MT 2002a

Thermocouple, complete with standard plug and tube adaptor, 304, 316, Inconel stainless steel sheath, constructed using mineral insulated cable, ungrounded junction.

Calibration	Diameter	Part No. Ø length
K	3mm	MT 2002a - K - 030 -
K	4.5mm	MT 2002a - K - 045 -
K	6mm	MT 2002a - K - 060 -
J/T/E	3mm	MT 2002a - J - 030 -
J/T/E	4.5mm	MT 2002a - J - 045 -
J/T/E	6mm	MT 2002a - J - 060 -

Insert part number when ordering diameter and length, eg. 3mm diameter 250mm long = MT 2002a - K - 030 - 0250

Thermocouples 400 Series

MT 401

Thermocouple, complete with ceramic terminal block, constructed using ceramic insulators over 8/3.2 AWG thermocouple grade wire.

Calibration	Part No. length
K	MT 401 - K - [ ]

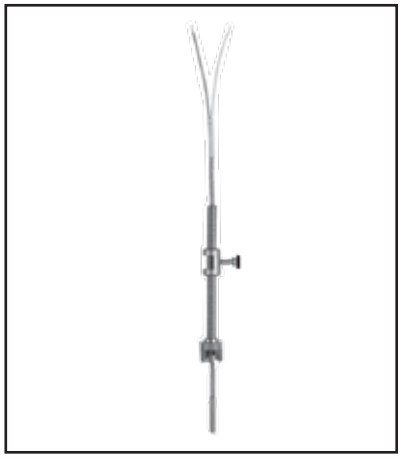
MT 402

Thermocouple, complete with aluminium encloser, stainless steel support tube, enclosed within ceramic sheath.

Calibration	Part No.
K	MT 402 - K - [ ]
R	MT 402 - R - [ ]
S	MT 402 - S - [ ]

Thermocouples MT-BYN Series

YM3



Bayonet cap type. Thermocouple complete with spring clamp and bayonet cap, constructed using thermocouple grade wires screen braided over fiber 4.8/6mm and/or screen braided over fiber glass (Round) diameter tip section, grounded junction.

Calibration	Part No.
K	MT - BYN - K - [1000]
J/T/E	MT - BYN - J - [1000]

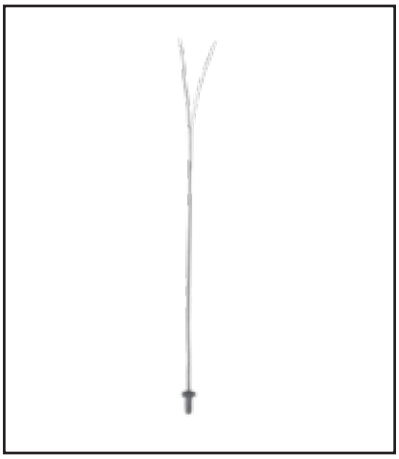
Adaptors

Single pin 1/8” BSP thread to suit Model MT-BYN

Part No.
BF4
BF5
BF6
BF9

MT-TCE 50

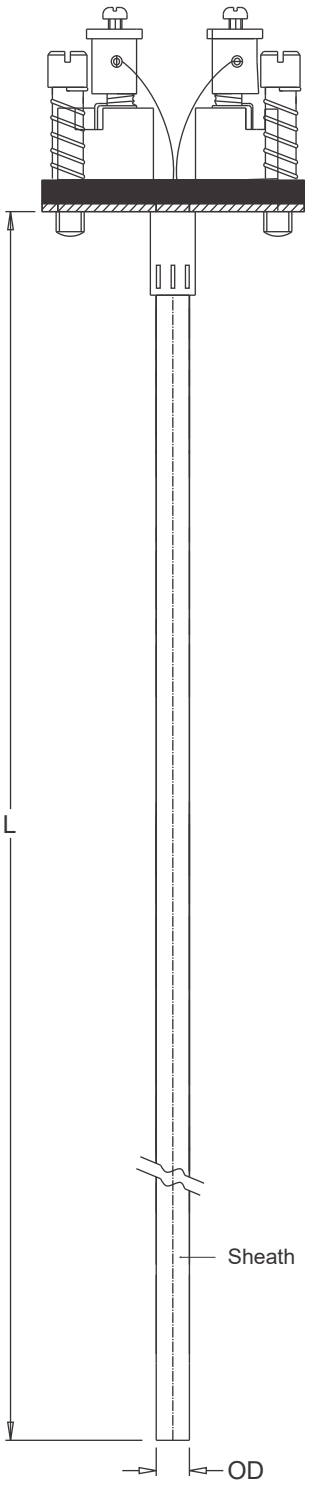
Bolt type 1/4 BSW thread. Thermocouple complete with swivel retaining bolt, constructed using thermocouple grade screen braided over fiber, grounded junction.



Calibration	length	Part No.
K	2M	MT-TCE 50K

*optional bolt M6/M8, ungrounded

THERMOCOUPLE INSERT



MT 1000 - A

Termination Housing

A	Teminal & Ceramic Block (Spring Loaded)

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Thermocouple Element

Type	Description
K	Chromal/Alumal
J	Iron/Constantan
N	Nicrosil-Nisil
T	Copper/Constantan
E	Ni-Cr/Constantan
Other	Consult Factory
Ex.:	If Simplex - K, Duplex - KK

Sheath "OD"

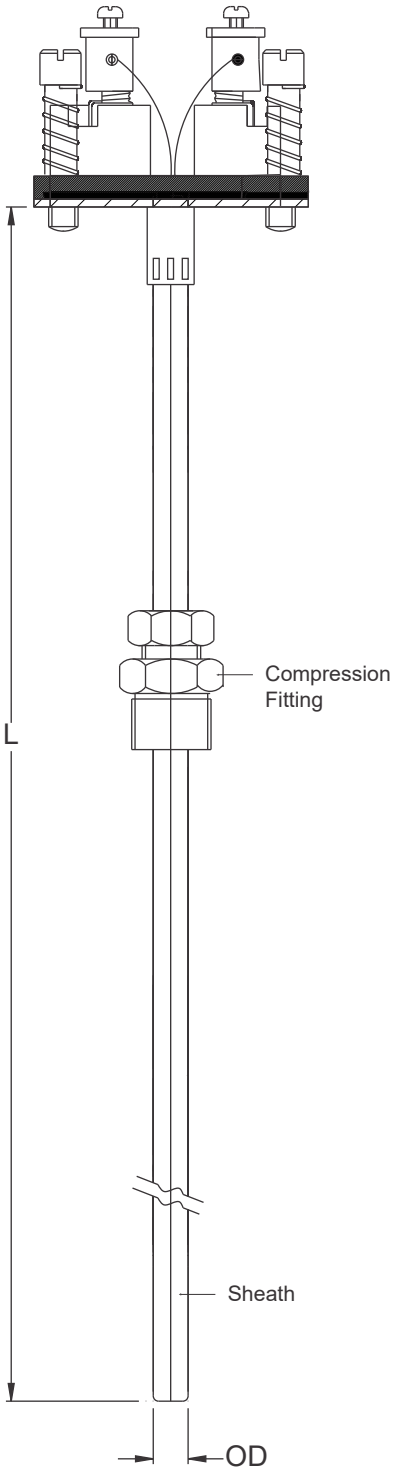
3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

304	SS 304
316	SS 316
Other	Consult Factory

Nominal Length Below Block (L)

THERMOCOUPLE INSERT WITH COMPRESSION FITTING



MT 1000 - B

Termination Housing

A	Teminal & Ceramic Block (Spring Loaded)

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Thermocouple Element

Type	Description
K	Chromal/Alumal
J	Iron/Constantan
N	Nicrosil-Nisil
T	Copper/Constantan
E	Ni-Cr/Constantan
Other	Consult Factory
Ex.:	If Simplex - K, Duplex - KK

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

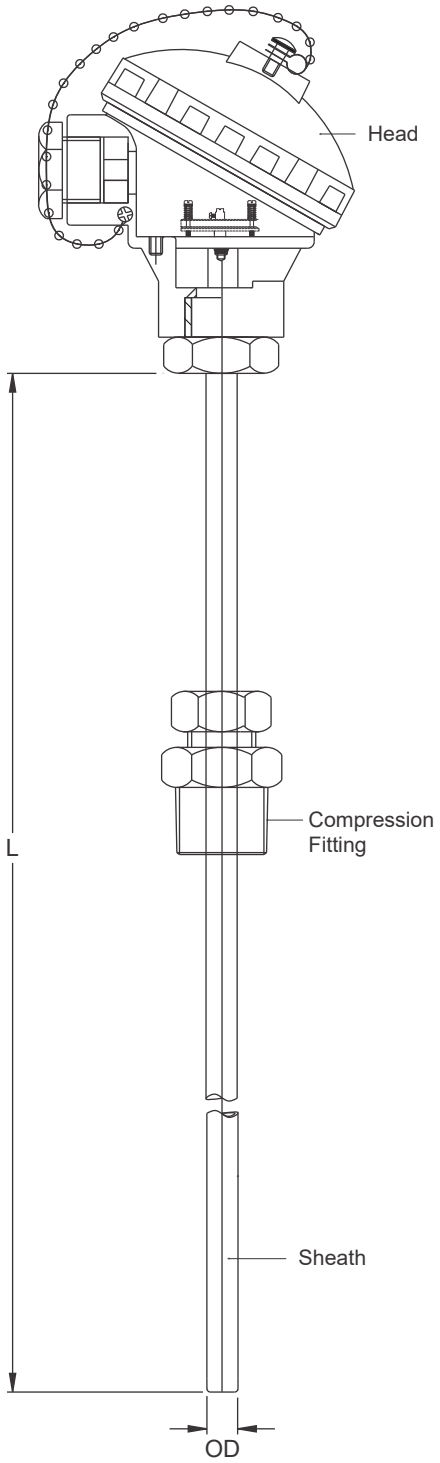
304	SS 304
316	SS 316
Other	Consult Factory

Compression Fitting

Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -T hread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Nominal Length of T/C Below TCB (L) (mm)

THERMOCOUPLE WITH COMPRESSION FITTING



MT 1000 - C

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Thermocouple Element

Type	Description
K	Chromal/Alumal
J	Iron/Constantan
N	Nicrosil-Nisil
T	Copper/Constantan
E	Ni-Cr/Constantan
Other	Consult Factory
Ex.:	If Simplex - K, Duplex - KK

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

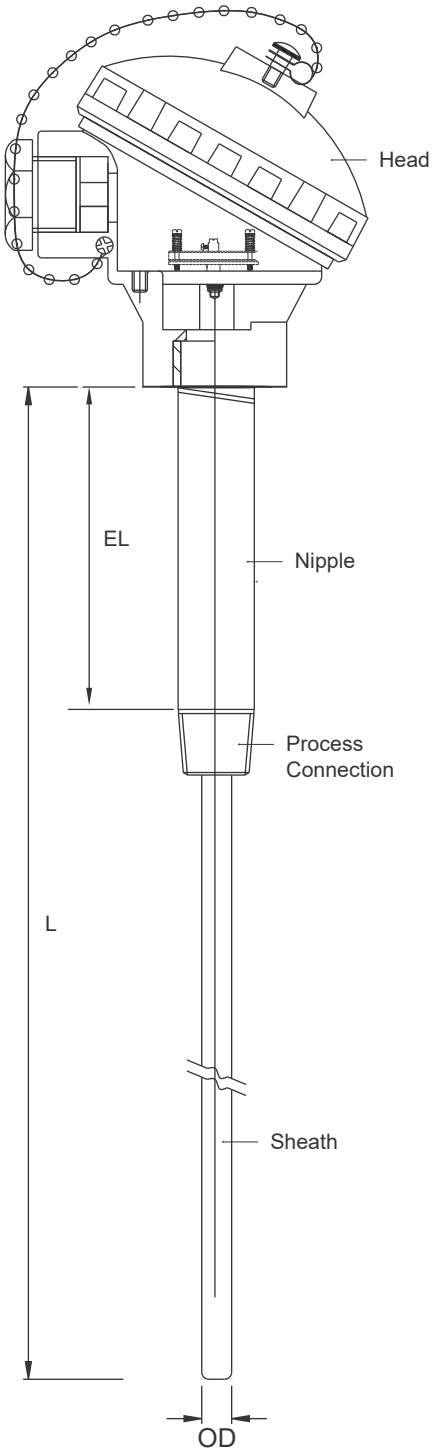
304	SS 304
316	SS 316
Other	Consult Factory

Compression Fitting

Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -Thread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Nominal Length of T/C (L) (mm)

THERMOCOUPLE WITH NIPPLE



MT 1000 - D

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Thermocouple Element

Type	Description
K	Chromal/Alumal
J	Iron/Constantan
N	Nicrosil-Nisil
T	Copper/Constantan
E	Ni-Cr/Constantan
Other	Consult Factory
Ex.:	If Simplex - K, Duplex - KK

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

304	SS 304
316	SS 316
Other	Consult Factory

Nipple

1/2" SCH 40	OD X ID: 21.3 X 15.7mm
Other	Consult Factory

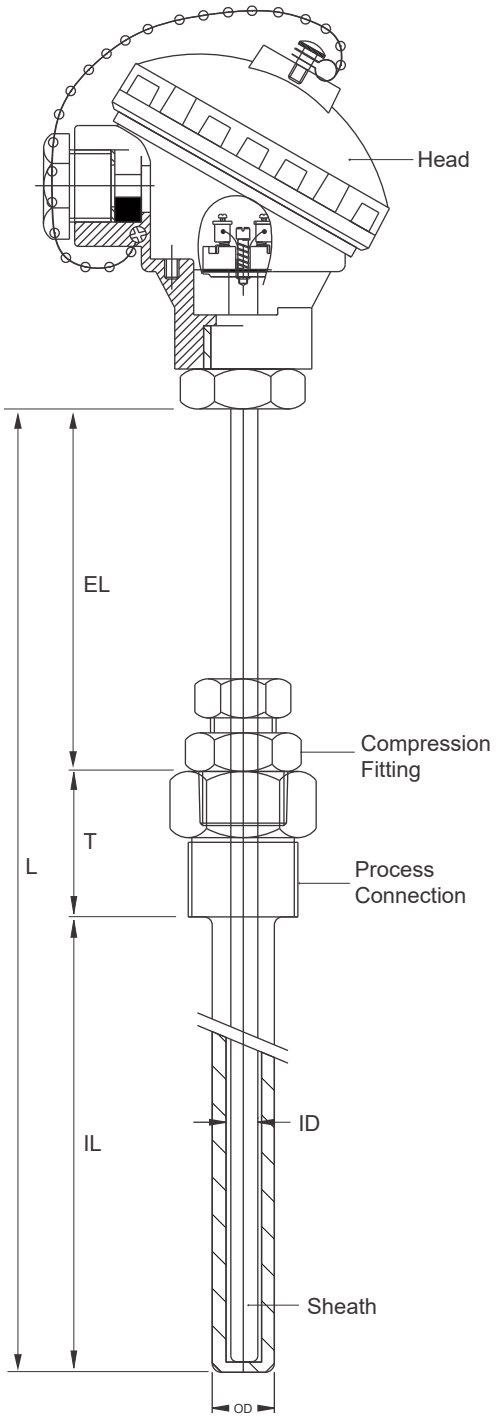
Compression Fitting

Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -Thread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Extention Length of (E.L) (mm)

Nominal Length of T/C (L) (mm)

THERMOCOUPLE WITH THERMOWELL COMPRESSION FITTING



MT 1000 - E

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Thermocouple Element

Type	Description
K	Chromal/Alumal
J	Iron/Constantan
N	Nicrosil-Nisil
T	Copper/Constantan
E	Ni-Cr/Constantan
Other	Consult Factory
Ex.:	If Simplex - K, Duplex - KK

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

304	SS 304
316	SS 316
Other	Consult Factory

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell OD (mm)

Thermowell ID (mm)

Process Connection

Length of "T" (mm)

Instrument Connection

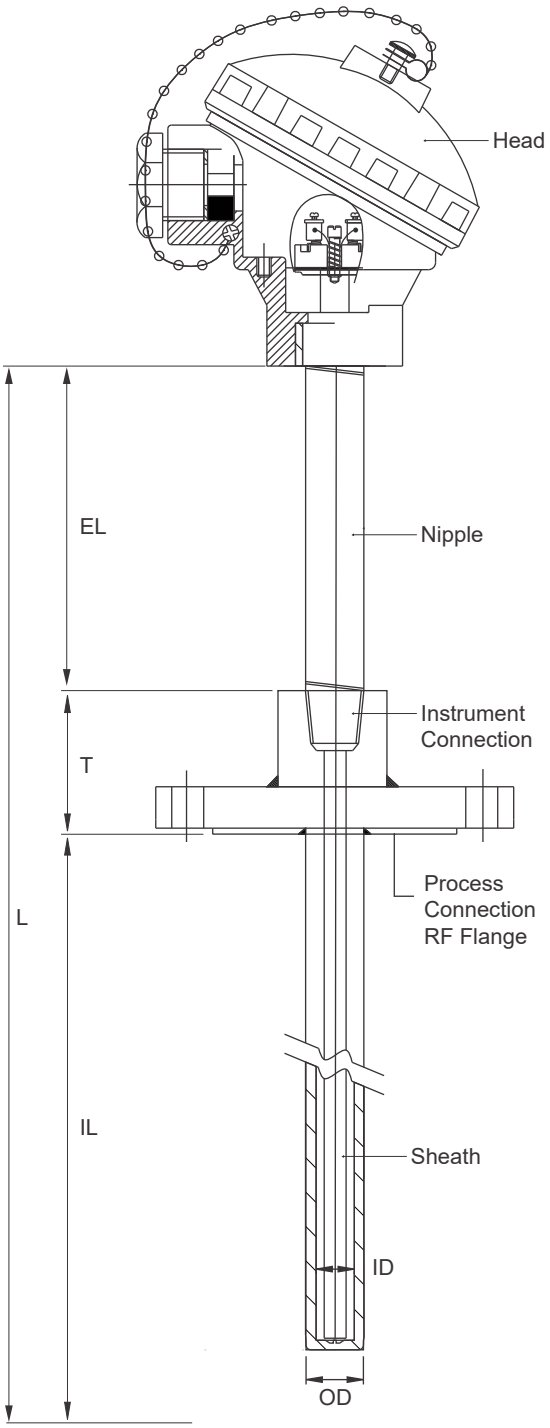
Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -T hread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Insertion Length (I.L.) (mm)

Extention Length (E.L.) (mm)

Nominal Length of T/C "L" (mm)

THERMOCOUPLE WITH NIPPLE & STRAIGHT THERMOWELL



MT 1000 - F

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Thermocouple Element

Type	Description
K	Chromal/Alumal
J	Iron/Constantan
N	Nicrosil-Nisil
T	Copper/Constantan
E	Ni-Cr/Constantan
Other	Consult Factory
Ex.:	If Simplex - K, Duplex - KK

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

304	SS 304
316	SS 316
Other	Consult Factory

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell OD (mm)

ID (mm)

1/2" SCH 40	OD X ID: 21.3 X 15.7mm
Other	Consult Factory

Nipple

Length of "T" (mm)

Process Connection

Flange Rating	Flange Size
JIS 5 K JIS 10 K	1/4"
	1/2"
	3/4"
ANSI 150 # ANSI 300 #	1"
	1 1/4"
	1 1/2"
	1 3/4"
	2"
Other	Consult Factory

Flange Material

Instrument Connection

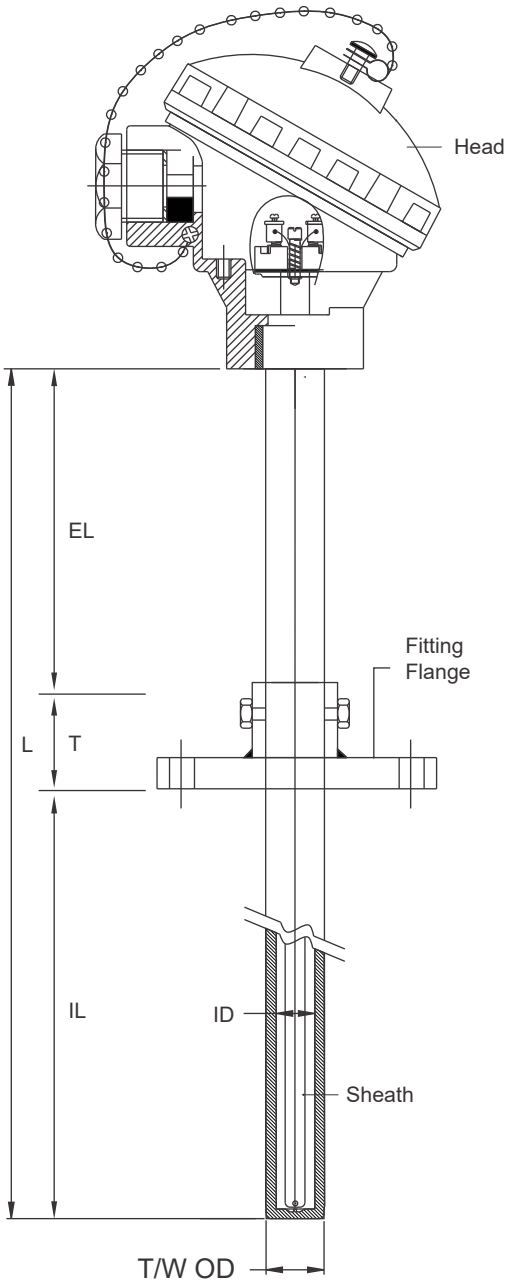
Insertion Length (I.L.) (mm)

Extention Length (E.L.) (mm)

Nominal Length of T/C "L" (mm)

Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M-Thread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

THERMOCOUPLE WITH ADJUSTABLE FLANGE THERMOWELL



MT 1000 - G

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Thermocouple Element

Type	Description
K	Chromal/Alumal
J	Iron/Constantan
N	Nicrosil-Nisil
T	Copper/Constantan
E	Ni-Cr/Constantan
Other	Consult Factory
Ex.:	If Simplex - K, Duplex - KK

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

304	SS 304
316	SS 316
Other	Consult Factory

Thermowell "OD" (mm)

Thermowell "ID" (mm)

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

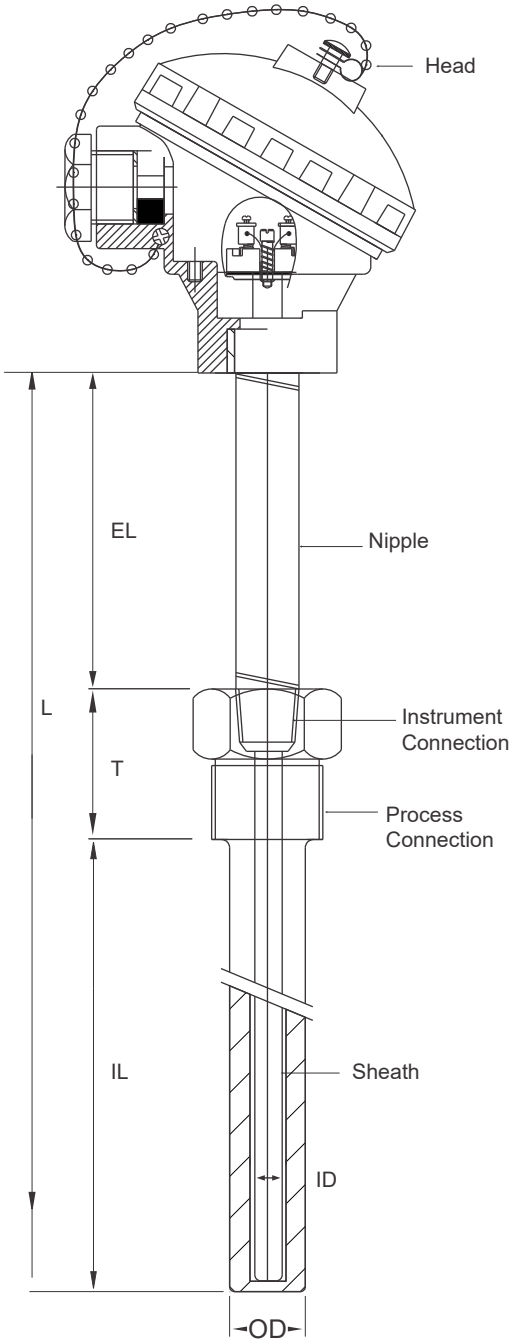
Process Connection

Flange Material

304	SS 304
316	SS 316
CS	Cast-Steel
Other	Consult Factory

Nominal Length of T/C "L" (mm)

THERMOCOUPLE WITH NIPPLE & FLANGE THERMOWELL



MT 1000 - H

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Thermocouple Element

Type	Description
K	Chromal/Alumal
J	Iron/Constantan
N	Nicrosil-Nisil
T	Copper/Constantan
E	Ni-Cr/Constantan
Other	Consult Factory
Ex.:	If Simplex - K, Duplex - KK

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

304	SS 304
316	SS 316
Other	Consult Factory

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell OD1 (mm)

Thermowell OD2 (mm)

Thermowell ID (mm)

Length of "T" (mm)

Process Connection

Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -T hread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

