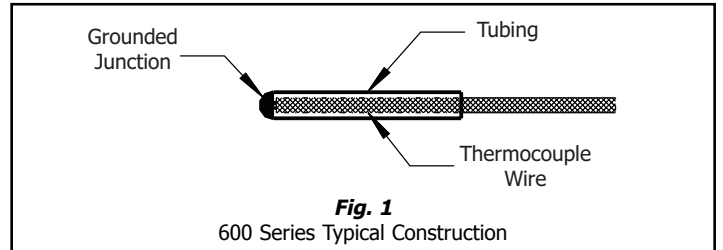


1.1 INTRODUCTION

Dynatherm's 600 Series tubing and wire thermocouples are manufactured from insulated thermocouple wire and tubing. Standard materials are fiberglass insulated thermocouple wire and SST 316 tubing. Often referred as "plastic industry thermocouples", these sensors have the following advantages;

- ◆ Low cost
- ◆ Operating temperature up to 450° C
- ◆ Wide range of terminations
- ◆ Single or double elements
- ◆ Grounded junction
- ◆ Fast response



All common materials are stocked at our in-house manufacturing facilities allowing us to **quickly deliver high quality** and **competitively priced** products. This catalogue illustrates the most common thermocouple models and options, consult factory for models or options not illustrated.

1.2 "QUICK SHIP" ITEMS

When selecting materials or options, you'll come across tables and lists where you must make selections. Order codes with grey highlights are most common and we take extra precautions to keep inventory for these items. When making choices, using **"Quick Ship"** items will ensure quick delivery of merchandise. Other items might also be in stock. Below are examples of **"Quick Ship"** items.

③ TUBING DIA. CODE Specify probe diameter.	
Sheath Diameter	Order Code
0.125"	5
0.188"	6
0.250"	7

② TUBING MATERIAL CODE Specify tubing alloy.	
Tube Material	Order Code
SST 316	3

"Quick Ship" items are common and in stock

2.1 CALIBRATION AND ALLOYS

In 1821, Thomas Seebeck discovered that by joining two dissimilar metals and heating the junction, a small voltage was produced, the thermocouple was invented. Thermocouples come in a wide range of calibrations, in the next tables you'll find application information and specifications for most common thermocouple calibrations.

Calibration	Application Range	Positive Alloy	Negative Alloy	Application Notes
K	0°C to 1250°C	Chromel	Alumel	Well suited for clean oxidizing atmospheres.
J	0°C to 750°C	Iron	Constantan	Recommended for use in reducing atmospheres.
T	-200°C to 350°C	Copper	Constantan	Recommended in both reducing and oxidizing atmospheres up to 400°C. Well suited for cryogenic temperature measurements.
E	0°C to 750°C	Chromel	Constantan	Recommended for use in vacuum or inert atmospheres. Highest emf output of base metal thermocouples.
N	0°C to 1250°C	Nicrosil	Nisil	Better stability and resistance to oxidation than Type K.

2.2 CALIBRATION TOLERANCES

Thermocouple wire is available in both standard or special limits of error. The table below lists tolerances for different thermocouple calibrations, tolerances are stated by 2 values, a fixed value and a percentage of reading, use whichever value is greater.

Calibration	Range	Standard Limits	Special Limits
Type K	-200° C to 0° C	± 2% Or 2.2° C	-
Type K	0° C to 1250° C	± 0.75% Or 2.2° C	± 0.4% Or 1.1° C
Type J	0° C to 750° C	± 0.75% Or 2.2° C	± 0.4% Or 1.1° C
Type T	-200° C to 0° C	± 1.5% Or 1° C	-
Type T	0° C to 350° C	± 0.75% Or 1° C	± 0.4% Or 0.5° C
Type N	0° C to 1260° C	± 0.75% Or 2.2° C	± 0.4% Or 1.1° C
Type E	-200° C to 0° C	± 1% Or 1.7° C	-
Type E	0° C to 900° C	± 0.5% Or 1.7° C	± 0.4% Or 1 C

2.3 TUBING MATERIAL INFORMATION

Metal tubing protects the thermocouple wire against harsh process conditions and give the sensor good mechanical strength. 600 Series are made with SST 316 tubing. Consult factory for other tubing material availability. Listed below are the properties of SST 316 tubing.

