Plastics Machinery Thermocouples - Type 4, 7, 10, 11 & 19

A wide variety of thermocouples commonly used in the plastics industry, suitable for high and low temperatures applications.

Available in a choice of thermocouple types with specifications custom built to suit most requirements.

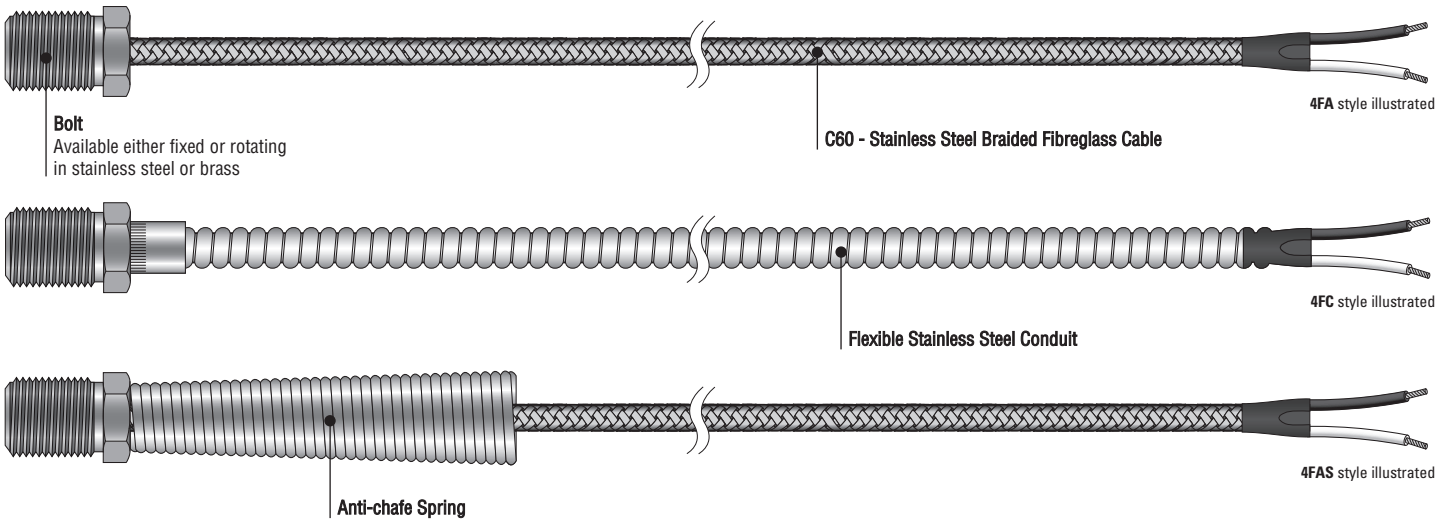
TC Ltd for Temperature Sensing, Measurement and Control

Type 4 Bolt (Nozzle) Thermocouple

Suitable for extruder nozzle, motor and pipe temperatures etc., these assemblies are available as standard in thermocouple types J, K, T or N. They can be supplied mounted into any bolt as required by the application and are available both as a fixed or a rotating bolt. They are supplied with either stainless steel braided fibreglass cable, which can be fitted with an anti-chafe spring if required. Alternatively, for more arduous applications, they can be supplied with fibreglass cable inside a flexible stainless steel flexible conduit (armour). Generally suitable up to 235°C or 480°C depending upon the bolt used. Thermocouple junctions are grounded to the bolt as standard but can be insulated if required. We also welcome receiving your free issued bolts for manufacturing into a completed sensor.

- **Thermocouple types J, K, T or N**
- **Stainless Steel or Brass bolts available in various sizes (see table below). Other bolt sizes are also available, please contact us for details**
- **Leads: Fibreglass insulated with Stainless Steel overbraid (conduit available)**
- **Operating range -30°C to +235°C / +480°C (depending on style selected)**

Typical Construction

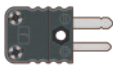


SECTION 1	Thermocouple Type	Temperature Range* (continuous)	(short term)
J	Iron vs Constantan	+20 to +700°C	-180 to +750°C
K	Nickel Chromium vs Nickel Aluminium	0 to +1100°C	-180 to +1350°C
T	Copper vs Constantan	-185 to +300°C	-250 to +400°C
N	Nicrosil vs Nisil	0 to +1100°C	-270 to +1300°C

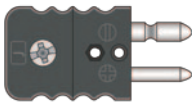
**Due to construction methods all Type 4 thermocouples are rated to +235°C or +480°C*

SECTION 2	Description
FA	Fixed Bolt - Stainless Steel braided Fibreglass cable
FC	Fixed Bolt - Stainless Steel conduit over Fibreglass cable
RA	Rotating Bolt - Stainless Steel braided Fibreglass cable
RC	Rotating Bolt - Stainless Steel conduit over Fibreglass cable
FAS	As Style FA but fitted with an anti-chafe spring
RAS	As Style RA but fitted with an anti-chafe spring

Fixed Bolts are rated to 235°C , Rotating Bolts are rated to 480°C



F11 - Optional F11 Miniature Plug



R11 - Optional R11 Standard Plug

SECTION 3	Available Thread Lengths (mm)
M3*	12
M4*	10, 20, 35
M5	8, 20, 25
M6	10, 12, 20, 25, 30, 40
M8	10, 12, 15, 16, 20, 25, 50, 60, 70
M10	16, 20, 25, 30, 35, 40
M12	20, 25, 50
M16	30