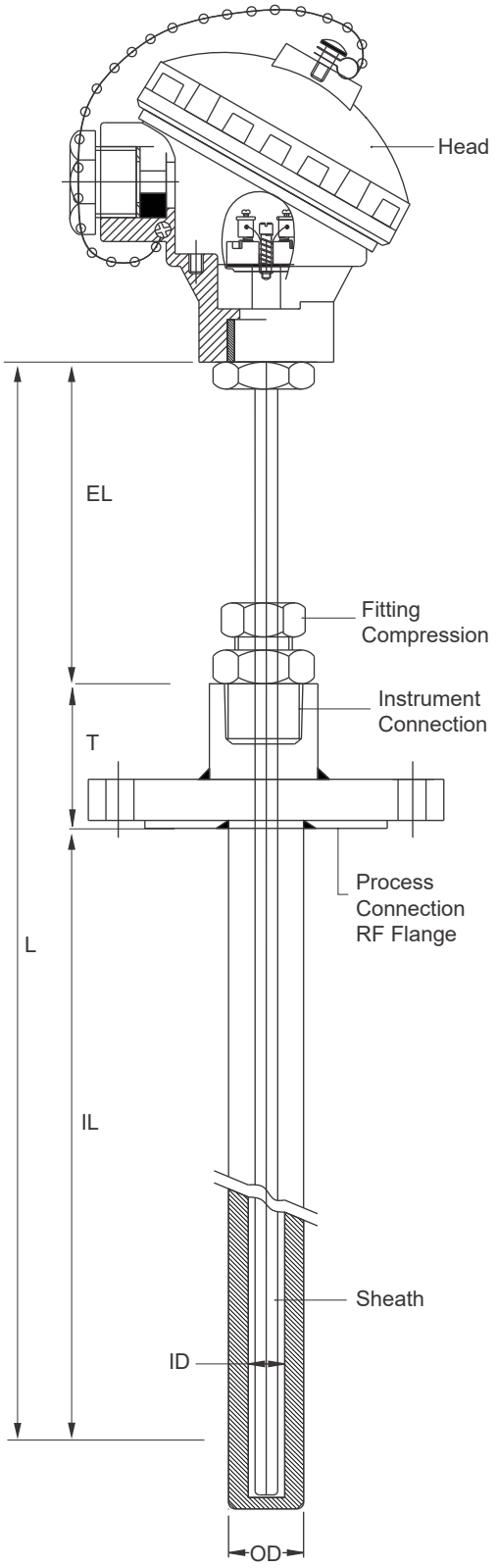
Instrument Connection

Insertion Length (I.L.) (mm)

Extention Length (E.L.) (mm)

Nominal Length of T/C "L" (mm)

THERMOCOUPLE WITH FLANGE THERMOWELL & COMPRESSION FITTING



MT 1000 - I

Termination Housing	
KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal	
W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Thermocouple Element	
Type	**Description**
K	Chromal/Alumal
J	Iron/Constantan
N	Nicrosil-Nisil
T	Copper/Constantan
E	Ni-Cr/Constantan
Other	Consult Factory
Ex.:	If Simplex - K, Duplex - KK

Sheath "OD"	
3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material	
304	SS 304
316	SS 316
Other	Consult Factory

Thermowell Material	
304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell OD (mm)

ID (mm)

Length of "T" (mm)

Process Connection	
Flange Rating	**Flange Size**
JIS 5 K	1/4"
JIS 10 K	1/2"
	3/4"
	1"
ANSI 150 #	1 1/4"
ANSI 300 #	1 1/2"
	1 3/4"
	2"
Other	Consult Factory

Flange Material

Instrument Connection

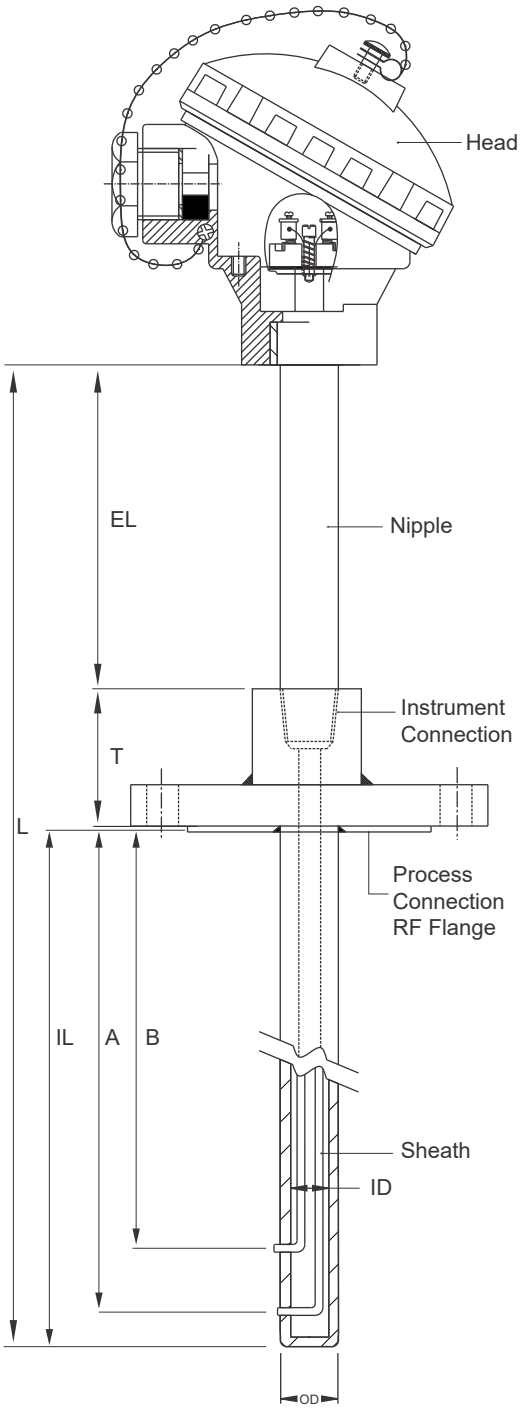
Fitting Compression	
Threads	1/8"
	1/4"
	3/8"
BSPT/ NPT	1/2"
	3/4"
	1"
M -Thread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Insertion Length (I.L.) (mm)

Extention Length (E.L.) (mm)

Nominal Length of T/C "L" (mm)

TWO POINT THERMOCOUPLE



MT 1000 - J

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Thermocouple Element

Type	Description
K	Chromal/Alumal
J	Iron/Constantan
N	Nicrosil-Nisil
T	Copper/Constantan
E	Ni-Cr/Constantan
Other	Consult Factory
Ex.:	If Simplex - K, Duplex - KK

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

304	SS 304
316	SS 316
Other	Consult Factory

Thermowell Material

Thermowell OD (mm)

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

ID (mm)

Nipple

1/2" SCH 40	OD X ID: 21.3 X 15.7mm
Other	Consult Factory

Length of "T" (mm)

Process Connection

Flange Material

Flange Rating	Flange Size
JIS 5 K JIS 10 K	1/4"
	1/2"
	3/4"
ANSI 150 # ANSI 300 #	1"
	1 1/4"
	1 1/2"
	1 3/4"
	2"
Other	Consult Factory

Instrument Connection

Insertion Length (I.L.) (mm)

Extension Length (E.L.) (mm)

Nominal Length of T/C "L" (mm)

Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -T hread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Thermocouples

MALTEC-T

Platinium Curve Rigid Averaging Sensors

DESCRIPTION

Continuous-resistance element **Platinum Curve Rigid Averaging Sensors** provide accurate sensing of duct temperatures when a small, inaccessible area must be covered. They average temperatures over their entire length and terminate in a weather-resistant housing. They are available in 12", 18", 24", and 36" (30.5, 45.7, 61, and 91.4 cm) lengths. The sensor uses an element that closely matches platinum resistance/temperature characteristics over the specified range. It is available in 100Ω and 1000Ω 385 curve and 1000Ω 375 curve. The sensors have a brass case that is rigid for easy single-point mounting.

FEATURES

- ***Continuous averaging***
- ***Rigid sensor***
- ***12", 18", 24", 36" (30.5, 45.7, 61, and 91.4 cm) lengths***
- ***100Ω and 1000Ω 385 curve***
- ***1000Ω 375 curve***
- ***Weather-resistant box***

APPLICATION

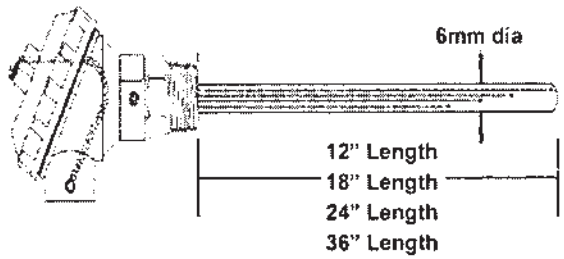
- ***Small ducts without access***
- ***Mixed air chambers***
- ***Hot/Cold deck discharge***
- ***Face/Bypass discharge***
- ***Unit vents***

SPECIFICATIONS

Sensors	1000Ω ±0.25% @ 32°F (0°C); 100Ω ±0.25% @ 32°F (0°C) TCR 375 or 385
Temp range	-50° to 275°F (-45° to 135°C)
Approx sensitivity	
100Ω	0.21Ω/°F @ 32°F (0°C)
1000Ω	2.1Ω/°F @ 32°F (0°C)

Element	4 RTD Element
Length	12" (30 cm) or 18" (45 cm); 24" (61 cm) or 36" (91 cm)
Casing	Cast Iron
Diameter	6mm
Warranty	1 year
Connection	1/2" BSP

MOUNTING / DIMENSIONS



ORDERING INFORMATION

MODEL	DESCRIPTION	
MAS-100	100Ω With 4 TO 20mA Transmitter	
MAS-1000	1000Ω With 4 TO 20mA Transmitter	
	INSERTION LENGTH	
	12	12" length
	18*	18" length
	24*	24" length
	36	36" length

No. 346700114-1/2

検査成績書
INSPECTION CERTIFICATE

04/06/2016

顧客名 CUSTOMER ＿＿＿＿＿＿＿＿＿＿ 殿
最終顧客名 END USER ＿＿＿＿＿＿＿＿＿＿ 殿
御注文番号 ORDER NO. XPO-1603-192
製品名称 PRODUCT NAME 熱電対 THERMOCOUPLES
型名 MODEL THERMOCOUPLE WIRE Type R
作業票 NO. JOB NO. 346700-11

規格 STANDARD JISC 1602-1995
種類 ELEMENT R
階級 CLASS 2
線径 WIRE DIAMETER φ 0.5
室内温度 ROOM TEMPRATURE 24 ℃
室内湿度 ROOM HUMIDITY 43 %

林電工株式会社
HAYASI DENKO CO.,LTD.

承認者 APPROVED BY K.Urata
検査者 INSPECTED BY Y.miyahara

温度特性
TEMPERATURE CHARACTERISTICS

	製造番号 SERIAL NO.	規格 STANDARD / TAG NO.	温度 200 ℃ TEMPERATURE		温度 400 ℃ TEMPERATURE		温度 600 ℃ TEMPERATURE		温度 800 ℃ TEMPERATURE		温度 1000 ℃ TEMPERATURE	
			基準値 mV DESIRED VALUE	許容差℃ TOLERANCE	基準値 mV DESIRED VALUE	許容差℃ TOLERANCE	基準値 mV DESIRED VALUE	許容差℃ TOLERANCE	基準値 mV DESIRED VALUE	許容差℃ TOLERANCE	基準値 mV DESIRED VALUE	許容差℃ TOLERANCE
			1.469	± 1.5	3.408	± 1.5	5.583	± 1.5	7.950	± 2.0	10.506	± 2.5
			測定値 mV ACTUAL VALUE	誤差 ℃ ERROR	測定値 mV ACTUAL VALUE	誤差 ℃ ERROR	測定値 mV ACTUAL VALUE	誤差 ℃ ERROR	測定値 mV ACTUAL VALUE	誤差 ℃ ERROR	測定値 mV ACTUAL VALUE	誤差 ℃ ERROR
1			1.466	-0.3	3.404	-0.4	5.579	-0.3	7.948	-0.2	10.506	0.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

	項目 ITEM	
外観 APPEARANCE		良 GOOD
寸法検査 DIMENSION CHECK	外径、長さ、フランジ、ねじ DIAMETER, LENGTH, FLANGE, SCREW	良 GOOD
絶縁抵抗 INSULATION RESISTANCE	端子－保護管、 TERMINAL-PROTECTIVE TUBE DC500V 10 MΩ	良 GOOD

備考 REMARK

上記はロット成績による
The abore figures are taken form Lot testing results.

Lot No. TC64032

Type R 0.5MM THERMOCOUPLE BARE LEADS

QC－101

97.01.06

No. 346700114-2/2

検査成績書
INSPECTION CERTIFICATE

顧客名 CUSTOMER ＿＿＿＿＿＿＿＿ 殿
最終顧客名 END USER ＿＿＿＿＿＿＿＿ 殿
御注文番号 ORDER NO. XPO-1603-192
製品名称 PRODUCT NAME 熱電対 THERMOCOUPLES
型名 MODEL THERMOCOUPLE WIRE Type R
作業票 NO. JOB NO. 346700-11

規格 STANDARD JISC 1602-1995
種類 ELEMENT R
階級 CLASS 2
線径 WIRE DIAMETER φ 0.5
室内温度 ROOM TEMPRATURE 24 ℃
室内湿度 ROOM HUMIDITY 43 %

04/06/2016

林電工株式会社
HAYASI DENKO CO.,LTD.

承認者 APPROVED BY K.Urata
検査者 INSPECTED BY Y.miyahara

温度特性
TEMPERATURE CHARACTERISTICS

製造番号 SERIAL NO. / TAG NO.	規格 STANDARD	温度 1200 ℃ TEMPERATURE		温度 1400 ℃ TEMPERATURE		温度 1600 ℃ TEMPERATURE		温度 ℃ TEMPERATURE		温度 ℃ TEMPERATURE	
		基準値 mV DESIRED VALUE	許容差℃ TOLERANCE	基準値 mV DESIRED VALUE	許容差℃ TOLERANCE	基準値 mV DESIRED VALUE	許容差℃ TOLERANCE	基準値 mV DESIRED VALUE	許容差℃ TOLERANCE	基準値 mV DESIRED VALUE	許容差℃ TOLERANCE
		13.228	± 3.0	16.040	± 3.5	18.849	± 4.0		±		±
		測定値 mV ACTUAL VALUE	誤差 ℃ ERROR	測定値 mV ACTUAL VALUE	誤差 ℃ ERROR	測定値 mV ACTUAL VALUE	誤差 ℃ ERROR	測定値 mV ACTUAL VALUE	誤差 ℃ ERROR	測定値 mV ACTUAL VALUE	誤差 ℃ ERROR
1		13.229	+0.1	16.039	-0.1	18.846	-0.2				
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

	項目 ITEM	
外観 APPEARANCE		良 GOOD
寸法検査 DIMENSION CHECK	外径、長さ、フランジ、ねじ DIAMETER, LENGTH, FLANGE, SCREW	良 GOOD
絶縁抵抗 INSULATION RESISTANCE	端子ー保護管、 TERMINAL-PROTECTIVE TUBE ~~DC500V 10 MΩ~~	良 GOOD

備考 REMARK

上記はロット成績による
The abore figures are taken form Lot testing results.

Lot No. TC64032

Type R 0.5MM THERMOCOUPLE BARE LEADS

QC－101

97.01.06

Explosion Proof Thermocouple

MALTEC-T

Dpstar Explosion Proof Thermocouple is designed to measure temperatures in explosive gaseous or liquid environments. Dpstar offers a wide range of standard or customised ATEX or IECEx certified temperature-sensors, single and multipoint for Gas zone 0, 1 and 2 with Exi, Exe and Exd, and Dust for zone 20, 21 and 22 approval. These sensors can be fitted with an integral certified head-mounted temperature transmitter or display unit with 4-20mA, HART or Profibus communication.

Features

- Temperature sensor range from -200°C to 1600°C depending on the sheath material.
- Thermowell connection by a nipple union nipple with 1/2”NPT connection.
- Aluminium connection head with swing cover.
- Cable entry M20x1.5mm.
- Replaceable 6mm insert with 20mm spring action.
- Calibration K, T, J, E, N, R, S or B, single or duplex.
- Can be delivered with head-mounted transmitter.
- Insertion length as required.

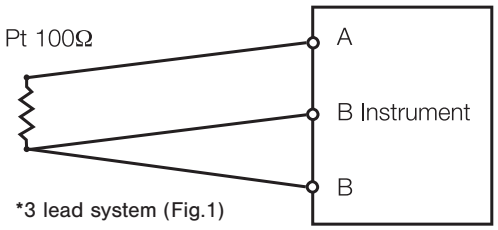
Applications

- Heavy duty applications
- Oil & Gas processing industry
- Gas tanker ships
- Chemical plants
- Offshore oil platforms
- Harsh environments

1. Operating Principles

MALTEC-T

Electric resistance of a metal changes at a fixed rate according to temperature changes. The resistance bulb uses this property to measure temperature. Theoretically, any metal may be used, but because of characteristics such as constant resistance change with temperature, interchangeability, and high temperature coefficient, there are few metals suitable for application. Only Platinum (Pt) is currently adopted by Japanese Industrial Standard (JIS), although nickel, copper and other metals are also used by other standards. The principle of measurement is shown in Fig.1. A constant current (1mA to 5mA) is flowed through a fixed resistance element (typically Pt100 Ω) and the change in resistance with temperature is measured. The common practice is to adopt a three-wire system to prevent lead resistance.



*3 lead system (Fig.1)

2. Allowable Error of Resistance Bulb (Table 1)

JLS C1604-1989					Former JIS C1604-1981				
Norminal resistance	Allowable error Class A Temperature value °C	Allowable error Class B Temperature value °C	Operating temperature range	Measuring temperature	Operating temperature range	Allowable error Class 0.15 Temperature value °C	Allowable error Class 0.2 Temperature value °C	Allowable error Class 0.5 Temperature value °C	Norminal resistance
100 Ω	± 0.55	± 1.3	L	-200	L	± 0.45	± 0.55	± 1.3	100 Ω (50 Ω)
	± 0.35	± 0.8		-100		± 0.30	± 0.35	± 0.8	
	± 0.15	± 0.3		0		± 0.15	± 0.15	± 0.3	
	± 0.35	± 0.8	M	100	M	± 0.30	± 0.35	± 0.8	
	± 0.55	± 1.3		200		± 0.45	± 0.55	± 1.3	
	± 0.75	± 1.8		300		± 0.60	± 0.75	± 1.8	
	± 0.85	± 2.05	H	350	H	± 0.68	± 0.85	± 2.05	
	± 0.95	± 2.3		400		-	± 0.95	± 2.3	
	± 1.15	± 2.8		500		-	± 1.15	± 2.8	
	± 1.35	± 3.3		600		-	-	-	
	± 1.45	± 3.6		650		-	-	-	
	Resistance value Ω	Resistance value Ω				Resistance value Ω	Resistance value Ω	Resistance value Ω	
100 Ω	± 0.24	± 0.56	L	-200	L	± 0.19	± 0.24	± 0.56	100 Ω Resistance for 50 Ω elements are half these value
	± 0.14	± 0.32		-100		± 0.12	± 0.14	± 0.32	
	± 0.06	± 0.12		0		± 0.06	± 0.06	± 0.12	
	± 0.13	± 0.30	M	100	M	± 0.12	± 0.13	± 0.31	
	± 0.20	± 0.48		200		± 0.16	± 0.20	± 0.48	
	± 0.27	± 0.64		300		± 0.21	± 0.27	± 0.64	
	± 0.29	± 0.71	H	350	H	± 0.24	± 0.30	± 0.73	
	± 0.33	± 0.79		400		-	± 0.33	± 0.80	
	± 0.38	± 0.93		500		-	± 0.39	± 0.95	
	± 0.43	± 0.06		600		-	-	-	
	± 0.46	± 0.13		650		-	-	-	

Note:
① L = Low temperature, M = Medium temperature, H = High temperature ② Specified currents 5 mA and 10 mA do not apply to Class A

Calculation Formula of Allowable Error of Medium temperature (Table 2)

Former JIS C1604-1981		Former JIS C1604-1981	
Allowable error	Class	Class	Allowed error
-	-	Class 0.15	± (0.15 + 0.015 t)°C
± (0.15 + 0.002 t)°C	Class A	Class 0.2	± (0.15 + 0.002 t)°C
± (0.3 + 0.005 t)°C	Class B	Class 0.5	± (0.3 + 0.005 t)°C

where t is the absolute value of the measured temperature (°C)

3. Insulation Resistance and Withstand Voltage (JLS C1604-1989)(Table 3)

Operating temperature range	Test temperature	Insulation resistance	Withstand voltage, 1 minute
Low temperature	- 183°C	5M Ω / 500V	DC 500 V
	Normal temperature	10M Ω / 500V	" 500 V
	100°C	5M Ω / 500V	" 500 V
Medium temperature	Normal temperature	10M Ω / 500V	" 500 V
	350°C	1M Ω / 250V	" 250 V
High temperature	Normal temperature	10M Ω / 500V	" 500 V
	650°C	1M Ω / 250V	" 250 V

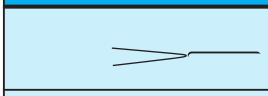
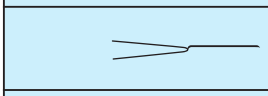
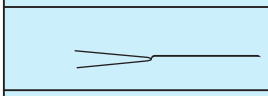
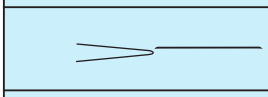
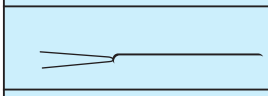
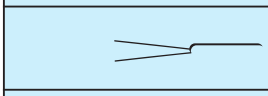
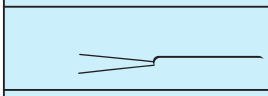
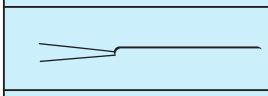
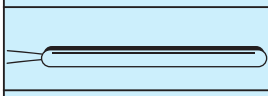
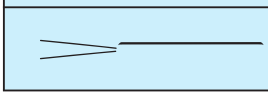
Note:
① Insulation resistance and withstand voltage are measured between the terminal and protecting tube with the temperature measuring section at the test temperature in Table 3.
② In withstand voltage testing of resistance bulbs with protecting tube ODs smaller than 4 8mm the test voltage must be reduced to 1/2 of the value in Table 3

4. Resistance Bulb Elements

MALTEC-T

CR Series (Ceramic Encapsulated Platinum Element) (Table 4)

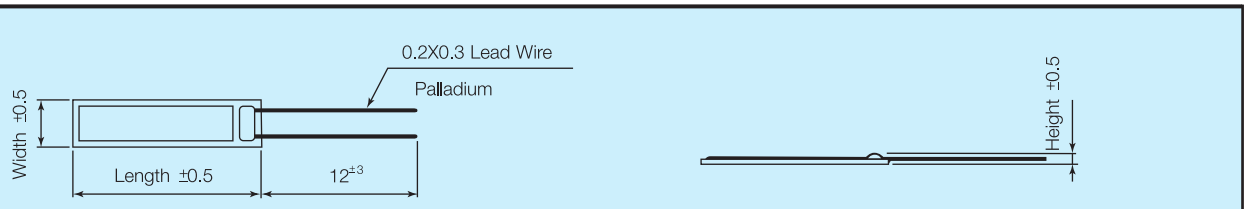
√ : Available

Appearance	Model No.	OD(ϕ)	Length (mm)	No. of elements		Resistance	Rated current	Class	Lead length (mm)	Operating temp. range
				1	2					
	※ CR-1010	1.0 ± 0.1	10 ± 2	√	–	Pt 100 Ω	1 mA max.	JIS DIN IEC CLASS A CLASSB	10 ± 3	-200°C to +500°C
	※ CR-1210	1.2 ± 0.1	10 ± 2	√	–		2 mA max.			
	※ CR-1215	1.2 ± 0.1	15 ± 2	√	–					
	※ CR-1615	1.6 ± 0.1	15 ± 2	√	–		5 mA max.			
	CR-1620	1.6 ± 0.1	20 ± 0.1	√	√					
	CR-2010	2.0 ± 0.1	10 ± 2	√	–					
	※ CR-2015	2.0 ± 0.1	15 ± 2	√	√					
	CR-2020	2.0 ± 0.1	20 ± 2	√	√					
	CR-2830	2.8 $^{+0.3}_{-0.1}$	30 ± 2	√	√					
	※ CR-2020	2.0 ± 0.1	20 ± 2	√	–	500 Ω	1 mA max.			

We also produce former JLS standard models to order

※ Semi-standard product

CRZ Series (Thin Film Platinum Elements)

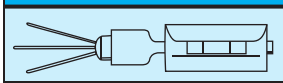
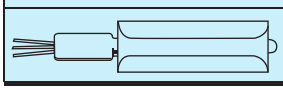


Model	Dimension of element (mm) Width x Length x Height	Number of Element		Resistance Value	Measurement Current	Dimension of Lead Wire (mm) Width x Length x Height	Class	Recommendable Operating Temperature Range
		S	D					
CRZ-1632-100	1.6x3.2x1.0	○	-	Pt 100 Ω	not exceeding 1mA	0.25x0.15x12	1/3B	1/3B -20 ~ +250°C
CRZ-2005-100	2.0x5.0x1.0	○	-	Pt 100 Ω	not exceeding 1mA	0.25x0.15x12	A	A -20 ~ +400°C
CRZ-2005-1000	2.0x5.0x1.0	○	-	Pt 500 Ω Pt 1000 Ω	not exceeding 1mA	0.25x0.15x12	B 2B	B, 2B -40 ~ +500°C

5. CRF Series (Ceramic Elements with Heat Sensitive Fins) (Table 6)

MALTEC-T

CRF series elements have heat sensing fins so shaped as tp fit 6, 8 or 10mm diameter protecting tubes.