Tubing Order Code	Tubing Material	Melting Temp.	Continuous Max. Temp.	Application Notes
3	Stainless Steel 316	1370° C	925° C	Good corrosion resistance and creep strength at elevated temperatures. Resists tendency to pit in phosphoric and acetic acids. Withstands sulfuric acid compounds. Most common general purpose tubing.

2.4 MANUFACTURING TOLERANCES

The table below lists manufacturing tolerances for 600 Series thermocouples.

Material	Range	Tolerance
Metal Tubing	Up To 24"	± 0.125"
Metal Tubing	Over 24"	± 0.5%
Leadwire	Up To 120"	+ 6"
Leadwire	Over 120"	+ 5%

2.5 CALCULATING "Z" LENGTH

When ordering a thermocouple with bayonet cap, use the following formula to specify the correct "Z" length.

$$**"Z" Length = Hole depth + Bayonet Adapter Length + 0.5"**$$

3.1 TUBING & CALIBRATION ORDER CODES

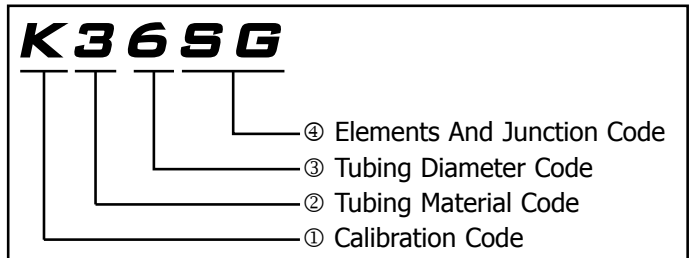
When ordering 600 Series thermocouples the following information must be specified;

- ◆ Probe calibration and limits of error
- ◆ Tubing material and diameter
- ◆ Number of elements
- ◆ Junction configuration

Using the example and the tables below, build your order code in **4 easy steps**.

Example : The code "K36SG" specifies;

- ① Type K probe calibration, standard limits
- ② SST 316 tubing material
- ③ 0.188" probe O.D.
- ④ Simplex element with grounded junction



① CALIBRATION CODE Specify calibration and limits of error.		
Calibration	Limits Of Error	
	Standard	Special
K	K	KK
J	J	JJ
T	T	TT
E	E	EE
N	N	NN

② TUBING MATERIAL CODE Specify tubing alloy.	
Tube Material	Order Code
SST 316	3

③ TUBING DIA. CODE Specify probe diameter.	
Sheath Diameter	Order Code
0.125"	5
0.188"	6
0.250"	7

④ ELEMENTS AND JUNCTION FORM CODE Specify elements and junction form.	
Element	Grounded Junction
Simplex	SG
Duplex	DG

3.2 LEADWIRE ORDER CODES

Use the table below to select leadwire insulation and protection. Conductors are available in solid or stranded construction. Table below indicates order codes for 20 AWG wire.

LEADWIRE ORDER CODES		
Protection	Leadwire insulation and conductor type	
	Fiberglass Solid	Fiberglass Stranded
None	G7	G8
Stainless Steel Overbraid	H7	H8
Stainless Steel Armor	I7	I8

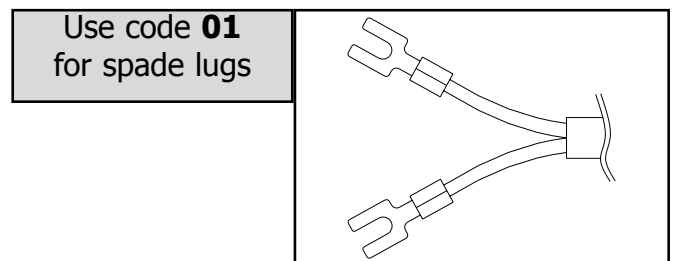
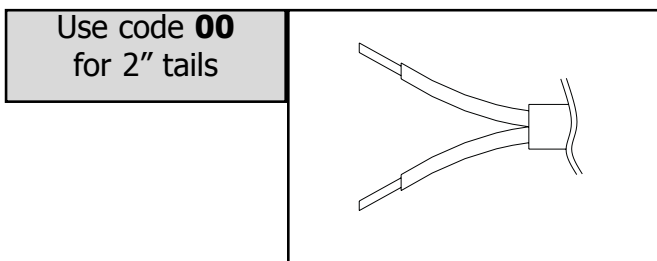
3.3 CONNECTOR TERMINATION ORDER CODES

Use the table below to select connector termination. Connectors come in standard (200°C) or high temperature (**HT** 425°C). Refer to connector brochure for more detailed specifications.

