MANOTHERM LIMITED

THE CONTROL CENTRES

Thermocouples and Resistance Thermometers

Catalogue Contents

Thermocouples

Resistance Thermometers

Thermocouple Introduction & Thermometry

Thermocouples can be manufactured in many styles, from a simple welded junction joining two dissimilar metals with extension leads to Mineral Insulated Sensors with Waterproof Connecting Heads and Stainless Steel adjustable process fittings. The Thermocouples described on the following pages cover many designs and are suitable for a wide range of installations.

The information below is a guide to help select the Thermocouple best suited for various applications along with some definitions.

When connecting Thermocouples in order to maintain the accuracy of any given measuring system it is imperative that the correct Extension or Compensating Cable is used. A definition of Compensating Cable and Extension Cable is given below.

Glossary of Definitions

THERMOELECTRIC (SEEBECK) EFFECT

The production of an Electromotive Force (E), due to the difference of temperature between two junctions of different metals or alloys forming part of the same circuit.

THERMOCOUPLE

A pair of conductors of dissimilar materials joined at one end and forming part of an arrangement using the thermoelectric effect for temperature measurement.

MEASURING JUNCTION

That junction which is subjected to the temperature to be measured.

REFERENCE JUNCTION

That junction of the thermocouple which is at a known (reference) temperature to which the measuring temperature is compared.

REFERENCE TEMPERATURE

For the tables of this document, the reference temperature is 0 °C.

Thermocouple Type Letter Designations

The following letter designations are established for thermocouple wire combinations as follows:

Letter	Thermocouple type	Temp Range °C
T	Copper/copper-nickel	-150 to + 350
J	Iron/copper-nickel	0 to +700
K	Nickel-chromium/nickel-aluminium	0 to +1200
N	Nickel-chromium-silicon/nickel-silicon	0 to +1250
S	Platinum 10% rhodium/platinum	0 to +1500
R	Platinum 13% rhodium/platinum	0 to +1600

When identifying noble or base metal thermocouples by their nominal alloy combinations, the positive leg will be listed first.

EXTENSION CABLES

Extension cables are manufactured from conductors having the same nominal composition as those of the corresponding thermocouple. They are designated by the letter "X" following the designation of the thermocouple, for example "JX"

COMPENSATING CABLES

Compensating cables are manufactured from conductors having a different composition from the corresponding thermocouple. They are designated by a letter "C" following the designation of the thermocouple, for example "KC". Different alloys may be used for the same thermocouple type. These are distinguished by using additional letters, for example, KCA and KCB.

Tolerance Classes for Thermocouples

(reference junction at 0 °C)

Types	Tolerance Class 1	Tolerance Class 2
TYPE T		
Temperature range	-40 °C to +125 °C	-40 °C to +133 °C
Tolerance value	±0.5 °C	±1 °C
Temperature range	125 °C to 350 °C	133 °C to 350 °C
Tolerance value	±0.4%	±0.75%
TYPE J		
Temperature range	-40 °C to +375 °C	-40 °C to +333 °C
Tolerance value	±1.5 °C	±2.5 °C
Temperature range	375 °C to 750 °C	333 °C to 750 °C
Tolerance value	±0.4%	±0.75%
Type K, Type N		
Temperature range	-40 °C to 375 °C	40 °C to +333 °C
Tolerance value	±1.5 °C	±2.5 °C
Temperature range	375 °C to 1200 °C	333 °C to 1200 °C
Tolerance value	±0.4%	±0.75%
Type R, Type S		
Temperature range	0 °C to 1100 °C	0 °C to +600 °C
Tolerance value	±1 °C	±1.5 °C
Temperature range	1100 °C to 600 °C	600 °C to 1600 °C
Tolerance value	±(1 + 3% of T -1100) °C	±0.25%

Thermocouple Application Guide

IMMERSION DEPTH - The required depth of probe immersion at which no incorrect reading will occur due to insufficient immersion. For information on specific probe constructions please consult our office.

RESPONSE TIMES - The time in which the probe will attain a proportion of the final medium temperature. Normally quoted as the time taken to achieve 63.2% of a step temperature change. The probe construction, i.e. isolated or grounded junction, application and environment will affect response times. For further information please contact our office with details of your application.

TYPE T - Copper/Copper-Nickel - 150 to 350 °C

Widely used to measure low temperatures and in applications where moisture is present. May be used in oxidising, or reducing atmospheres.

TYPE J - Iron /Copper-Nickel - 0 to 700°C

May be used in oxidising atmospheres limited to below 500°C in sulphurous atmospheres. Iron conductor liable to rust at low temperatures (Ice point and below).

TYPE K - Nickel-Chromium/Nickel-Aluminium - 0 to 1200 °C

Widely used thermocouple with a useful measuring range. Not recommended for Sulphur Bearing atmospheres or reducing atmospheres but good resistance to Oxidising atmosphere.

TYPE N - Nickel-Chromium-Silicon/Nickel-Silicon - 0 to 1250 °C

Very good resistance to oxidising atmospheres and may be used when good stability at high temperatures is required.

TYPE R/S -
Platinum - 10% Rhodium/Platinum 0 to 1500 °C
Platinum - 13% Rhodium/Platinum 0 to 1600 °C

Recommended for very high temperature use in oxidising atmospheres. For some applications a secondary ceramic protective sheath is recommended. The application guide above gives recommendations appertaining to the primary thermocouple wire. When protected by the appropriate outer sheath some of the limitations given can be overcome.

Thermocouple Ordering Codes

The Product codes given to sensors and accessories throughout this catalogue are constructed to specify the product in a logical sequence, help the user to define the sensor and ensure that the final specification contains all of the component parts required.

For example on Page 3 details of the TC GP FL Thermocouple are shown.

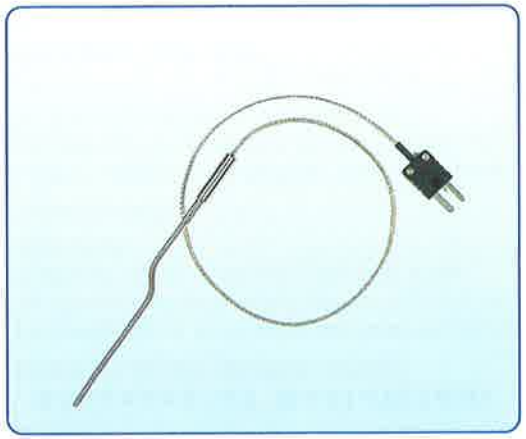
The Generic Heading TC GP FL covers Thermocouples - General Purpose with Flying Leads.

A typical Part No. would be:

TC GP FL K J B D30 SL200 LL1000 LIL5 TT6 FF2

The sensor description would be: TC GP FL Calibration Type K, Junction bonded, Sheath diameter 3.0mm, Sheath length 200mm, Lead Length 1 metre, Lead insulation Glass Braided/Tin Copper Braided Outer, Termination STD T/C Socket with 1/8" BSP Stainless Steel Fitting.

Thermocouples TC MI FL



The TC MI FL series of Mineral Insulated thermocouples comprises of a range of high quality multi purpose probes. Sheaths are manufactured in ductile sheath material in a choice of sizes and are connected to various types of flying leads. Having a maximum temperature of 1250°C they are suitable for many applications. An indication of suitable applications is given below.

316 stainless steel - Excellent corrosion resistance often specified for food and medical applications.

321 stainless steel - Good corrosion resistance and high ductility. Widely used in industry.

310 stainless steel - Good corrosion resistance at high temperatures and recommended for use in sulphurous atmospheres.

600 Inconel alloy - Good resistance to oxidation and extremely corrosive atmospheres at high temperature. Not recommended for use in sulphurous atmospheres.

Nicrobell - Recommended for use with type N conductors. Nicrobell is a Ni/Ch/Si alloy that is suitable for use in reducing, oxidising and vacuum atmospheres.

TC MI FL THERMOCOUPLE 1MM DIA WITH P1 POT SEAL, ST/ST BRAID FLYING LEAD AND MINIATURE T/C SOCKET (T4)

TC MI FL THERMOCOUPLE 3MM DIA WITH P2 POT SEAL ST/ST AND 50MM SINGLE WIRE TEFLON COATED (T1)

TC MI FL THERMOCOUPLE 6MM DIA WITH HELICOIL SHEATHED FLYING LEAD AND CONNECTOR BLOCK WITH THERMOCOUPLE MATERIAL TERMINALS (T7)

ORDER CODE

TC MI FL - J - D -- SL ---- SM --- P -- LL ---- LI -- T -- F --

The order code information below is shown as a guide to specifying the probe.

Please contact our sales office if any features that you require are not shown.

CALIBRATION TYPE

K
N
J
T

JUNCTION TYPE

Type	Code
Insulated	I
Grounded	G

SHEATH DIAMETER

Size	Code
1.0mm	10
1.5mm	15
2.0mm	20
3.0mm	30
4.5mm	45
6.0mm	60

SHEATH LENGTH

Size	Code
50mm	0050
75mm	0075
100mm	0100
200mm	0200
250mm	0250
300mm	0300
400mm	0400
500mm	0500
750mm	0750
1mtr	1000
2mtr	2000
3 mtr	3000
5 mtr	5000

SHEATH MATERIAL & TEMPERATURE

Type	Max Temp °C	Code
316 st/st	800	316
321 st/st	800	321
310 st/st	1100	310
INC 600	1100	600
Nicrobell	1250	NBL

POT SEAL

Type	Code
6.3mm x 25mm	P1
For sheaths up to 3.0mm	
8.0mm x 25mm	P2
With 8 x 1mm ISO thread	
for sheaths up to 3.0mm	
10.0mm x 25mm	P3
For sheaths 3mm to 6mm dia	

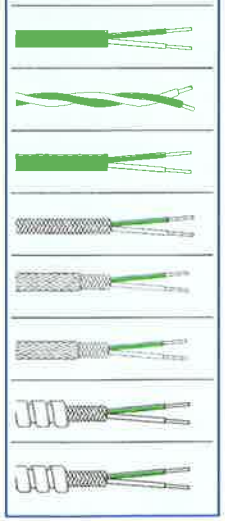
LEAD LENGTH

Length	Code
250mm	0250
500mm	0500
1.0mtr	1000
1.5mtr	1500
2.0mtr	2000
3.0mtr	3000
4.0mtr	4000
5.0mtr	5000

LEAD INSULATION

	Max. Temp	Code
PVC leads/PVC Outer	100°C	L1
Teflon Twisted	260°C	L2
Teflon leads/Teflon outer	260°C	L3
Glass Braided	400°C	L4
Glass braided/ tin copper braid outer	400°C	L5
Glass braided/ st/st braid outer	400°C	L6
Glass braided/ Galv helicoil outer	400°C	L7
Glass braided/ st/steel helicoil outer	400°C	L8

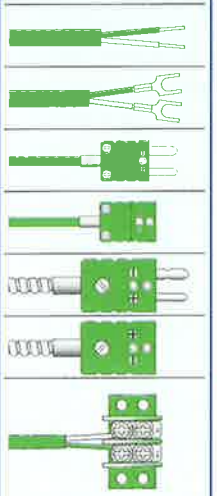
LEAD INSULATION



TERMINATION TYPE

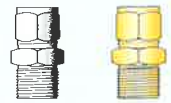
	Code
50mm tails	T1
T/C spade terminals	T2
Miniature T/C plug	T3
Miniature T/C socket	T4
Std T/C plug	T5
Std T/C socket	T6
T/C connector block (with thermocouple material terminals)	T7

TERMINATION TYPE



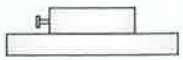
FITTINGS

Size/Code	St/St	Brass
No fitting	F0	F0
1/8" BSPT	F1	F7
1/8" BSP	F2	F8
1/4"BSPT	F3	F9
1/4" BSP	F4	F10
1/2" BSPT	F5	F11
1/2" BSP	F6	F12



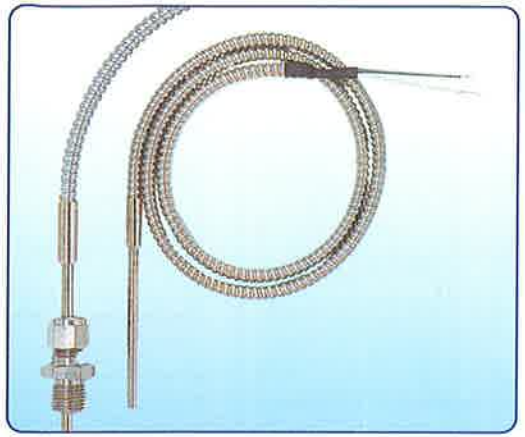
Compression Fittings

Flange 50mm dia	F13	F14



These sensors are supplied, as standard, to Thermocouple Class 1 providing greater accuracy.

Thermocouples TC GP FL



The GP FL series of thermocouples comprises of a range of high quality low cost general purpose probes.

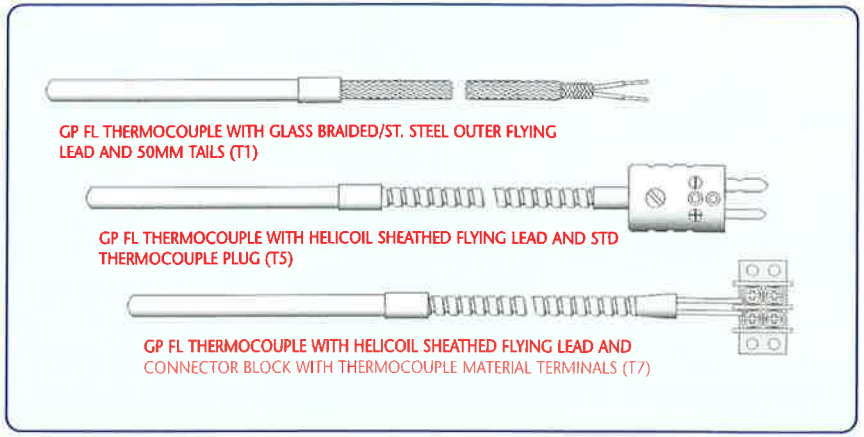
Sheaths are manufactured in 316 stainless steel in a choice of sizes, connected to various types of flying leads.

Having a maximum tip temperature of 400°C they are suitable for many applications.

A wide variety of installation fittings are available along with a choice of wire terminations.

The sheaths are available in 3mm, 4.5mm or 6mm diameters.

These thermocouples are supplied, as standard, to Thermocouple Tolerance Class 1 for greater accuracy.