Appearance	Model No.	OD(ϕ)	Length (mm)	No. of elements		Resistance	Rated current	Class	Lead length (mm)	Operating temp. range
				1	2					
	CRF-6	6 to 9	32 ± 1.5	√	√	Pt100 Ω	1 mA 2 mA 5 mA	CLASS A CLASs B JIS DIN IEC	30 ± 3	-200°C to +500°C
	CRF-10	10 to 12	42 ± 1.5	√	√					

We also produce former JIS standard models to order

6. CRF Series (Glass Insulated Platinum Elements)(Table 7)

Appearance	Model No.	OD(ϕ)	Length (mm)	No. of elements		Resistance	Rated current	Class	Lead length (mm)	Operating temp. range
				1	2					
	※GR-0705	0.7 ± 0.1	5 ± 1	√	–	Pt 100 Ω	1 mA max.	JIS DIN IEC CLASS A CLASS B	10 ± 3	-200°C to +350°C
	GR-0708	0.7 ± 0.1	8 ± 1	√	–					
	※GCR-1005	1.0 ± 0.1	5 ± 1	√	–					
	GR-1010	1.0 ± 0.1	10 ± 1	√	–					
	※GR-1205	1.2 ± 0.15	5 ± 1	√	–					
	GR-1210	1.2 ± 0.15	10 ± 2	√	–		2 mA max.			
	GR-1610	1.6 ± 0.15	10 ± 1	√	–					
	GR-2010	2.0 ± 0.2	10 ± 1	√	–		5 mA max.			
	GR-2015	2.0 ± 0.2	15 ± 1.5	√	–					
	GR-3030	3.0 ± 0.2	30 ± 1	√	–	Pt 1000 Ω	1 mA max.			

We also produce former JIS standard models to order

※ Semi-standard product

Model Number Coding

CR-2820 — S (D) — * 100 — 2 — B

- CR-2820: Model
- S (D): No. of elements S=1 D=2
- * 100: Nominal resistance
- 2: Rated current
- B: Class

* When ordering former JIS standards, please specify JPT100 instead of 100.

RTDs With Thermowells/ Protection Tubes

MALTEC-T

Resistance temperature detectors are designed for corrosive, high pressure, fast flowing medium with Thermowell. Resistance temperature detectors are temperature sensors that have elements which change their electrical resistance with change in temperature. RTDs with thermowell are suitable for high pressure and flow medium where there is a need for frequent change of sensor.

Type	Pt 100, 200, 500, 1000 etc
Element Diameter	Wire wound ceramic encapsulated, wire wound glass encapsulated, Thin film ceramic encapsulated
Sheath Material	2, 3, 4 Wire
Configuration	SS304, SS321, SS316, SS310, Inconel 600/800, HRS 446, Hastalloy
Configuration	Simplex/Duplex/Others

Mineral Insulated RTDs

Mineral-insulated RTDs provide excellent performance, even when exposed to high levels of shock and vibration in tough industrial environments. Mineral Insulated Resistance Thermometers are made with Platinum-measuring resistors Pt100Ω to DIN IEC 751. The measuring resistor will be connected to the inner conductors, is also embedded and is surrounded by the metal sheath to form a hermetically sealed assembly.

Type	Pt 100, 200, 500, 1000 cu-50, 53 etc
Connection	2, 3, 4 wire
Element Diameter	1.5, 3.0, 4.5, 6.0, 8.0 mm
Configuration	Simplex/Duplex/Others

MT 1001

RTD 3 wire type, complete with small aluminium enclosed head (IP65 rating). Constructed using 316 stainless steel sheath, maximum operating temperature 400°C

Calibration	Diameter	Part No. Ø length
RTD Pt100	3mm	MT 1001 - 030 -
RTD Pt100	6mm	MT 1001 - 060 -
RTD Pt100	8mm	MT 1001 - 080 -

Insert part number when ordering diameter and length, eg. 3mm diameter 250mm long = MT 1001 - 030 - 0250

MT 1001a

As for model 1001 complete with 1/2" BSP 316 stainless steel fixed nipple, sanitery weld.

Calibration	Diameter	Part No. Ø length
RTD Pt100	3mm	MT 1001a - 030 -
RTD Pt100	6mm	MT 1001a - 060 -
RTD Pt100	8mm	MT 1001a - 080 -

Insert part number when ordering diameter and length, eg. 3mm diameter 250mm long = MT 1001a - 030 - 0250

MT 1002

RTD 3 wire type, complete with large aluminium enclosed head (IP65 rating). Constructed using 316 stainless steel sheath, maximum operating temperature 400°C.

Calibration	Diameter	Part No. Ø length
RTD Pt100	3mm	MT 1002 - 030 -
RTD Pt100	6mm	MT 1002 - 080 -
RTD Pt100	8mm	MT 1002 - 080 -

Insert part number when ordering diameter and length, eg. 3mm diameter 250mm long = MT 1002 - 030 - 0250

RTD Sensors 1000 Series

MALTEC-T

MT 1002a

As for model 1002 complete with 1/2" BSP 316 stainless steel fixed nipple, sanitery weld.

Calibration	Diameter	Part No. Ø length
RTD Pt100	3mm	MT 1002a - 030 -
RTD Pt100	6mm	MT 1002a - 060 -
RTD Pt100	8mm	MT 1002a - 080 -

Insert part number when ordering diameter and length, eg. 6mm diameter 250mm long = MT 1002a - 060 - 0250
Remarks : Duplex version add x2

RTD Sensors 2000 Series

MT 2001

RTD 3 wire type, complete with screenfiber, silicon, PVC wire, constructed using 316 stainless steel sheath.

Calibration	Diameter	Part No. Ø length
RTD Pt100	2mm	MT 2001 - 020 -
RTD Pt100	3mm	MT 2001 - 030 -
RTD Pt100	4mm	MT 2001 - 040 -
RTD Pt100	6mm	MT 2001 - 060 -

Insert part number when ordering diameter and length, eg. 2mm diameter 250mm long = MT 2001 - 020 - 0250
Remarks : Duplex version add x2

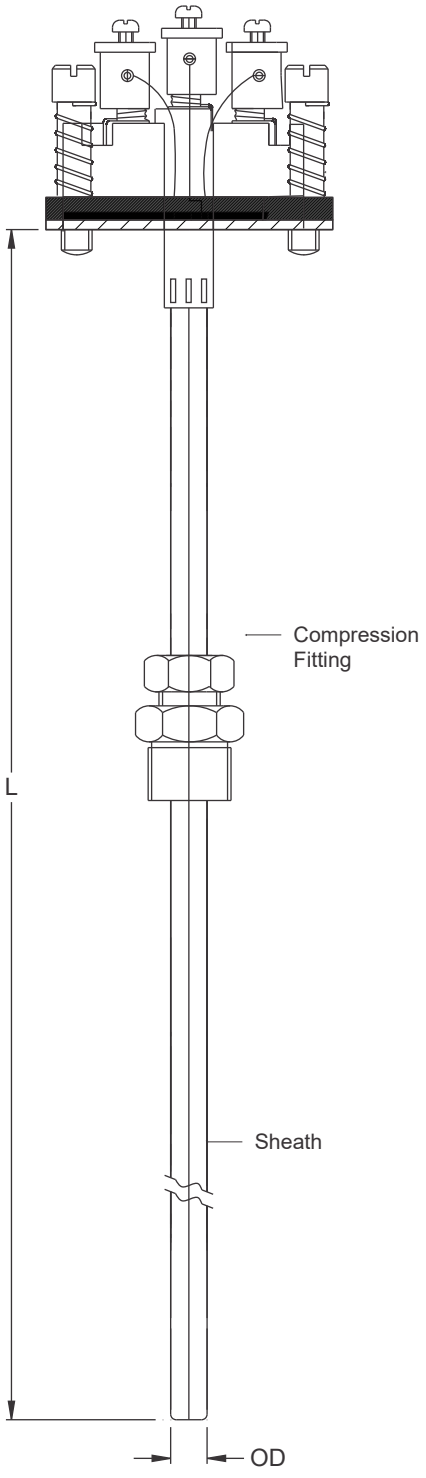
RTD Sensors 3000 Series

MT 3001

RTD 3 wire type industrial wall mounted.

Calibration	Box Size	Part No.
RTD Pt100	71mm x 71mm x 30mm	MT 3001

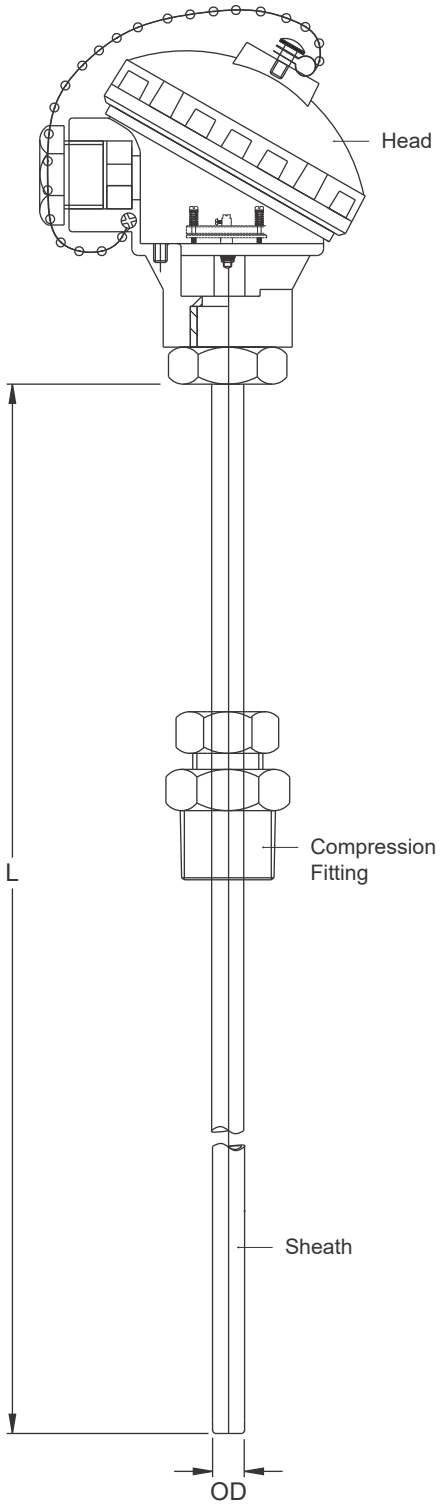
RTD INSERT WITH COMPRESSION FITTING



MT 1000 - K

RTD Element	**1**	Pt-100x1, Simplex
	2	Pt-100x2, Duplex
	Other	Consult Factory
Termination Housing	**A**	Teminal & Ceramic Block (Spring Loaded)
Terminal	**W2**	2- Wire
	W3	3- Wire
	W4	4- Wire
	W6	6- Wire
Sheath OD	**3**	Ø3mm
	3.2	Ø3.2mm
	4.8	Ø4.8mm
	6	Ø6mm
	6.35	Ø6.35mm
	8	Ø8mm
	Other	Consult Factory
Sheath Material	**304**	SS 304
	316	SS 316
	Other	Consult Factory
Compression Fitting	**Threads BSPT**	1/2" BSPT
	M -Thread	M20X1.5
	Other	Consult Factory
Nominal Length of RTD "L" (mm)	**N/A**	Not Applicable

RTD WITH COMPRESSION FITTING



MT 1000 - L

RTD Element	
1	Pt-100x1, Simplex
2	Pt-100x2, Duplex
Other	Consult Factory

Termination Housing	
KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal	
W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

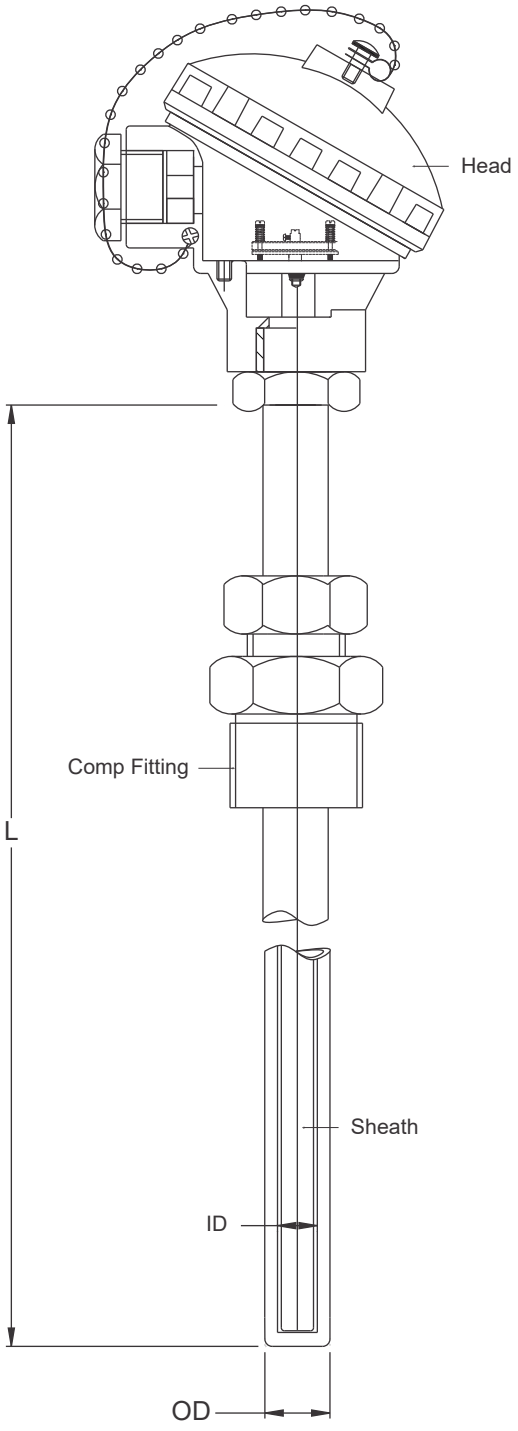
Sheath "OD"	
3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material	
304	SS 304
316	SS 316
Other	Consult Factory

Compression Fitting	
Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -Thread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Nominal Length of RTD "L" (mm)

RTD WITH THERMOWELL & COMPRESSION FITTING



MT 1000 - M

RTD Element

1	Pt-100x1, Simplex
2	Pt-100x2, Duplex
Other	Consult Factory

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

304	SS 304
316	SS 316
Other	Consult Factory

Thermowell "OD" (mm)

Thermowell "ID" (mm)

Thermowell Material

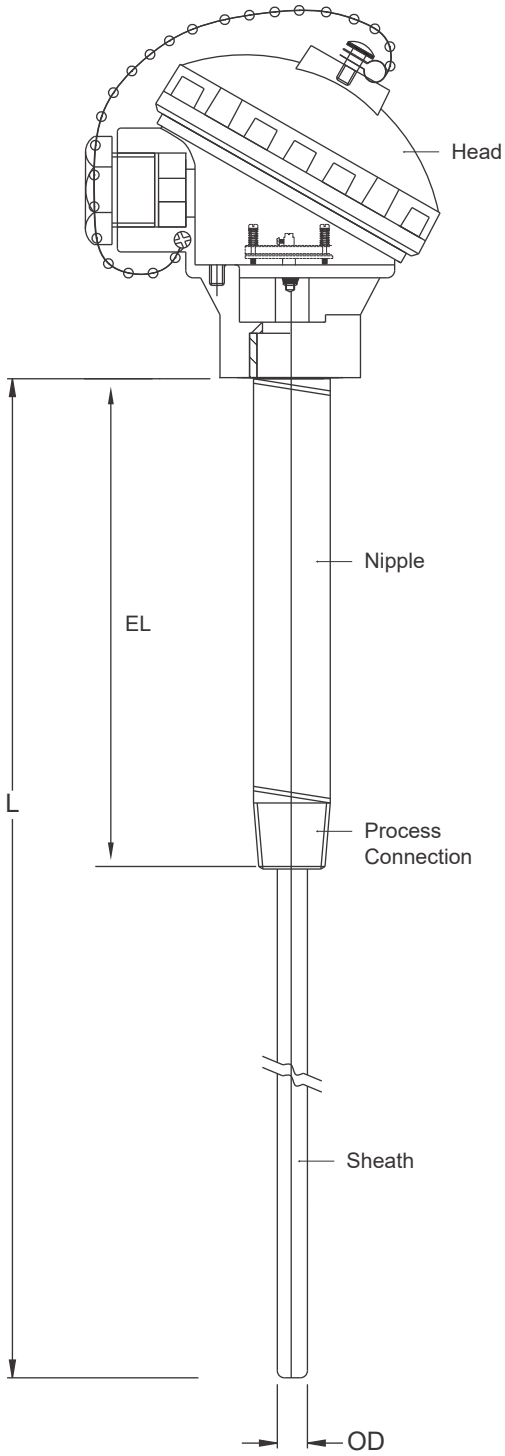
304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Compression Fitting

Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -Thread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Nominal Length of T/C "L" (mm)

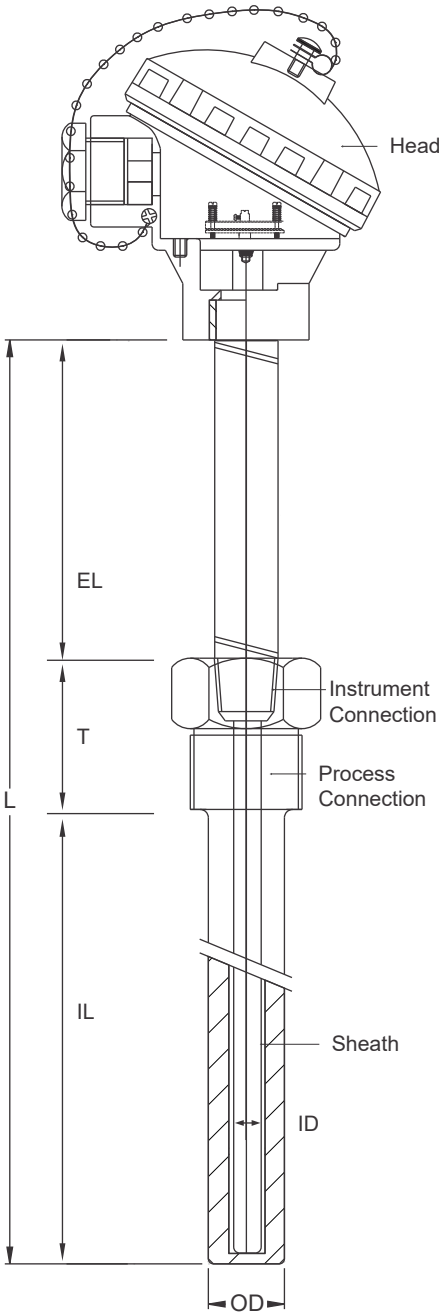
RTD WITH NIPPLE



MT 1000 - N

RTD Element	
1	Pt-100x1, Simplex
2	Pt-100x2, Duplex
Other	Consult Factory
Termination Housing	
KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory
Terminal	
W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire
Sheath "OD"	
3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory
Sheath Material	
304	SS 304
316	SS 316
Other	Consult Factory
Nipple	
A	1/2" SCH 40
B	1/2" SCH 80
Other	Consult Factory
Process Connection	
Threads	1/2" BSPT
M -Thread	M20X1.5
Other	Consult Factory
Extension Length (E.L)(mm)	
Nominal Length of RTD "L"(mm)	

RTD WITH NIPPLE & STRAIGHT THERMOWELL



MT 1000 - O

RTD Element	

1	Pt-100x1, Simplex
2	Pt-100x2, Duplex
Other	Consult Factory

Termination Housing	

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal	

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Sheath "OD"	

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material	

304	SS 304
316	SS 316
Other	Consult Factory

Thermowell Material	

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell OD1 (mm)	
Thermowell OD2 (mm)	
Thermowell ID (mm)	
Length of "T" (mm)	

Process Connection	

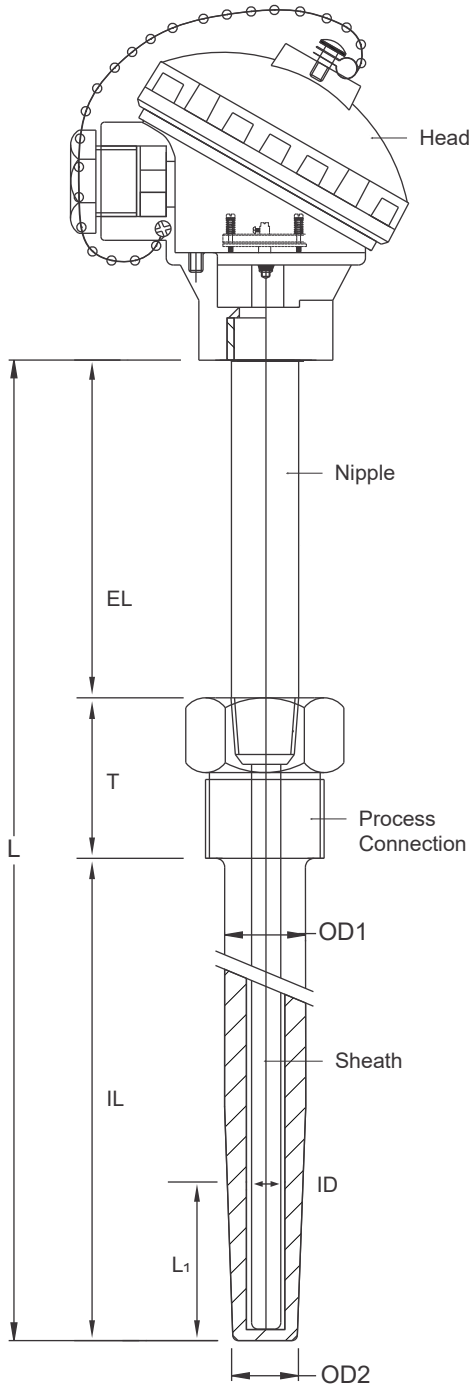
Threads	1/2" BSPT
M -T hread	M20X1.5
Other	Consult Factory

Instrument Connection	

N/A	Not Applicable

Insertion Length (I.L.) (mm)	
Extention Length (I.L.) (mm)	
Nominal Length (I.L.) (mm)	

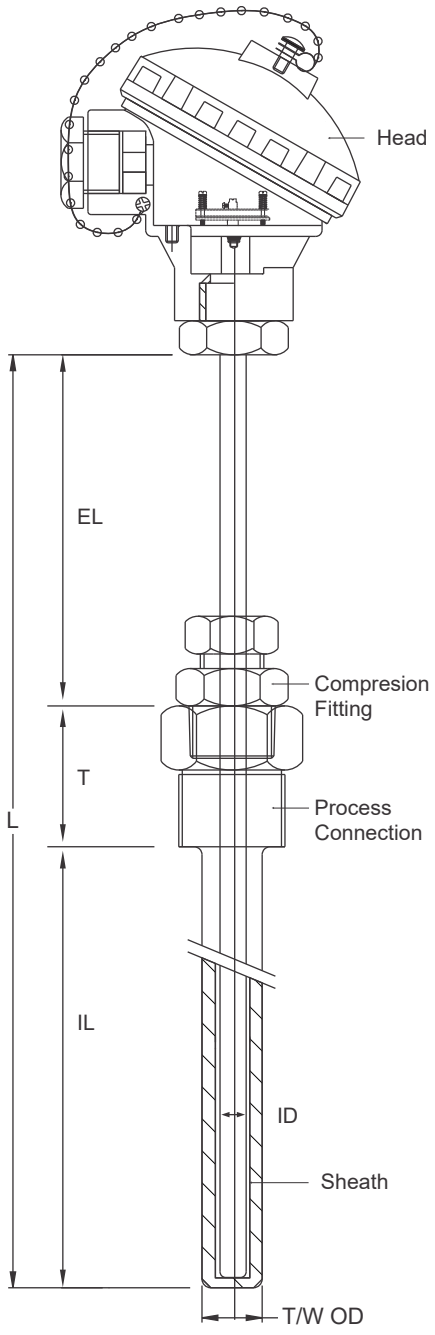
RTD WITH NIPPLE & TAPPER THERMOWELL



MT 1000 - P

RTD Element	1	Pt-100x1, Simplex
	2	Pt-100x2, Duplex
	Other	Consult Factory
Termination Housing	KSE	Small Head
	KNE	Big Head
	KD	Din Head
	KBS	Small Bakelite
	KB	Big Bakelite
	TL	Big T-Head
	XE-DANA	Ex-Proof Dana
	XD-AD	Ex-Proof Head
	Other	Consult Factory
Terminal	W2	2- Wire
	W3	3- Wire
	W4	4- Wire
	W6	6- Wire
Sheath "OD"	3	Ø3mm
	3.2	Ø3.2mm
	4.8	Ø4.8mm
	6	Ø6mm
	6.35	Ø6.35mm
	8	Ø8mm
	Other	Consult Factory
Sheath Material	304	SS 304
	316	SS 316
	Other	Consult Factory
Thermowell Material	304	SS 304
	316	SS 316
	600	Inconel-600
	Other	Consult Factory
Thermowell OD1 (mm)		
Thermowell OD2 (mm)		
Thermowell ID (mm)		
Nipple	A	1/2" SCH 80
	B	1/2" SCH 40
	Other	Consult Factory
Length of "T" (mm)		
Process Connection	Threads	1/2" BSPT
	M -T hread	M20X1.5
	Other	Consult Factory
Instrument Connection		
Insertion Length (I.L.) (mm)		
Tapered Length (L1) (mm)		
Extention Length (E.L.) (mm)		
Nominal Length of T/C "L" (mm)		