CONNECTOR TERMINATION ORDER CODES								
Mounting Adapter	Connector Type							
	Standard Male	Standard Female	Standard Male HT	Standard Female HT	Mini Male	Mini Female	Mini Male HT	Mini Female HT
Hex-Crimp	AA	BA	CA	DA	EA	FA	GA	HA
Crimp	AB	BB	CB	DB	EB	FB	GB	HB
Braze	AC	BC	CC	DC	EC	FC	GC	HC
Compression	AD	BD	CD	DD	-	-	-	-
Wire Clamp	AE	BE	CE	DE	EE	FE	GE	HE

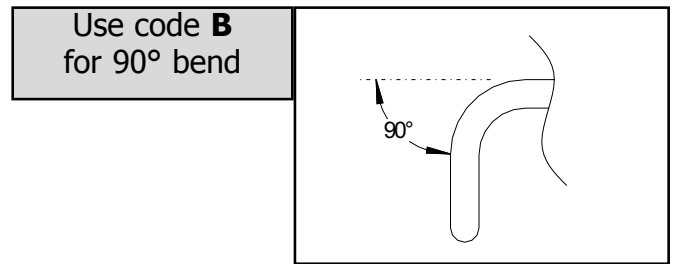
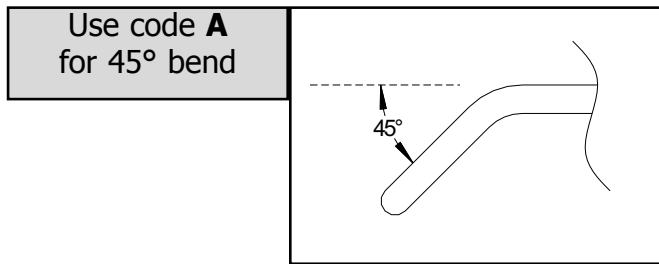
3.4 LEADWIRE TERMINATION ORDER CODES

For 2" tails or spade lug terminations, use the order codes below. Standard maximum ambient temperature for these terminations is 90° C, specify if higher operational temperature is required.



3.5 PROBE BEND ANGLE ORDER CODES

When a bend is required in the probe, use the following order codes;



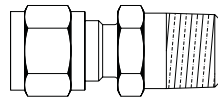
3.6 COMPRESSION ADAPTER ORDER CODES

If a compression adapter is required to mount the thermocouple it must be ordered separately, use the tables below to select the right adapter.

CF-SD-M7

①

②

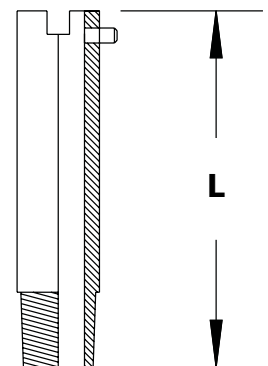


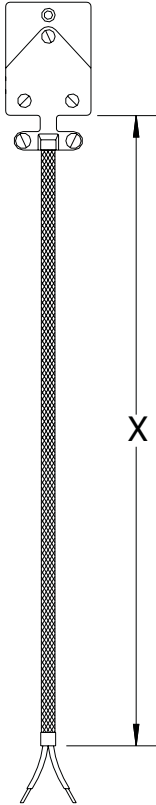
COMPRESSION ADAPTERS ORDER CODES													
① Material	Mounting Threads NPT					② Ferrule Material	Tubing Diameter						
	1/8"	1/4"	3/8"	1/2"	3/4"		0.063"	0.125"	0.188"	0.250"	0.313"	0.375"	0.500"
Stainless Steel	SA	SB	SC	SD	SE	Metal	M4	M5	M6	M7	M8	M9	MA
Brass	BA	BB	BC	BD	BE	Teflon	T4	T5	T6	T7	T8	T9	TA

3.7 BAYONET ADAPTERS ORDER CODES

CARBON STEEL ZINC PLATED ADAPTERS							
Mounting Thread	Bayonet Adapter Length						
	1"	1.5"	2"	2.5"	3"	3.5"	4"
1/8" NPT	6203-003	6203-009	6203-004	6203-005	6203-006	6203-007	6203-008
3/8-24 UNF	6203-023	6203-029	6203-024	6203-025	6203-026	6203-027	6203-028

