Plastics Industry Sensors



Technical Data

Plastics Sensors Construction

Introduction

The typical plastics industry sensor assembly consists of four components:

- attaching device,
- element,
- · element protection,
- cold end termination.

The sensor is further defined by its physical attributes:

- number of elements
- junction style (hot end)
- probe configuration (straight, 45°, 90°)
- length of components

The following paragraphs provide a brief explanation of each component and physical attribute. After reading this section you should have a general, comprehensive understanding of how sensors for the plastics industry are constructed.

Components

Attaching Device

Some sensors are designed for specific applications and have a unique attaching device; others are designed for general application and have a common attaching device.

The attaching device, also called the process mount, is defined by the way it mounts the sensor to the workpeice. The following paragraphs discuss the various devices. For detailed explanation, see "Process Mounting."

Unique mounts include

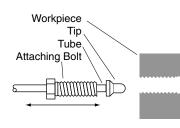
- melt bolt
- nozzle melt
- ring or lug

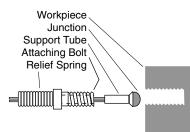
The melt bolt sensor is used on extruders and injection molding machines. A melt bolt "blank" with a hole through its length is welded to the rigid tube.

The nozzle melt sensor is designed for injection molders. Two types are available: immersion type and non-immersion type. The immersion type is a bolt "blank" with a hole through its length on the sensor tube. The sensor tip protrudes through the workpeice and seats in a beveled hole in the work piece. The attaching bolt is threaded into the workpiece and tightly seals the tip to the workpiece.

The non-immersion type is an attaching bolt with a center hole. A short tube seats in the bolt hole and supports the thermocouple junction against the bottom of the hole in the workpiece. Or, if the sensor is an RTD, the tip is potted in the hole in the bolt.

Ring type and lug type sensors measure surface temperature – such as a barrel or a mold. The sensor leads are joined at the ring or lug (hot junction). The sensor attaches to a threaded stud on the workpiece and must be secured with a nut.





Nozzle Melt Sensors

Technical Data

Components (continued)

General application sensors are commonly called tube style sensors and are mounted with:bayonet lock, orthreaded bushing.
These devices are secured to the rigid tube portion of the sensor assembly.
Varidepth® sensors have no rigid tube (other than the tip). The element of a Varidepth sensor is protected by either a flexible tube or spring. Both of these components are compressible. Varidepth sensors are equipped with a bayonet style lock cap directly on the tube or spring.
Two types of bayonet locks are available: fixed or adjustable. The fixed bayonet lock is secured to the tube between two rings formed on the tube surface. The adjustable bayonet lock is held on the tube with a compression ring and nut.
Two types of threaded bushing mounts are available: fixed or adjustable. However, the more common, by far, is the adjustable bushing held on the tube with a compression ring and nut. The fixed bushing is brazed to the tube.
Both the Varidepth sensor and the bayonet lock require a mating adapter to mount it to the workpiece. The threaded bushing mounts directly into a tapped hole in the workpiece.
The thermocouple element is defined by its calibration (type), wire size (gauge), construction (solid, strand, insulation). The resistance temperature detector (RTD) is defined by its resistance coefficient.
Element protection is defined by its construction: rigid tube, flexible armor (or flexible tube), stainless steel overbraid, spring, or insulation only. Rigid length is identified as dimension "X." Flexible length is identified as dimension "Y."
The depth of the fixed bayonet lock attaching device is identified as dimension "Z." Since the location of the bayonet lock on most assemblies (but not all) is near the transition point (from rigid to flexible), the "Z" dimension is equal to the length of the probe. Therefore, there is no "X" dimension.
Cold end termination is defined by the device with which the sensor leads are terminated: stripped ends, spade lugs, plug, and/or jack. It is further defined by the extended length of the leads – that is, leads in addition to the standard length normally provided with that sensor. Extended lead length is identified as dimension "L."
Many sensors can accommodate two elements – called dual element. Dual element construction is restricted by wire size and tube size.
Junction style specifies whether the tube end is open or closed, and if the element is grounded to the tube.
Specifies the angle of the sensor probe relative to the attaching device. Sensors are available straight in line, or 45° or 90° off the mounting plane.
Components with meaningful linear dimensions are the rigid tube (or probe), flexible tube, including stainless steel overbraid and Fiberglass insulation only, and extended lead

Components (continued)

(considered part of the cold end termination). Code designations for each of these dimensions are as follows:

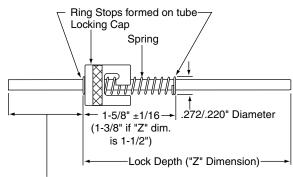
- X = Rigid length (probe). Typically applies to sensor with adjustable attaching device.
- Y = Flexible length (flexible armor, SS overbraid, Fiberglass)
- Z = Locating depth for fixed bayonet lock. Frequently, but not always, replaces X.
- L = Extended lead. In addition to the standard lead length provided on the sensor.

Process Mounting

The sensor probe can be mounted to the workpiece with any of the following attaching devices. All attaching devices are not applicable to all sensors. Each sensor illustration on the following pages lists only the attaching devices appropriate for that sensor.

Fixed Bayonet

A spring loaded locking cap held lin a fixed position on the probe tube between two rings formed ("popped") on the tube surface. The locking cap attaches to an adapter that is mounted to the workpiece. Various adapters are illustrated under "Accessories" at the end of this section.

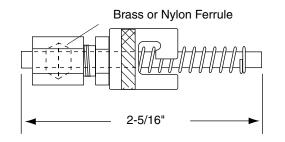


1" for straight probes; 2-3/4" for 45° and 90° probes (angles bent at final assembly)

Adjustable Bayonet

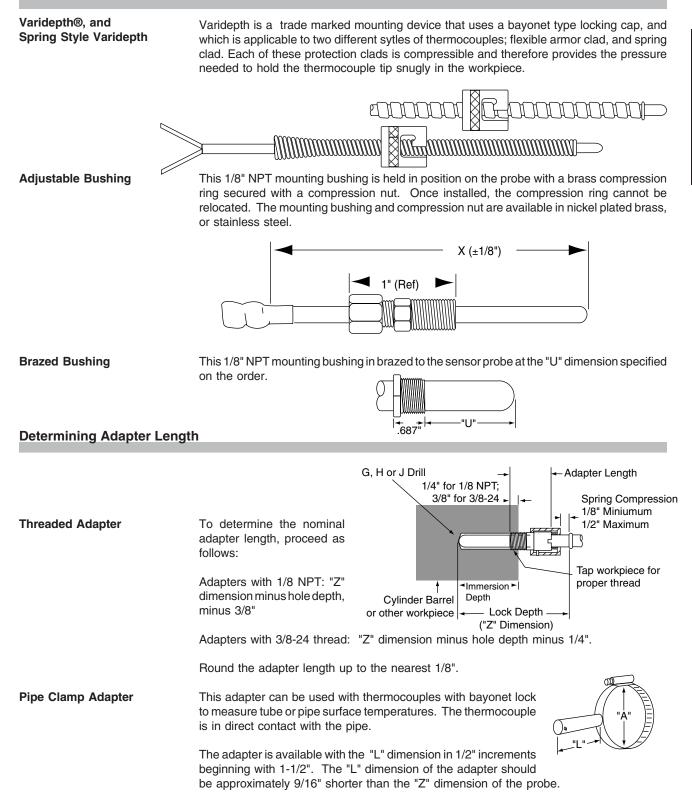
This device can be fitted over any 1/8" o.d. plain end thermocouple and adjusted to the selected immersion depth by tightening the compression fitting. With a suitable adapter, any immersion depth over 1/2" can be selected.

The fitting is shipped with both a nylon and brass ferrule. Nylon permits readjustment, but should not be exposed to temperature over 250°F. The brass ferrule cannot be adjusted after it is set. It is suitable for temperatures up to 900°F.



Technical Data

Process Mounting (continued)



Model Number Breakdown

Anatomy of a Model Number

Introduction The Barber-Colman model number is made up of fifteen fields. Each field, or series of fields, contains a code, or codes, that represents a specific feature of the product. This section of the book is devoted to sensors designed primarily for application in the plastics manufacturing industry. Two types of sensors are listed: thermocouples and resistance temperature detectors. This section tells you how to identify the specifications of a thermocouple from the model number. Analyzing a Model Number Field 1 Application – Plastics Industry The code in most of the fields vary from product to product. However, the first field always contains the code "P" which identifies the product as a sensor designed specifically for application in the plastics industry Th Model No. P Field 13 Attaching Device (Style) After identifying the plastics industry sensor, the second most significant code is in Field 13. The style of a thermocouple is commonly defined by the way it attaches to the workpiece. The attaching device, also called process mounting, is specified in field 13 of the part number T Model No. P All the various styles for the plastics industries thermocouples are: Code **Description** See Page Tube style with no mounting fitting 2-20, 2-24, 2-26, 2-28 0 1 2 3 4 5 6 Armor style Varidepth® 2-10, 2-13 7 Ring or lug mount 2-30 8 Non-immersion nozzle melt style thermocouple 2-28, 2-34 Spring style Varidepth, standard lock cap, 12" spring 2-14, 2-16 В D Spring style Varidepth, 12 mm lock cap, 12" spring 2-14, 2-16 F Spring style Varidepth, 15 mm lock cap, 12" spring 2-14, 2-16 After identifying the application and style of the thermocouple, you can now define the remaining specifications by the codes in other fields. They are:

Analyzing a Model Number (continued)

Fields 2 and 3	Element Two wires of dissimilar alloys joined at the tip. When the ends are exposed to a temperature gradient, and electromotive force (EMF) is generated. The EMF is very small, amounting to microvolts per degree.
Field 4	Element Configuration This field indicates either single or dual element in a straight, 45° angle, or 90° angle tube.
Field 5	Probe Diameter This code indicates either a 1/8" diameter or a 3/16" diameter.
Field 6	Junction Style and Protection This field indicates closed or open end, ground or ungrounded junction, and with or without flexible armor.
Field 7	Cold End Termination Specifies stripped ends, lugs, plug and/or jack.
Fields 8 and 9	Rigid Length or Melt Bolt Length This field specifies the rigid length of the probe (dimension "X") of those sensors with an adjustable attaching device; or the length of a melt bolt style sensor.
Fields 10, 11 and 12	Flexible Length This is the flexible length (dimension "Y") of the thermocouple. It is the entire length of the spring style Varidepth sensor, or the flexible portion behind the rigid portion of other assemblies. Flexible length may be fiberglass insulated, or clad with stainless steel overbraid or flexible armor.
Fields 14 and 15	Immersion Depth This code defines how the sensor interacts with the measured media. It defines the immersion depth (dimension "Z") of a typical sensor or the tip length (dimension "T") of a melt bolt sensor. Or, it defines the size of the ring or lug on the ring/lug style sensor.