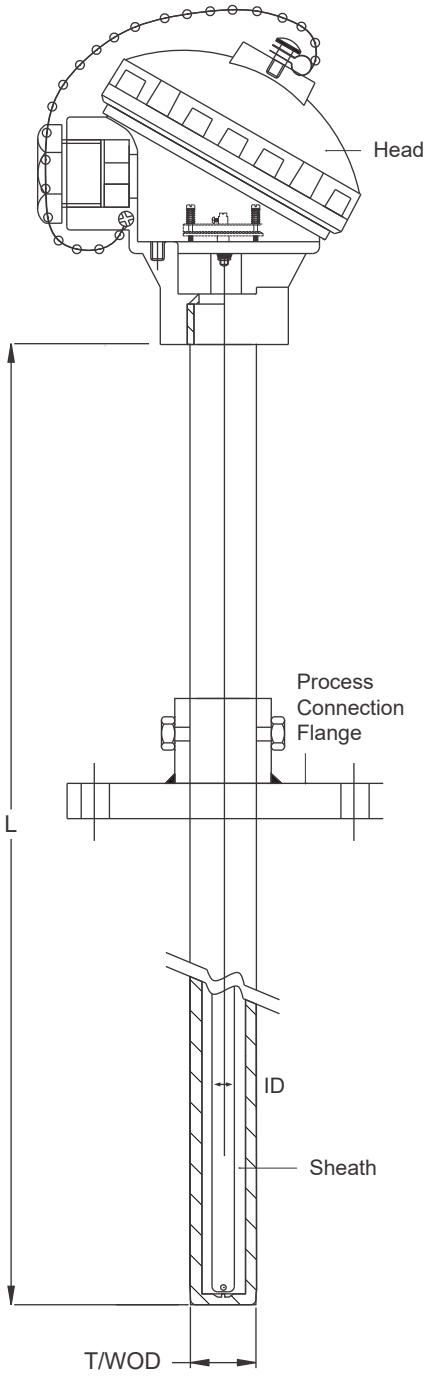
RTD WITH STRAIGHT THERMOWELL & COMPRESSION FITTING



MT 1000 - Q

RTD Element	1	Pt-100x1, Simplex
	2	Pt-100x2, Duplex
	Other	Consult Factory
Termination Housing	KSE	Small Head
	KNE	Big Head
	KD	Din Head
	KBS	Small Bakelite
	KB	Big Bakelite
	TL	Big T-Head
	XE-DANA	Ex-Proof Dana
	XD-AD	Ex-Proof Head
	Other	Consult Factory
Terminal	W2	2- Wire
	W3	3- Wire
	W4	4- Wire
	W6	6- Wire
Sheath "OD"	3	Ø3mm
	3.2	Ø3.2mm
	4.8	Ø4.8mm
	6	Ø6mm
	6.35	Ø6.35mm
	8	Ø8mm
	Other	Consult Factory
Sheath Material	304	SS 304
	316	SS 316
	Other	Consult Factory
Thermowell Material	304	SS 304
	316	SS 316
	600	Inconel-600
	Other	Consult Factory
Thermowell OD (mm)		
Thermowell ID (mm)		
Process Connection	Threads	1/2" BSPT
	M -Thread	M20X1.5
	Other	Consult Factory
Length of "T" (mm)		
Instrument Connection		
Insertion Length (I.L) (mm)		
Extention Length (E.L) (mm)		
Nominal Length of T/C "L" (mm)		

RTD WITH ADJUSTABLE FLANGE THERMOWELL



MT 1000 - R

RTD Element

1	Pt-100x1, Simplex
2	Pt-100x2, Duplex
Other	Consult Factory

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

304	SS 304
316	SS 316
Other	Consult Factory

Thermowell "OD" (mm)

Thermowell "ID" (mm)

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

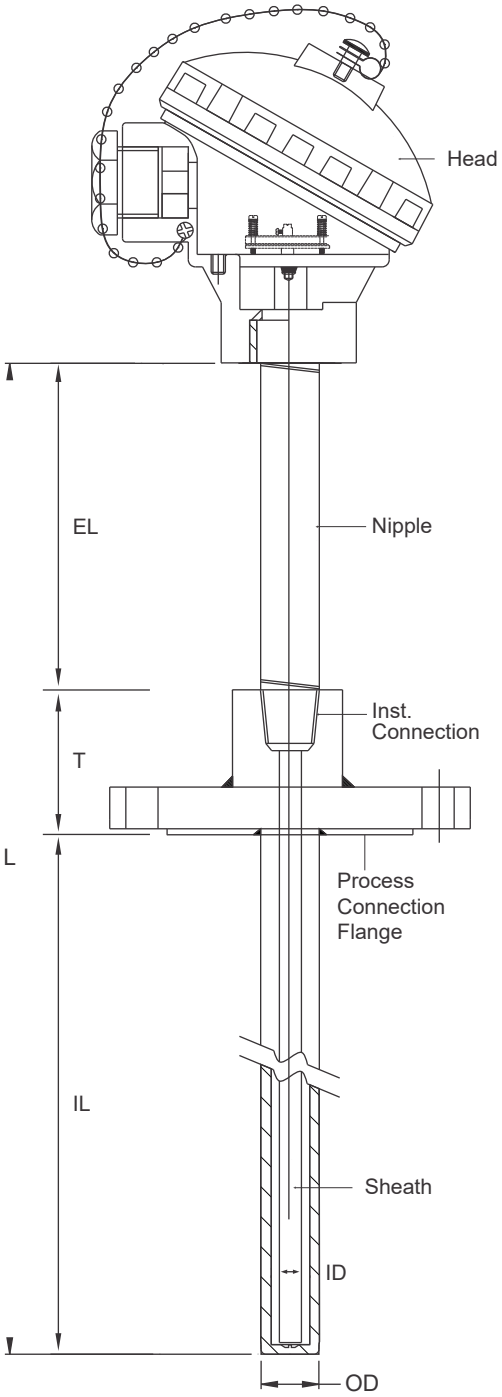
Process Connection

Flange Rating	Flange Size
JIS 5 K JIS 10 K ANSI 150 #	1/4"
	1/2"
	3/4"
	1"
	1 1/4"
	1 1/2"
	1 3/4"
	2"
Other	Consult Factory

Flange Material

304	SS 304
316	SS 316
Other	Consult Factory

RTD WITH FLANGE STRAIGHT THERMOWELL



MT 1000 - S

RTD Element

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Thermowell Material

Thermowell OD (mm)

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

ID (mm)

Nipple

A	1/2" SCH 40
B	1/2" SCH 80
Other	Consult Factory

Length of "T" (mm)

Process Connection

Flange Material

Flange Rating	Flange Size
JIS 5 K JIS 10 K	1/4"
	1/2"
	3/4"
ANSI 150 #	1"
	1 1/4"
	1 1/2"
	1 3/4"
	2"
Other	Consult Factory

Instrument Connection

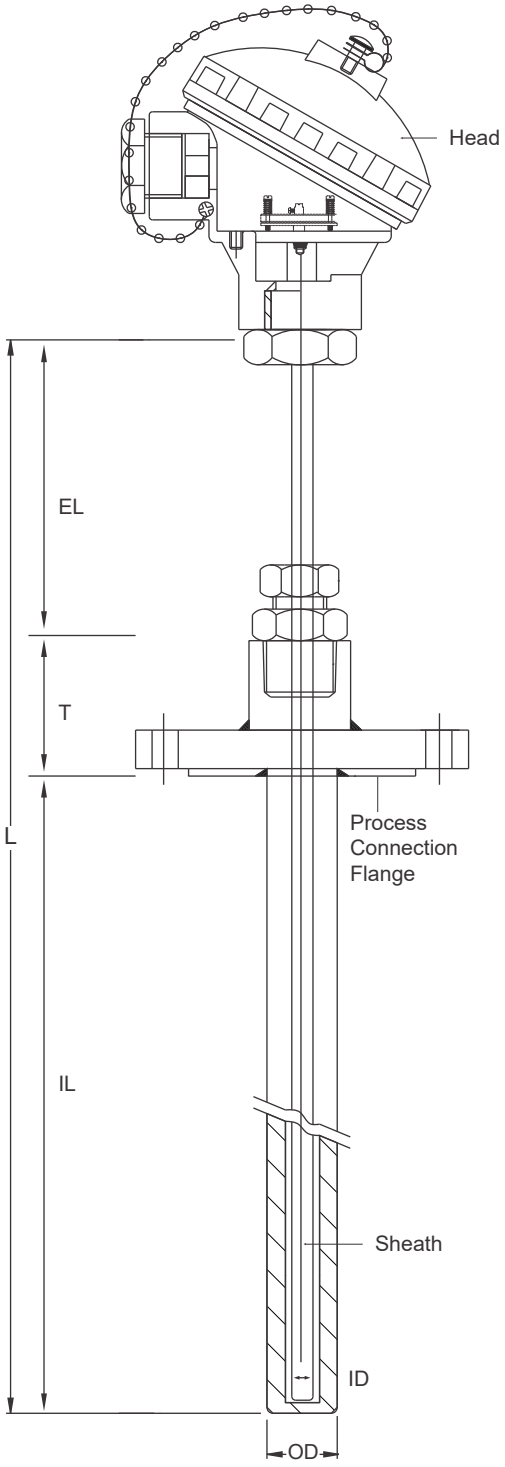
Threads	1/2" BSPT
M -Thread	M20X1.5
Other	Consult Factory

Insertion Length (I.L) (mm)

Extention Length (E.L) (mm)

Nominal Length of T/C "L" (mm)

RTD WITH NIPPLE & FLANGE STRAIGHT THERMOWELL



MT 1000 - T

RTD Element

Termination Housing

KSE	Small Head
KNE	Big Head
KD	Din Head
KBS	Small Bakelite
KB	Big Bakelite
TL	Big T-Head
XE-DANA	Ex-Proof Dana
XD-AD	Ex-Proof Head
Other	Consult Factory

Terminal

W2	2- Wire
W3	3- Wire
W4	4- Wire
W6	6- Wire

Sheath "OD"

3	Ø3mm
3.2	Ø3.2mm
4.8	Ø4.8mm
6	Ø6mm
6.35	Ø6.35mm
8	Ø8mm
Other	Consult Factory

Sheath Material

304	SS 304
316	SS 316
Other	Consult Factory

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell "OD" (mm)

ID (mm)

Process Connnection

Flange Material

Flange Rating	Flange Size
JIS 5 K JIS 10 K	1/4"
	1/2"
	3/4"
ANSI 150 #	1"
	1 1/4"
	1 1/2"
	1 3/4"
	2"
Other	Consult Factory

Instrument Connection

Compression Fitting

Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -T hread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Insertion Length (I.L) (mm)

Extention Length (E.L) (mm)

Nominal Length of T/C "L" (mm)

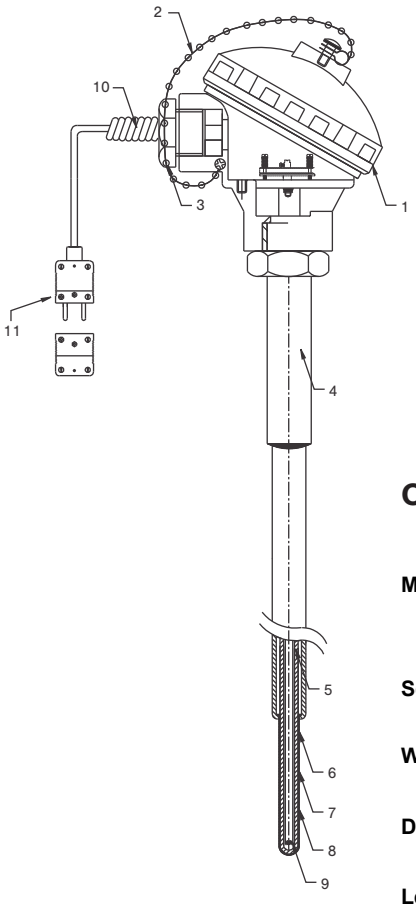
Thermocouple For Glass Industry

MALTEC-T

Simplex Fore Hearth and Distributor

In Distributor & in Fore-Hearths rear and middle zone most of the glass companies use this simplex small thimble thermocouple. This is the substitute of fibre optic pyrometer. With Pyrometer customer can get only glass surface temperature but using this thermocouple, customer can get immersion temperatures. It is commonly used in all container glass industries. When conditioning zone trilevels & rear /Middle zone simplex Thermocouple are manufactured with same batch element, Customer can get relative temperatures.

Measuring range	100 to 1600°C
Sensor type	R / S / B. At 3 levels at B-Bottom, M-Middle, T-Top
Protection sheathing	Recrystallised alumina KER-710 (C-799) tube with hole at one end. Special hardened platinum / PT alloy thimble
Application	Fore hearth and distributor glass immersion



No	Description
1	SS/ Aluminium connection head IP-67
2	SS chain
3	1/2" NPT (M) Cable gland
4	Holding Tube : Inconel 600 / SS310
5	Recrystallized alumina tube : OD x ID to be specified
6	Inner Tube suitable to outer tube
7	2 bore recrystallized alumina insulating tube
8	Hardened PT/PT alloy thimble : OD x thk. Suitable to inner dimension
9	PT-RHPT thermocouples element - R / S / B type
10	Ceramic fibre insulated compensating cable 3 / 6 meters long with overall ceramic fiber sleeve
11	Quick release compensated connectors - R / S / B

Ordering Cable

Model : MT/GL 1 [ ] — [ ] — [ ] — [ ] — [/ /] — [ ]

Sensor Type :

Wire Size (mm) :

Diameter of Platinum / PT alloy Thimble :

Length (mm) L1 / L2 / L3 :

Optional :

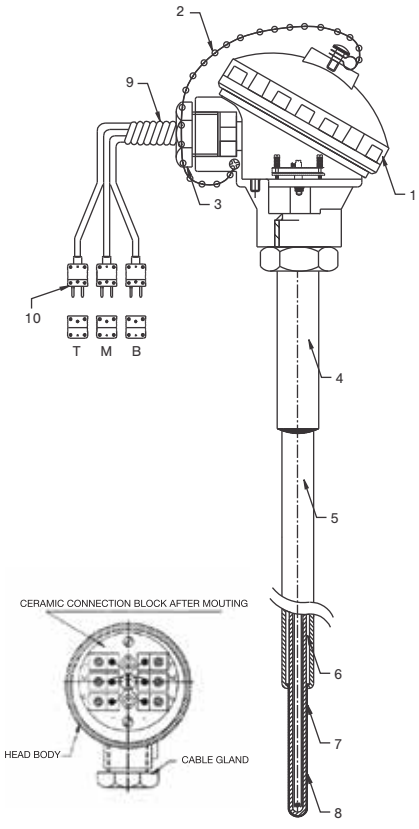
4-20mA : Transmitter 4-20 mA

MALTEC-T

Trilevel Fore Hearth/Distributor

In Distributor & Fore-Hearths temperature measurement & control is most important, the glass fore-hearth control system includes a temperature sensing system and control system. The temperature sensing system includes an arrangement of pre-positioned temperature sensors. Simplex thimble thermocouples & tri-level / triplex thermocouples consist of an assembly of a bottom, middle and top thermocouples for sensing the vertical temperature profile of the molten glass at a fixed location. The output signals from these temperature sensors are received by controllers of the system which then provide control signals & regulate the operation of the heat input devices and the cooling input devices. Thermocouple output & controller's calibration must be accurate, reliable and repeatable. The Tri-Level Thermocouples designed to achieve thermal homogeneity of the glass exiting from the fore-hearth for forming, as the homogeneity will help to get the proper distribution of Gob in moulds.

Measuring range	100 to 1600°C
Sensor type	R / S / B. At 3 levels at B-Bottom, M-Middle, T-Top
Protection sheathing	Recrystallised alumina KER-710 (C-799) tube with hole at one end. Special hardened platinum / PT alloy thimble
Application	Fore hearth and distributor glass immersion



No	Description
1	SS/ Aluminium connection head IP-67
2	SS chain
3	1/2" NPT (M) Cable gland
4	Holding Tube : Inconel 600 / SS310
5	Recrystallized alumina tube : OD x ID to be specified
6	Inner Tube suitable to outer tube
7	6 bore recrystallized alumina insulating tube
8	Hardened PT/PT alloy thimble : OD x thk. Suitable to outer dimension
9	Ceramic fibre insulated compensating cable 3 / 6 meters long with overall ceramic fiber sleeve
10	Quick release compensated connectors - R / S / B
11	a, b, c are distances from tip to bottom, middle & top sensor elements depending on the design

Ordering Cable

Model : MT/GL 3 — ☐ — ☐ — ☐ — ☐ — / / — ☐

Sensor Type :

Wire Size (mm) :

Diameter of Platinum / PT alloy Thimble :

Length (mm) L1 / L2 / L3 :

Optional :

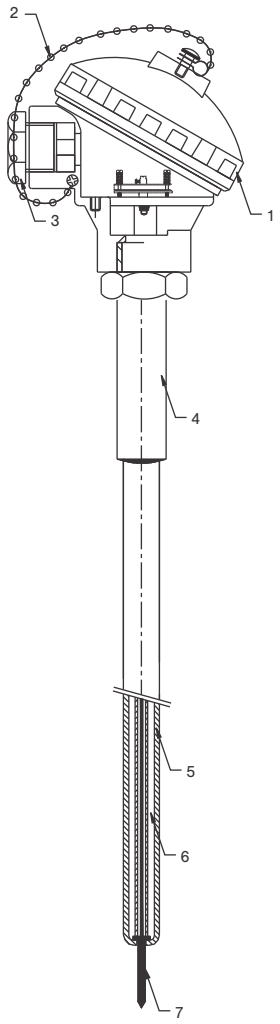
4-20mA : Transmitter 4-20 mA

Dpstar Group

Glass Level Probe For Level Control

Glass level probe for glass level control is made with Pt alloy probe. Inside and outside protection is with recrystallized alumina tubes. With this, customer can replace old fashioned water cooled level probes. These probes are available in different type of hangers as per customers requirement. Service life is very good. All lengths & dia are available as per site needs.

Measuring range	Glass Contact
Sensor type	PT. or PT RH alloy electrode
Protection sheathing	Recrystallised alumina KER-710 (C-799) tube with hole at one end. With PT alloy tip for glass level sensing
Application	Fore hearth and distributor



No	Description
1	SS/ Aluminium connection head IP-67
2	SS chain
3	1/2" NPT (M) Cable gland
4	Holding Tube : Inconel 600 / SS310
5	Recrystallized alumina outer tube hole at close end : OD x 1D to be specified
6	Inner Tube suitable to outer tube
7	Pt alloy electrode

Ordering Cable

Model : MT/GL — [ ] — [ ] — [ ] — / / — [ ]

Sensor Type :

Wire Size (mm) :

Diameter of Platinum / PT alloy Thimble :

Length (mm) L1 / L2 / L3 :

Other Specification :

MT-701-A/B

Temperature Sensor Flange Mount

Incorporate a hermitically sealed 304 SS probe, crimped on to a steel flange providing a rugged assembly for duct temperature sensing. Two mounting holes are provided for #8 screws and the flange mating surface is fully gasketted to seal off the probe and screw holes. MT-701-A is available with 3 in/76mm wire leads and the MT-701-B has 6 ft/1.8 meter plenum rated cable. MT-701-A/B is an ideal product for a rugged, reliable, quick and easy installation in air handlers, fan coil units, ducts, furnaces, freezers, ovens or any other through the wall temperature sensing application. Maximum temp 200°C.

MT-701-C/D

Temperature Sensor Bulkhead Mount

Fast response 304 SS probe with a brass bulkhead fitting and a compression sleeve forms a strong assembly for duct temperature sensing if adjustable insertion depth is desired. The bulkhead fitting is installed in the duct, compression sleeve loosened, probe inserted to the desired length and the sleeve is tightened. Sensor is available with 3 in/75mm leads or 6 ft/1.8 meter plenum rated cable. MT-701-C/D sensors provide a low cost, rugged, quick and easy installation in air handlers, fan coil units, ducts, plenum, furnaces, freezers, oven or any other through the wall temperature sensing, maximum temp 200°C.

Ordering Information: MT-701

Installation	Sensor*	Probe Length
A Flange mount 3 in/75mm wire leads	1 100 ohm Platinum RTD	A 4 inches/100mm
B Flange mount 6 ft/1.8m plenum cable	2 1,000 ohm Platinum RTD	B 6 inches/150mm
C Bulkhead mount 3 in/75mm wire leads	3 1,000 ohm NTC thermistor	C 8 inches/200mm
D Bulkhead mount 6 ft/1.8m plenum cable	4 5,000 ohm NTC thermistor	D 12 inches/300mm
	5 10,000 ohm NTC thermistor	

Example : MT-701-B-3-A Flange mount with 6 ft cable, 1,000 ohm thermistor and 4 inch probe length.

MT-702-A

Temperature Sensor Polycarb Enclosure

Polycarbonate enclosure designed to withstand temperature extreme, mechanical shock and vibration. 304 SS probe crimp attached to the enclosure flange for a low profile mating surface, external mounting bracket to conform to irregular surfaces, single screw cover attachment, are some of the features which improve reliability and lower installation cost. MT-702-A temperature sensors provide a cost effective and reliable solution for air handlers, fan coil units, ducts, plenums, furnaces or any other application which does not require conduit wiring, Maximum temp 200°C.

MT-702-B

Temperature Sensor Aluminum Enclosure

Aluminum enclosure designed for all industrial and commercial duct temperature sensing applications. Hermitically sealed, fast response 304 SS probe crimped attached to the enclosure flange to provide a low profile mating surface, external mounting bracket to conform to uneven surfaces, some of the features which improve reliability and lower installation cost, Maximum temp 200°C.

Ordering Information: MT-702

Installation	Sensor*	Probe Length
A Polycarb Plastic Enclosure IP-54	1 100 ohm Platinum RTD	A 4 inches/100mm
B Galvanized Steel Eclosure NEMA-1/ IP-30	2 1,000 ohm Platinum RTD	B 6 inches/150mm
	3 1,000 ohm NTC thermistor	C 8 inches/200mm
	4 5,000 ohm NTC thermistor	D 12 inches/300mm
	5 10,000 ohm NTC thermistor	

Example : MT-702-A-2-D Polycarb plastic enclosure with 1000 ohm Platinum RTD and 12 inch probe length.

MT-703-A

Immersion Temperature Sensor Thermowell Adapter Mount

Incorporate a hermitically sealed 304 SS probe and a brass adapter with a compression sleeve providing a rugged assembly for immersion temperature sensing if field adjustable insertion depth is desired. The brass adapter is screwed in to the thermowell, compression sleeve is loosened, probe inserted to desired length and the sleeve is tightened. Sensor has 6ft/1.8m plenum rated cable for remote termination. MT-704-A sensors provide a cost effective and reliable solution for hot/ chilled water condenser water or low pressure steam applications which require adjustable insertion length, Maximum temp 200°C.

MT-703-B

Immersion Temperature Sensor Polycarb Enclosure

Polycarbonate enclosure designed to withstand temperature extreme, mechanical shock and vibration. 304 SS probe crimp attached to the enclosure for a low profile mating surface. Patented locking thermowell adapter, single screw cover attachment, are some of the features which improve reliability and lower installation costs. MT-703-B sensors provide a cost effective and reliable solution for hot/ chilled water, Maximum temp 200°C.

Ordering Information: MT-703

Installation	Sensor*	Probe Length	Adapter
A Immersion style with adapter	1 100 ohm Platinum RTD	A 4 inches/100mm	1 1/8" NPT
B Polycarb Plastic Enclosure IP-54	2 1,000 ohm Platinum RTD	B 6 inches/150mm	2 1/4" NPT
C Aluminum Enclosure NEMA-1/ IP-30	3 1,000 ohm NTC thermistor	C 8 inches/200mm	3 1/2" NPT
	4 5,000 ohm NTC thermistor		
	5 10,000 ohm NTC thermistor		

Example: MT-703-A-3-A-3: Immersion style with ½" adapter, 1,000 ohm Thermistor and 4 inch probe.

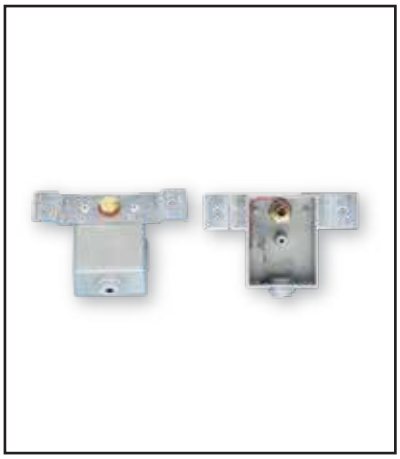
MT-704-A

Surface Temperature Sensor Strap On Probe Enclosure

Incorporates a 2” 304 SS probe with a 6ft/1.8m plenum rated cable for pipe surface temperature sensing, Nylon ties are provided to secure the probe to the pipe. MT-704-A provides a cost effective and reliable solution for surface contact temperature measurement of conditioned water pipes, low pressure steam or refrigerant line, Maximum temp 200°C.

MT-704-B

Surface Temperature Sensor Polycarb Enclosure



Polycarbonate enclosure designed to withstand temperature extreme, mechanical shock and vibration. Fast response brass contact sensor attached to the enclosure for a low profile mating surface, mounting bracket for pipe clamp installation, single screw cover attachment, are some of the features which improve reliability and lower installation costs, Maximum temp 200°C.

MT-704-C

Surface Temperature Sensor Aluminum Enclose

Standard Aluminum enclosure designed for all industrial and commercial surface temperature sensing applications. Fast response brass contact sensor attached to the enclosure for a low profile mating surface, Maximum temp 200°C.

Ordering Information: MT-704

Installation	Sensor*
A Surface Mount Strap-on	1 100 ohm Platinum RTD
B Polycarb Plastic Enclosure IP-54	2 1,000 ohm Platinum RTD
C Aluminum Enclosure NEMA-1/ IP-30	3 1,000 ohm NTC thermistor
	4 5,000 ohm NTC thermistor
	5 10,000 ohm NTC thermistor

Example: MT-704-C-1: NEMA-1 Enclosure with 100 ohm Platinum RTD surface mount sensor.