** Only available for 4FC and 4RC*

Order Code - Example

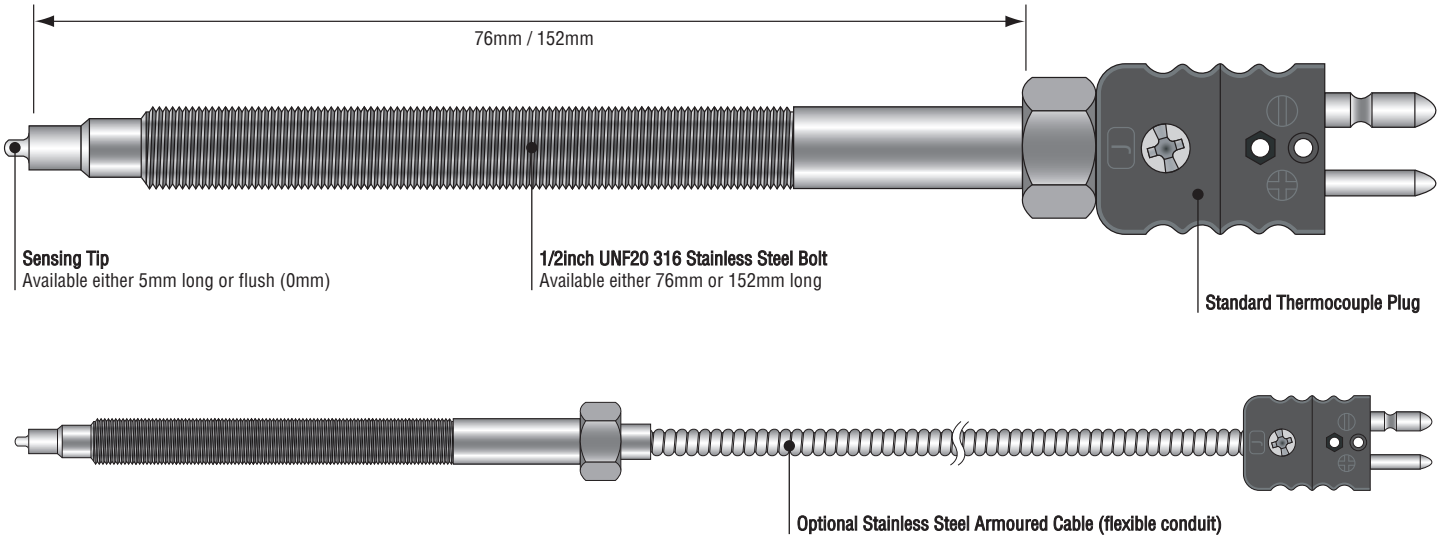
Style No.		Thermocouple Type		Thread and Length		Bolt Material		Lead Length		Sensing Junction		Optional Connector (if required)
4FC	-	J	-	M8 x 10MM	-	BRASS	-	1 MTR	-	GROUNDED	-	R11

Type 4M Melt Bolt Thermocouple

These robust sensors have been designed to withstand the high pressures found within the nozzles of plastics extruders and injection moulding machines where they are used to measure the temperature of the molten plastic. Available as standard in either 76mm or 152mm bolt lengths with either a 5mm long or flush sensing tip. Available in thermocouple types J, K, T or N, they have an insulated junction and are terminated in a standard round pin thermocouple plug. Suitable for use up to 600°C (at tip) with a bolt thread size of 1/2 inch UNF20, 316 stainless steel.

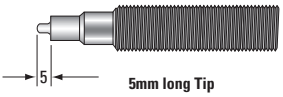
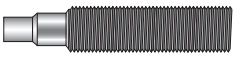
- **Thermocouple types J, K, T or N**
- **76mm or 152mm bolt lengths available**
- **Bolt thread: 1/2 inch UNF 20. Bolt material: 316 Stainless Steel**
- **Sensing tip length: Either 5mm or 0mm (flush)**
- **Bolt termination: Standard round pin thermocouple connector**
- **Insulated sensing junction**
- **Operating temperature: 0°C to 600°C at tip**

Typical Construction



SECTION 1	Thermocouple Type	Temperature Range* (continuous)	Temperature Range* (short term)
J	Iron vs Constantan	+20 to +700°C	-180 to +750°C
K	Nickel Chromium vs Nickel Aluminium	0 to +1100°C	-180 to +1350°C
T	Copper vs Constantan	-185 to +300°C	-250 to +400°C
N	Nicrosil vs Nisil	0 to +1100°C	-270 to +1300°C