Ordering Information

Illustrations on the following pages list wire most commonly used in specific thermocouples (Fields 2, 3 of the part number); however, any wire from the following table can be used. Standard and special limits (tolerances) are defined in Table 1 of the "Overview" section of this book, under "Certification."

When selecting thermocouple wire, be sure to check Table 2 and verify its compatibility with the probe o.d., junction style, and lead protection.

Table 1. Thermocouple Wire

Fields 2, 3. Thermocouple Type Code Gauge Limits Construction Insumatio rPart Numbe					
Type J – Rated at 900°F except Teflon insulated (code 25) rated at $400^{\circ}F^{*}$					
01			Solid	Fiberglass	WJ520-1130
07				Fiberglass w/SS	5WJ20-1230
11	20	Std	Strand	Fiberglass w/SS	2WJ20-3230
12	20		otrand	Fiberglass	WJ220-3130
25			Solid	Teflon	WJ207-1150
60		Spl	Colid	Fisberglas	WJ520-2130
02			Solid	Fiberglass	WJ524-1130
13		Std	30110	Fiberglass w/SS	5WJ24-1230
15	24	Siu	Strand	Fiberglass w/SS	5WJ24-3230
26			Stranu	Fiberglass	WJ524-3130
61		Spl	Solid	Fiberglass	WJ524-2130
09	18	Std	Strand	Fiberglass	WJ#18-3130
Type K – Rated at 900°F*					
05		Std	Solid	Fiberglass	WK520-1130
08			Std	30110	Fiberglass w/SS
20	20		Strand	Fiberglass	WK220-3130
62		Spl		Fiberglass	WK420-2130
19		Std	Solid	Fsiberglas	WK424-1130
24	24	Std	30110	Fibe6glass w/S	57VK24-1230
63		Spl		Fisberglas	WK424-2130
Type I	E – Rate	ed at 90)0°F*		
17	20	C+d	Solid	Fibergloop	WE20-11304
18	24	24 Std Solid Fiberglass	ribergiass -	WE24-1130	
Туре	Г – 20 g	auge ra	ated at 500°F	; 24 gauge rated a	t 400°F*
06	20	Std			WT20-11304
64	20	Spl	Solid	F4lberglass	WT20-2130
14	24	Std		4	WT24-1130

*Rating is maximum continuous temperature of wire only; maximum operating temperature of thermocouple assembly may be lower.

Technical Data

Ordering Information (continued)

Component Compatibility

The number of elements in a thermocouple is constrained by wire size, probe diameter, and lead protection. The table below shows the compatibility of these components

Table 2. Compatibility

Code	21	23	30	31	32	33	34	35
Probe O.D.	1,	/8"			3/*	16"		
Tin	Grou	Inded		Grou	nded		Ungro	unded
Tip	Clo	sed	Open	Closed	Open	Closed	Clo	sed
Flex Tube	No	Yes	N	lo	Y	es	No	Yes
ields 2, 3. T/C Type								
01	No	one		Single	or Dual		Sin	gle
02	Sir	ngle		Single	or Dual		Single	or Dual
05	No	one		Single	or Dual		Sin	gle
06	No	one		Single	or Dual		Sin	gle
07	No	one	Sir	ngle	None	Single	Sin	gle
08	No	one	Sir	ngle	None	Single	-	
09	None		Single		None			
11	None		Sir	ngle	None	Single	Nc	ne
12	None		Single		None			
13	Sir	ngle		Single	or Dual		Sin	gle*
14	Single		Single or Dual		Single	or Dual		
15	Single		Single or Dual		Sin	gle*		
17	None		Single or Dual		Single			
18	Sir	ngle		Single	or Dual		Single	or Dual
19	Sir	ngle		Single	or Dual		Single	
20	No	one	Single		Nc	ne		
24	Sir	ngle		Single	or Dual		Single	or Dual
25	Sir	ngle		Single	or Dual		Single	or Dual
26	Sir	ngle		Single	or Dual		Single	or Dual
60	No	one		Single	or Dual		Sin	gle
61	Sir	ngle			or Dual		Dı	ual
62	No	one		Single	or Dual		Sin	gle
63	Sir	ngle	Single or Dual			Dual		
64	No	one		Single	or Dual		Sin	gle

* Dual only for code 34 spring style

Varidepth T/C, Armor

Varidepth[®] Adjustable Depth Immersion Thermocouple in Armor Clad Flexible Tube

Introduction

The Varidepth thermocouple adjusts to many depths eliminating the need to stock a variety of fixed immersion sensors. Compression of the flexible tube provides locking force that keeps the probe tip tight against the well bottom. Varidepth thermocouples are available in Types J, K, T and E. Grounded Type K thermocouples have a welded tips; Types J, T and E thermocouples have silver soldered tipped probes for faster response.

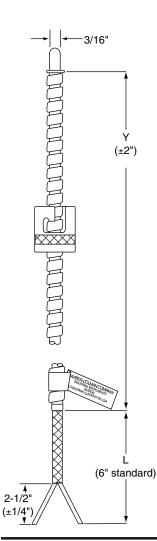
Features

- Locking Cap Adjusts Easily to Any Position On Flexible Tube
- Compressed Tube Holds Probe Tip Firmly Against Well Bottom
- Thermocouple at Tip of Probe for Maximum Heat Transfer
- Types J, K, E Withstand up to 750°F Over Probe and Tube

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• Type T Withstands up to 500°F

Ordering Information



Field 1. BASE MODEL

P - Plastics industry

Fields 2, 3. THERMOCOUPLE TYPE

Fiberglass insulation unless otherwise stated.

Determine length (Y + L) by completing Fields 10, 11, 12, and Field 7.

Туре	Description	

- 01 J 20 gauge, solid
- 02 J 24 gauge, solid
- 12 J 20 gauge, strand
- 60 J 20 gauge, solid, special limits
- 05 K 20 gauge, solid

62 - K 20 gauge, solid, special limits

Several other wire codes are available. See Table 1 on page 2-8 for a complete listing. Compatibility of wire and junction styles is listed in Table 2 on page 2-9.

Field 4. NUMBER OF ELEMENTS

Complete Fields 5, 6; then check compatibility Table 2 on page 2-9.

- 1 Single element
- 4 Dual element. (24 gauge element only). Return to Fields 2, 3.

Fields 5, 6. JUNCTION STYLE, LEAD PROTECTION

- Determine length by completing Fields 10, 11, 12
- 33 Closed end, grounded, flexible tube
- 35 Closed end, ungrounded, flexible tube (24 gauge only, single element only)

Ordering Information (continued)

Field 7. COLD END TERMINATION

- 0 2-1/2" split leads, ends stripped
- 1 2-1/2" split leads, spade lugs
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut
- 3 Solid pin quick disconnect plug(s)
- 4 Solid pin quick disconnect plug(s) with mating jack(s)
- 7 Quick disconnect jack(s)
- C Hollow pin quick disconnect plug(s), Type J only
- D Hollow pin quick disconnect plug(s) with mating jack(s), Type J only

Extended Lead (DIMENSION "L")

Complete this Field to determine length for Fields 2, 3

- F 12", split ends stripped
- G 24", split ends stripped
- H 48", split ends stripped
- J 96", split ends stripped
- K 144", split ends stripped

For other lengths, consult factory

Fields 8, 9. RESERVED

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")

Complete these Fields to determine length for Fields 2, 3; and 5, 6 YYY - Enter "Y" length in whole inches; minimum 018"

Fields 13, 14, 15. RESERVED

The most often ordered assemblies are:

P011-33000-YYY-6-00 with stripped leads P011-33100-YYY-6-00 with spade lugs P011-33300-YYY-6-00 with quick disconnect plug

Refer to Price Guide

Varidepth RTD, Armor

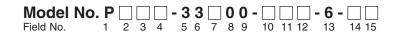
Varidepth[®] Adjustable Depth Immersion RTD in Armor Clad Flexible Tube

Introduction	
	The Varidepth resistance temperature detector adjusts to many depths eliminating the nee to stock a variety of fixed immersion sensors. Compression of the flexible tube provide locking force that keeps the probe tip tight against the bottom of the adapter well.
Features	 Locking Cap Adjusts Easily to Any Position On Flexible Tube Compressed Tube Holds Probe Tip Firmly Against Well Bottom RTD at Tip of Probe for Maximum Heat Transfer
Varidepth Installation	Procedure
	1. Using a number 9 drill, bore a Sensitivity Length hole to the immersion depth. Sensitivity Length $-1" + 1$ Flexible Tuber Length Sensitivity Length $-1" + 1$
	2. Using a 9/32" drill, bore a hole to within 7/8" of the adapter well bottom. Clean chips from hole.
	3. Tap the open end of the adapter well for 1/8" NPT or 3/8-24. Clean chips from hole. Cylinder Barrel or other workpiece → 4" Minimum →
	 4. Install adapter. Minimum (Recommended) distance recommended from bottom of well to top of adapter is four inches.
	5. Insert probe into adapter.
White Red	6. Hold probe firmly against bottom of well. Rotate locking cap on flexible tube until it is about one turn from adapter. Press and twist the locking cap to lock i against the adapter. Be certain the probe is firmly seated in the well.
White Red Red	 The six inch leads must be free to move to allow the flexible tubing to compress at the probe end. A one inch diameter loop in the leads is suggested.

8. Wire the RTD to indicator or controller instrument per instructions of the instrument manufacturer.

Varidepth RTD, Armor

Ordering Information



Fields 1, 2. BASE MODEL

- P5 0.00391 //°C Resistance Temperature Detector
- P7 0.00385 //°C Resistance Temperature Detector

Field 3. ELEMENT

E Determine length (Y + L) by completing Fields 10, 11, 12, and Fields 14, 15.

	Accuracy (at 300°F)	Temp Rating	<u>Wires</u>
1 -	0.25%	500°F	3
2 -	0.10%	932°F	3
3 -	0.25%	932°F	3
4 -	0.10%	500°F	2
5 -	0.25%	932°F	2
6 -	0.10%	500°F	3

Field 4. NUMBER OF ELEMENTS, CONFIGURATION

- 1 Single element, straight
- 4 Dual element, straight (P74 or P75 only)

Fields 5, 6. RESERVED

Field 7. COLD END TERMINATION

- 0 2-1/2" split leads, ends stripped
- 1 2-1/2" split leads, spade lugs
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut
- 3 Solid pin quick disconnect plug
- 4 Solid pin quick disconnect plug with mating jack

Fields 8, 9. RESERVED

Field 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")*

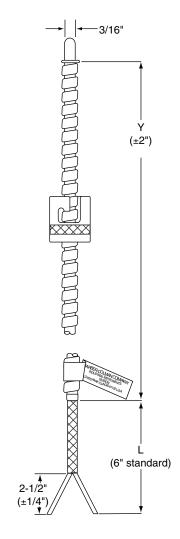
Complete these Fields to determine length for Field 3 YYY - Actual length in whole inches (minimum 018)

Field 13. RESERVED

Fields 14, 15. LEAD LENGTH (DIMENSION "L")*

- Complete these Fields to determine length for Field 3
- 00 6"
- LL Actual length in feet
- 99 Longer than 98 feet

*Total assembly length over 4 feet introduces an offset in sensed temperature of approximately 1-1/4°F per 10 feet over 4 feet.