ORDER CODE

TC GP FL - J - D -- SL --- LL ---- LI -- T -- F --

The order code information below is shown as a guide to specifying the probe.

Please contact our sales office if any features that you require are not shown.

CALIBRATION TYPE

K
J
T

JUNCTION TYPE

Type	Code
Insulated	I
Grounded	G

Grounded junctions have a silver soldered tip

SHEATH DIAMETER

Size	Code
3.0mm	30
4.5mm	45
6.0mm	60

SHEATH LENGTH

Size	Code
50mm	050
100mm	100
200mm	200
250mm	250
300mm	300
400mm	400

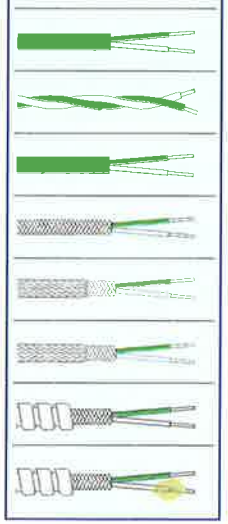
LEAD LENGTH

Length	Code
250mm	0250
500mm	0500
1.0mtr	1000
1.5mtr	1500
2.0mtr	2000
3.0mtr	3000
4.0mtr	4000
5.0mtr	5000

LEAD INSULATION

	Max. Temp	Code
PVC leads/PVC Outer	100°C	L1
Teflon Twisted	260°C	L2
Teflon leads/Teflon outer	260°C	L3
Glass Braided	400°C	L4
Glass braided/ tin copper braid outer	400°C	L5
Glass braided/ st/st braid outer	400°C	L6
Glass braided/ Galv helicoil outer	400°C	L7
Glass braided/ st/steel helicoil outer	400°C	L8

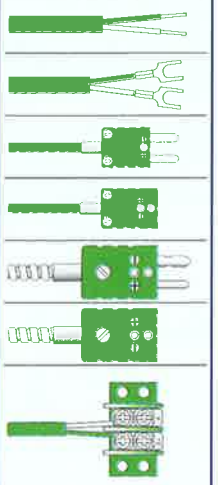
LEAD INSULATION



TERMINATION TYPE

	Code
50mm tails	T1
T/C spade terminals	T2
Miniature T/C plug	T3
Miniature T/C socket	T4
Std T/C plug	T5
Std T/C socket	T6
T/C connector block (with thermocouple material terminals)	T7

TERMINATION TYPE



FITTINGS

Size		Code
No fitting	st/st	F0
1/8 inch BSPT	st/st	F1
1/8 inch BSP	st/st	F2
1/4 inch BSPT	st/st	F3
1/4 inch BSP	st/st	F4
1/2 inch BSPT	st/st	F5
1/2 inch BSP	st/st	F6
No fitting	Brass	F0
1/8 inch BSPT	Brass	F7
1/8 inch BSP	Brass	F8
1/4 inch BSPT	Brass	F9
1/4 inch BSP	Brass	F10
1/2 inch BSPT	Brass	F11
1/2 inch BSP	Brass	F12
Flange 50mm dia	st/st	F13
Flange 50mm dia	Brass	F14

FITTINGS

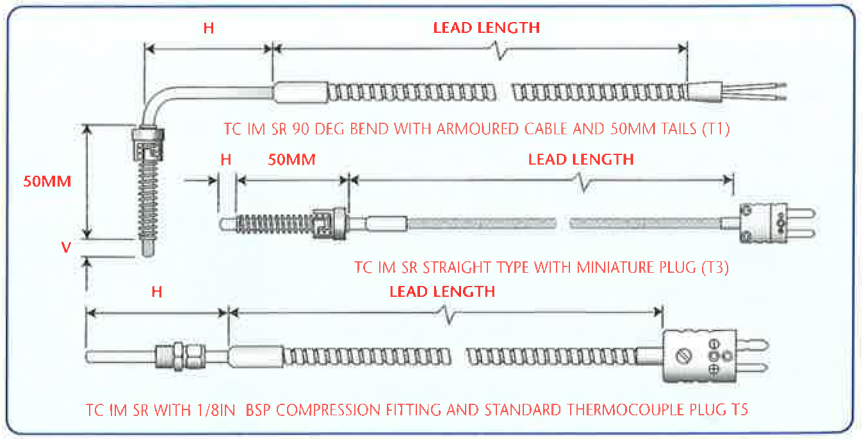
Thermocouples TC IM SR

The TC IM SR Range of Thermocouples are designed primarily for use in plastics machinery although they are suitable for many temperature measuring applications. They are commonly used in Injection Moulding Machines, Plastic Extruders and Moulding Tools etc.

The thermocouples are ruggedly constructed having a stainless steel sheath housing multi-stranded glass insulated thermocouple wire. The flexible extension is protected by a choice of Insulation and covering. All thermocouples are coded by coloured tails to identify the calibration of the element. (IEC colour coded.) Double (DUPLEX) elements are available.

The standard probe diameter is 4.76mm (3/16"), 3.2mm (1/8"), 4.5 & 3.0mm diameters are offered as alternatives. Maximum operating temperature for the standard range is 400°C although higher ranges are made to order.

These Thermocouples are all supplied, as standard, to Thermocouple Tolerance Class 1 for greater accuracy.



ORDER CODE

TC IM SR - E - J - D -- B - H --- V --- B - LL ---- LI -- T -- F --

The order code information below is shown as a guide to specifying the probe. Please contact our sales office if any features that you require are not shown.

CALIBRATION TYPE

K
J
T

ELEMENTS

Type	Code
Single	S
Duplex	D

JUNCTION TYPE

Type	Code
Insulated	I
Grounded	G

Grounded junctions have a silver soldered tip

SHEATH DIAMETER

Size	Code
3.00mm	30
3.2mm (1/8")	32
4.50mm	45
4.76mm (3/16")	48

SHEATH STYLE

Description	Code
90° Bend	Y
Straight Sheath	N

HORIZONTAL SHEATH LENGTH

Insert dimension in mm

Example	Code
5mm	005
50mm	050
500mm	500

VERTICAL SHEATH LENGTH

Insert dimension in mm

Example	Code
8mm	008
80mm	080
800mm	800

Only applicable to 90º bent probes, if sheath is straight with no vertical dimension

insert	XXX

BAYONET FITTING

Description	Code
With Bayonet assembly	Y
Without Bayonet assembly	N

Standard Bayonet Cap I/D 11.5mm Please note Bayonet assembly (cap & spring) is 50mm long. H & V dimensions are additional lengths.

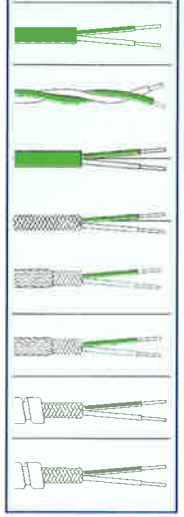
LEAD LENGTH

Length	Code
250mm	0250
500mm	0500
1.0mtr	1000
1.5mtr	1500
2.0mtr	2000
3.0mtr	3000
4.0mtr	4000
5.0mtr	5000

LEAD INSULATION

	Max. Temp	Code
PVC leads/PVC Outer	100°C	L1
Teflon Twisted	260°C	L2
Teflon leads/Teflon outer	260ºC	L3
Glass Braided	400°C	L4
Glass braided/ tin copper braid outer	400°C	L5
Glass braided/ st/st braid outer	400°C	L6
Glass braided/ Galv helicoil outer	400°C	L7
Glass braided/ st/steel helicoil outer	400°C	L8

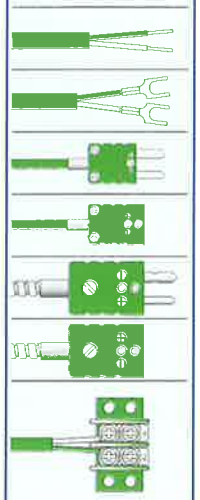
LEAD INSULATION



TERMINATION TYPE

	Code
50mm tails	T1
T/C spade terminals	T2
Miniature T/C plug	T3
Miniature T/C socket	T4
Std T/C plug	T5
Std T/C socket	T6
T/C connector block (with thermocouple material terminals)	T7

TERMINATION TYPE



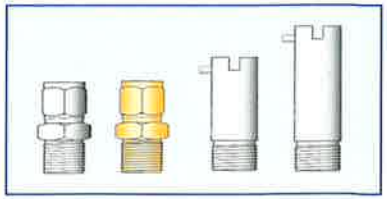
COMPRESSION FITTINGS

Size/Code	St/St	Brass
No fitting	F0	F0
1/8" BSPT	F1	F7
1/8" BSP	F2	F8
1/4"BSPT	F3	F9
1/4" BSP	F4	F10

BAYONET ADAPTORS

STYLE 1

Thread	O/D	No of Pegs	Length	Code
1/8" BSP	11mm	1 Peg	24mm	B1
1/8" BSP	11mm	1 Peg	35mm	B2



Thermocouples TC IM WB

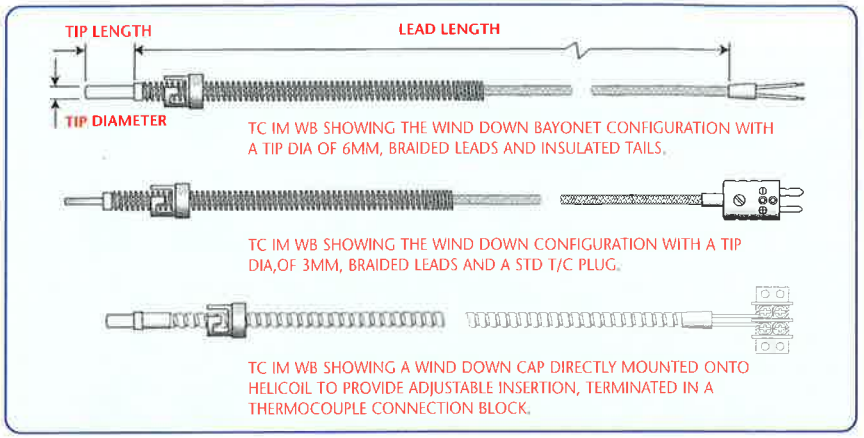
The TC IM WB Series of Thermocouples comprises of a range of probes with adjustable bayonet fittings.

The insertion length of the probe is variable by means of a Bayonet Cap that can be wound along a compression spring to give fine adjustment over a large immersion range.

They are available with a choice of lead insulation and termination as shown in the order code below.

In addition to being specified in many new applications the very wide range of Bayonet Caps available means it is often possible to retro fit these probes into existing machines, primarily in the Plastics Industry. A range of bayonet adaptors is also available.

The thermocouple element/cable are supplied, as standard, to Thermocouple Tolerance Class 1 for greater accuracy.



TC IM WB SHOWING THE WIND DOWN BAYONET CONFIGURATION WITH A TIP DIA OF 6MM, BRAIDED LEADS AND INSULATED TAILS.

TC IM WB SHOWING THE WIND DOWN CONFIGURATION WITH A TIP DIA,OF 3MM, BRAIDED LEADS AND A STD T/C PLUG.

TC IM WB SHOWING A WIND DOWN CAP DIRECTLY MOUNTED ONTO HELICOIL TO PROVIDE ADJUSTABLE INSERTION, TERMINATED IN A THERMOCOUPLE CONNECTION BLOCK.

ORDER CODE

TC IM WB - J - D -- TL -- B --- SP --- LL ---- LI -- T --

CALIBRATION TYPE

K
J
T

JUNCTION TYPE

Type	Code
Insulated	I
Grounded	G

TIP DIAMETER

Size	Code
3.00mm	30
4.50mm	45
4.80mm	48
6.00mm	60

TIP LENGTH

Insert dimension in mm

Example	Code
5mm	05
10mm	10
12mm	12
etc.	

BAYONET CAP

Description		Code
Single slot	10mm ID	BC1
Double slot	10mm ID	BC2
Single slot	11.5mm ID	BC3
Double slot	12.5mm ID	BC4
Double slot	15mm ID	BC5
Single slot	11.5mm ID	BC6
Double slot	15mm ID	BC7
Double slot	14mm ID	BC8
Double slot	15mm ID	BC9
Double slot	16mm ID	BC10
Double slot	17mm ID	BC11
2 Peg	10mm OD	BC12
2 Peg	12mm OD	BC13

BC6/BC7 are wound onto the helicoil outer

SPRING LENGTH

Length	Code
100mm	100
150mm	150
180mm	180
300mm	300

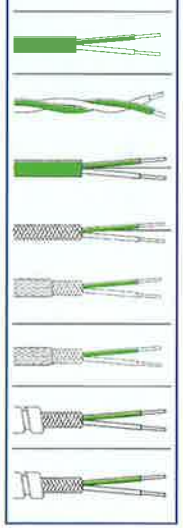
LEAD LENGTH

Length	Code
250mm	0250
500mm	0500
1.0mtr	1000
1.5mtr	1500
2.0mtr	2000
3.0mtr	3000
4.0mtr	4000
5.0mtr	5000

LEAD INSULATION

	Max. Temp	Code
PVC leads/PVC Outer	100°C	L1
Teflon Twisted	260°C	L2
Teflon leads/Teflon outer	260°C	L3
Glass Braided	400°C	L4
Glass braided/ tin copper braid outer	400°C	L5
Glass braided/ st/st braid outer	400°C	L6
Glass braided/ Galv helicoil outer	400°C	L7
Glass braided/ st/steel helicoil outer	400°C	L8

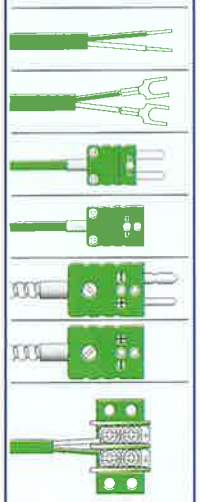
LEAD INSULATION



TERMINATION TYPE

	Code
50mm tails	T1
T/C spade terminals	T2
Miniature T/C plug	T3
Miniature T/C socket	T4
Std T/C plug	T5
Std T/C socket	T6
T/C connector block (with thermocouple material terminals)	T7

TERMINATION TYPE



The order code information above is shown as a guide to specifying the probe.

Please contact our sales office if any features that you require are not shown.

The range of bayonet caps & adaptors are from our standard range - others can be manufactured to your requirements.