MT-705

Duct Averaging Temperature Sensor

Two probe construction options-3/8" (9.53mm) bendable thin wall copper probe. MT-705-A incorporates rugged copper sensor strain reliefs. Available with plastic Aluminum to cover all applications, Maximum temp 200°C.

Ordering Information: MT-705

Installation	Sensor*	Probe Length	Adapter
A Polycarb plastic PVC Box Enclosure	1 100 ohm Platinum RTD	A 6 feet/1.8m	1 Bendable 3/8" Copper
B Aluminum Enclosure NEMA-1/IP-30	2 1,000 ohm Platinum RTD	B 12 feet/3.6m	
C Thermocouple Head	3 1,000 ohm NTC thermistor	C 24 feet/7m	
	4 5,000 ohm NTC thermistor		
	5 10,000 ohm NTC thermistor		

MTW1

Wireless Temperature Transmitter

The Universal Wireless Temperature Transmitter MTW1 is specifically designed to meet the most rigorous requirements of operation in the industrial process environments. Due to its reduced dimensions, it may be installed in the DIN Form B Sensor connection head, in place of the traditional terminal blocks or current loop temperature transmitter. In its high RF power mode, it can communicate over a long distance range (up to 4 km line of sight). It accepts the most commonly used temperature sensors.

Dimensions	45ø x 23 mm
Weight	50g (approx.)
Material	Nylon 66
Protection Index	IP40

Features

- **Universal Sensor Input**
  Resistance Thermometers, Thermocouples and DC Voltage Sources
- **Up To 4km Or 2km Distance (Los)**
  Transmission Up to 4km Distance (LOS) 868 MHZ
  Transmission Up to 2km Distance (LOS) 2,4 GHZ
- **Real Time Transmission**
  Process and Ambient Temperature, RF Signal
  Strength and Battery Status
- **Ultra Low Power Mode**
  Long Battery Life
- **Wide Supply Voltage Range**
  5 TO 24 V DC
- **Compact Design**
  DIN Form B Connection Head Mounting

TECHNICAL SPECIFICATIONS

INPUT RESISTANCE THERMOMETER (RTD)	
Measured variable	Temperature
Sensor type	PT100, PT500, PT1000
Units	°C or °F
Connection	1 Resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire system
Sensor current	<0.05 mA (50µA)
Response time	<500 ms
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	Always active (cannot be disabled)
Measuring range	See "Digital measuring accuracy thermometer" table

INPUT THERMOCOUPLES (TC)	
Measured variable	Temperature
Sensor type	E, J, K, N ,R ,S, T
Units	°C or °F
Connection	1 Thermocouple
Sensor current	<0.05 mA (50µA)
Response time	<500 ms
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	Not available
Cold junction compensation (CJC)	Integrated resistance thermometer
Measuring range	See "Digital measuring accuracy thermocouples" table

RADIO SPECIFICATIONS	868 MHZ	2,4 GHZ
Range[1]	Up to 4km LoS, 27 dBm (500mW)	Up to 2km LoS, 10 dBm (10mW)
Frequency band	868 to 870 MHz[2]	2,4 to 2,5 GHz[2]
Number of channels	16	
Reception sensivity	-97 to -109 dBm[2]	-91 to -108 dBm[2]
Transmit power	0 to 27 dBm[2]	-10 to 18 dBm[2]
Communication period	Adjustable from 1 second to 24h	

OUTPUT (RF TRANSMISSION)	
Output signals	
Sensor value (Temperature / mV)	Temperature °C (°F) / mV
Internal Temperature	Temperature °C (°F)
RSSI	Absolute value
Power supply voltage	Voltage V
Configurable parameters	Sensor type, Communication period

OPERATING ENVIRONMENT	868 MHZ	2,4 GHZ
Ambient temperature range	-40 to 80 °C (-40 to 176 °F)	-20 to 80 °C (-4 to 176 °F)
Storage temperature range	-40 to 80 °C (-40 to 176 °F)	-20 to 80 °C (-4 to 176 °F)
Relative humidity	≤ 95 %, without condensation	

POWER SUPPLY	
Voltage Range	5 to 24 V DC
Measurement accuracy	± 100mV
Power consumption (sleep)	< 0,2 mA
Battery Life	For a 9V battery, with 1200 mAh with a transmission interval of 2 minutes, the battery life is higher than 2 years

CASING	
Material	Nylon 66
Weight	Approx. 50g
Dimensions	See “Dimensional drawings”
Cross section	2.5 mm
Protection type	IP40

FACTORY DEFAULT SETTINGS	
Sensor	Thermocouple K
Measuring range	0...100°C (32...212°F)
Transmission interval	300s
Wireless transmitter ID	0
Wireless network ID	0

CERTIFICATIONS AND APPROVALS	
EN 61326	Electrical equipment for measurement, control and laboratory use. EMC requirements.
IEC 61000-4-2	Electrostatic discharge immunity test
IEC 61000-4-3	Radiated, radio-frequency, electromagnetic field immunity test
IEC 61000-4-4	Electrical fast transient/burst/immunity test
IEC061000-4-5	Surge immunity test
EN 300 228	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive
EN 300 440	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive

MEASURING ACCURACY

MEASURING ACCURACY	
Reference conditions	
Auxiliary power	9V DC ± 1%
Ambient temperature	23°C (73,4°F)
Warm-up time	>5min
Error due to internal cold junction	<0.5°C (0.9°F)

Influence of ambient temperature	
with resistance thermometers	0.06°C (0.11°F)/10°C (18°F)
with thermocouples	0.6°C (1.1°F)/10°C (18°F)

ACCURACY
RESISTANCE THERMOMETER (RTD)

Sensor	Range °C (°F)	Digital accuracy °C (°F)
PT100	-200 to 850 (-328 to 1562)	0,1 (0,18)
PT500	-200 to 850 (-328 to 1562)	0,2 (0,36)
PT1000	-200 to 350 (-328 to 662)	0,2 (0,36)

ACCURACY THERMOCOUPLES (TC)

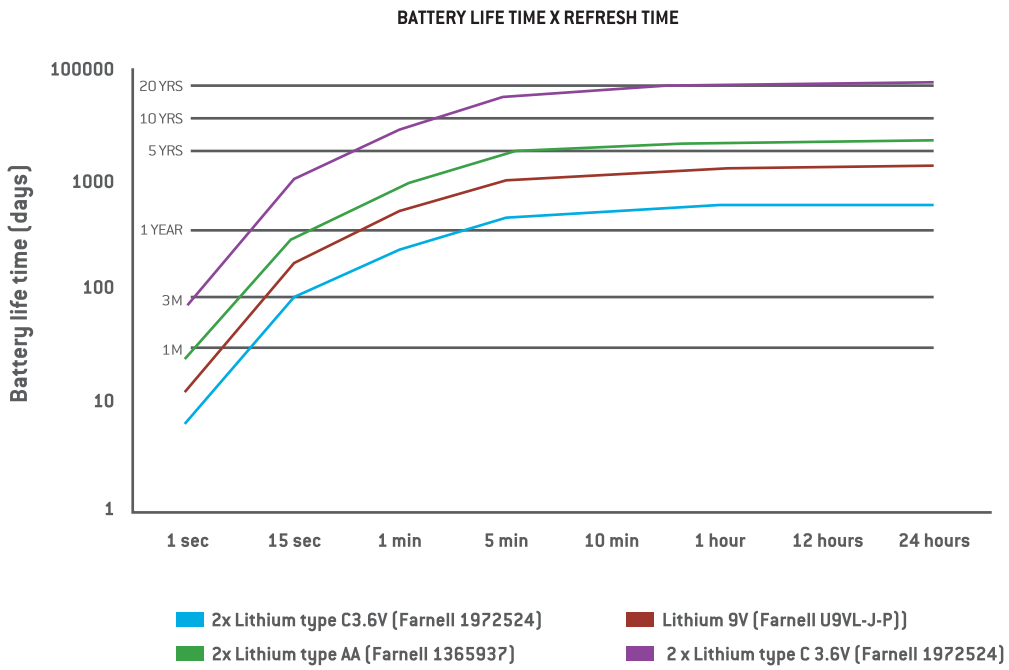
Sensor	Range °C (°F)	Digital accuracy °C (°F)
E	-200 to 1000 (-328 to 1832)	1 (1,8)
J	-210 to 1200 (-346 to 2192)	1 (1,8)
K	-230 to 1370 (-382 to 2498)	1 (1,8)
N	-200 to 1300 (-328 to 2372)	1 (1,8)
R	-50 to 1760 (-58 to 3200)	2 (3,6)
S	-50 to 1760 (-58 to 3200)	2 (3,6)
T	-200 to 400 (-328 to 752)	1 (1,8)

DIGITAL MEASUREMENT ACCURACY
MV

Sensor	Range (mV)	Accuracy
mV	- 8 to 100 mV	<40 µV

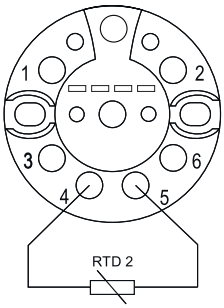
TECHNICAL DRAWINGS AND INFORMATION

BATTERY LIFE TIME

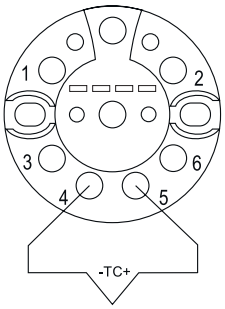


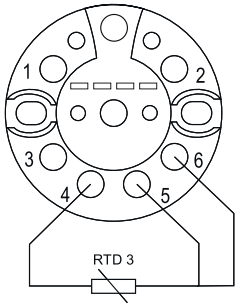
ELECTRICAL CONNECTIONS

RESISTANCE THERMOMETER

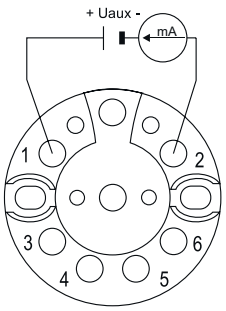


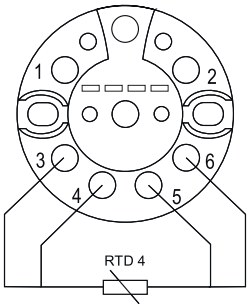
THERMOCOUPLE



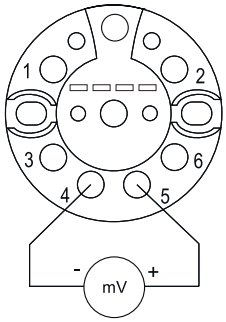


POWER SUPPLY (Uaux)

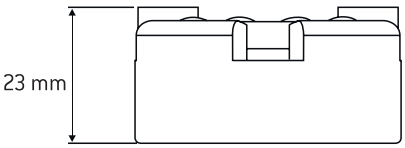


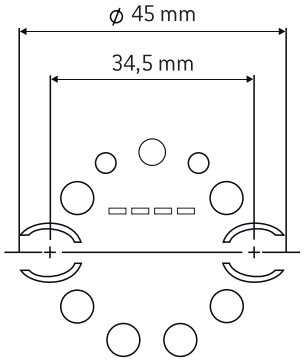


mV SENSOR

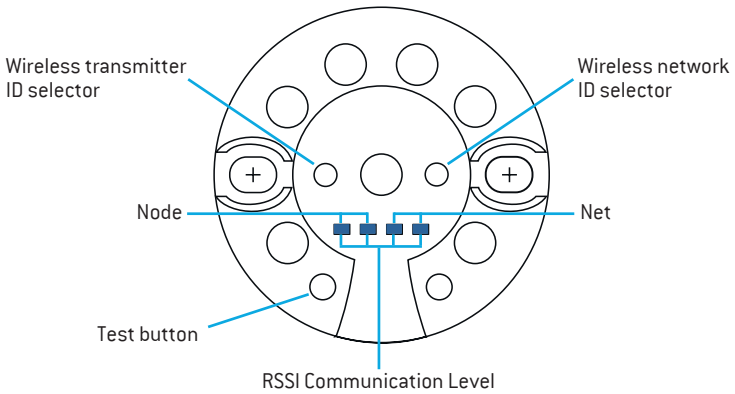


DIMENSIONAL DRAWINGS

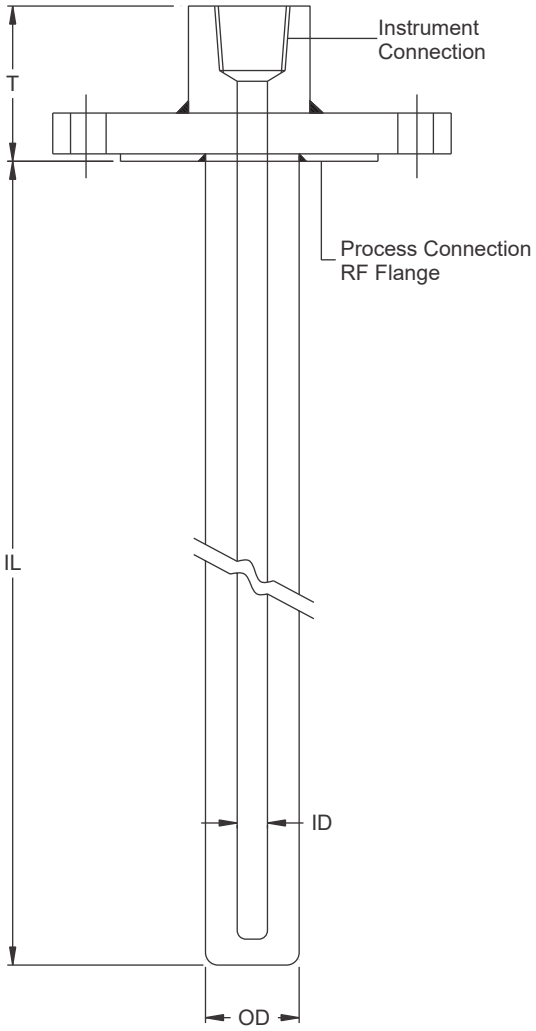




LED INDICATION IN CONNECTION AND CONFIGURATION



STRAIGHT THERMOWELL WITH FLANGE



MTW - TW - 5001

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell OD (mm)

ID (mm)

Process Connection RF Flange

Flange Rating	Flange Size
JIS 5 K **JIS 10 K** **ANSI 150 #** **ANSI 300 #**	1/4"
	1/2"
	3/4"
	1"
	1 1/4"
	1 1/2"
	1 3/4"
	2"
Other	Consult Factory

Flange Material

304	SS 304
316	SS 316
Other	Consult Factory

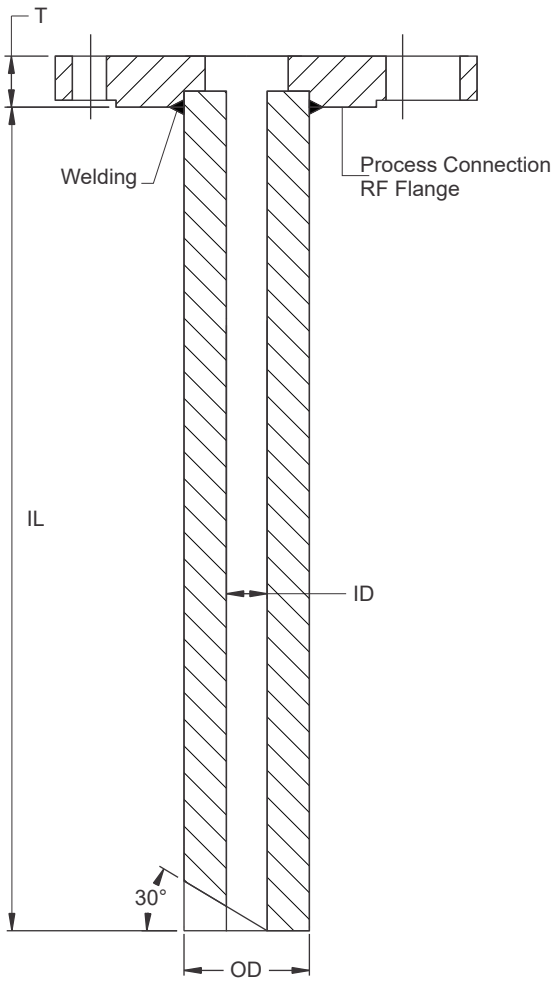
Instrument Connection

Threads **BSPT/** **NPT**	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -T hread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Length of "T" (mm)

Insertion Length "I.L." (mm)

HEAVY DUTY THICK WALL THERMOWELL



MTW - TW - 5001a

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell OD (mm)

Thermowell ID (mm)

Process Connection RF Flange

Flange Rating	Flange Size
JIS 5 K	1/4"
JIS 10 K	1/2"
	3/4"
	1"
ANSI 150 #	1 1/4"
ANSI 300 #	1 1/2"
	1 3/4"
	2"
Other	Consult Factory

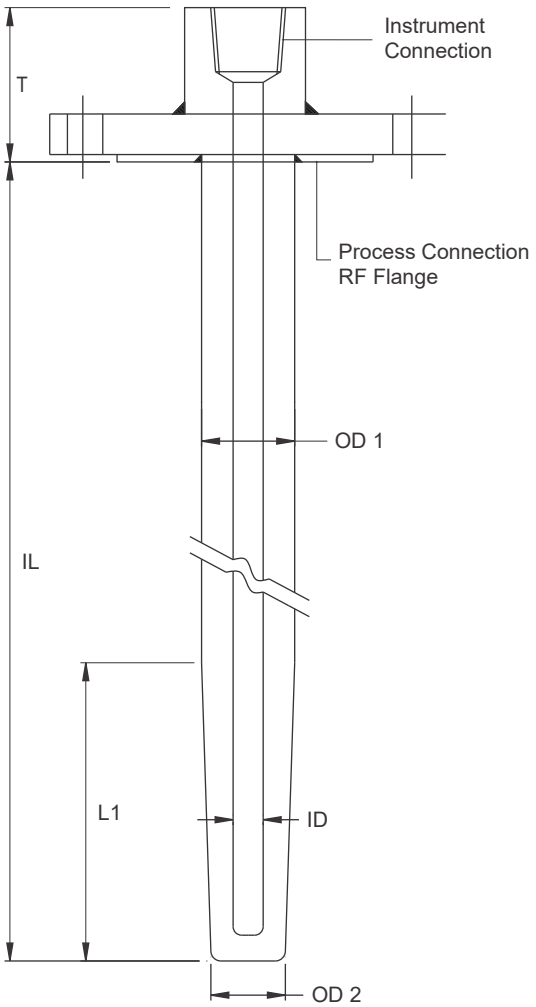
Length of "T" (mm)

Flange Material

304	SS 304
316	SS 316
Other	Consult Factory

Insertion Length "I.L." (mm)

TAPER THERMOWELL WITH FLANGE



MTW - TW - 5002

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell OD 1 (mm)

Thermowell OD 2 (mm)

ID (mm)

Process Connection RF Flange

Flange Rating	Flange Size
JIS 5 K JIS 10 K	1/4"
	1/2"
	3/4"
ANSI 150 # ANSI 300 #	1"
	1 1/4"
	1 1/2"
	1 3/4"
	2"
Other	Consult Factory

Flange Material

304	SS 304
316	SS 316
Other	Consult Factory

Instrument Connection

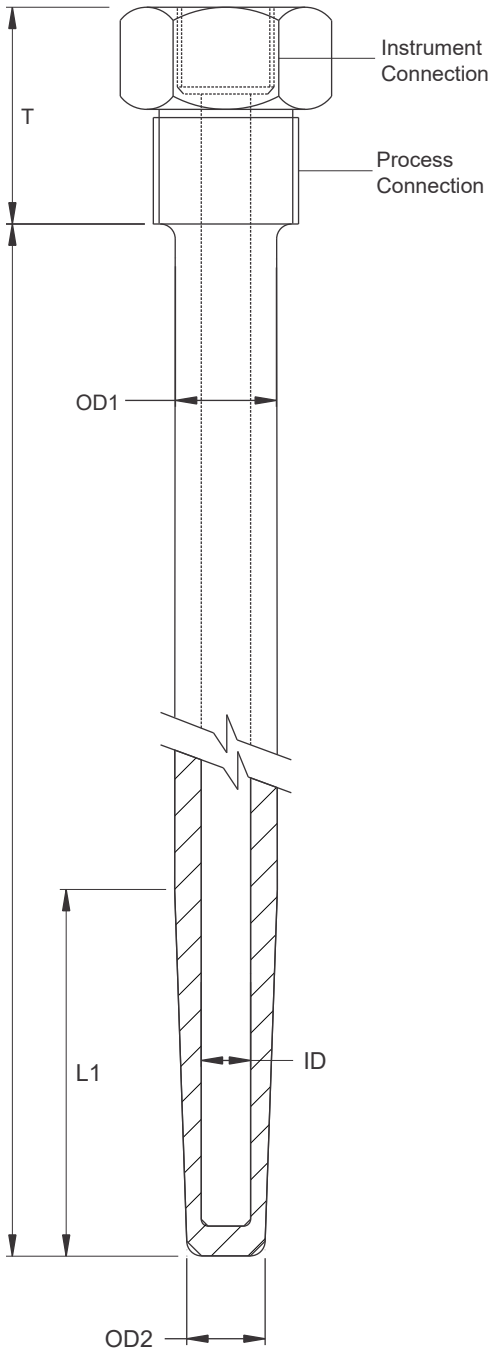
Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -T hread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Taper Length "L1" (mm)

Length of "T" (mm)

Insertion Length "I.L." (mm)

TAPER THERMOWELL WITH FLANGE



MTW - TW - 5003

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell OD 1 (mm)

Thermowell OD 2 (mm)

ID (mm)

Process Connection

Instrument Connection

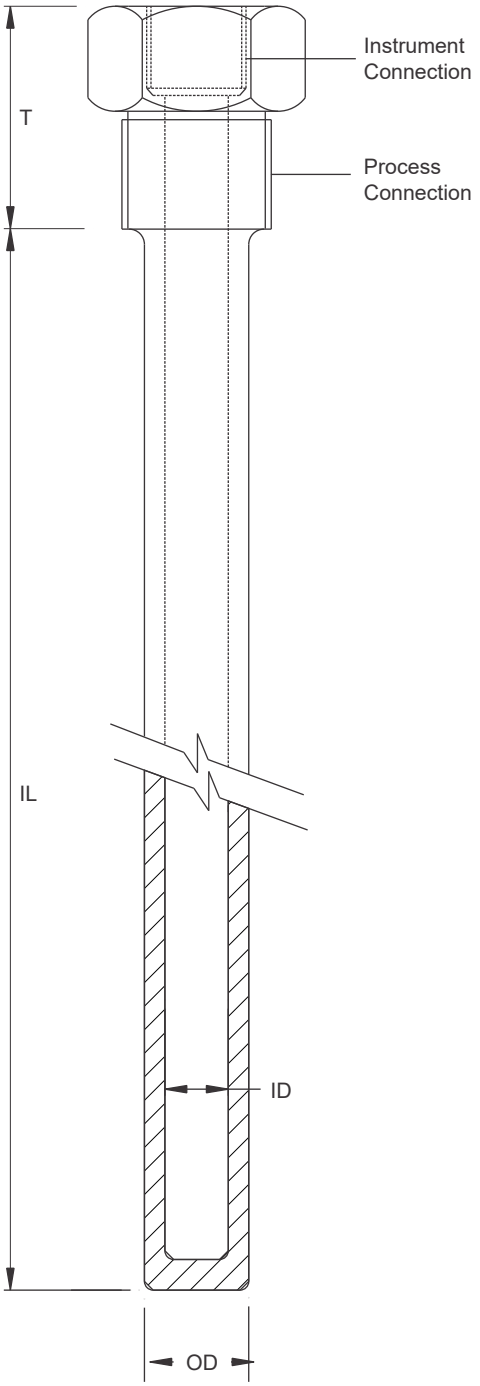
Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -Thread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

Taper Length "L1" (mm)

Length of "T" (mm)

Insertion Length "I.L." (mm)

STRAIGHT THERMOWELL (SCREWED TYPE)



MTW - TW - 5004

Thermowell Material

304	SS 304
316	SS 316
600	Inconel-600
Other	Consult Factory

Thermowell OD (mm)

ID (mm)

Process Connection

Threads BSPT/ NPT	1/8"
	1/4"
	3/8"
	1/2"
	3/4"
	1"
M -T hread	M20X1.5
Other	Consult Factory
N/A	Not Applicable

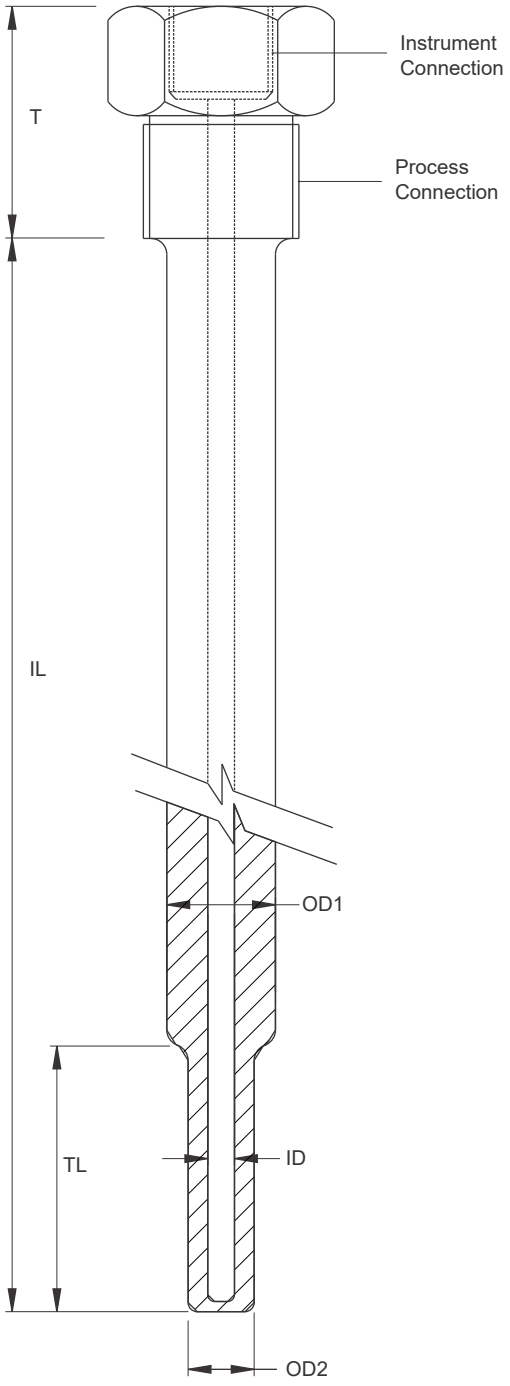
Instrument Connection

Length of "T" (mm)