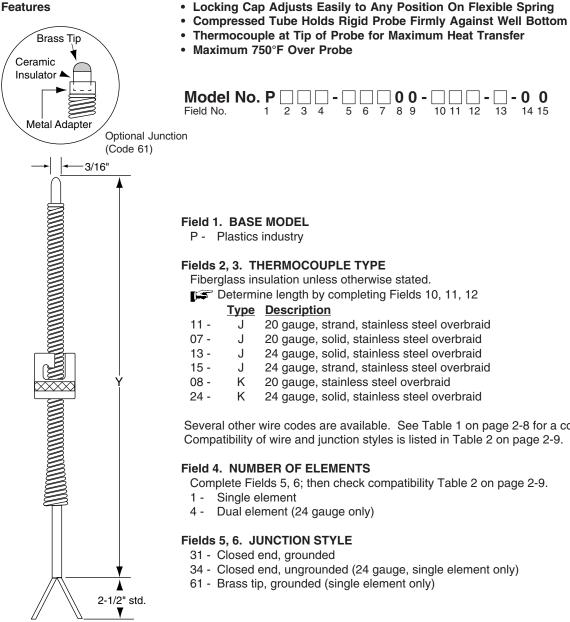
Varidepth T/C, Spring Style

Varidepth[®] Adjustable Depth Immersion Thermocouple **Spring Style**

Introduction

The Varidepth thermocouple adjusts to many depths eliminating the need to stock a variety of fixed immersion length sensors. The locking cap rotates on the flexible spring achieving locking force that keeps the probe tip tight against the bottom of the adapter well. Varidepth thermocouples are available in Types J, K, T and E. Grounded Type K thermocouples have a welded tip: grounded Types J. T and E thermocouples have silver soldered tipped probes for faster response.

Features



- 24 gauge, solid, stainless steel overbraid
 - 24 gauge, strand, stainless steel overbraid
 - 20 gauge, stainless steel overbraid
 - 24 gauge, solid, stainless steel overbraid

Several other wire codes are available. See Table 1 on page 2-8 for a complete listing. Compatibility of wire and junction styles is listed in Table 2 on page 2-9.

Complete Fields 5, 6; then check compatibility Table 2 on page 2-9.

- 34 Closed end, ungrounded (24 gauge, single element only)

Ordering Information (continued)

Field 7. COLD END TERMINATION

- 0 2-1/2" split leads, ends stripped
- 1 2-1/2" split leads, spade lugs
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut
- 3 Solid pin quick disconnect plug(s)
- 4 Solid pin quick disconnect plug(s) with mating jack(s)
- 7 Quick disconnect jack(s)
- C Hollow pin quick disconnect plug(s), Type J only
- D Hollow pin quick disconnect plug(s) with mating jack(s), Type J only

Fields 8, 9. RESERVED

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")

Complete these Fields to determine length for Fields 2, 3 YYY - Enter "Y" length in whole inches; minimum 018"

Field 13. SPRING AND LOCKCAP

- B 12" spring, standard lockcap
- D 12 spring, 12 mm lockcap
- F 12" spring, 15 mm lockcap

Fields 14, 15. RESERVED

The most often ordered assemblies are:

P111-31000-YYY-B-00 with stripped leads P111-31100-YYY-B-00 with spade lugs P111-31300-YYY-B-00 with quick disconnect plug

Refer to Price Guide

Varidepth RTD, Sprinq Style

Varidepth[®] Adjustable Depth Immersion RTD Spring Style

Ordering Information

-3/16"

Model No. P I 1 3 1 I 0 0 I I 0 0 I I 0 0 I I 0 0 I I 0 0 I I 0 0 I I 0 0 I I I 0 0 I <thI</th> I <thI</th> <thI</t

Fields 1, 2. BASE MODEL

P5 - 0.00391 //°C Resistance Temperature Detector P7 - 0.00385 //°C Resistance Temperature Detector

Field 3. ELEMENT

Determine length by completing Fields 10, 11, 12

Ac	<u>curacy (at 300°F)</u>	Temp Rating	<u>Wires</u>
1 -	0.25%	500°F	3
2 -	0.10%	932°F	3
3 -	0.25%	932°F	3
4 -	0.10%	500°F	2
5 -	0.25%	932°F	2
6 -	0.10%	500°F	3

Fields 4, 5, 6 RESERVED

Field 7. COLD END TERMINATION

- 0 2-1/2" split leads, ends stripped
- 1 2-1/2" split leads, spade lugs
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut
- 3 Solid pin quick disconnect plug
- 4 Solid pin quick disconnect plug with mating jack

Fields 8, 9. RESERVED

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")*

Complete these Fields to determine length for Field 3

YYY - Actual length in whole inches (minimum 018")

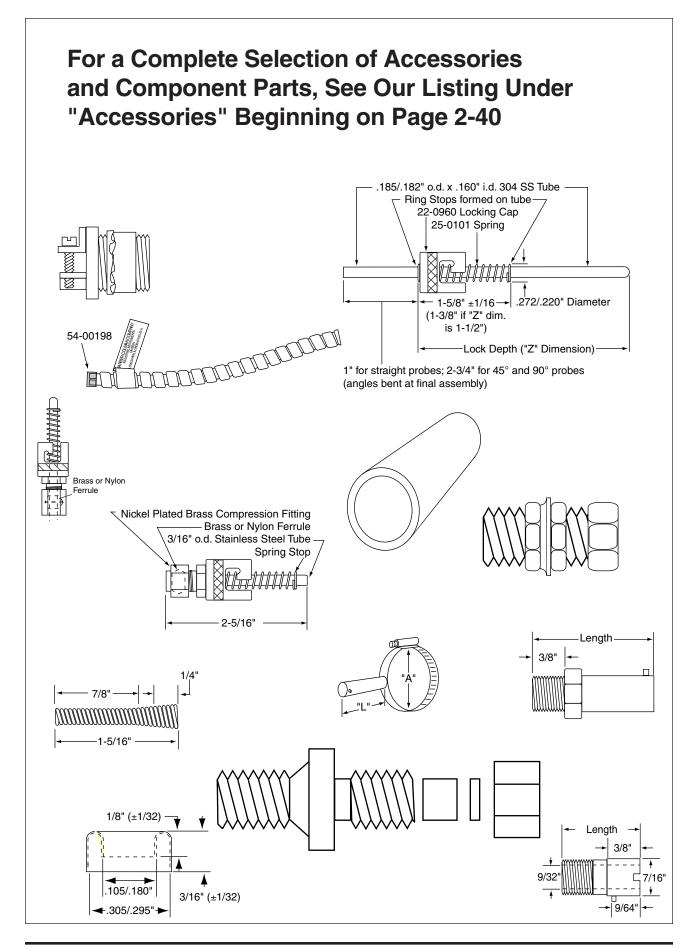
*Total assembly length over 4 feet introduces an offset in sensed temperature of approximately 1-1/4°F per 10 feet over 4 feet.

Field 13. SPRING AND LOCKCAP

- B 12" spring, standard lockcap
- D 12" spring, 12 mm lockcap
- F 12" spring, 15 mm lockcap

Fields 14, 15. RESERVED

(2-1/2" std)



Fixed T/C, Bayonet

Fixed Depth Immersion Thermocouple with Bayonet Lock

Introduction

Features

-3/16"

1-5/8'

Z ±1/8"

Bayonet thermocouples have a compressible spring and locking cap for quick insertion and detachment. They are available with no protection tube (insulation only), armor clad flexible tube, or stainless steel overbraid. All are light weight for easy connection to an instrument or a distant junction box. Closed end tubes are silver soldered for Types J, T and E; and welded for Type K. Bayonet thermocouples are generally rated for service to 900°F under dry conditions; temperature rating does not apply to cold end terminations.

- Locking Cap/Spring for Quick and Easy Attachment/Detachment
- Compressed Spring Holds Rigid Probe Firmly Against Well Bottom
- Thermocouple at Tip of Probe for Maximum Heat Transfer
- Maximum 900°F Over Probe and Tube



Field 1. BASE MODEL

P - Plastics industry

Fields 2, 3. THERMOCOUPLE TYPE

Fiberglass insulation unless otherwise stated.

- E Determine length (Y + L) by completing Fields 10, 11, 12 and Field 7.
 - Type Description
- 01 -20 gauge, solid J
- 07 -J 20 gauge, stainless steel overbraid
- 11 -J 20 gauge, strand, stainless steel overbraid
- 05 -Κ 20 gauge, solid

Several other wire codes are available. See Table 1 on page 2-8 for a complete listing. Compatibility of wire and junction styles is listed in Table 2 on page 2-9.

Field 4. NUMBER OF ELEMENTS, PROBE CONFIGURATION

Complete Fields 5, 6; then check compatibility Table 2 on page 2-9.

- 1 -Single element, straight
- 2 -Single element, 90°
- 3 -Single element, 45°
- Dual element, straight (24 gauge only) 4 -
- 5 -Dual element, 90° (24 gauge only)
- Dual element, 45° (24 gauge only) 6 -

Fields 5, 6. JUNCTION STYLE, LEAD PROTECTION

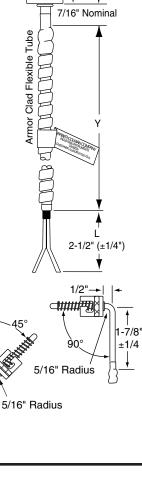
- E Determine length by completing Fields 10, 11, 12.
- 30 Open end, grounded, no flexible tube
- 31 Closed end, grounded no flexible tube
- 32 Open end, grounded
- flexible tube 33 - Closed end, grounded flexible tube

flexible tube

- 34 Closed end, ungrounded no flexible tube
- 35 Closed end, ungrounded

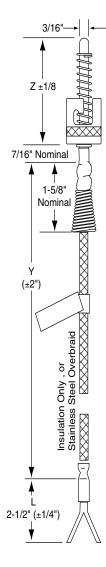
Page 2-18

3/16



Plastics Industry

Fixed T/C, Bayonet



Field 7. COLD END TERMINATION

- 0 2-1/2" split leads, ends stripped
- 1 2-1/2" split leads, spade lugs
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut
- 3 Solid pin quick disconnect plug(s)
- 4 Solid pin quick disconnect plug(s) with mating jack(s)
- 7 Quick disconnect jack(s)
- C Hollow pin quick disconnect plug(s), Type J only
- D Hollow pin quick disconnect plug(s) with mating jack(s), Type J only Extended Lead (DIMENSION "L")

Complete this Field to determine length for Fields 2, 3.