**Due to construction methods all Type 4M thermocouples are rated 0°C to +600°C*

SECTION 2	Sensing Tip Style
5MM	 5mm long Tip
0MM	 Flush Tip

Order Code - Example

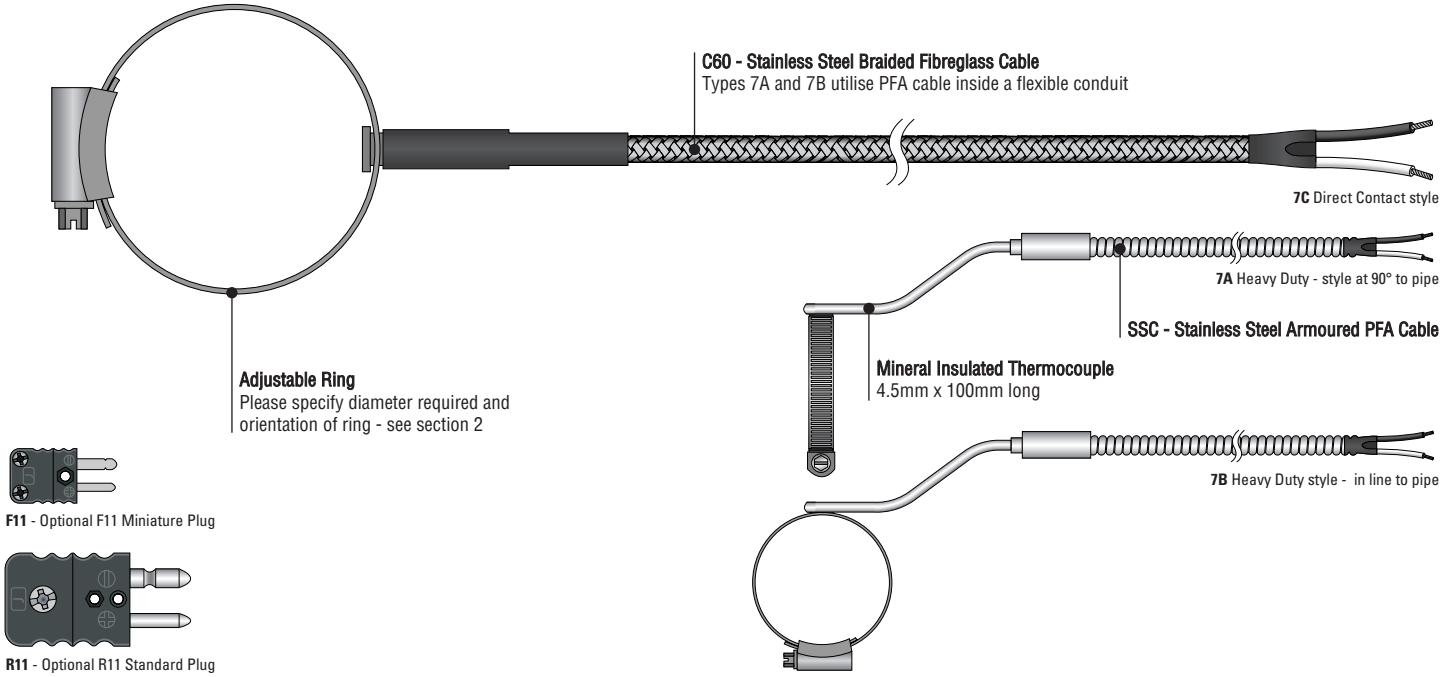
Style No.		Thermocouple Type		Bolt Length (specify 76mm or 152mm)		Tip Length (see section 2)		Optional Flexible Conduit Length		Connector
4M	-	J	-	152MM	-	5MM	-	2 MTRS	-	R11

Type 7 Adjustable Ring Thermocouple

For pipe temperature measurement up to 600°C, these thermocouples are available in types J, K, T or N. The direct contact version, Type 7C, is a contact sensor for use at lower temperatures up to 400°C and is comprised of a stainless steel braided cable attached directly to the adjustable ring. Type 7A or 7B are more heavy duty versions utilising a mineral insulated thermocouple (either insulated or grounded junction). These versions can be supplied with the ring either in line to the pipe or at 90° to the pipe and are usually supplied with a flexible stainless steel conduit over fibreglass extension leads, although other lead options are available. The thermocouple sensor sheath, is 4.5mm dia x 100mm long with other sizes available upon request.

- **Thermocouple types J, K, T and N available**
- **Versions available for most pipe diameters**
- **Direct Contact or Heavy Duty versions available**
- **Operating range: -100°C to 600°C depending on model selected**
- **Basic style also available for less demanding applications**

Typical Construction

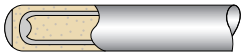
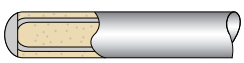


F11 - Optional F11 Miniature Plug

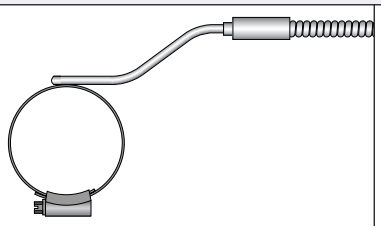
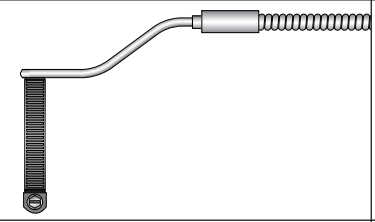
R11 - Optional R11 Standard Plug

SECTION 1	Thermocouple Type	Temperature Range* (continuous)	(short term)
J	Iron vs Constantan	+20 to +700°C	-180 to +750°C
K	Nickel Chromium vs Nickel Aluminium	0 to +1100°C	-180 to +1350°C
T	Copper vs Constantan	-185 to +300°C	-250 to +400°C
N	Nicrosil vs Nisil	0 to +1100°C	-270 to +1300°C

**Due to construction methods all Type 7 thermocouples are rated -100°C to +400°C or +600°C*

SECTION 3	Types of Sensing Junction	
I		**Insulated** Hot junction insulated from sheath. Gives floating output with typical insulation resistance in excess of 100 megohms.
G		**Grounded** Hot junction welded to sheath tip giving earthed output and faster response to temperature changes.