Insertion Length "I.L." (mm)

MALTEC-T

STEPPED THERMOWELL

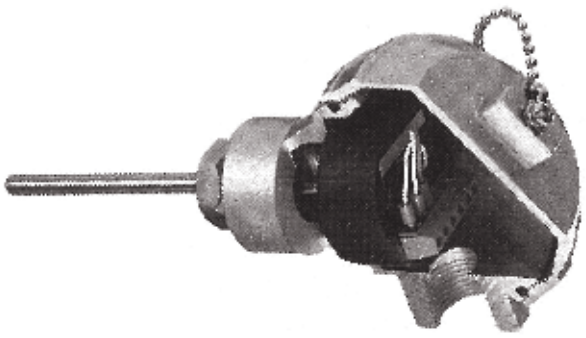


MTW - TW - 5005

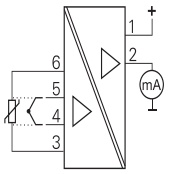
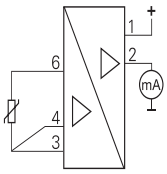
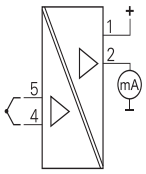
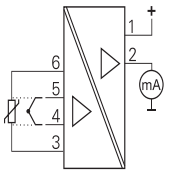
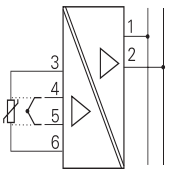
Thermowell Material	**304**	SS 304
	316	SS 316
	600	Inconel-600
	Other	Consult Factory
Thermowell OD1 (mm)		
Thermowell OD2 (mm)		
ID (mm)		
Process Connection	**Threads BSPT/ NPT**	1/8"
		1/4"
		3/8"
		1/2"
		3/4"
		1"
Instrument Connection	**M -T hread**	M20X1.5
	Other	Consult Factory
	N/A	Not Applicable
Tip Length "TL" (mm)		
Length of "T" (mm)		
Insertion Length "I.L." (mm)		

Temperature Transmitters

MALTEC-T



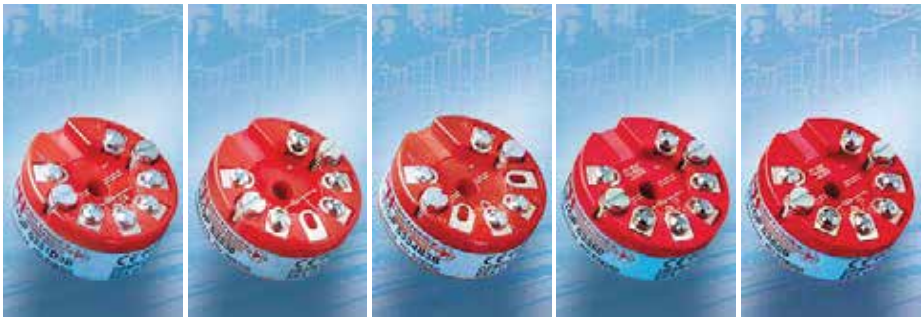
SIL2 HART COMMUNICATION FOUNDATION PROFIBUS FOUNDATION

TYPE	5331A	5333A	5334A	5335A	5350A	
INPUT: RTD, linear resistance, TC, mV OUTPUT: mA, HART® communication, Profibus® PA, Foundation™ Fieldbus	2-wire programmable transmitter 	2-wire programmable transmitter 	2-wire programmable transmitter 	2-wire transmitter with HART® protocol 	Profibus® PA / Foundation™ Fieldbus transmitter 	
OUTLINE OF FUNCTIONS:						
Number of hardware versions	1	1	1	1	1	
INPUT:						
Pt100, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C		-200...+850°C / 10°C	-200...+850°C / -	
Pt1000, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C		-200...+850°C / 10°C	-200...+850°C / -	
Ni100, measurement range / min. span	-60...+250°C / 25°C	-60...+250°C / 25°C		-60...+250°C / 10°C	-60...+250°C / -	
Lin. R, measurement range / min. span	0...5000 Ω / 30 Ω	0...10 kΩ / 30 Ω		0...7000 Ω / 25 Ω	0...10 kΩ / -	
Sensor connection, wires	2 - 3 - 4	3		2 - 3 - 4	2 - 3 - 4	
TC types	BEJKLNRSTUW3W5Lr		BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5	BEJKLNRSTUW3W5	
CJC connector 1 / 2 channels						
Max. offset	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value		
OUTPUT:						
mA, signal range / min. span	4...20 mA / 16 mA	4...20 mA / 16 mA	4...20 mA / 16 mA	4...20 mA / 16 mA		
2-wire output	4...20 mA	4...20 mA	4...20 mA	4...20 mA		
Digital signal communication				HART® communication	Profibus® PA/Foundation™ F.	
APPROVALS:						
Ex approval CENELEC	KEMA 10ATEX0002 X	KEMA 10ATEX0003 X	KEMA 10ATEX0002 X	KEMA 03ATEX1508 X	KEMA 03ATEX1011 X	
ATEX	Ⓔx II 3 GD	Ⓔx II 3 GD	Ⓔx II 3 GD	Ⓔx II 3 GD	Ⓔx II 3 GD	
	Ex nA [nL] IIC T4...T6	Ex nA [nL] IIC T4...T6	Ex nA [nL] IIC T4...T6	Ex nA [nL] IIC T4...T6	Ex nA [nL] IIC T4...T6	
UL					UL 1604, UL 508	
Det Norske Veritas, Ships & Offshore	Stand. f. Certification 2.4	Stand. f. Certification 2.4	Stand. f. Certification 2.4	Stand. f. Certification 2.4		
FEATURES:						
Supply	Loop-powered	Loop-powered	Loop-powered	Loop-powered	Bus-powered	
Isolation	Input / output	No	Input / output	Input / output	Input / output	
Channels	1	1	1	1	1	

Temperature Transmitters

Ex-Approved Temperature Transmitters

MALTEC-T



TYPE	5331D	5333D	5334B	5335D	5350B
INPUT: RTD, linear resistance, TC, mV OUTPUT: mA, HART® communication, Profibus® PA, Foundation™ Fieldbus	2-wire programmable transmitter	2-wire programmable transmitter	2-wire programmable transmitter	2-wire transmitter with HART® protocol	Profibus® PA / Foundation™ Fieldbus transmitter
OUTLINE OF FUNCTIONS:					
INPUT:					
Pt100, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C		-200...+850°C / 10°C	-200...+850°C / -
Pt1000, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C		-200...+850°C / 10°C	-200...+850°C / -
Ni100, measurement range / min. span	-60...+250°C / 25°C	-60...+250°C / 25°C		-60...+250°C / 10°C	-60...+250°C / -
Lin. R, measurement range / min. span	0...5000 Ω / 30 Ω	0...10 kΩ / 30 Ω		0...7000 Ω / 25 Ω	0...10 kΩ / -
Sensor connection, wires	2 - 3 - 4	3		2 - 3 - 4	2 - 3 - 4
TC types	BEJKLNRSTUW3W5Lr		BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5	BEJKLNRSTUW3W5
OUTPUT:					
mA, signal range / min. span	4...20 mA / 16 mA	4...20 mA / 16 mA	4...20 mA / 16 mA	4...20 mA / 16 mA	
2-wire output	4...20 mA	4...20 mA	4...20 mA	4...20 mA	
Digital signal communication				HART® communication	Profibus® PA/Foundation™ F.
APPROVALS:					
Ex approval CENELEC	KEMA 06ATEX0062	KEMA 03ATEX1535	KEMA 06ATEX0062	KEMA 03ATEX1537	KEMA 02ATEX1318
ATEX	Ex II 1 GD	Ex II 1 GD	Ex II 1 GD	Ex II 1 GD	Ex II 1 GD
	Ex ia IIC T4 or T6	Ex ia IIC T4 or T6	Ex ia IIC T4 or T6	Ex ia IIC T4 or T6	Ex ia IIC T4 or T6
FM	IS, CL. I, DIV. 1&2, GP. A-D	IS, CL. I, DIV. 1&2, GP. A-D		IS, CL. I, DIV. 1&2, GP. A-D	IS, CL. I, DIV. 1&2, GP. A-D
CSA	Class I, Zone 0/1, Gr. IIC	Class I, Zone 0/1, Gr. IIC		Class I, Zone 0/1, Gr. IIC	Class I, Zone 0/1, Gr. IIC
UL					UL 913 / UL 508
GOST Ex, VNIIFTRI	www.prelectronics.com	www.prelectronics.com	www.prelectronics.com	www.prelectronics.com	www.prelectronics.com
Det Norske Veritas, Ships & Offshore	Stand. f. Certification 2.4	Stand. f. Certification 2.4	Stand. f. Certification 2.4	Stand. f. Certification 2.4	
FEATURES:					
Supply	Loop-powered	Loop-powered	Loop-powered	Loop-powered	Bus-powered
Isolation	Input / output	No	Input / output	Input / output	Input / output
Channels	1	1	1	1	1

TECHNICAL SPECIFICATIONS:					
Programmable	PCP / PCF	PCP / PCF	PCP / PCF	PCP / PCF / HART®	Profibus® PA/Foundation™ F.
Ambient temperature	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C
Supply voltage, DC	7.2...30 VDC	8...30 VDC	7.2...30 VDC	8...30 VDC	9...32 VDC
Consumption	20 mA	20 mA	20 mA	20 mA	< 11 mA
Voltage drop	7.2 VDC	8 VDC	7.2 VDC	8 VDC	
Isolation voltage, test / operation	1500 VAC / 50 V		1500 VAC / 50 V	1500 VAC / 50 V	1500 VAC / 50 V
Programming unit	Loop Link	Loop Link	Loop Link	Loop Link / HART®	Profibus® PA/Foundation™ F.
Response time	1...60 s	0.33...60 s	1...60 s	1...60 s	1...60 s
Signal dynamics, input	20 bit	19 bit	18 bit	22 bit	24 bit
Basic accuracy, Pt100	< ±0.2°C	< ±0.3°C		< ±0.1°C	< ±0.1°C
Basic accuracy, TC type: E J K L N T U	< ±1°C		< ±1°C	< ±0.5°C	< ±0.5°C
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.005% of span / °C	< ±0.002% of MV / °C
EMC, complies with NAMUR NE 21	A criterion, burst		A criterion, burst	A criterion, burst	A criterion, burst
Mounting	Sensor head	Sensor head	Sensor head	Sensor head	Sensor head

Accessories

Terminal Blocks

Small 2 Way

Large 3 Way

Part No.	Description
SB 2P	Small 2-pole High aluminium ceramic (extra white colour)
SB 3P	Small 3-pole High aluminium ceramic (extra white colour)
LB 2P	Large 2-pole High aluminium ceramic (extra white colour)
LB 3P	Large 3-pole High aluminium ceramic (extra white colour)
LB 4P	Large 4-pole High aluminium ceramic (extra white colour)
LB 6P	Large 6-pole High aluminium ceramic (extra white colour)

Compression Fittings

Part No.	Material	Tube Size	Process Connection
CFB 30 B 125	Brass	3mm (1/8”)	1/8” BSP
CFB 30 B 250	Brass	3mm (1/8”)	1/4” BSP
CFB 45 B 125	Brass	4.5mm (3/16”)	1/8” BSP
CFB 45 B 250	Brass	4.5mm (3/16”)	1/4” BSP
CFB 60 B 125	Brass	6mm (1/4”)	1/8” BSP
CFB 60 B 250	Brass	6mm (1/4”)	1/4” BSP
CFB 60 B 375	Brass	6mm (1/4”)	3/8” BSP
CFB 60 B 500	Brass	6mm (1/4”)	1/2” BSP
CFB 95 B 500	Brass	9.5mm (3/8”)	1/2” BSP
CFB 30 B 250	S/S 316	3mm (1/8”)	1/4” BSP
CFB 45 B 250	S/S 316	4.5mm (3/16”)	1/4” BSP
CFB 60 B 250	S/S 316	6mm (1/4”)	1/4” BSP
CFB 60 B 375	S/S 316	6mm (1/4”)	3/8” BSP
CFB 60 B 500	S/S 316	6mm (1/4”)	1/2” BSP

Small Aluminium

Big Aluminium

Din Head

Big Stainless Steel

Part No.	Size	Material	Sensor Connection	Cable Entry
KSC 500	Small	Aluminium	1/2" BSP	M16 x 1.5
KNC 500	Big	Aluminium	1/2" BSP	M20 x 1.5
KNC 750	Big	Aluminium	3/4" BSP	M20 x 1.5
KB 250	Small	Bakelite	1/4" BSP	M16 x 1.5
KB 500	Small	Bakelite	1/2" BSP	M16 x 1.5
KD 500	Big	Din Aluminium	1/2" BSP	M20 x 1.5
LS 500	Big	S/S 316	1/2" BSP	M20 x 1.5

EEx d (flameproof) Connection Head

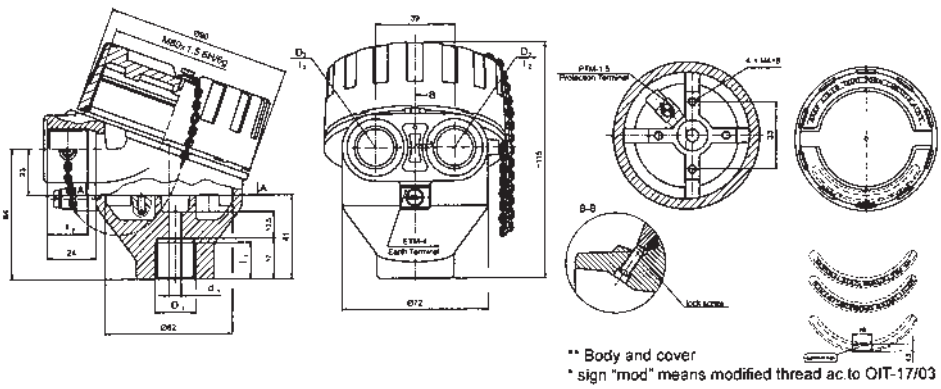
Type XD-AD

Material of body and cover : aluminium pressure die-casting, max.0.5% Mg

Ambient temperature: T_{amb} = -40 to 100°C - silicone rubber

Coating: yellow chromating and chemically resistant paint (outside only)

Maximum space for transmitter: Ø52 x 30

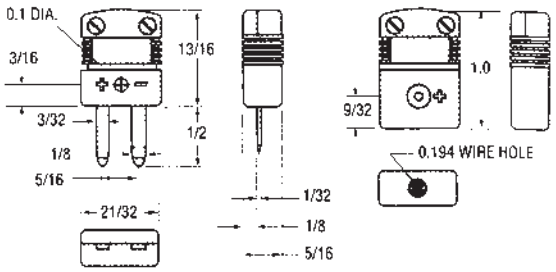


Miniature Connectors

To Order (Specify Model Number)

Alloy[1] Code	Compensating Alloy Used in Connector		Shell Color	Glass-Filled Nylon Model Number	
	+	-		w/ Window	w/o Window
K	CHROMEGA®	ALOMEGA®	Yellow	SMPW-K-(*)	SMPW-K-(*)
T	Copper	Constantan	Blue	SMPW-T-(*)	SMPW-T-(*)
J	Iron	Constantan	Black	SMPW-J-(*)	SMPW-J-(*)
E	CHROMEGA®	Alloy #11	Purple	SMPW-E-(*)	SMPW-E-(*)
R	Copper	Alloy #11	Green	SMPW-R-(*)	SMPW-R-(*)
S	Copper	Alloy #226	Green	SMPW-S-(*)	SMPW-S-(*)
G	Alloy #200	Alloy#426	Red/Green	SMPW-G-(*)	SMPW-G-(*)
C	Alloy #405	Alloy#225	Red	SMPW-C-(*)	SMPW-C-(*)
D	Alloy #203	Alloy#203	Red/White	SMPW-D-(*)	SMPW-D-(*)
U	Copper	Copper	White	SMPW-U-(*)	SMPW-U-(*)
N	OMEGA-P®	OMEGA-N®	Orange	SMPW-N-(*)	SMPW-N-(*)

SMPW & SMP

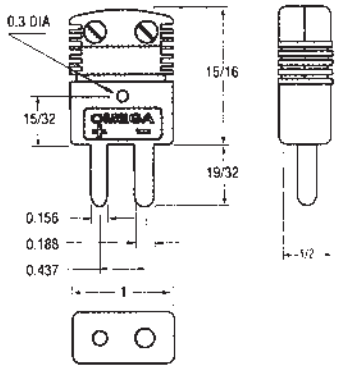


Standard Connectors

To Order (Specify Model Number)

Alloy[1] Code	Compensating Alloy Used in Connector		Shell Color	Glass-Filled Nylon Model Number	
	+	-		w/ Window	w/o Window
K	CHROMEGA®	ALOMEGA®	Yellow	OSTW-K-(*)	
T	Copper	Constantan	Blue	OSTW-T-(*)	
J	Iron	Constantan	Black	OSTW-J-(*)	
E	CHROMEGA®	Constantan	Purple	OSTW-E-(*)	
R/S	Copper	Alloy #11	Green	OSTW-R/S-(*)	
U	Copper	Copper	White	OSTW-U-(*)	
N	OMEGA-P®	OMEGA-N®	Orange	OSTW-N-(*)	

OSTW

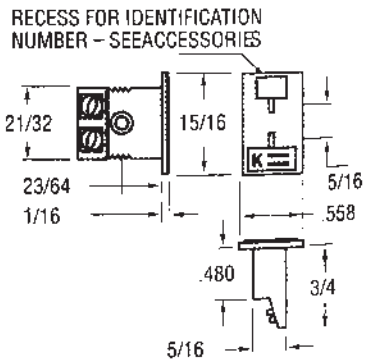


Miniature Panel Jacks

To Order (Specify Model Number)

Alloy[1] Code	Type of Thermocouple Used with Connector	Compensating Alloy Used in Connector		Shell Color	Model Number (Female)
		+	-		
K	CHROMEGA®-ALOMEGA®	CHROMEGA®	ALOMEGA®	Yellow	MPJ-K-F
T	Copper-Constantan	Copper	Constantan	Blue	MPJ-T-F
J	Iron-Constantan	Iron	Constantan	Black	MPJ-J-F
E	CHROMEGA®-Constantan	CHROMEGA®	Constantan	Purple	MPJ-E-F
R/S	Pt-Pt/13%Rh	Copper	Alloy #11	Green	MPJ-R/S-F
G	W-W/26%Re	Alloy #200	Alloy #226	Red	MPJ-G-F
C	W/5%Re-W/26%Re	Alloy #405	Alloy#426	Red	MPJ-C-F
D	W/3%Re-W/25%Re	Alloy #203	Alloy#225	Red	MPJ-D-F
U	Uncompensated	Copper	Copper	White	MPJ-U-F
N	OMEGALLOY®	OMEGA-P®	OMEGA-N®	Orange	MPJ-N-F

MPJ

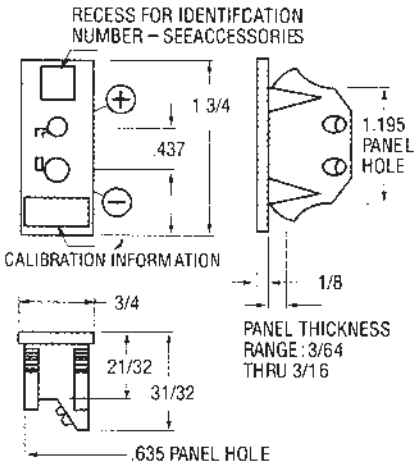


Standard Panel Jacks

To Order (Specify Model Number)

Alloy[1] Code	Type of Thermocouple Used with Connector	Compensating Alloy Used in Connector		Shell Color	Model Number (Female)
		+	-		
K	CHROMEGA®-ALOMEGA®	CHROMEGA®	ALOMEGA®	Yellow	SPJ-K-F
T	Copper-Constantan	Copper	Constantan	Blue	SPJ-T-F
J	Iron-Constantan	Iron	Constantan	Black	SPJ-J-F
E	CHROMEGA®-Constantan	CHROMEGA®	Constantan	Purple	SPJ-E-F
R/S	Pt-Pt/13%Rh	Copper	Alloy #11	Green	SPJ-R/S-F
G	W-W/26%Re	Alloy #200	Alloy #226	Red	SPJ-G-F
C	W/5%Re-W/26%Re	Alloy #405	Alloy#426	Red	SPJ-C-F
D	W/3%Re-W/25%Re	Alloy #203	Alloy#225	Red	SPJ-D-F
U	Uncompensated	Copper	Copper	White	SPJ-U-F
N	OMEGALLOY®	OMEGA-P®	OMEGA-N®	Orange	SPJ-N-F

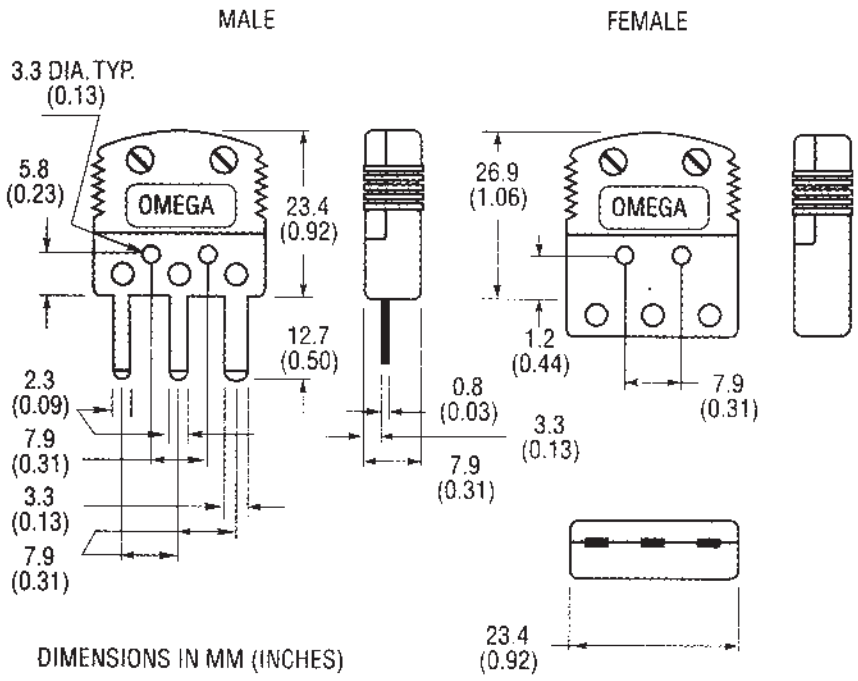
SJP



Standard Panel Jacks

To Order (Specify Model Number)

Alloy[1] Code	Type of Thermocouple Used with Connector	Compensating Alloy Used in Connector			Shell Color	Model Number (Female)
		+	-	G		
K	CHROMEGA®-ALOMEGA®	CHROMEGA®	ALOMEGA®	Copper	Yellow	MTP-K-(*)
T	Copper-Constantan	Copper	Constantan	Copper	Blue	MTP-T-(*)
J	Iron-Constantan	Iron	Constantan	Copper	Black	MTP-J-(*)
E	CHROMEGA®-Constantan	CHROMEGA®	Constantan	Copper	Purple	MTP-E-(*)
U	Uncompensated	Copper	Copper	Copper	White	MTP-U-(*)
N	OMEGALLOY®	OMEGA-P®	OMEGA-N®	Copper	Orange	MTP-N-(*)



Porous materials

Sillimantin 60 NG-Tubes medium fine structure Al_2O_3 content approx. 73-75%	**Sillimantin 65-Rollers** fine structure Al_2O_3 content 78-80% Especially for roller hearth kilns.	**Sillimantin 60-Tubes** Type 530 (DIN VDE 0335) medium fine structure Al_2O_3 content approx. 73-75%	**Sillimantin KS-Tubes** medium fine structure Al_2O_3 content approx. 70%	**Silicon Carbide-Tubes** fine and coarse structure SiC content 75%–90% claybonded	**Halsic-R-Tubes** recrystallized SiC SiC content 99%
Outer/inner ø mm	Outer/inner ø mm	Outer/inner ø mm	Outer/inner ø mm	Outer/inner ø mm	Outer/inner ø mm
20 × 15	25.0 × 15.0	20 × 15	15 × 7	17 × 12	20 × 10
22 × 17	26.9 × 17.0	22 × 17	20 × 12	20 × 15	22 × 12
24 × 19	27.0 × 17.0	24 × 19	20 × 15	22 × 17	25 × 15
26 × 18	27.7 × 17.0	26 × 18	25 × 15	24 × 19	30 × 20
28 × 22	30.0 × 20,0	28 × 22	25 × 18	26 × 18	32 × 22
30 × 23	31.0 × 21.0	30 × 23	30 × 20	26 × 20	34 × 24
35 × 27	33.0 × 23.0	35 × 27	35 × 25	28 × 22	35 × 25
40 × 32	33.7 × 23.0	40 × 32	40 × 30	30 × 23	40 × 30
50 × 40	33.7 × 23.7	50 × 40	45 × 35	31 × 25	45 × 35
60 × 50	34.0 × 22.5	60 × 50	50 × 40	33 × 28	50 × 38
70 × 60	35.0 × 28.0	70 × 60	55 × 45	35 × 27	
80 × 70	36.0 × 24.0	80 × 70	60 × 48	40 × 32	
90 × 75	36.0 × 25.0	90 × 75		45 × 35	
100 × 85	40.0 × 30.0	100 × 85		50 × 40	
110 × 95	42.0 × 32.0	110 × 95		55 × 45	
120 × 100	42.4 × 32.4	120 × 100		60 × 50	
130 × 110	55.0 × 45.0	130 × 110		65 × 55	
140 × 120		140 × 120		70 × 60	
160 × 140		160 × 140		75 × 65	
200 × 175		200 × 175		80 × 70	
250 × 230		250 × 230		85 × 75	
330 × 310		330 × 310		90 × 75	
max. length 3200 mm depending on diameter	max. length 3400 mm depending on diameter	max. length 3500 mm depending on diameter	max. length 2000 mm depending on diameter	max. length 2000 mm depending on diameter	max. length 3000 mm depending on diameter

Insulators and short insulating tubes for thermocouple elements are made in our materials ALSINT 99,7 TYPE 799 and PYTHAGORAS TYPE 610.