- F 12", split ends stripped
- G 24", split ends stripped
- H 48", split ends stripped
- J 96", split ends stripped
- K 144", split ends stripped

For other lengths, consult factory

Fields 8, 9. RESERVED

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")

Complete these Fields to determine length for Fields 2, 3: and 5, 6. YYY - Enter "Y" length in whole inches; minimum 018"

Field 13. RESERVED

Fields 14, 15. LOCK DEPTH (DIMENSION "Z")

Add adapter length to immersion (hole) depth; then add 3/16" if adapter has 1/8 NPT, or 1/16" if adapter has 3/8-24 thread. Round "Z" dimension upward to nearest 1/8". ZZ - See table below.

$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	6-1/2" 6-5/8" 6-3/4" 6-7/8" 7" 7-1/8" 7-1/4" 7-3/8"
	7-3/8" 7-1/2"

The most often ordered assemblies are:

With Flexible Tube

P011-33000-YYY-4-ZZ with stripped leads P011-33100-YYY-4-ZZ with spade lugs P011-33300-YYY-4-ZZ with quick disconnect plug **With Stainless Steel Overbraid** P111-31000-YYY-4-ZZ with stripped leads P111-31100-YYY-4-ZZ with spade lugs P111-31300-YYY-4-ZZ with quick disconnect plug Refer to Price Guide

HA136712

Thermistors

Fixed Depth Immersion Thermistor with Bayonet Lock

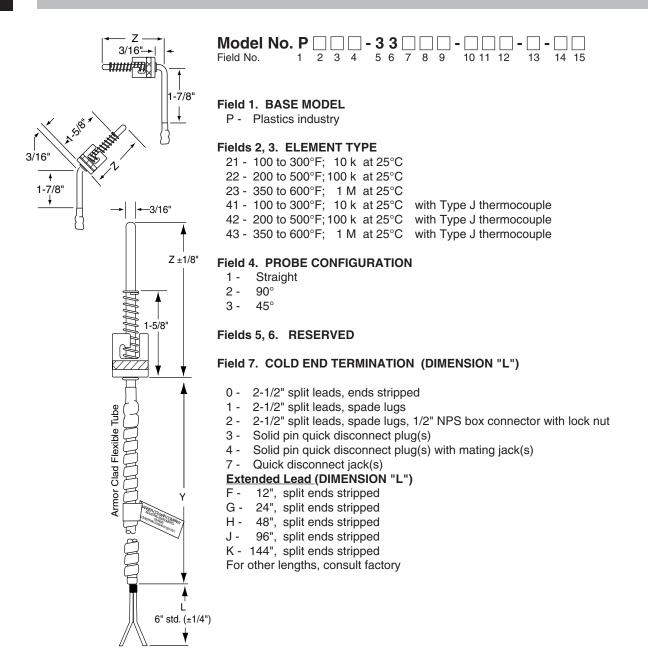
or

Adjustable Depth Immersion Thermistor with Compression Fitting

Introduction

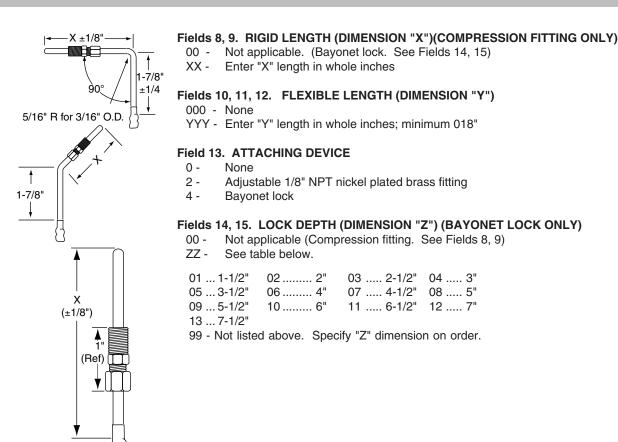
These thermistor probes are available with the attaching lock depth either fixed at the factory ("Z" dimension), or with an adjustable attaching device that you set when you install the probe. Fixed device is bayonet lock; adjustable device is secured with a a compression fitting.

Ordering Information



Thermistors

Ordering Information (continued)



Compression Fitting

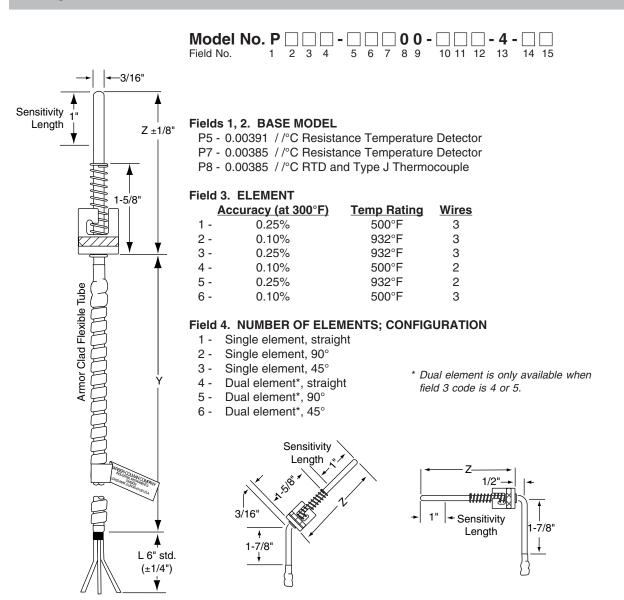
Fixed RTD, Bayonet

Fixed Depth Immersion RTD with Bayonet Lock

Introduction

Bayonet resistance temperature detectors have a compressible spring and locking cap for quick insertion and detachment. They are available with no protection tube (insulation only), armor clad flexible tube, or stainless steel overbraid. All are light weight for easy connection to an instrument or a distant junction box.

Ordering Information



Fixed RTD, Bayonet

Ordering Information (continued)

Fields 5, 6. PROTECTION

Determine length by completing Fields 10, 11, and 12. **Model P5 or Model P7**

- 31 No lead, or lead with stainless steel overbraid
- 33 Leadwire with flexible armor

Model P8

- 31 No lead, or lead with stainless steel overbraid
- 33 Leadwire with flexible armor

Field 7. COLD END TERMINATION

- 0 2-1/2" split leads, ends stripped
- 1 2-1/2" split leads, spade lugs
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut
- 3 Solid pin quick disconnect plug
- 4 Solid pin quick disconnect plug with mating jack

Extended Lead (DIMENSION "L")

- F 12", split ends stripped
- G 24", split ends stripped
- H 48", split ends stripped
- J 96", split ends stripped
- K 144", split ends stripped

For other lengths, consult factory.

Fields 8, 9. RESERVED

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")*

Complete these Fields to determine length for Fields 5, 6 YYY - Actual length in whole inches (minimum 018")

Field 13. RESERVED

Fields 14, 15. LOCK DEPTH (DIMENSION "Z")*

03 2-1/2"	06 4"	38 5-5/8"	12 7"
20 2-5/8"	29 4-1/8"	39 5-3/4"	47 7-1/8"
21 2-3/4"	30 4-1/4"	40 5-7/8"	48 7-1/4"
22 2-7/8"	31 4-3/8"	10 6"	49 7-3/8"
04 3"	07 4-1/2"	41 6-1/8"	13 7-1/2"
23 3-1/8"	32 4-5/8"	42 6-1/4"	
24 3-1/4"	33 4-3/4"	43 6-3/8"	
05 3-1/2"	34 4-7/8"	11 6-1/2"	
25 3-3/8"	08 5"	44 6-5/8"	
05 3-1/2"	35 5-1/8"	45 6-3/4"	
26 3-5/8"	36 5-1/4"	46 6-7/8"	
27 3-3/4"	37 5-3/8"		
28 3-7/8"	09 5-1/2"		

99 - Not listed; specify on order

*Total assembly length over 4 feet introduces an offset in sensed temperature of approximately $1-1/4^{\circ}F$ per 10 feet over 4 feet.

Adjustable T/C, Bayonet or Compression

Adjustable Depth Immersion Thermocouple with Bayonet Lock or Compression Attachment

Introduction

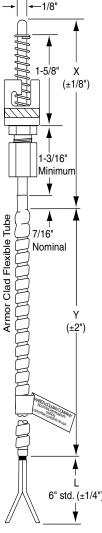
A compression fitting, or a compression mounted bayonet spring assembly allows user to determine final immersion depth. Minimum recommended bayonet spring compression is 1/4". The bayonet spring assembly is available only with 1/8" o.d. probe; compression fitting is available with either 1/8" o.d. or 3/16" o.d. probe.

Features

- Thermocouple at Tip of Probe for Maximum Heat Transfer
- Maximum 900°F Over Probe and Tube

Ordering Information

Model No. P □ - □ - **0 0** - | 2 3 4 5 6 7 8 9 Field No. 1 10 11 12 13 14 15



- Field 1. BASE MODEL
- P Plastics industry

Fields 2, 3. THERMOCOUPLE TYPE

Fiberglass insulation unless otherwise stated.

E Determine length (Y + L) by completing Fields 7; and 10, 11, 12

	(±1/8")
	1-3/16" Minimum
Tube	7/16"
Armor Clad Flexible Tube	Nominal
Armor	Y (±2")
P	
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L	ASSECTION COMPANY ACCOUNT OF COMPANY OCSAMPLE OF COMPANY OCSAMPLE OF COMPANY
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	6" std. (±1/4")
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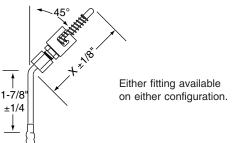
- Type Description
- 01 -20 gauge, solid J
- 02 -J 24 gauge, solid
- 07 -20 gauge, stainless steel overbraid J
- 11 -20 gauge, strand, stainless steel overbraid J
- 05 -Κ 20 gauge, solid
- 80 Κ 20 gauge, stainless steel overbraid

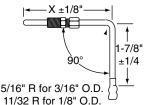
Several other wire codes are available. See Table 1 on page 2-8 for a complete listing. Compatibility of wire and junction styles is listed in Table 2 on page 2-9.