Above details are broadly applicable to types 7A and 7B only.

SECTION 2	Cable Style	
7A		**Heavy Duty Style - 90° to Pipe** Mineral insulated thermocouple attached to the adjustable ring at 90° to the pipe direction. Lagging may help sensor performance. Temperature rating: -100°C to 600°C.
7B		**Heavy Duty Style - In Line to Pipe** Mineral insulated thermocouple attached to the adjustable ring set in line to the pipe direction. Lagging may help sensor performance. Temperature rating: -100°C to 600°C.
7C	Recommended 	**Direct Contact Style** This sensor is suited to less demanding applications than the mineral insulated styles shown above. Supplied with a flexible stainless steel braided cable. Does not require lagging. Temperature rating: -100°C to 400°C.

Order Code - Example

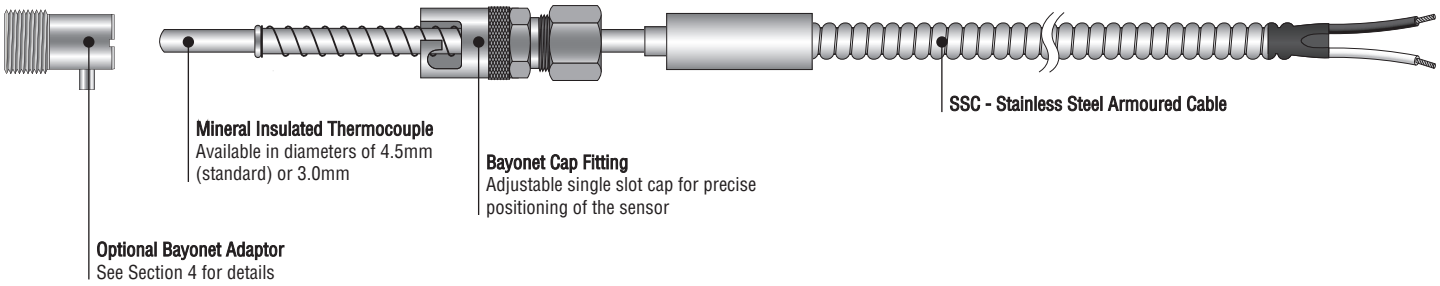
Style No. including Junction Type (see sections 2 and 3)		Thermocouple Type		Diameter Required		Cable Length		Optional Connector (if required)
7AG	-	J	-	50MM	-	2 MTRS	-	R11

Type 11A Mineral Insulated Bayonet Thermocouple

Suitable for plastics machinery and general purpose applications these assemblies are available in thermocouple types J, K, T or N with an industry standard one slot adjustable bayonet cap fitting. The fitting can be fine tuned for positioning on site and is suitable where several applications in your plant require individual positioning of the assembly. The sensor is mineral insulated and can therefore be bent after installation for exact positioning. Rated -50°C to +800°C with a diameter of 4.5mm as standard (a 3.0mm option is also available). A choice of stainless steel braided cable (SSB) or flexible stainless steel conduit (SSC) is available. The thermocouple junction can be grounded (G) or insulated (I).

- **Thermocouple types J, K, T or N available**
- **Adjustable bayonet cap fitting for precise positioning**
- **Semi flexible mineral insulated construction rated -50°C to +800°C**
- **Armoured flexible cable available for use in arduous environments**
- **Industry standard single slot bayonet cap**
- **4.5mm or 3.0mm diameter sensor**

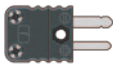
Typical Construction



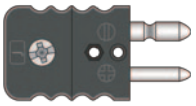
SECTION 1	Thermocouple Type	Temperature Range* (continuous)	Temperature Range* (short term)
J	Iron vs Constantan	+20 to +700°C	-180 to +750°C
K	Nickel Chromium vs Nickel Aluminium	0 to +1100°C	-180 to +1350°C
T	Copper vs Constantan	-185 to +300°C	-250 to +400°C
N	Nicrosil vs Nisil	0 to +1100°C	-270 to +1300°C

**Due to construction methods all Type 11A thermocouples are rated -50°C to +800°C*

SECTION 2	Sensor Diameter (mm)
Standard Sizes	3.0mm
	4.5mm



F11 - Optional F11 Miniature Plug



R11 - Optional R11 Standard Plug

SECTION 3 — Cable Style

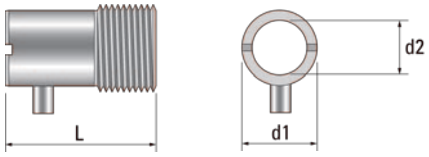
SSC

Flexible Stainless Steel Conduit

SSB

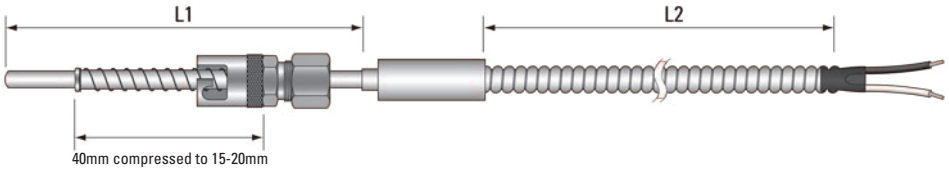
Stainless Steel Braided Cable

SECTION 4 — Optional Compatible Adaptors



Part No.	Notch	Length 'L'	OD	ID	Thread
BA1-220-110-18P	single	22mm	10.9mm	7.6mm	1/8" BSPP
BA1-220-108-14P	single	22mm	10.6mm	7.7mm	1/4" BSPP