The tolerances adhered to are according to DIN 40 680. Closer tolerances on enquiry.

Impervious materials

Alsint 99,7-Tubes
Type 799 (DIN VDE 0335)
Al_2O_3 content 99.7%

Outer/inner Ø mm

0.8 × 0.3	26 × 20	120 × 100
1.3 × 0.7	28 × 22	120 × 105
1.6 × 1.0	30 × 23	130 × 110
1.8 × 1.2	35 × 27	140 × 120
2.0 × 1.0	38 × 30	140 × 125
2.7 × 1.7	42 × 34	150 × 130
3.0 × 2.0	46 × 38	155 × 135
4.0 × 2.0	50 × 40	160 × 140
5.0 × 3.0	55 × 45	170 × 150
6.0 × 4.0	60 × 50	175 × 155
8.0 × 5.0	65 × 56	180 × 160
9.0 × 6.0	70 × 60	185 × 165
9.6 × 6.4	72 × 62	190 × 170
10.0 × 6.0	75 × 65	200 × 175
12.0 × 8.0	80 × 70	220 × 200
12.7 × 8.9	85 × 75	240 × 220
14.0 × 10.0	90 × 80	260 × 240
15.0 × 10.0	95 × 85	270 × 250
17.0 × 12.0	100 × 85	300 × 280
17.5 × 11.1	105 × 90	320 × 300
20.0 × 15.0	110 × 95	420 × 380
24.0 × 18.0	115 × 100	450 × 430

max. length 3500 mm
depending on diameter

Pythagoras-Tubes
Type 610 (DIN VDE 0335)
Al_2O_3 content approx. 60%
Alkali content 3%

Outer/inner Ø mm

0.8 × 0.3	20 × 15	80 × 70
1.3 × 0.7	22 × 17	85 × 75
1.6 × 1.0	24 × 18	90 × 75
1.8 × 1.2	24 × 19	90 × 80
2.0 × 1.0	26 × 18	95 × 85
2.7 × 1.7	26 × 20	100 × 85
3.0 × 2.0	28 × 22	105 × 90
4.0 × 2.0	30 × 23	110 × 95
5.0 × 3.0	31 × 25	115 × 100
6.0 × 4.0	35 × 27	120 × 100
8.0 × 5.0	38 × 30	125 × 105
9.0 × 6.0	40 × 32	130 × 110
9.6 × 6.4	45 × 38	140 × 120
10.0 × 6.0	48 × 40	140 × 125
12.0 × 8.0	50 × 40	150 × 130
12.7 × 8.9	52 × 42	160 × 140
14.0 × 10.0	55 × 46	170 × 150
15.0 × 10.0	58 × 50	180 × 160
15.0 × 11.0	60 × 50	190 × 170
17.0 × 12.0	65 × 55	200 × 180
17.0 × 13.0	70 × 60	240 × 220
17.5 × 11.1	75 × 65	300 × 280

max. length 3500 mm
depending on diameter

Pythagoras 1800 Z-Tubes
Al_2O_3 content approx. 76%
Alkali content 0.3%

Outer/inner Ø mm

48 × 40
53 × 43
60 × 52
63 × 53
70 × 60
73 × 63
75 × 65
80 × 70
82 × 72
85 × 74
86 × 76
87 × 77
88 × 78
93 × 83
95 × 85
100 × 90
105 × 90
115 × 105
120 × 110

max. length 2000 mm
depending on diameter

Halsic-I-Tubes
reaction bonded
Si-infiltrated SiC
SiC content approx. 90%
free Si approx. 10%

Outer/inner Ø mm

20 × 13
22 × 15
25 × 18
27 × 20
30 × 20
40 × 30
42 × 32
45 × 35

max. length 3000 mm
depending on diameter

Dimensions not shown above can be made to order. The dimensions shown are a selection from our range. The maximum outer diameter which can be manufactured is 450 mm.

We supply the following types of tubes:
open both ends
closed one end
open both ends with flange
closed one end with flange

Ninomiya Thermocouple Wire

MALTEC-T

Extension and Compensating Cables for Thermocouples

The extension and compensating cables for thermocouples correspond with JIS C 1610-1995. The JIS standards corresponds to the following international standards. IEC 584-3 Thermocouples Parts 3: Extension and compensating cables. Tolerances and identification system. Quality insulation and sheaths are adopted in our extension and compensating cables for a wide range of uses, cables which are manufactured based on the NINOMIYA Standards.

Please refer to our catalogs.

1. Varieties, Symbols, and Composing Materials of Conductors (Cores)

Classification			JISC 1610-1995									ASTM (Old standard : ANSi MC96.1)						
Type of thermocouple combined for service	Material composing cores		Symbol	Tolerance			Colour coding					Symbol	Temperature range	Tolerance		Colour Coding		
	+side core	-side core		Class 1 μV	Class 2 μV	Compensating junction temperature (°C)	Core covering			Outer sheath				Class		Core covering		Outer sheath
							+side		-side					Special	Standard	+side	-side	
							Section 1	Section 2		Section 1	Section 2		°C	°C	°C			
B	Cu	Cu	BC	not specified		0 ~+100	Gray	Red	White	Gray	Red	BX	0 ~+100	-	± 3.7	Gray	Red	Gray
R	Cu	Cu,Ni alloy	RCA	-	± 30	0 ~+100	Orange	Red	White	Orange	Black	RX	0 ~+200	-	± 5.0	Black	Red	Green
	Cu	Cu,Ni alloy	RCB	-	± 30	0 ~+200	Orange	Red	White	Orange	Black	-	-	-	-	-	-	-
S	Cu	Cu,Ni alloy	SCA	-	± 30	0 ~+100	Orange	Red	White	Orange	Black	SIX	0 ~+200	-	± 5.0	Black	Red	Green
	Cu	Cu,Ni alloy	SCB	-	± 60	0 ~+200	Orange	Red	White	Orange	Black	-	-	-	-	-	-	-
N	Ni,Si alloy	Ni,Si alloy	NX	± 60	± 100	-25 ~+200	Pink	Red	White	Pink	-	NX	0 ~+200	-	± 2.2	Orange	Red	Orange
	Cu,Ni alloy	Cu,Si alloy	NC	-	± 100	0 ~+150	Pink	Red	White	Pink	-	-	-	-	-	-	-	-
K	Ni, Cr alloy	Ni alloy	KX	± 60	± 100	-25 ~+200	Green	Red	White	Green	Blue	KX	0 ~+200	-	± 2.2	Yellow	Red	Yellow
	Ni, Cr alloy	Ni alloy	KCA	-	± 150	0 ~+150	Green	Red	White	Green	Blue	-	-	-	-	-	-	-
	Fe	Cu,Ni alloy	KCB	-	± 150	0 ~+150	Green	Red	White	Green	Blue	-	-	-		-	-	-
	Cu	Cu,Ni alloy	KCC	-	± 100	0 ~+100	Green	Red	White	Green	Blue	-	-	-	-	-	-	-
E	Ni, Cr alloy	Cu,Ni alloy	EX	± 120	± 200	-25 ~+200	Violet	Red	White	Violet	Purple	EX	0 ~+200	-	± 1.7	Purple	Red	Purple
J	Fe	Cu,Ni alloy	JX	± 85	± 140	-25 ~+200	Black	Red	White	Black	Yellow	JX	0 ~+200	± 1.1	± 2.2	White	Red	Black
T	Cu	Cu,Ni alloy	TX	± 30	± 60	-25 ~+200	Brown	Red	White	Brown	Brown	TX	-25 ~+100	± 0.5	± 1.0	Blue	Red	Blue

Note : Though "purple" and "violet" are differentiale in the above specifications, coloring of our products are all purple.

2. Insulation Materials and Operating-temperature Range

Item	Symbol	Description	Operating temperature range
Service category	G	General service : P.V.C system (1) Not applicable to RCB and SCB (2) The operating temperature range of BC, RCA, SCA, NC, KCA, KCB and KCC shall be 0°C to +90°C.	-20 to + 90
	H	Heat-resistant service: Glass system (1) Not applicable to be BC, RCA, SCA, KCC and TX.	0 to + 150
	S	Super-heat resistant service : Tetrafluoroethylene system (1) Not applicable to compensating type core. (2) The operating temperature range of TX shall be -25~ +100oC.	-25 to + 200
Service category (NINOMIYA Standards)	SR	Silicone-rubber	0 to + 180
	SRGB	Silicone-rubber+Glass-yarn braid, Finished with heat-resistant coating	-55 to + 200
	6F	Fluorocarbon-resin (FEP)	-0 to + 200
	6FGB	Fluorocarbon-resin (FEP)+Glass-yarn braid. Finished eith heat-resisita	-250 to + 200
	6FSR	Fluorocarbon-resin (FEP)+Sillicone-rubber	-0 to + 180
	SRNR	Silicone-rubber+Chloroprene rubber	-20 to + 80
	SRGB	Silicone-rubber+Glass-yarn braid. Finished with heat-resistant coating	0 to + 180
	CERAC	Ceramic fiber braid	0 to + 1000
	CF	Ceramic fiber braid. Fiber-Convergent agent free	0 to + 1000
	SLGB	Sillicone-glass-yarn braid. Finished with polyimide coating	0 to + 600
	GBSR	Glass-yarn braid+Silicone-rubber	0 to + 180
	GB6F	Glass-yarn braid+Fluorocarbon-resin (FEP)	0 to + 200
	PE	Polyethlene	-20 to + 75
	ETFE	Fluorocarbon-resin (ETFE)	-100 to + 150
Shields and protective Braids	TIS	Inner shield of copper tape (Round type : JIS Symbol S1)	-
	IS	Inner shield of tin-plated annealed copper wire braid (Flat type : JIS Symbol S2)	-
	AIS	Inner shield aluminum-foil laminated plastic tape (Round type : JIS Symbol S3)	-
	OS	Outer sheid tin-plated annealed copper wire braid	-
	SOS	Outer shield of stainless-wire braid	-
	FIS	Inner shield of iron-braid shield	-

Item	Symbol	Description	Heat-resistance enduring temperature (°C)
Service category (NINOMIYA Standards)	V	90°C heat-resistant PVC	-20 to + 90
	V1	105°C heat-resistant flame-retardant PVC	-20 to + 105
	V2	Flame-retardant low-chlorinated PVC	-20 to + 105
	V3	Flexible PVC	-20 to + 90
	V4	Elastomer vinyl	-20 to + 90
	E	Polyethylene	-20 to + 75
	E1	Crosslinked Polyethylene	-20 to + 120
	E2	Flame-retardant Polyethylene	-20 to + 90
	N	Chloroprene rubber	-20 to + 80
	G	Duxplex glass-yarn rolled single braid	0 to + 200
	B	Single glass-yarn braid	0 to + 200
	K	Silicone-rubber	-55 to + 180
	K1	High-strength silicone-rubber	-55 to + 180
	K2	Flame-retardant silicone-rubber	-55 to + 180
	F	FEP	-250 to + 200
	F1	PTFE	-250 to + 260
	F2	PFA	-250 to + 260
	F3	ETFE	-100 to + 150
Shapes	F	Flat type	-
	R	Round type with filler	-
	T	Round type without filler	-
	P	Flat type with protective braid (without sheath)	-
	FF	Eyeglass-shaped flat type by batch extrusion	-
	r	Bonded flat type of single pair or more	-

3. NINOMIYA Parts Numbers

How to make a NINOMIYA Parts Number

③and④of a NINOMIYA Parts Number are not yet fixed for the products contained in the catalog. Please determine your NINOMIYA Parts Number as per the Article 4. How to order. The Parts Number can be produced as follows:

	①		②		③			④	⑤	⑥	⑦	⑧	⑨
Ex.	7/0.3	X	1P		KX	-	1	G	J1	IS	V	V	N
	Conductor		Number of pairs		Variety of extension and compensating cable for thermocouples	-	Tolerance class	Service catagory	Color identification	Sheild and protective braid	Insulation materials	Sheath materials	Shape

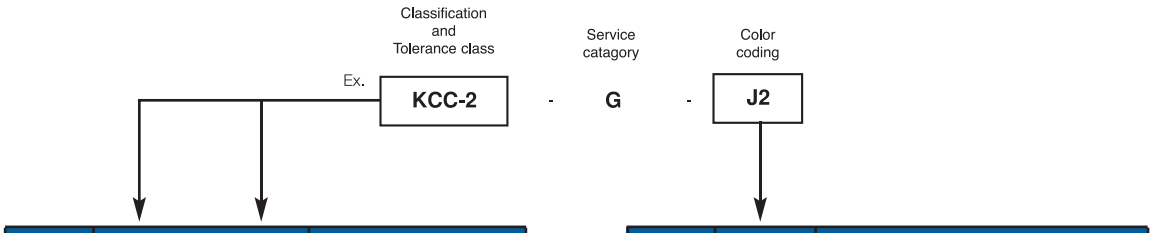
4. How to Order

How to order standardized products

Please let us be informed on the following:

* Name of a product
* Symbol of a product : Each standardized product is numbered. A product-code number is determined by completing ☐. To fill in ☐, select a symbol among the ones shown in the below table. A type, tolerance class, and color identification of an extension and compensating cable for thermocouples should be selected.
* Quantity

How to fill ☐ using the symbols



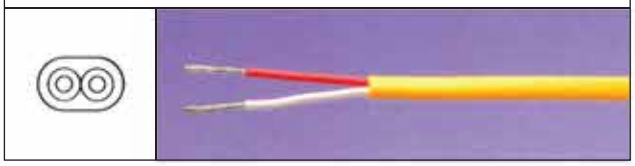
Item	Symbol		Class of tolerance	
	JIS	ASTM	JIS	ASTM
Classification and Class of tolerance	BC	BX-ASt	Not specified	Standard
	RCA-2	RX-ASt	Class 2	Standard
	RCB-2	-	Class 2	-
	SCA-2	SX-ASt	Class 2	Standard
	SCB-2	-	Class 2	-
	NX-1	-	Class 1	-
	NX-2	NX-ASt	Class 2	Standard
	NC-2	-	Class 2	-
	KX-1	KX-ASt	Class 1	Standard
	KX-2	-	Class 2	-
	KCA-2	-	Class 2	-
	KCB-2	-	Class 2	-
	KCC-2	-	Class 2	-
	EX-1	-	Class 1	-
	EX-2	EX-ASt	Class 2	Standard
	JX-1	JX-ASp	Class 1	Special
	JX-2	JX-ASt	Class 2	Standard
	TX-1	TX-ASp	Class 1	Special
	TX-2	TX-ASt	Class 2	Standard

Item	Symbol	Remarks
Color coding	J1	Color code in the JIS Section 1
	J2	Color code in the JIS Section 2 (former JIS)
	AS	Color code in the ASTM (former ANSI MC96.1)

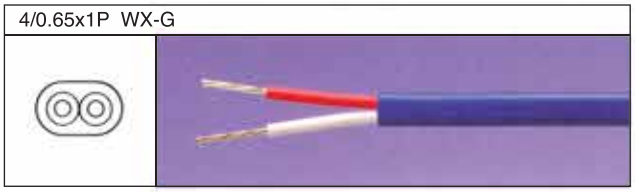
How to order customized products

The extension and compensating cables contained in the catalog are just part of our line of business. We have been also producing extension cables with various kinds of construction and material other than the listed products. We can manufacture extension and compensating cables for thermocouples with the same basic construction as contained in the catalog, cables which have different type of insulation and sheath materials.
In addition, depending on applications, we can manufacture multi-pair types of extension and compensating cables with flat / round shape and composite cable made up of different types of cable.
Since we are ready to comply with your requests, please contact our salespeople.

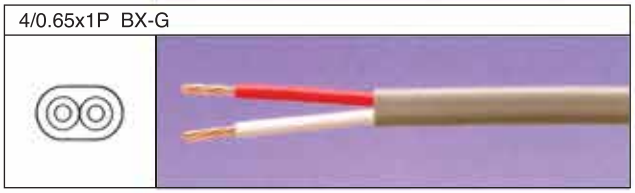
7/0.3x1P JX-Gm



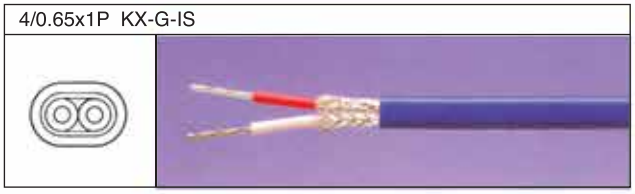
4/0.65x1P WX-G



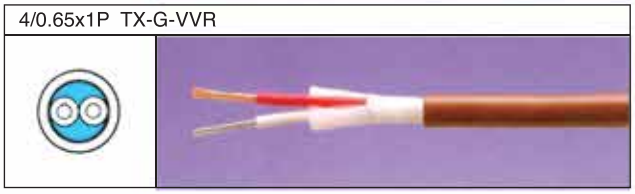
4/0.65x1P BX-G



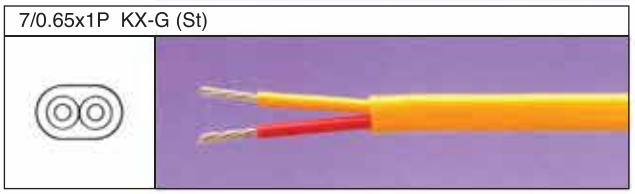
4/0.65x1P KX-G-IS



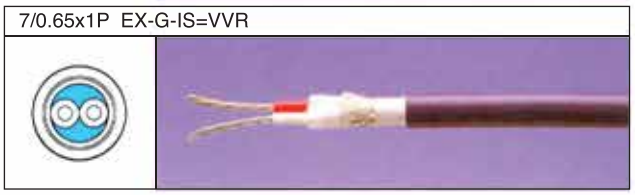
4/0.65x1P TX-G-VVR



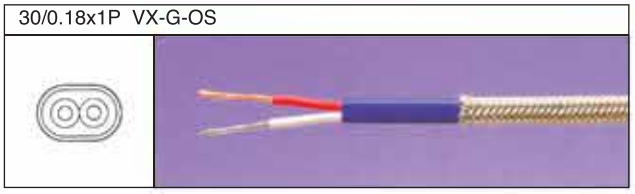
7/0.65x1P KX-G (St)