Field 4. NUMBER OF ELEMENTS, PROBE CONFIGURATION

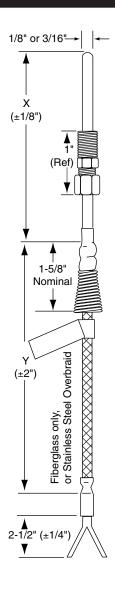
Complete Fields 5, 6; then check compatibility Table 2 at the front of this section 1 -Single element, straight

- 2 -Single element, 90°
- 3 Single element, 45°
- 4 Dual element, straight (24 gauge only)
- 5 Dual element, 90° (24 gauge only)
- Dual element, 45° (24 gauge only) 6 -





Adjustable T/C, Bayonet or Compression



Fields 5, 6. JUNCTION STYLE, PROBE O.D., LEAD PROTECTION

3/16"

3/16"

3/16"

flexible tube

flexible tube

flexible tube

no flexible tube (24 gauge, single element only)

flexible tube (24 gauge, single element only)

no flexible tube

no flexible tube

- Determine length by completing Fields 10, 11, 12. no flexible tube
- 1/8" 21 - Closed end, grounded 1/8"
- 23 Closed end, grounded
- 30 Open end, grounded
- 31 Closed end, grounded
- 32 Open end, grounded
- 33 Closed end, grounded 3/16"
- 34 Closed end, ungrounded 3/16" 35 - Closed end, ungrounded 3/16"

Field 7. COLD END TERMINATION

- 0 2-1/2" split leads, ends stripped
- 1 2-1/2" split leads, spade lugs
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut
- 3 Solid pin guick disconnect plug(s)
- 4 Solid pin guick disconnect plug(s) with mating jack(s)
- 7 Quick disconnect iack(s)
- C Hollow pin guick disconnect plug(s), Type J only
- D Hollow pin quick disconnect plug(s) with jack(s), Type J only

Extended Lead (DIMENSION "L")

Complete this Field to determine length for Fields 2, 3.

- F 12", split ends stripped
- G 24", split ends stripped
- 48", split ends stripped Η-
- J 96", split ends stripped
- K 144", split ends stripped

For other lengths, consult factory.

Fields 8, 9. RIGID LENGTH (DIMENSION "X")

XX - Enter "X" length in whole inches

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")

Complete these Fields to determine length for Fields 2, 3; and 5, 6. YYY - Enter "Y" length in whole inches; minimum 018"

Field 13. ATTACHING DEVICE

- 0 None
- 2 1/8" NPT compression fitting, nickel plated brass
- 3 1/8" NPT compression fitting, stainless steel
- 4 Adjustable bayonet, 1/8" tube only ("X" must be at least 3")

Fields 14, 15. RESERVED

The most often ordered assemblies are:

With Flexible Tube P011-330XX-YYY-2-00 with stripped leads P011-331XX-YYY-2-00 with spade lugs P011-333XX-YYY-2-00 with quick disconnect plug With Stainless Steel Overbraid P111-310XX-YYY-2-00 with stripped leads P111-311XX-YYY-2-00 with spade lugs P111-313XX-YYY-2-00 with quick disconnect plug

Refer to Price Guide



Riqid T/C, Fixed or Adjustable

Rigid Tube Thermocouples Fixed or Adjustable Depth Immersion

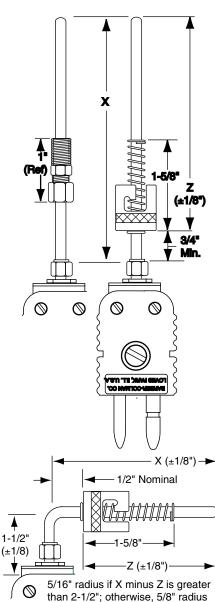
Introduction

Thermocouple wire is duplex insulated, temperature rated to 900°F except Type T which is limited to 700°F. These temperatures do not apply to cold end termination. Standard junction style is closed and grounded. Type K has a welded tip; others are silver soldered tipped probes for faster response.

Features

- Thermocouple at Tip of Probe for Maximum Heat Transfer
- Maximum 900°F Over Probe and Tube, except Type T is 700°F

Ordering Information



 Model No.
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Field 1. BASE MODEL

P - Plastics industry

Fields 2, 3. THERMOCOUPLE TYPE

Determine length by completing Fields 8, 9.

Туре	Description
	00

- 01 J 20 gauge, solid
- 02 J 24 gauge, solid
- 12 J 20 gauge, strand
- 25 J 20 gauge, solid, Teflon insulated, 400°F max.
- 60 J 20 gauge, solid, special limits
- 05 K 20 gauge, solid
- 62 K 20 gauge, solid, special limits

Several other wire codes are available. See Table 1 on page 2-8 for a complete listing. Compatibility of wire and junction styles is listed in Table 2 on page 2-9.

Field 4. NUMBER OF ELEMENTS, PROBE CONFIGURATION

Complete Fields 5, 6

- 1 Single element, straight
- 2 Single element, 90°
- 3 Single element, 45°
- 4 Dual element, straight. Return to Fields 2, 3.
- 5 Dual element, 90°. Return to Field 2.
- 6 Dual element, 45°. Return to Field 3.

Note: Dual element applicable to 24 gauge only.

Note: Dual element has common junction.

Riqid T/C, Fixed or Adjustable

Fields 5, 6. JUNCTION STYLE, PROBE O.D., LEAD PROTECTION

Check compatibility Table 2 at beginning of this section.

- 21 Closed end, grounded 1/8" no flexible tube
- 30 Open end, grounded 3/16" no flexible tube
- 31 Closed end, grounded 3/16" no flexible tube
- 34 Closed end, ungrounded 3/16" no flexible tube

Field 7. COLD END TERMINATION

- 3 Solid pin quick disconnect plug(s)
- 4 Solid pin quick disconnect plug(s) with mating jack(s)
- 7 Quick disconnect jack(s)
- 8 Miniature plastic weatherproof head
- A 3" lead with 1/4" stripped ends, no spring or ferrule; or, specify lead length on order.*
- B 2-1/2" lead with lugs, no spring or ferrule; or, specify lead length on order.
- C Hollow pin quick disconnect plug(s), Type J only
- D Hollow pin quick disc. plug(s) with jack(s), Type J only

Fields 8, 9. RIGID LENGTH (DIMENSION "X")

XX - Enter "X" length in whole inches

Fields 10, 11, 12. RESERVED

Field 13. ATTACHING DEVICE

- 0 None
- 2 1/8" NPT compression fitting, nickel plated brass
- 3 1/8" NPT compression fitting, stainless steel
- 4 Fixed bayonet fitting on 3/16" tube, or adjustable bayonet on 1/8" tube ("X" must be at least 3")

Note: maximum pressure 100 psi for compression fittings

Fields 14, 15. LOCK DEPTH (DIMENSION "Z")

00 - None. Compression fitting or adjustable bayonet ZZ - Fixed bayonet styles, see table below.

01 1-1/2"	04 3"	31 4-3/8"	10 6"
14 1-5/8"	23 3-1/8"	07 4-1/2"	41 6-1/8"
14 1-5/0	20 0-1/0	-	41 0-1/0
15 1-3/4"	24 3-1/4"	32 4-5/8"	42 6-1/4"
16 1-7/8"	05 3-1/2"	33 4-3/4"	43 6-3/8"
02 2"	25 3-3/8"	34 4-7/8"	11 6-1/2"
17 2-1/8"	05 3-1/2"	08 5"	44 6-5/8"
18 2-1/4"	26 3-5/8"	35 5-1/8"	45 6-3/4"
19 2-3/8"	27 3-3/4"	36 5-1/4"	46 6-7/8"
03 2-1/2"	28 3-7/8"	37 5-3/8"	12 7"
20 2-5/8"	06 4"	09 5-1/2"	47 7-1/8"
21 2-3/4"	29 4-1/8"	38 5-5/8"	48 7-1/4"
22 2-7/8"	30 4-1/4"	39 5-3/4"	49 7-3/8"
99 - Not listed; s	pecify on order	40 5-7/8"	13 7-1/2"

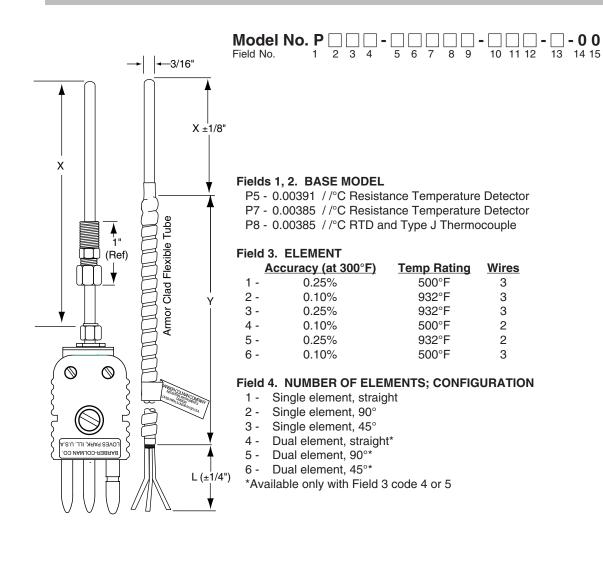
Fixed or Adjustable RTD

Rigid or Flexible RTD Fixed or Adjustable Depth Bushing Mount

Introduction

Bushing mounted RTDs are available with rigid tube or flexible armor. The process mounting bushing can be brazed on the tube in the position ("U" dimension) specified on your order; or you can order and adjustable bushing held by a compression fitting. The adjustable bushing allows you to set the immersion depth when you install the probe.

Ordering Information



Fixed or Adjustable RTD

Ordering Information (continued)

Fields 5, 6. PROTECTION

Determine length by completing Fields 10, 11, 12. Model P5 or Model P7

- 31 No lead, or lead with stainless steel overbraid
- 33 Leadwire with flexible armor

Model P8

- 31 No lead, or lead with stainless steel overbraid
- 33 Leadwire with flexible armor

Field 7. COLD END TERMINATION

- 0 2-1/2" split leads, ends stripped
- 1 2-1/2" split leads, spade lugs
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut
- 3 Solid pin quick disconnect plug
- 4 Solid pin quick disconnect plug with mating jack

Extended Lead (DIMENSION "L")

- F 12", split ends stripped
- G 24", split ends stripped
- H 48", split ends stripped
- J 96", split ends stripped
- K 144", split ends stripped

For other lengths, consult factory.

Fields 8, 9. RIGID LENGTH (DIMENSION "X")*

XX - Length in whole inches (02" minimum)

*Total assembly length over 4 feet introduces an offset in sensed temperature of approximately 1-1/4°F per 10 feet over 4 feet.