All bayonet adaptors are sold separately



Order Code - Example

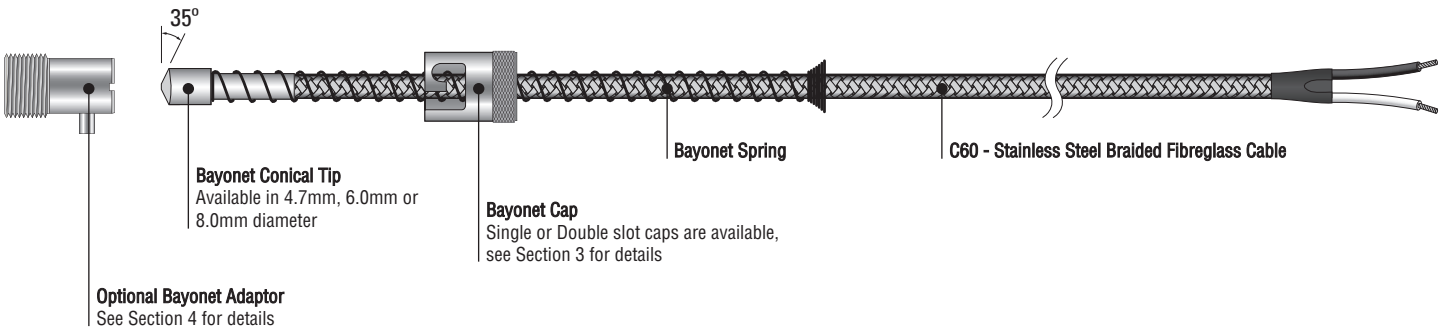
Style No.	Thermocouple Type (see section 1)	Sheath Diameter (see section 2)	Sheath Length 'L1'	Cable Style	Extension Cable Length 'L2'	Sensing Junction	Optional Connector (if required)
11A	J	4.5MM	100MM	SSC	1 MTR	G	R11

Type 11B Screw On Spring Bayonet Thermocouple

Suitable for plastics machinery and general purpose applications, these assemblies are supplied with a 200mm spring on which an industry standard one or two slot adjustable bayonet cap is screwed for fine positioning on site. These assemblies are available in thermocouple types J, K, T or N with the sensing tip is incorporated in an 18mm long x 4.7, 6.0 or 8.0mm diameter tube in which the stainless steel braided fibreglass leads are sealed. Rated -50°C to +400°C.

- **Thermocouple types J, K, T or N available**
- **Single or double slot caps available**
- **Sheath and lead rated -50°C to +400°C**
- **Grounded junction for fast response (insulated junction also available)**
- **Adaptors are also available with a choice of thread types and sizes**

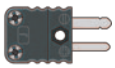
Typical Construction



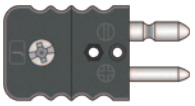
SECTION 1	Thermocouple Type	Temperature Range* (continuous)	(short term)
J	Iron vs Constantan	+20 to +700°C	-180 to +750°C
K	Nickel Chromium vs Nickel Aluminium	0 to +1100°C	-180 to +1350°C
T	Copper vs Constantan	-185 to +300°C	-250 to +400°C
N	Nicrosil vs Nisil	0 to +1100°C	-270 to +1300°C

**Due to construction methods all Type 11B thermocouples are rated -50°C to +400°C*

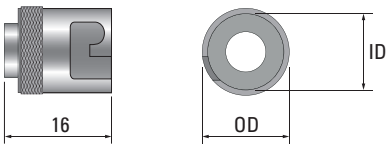
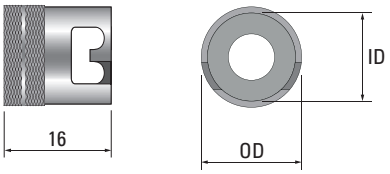
SECTION 2	Tip Diameter (mm)
Standard Sizes	4.7mm
	6.0mm
	8.0mm



F11 - Optional F11 Miniature Plug



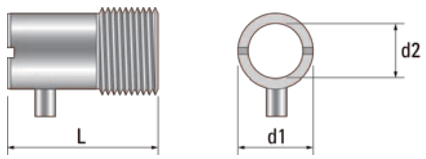
R11 - Optional R11 Standard Plug

SECTION 3	Cap Style	Sensor ∅	Notch	OD	ID*	Adaptor
1	 Single Slot Bayonet Cap	4.7mm	single	13.1mm	11.4mm	BA1-220-110-18P BA1-220-108-14P BA1-350-110-18P BA1-640-110-18P
		6.0mm / 8.0mm	single	13.1mm	11.4mm	BA1-220-110-18P BA1-220-108-14P BA1-350-110-18P BA1-640-110-18P
2	 Double Slot Bayonet Cap	4.7mm	double	13.1mm	11.4mm	BA2-601-120-12M
		6.0mm / 8.0mm	double	13.1mm	11.4mm	BA2-601-120-12M

** Nominal. Other sizes are available, please specify in order code.*

See section 4 for details of bayonet adaptors.