BAYONET ADAPTORS

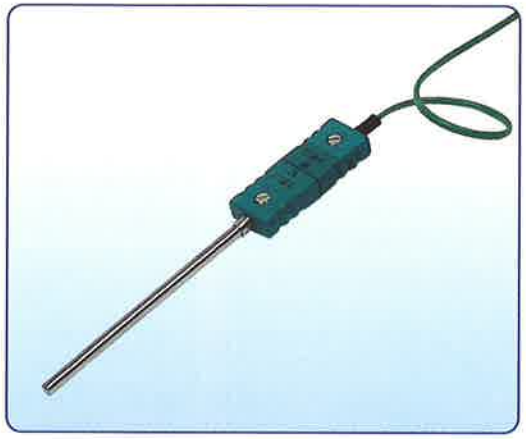
STYLE 1

Thread	O/D	No of Pegs/Slots	Length	Code
1/8" BSP	11mm	1 Peg	24mm	B1
1/8" BSP	11mm	1 Peg	35mm	B2
1/8" BSP	11mm	1 Peg	48mm	B3
1/8" BSP	11mm	1 Peg	22mm	B4
1/8" BSPT	11mm	2 Pegs	22mm	B5
1/8" BSPT	11mm	1 Peg	35mm	B6
1/8" BSPT	11mm	1 Peg	22mm	B7
1/8" BSPT	11mm	2 Pegs	70mm	B8
1/8" NPT	11mm	1 Peg	22mm	B9
M10x1	11mm	2 Pegs	22mm	B10
STYLE 2				
M12x1.5	12mm	2 Pegs	50mm	B11
M14x1.5	14mm	2 Slots	50mm	B12
M14x1.5	14mm	2 Slots	60mm	B13
M14x1.5	14mm	2 Pegs	50mm	B14
M14x1.5	14mm	2 Pegs	60mm	B15

BAYONET ADAPTORS

STYLE 1 STYLE 2

Thermocouples TC MI PS



The TC MI PS series of thermocouples consists of a range of Minerally Insulated Thermocouples which are terminated directly onto either a plug or a socket that has contacts of thermocouple material. They are available in a range of sheath materials, a variety of sheath lengths and diameters.

Having a maximum temperature of 1250°C they are suitable for many applications. An indication of suitable applications is given below.

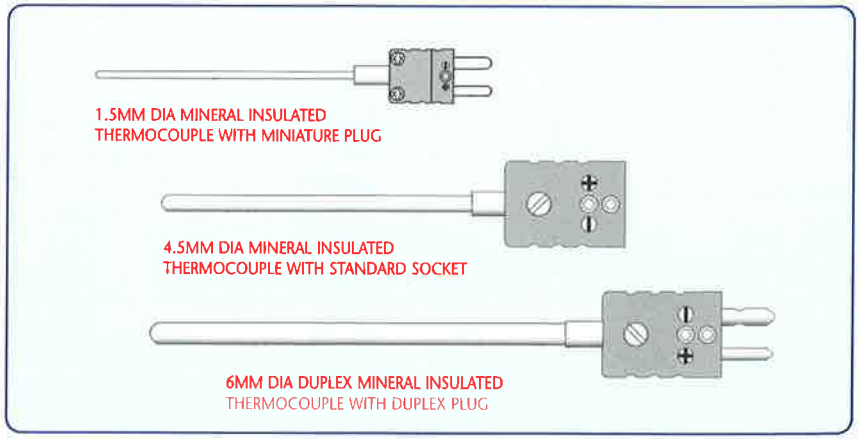
316 stainless steel - Excellent corrosion resistance often specified for food and medical applications.

321 stainless steel - Good corrosion resistance and high ductility. Widely used in industry.

310 stainless steel - Good corrosion resistance at high temperatures and recommended for use in sulphurous atmospheres.

600 Inconel alloy - Good resistance to oxidation and extremely corrosive atmospheres at high temperature. Not recommended for use in sulphurous atmospheres.

Nicrobell - Recommended for use with type N conductors. Nicrobell is a Ni/Ch/Si alloy that is suitable for use in reducing, oxidising and vacuum atmospheres.



All our thermocouples are supplied, as standard, to Class 1 tolerance for improved accuracy.

ORDER CODE

TC MI PS - E - J - SM --- D -- SL ---- T -- F --

The order code information below is shown as a guide to specifying the probe.

Please contact our sales office if any features that you require are not shown.

CALIBRATION TYPE

K
N
J
T

ELEMENTS

Type	Code
Single	S
Duplex	D

JUNCTION TYPE

Type	Code
Insulated	I
Grounded	G

SHEATH MATERIAL & TEMPERATURE

Type	Code	Max Temp °C
316 st/st	316	800
321 st/st	321	800
310st/st	310	1100
INC 600	600	1100
Nicrobell	NBL	1250

SHEATH DIAMETER

Size	Code
1.0mm	10
1.5mm	15
2.0mm	20
3.0mm	30
4.5mm	45
6.0mm	60

Duplex available for 3.0, 4.5 & 6mm sheaths

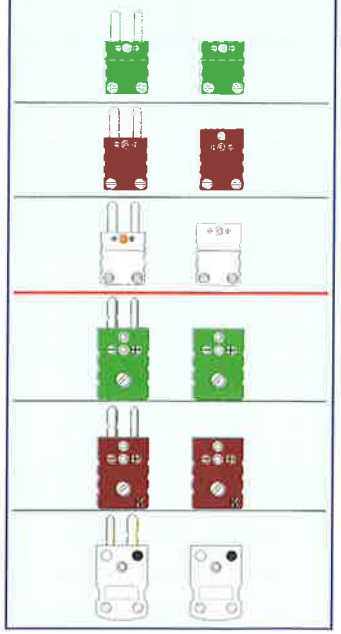
SHEATH LENGTH

Size	Code
50mm	0050
75mm	0075
100mm	0100
200mm	0200
250mm	0250
300mm	0300
400mm	0400
500mm	0500
750mm	0750
1mtr	1000
2mtr	2000
3 mtr	3000
5 mtr	5000

TERMINATION TYPE & TEMPERATURE

Type	Code	Max Temp °C
Mini T/C Plug	T1	200
Mini T/C Socket	T2	200
Mini T/C Plug High Temperature Plastic	T3	350
Mini T/C Socket High Temperature Plastic	T4	350
Mini T/C Plug Ceramic	T5	600
Mini T/C Socket Ceramic	T6	600
Std. T/C Plug	T7	200
Std. T/C Socket	T8	200
Std. T/C Plug High Temperature Plastic	T9	350
Std. T/C Socket High Temperature Plastic	T10	350
Std. T/C Plug Ceramic	T11	600
Std. T/C Socket Ceramic	T12	600

TERMINATION TYPE



FITTINGS

Size		Code
No fitting	St/St	F0
1/8 inch BSPT	St/St	F1
1/8 inch BSP	St/St	F2
1/4 inch BSPT	St/St	F3
1/4 inch BSP	St/St	F4
1/2 inch BSPT	St/St	F5
1/2 inch BSP	St/St	F6
No fitting	Brass	F0
1/8 inch BSPT	Brass	F7
1/8 inch BSP	Brass	F8
1/4 inch BSPT	Brass	F9
1/4 inch BSP	Brass	F10
1/2 inch BSPT	Brass	F11
1/2 inch BSP	Brass	F12
Flange 50mm dia	St/St	F13
Flange 50mm dia	Alum	F14

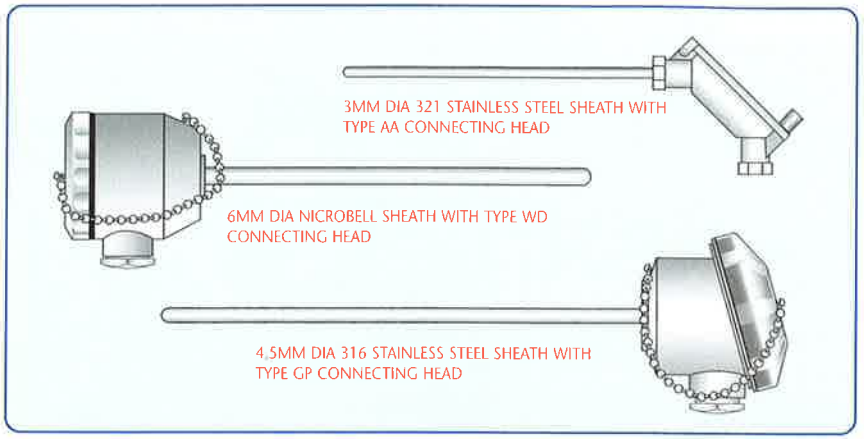
FITTINGS

Thermocouples TC MI CH

The TC MI CH Range of Thermocouples comprises a series of Mineral Insulated probes complete with Terminal Heads. A variety of connecting heads provide a convenient method of termination for connecting cables and offer a choice of styles, terminal access and cable entry. An indication of suitable applications is given below.

316 Stainless Steel	Excellent corrosion resistance often specified for food and medical applications.
321 Stainless Steel	Good corrosion resistance and high ductility. Widely used in industry.
310 Stainless Steel	Good corrosion resistance at high temperatures and recommended for use in sulphurous atmospheres.
600 Inconel Alloy	Good resistance to oxidation and extremely corrosive atmospheres at high temperature. Not recommended for use in sulphurous atmospheres.
Nicrobell	Recommended for use with type N conductors. Nicrobell is a Ni/Ch/Si alloy that is suitable for use in reducing, oxidising and vacuum atmospheres.

These sensors are supplied, as standard, to Thermocouple Class 1 providing greater accuracy.



ORDER CODE

TC MI CH - E - J - SM --- D -- SL --- CH -- F --

The order code information below is shown as a guide to specifying the probe. Please contact our sales office if any features that you require are not shown.

CALIBRATION TYPE

K
J
T
N

ELEMENTS

Type	Code
Single	S
Duplex	D

JUNCTION TYPE

Type	Code
Insulated	I
Grounded	B

SHEATH DIAMETER

Size	Code
3.00mm	30
4.50mm	45
6.00mm	60
8.00mm	80

SHEATH LENGTH

Size	Code
100mm	100
150mm	150
200mm	200
250mm	250
300mm	300
350mm	350
400mm	400
450mm	450
500mm	500

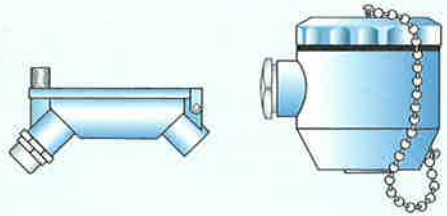
SHEATH MATERIAL & TEMPERATURE

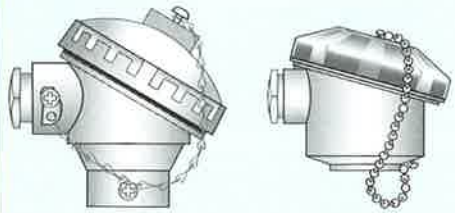
Type	Max Temp °C	Code
316 st/st	800	316
321 st/st	800	321
310 st/st	1100	310
INC 600	1100	600
Nicrobell	1250	NBI

CONNECTING HEAD

Description	Code
Angled Alloy Connecting Head with hinged lid. Sealed to IP54	AA
Die Cast Aluminium Connecting Head with screw on cap with 'O' Ring Seal Sealed to IP67.	WD
Die Cast Angled Screw Cap with O Ring Seal. Sealed to IP67.	KN
Glass reinforced Polymer Terminal Head with compression seal & angled cap Sealed to IP68.	GP

CONNECTING HEAD





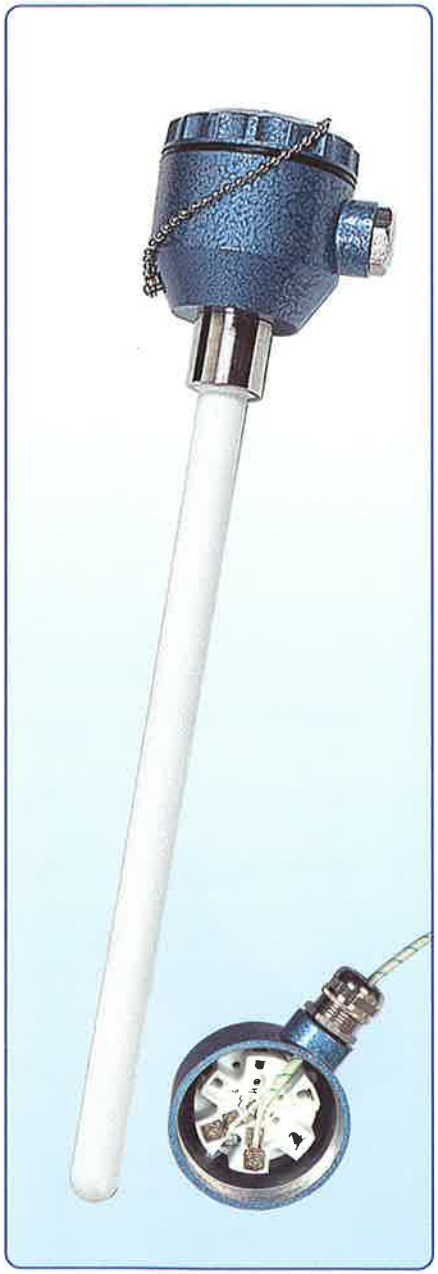
The connecting head houses a ceramic or moulded block with terminals of thermocouple material to maintain accuracy of sensor calibration.

FITTINGS

Size/Code	St/St	Brass
No fitting	F0	F0
1/8" BSPT	F1	F7
1/8" BSP	F2	F8
1/4"BSPT	F3	F9
1/4" BSP	F4	F10
1/2" BSPT	F5	F11
1/2" BSP	F6	F12

Flange 50mm dia	Code
St/St	F13
Aluminium	F14

Thermocouples TC HT CH



The Series TC HT CH comprises of a range of thermocouples designed for use at elevated temperatures.

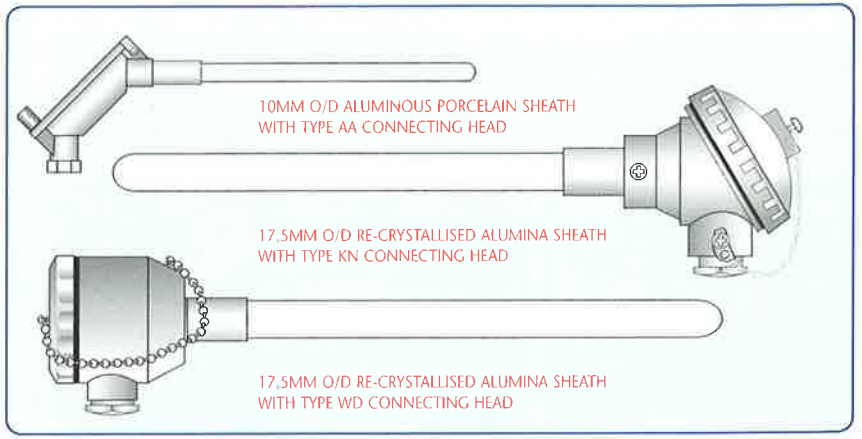
The protection sheath is manufactured from ceramic material in a choice of either Aluminous Porcelain or Recrystallised Alumina.