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")*

- Complete these Fields to determine length for Fields 5, 6.
- 000 None. Used only with Field 7, code 3 or 4

YYY - Actual length in whole inches

Field 13. ATTACHING DEVICE (DIMENSION "U")

- 0 None
- 2 1/8" nickel plated brass compression fitting
- 3 1/8" stainless steel compression fitting
- 8 Brazed 1/8" NPT fitting for fixed depth. See illustration. Specify "U" dimension on order.
- 9 Other stocked compression fittings or bushings (consult factory)



Fields 14, 15. RESERVED

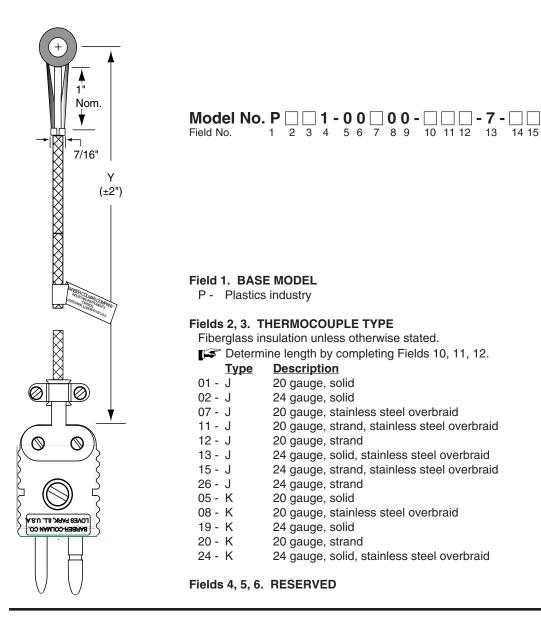
Rinq, Luq T/C

Ring Type and Lug Type Thermocouples

Introduction

These thermocouples measure surface temperature – such as a barrel or mold. The ring or lug is placed over a threaded stud and secured with a nut. A ring or lug thermocouple is often connected in parallel with another thermocouple to control at average temperature between barrel surface and some point inside the barrel. Both thermocouples must be the same type, and have the same resistance. This arrangement produces closer control for more uniform temperature of the plastic melt.

Ordering Information



Rinq, Luq T/C

Ordering Information (continued)

Field 7. COLD END TERMINATION

- 0 2-1/2" split leads, ends stripped
- 1 2-1/2" split leads, spade lugs
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut
- 3 Solid pin quick disconnect plug(s)
- 4 Solid pin quick disconnect plug(s) with mating jack(s)
- 7 Quick disconnect jack(s)
- C Hollow pin quick disconnect plug(s), Type J only
- D Hollow pin quick disconnect plug(s) with jack(s), Type J only

Fields 8, 9. RESERVED

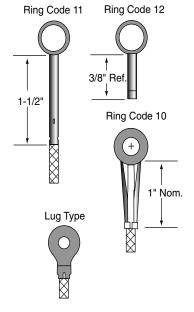
Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")

Complete these Fields to determine length for Fields 2, 3 YYY - Enter "Y" length in whole inches; minimum 018"

Field 13. RESERVED

Fields 14, 15. RING OR LUG TYPE

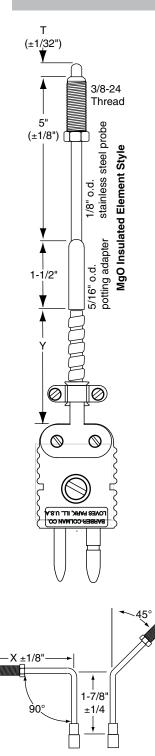
Lugs		
01 - #8 screw (.173" i.d.) 3/8" o.d.	
02 - #10 screw (.204" i.c	d.)15/32" o.d.	
03 - 1/4" screw	17/32" o.d.	
04 - 5/16" screw	17/32" o.d.	
05 - 3/8" screw	3/4" o.d.	
06 - 1/2" screw	3/4" o.d.	
<u>Rings</u>		
10 - 3/8" screw	13/16 o.d.	3/32" thick
11 - #10 screw	5/16" o.d.	1/4" thick; stainless steel
12* - #10 screw	5/16" o.d.	5/32" thick
*Fields 2, 3 codes 01, 02	2, 13, 19 and 2	24 only



Nozzle Melt T/C

Nozzle Melt Thermocouple for Injection Molding

Introduction



The nozzle melt thermocouple is designed for injection molders. This stainless steel thermocouple fits on the nozzle of an injection molding machine and senses the actual temperature of the plastic just before it is injected into the mold. This allows accurate control of the nozzle. Direct contact is the most reliable way to measure the melt temperature.

The thermocouple seals against the high pressures encountered in the nozzle. The mounting rotates, simplifying installation and eliminating the twisting of the leads. Quick disconnect plugs may be ordered.

This thermocouple will withstand the abuse of long production runs. Start-up time is minimized with melt temperature conditions quickly established. Two Type J sensor styles are available: 24 gauge strand, fiberglass insulated with stainless steel overbraid; and solid, magnesium oxide insulated, stainless steel sheathed probe with transition to 20 gauge strand, fiberglass insulated wire. Since the MgO, SS sheathed probe can be formed over a mandrel as small as 1/4", this style is normally sold straight

<u>Style</u> Magnesium Oxide Tubing and Fiberglass Response Time 0.5 second 0.9 second Pressure Rating at 750°F 40,000 psi 40,000 psi

- Temperature rating to 750°F Excluding Cold End Termination
- Small Size No Interference With Mold Platens
- Easy Installation Mounting Nut Rotates; No Lead Twisting
- Improved Product Quality; Faster Setup Time

Model No.	Ρ			-					-				- 5 -	•
Field No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14 15

Field 1. BASE MODEL

P - Plastics industry

Fields 2, 3. THERMOCOUPLE TYPE

- Determine length (Y + L) by completing Fields 10, 11, 12, and Field 7.
 <u>Type Description</u>
- 15 J 24 gauge, strand, stainless steel overbraid
- 16 J MgO insulated with transition to 20 ga. strand

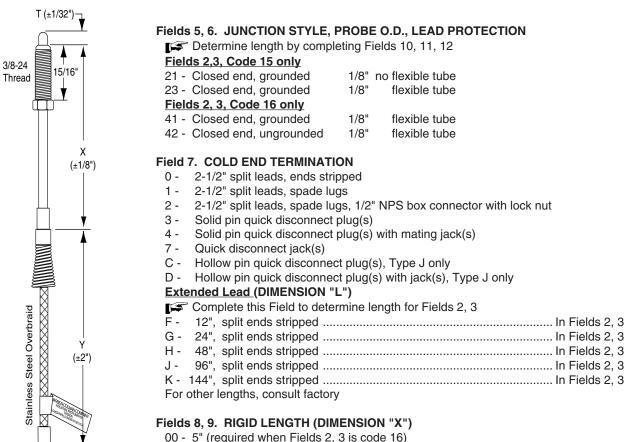
Field 4. NUMBER OF ELEMENTS AND PROBE CONFIGURATION

1 - Single element, straight Fields 2, 3, Code 15 only

- 2 Single element, 90°
- 3 Single element, 45°

Nozzle Melt T/C

Ordering Information (continued)



- 01 1-1/2"
- 02 1-3/4"
- 03 2"
- 04 2-1/4"
- 05 2-1/2"
- 99 Other than above. Specify in whole inches on order

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")

Complete these Fields to determine length for Fields 2, 3; and 5, 6 YYY - Enter actual "Y" length in whole inches; minimum 018"

Field 13. RESERVED

Fields 14, 15. TIP LENGTH (DIMENSION "T")

- 01 1/8" (recommended)
- 02 3/16"
- 03 1/4"

Bolt Blank (Part No.11-03359) Plugs mounting hole when sensor removed



L (±1/4") V

Non-Immersion Nozzle T/C

Non-Immersion Nozzle Thermocouple

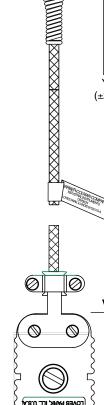
Introduction The non-immersion nozzle melt single element thermocouple is available with 1/4-28 thread, stainless steel, rotatable fitting. The probe is 1/8", closed end grounded. The leads are available with stainless steel overbraid sheath. The thermocouple measures the temperature in a threaded shallow drilled hole. **Ordering Information** Model No. P 🗌 🗌 1 - 2 1 🗌 0 0 - 🗌 🗌 🗌 - 8 - 0 0 Field No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1/4-28 Thread 3/16" Field 1. BASE MODEL P - Plastics industry Fields 2, 3. THERMOCOUPLE TYPE E Determine length by completing Fields 10, 11, 12. Type Description 02 -24 gauge, solid J (±2") 13 -24 gauge, solid, stainless steel overbraid J 15 -24 gauge, strand, stainless steel overbraid J 26 -J 24 gauge, strand Fields 4, 5, 6. RESERVED Field 7. COLD END TERMINATION 0 - 2-1/2" split leads, ends stripped 2-1/2" split leads, spade lugs 1 -2 - 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut Solid pin quick disconnect plug(s) 3 -4 -Solid pin quick disconnect plug(s) with mating jack(s) 7 -Quick disconnect jack(s) Ø C - Hollow pin quick disconnect plug(s), Type J only D - Hollow pin quick disconnect plug(s) with jack(s), Type J only

Fields 8, 9. PRESERVED

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")

Complete these Fields to determine length for Fields 2, 3 YYY - Enter actual "Y" length in whole inches; minimum 018"

Fields 13, 14, 15. RESERVED



Non-Immersion Nozzle RTD

Non-Immersion Nozzle RTD

Introduction

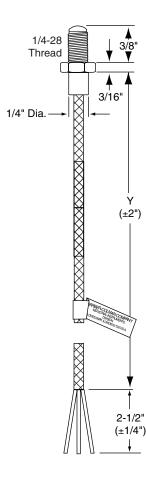
Single Platinum 100 ohms, RTD element.

The tolerances shown below apply to all three lead probes, and two lead probes whose total length does not exceed 48". Tolerances for two lead probes longer than 48" are increased .03 ohm for each 12" over 48" length:

Temperature range: -148° to 932°F (-100 to 500°C), reduced to 350°F (176°C) for plug connector.

Insulation resistance: 100 megohms minimum at 100 Vdc. Leads to case.