STAINLESS STEEL 304 ADAPTERS							
Mounting Thread	Bayonet Adapter Length						
	1"	1.5"	2"	2.5"	3"	3.5"	4"
1/8" NPT	6203-063	6203-069	6203-064	6203-065	6203-066	6203-067	6203-068
3/8-24 UNF	6203-083	6203-089	6203-084	6203-085	6203-086	6203-087	6203-088





610-J20-1-GGS-72-BE-00

1 2 3 4

1 WIRE ORDER CODE (Refer To Thermocouple Wire Catalogue)

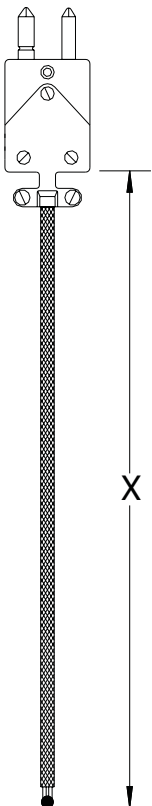
2 WIRE LENGTH IN INCHES "X"

3 "A" TERMINATION ORDER CODE (See Section 3.3 & 3.4)

4 "B" TERMINATION ORDER CODE (See Section 3.3 & 3.4)

FEATURES

- ◆ Available in thermocouple or extension grade wire.



620-J20-1-GGS-72-AE

1 2 3

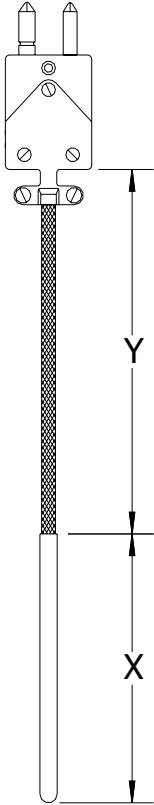
1 WIRE ORDER CODE (Refer To Thermocouple Wire Catalogue)

2 WIRE LENGTH IN INCHES "X"

3 TERMINATION ORDER CODE (See Section 3.3 & 3.4)

FEATURES

- ◆ Exposed junction.



630-J36SG-6-H8-12-AE

1 2 3 4 5

1 TUBING & CALIBRATION ORDER CODE (See Section 3.1)

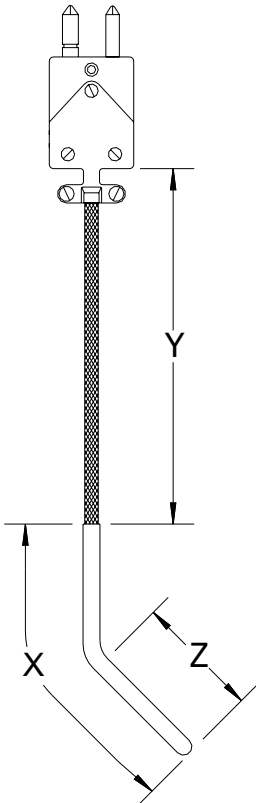
2 TUBING LENGTH IN INCHES "X"

3 LEADWIRE ORDER CODE (See Section 3.2)

4 LEADWIRE LENGTH IN INCHES "Y"

5 TERMINATION ORDER CODE (See Section 3.3 & 3.4)

FEATURES



631-J36SG-6-4-A-H8-12-AE

1 2 3 4 5 6 7

1 TUBING & CALIBRATION ORDER CODE (See Section 3.1)

2 TUBING LENGTH IN INCHES "X"

3 TUBING LENGTH IN INCHES "Z"

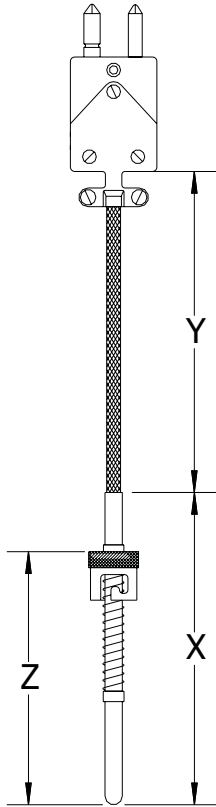
4 PROBE BEND ANGLE ORDER CODE (See Section 3.5)