They have an Inconel extension piece 25mm or 75mm long to enable mounting fittings to be used.

Thermocouple elements type K N R & S are supplied as standard.

For use up to 1,600°C they are used in a variety of applications from pottery kilns to large industrial furnaces.

The WD & KN connecting heads house a ceramic block with terminals of thermocouple material to maintain accuracy of sensor calibration. These Thermocouples are all supplied, as standard, to Thermocouple Tolerance Class 1 for greater accuracy.



ORDER CODE

TC HT CH - E - SS ---- SL ---- EX -- CH -- F --

The order code information below is shown as a guide to specifying the probe.

Please contact our sales office if any features that you require are not shown.

CALIBRATION TYPE

Type/Code	Max Temp
K	1,150
N	1,250
R	1,600
S	1,500

ELEMENTS

Type	Code
Single	S
Duplex	D

SHEATH LENGTH

Size	Code
200mm	0200
250mm	0250
300mm	0300
350mm	0350
400mm	0400
500mm	0500
600mm	0600
700mm	0700
1000mm	1000

EXTENSION PIECE

Length	Code
25mm	25
75mm	75

CONNECTING HEAD

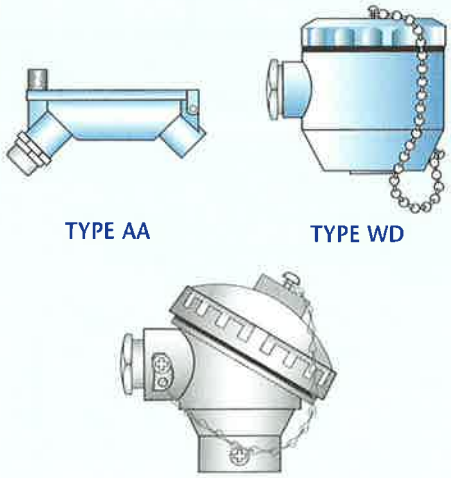
Description	Code
Angled Alloy Connecting Head with hinged lid (16mm dia sheaths) IP54	AA
Die Cast Aluminium Connecting Head with screw on cap with 'O' Ring Seal (all dia sheaths) IP67	WD
Die Cast Angled Screw Cap with O Ring Seal (all dia sheaths) IP67	KN

SHEATH SPECIFICATION & TEMPERATURE

Type	Max Temp °C	Code
Aluminous Porcelain 10mm dia	1400	AP10
Aluminous Porcelain 17.5mm dia	1400	AP20
Recrystallised Alumina 10mm dia	1600	RA10
Recrystallised Alumina 17.5mm dia	1600	RA20

Some applications may require a double protection sheath (inner & outer)

CONNECTING HEAD



FITTINGS

Size/Code	Code
No fitting	F0
3/4" BSPT Compression	F1
Flange 40mm dia (10mm sheaths only)	F2
Flange 115mm dia	F3

Thermocouples TC HD CH

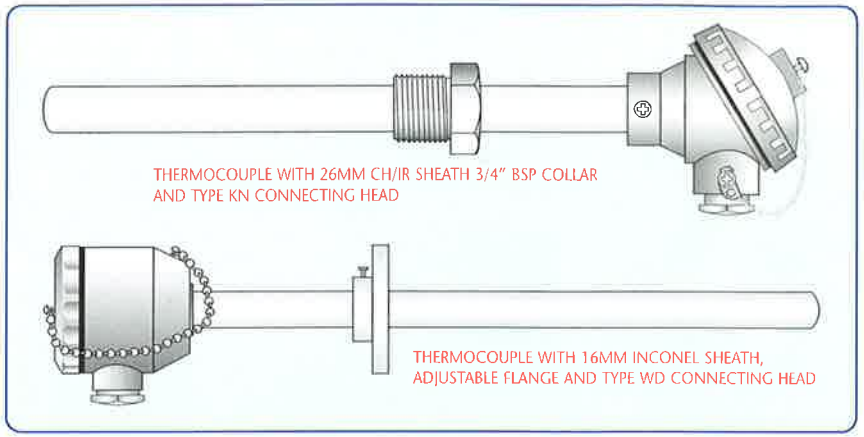
The TC HD CH Range of Thermocouples comprise of a series of Heavy Duty Probes. The sheath diameter and material can be chosen to give optimum life and performance.

The construction is of heavy gauge thermocouple wire with ceramic insulation.

The hot junction is isolated and termination is made via a robust Industrial Connecting Head.

A choice of protective sheaths along with a guide to suitable applications is given below.

The connecting head houses a ceramic block with types WD and KN having terminals of thermocouple material to maintain accuracy of sensor calibration. These Thermocouples are all supplied, as standard, to Thermocouple Tolerance Class 1 for greater accuracy.



The order code information below is shown as a guide to specifying the probe.

Please contact our sales office if any features that you require are not shown.

ORDER CODE

TC HD CH - E - SS - SL ---- CH -- F --

CALIBRATION TYPE

Type	Max Temp
K	1150
J	750
N	1250
R	1600
S	1500

ELEMENTS

Type	Code
Single	S
Duplex	D

SHEATH SPECIFICATION & TEMPERATURE

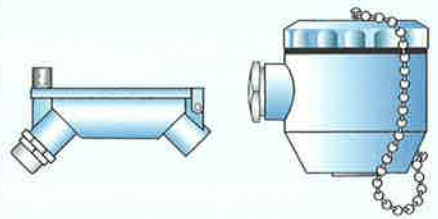
Type	Max Temp °C	Code
16mm Stainless Steel 316 Excellent corrosion resistance up to the maximum operating temperature	800°C	1
16mm Inconel 600 Very good corrosion resistance up to maximum operating temperatures. Not recommended for Sulphur bearing atmospheres.	1100°C	2
26mm Inconel 600 Very good corrosion resistance up to maximum operating temperatures. Thick wall provides extended service life. Not recommended for use in sulphur bearing atmospheres.	1100°C	3
26mm CH/IB446 Chromium Iron composition. Excellent corrosion resistance up to maximum operating temperatures. Suitable for use in Sulphur bearing atmospheres.	1150°C	4
25mm Kanthal APM Extremely versatile sheath which has a very high maximum temperature when compared to other metallic sheaths. High resistance to sulphur bearing atmospheres and rapid response time. Excellent service life in harsh conditions (Lengths available 400,500,600,750 & 1000mm)	1400°C	5
25.5mm Nicrobell C Especially recommended for use with Type N conductors but can be used with all calibrations. Suitable for oxidising and reducing atmospheres. Not recommended for sulphur bearing atmospheres.	1250°C	6

SHEATH LENGTH

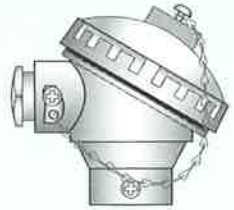
Size	Code
200mm	0200
250mm	0250
300mm	0300
350mm	0350
400mm	0400
500mm	0500
600mm	0600
700mm	0700
750mm	0750
800mm	0800
900mm	0900
1000mm	1000
1200mm	1200
1500mm	1500

Most of the above listed sheath lengths are stock items - please contact our Sales office for availability of other lengths.

CONNECTING HEAD



TYPE AA TYPE WD



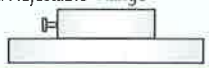
TYPE KN

CONNECTING HEAD

Description	Code
Angled Alloy Connecting Head with hinged lid (16mm dia sheaths) IP54	AA
Die Cast Aluminium Connecting Head with screw on cap with 'O' Ring Seal (all dia sheaths) IP67	WD
Die Cast Angled Screw Cap with O Ring Seal (all dia sheaths) IP67	KN

FITTINGS

Description	Code
No fitting	F0
3/4" BSP Welded Collar (State Position - not available for Kanthal Sheaths)	F1
115mm dia Adjustable Flange	F3



Thermocouples TC MM CH

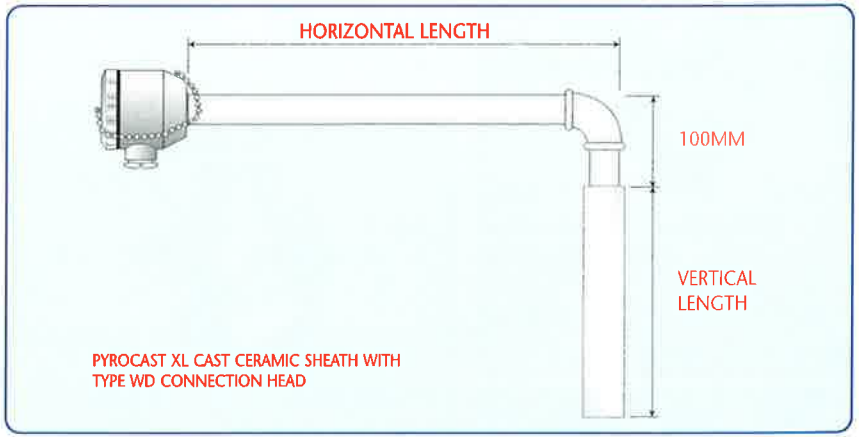
The TC MM CH series of thermocouples are used in the metal casting industry to monitor the temperature of molten metal.

They are configured to be immersed into the melt and have a 25mm O/D horizontal extension of mild steel to provide a terminal connection which operates at an acceptable temperature.

The thermocouple element is isolated from the sheath and the ceramic protection sheaths are replaceable.

The connecting head houses a ceramic block with terminals of thermocouple material to maintain accuracy of sensor calibration.

These Thermocouples are all supplied, as standard, to Thermocouple Tolerance Class 1 for greater accuracy.



The order code information below is shown as a guide to specifying the probe.

Please contact our sales office if any features that you require are not shown.

ORDER CODE

TC MM CH - E - H ---- SS --- VL ---- CH --

CALIBRATION TYPE

Type	Max Temp.
K	1150
J	900

ELEMENTS

Type	Code
Single	S
Duplex	D

HORIZONTAL LENGTH

Size	Code
300mm	0300
400mm	0400
500mm	0500
600mm	0600
750mm	0750
1000mm	1000

SHEATH SPECIFICATION & TEMPERATURE

Description	Code
Ceramic Coated Cast Iron 42mm dia.robust construction with thick wall for optimum life. Suitable for molten metal such as Zinc, Mazak etc. (Not recommended for use in molten Aluminium)	CC1
Pirocast XL Cast Ceramic Sheath for molten metals. It is particularly suitable for use in molten Aluminium the cast ceramic material is inert to molten Aluminium and its alloys. This sheath combines high strength with excellent thermal shock resistance.	PXL

VERTICAL LENGTH

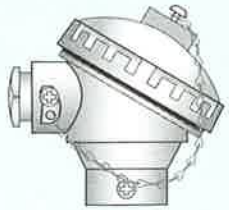
Size	Code
300mm	0300
450mm	0450
600mm	0600
915	0915
CC1 SHEATHS ONLY	
1070mm	1070
1200mm	1200

CONNECTING HEAD

Description	Code
Die Cast Aluminium Connecting Head with Screw On cap with 'O' Ring Seal IP67	WD
Die Cast Angled Screw Cap with 'O' Ring Seal IP67	KN

CONNECTING HEAD

TYPE WD

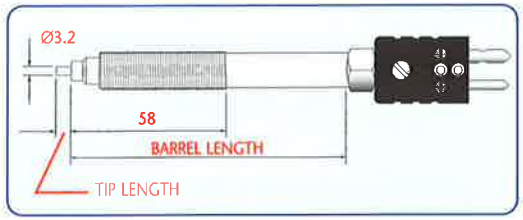


TYPE KN

Thermocouples - Application-Specific Types

TC PI MP

The TC PI MP is a thermocouple manufactured to monitor the temperature of the melt plastic in plastic moulding machines. The assembly is manufactured in stainless steel and has a long mounting thread enabling the probe to be inserted into the plastic melt. The element is isolated from the sheath. Operating temperature is 0-500 °C and termination is via a standard thermocouple plug.



ORDER CODE

TC MI PS - T - E - TP - B 75

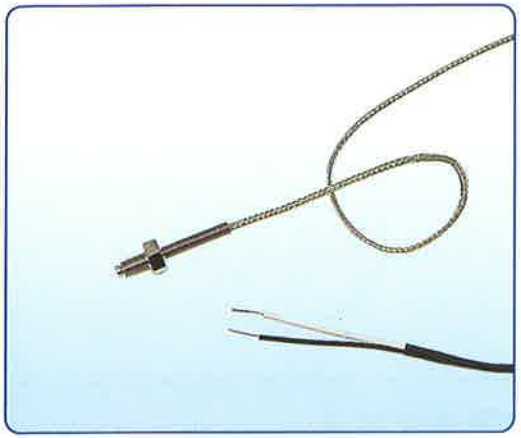
CALIBRATION TYPE
K
J
T

THREAD TYPE	
Type	Code
1/2" x20UNF	T1
1/2" BSF	T2
M12 x 1.7	T3

ELEMENTS	
Type	Code
Single	S
Duplex	D

TIP LENGTH	
Size in mm	Code
for example:	
5mm	05
12mm	12

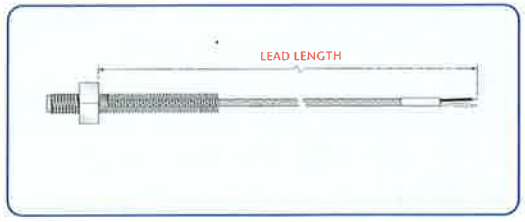
BARREL LENGTH	
Length	Code
75mm-std	75
other please specify ie:	
120mm	120
180mm	180

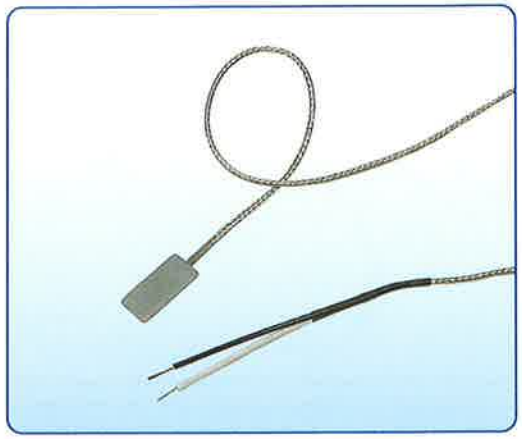


TC PI NZ

Nozzle Bolt Type thermocouples are available in calibration types K J and T. Normally constructed as per drawing they can be supplied in a variety of configurations.