Ordering Information



Model No. P I 1 0 0 I 0 I I 5 0 0 I I 5 0 0 I <thI</th> <thI</th> <thI</t

Fields 1, 2. BASE MODEL

P5 - 0.00391 //°C Nozzle Resistance Temperature Detector P7 - 0.00385 //°C Nozzle Resistance Temperature Detector

Field 3. ELEMENT

Determine length by completing Fields 10, 11, 12

Ac	<u>curacy (at 300°F)</u>	<u>Temp Rating</u>	<u>Wires</u>
2 -	0.10%	932°F	3
5 -	0.25%	932°F	2

Fields 4, 5, 6. RESERVED

Field 7. COLD END TERMINATION

0 - 2-1/2" split leads, ends stripped

- 1 2-1/2" split leads, spade lugs
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut
- 3 Solid pin quick disconnect plug
- 4 Solid pin quick disconnect plug with mating jack

Fields 8, 9. RESERVED

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")

Complete these Fields to determine length for Field 3 YYY - Actual length in whole inches

Fields 13, 14, 15. RESERVED

Melt Bolt T/C, Fixed

Melt Bolt Thermocouple Fixed Depth Immersion

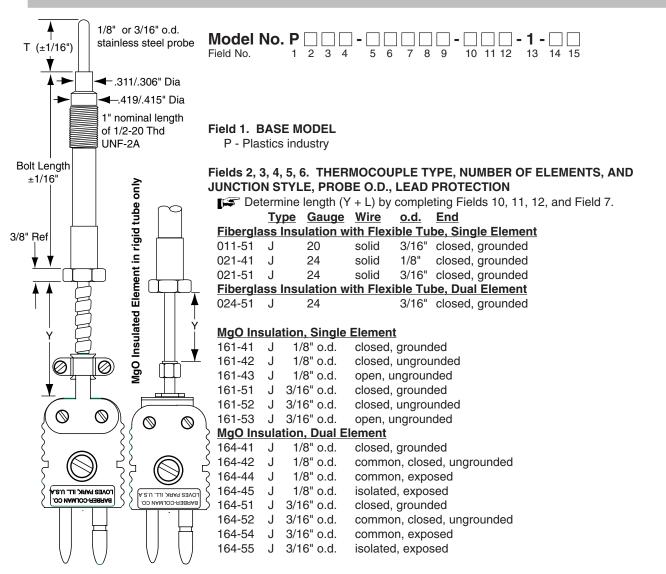
Introduction

Melt bolt thermocouples are used on extruders and injection molding machines. The immersed tip provides direct melt temperature measurement. Two styles are available:

- MgO insulated wire in a full length, rigid stainless steel probe
- Fiberglass insulated wire in a rigid stainless steel probe with a flexible, armor clad protection tube

Standard bolt lengths are 3", 4" and 6". Other lengths are available. Typically, 2" of protection tube ("Y" dimension) beyond the bolt head is satisfactory.

Ordering Information



Melt Bolt T/C, Fixed

Ordering Information (continued)

Field 7. COLD END TERMINATION

- 0 2-1/2" split leads, ends stripped*
- 1 2-1/2" split leads, spade lugs*
- 2 2-1/2" split leads, spade lugs, 1/2" NPS box connector with lock nut*
- 3 Solid pin quick disconnect plug(s)
- 4 Solid pin quick disconnect plug(s) with mating jack(s)
- 7 Quick disconnect jack(s)
- C Hollow pin quick disconnect plug(s), Type J only
- D Hollow pin quick disconnect plug(s) with jack(s), Type J only

Extended Lead (DIMENSION "L")*

- Complete this Field to determine length for Fields 2, 3, 4, 5, 6
- F 12", split ends stripped
- G 24", split ends stripped
- H 48", split ends stripped
- J 96", split ends stripped
- K 144", split ends stripped
- For other lengths, consult factory

*not available on thermocouples with MgO insulation

Fields 8, 9. BOLT LENGTH

- 03 3"
- 04 4"
- 06 6"
- 98 1-7/16" to 1-7/8" specify on order
- 99 2-1/4" to 12" specify on order

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")

Complete these Fields to determine length for Fields 2, 3, 4, 5, 6

Note: "Y" length of MgO insulated thermocouple not flexible.

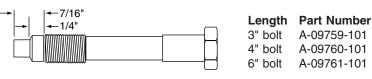
- YYY- Enter actual "Y" length.
- 000 No lead. Cold end termination plug (Field 7, code 3 or 4) on end of bolt (see illustration). Not available on dual element thermocouple with MgO insulation.

Field 13. RESERVED

Fields 14, 15. TIP LENGTH (DIMENSION "T")

- 00 None flush
- 01 1/8"
- 03 1/4"
- 05 1/2"
- 07 3/4"
- 09 1"
- 99 Not listed. Specify on order. 1/16" minimum for thermocouples with MgO insulation; 1/8" minimum for thermocouples with fiberglass insulation.

Blank bolts are available to seal holes in extruder after the thermocouple has been removed. Dimensions illustrated here are typical of blank bolts and immersion thermocouples.





Y = 000



Melt Bolt RTD, Fixed

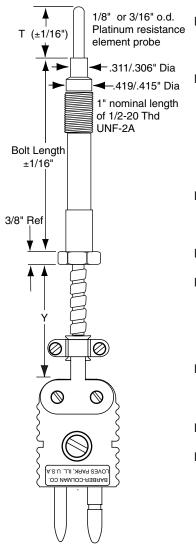
Melt Bolt RTD Fixed Depth Immersion

Introduction

Platinum 100 ohms, RTD element . The tolerances shown below apply to all three lead probes, and two lead probes whose total length does not exceed 48". Tolerances for two lead probes longer than 48" are increased .03 ohm for each 12" over 48" length:

Temperature range: -148° to 932°F (-100 to 500°C), reduced to 350°F (176°C) for plug connector. Insulation resistance: 100 megohms minimum at 100 Vdc; leads to case. Pressure capacity: 10,000 PSI on sensing element.

Ordering Information



Model No. P I <thI</th> <thI</th> <thI</t

Fields 1, 2. BASE MODEL P5 - 0.00391 //°C Melt Bolt Resistance Temperature Detector P7 - 0.00385 //°C Melt Bolt Resistance Temperature Detector

Fields 3, 4. ELEMENT

Determine length by completing Fields 10, 11, 12

4	Accuracy	Temp Rating	Wires	Elements
21 -	0.10%	932°F	3	Single
31 -	0.25%	932°F	3	Single
51 -	0.25%	932°F	2	Single
54 -	0.25%	932°F	2	Dual

Fields 5, 6. PROTECTION

42 - 1/8" diameter, closed end (Not available with Fields 3, 4, code 54)

52 - 3/16" diameter closed end

Field 7. RESERVED

Fields 8, 9. BOLT LENGTH

- 03 3"
- 04 4"
- 06 6"

99 - None of the above. Specify on order

Fields 10, 11, 12. FLEXIBLE LENGTH (DIMENSION "Y")*

Complete these Fields to determine length for Fields 3, 4 YYY - Actual length in whole inches

Field 13. RESERVED

Fields 14, 15. PROBE LENGTH (DIMENSION "T")

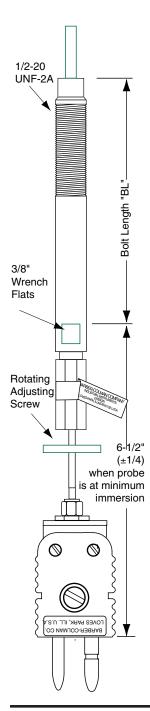
Note: 1/2" maximum for 1/8" o.d. probe; 5/8" maximum for 3/16" o.d. dual probe 00 - Flush (3/16" o.d. only)

- 05 1/2"
- 07 3/4"
- 09 1"
- 99 None of the above. Specify on order.

Retractable Melt Bolt T/C

Retractable Melt Bolt Thermocouple

Introduction



The retractable melt bolt thermocouple measures melt stream temperature under working conditions. It can be installed wherever standard melt bolt thermocouples are used. Bolt lengths of 3", 5" and 7" are available. A ceramic insulator in the bolt tip reduces conduction from the barrel.

The probe is fitted with a positive stop to prohibit removal unless the hex nut is disengaged from the bolt. The 1/8" diameter probe provides minimum barrier to melt flow. You can adjust the tip of the probe from 1/8" to 1" on standard models; other depth ranges are available under special order. The element leads are MgO insulated; the measuring junction is exposed for fast response and rated to 900°F. This thermocouple is available with either single or dual Type J elements. Replacement elements are available.

<u>Size</u> Single	Model Number Element	Replacement Element
3"	A-10528-100-0-03	A-10529-100-0-03
5"	A-10528-100-0-05	A-10529-100-0-05
7"	A-10528-100-0-07	A-10529-100-0-07
Dual E	<u>Elements</u>	
3"	A-10528-100-1-03	A-10529-100-1-03
5"	A-10528-100-1-05	A-10529-100-1-05
7"	A-10528-100-1-07	A-10529-100-1-07
Optior	IS	

Support Tube

The thermocouple can be ordered with a 3/16" o.d. support tube surrounding the probe for added strength. This option may be effective under certain flow conditions, or extended immersion. Simply specify "with 3/16" support tube" on order.

Special Immersion Range

0 to 7/8" Specify "special immersion of 0 to 7/8 inches" on order.

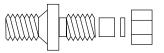
Specify "special immersion of _____ to ____ inches" on order.

Special Bolt Length Consult Factory

Note: Thermocouples with options will be assigned a unique model number at the factory for future reference.

Accessories

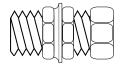
Wire Grip Fitting.



Provides strain relief and moisture proof protection for extension wires from 1/8" to 3/8" o.d. Contains 1/4 NPT brass body, nut, two sizes of back-up washers and four assorted sizes of elastomer grommets. Weight 1 oz.

Part Number PF75-J0200-375

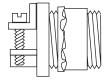
Water Tight Wire Fitting



Liquid tight Nylon gasket for wire diameter of .219 to .375" mounting in 1/2" conduit knockout. Weight 1 oz.

Part Number A-11426

Terminal Connector and Locknut



Made for standard terminal junciton box. Connector has two clamp screws for attaching to thermocouple protection tube or flexible conduit. Weight 1/2 oz.

Part Number 34-400-100

Butt Connector



Crimp-on terminal for use on 22 to 18 gauge thermocouple wires to insure positive screw connection. Weight 1 oz.

Part Number 34-00774

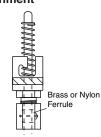
Stainless Steel Flexible Armor Cable

DODDART

0.188" i.d., 0.266" o.d. Weight 0.6 ounce per foot.

Part Number R6-00821-100-0-00

Adjustable Bayonet Lock Attachment



This device can be fitted over any 1/8" o.d. plain end thermocouple and adjusted to the selected immersion depth by tightening the compression fitting. With a suitable adapter, any immersion depth over 1/2" can be selected.

The fitting is shipped with both a nylon and brass ferrule. Nylon permits readjustment, but should not be exposed to temperature over 250° F. The brass ferrule cannot be adjusted after it is set. It is suitable for temperatues up to 900° F.

Part Number A-05205-000-0-00

Stainless Steel Flexible Armor Cable Assemblies

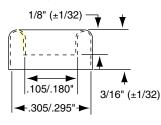


0.188" i.d., 0.266" o.d. Weight 0.6 ounce per foot. 54-00198-000-0-00 brass eyelet crimped on termination end.

Part Number

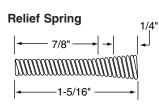
A-09830-000-0-12	12"	long
A-09830-000-0-24	24"	long
A-09830-000-0-36	36"	long
A-09830-000-0-48	48"	long
A-09830-000-0-60	60"	long
A-09830-000-0-72	72"	long
A-09830-000-0-84	84"	long
A-09830-000-0-96	96"	long
A-09830-000-1-20	120"	long
A-09830-000-1-44	144"	long

Brass Eyelet



To be inserted in termination end of flexible armor to protect lead wires from rough edge of armor cable. Crimping not needed. Weight 1 ounce.