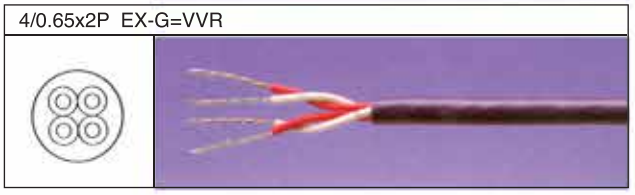
7/0.65x1P EX-G-IS=VVR



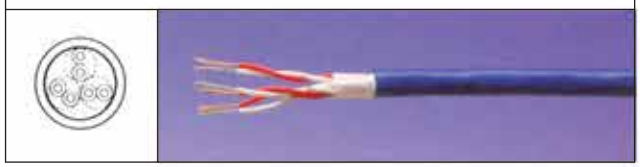
30/0.18x1P VX-G-OS



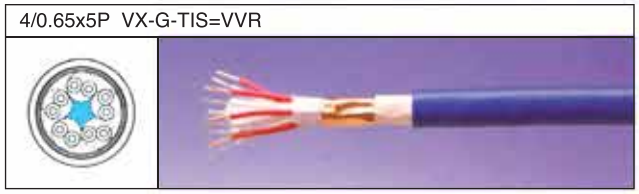
4/0.65x2P EX-G=VVR



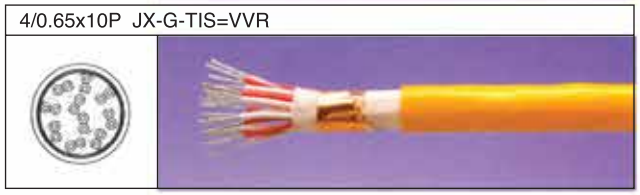
7/0.3x3P VX-G=VVR



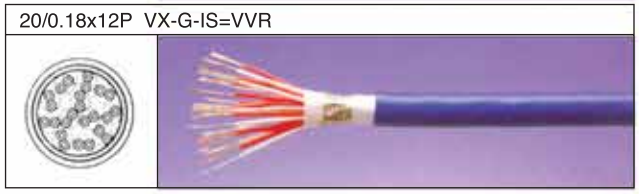
4/0.65x5P VX-G-TIS=VVR



4/0.65x10P JX-G-TIS=VVR

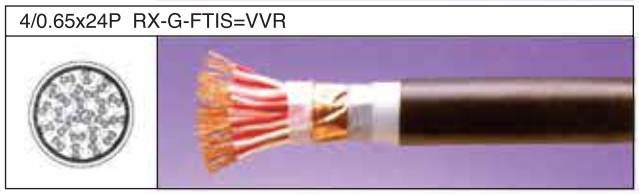


20/0.18x12P VX-G-IS=VVR



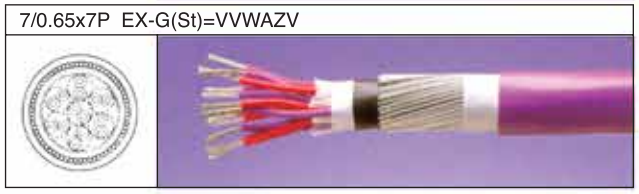
7/0.45x20P RX-G-TIS=VVR

4/0.65x24P RX-G-FTIS=VVR

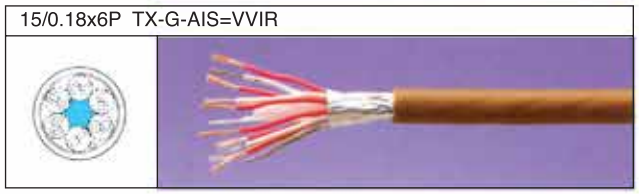


7/0.65x6P KX-G-IDTIS=VVR

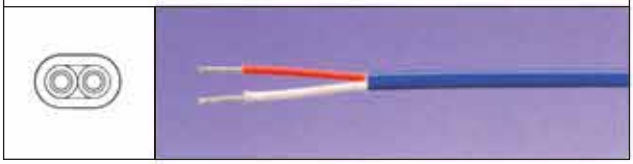
7/0.65x7P EX-G(St)=VVWAZV



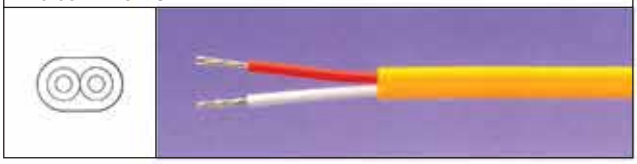
15/0.18x6P TX-G-AIS=VVIR



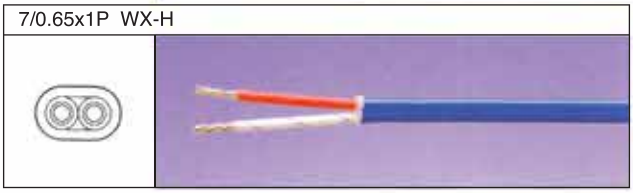
7/0.3x1P KX-H



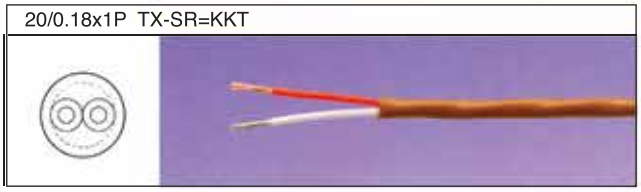
4/0.65x1P JX-SR



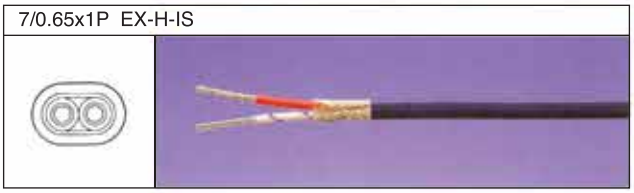
7/0.65x1P WX-H



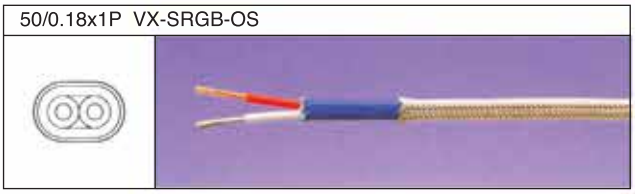
20/0.18x1P TX-SR=KKT



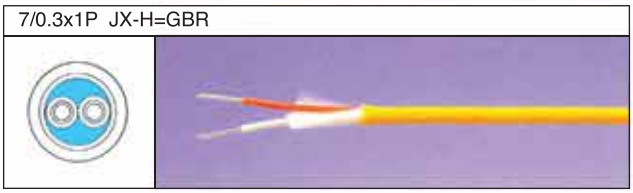
7/0.65x1P EX-H-IS



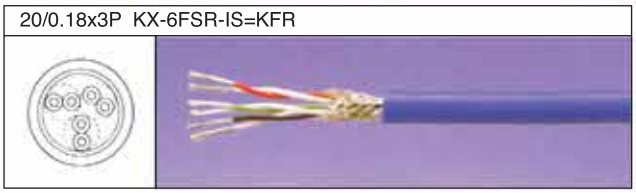
50/0.18x1P VX-SRGB-OS



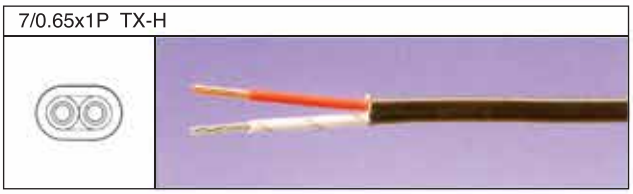
7/0.3x1P JX-H=GBR



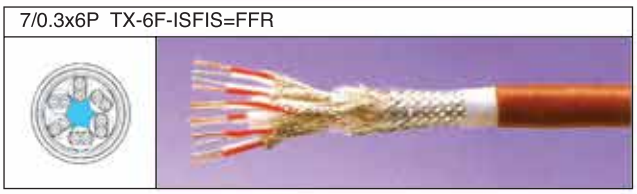
20/0.18x3P KX-6FSR-IS=KFR



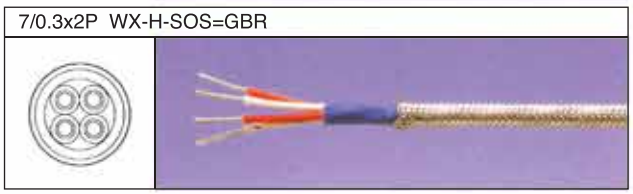
7/0.65x1P TX-H



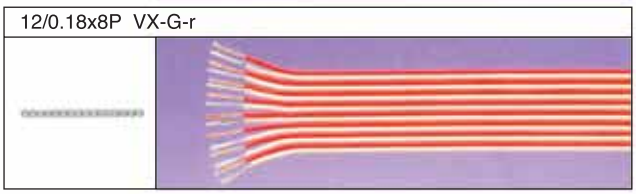
7/0.3x6P TX-6F-ISFIS=FFR



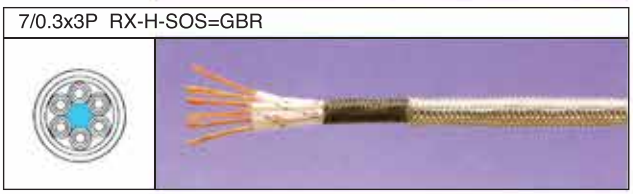
7/0.3x2P WX-H-SOS=GBR



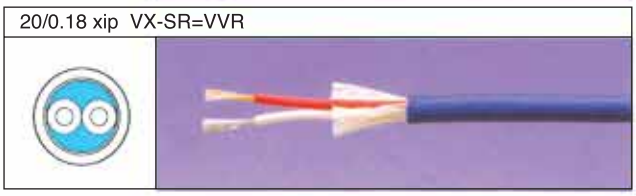
12/0.18x8P VX-G-r



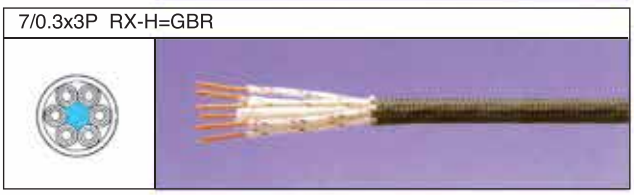
7/0.3x3P RX-H-SOS=GBR



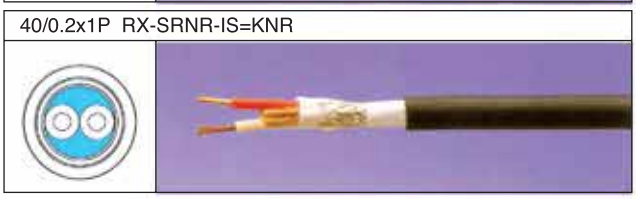
20/0.18 xip VX-SR=VVR



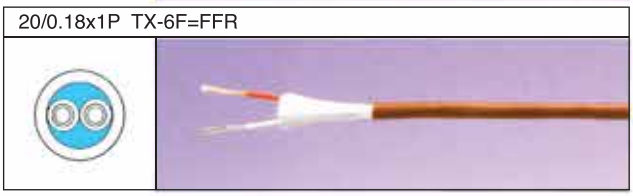
7/0.3x3P RX-H=GBR



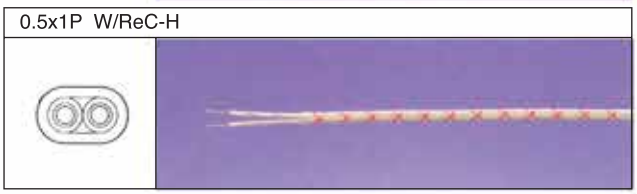
40/0.2x1P RX-SRNR-IS=KNR



20/0.18x1P TX-6F=FFR



0.5x1P W/ReC-H



INTERNATIONAL THERMOCOUPLE WIRE COLOUR CODE

ANSI Code	Alloy Combination + Lead	Alloy Combination - Lead	Maximum Temperature Range	EMF (mV) Over Max. Temperature Range	Limits of Error (Whichever is Greater) For new wire Standard	Limits of Error (Whichever is Greater) For new wire Special	International IEC 584-3	International IEC 584-3 Intrinsically safe	Colour Coding Thermocouple Grade	Colour Coding Extension Grade	CZECH BRITISH to BS 1843	DUTCH CERMAN to Din 43710	JAPANESE to JIS C1610-1981	FRENCH to NFE-18001	Comments Environment- Bare Wire	ANSI Code
J	IRON Fe (magnetic)	CONSTANTAN - COPPER-NICKEL Cu-Ni	-210 to 760ºC Thermocouple Grade 0 to 200ºC Extension Grade	-8.095 to 43.559	2.2ºC or 0.75%	1.1ºC or 0.4%									Reducing, Vacuum, Inert, Limited Use in Oxidizing at High Temperatures Not Recommended for Low Temperatures	J
K	NICKEL-CHROMIUM Ni-Cr	NICKEL-ALUMINUM Ni-Al (magnetic)	-270 to 1150ºC Thermocouple Grade 0 to 200ºC Extension Grade	-6.458 to 49.995	2.2ºC or 0.75% Above 0ºC 2.2ºC or 2.0% Below 0ºC	1.1ºC or 0.4%									Clean Oxidizing and Inert. Limited Use in Vacuum or Reducing. Becomes unstable from 1050ºC	K
V*	COPPER Cu	CONSTANTAN COPPER-NICKEL Cu-Ni	0 to 80ºC Extension Grade						NONE ESTABLISHED	NONE ESTABLISHED					Alternative to KX type extension wire for low temperatures; Not recommended for general use	V*
T	COPPER Cu	CONSTANTAN COPPER-NICKEL Cu-Ni	-270 to 400ºC Thermocouple Grade -60 to 100ºC Extension Grade	-6.258 to 20.872	1.0ºC or 0.75% Above 0ºC 1.0ºC or 1.5% Below 0ºC	0.5ºC or 0.4%									Mild Oxidizing, Reducing Vacuum or Inert. Good where Moisture is Present. Low Temperature and Cryogenic Applications	T
E	NICKEL-CHROMIUM Ni-Cr	CONSTANTAN COPPER-NICKEL Cu-Ni	-270 to 1000ºC Thermocouple Grade 0 to 200ºC Extension Grade	-9.835 to 76.373	1.7ºC or 0.5% Above 0ºC 1.7ºC or 1.0% Below 0ºC	1.0ºC or 0.4%									Oxidizing or Inert. Limited use in Vacuum or Reducing. Highest EMF Change per Degree	E
N	NICROSIL Ni-Cr-Si	NISIL Ni-Si-Mg	-270 to 1300ºC Thermocouple Grade 0 to 200ºC Extension Grade	-4.345 to 47.513	2.2ºC or 0.75% Above 0ºC 2.2ºC or 2.0% Below 0ºC	1.1ºC or 0.4%						NO STANDARD USE AMERICAN COLOUR CODES			Clean, Oxidizing, Inert, Reducing, Vacuum. More Stable up to 1300ºC	N
R	PLATINUM-13% RHODIUM Pt-13% Rh	PLATINUM Pt	-50 to 1768ºC Thermocouple Grade 0 to 150ºC Extension Grade	-0.226 to 21.101	1.5ºC or 0.25%	0.6ºC or 0.1%			NONE ESTABLISHED						Oxidizing or Inert. Do Nor Insert in Metal Tubes. Beware of Contamination. High Temperature	R
S	PLATINUM-10% RHODIUM Pt-10% Rh	PLATINUM Pt	-50 to 1768ºC Thermocouple Grade 0 to 150ºC Extension Grade	-0.236 to 18.693	1.5ºC or 0.25%	0.6ºC or 0.1%			NONE ESTABLISHED						Oxidizing or Inert. Do Nor Insert in Metal Tubes. Beware of Contamination. High Temperature	S
U*	COPPER Cu	COPPER LOW NICKEL Cu-Ni	0 to 50ºC Extension Grade						NONE ESTABLISHED						Extension grade connecting wire for R & S thermocouples; also known as RX and SX extension wire	U*
B	PLATINUM-30% RHODIUM Pt-30% Rh	PLATINUM-6% RHODIUM Pt-6% Rh	0 to 1820ºC Thermocouple Grade 0 to 100ºC Extension Grade	0 to 13.820	0.5% over 800ºC	NOT ESTABLISHED			NONE ESTABLISHED		NO STANDARD USE COPPER WIRE			NO STANDARD USE COPPER WIRE	Oxidizing or Inert. Do Not Insert in Metal Tubes. Beware of Contamination. High Temperature. Common Use in Glass Industry	B
G* (W)	TUNGSTEN W	TUNGSTEN 26% RHENIUM W-26% Re	0 to 2320ºC Thermocouple Grade 0 to 260ºC Extension Grade	0 to 38.564	4.5ºC to 425% 1.0% to 2320ºC	NOT ESTABLISHED			NONE ESTABLISHED		NO STANDARD USE AMERICAN COLOUR CODES				Vacuum, Inert, Hydrogen. Beware of Embrittlement. Not Practical Below 399ºC Not for Oxidizing Atmosphere	G* (W)
C* (W5)	TUNGSTEN-5% RHENIUM W-5% Re	TUNGSTEN 26% RHENIUM W-26% Re	0 to 2320ºC Thermocouple Grade 0 to 870ºC Extension Grade	0 to 37.066	4.5ºC to 425% 1.0% to 2320ºC	NOT ESTABLISHED			NONE ESTABLISHED		NO STANDARD USE AMERICAN COLOUR CODES				Vacuum, Inert, Hydrogen. Beware of Embrittlement. Not Practical Below 399ºC Not for Oxidizing Atmosphere	C* (W5)
D* (W3)	TUNGSTEN-3% RHENIUM W-3% Re	TUNGSTEN-25% RHENIUM W-25% Re	0 to 2320ºC Thermocouple Grade 0 to 260ºC Extension Grade	0 to 39.506	4.5ºC to 425% 1.0% to 2320ºC	NOT ESTABLISHED			NONE ESTABLISHED		NO STANDARD USE AMERICAN COLOUR CODES				Vacuum, Inert, Hydrogen. Beware of Embrittlement. Not Practical Below 399ºC Not for Oxidizing Atmosphere	D* (W3)

Float Switches

MALTEC-T

The stem of this liquid float switches contains a hermitically sealed reed switch. The float contains a permanent magnet. As the float rises or falls with the level of the liquid, the reed switch is activated by the magnet. The operation of the switch, normally open or normally closed, is easily changed by removing a retainer and inverting the float.

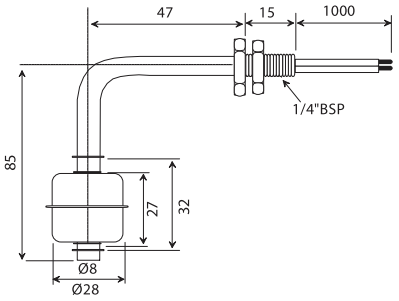
Features

- Compact design
- Low Cost
- High Reliability and Long switch life.

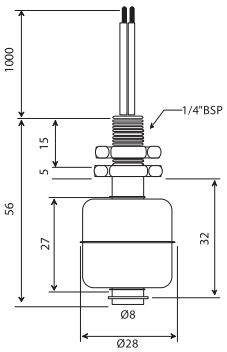
Application

- Marine Industry
- Power station equipment
- Automatic vending machine
- Food Industry
- Waste-water/pure water processing
- Small collection tanks

MLS-25S



MLS-5



Specification

Part Number	MLS-5 / MLS-25S
Material: Steam Float Retainer	316SS
Operating Temperature	-20 ~ 120°C
Pressure Rating	10 bar
Switch Rating	50VA / 240VAC
Maximum Carry Current	2.5A
Liquid Specific Gravity Min.	0.7
Lead Wire	PVC Wire, 1 Meter
Pull-in Value (PI)	20~60 AT
Drop-out Value (PI)	6min AT
Contact resistance (CR)	100 mΩ
Breakdown voltage	600 min (PI≥35)VDC
	500 min (PI 20 to 35)VDC
Insulation resistance	10^{10}minΩ
Electrostatic capacitance	0.5max pF
Contact rating	50W
	70VA
Maximum switching voltage	300VAC
	350VDC
Maximum switching current	DC0.7/AC0.5A

MALTEC-F Series Multi-level Float Switches

MALTEC-T

MT-F - Standard Type • MT-FH - Heavy Duty Type

Common Specifications

- Aluminium terminal head
- All wetted parts 316SS
- Multiple floats
- Operating temperature -55°C -+150°C
- High current ratings

MT-F (Standard)

- 1” table ‘D’ flange or 1” BSP plug
- Switching voltage: 250 VAC/200 VDC
- Switching current: 1 AMP AC/DC
- Switching power: 30W AC/DC
- Minimum voltage breakdown: 430 VDC

MT-FH (Heavy Guty)

- 2” table ‘D’ flange or 2” BSP plug
- Switching voltage: 250 VAC/200 VDC
- Switching current: 2 AMPS AC/DC
- Switching power: 50W AC/DC
- Minimum voltage breakdown: 500 VDC

Common options

- 316SS or plastic terminal head

MT-F Series

1” BSP Plug 1” table D’Flange

MT-FH Series

2” BSP Plug 2” table D’Flange

MT-F Series Ordering Information

MT-F- □ - □ - □ - □

Termination
H: Diecast head
L: Leads
(nominate length)
O: Other (specify)

Process Connection
F: 1" table D'flange
P: 1" BSP plug
O: Other (specify)

Number of Floats
1: 1 floats
2: 2 floats
3: 3 floats
4: 4 floats
5: 5 floats

Overall Length
1000: 1000mm
1500: 1500mm
XXXX: XXXXmm
(nominate

Additional ordering information required:
(see opposite page)
Switch Point Length (mm)

MT-FH Series Ordering Information

MT-FH- □ - □ - □ - □

Termination
H: Diecast head
L: Leads
(nominate length)
O: Other (specify)

Process Connection
F: 2" table D'flange
P: 2" BSP plug
O: Other (specify)

Number of Floats
1: 1 floats
2: 2 floats
3: 3 floats
4: 4 floats
5: 5 floats

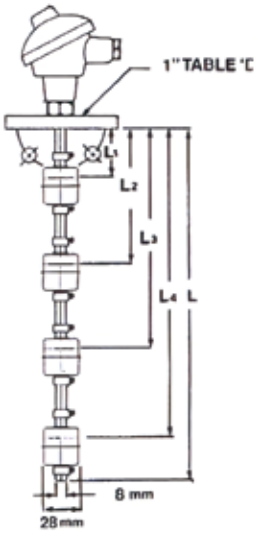
Overall Length
1000: 1000mm
1500: 1500mm
XXXX: XXXXmm
(nominate

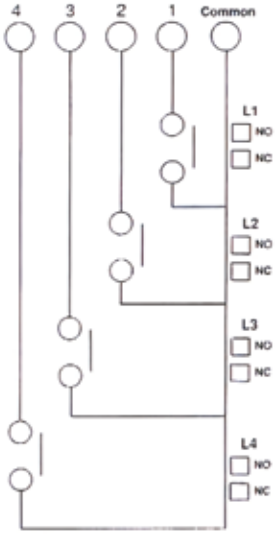
Additional ordering information required:
(see opposite page)
Switch Point Length (mm)

MT-F Series Ordering Specifications

1. Switch Point Length

2. Switch Operation (N.O or N.C)
Other circuit configuration available on request





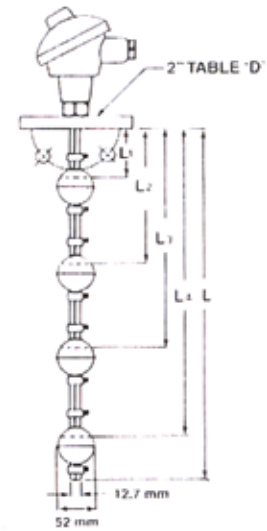
L1 = ... mm
L2 = ... mm
↓
L (overall length) = ... mm
etc.

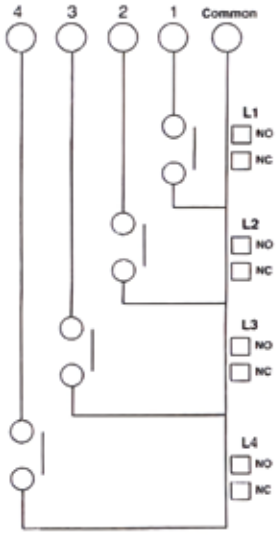
L1 = NO
L2 = NO
↓
L4 = NC
etc.

MT-FH Series Ordering Specifications

1. Switch Point Length

2. Switch Operation (N.O or N.C)
Other circuit configuration available on request





L1 = ... mm
L2 = ... mm
↓
L (overall length) = ... mm
etc.

L1 = NO
L2 = NO
↓
L4 = NC
etc.

MALTEC-T

CENTER 307 & 308

Handheld temperature instruments and plug-in probes to suit.

Model	Description	Calibration	Range
CENTER 307	Single input thermocouple	K	-200° ~ 1370°C
CENTER 308	Dual input thermocouple	K	-200° ~ 1370°C

Plug-In Probes

Model	Description	Max. Temp.	Response Time
ST39	Air probe : plug wire soldered beaded tip	150°C	-
ST31B	Surface probe	400°C	3 sec
ST33	L-Shape surface probe	400°C	3 sec
ST34A	Immersion probe	600°C	3 sec
ST38B	Air probe : enclosed	600°C	3 sec
ST35A	Metal roller probe	400°C	3 sec
ST35B	Teflon roller probe	400°C	3 sec

ST31B

ST33

ST34A

ST35A / ST35B

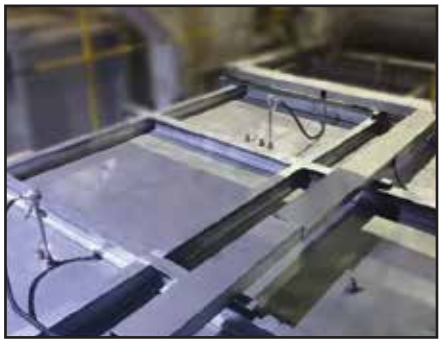
ST38B

ST39

Customised Temperature Sensor

Thermocouples in
Low-Pressure Die Casting

Temperature Sensor For
Steam Pipelines In
A Chemical Plant



Temperature Sensor For
Production Process

PT100 Sensor To Measure
The Oil Temperature

Temperature Monitoring In A
Continuous Casting Plant

Vibration-resistant Rtd Sensor
With Thermowell For
Power Plant

Our Certifications

MALTEC-T

30 YEARS OF EXCELLENCE


SGS

ISO 9001:2008

Standard Malaysia


SGS

ISO 9001:2008

UKAS


CERTIFICATE OF COMPLIANCE

UL Certificate


CERTIFICATE OF COMPLIANCE

UL Certificate


CERTIFICATE OF COMPLIANCE

UL Certificate


TCT

Certificate of Compliance

CE Certificate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KJCF
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Q. How many feet of T/C wire can I run?

A. For a specific instrument, check its specifications to see if there are any limits to the input impedance. However as a rule of thumb, limit the resistance to 100 Ohms resistance maximum, and this depends on the gauge of the wire; the larger the diameter, the less resistance/foot, the longer the run can be. However, if the environment is electrically noisy, then a transmitter may be required which transmits a 4-20 mA signal that can be run longer distances and is more resistant to noise.

Q. Should I use a grounded or ungrounded probe?

A. It depends on the instrumentation. If there is any chance that there may be a reference to ground (common in controllers with non-isolated inputs), then an ungrounded probe is required. If the instrument is a handheld meter, then a grounded probe can almost always be used.

Q. What size relay do I need to control my heaters?

A. This must be calculated from known parameters. Take the total wattage of heaters and divide this value in watts by the voltage rating of the heaters in volts. The answer will be in amperes, and solid state and mechanical relays are rated by "current rating" in amperes.

Q. Can I send my 4-20 mA control output to a chart recorder to monitor a process input?

A. No. A control output is designed to control a valve or some equivalent control device. If you need to send an analog signal to a recording device, then choose a controller that has a "retransmission or recorder output" option.

Q. Can I split my one T/C signal to two separate instruments?

A. No. The T/C signal is a very low-level millivolt signal, and should only be connected to one device. Splitting to two devices may result in bad readings or loss of signal. The solution is to use a "dual" T/C probe, or convert one T/C output to a 4-20 mA signal by using a transmitter or signal conditioner; then the new signal can be sent to more than one instrument.

Q. What are the accuracies and temperature ranges of the various thermocouples?

A. They are summarized in the tables on the first few pages of Section H. It is important to know that both accuracy and range depend on such things as the thermocouple alloys, the temperature being measured, the construction of the sensor, the material of the sheath, the media being measured, the state of the media (liquid, solid, or gas) and the diameter of either the thermocouple wire (if it is exposed) or the sheath diameter (if the thermocouple wire is not exposed but is sheathed).

Q. Why can't I use ANY multimeter for measuring temperature with thermocouples? What errors will result if I don't use a thermocouple temperature meter?

A. The magnitude of the thermoelectric voltage depends on the closed (sensing) end as well as the open (measuring) end of the particular thermocouple alloy leads. Temperature sensing instruments that use thermocouples take into account the temperature of the measuring end to determine the temperature at the sensing end. Most millivoltmeters do not have this capability, nor do they have the ability to do non-linear scaling to convert a millivoltage measurement to a temperature value. It is possible to use lookup tables to correct a particular millivoltage reading and calculate the temperature being sensed. However, the correction value needs to be continuously recalculated, as it is generally not constant over time. Small changes in temperature at the measuring instrument and the sensing end will change the correction value.

Q. How can I choose between thermocouples, resistance temperature detectors (RTD's), thermistors and infrared devices when measuring temperature?

A. You have to consider the characteristics and costs of the various sensors as well as the available instrumentation. In addition: THERMOCOUPLES generally can measure temperatures over wide temperature ranges, inexpensively, and are very rugged, but they are not as accurate or stable as RTD's and thermistors. RTD's are stable and have a fairly wide temperature range, but are not as rugged and inexpensive as thermocouples. Since they require the use of electric current to make measurements, RTD's are subject to inaccuracies from self-heating. THERMISTORS tend to be more accurate than RTD's or thermocouples, but they have a much more limited temperature range. They are also subject to self-heating. INFRARED SENSORS can be used to measure temperatures higher than any of the other devices and do so without direct contact with the surfaces being measured. However, they are generally not as accurate and are sensitive to surface radiation efficiency (or more precisely, surface emissivity). Using fiber optic cables, they can measure surfaces that are not within a direct line of sight.

Q. What are the two most often overlooked considerations in selecting an infrared temperature measuring device?

A. The surface being measured must fill the field of view, and the surface emissivity must be taken into account.

Q. What are the best ways of overcoming electrical noise problems?

A. 1) Use low noise, shielded leads, connectors and probes. 2) Use instruments and connectors that suppress EMI and RF radiation. 3) Consider using analog signal transmitters, especially current transmitters. 4) Evaluate the possibility of using digitized signals.

Q. If a part is moving, can I still measure temperature?

A. Yes. Use infrared devices or direct contacting sensors plus a slip ring assembly.

Q. Can a two-color infrared system be used to measure low emissivity surfaces?

A. Only if at high temperature, say, above 700°C (1300°F).

Q. What error will result if the spot size of the infrared pyrometer is larger than the target size?

A. It would be indeterminate. The value would be a weighted average that wouldn't necessarily be repeatable.

Q. What readout should be used with the OS36, OS37 and OS38 units?

A. Using the DP5000, BS6000, or the HH-200 would be best.

www.dpstar.com.my

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