Please specify Bolt thread, calibration types and lead lengths.

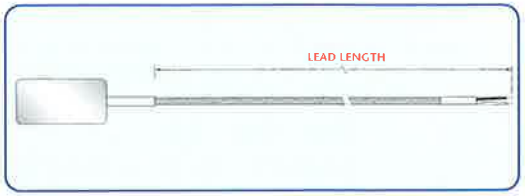


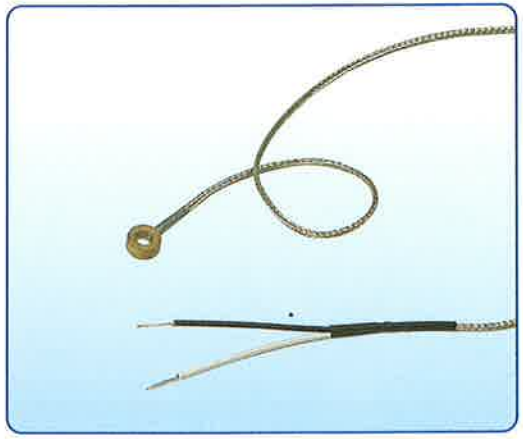


TC PI LT

24mm x 13mm x 0.5mm.Leaf type Thermocouple often used to measure temperatures under heater bands, this fast response probe can be supplied with any length of metal braided glass fibre insulated cable.

Please specify thermocouple calibration and lead length.

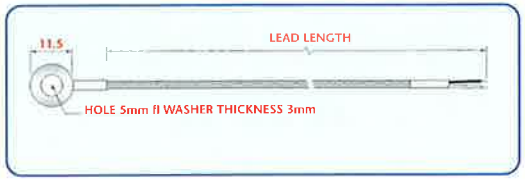


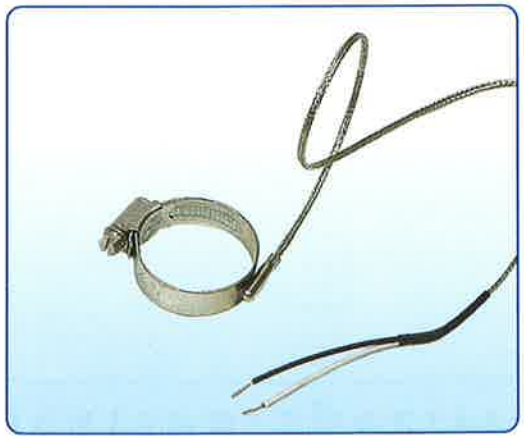


TC PI WT

The Washer Thermocouple is a convenient configuration which allows temperature to be monitored in a variety of applications. The standard washer dimensions are as shown in the drawing but many variations are available.

Please specify washer dimensions required, calibration type and lead length.

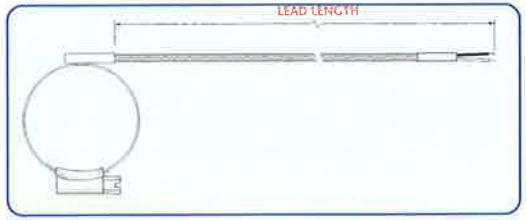




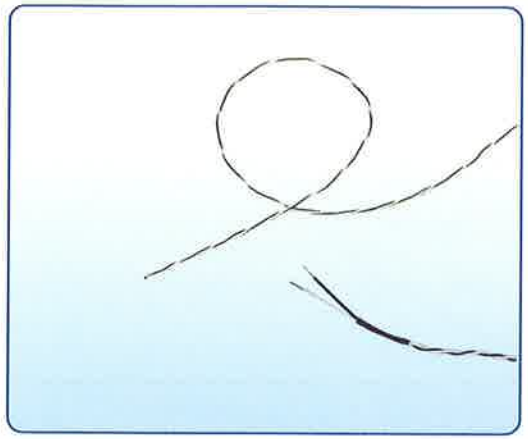
TC GP RT

The Ring type thermocouple has been designed to allow the temperature of pipes to be monitored using a jubilee type clamp, the thermocouple junction is housed in a small protection sheath attached to the clamp.

Please specify Clip Dia. calibration and lead lengths.



Thermocouples - Application-Specific Types



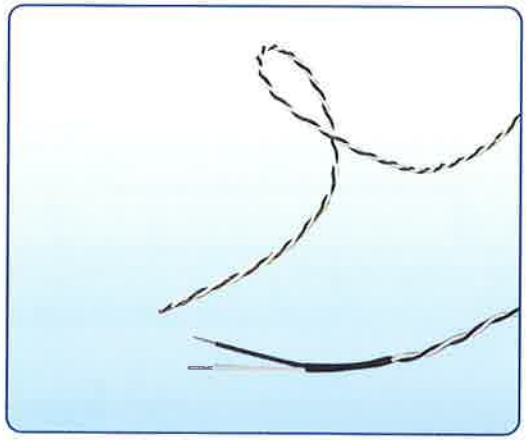
TC TS WJ

Thermocouples with Teflon covered Leads 1/0.5mm dia. Welded junction, max insulation temperature 260°C.

ORDER CODE

TC TS WJ -	LL - - - -	
Calibration	Lead Length	Code
K (Max junction temperature 1000°C)	250mm	0250
J (Max junction temperature 750°C)	500mm	0500
T (Max junction temperature 450°C)	1mtr	1000
	2mtrs	2000
	5mtrs	5000

ORDER EXAMPLE: TC TS WJ K LL 1000 - Thermocouple Series TC TS WJ with Type K calibration & 1 metre lead.



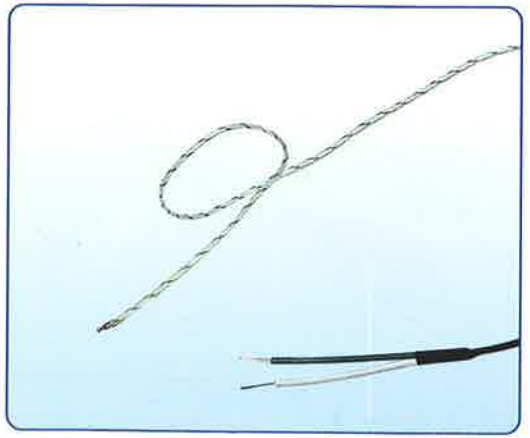
TC TM WJ

Thermocouples with Teflon covered Multi Stranded Leads 7/0.2mm Welded junction, max insulation temperature 260°C.

ORDER CODE

TC TM WJ -	LL - - - -	
Calibration	Lead Length	Code
K (Max junction temperature 1000°C)	250mm	0250
J (Max junction temperature 750°C)	500mm	0500
T (Max junction temperature 450°C)	1mtr	1000
	2mtrs	2000
	5mtrs	5000

ORDER EXAMPLE: TC TM WJ J LL 0500 - Thermocouple Series TC TM WJ with Type J calibration & 500mm lead.



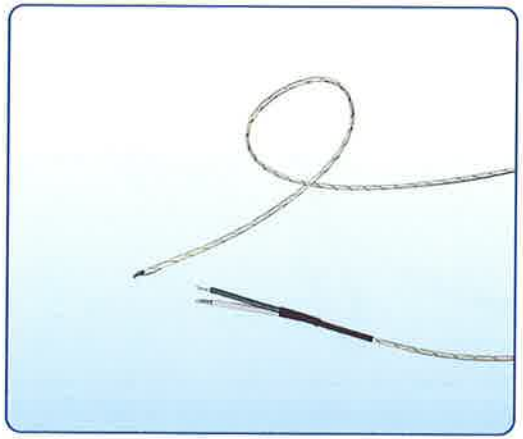
TC GS WJ

Thermocouples with Glass Fibre Covered Leads 1/0.5mm dia. Beaded junction, max insulation temperature 400°C.

ORDER CODE

TC GS WJ -	LL - - - -	
Calibration	Lead Length	Code
K (Max junction temperature 1000°C)	250mm	0250
J (Max junction temperature 750°C)	500mm	0500
T (Max junction temperature 450°C)	1mtr	1000
	2mtrs	2000
	5mtrs	5000

ORDER EXAMPLE: TC GS WJ K LL 1000 - Thermocouple Series TC GS WJ with Type K calibration & 1 metre lead



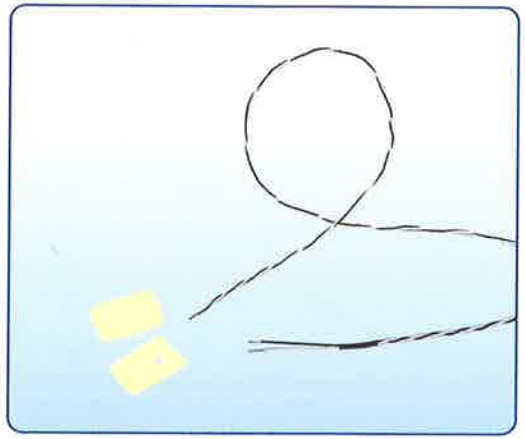
TC GM WJ

Thermocouples with Glass Fibre covered multi stranded leads 7/0.2mm Welded junction, max insulation temperature 400°C.

ORDER CODE

TC GM WJ -	LL - - - -	
Calibration	Lead Length	Code
K (Max junction temperature 1000°C)	250mm	0250
J (Max junction temperature 750°C)	500mm	0500
T (Max junction temperature 450°C)	1mtr	1000
	2mtrs	2000
	5mtrs	5000

ORDER EXAMPLE: TC GM WJ T LL 0500 - Thermocouple Series TC GM WJ with Type T calibration & 500mm lead.



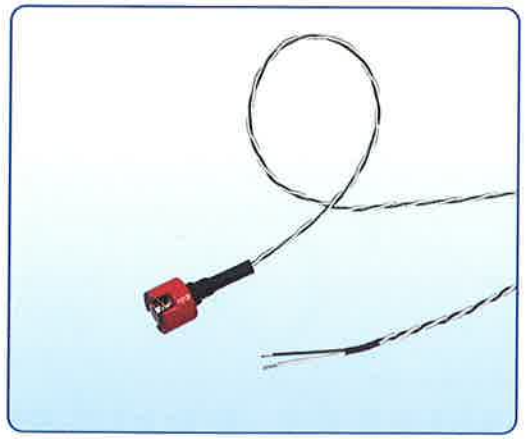
TC MP SP

Thermocouples are attached to an adhesive patch which allows easy application. The max temperature is 200°C. Supplied with Multi Stranded Thermocouple 7/0.2mm Teflon insulated lead wire they provide a convenient method of surface temperature measurement.

ORDER CODE

TC MP SP -	LL - - - -	
Calibration	Lead Length	Code
K	250mm	0250
J	500mm	0500
T	1mtr	1000
	2mtrs	2000
	5mtrs	5000

ORDER EXAMPLE: TC MP SP T LL 2000 - Thermocouple Series TC MP SP with Type T calibration & 2 metre lead.



TC MP MB

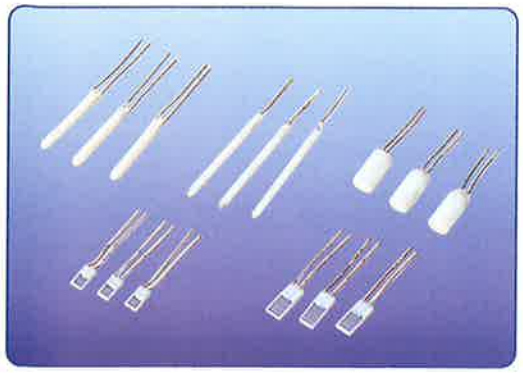
Thermocouples spring loaded into a button magnet for application where temperature measurement of Ferrous material is required. Having multi stranded Glass Fibre insulated leads this can be a convenient method of measuring surface temperatures. Max temp 250°C.

ORDER CODE

TC MP MB -	LL - - - -	
Calibration	Lead Length	Code
K	250mm	0250
J	500mm	0500
T	1mtr	1000
	2mtrs	2000
	5mtrs	5000

ORDER EXAMPLE: TC MP MB T LL 2000 - Thermocouple Series TC MP MBJ with Type T calibration & 2 metre lead.

Resistance Thermometers & Thermometry



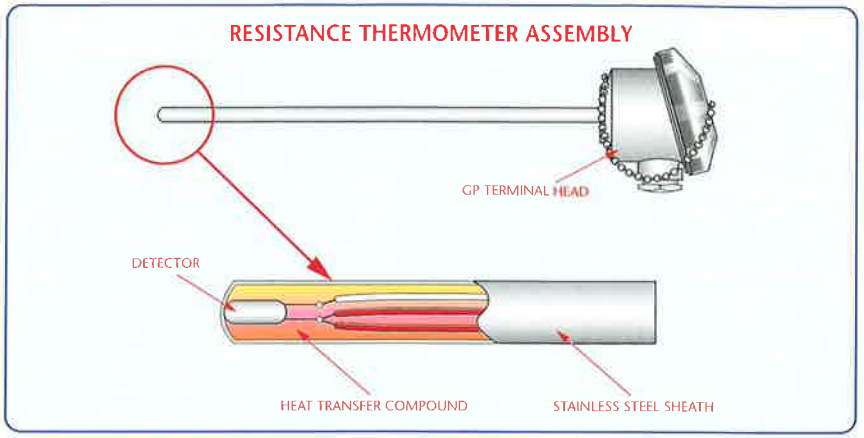
A selection of Resistance Thermometer Detectors are shown above. The Detector used will depend upon the Sensor Specification.

The Resistance Thermometers supplied as standard and described in the following pages, have a Platinum Pt 100 Detector housed in a closed ended protection tube of 316 Stainless Steel. The detector is positioned at the tip of the probe and the sheath is packed with heat transfer material to enhance response times and increase immunity to vibrations.