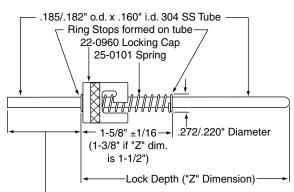
Part Number 54-00198-000-0-00



Weight 1 ounce.

Part Number 25-00360-000-0-00, 1/4" o.d. Part Number 25-00361-000-0-00, 5/16" o.d.

Probe with Bayonet Lock Cap



1" for straight probes; 2-3/4" for 45° and 90° probes (angles bent at final assembly)

Part Number	"Z" Dimension
Straight Probes	
A-09831-000-0-01	1-1/2"
A-09831-000-0-04	3"
A-09831-000-0-06	4"
A-09831-000-0-08	5"
A-09831-000-0-10	6"
A-09831-000-0-13	7-1/2"
45° and 90° Angle P	robes
A-09933-000-0-01	1-1/2"
A-09933-000-0-04	3"
A-09933-000-0-06	4"
A-09933-000-0-08	5"
A-09933-000-0-10	6"
A-09933-000-0-13	7-1/2"

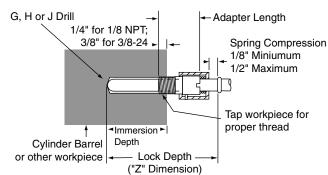
Bayonet Lock Adapters

To determine the nominal adapter length, proceed as G, H or J Drill follows:

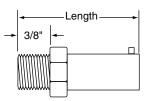
Adapters with 1/8 NPT: "Z" dimension minus hole depth minus 3/8".

Adapters with 3/8-24 thread: "Z" dimension minus hole depth minus 1/4".

Round the adapter up to the nearest 1/8".



Adapters with Hex Bushing



Part Number	Length	<u>Thread</u>
A-04790-000-0-00 A-04791-000-0-00 A-04792-000-0-00	7/8" 1-1/8" 1-1/2"	3/8-24 3/8-24 3/8-24

Adapters with Slot – Common Lengths

$\begin{array}{c c} & \leftarrow & \text{Length} & \rightarrow \\ & & \rightarrow & 3/8" & \leftarrow \\ \hline 9/32" & & \hline & & 7/16" \\ \hline & & & & \\ & & & & \\ & & & & \\ & & & &$	A-02709-001-0-00	13/16"	1/8 NPT
	A-03076-001-0-00	15/16"	3/8-24
	A-04017-000-0-00	1"	1/8 NPT
	A-03077-001-0-00	1-1/2"	1/8 NPT
	A-03179-000-0-00	1-1/2"	3/8-24
	A-03092-001-0-00	2"	1/8 NPT
	A-11124-000-0-00	2"	12-1 MM
→ [¯] 9/64" < -	A-11124-000-0-00	2"	12-1 MM
	A-03414-000-0-00	2-1/2"	1/8 NPT

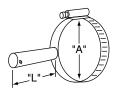
Adapters with Slot – Custom Lengths (Minimum ten adapters per order)

A-11355-000-0-16	2"	1/8 NPT (Order A-03092-001-0-00)
A-11356-000-0-16	2"	3/8-24
A-11355-000-0-18	2-1/4"	1/8 NPT
A-11356-000-0-18	2-1/4"	3/8-24
A-11355-000-0-20	2-1/2"	1/8 NPT
A-11356-000-0-20	2-1/2"	3/8-24
A-11355-000-0-22	2-3/4"	1/8 NPT
A-11356-000-0-22	2-3/4"	3/8-24
A-11355-000-0-24	3"	1/8 NPT
	A-11356-000-0-16 A-11355-000-0-18 A-11356-000-0-18 A-11355-000-0-20 A-11356-000-0-20 A-11355-000-0-22 A-11356-000-0-22	A-11356-000-0-162"A-11355-000-0-182-1/4"A-11356-000-0-182-1/4"A-11355-000-0-202-1/2"A-11356-000-0-202-1/2"A-11355-000-0-222-3/4"A-11356-000-0-222-3/4"

Adapters with Slot – Custom Lengths (Continued) Part Number	•	dapters per order) <u>Thread</u>
A-11356-000-0-24	<u>Lengin</u> 3"	3/8-24
A-11355-000-0-24 A-11355-000-0-26	3 3-1/4"	1/8 NPT
A-11356-000-0-20 A-11356-000-0-26	3-1/4"	3/8-24
A-11355-000-0-28	3-1/2"	1/8 NPT
A-11356-000-0-28	3-1/2"	3/8-24
A-11355-000-0-20	3-3/4"	1/8 NPT
A-11356-000-0-30	3-3/4"	3/8-24
A-11355-000-0-32	4"	1/8 NPT
A-11356-000-0-32	4"	3/8-24
A-11355-000-0-32	- 4-1/4"	1/8 NPT
A-11356-000-0-34	4-1/4"	3/8-24
A-11355-000-0-36	4-1/2"	1/8 NPT
A-11356-000-0-36	4-1/2"	3/8-24
A-11355-000-0-38	4-3/4"	1/8 NPT
A-11356-000-0-38	4-3/4"	3/8-24
A-11355-000-0-40	5"	1/8 NPT
A-11356-000-0-40	5"	3/8-24
A-11355-000-0-40	5-1/4"	1/8 NPT
A-11356-000-0-42	5-1/4"	3/8-24
A-11355-000-0-44	5-1/2"	1/8 NPT
A-11356-000-0-44	5-1/2"	3/8-24
A-11355-000-0-46	5-3/4"	1/8 NPT
A-11356-000-0-46	5-3/4"	3/8-24
A-11355-000-0-48	6"	1/8 NPT
A-11356-000-0-48	6"	3/8-24
A-11355-000-0-50	6-1/4"	1/8 NPT
A-11356-000-0-50	6-1/4"	3/8-24
A-11355-000-0-52	6-1/2"	1/8 NPT
A-11356-000-0-52	6-1/2"	3/8-24
A-11355-000-0-54	6-3/4"	1/8 NPT
A-11356-000-0-54	6-3/4"	3/8-24
A-11355-000-0-56	7"	1/8 NPT
A-11356-000-0-56	7"	3/8-24
A-11355-000-0-58	7-1/4"	1/8 NPT
A-11356-000-0-58	7-1/4"	3/8-24
A-11355-000-0-60	7-1/2"	1/8 NPT
A-11356-000-0-60	7-1/2"	3/8-24
A-11355-000-0-62	7-3/4"	1/8 NPT
A-11356-000-0-62	7-3/4"	3/8-24
A-11355-000-0-64	8"	1/8 NPT
A-11356-000-0-64	8"	3/8-24
A-11355-000-0-66	8-1/4"	1/8 NPT
A-11356-000-0-66	8-1/4"	3/8-24
A-11355-000-0-68	8-1/2"	1/8 NPT
A-11356-000-0-68	8-1/2"	3/8-24
A-11355-000-0-70	8-3/4"	1/8 NPT
A-11356-000-0-70	8-3/4"	3/8-24
A-11355-000-0-72	9"	1/8 NPT
A-11356-000-0-72	9"	3/8-24
A-11355-000-0-74	9-1/4"	1/8 NPT
A-11356-000-0-74	9-1/4"	3/8-24
A-11355-000-0-76	9-1/2"	1/8 NPT
A-11356-000-0-76	9-1/2"	3/8-24
A-11355-000-0-78	9-3/4"	1/8 NPT
A-11356-000-0-78	9-3/4"	3/8-24

Adapters with Slot – Custom Lengths (Continued)	(Minimum ten adapters per order)
Part Number	Length Thread
A-11355-000-0-80	10" 1/8 NPT
A-11356-000-0-80	10" 3/8-24
A-11355-000-0-82	10-1/4" 1/8 NPT
A-11356-000-0-82	10-1/4" 3/8-24
A-11355-000-0-84	10-1/2" 1/8 NPT
A-11356-000-0-84	10-1/2" 3/8-24
A-11355-000-0-86	10-3/4" 1/8 NPT
A-11356-000-0-86	10-3/4" 3/8-24
A-11355-000-0-88	11" 1/8 NPT
A-11356-000-0-88	11" 3/8-24
A-11355-000-0-90	11-1/4" 1/8 NPT
A-11356-000-0-90	11-1/4" 3/8-24
A-11355-000-0-92	11-1/2" 1/8 NPT
A-11356-000-0-92	11-1/2" 3/8-24
A-11355-000-0-94	11-3/4" 1/8 NPT
A-11356-000-0-94	11-3/4" 3/8-24
A-11355-000-0-96	12" 1/8 NPT
A-11356-000-0-96	12" 3/8-24

Adapter, Pipe Clamp



This adapter can be us	sed with thermocouples with bayonet lock to measure tube or pipe
surface temperatures.	The thermocouple is in direct contact with pipe.

Part Number	"A" Dimension	"L" Dimension
A-05915-100-0-00	13/16 to 1-1/2"	1-1/2"
A-05915-200-0-00	13/16 to 1-1/2"	2"
A-05915-300-0-00	13/16 to 1-1/2"	2-1/2"
A-05915-400-0-00	13/16 to 1-1/2"	3"
A-05915-500-0-00	13/16 to 1-1/2"	3-1/2"
A-05915-600-0-00	13/16 to 1-1/2"	4"
A-05915-700-0-00	13/16 to 1-1/2"	4-1/2"
A-05916-100-0-00	1-9/16 to 2-1/2"	1-1/2"
A-05916-200-0-00	1-9/16 to 2-1/2"	2"
A-05916-300-0-00	1-9/16 to 2-1/2"	2-1/2"
A-05916-400-0-00	1-9/16 to 2-1/2"	3"
A-05916-500-0-00	1-9/16 to 2-1/2"	3-1/2"
A-05916-600-0-00	1-9/16 to 2-1/2"	4"
A-05916-700-0-00	1-9/16 to 2-1/2"	4-1/2"
A-05917-100-0-00	2-9/16 to 3-1/2"	1-1/2"
A-05917-200-0-00	2-9/16 to 3-1/2"	2"
A-05917-300-0-00	2-9/16 to 3-1/2"	2-1/2"
A-05917-400-0-00	2-9/16 to 3-1/2"	3"
A-05917-500-0-00	2-9/16 to 3-1/2"	3-1/2"
A-05917-600-0-00	2-9/16 to 3-1/2"	4"
A-05917-700-0-00	2-9/16 to 3-1/2"	4-1/2"
A-05918-100-0-00	3-9/16 to 4-1/2"	1-1/2"
A-05918-200-0-00	3-9/16 to 4-1/2"	2"
A-05918-300-0-00	3-9/16 to 4-1/2"	2-1/2"
A-05918-400-0-00	3-9/16 to 4-1/2"	3"
A-05918-500-0-00	3-9/16 to 4-1/2"	3-1/2"
A-05918-600-0-00	3-9/16 to 4-1/2"	4"
A-05918-700-0-00	3-9/16 to 4-1/2"	4-1/2"