SECTION 4 — Optional Compatible Adaptors



Part No.	Notch	Length 'L'	OD	ID	Thread
BA1-220-110-18P	single	22mm	10.9mm	7.6mm	1/8" BSPP
BA1-220-108-14P	single	22mm	10.6mm	7.7mm	1/4" BSPP
BA1-350-110-18P	single	35mm	11mm	7.5mm	1/8" BSPP
BA1-640-110-18P	single	64mm	11mm	7.9mm	1/8" BSPP
BA2-601-120-12M	double	60mm	12mm	8.7mm	M12x1mm

All bayonet adaptors are sold separately

Order Code - Example

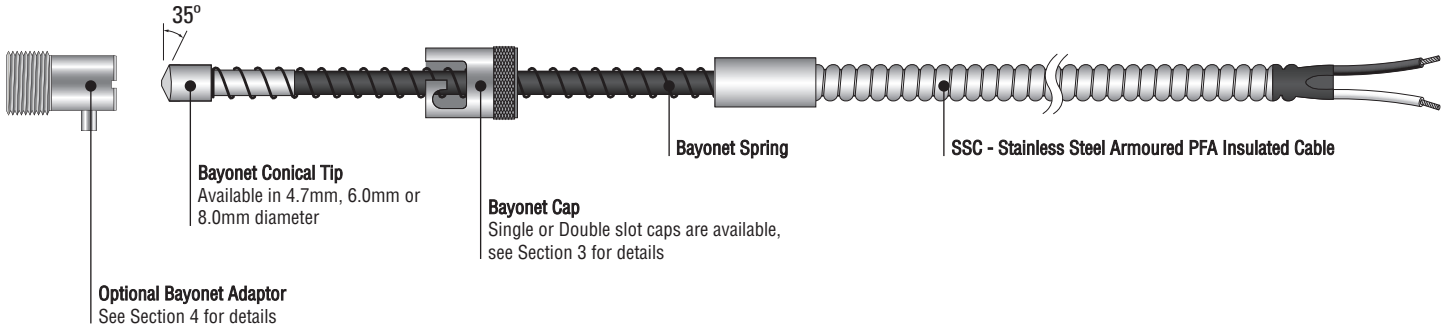
Style No.	Thermocouple Type (see section 1)	Sheath Diameter (see section 2)	Cap I.D	No. of Notches	Cable Length	Sensing Junction ('G' Grounded or 'I' Insulated)	Optional Connector (if required)
11B	J	4.7MM	11.4MM	1	2 MTRS	G	R11

Type 11C Heavy Duty Screw On Bayonet Thermocouple

Suitable for plastics machinery and general purpose applications where a more robust sensor is required. These assemblies are supplied with a spring on which an industry standard one or two slot adjustable bayonet cap is screwed for fine positioning on site. These assemblies are available in thermocouple types J, K, T or N with the sensing tip is incorporated in an 18mm long x 4.7, 6.0 or 8.0mm diameter tube. The flexible stainless steel armoured PFA cable provides increased mechanical protection in arduous environments up to a maximum of 250°C.

- **Thermocouple types J, K, T or N available**
- **Single or double slot caps available**
- **For use in demanding applications up to 250°C**
- **Armoured flexible cable for use in arduous environments**
- **Grounded junction for fast response (insulated junction also available)**
- **Adaptors are also available with a choice of thread types and sizes**

Typical Construction



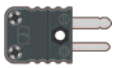
SECTION 1

Thermocouple Type		Temperature Range* (continuous)	Temperature Range* (short term)
J	Iron vs Constantan	+20 to +700°C	-180 to +750°C
K	Nickel Chromium vs Nickel Aluminium	0 to +1100°C	-180 to +1350°C
T	Copper vs Constantan	-185 to +300°C	-250 to +400°C
N	Nicrosil vs Nisil	0 to +1100°C	-270 to +1300°C

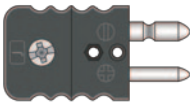
**Due to construction methods all Type 11C thermocouples are rated to +250°C*

SECTION 2

	Tip Diameter (mm)
Standard Sizes	4.7mm
	6.0mm
	8.0mm

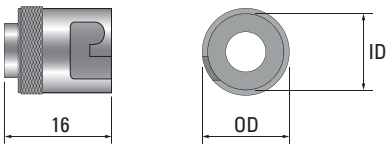
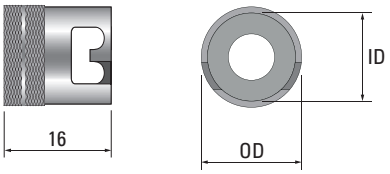


F11 - Optional F11 Miniature Plug



R11 - Optional R11 Standard Plug

SECTION 3

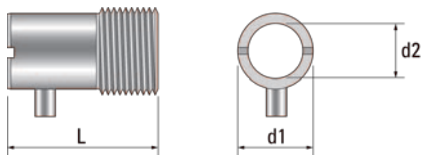
	Cap Style	Sensor ∅	Notch	OD	ID*	Adaptor
1	 Single Slot Bayonet Cap	4.7mm	single	13.1mm	11.4mm	BA1-220-110-18P BA1-220-108-14P BA1-350-110-18P BA1-640-110-18P
		6.0mm / 8.0mm	single	13.1mm	11.4mm	BA1-220-110-18P BA1-220-108-14P BA1-350-110-18P BA1-640-110-18P
2	 Double Slot Bayonet Cap	4.7mm	double	13.1mm	11.4mm	BA2-601-120-12M
		6.0mm / 8.0mm	double	13.1mm	11.4mm	BA2-601-120-12M

** Nominal. Other sizes are available, please specify in order code.*

See section 4 for details of bayonet adaptors.