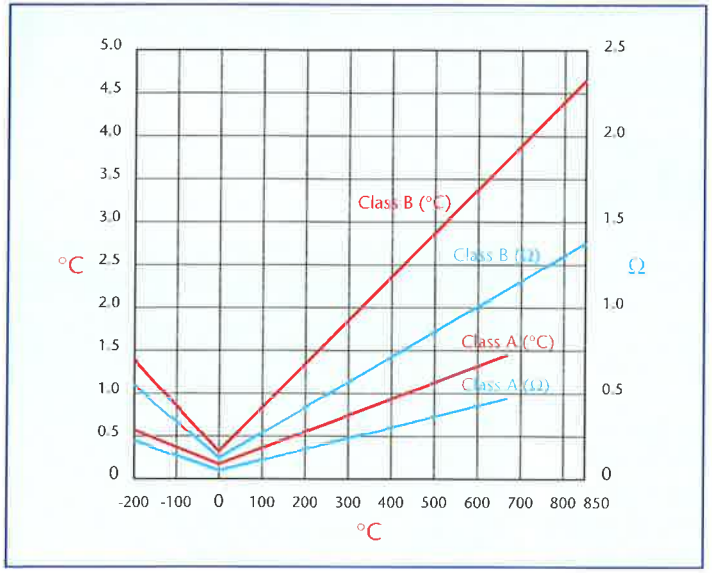
Connected to extension wire, termination is either by flying leads, plug or socket connectors or via a terminal head.

Immersion Depth - is the required depth at which no incorrect reading will occur due to insufficient immersion. For information on specific probe construction please consult our office.

Response Time - is the time in which the probe will attain a proportion of the final medium temperature. Normally quoted as the time taken to achieve 63.2% of a step temperature change. The probe construction, application and environment will all affect response times. For further information please contact our office with details of your application.



TOLERANCE VALUES AS A FUNCTION OF TEMPERATURE FOR 100 OHM RESISTANCE THERMOMETERS



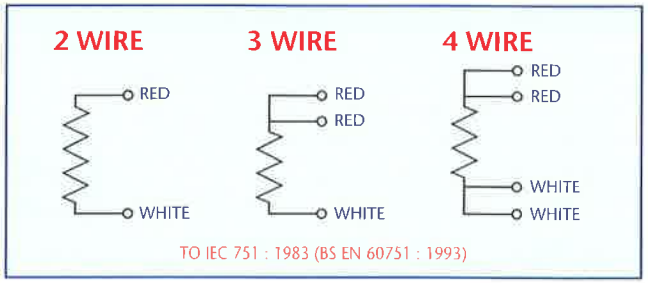
The specification covering the resistance value against temperature conforms to BSEN 60751 - 1996 IEC 751. This standard depicts tolerances available as Class A and Class B.

CLASS A (HIGHER ACCURACY CALIBRATION) IS OUR SUPPLY STANDARD

TOLERANCE VALUES FOR 100 OHM RESISTANCE THERMOMETERS

TEMPERATURE	TOLERANCES IEC 751:1983 (BS EN 60751:1996)			
	CLASS A		CLASS B	
° C	± °C	± Ω	± °C	± Ω
-200	0.55	0.24	1.3	0.56
-100	0.35	0.14	0.8	0.32
0	0.15	0.06	0.3	0.12
100	0.35	0.13	0.8	0.30
200	0.55	0.20	1.3	0.48
300	0.75	0.27	1.8	0.64
400	0.95	0.33	2.3	0.79
500	1.15	0.38	2.8	0.93
600	1.35	0.43	3.3	1.06
650	1.45	0.46	3.6	1.13
700	---	---	3.8	1.17
800	---	---	4.3	1.28
850	---	---	4.6	1.34

CONNECTION SCHEMATICS FOR 2, 3, & 4 WIRE RESISTANCE THERMOMETERS



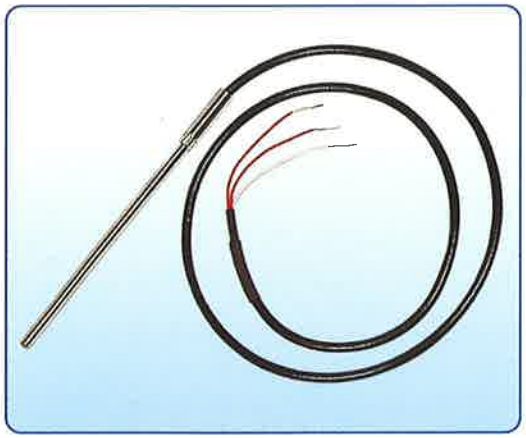
RESISTANCE THERMOMETER ORDERING CODES

The ordering code system for Resistance Thermometers follows the principle of Thermocouple codes. For example Resistance thermometer Series RT GP CH (Page 15) denotes a Resistance Thermometer general purpose with a Connecting Head.

Part No. **RTGPCH 3 SD45 SL300 CHGP FO**

specifies a Resistance Thermometer 100 ohms having a Stainless Steel sheath, 3 Wire Configuration, Sheath diameter of 4.5mm Sheath length 300mm with Connecting head type GP (No fittings are required)

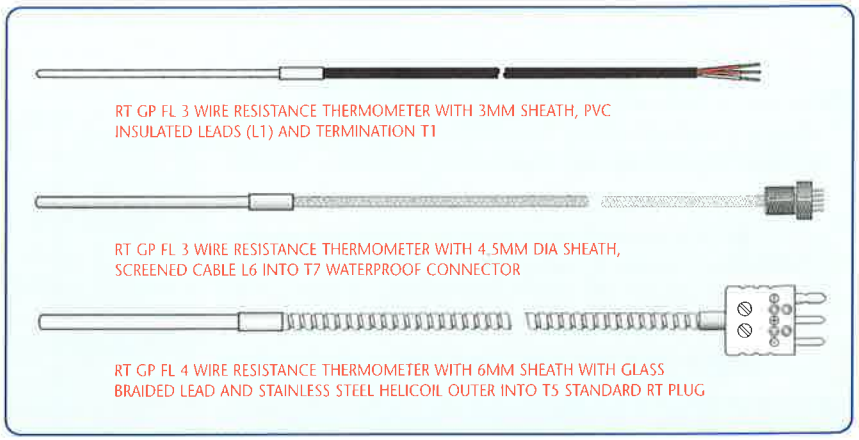
Resistance Thermometers RT GP FL



The RT GP FL Series of Resistance thermometers comprise of a range of PT 100 probes. Having a maximum tip temperature of 400°C they are suitable for many applications. The connecting wire insulation and termination options are given below.

The wires are colour coded as per BS EN60751 - IEC 751. Calibration and accuracy also conforms to the above standard.

Please note all of our Platinum Resistance Thermometer sensors are supplied to Class A tolerance for improved accuracy.



ORDER CODE

RT GP FL - SD -- SL--- LL ---- LI -- T -- F --

The order code information below is shown as a guide to specifying the probe.

Please contact our sales office if any features that you require are not shown.

CONFIGURATION TYPE

Description	Code
2 Wire	2
3Wire	3
4Wire	4

SHEATH DIAMETER

Size	Code
3.0mm	30
4.5mm	45
6.0mm	60

SHEATH LENGTH

Size	Code
50mm	050
100mm	100
200mm	200
250mm	250
300mm	300
400mm	400
500mm	500

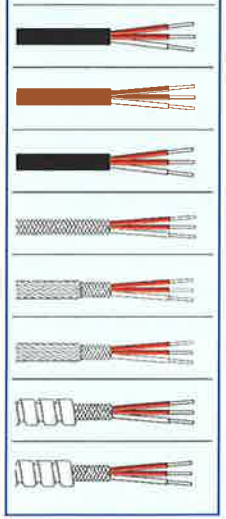
LEAD LENGTH

Length	Code
250mm	0250
500mm	0500
1.0mtr	1000
1.5mtr	1500
2.0mtr	2000
3.0mtr	3000
4.0mtr	4000
5.0mtr	5000

LEAD INSULATION

	Max. Temp	Code
PVC leads/PVC Outer	100°C	L1
Silicon Rubber/ Silicon Rubber Outer	180°C	L2
Teflon leads/Teflon outer (Screened)	260ºC	L3
Glass Braided	400°C	L4
Glass braided/ tin copper braid outer	400°C	L5
Glass braided/ st/st braid outer	400°C	L6
Glass braided/ Galv helicoil outer	400°C	L7
Glass braided/ st/steel helicoil outer	400°C	L8

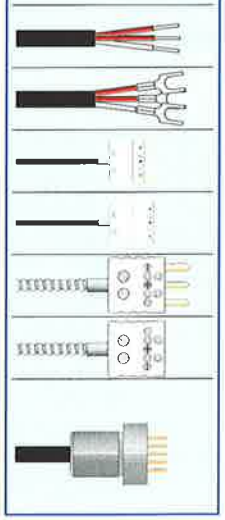
LEAD INSULATION



TERMINATION TYPE

	Code
50mm tails	T1
Spade terminals	T2
Miniature RT plug	T3
Miniature RT socket	T4
Std RT plug	T5
Std RT socket	T6
Circular, waterproof (gold plated) plug	T7

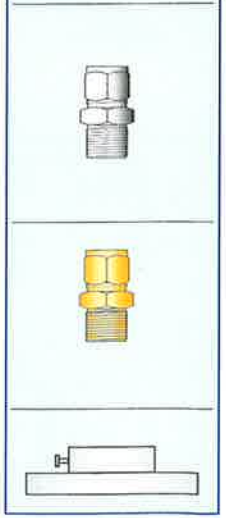
TERMINATION TYPE



FITTINGS

Size		Code
No fitting	St/St	F0
1/8 inch BSPT	St/St	F1
1/8 inch BSP	St/St	F2
1/4 inch BSPT	St/St	F3
1/4 inch BSP	St/St	F4
1/2 inch BSPT	St/St	F5
1/2 inch BSP	St/St	F6
No fitting	Brass	F0
1/8 inch BSPT	Brass	F7
1/8 inch BSP	Brass	F8
1/4 inch BSPT	Brass	F9
1/4 inch BSP	Brass	F10
1/2 inch BSPT	Brass	F11
1/2 inch BSP	Brass	F12
Flange 50mm dia	St/St	F13
Flange 50mm dia	Alum	F14

FITTINGS



Note: The terminations shown above apply to 3 wire termination types. In all cases the termination supplied will correspond with the relevant configuration specified : either 2,3, or 4 wire.

To specify a probe complete wiyh mating connector suffix termiation code with M, i.e. T1/M, T2/M T5/M etc.

Resistance Thermometers RT GP CH

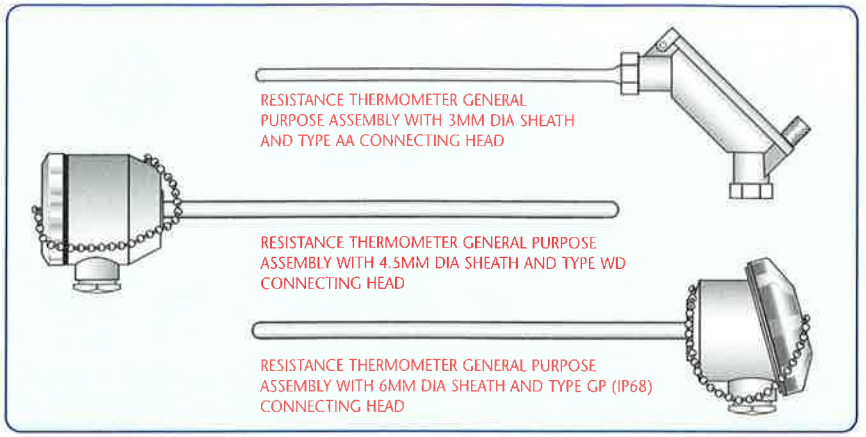
The RT GP CH series of Resistance Thermometer comprises of a range of sensors housed in 316 Stainless Steel sheaths and terminated directly into a connecting head.

This provides a convenient method of termination and the terminal head contains connections in accordance with the wiring configuration chosen (2, 3 or 4 wire).

A choice of sheath diameters, lengths and connecting heads is given below.

The calibration and accuracy of these sensors conforms to BS EN60751 - IEC 751, 100Ω at 0°C.

All sensors are supplied to Class A tolerance for enhanced accuracy



ORDER CODE

RT GP CH - SD -- SL --- CH -- F--

The order code information below is shown as a guide to specifying the probe.

Please contact our sales office if any features that you require are not shown.

CONFIGURATION

Description	Code
2 Wire	2
3 Wire	3
4 Wire	4

SHEATH DIAMETER

Size	Code
3.0mm	30
4.5mm	45
6.0mm	60

SHEATH LENGTH

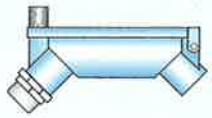
Size	Code
50mm	050
100mm	100
200mm	200
250mm	250
300mm	300
400mm	400
500mm	500

CONNECTING HEAD

Description	Code
Angled Alloy Connecting Head with hinged lid Sealed to IP54.	AA
Die Cast Aluminium Connecting Head with screw on cap with 'O' Ring Seal Sealed to IP67.	WD
Die Cast Angled Screw Cap with O Ring Seal (all dia sheaths) IP67	KN
Glass reinforced Polymer Terminal Head with compression seal, angled cap. Sealed to IP68.	GP

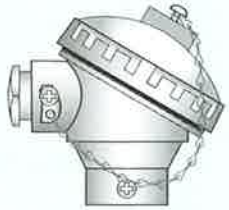
These assemblies can house double elements, 2x2 wire using Type AA head and either 2x2 wire or 2x3 wire using WD, KN and GP connecting heads. PLease call with your requirements.