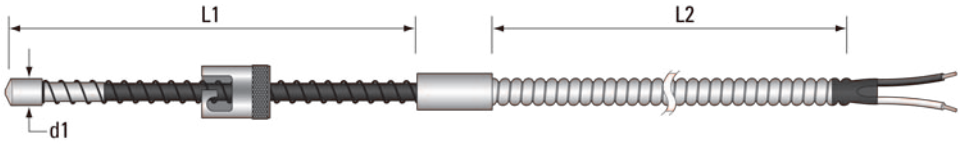
SECTION 4

Optional Compatible Adaptors



Part No.	Notch	Length 'L'	OD	ID	Thread
BA1-220-110-18P	single	22mm	10.9mm	7.6mm	1/8" BSPP
BA1-220-108-14P	single	22mm	10.6mm	7.7mm	1/4" BSPP
BA1-350-110-18P	single	35mm	11mm	7.5mm	1/8" BSPP
BA1-640-110-18P	single	64mm	11mm	7.9mm	1/8" BSPP
BA2-601-120-12M	double	60mm	12mm	8.7mm	M12x1mm

All bayonet adaptors are sold separately



Order Code - Example

Style No.	Thermocouple Type (see section 1)	Sheath Diameter 'd1' (see section 2)	Cap I.D	No. of Notches	Cable Length 'L1' (max. 200mm)	Conduit Length 'L2'	Sensing Junction ('G' Grounded or 'I' Insulated)	Optional Connector (if required)
11C	J	4.7MM	11.4MM	1	200MM	1 MTR	G	R11

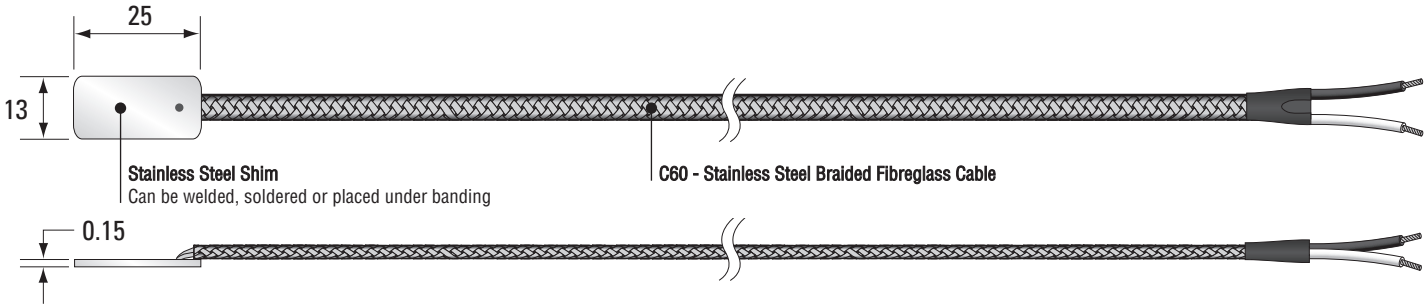
Type 10LT Leaf and Type 19 Washer Thermocouples

Type 10LT: Leaf Thermocouple

This sensor has a fast response thermocouple mounted on a stainless steel shim which allows it to be welded, soldered or placed under banding on a variety of surfaces including nozzle or band heaters. Supplied with stainless steel braided fibreglass cable.

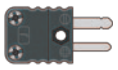
- **Thermocouple types J, K, T or N, grounded junction**
- **Stainless Steel leaf dimensions: 13mm x 25mm x 0.15mm thick**
- **Leads: Stainless Steel braided Fibreglass**
- **Operating range -30°C to +350°C**

Typical Construction

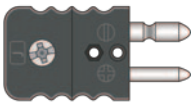


SECTION 1	Thermocouple Type	Temperature Range* (continuous)	(short term)
J	Iron vs Constantan	+20 to +700°C	-180 to +750°C
K	Nickel Chromium vs Nickel Aluminium	0 to +1100°C	-180 to +1350°C
T	Copper vs Constantan	-185 to +300°C	-250 to +400°C
N	Nicrosil vs Nisil	0 to +1100°C	-270 to +1300°C

**Due to construction methods all Type 10LT thermocouples are rated -30°C to +350°C*



F11 - Optional F11 Miniature Plug



R11 - Optional R11 Standard Plug

Order Code - Example

Style No.		Thermocouple Type		Overall Length		Optional Connector (if required)
10LT	-	J	-	2 MTRS	-	F11

Type 19: Washer Thermocouple

These assemblies which are available in thermocouple types J, K, T or N are suitable for surface temperature monitoring of plates, pipes and vessels etc. up to a maximum operating temperature of 400°C. The crimp washers are made from plated brass and are available in the following sizes; 0BA/M6, 2BA/M5, 3BA/M4, 4BA/M3.5 and 6BA/M3. The extension leads are made from stainless steel braided fibreglass cable which is then grounded to the washer, insulated junctions are also available.