CONNECTING HEAD



TYPE AA

TYPE WD



TYPE KN

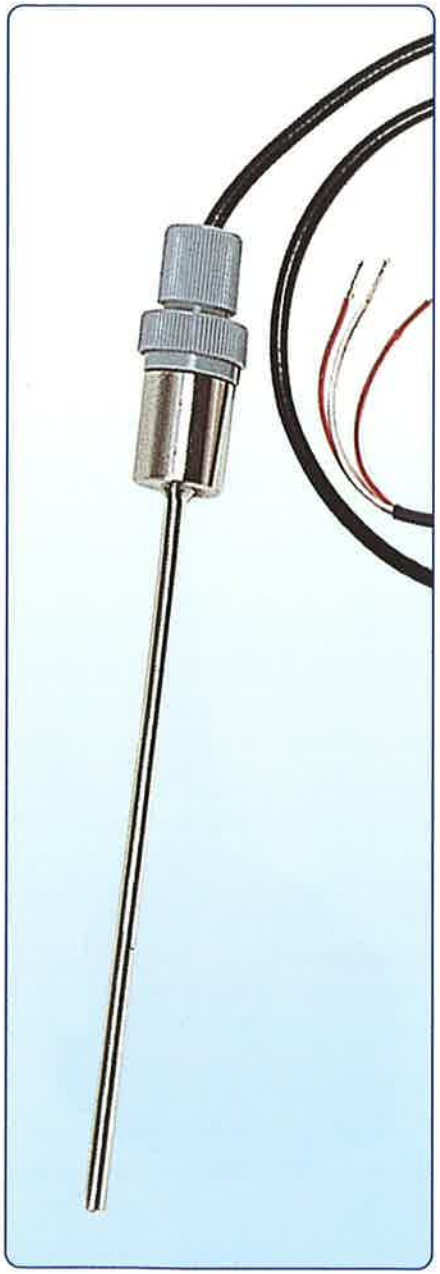
TYPE GP

FITTINGS

Size/Code	St/St	Brass
No fitting	F0	F0
1/8" BSPT	F1	F7
1/8" BSP	F2	F8
1/4"BSPT	F3	F9
1/4" BSP	F4	F10
1/2" BSPT	F5	F11
1/2" BSP	F6	F12

Flange 50mm dia	F13	F14

Resistance Thermometer RT GP PS



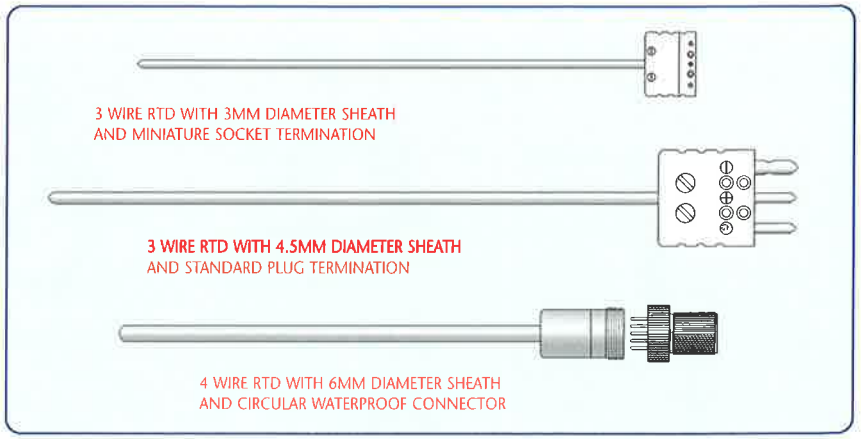
The RT GP PS series of Platinum Resistance sensors comprises of a range of probes terminating directly into plug or socket connectors.

They are constructed with a 316 stainless steel sheath housing a PT 100 detector.

A choice of sheath diameters, lengths and connector types is shown below.

Calibration and accuracy is to BS EN60751, IEC 751. These detectors are supplied to Class A tolerance for greater accuracy.

They have a maximum tip temperature of 400°C and the connector should be kept below 120°C.



ORDER CODE

RT GP PS - SD --- SL --- T -- F --

The order code information below is shown as a guide to specifying the probe.

Please contact our sales office if any features that you require are not shown.

CONFIGURATION

Description	Code
2 Wire	2
3 Wire	3
4 Wire	4

SHEATH DIAMETER

Size	Code
3.0mm	30
4.5mm	45
6.0mm	60

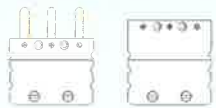
SHEATH LENGTH

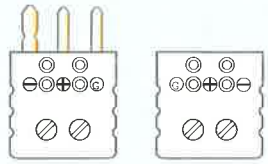
Size	Code
50mm	050
100mm	100
200mm	200
250mm	250
300mm	300
400mm	400
500mm	500

TERMINATION TYPE & TEMPERATURE

Type	Code
Mini R/T Plug	T1
Mini R/T Socket	T2
Std. R/T Plug	T3
Std. R/T Socket	T4
Circular Waterproof Connector Socket (gold plated contacts)	T5

TERMINATION TYPE





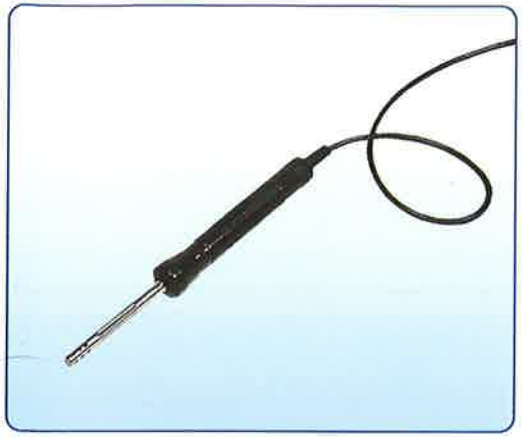
FITTINGS

Size		Code
No fitting	st/st	F0
1/8 inch BSPT	st/st	F1
1/8 inch BSP	st/st	F2
1/4 inch BSPT	st/st	F3
1/4 inch BSP	st/st	F4
1/2 inch BSPT	st/st	F5
1/2 inch BSP	st/st	F6
No fitting	Brass	F0
1/8 inch BSPT	Brass	F7
1/8 inch BSP	Brass	F8
1/4 inch BSPT	Brass	F9
1/4 inch BSP	Brass	F10
1/2 inch BSPT	Brass	F11
1/2 inch BSP	Brass	F12
Flange 50mm dia	st/st	F13
Flange 50mm dia	Brass	F14

FITTINGS

To specify a probe complete wiyh mating connector suffix termination code with M, i.e. T1/M, T2/M T5/M etc.

Resistance Thermometers - Application-Specific Types

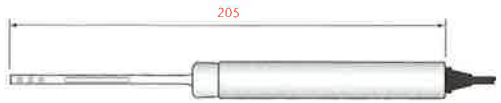


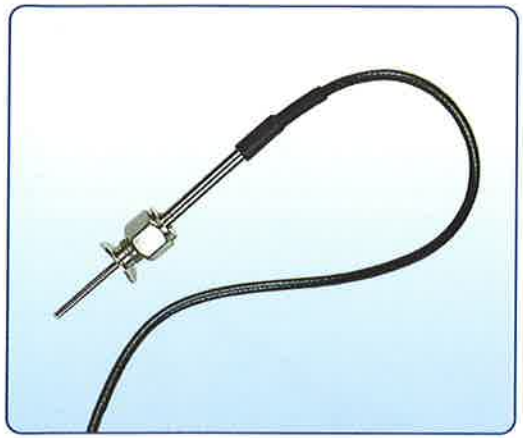
RT HH AT

Resistance Thermometer PT100. Suitable for Air Temperature measurement. This Hand Held Probe is fitted with a PT100 Class A Detector housed in a ventilated St. St. Sheath and has a 1 metre 3 wire cable.

ORDER CODE

RT HH AT





RT PS SW

This Sensor comprises of a Class A PT100 Sensor housed in a St. St. Sheath of 6mm dia reducing to 3mm. Supplied with a small thermo-pocket which is welded to the outside of the pipe this construction is ideal for measuring the temperature of liquid inside pipes of various diameters. Cable construction is Teflon Insulated 3 wire 7/0.2mm conductors

ORDER CODE

RT PS SW - I - - C - - - -

Immersion Length		Cable Length	
mm	Code	mm	Code
25	25	500	0500
50	50	1000	1000
75	75	2000	2000
		5000	5000

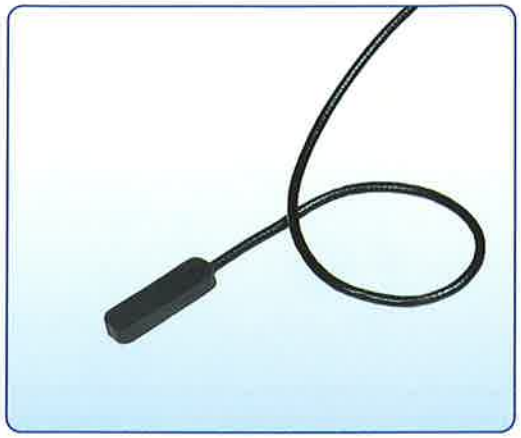
THIS HOUSING CAN ALSO BE SUPPLIED WITH A 4-20MA TRANSMITTER

RT AT IW

An Air Temperature Sensor in a plastic wall mounted housing. The Sensor is supplied with a PT100 class A detector and terminal block. It is used for general ambient temperature measurement and energy management. Dimensions: 86 x 86 x 30mm

ORDER CODE

RT AT IW



RT PT FL

The Sensor comprises of a Class A PT100 resistance thermometer detector housed in a Rubber Pad (Size 12 x 40mm) which has an adhesive strip and can be attached to measure surface temperature. Complete with a 3 wire FEP cable it can be used in a variety of applications. Max temp 200°C

ORDER CODE

RT PT FL

Lead Length mm	Code
250	0250
500	0500
1000	1000
1500	1500
2000	2000
3000	3000

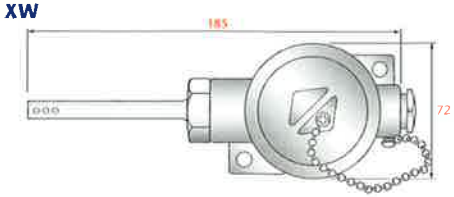
THIS AIR TEMPERATURE SENSOR CAN ALSO BE SUPPLIED WITH A 4-20MA TRANSMITTER

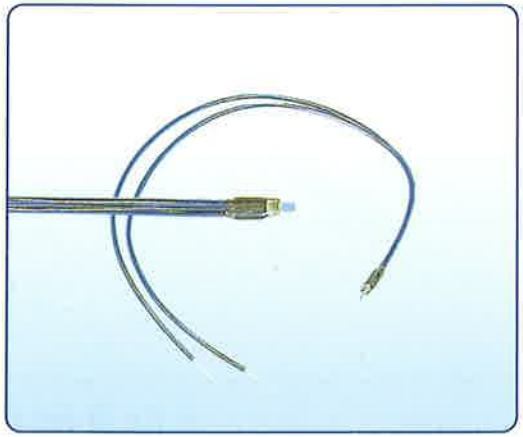
RT AT XW

This Robust Air temperature Sensor comprises of a PT100 Class A Resistance Thermometer detector in a surface mounting housing. The weatherproof construction allows the sensor to be used internally or externally to measure cold room/ambient temperatures and is often used in energy management systems.

ORDER CODE

RT AT XW



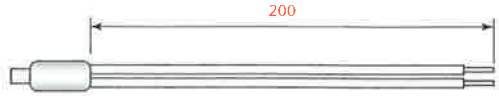


RT GP PT

This sensor comprises of a PT100 Class A element connected to two extension wires 200mm long Insulated by a PTFE Sleeving in a two wire configuration. The detector is exposed for fast response and can be submerged to measure liquid temperatures.

ORDER CODE

RT GP PT



Thermowells

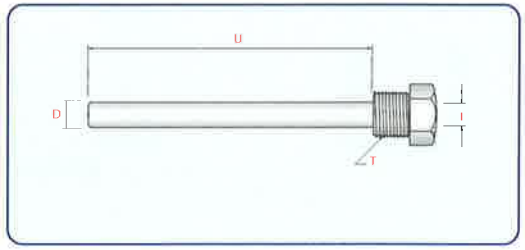
A range of fabricated and solid drilled Thermowells is available generally as detailed below.

Due to the wide variety of construction methods only a sample of the types available is shown.

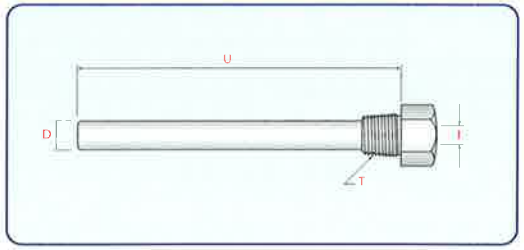
Please contact our Sales Office with your specific requirements or if you require assistance.

When ordering please specify:

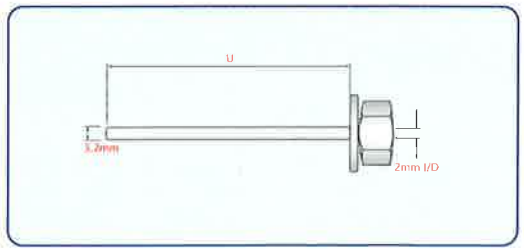
CONSTRUCTION - Solid/Fabricated
PROCESS CONNECTION - Thread Size & Type (BSP, NPT, BSPT etc) (T)
INTERNAL THREAD (I)
DIMENSIONS: (D), (U) & (L)
FLANGE DETAILS
Material Specification & Pressure Rating, Material Certification required.



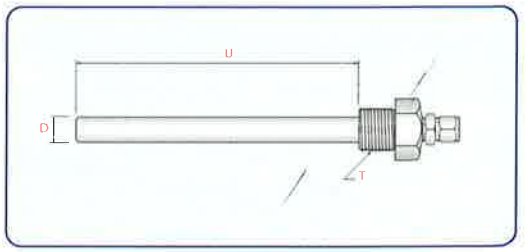
Solid drilled thermowell with male process connection and female inner thread.



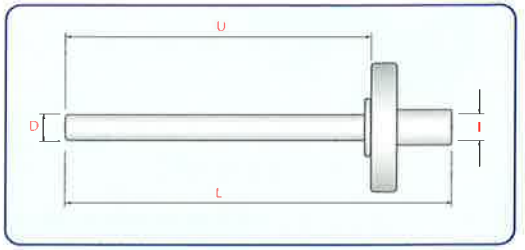
Fabricated thermowell with tapered threaded process connector and female inner thread.



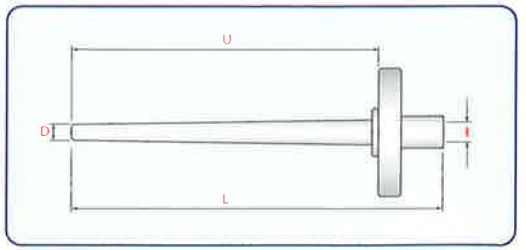
Miniature thermowell with welding flange and integral compression fitting.



Fabricated Thermowell with parallel male process connector and compression fitting.



Fabricated thermowell with process flange and extension piece.



Solid drilled tapered thermowell with process flange and lagging extension.