- **Thermocouple types J, K, T or N**
- **Grounded or Insulated junction**
- **Washer sizes 0BA/M6, 2BA/M5, 3BA/M4, 4BA/M3.5 and 6BA/M3 available**
- **Leads: Fibreglass insulated with Stainless Steel overbraid**
- **Operating range: -10°C to +400°C**

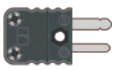
Typical Construction

SECTION 1	Thermocouple Type	Temperature Range* (continuous)	(short term)
J	Iron vs Constantan	+20 to +700°C	-180 to +750°C
K	Nickel Chromium vs Nickel Aluminium	0 to +1100°C	-180 to +1350°C
T	Copper vs Constantan	-185 to +300°C	-250 to +400°C
N	Nicrosil vs Nisil	0 to +1100°C	-270 to +1300°C

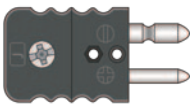
**Due to construction methods all Type 19 thermocouples are rated -10°C to +400°C*

SECTION 2	Washer Size
0BA	to suit thread size 0BA / M6
2BA	to suit thread size 2BA / M5
3BA	to suit thread size 3BA / M4
4BA	to suit thread size 4BA / M3.5
6BA	to suit thread size 6BA / M3

Other sizes are available, please contact us for details



F11 - Optional F11 Miniature Plug



R11 - Optional R11 Standard Plug

Order Code - Example

Style No.		Thermocouple Type		Washer Size		Sensing Junction ('G' Grounded or 'I' Insulated)		Lead Length		Optional Connector (if required)
19	-	J	-	4BA	-	G	-	1 MTR	-	F11

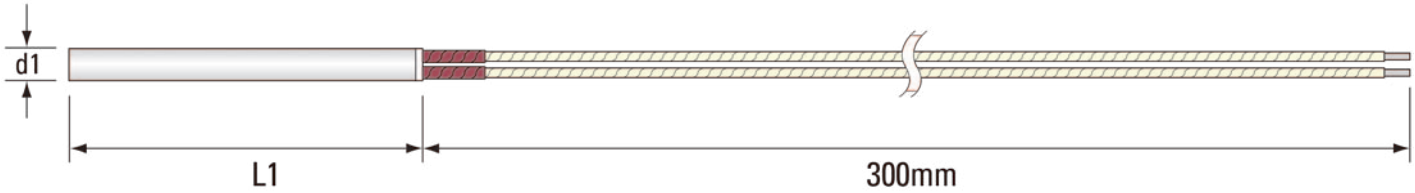
Cartridge Heaters

We have an extensive range of cartridge heaters to suit a wide variety of applications. Our cartridge heaters incorporate 80/20 nickel chromium heating wires mounted on a ceramic former close to the ceramic lined thin wall stainless steel sheath which gives excellent thermal conductivity. Ideal for high wattage applications or for applications requiring long life due to their self protective oxidation properties.

Warning
Whilst the elements are insulated from the sheath by magnesium oxide powder, for safety reasons the heater block and/or cartridge heater must be bonded to earth.

Technical specifications:

- **Supply voltage: 230V AC**
- **Sheath Material: Stainless Steel**
- **Connection Lead Length: 300mm**
- **Connection Lead Insulation: Silicone impregnated Fibreglass**
- **Working temperature: 750°C maximum**



230V AC Rated Cartridge Heaters - 6.5mm and 10mm diameter

Code No	Diam. (d1)	Length (L1)	Power(W)
921-100	6.5mm	40mm	160
921-106	6.5mm	40mm	175
921-112	6.5mm	50mm	180
921-118	6.5mm	50mm	200
921-124	6.5mm	80mm	250
921-130	6.5mm	80mm	315
921-136	6.5mm	100mm	350
921-142	6.5mm	130mm	400
921-148	6.5mm	160mm	150
921-307	10mm	40mm	160
921-313	10mm	50mm	200
921-319	10mm	50mm	400
921-325	10mm	60mm	200
921-331	10mm	80mm	200
921-337	10mm	80mm	315
921-343	10mm	80mm	400
921-355	10mm	100mm	315
921-361	10mm	100mm	500
921-367	10mm	100mm	850
921-373	10mm	130mm	315
921-379	10mm	130mm	500
921-385	10mm	130mm	750
921-391	10mm	160mm	500
921-397	10mm	160mm	800

230V AC Rated Cartridge Heaters - 12.5mm and 16mm diameter

Code No	Diam. (d1)	Length (L1)	Power(W)
921-602	12.5mm	50mm	250
921-608	12.5mm	60mm	250
921-614	12.5mm	60mm	400
921-620	12.5mm	80mm	400
921-632	12.5mm	100mm	500
921-638	12.5mm	100mm	800
921-644	12.5mm	100mm	1000
921-650	12.5mm	130mm	800
921-656	12.5mm	160mm	800
921-662	12.5mm	160mm	1000
921-668	12.5mm	180mm	630
921-674	12.5mm	200mm	1000
921-680	12.5mm	250mm	1250
921-686	12.5mm	300mm	1500
921-800	16mm	50mm	200
921-806	16mm	80mm	400
921-812	16mm	80mm	630
921-818	16mm	100mm	500
921-824	16mm	100mm	800
921-830	16mm	130mm	1000
921-836	16mm	160mm	1000
921-842	16mm	180mm	1000
921-848	16mm	200mm	1500
921-860	16mm	250mm	1250
921-866	16mm	250mm	1600
921-872	16mm	300mm	1500

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