Connectors

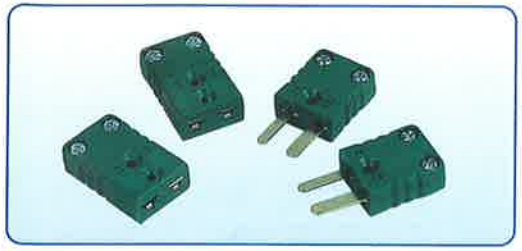
Introduction/Miniature Connectors

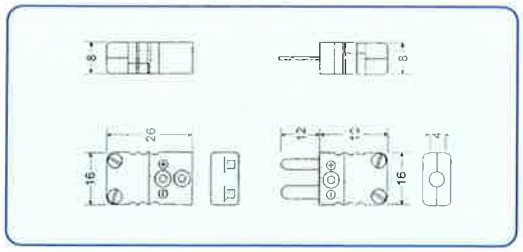
When making thermocouple connections it is essential that suitable connectors are used. All are available with connector pins manufactured in thermocouple alloy or compensating material.

This ensures that potential errors are not introduced into the temperature measuring circuits by introducing a different alloy, which could result in large spurious EMFS being generated at various ambient/operating temperatures.

The Thermocouple Connectors fall into two ranges - the Standard size and the Miniature series.

The Standard Connectors have round pins normally manufactured from solid bar, whereas the smaller (miniature) series have flat stamped contacts.





Application:

These miniature thermocouple connectors are manufactured to a high specification and have contacts of thermocouple materiel to ensure thermocouples and cables are connected without spurious e.m.f,s affecting the accuracy of the system.

Construction:

Glass filled thermoplastic body with original thermocouple material pins and springloaded inserts.
Polarized pins ensure proper connection.

Accessories:

See separate specification sheet.

Wire size:

Accepts wires from 0.2mm to 0.6mm.
Maximum cable diameter 4.5mm

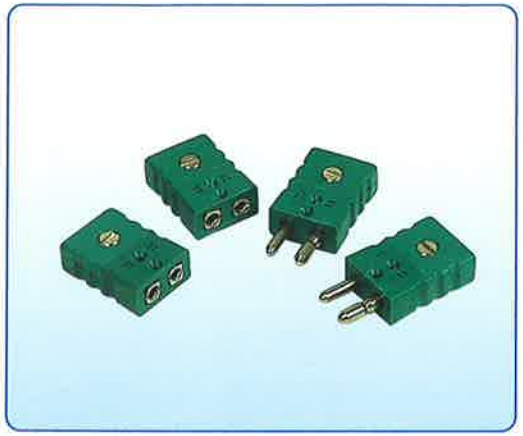
Temperature rating:

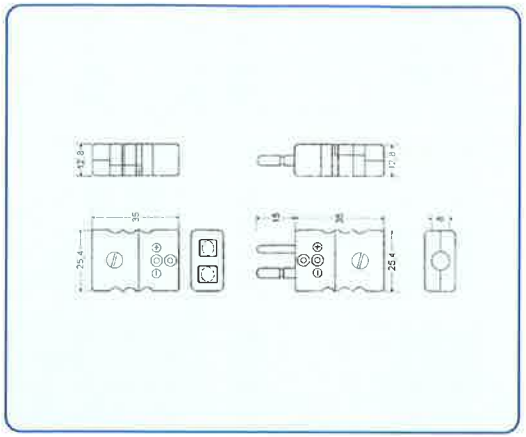
-200°C max.

Colour Code:

Available in all colour code standards.

Standard Connectors Solid Pin





Application:

These connectors are designed for use with thermocouples and thermocouple extension and compensating cable. They are manufactured using solid pins to ensure a reliable connection. The plug and socket contact materials consist of thermocouple alloy to ensure continuity of material type and prevent inaccuracies in the temperature measuring circuit.

Construction:

Glass filled thermoplastic body with original thermocouple material pins and springloaded inserts.
Polarized pins.
Central cover screw design for quick wiring.
Captive cover screw for easy assembly.

Accessories:

All accessories for the standard connector can be fitted. See separate specification sheet.

Wire size:

Accepts wires from 0.2mm to 2.0mm.
Maximum cable diameter 8.0mm

Temperature rating:

-200°C max.

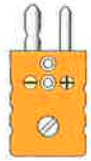
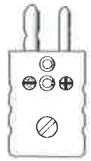
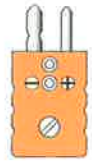
Colour Code:

Available in all colour code standards.

ORDER CODE

IEC Colour Code Colour Body	Black	Green	Brown	Violet	Orange	White	Pink
Part number male plug	TCMP-JI	TCMP-KI	TCMP-TI	TCMP-EI	TCMP-RI	TCMP-UI	TCMP-NI
Part number female socket	TCMJ-JI	TCMJ-KI	TCMJ-TI	TCMJ-EI	TCMJ-RI	TCMJ-UI	TCMJ-NI
							
Calibration Code	J	K	T	E	R/S	U	N
Contact Material Positive	Fe	NiCr	Cu	NiCr	Cu	Cu	NiCrSi
Contact Material Negative	CuNi	NiAl	CuNi	CuNi	Alloy#11	Cu	NiSi

ORDER CODE

IEC Colour Code Colour Body	Black	Green	Brown	Violet	Orange	White	Pink
Part number male plug	TCSP-JI	TCSP-KI	TCSP-TI	TCSP-EI	TCSP-RI	TCSP-UI	TCSP-NI
Part number female socket	TCSJ-JI	TCSJ-KI	TCSJ-TI	TCSJ-EI	TCSJ-RI	TCSJ-UI	TCSJ-NI
							
Calibration Code	J	K	T	E	R/S	U	N
Contact Material Positive	Fe	NiCr	Cu	NiCr	Cu	Cu	NiCrSi
Contact Material Negative	CuNi	NiAl	CuNi	CuNi	Alloy#11	Cu	NiSi

Leadwire

Thermocouple Extension Wire & Compensating Cable

Thermocouple Extension Wire and Compensating Cable is supplied on 100m reels.

The Thermocouple Type is identified by colour coding to IEC 584.3.

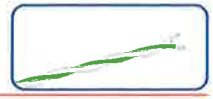
The information given below is a guide to the various constructions available and other types (i.e. multipair cables) can be supplied.

Compensating cable can be used when the temperature of the connection to the thermocouple wire does not exceed 100°C.

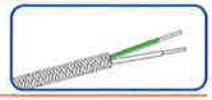
Thermocouple extension wire is supplied as Class 1.

Insulation Construction

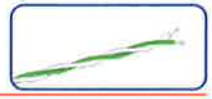
1/0.5mm
Twin Twisted
PFA/PTFE



1./0.5mm Glass fibre over each conductor
Laid Flat
Glass fibre overall

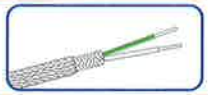


7/0.2mm
Twin Twisted
PFA /PTFE

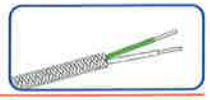


7/0.2mm
PVC over each conductor
Laid flat
PVC overall

7/0/2mm overall
PVC conductor Laid flat
PVC covered + St. St. overall

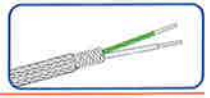


7/0.2mm Glass fibre over each conductor laid flat
Glass fibre overall

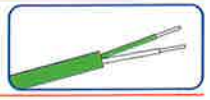


7/0.2mm Glass fibre over each conductor laid flat
Glass fibre covered and
Tin copper braid overall

7/0.2mm Glass fibre over each conductor laid flat.
Glass fibre covered and
St/st. braid overall



7/0.2mm PFA over each conductor
Laid flat and PFA overall



Available in all colour code standards.

COLOUR CODED TO IEC 584-3

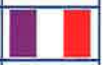
CALIBRATION	CONDUCTORS	WIRE INSULATION	OUTER SHEATH	MAX INS TEMP	ORDER CODE
K EXTENSION	1/0.5mm TWIN TWISTED	PFA/PTFE	NONE	260	IKXPF15TTN
J EXTENSION	1/0.5mm TWIN TWISTED	PFA/PTFE	NONE	260	IJXPF15TTN
T EXTENSION	1/0.5mm TWIN TWISTED	PFA/PTFE	NONE	260	ITXPF15TTN
K EXTENSION	1/0.5mm LAID FLAT	GLASS FIBRE	GLASS	400	IKXG15LFN
J EXTENSION	1/0.5mm LAID FLAT	GLASS FIBRE	GLASS	400	IJXG15LFN
T EXTENSION	1/0.5mm LAID FLAT	GLASS FIBRE	GLASS	400	ITXG15LFN
K EXTENSION	7/0.2mm TWIN TWISTED	PFA/PTFE	NONE	260	IKXPF72TTN
J EXTENSION	7/0.2mm TWIN TWISTED	PFA/PTFE	NONE	260	IJXPF72TTN
T EXTENSION	7/0.2mm TWIN TWISTED	PFA/PTFE	NONE	260	ITXPF72TTN
N EXTENSION	7/0.2mm TWIN TWISTED	PFA/PTFE	NONE	260	INXPF72TTN
K COMPENSATING	7/0.2mm TWIN TWISTED	PFA/PTFE	NONE	260	IKCPF72TTN
K EXTENSION	7/0.2mm LAID FLAT	PVC	PVC	105	IKXPV72LFN
J EXTENSION	7/0.2mm LAID FLAT	PVC	PVC	105	IJXPV72LFN
T EXTENSION	7/0.2mm LAID FLAT	PVC	PVC	105	ITXPV72LFN
N EXTENSION	7/0.2mm LAID FLAT	PVC	PVC	105	INXPV72LFN
K COMPENSATING	7/0.2mm LAID FLAT	PVC	PVC	105	IKCPV72LFN
R/S COMPENSATING	7/0.2mm LAID FLAT	PVC	PVC	105	IRCPV72LFN
K EXTENSION	7/0.2mm LAID FLAT	PVC	PVC + ST/ST BRAID	105	IKXPV72LFS
J EXTENSION	7/0.2mm LAID FLAT	PVC	PVC + ST/ST BRAID	105	IJXPV72LFS
T EXTENSION	7/0.2mm LAID FLAT	PVC	PVC + ST/ST BRAID	105	ITXPV72LFS
N EXTENSION	7/0.2mm LAID FLAT	PVC	PVC + ST/ST BRAID	105	INXPV72LFS
K COMPENSATING	7/0.2mm LAID FLAT	PVC	PVC + ST/ST BRAID	105	IKCPV72LFS
R/S COMPENSATING	7/0.2mm LAID FLAT	PVC	PVC + ST/ST BRAID	105	IRCPV72LFS

CALIBRATION	CONDUCTORS	WIRE INSULATION	OUTER SHEATH	MAX INS TEMP	ORDER CODE
K EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS	400	IKXGL72LFN
J EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS	400	IJXGL72LFN
T EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS	400	ITXGL72LFN
N EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS	400	INXGL72LFN
K COMPENSATING	7/0.2mm LAID FLAT	GLASS	GLASS	400	IKCGL72LFN
R/S COMPENSATING	7/0.2mm LAID FLAT	GLASS	GLASS	400	IRCGL72LFN
K EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS + TIN COP BRAID	400	IKXGL72LFT
J EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS + TIN COP BRAID	400	IJXGL72LFT
T EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS + TIN COP BRAID	400	ITXGL72LFT
N EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS + TIN COP BRAID	400	INXGL72LFT
K COMPENSATING	7/0.2mm LAID FLAT	GLASS	GLASS + TIN COP BRAID	400	IKCGL72LFT
R/S COMPENSATING	7/0.2mm LAID FLAT	GLASS	GLASS + TIN COP BRAID	400	IRCGL72LFT
K EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS ST/ST BRAID	400	IKXGL72LFS
J EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS ST/ST BRAID	400	IJXGL72LFS
T EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS ST/ST BRAID	400	ITXGL72LFS
N EXTENSION	7/0.2mm LAID FLAT	GLASS	GLASS ST/ST BRAID	400	INXGL72LFS
K COMPENSATING	7/0.2mm LAID FLAT	GLASS	GLASS ST/ST BRAID	400	IKCGL72LFS
R/S COMPENSATING	7/0.2mm LAID FLAT	GLASS	GLASS ST/ST BRAID	400	IRCGL72LFS
K EXTENSION	7/0.2mm LAID FLAT	PTFE	PTFE	260	IKXPF72LFPF
J EXTENSION	7/0.2mm LAID FLAT	PTFE	PTFE	260	IJXPF72LFPF
T EXTENSION	7/0.2mm LAID FLAT	PTFE	PTFE	260	ITXPF72LFPF
N EXTENSION	7/0.2mm LAID FLAT	PTFE	PTFE	260	INXPF72LFPF
K COMPENSATING	7/0.2mm LAID FLAT	PTFE	PTFE	260	IKCPF72LFPF

Leadwire

Thermocouple Extension Wire & Compensating Cable

THERMOCOUPLE CABLE COLOUR CODING

THERMOCOUPLE CONDUCTOR COMBINATION TYPE	EXTENSION & COMPENSATING CABLE TYPE		INTERNATIONAL COLOUR CODE TO IEC 584.3:1989 BS 4937 Part 30:1993	INTERNATIONAL COLOUR CODE TO IEC 584.3:1989 BS 4937 Part 30:1993 for Intrinsically Safe Circuits	FORMER COLOUR CODING FOR THERMOCOUPLE EXTENSION & COMPENSATING CABLE				
	EXTENSION CABLE	COMPENSATING CABLE			BRITISH TO BS 1843	JAPANESE TO JIS C 1610-1981	AMERICAN TO ANSI/MC96.1	GERMAN TO DIN43714	FRENCH TO NFC 42324
K	KX								
		KCA							
		KCB							
T	TX								
J	JX								
N	NX								
E	EX								
R		RCA							
		RCB							
S		SCA							
		SCB							

THERMOCOUPLE EXTENSION WIRE TOLERANCES

Thermocouple Conductor Calibration		Extension Cable type	Tolerance Class 1	Tolerance Class 2	Maximum Cable Temperature	Maximum Junction Temperature
K	Nickel Chromium/ Nickel Aluminium	KX	±1.5°C	±2.5°C	200°C	900°C
J	Iron/Constantan	JX	±1.5°C	±2.5°C	200°C	500°C
T	Copper/Constantan	TX	±0.5°C	±1.0°C	100°C	300°C
N	Nicrosil/Nisil	NX	±0.5°C	±2.5°C	200°C	900°C

SPECIFICATION

Compensating cable for use with thermocouples is manufactured with a choice of tolerance class and operating temperatures.

Type	Tolerance	Max Cable Temperature
KCA Compensating for type K	±2.5°C	150°C
KCB Compensating for Type K	±2.5°C	100°C
RCA Compensating for Type R	±2.5°C	100°C
RCB Compensating for Type R	±5.0°C	200°C
SCA Compensating for Type S	±2.5°C	100°C
SCB Compensating for Type S	±5.0°C	100°C

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Manotherm since 1958