5 LEADWIRE ORDER CODE (See Section 3.2)

6 LEADWIRE LENGTH IN INCHES "Y"

7 TERMINATION ORDER CODE (See Section 3.3 & 3.4)

FEATURES



640-J36SG-6-3-H8-12-AE

1 2 3 4 5 6

1 TUBING & CALIBRATION ORDER CODE (See Section 3.1)

2 TUBING LENGTH IN INCHES "X"

3 TUBING LENGTH IN INCHES "Z"

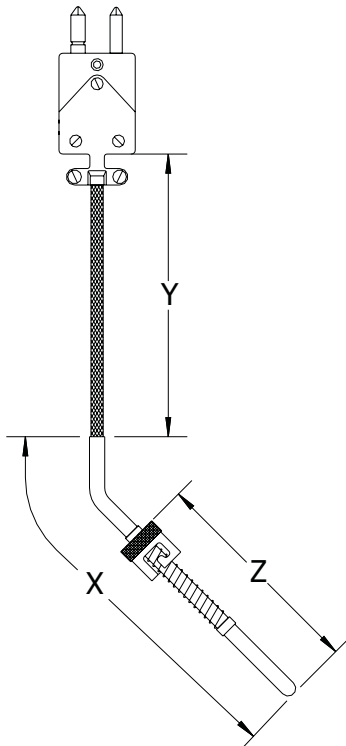
4 LEADWIRE ORDER CODE (See Section 3.2)

5 LEADWIRE LENGTH IN INCHES "Y"

6 TERMINATION ORDER CODE (See Section 3.3 & 3.4)

FEATURES

- ♦ Stainless Steel 304 cap and spring.



641-J36SG-6-3-A-H8-12-AE

1 2 3 4 5 6 7

1 TUBING & CALIBRATION ORDER CODE (See Section 3.1)

2 TUBING LENGTH IN INCHES "X"

3 TUBING LENGTH IN INCHES "Z"

4 PROBE BEND ANGLE ORDER CODE (See Section 3.5)

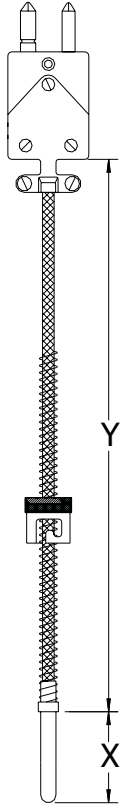
5 LEADWIRE ORDER CODE (See Section 3.2)

6 LEADWIRE LENGTH IN INCHES "Y"

7 TERMINATION ORDER CODE (See Section 3.3 & 3.4)

FEATURES

- ♦ Stainless Steel 304 cap and spring.



650-J36SG-.5-H8-24-AE

1 2 3 4 5

1 TUBING & CALIBRATION ORDER CODE (See Section 3.1)

2 TUBING LENGTH IN INCHES "X"

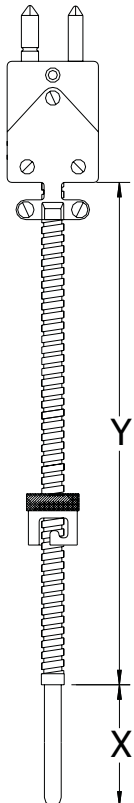
3 LEADWIRE ORDER CODE (See Section 3.2)

4 LEADWIRE LENGTH IN INCHES "Y"

5 TERMINATION ORDER CODE (See Section 3.3 & 3.4)

FEATURES

- ♦ Stainless Steel 304 cap and run-up spring.
- ♦ Standard run-up spring 10" long.



660-J36SG-.5-18-24-AE

1 2 3 4 5

1 TUBING & CALIBRATION ORDER CODE (See Section 3.1)

2 TUBING LENGTH IN INCHES "X"

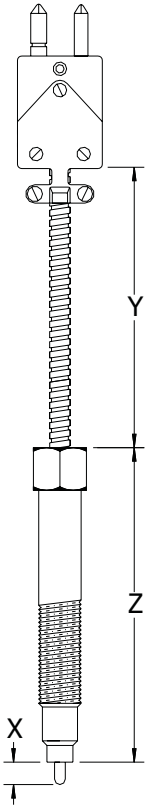
3 LEADWIRE ORDER CODE (See Section 3.2)

4 LEADWIRE LENGTH IN INCHES "Y"

5 TERMINATION ORDER CODE (See Section 3.3 & 3.4)

FEATURES

- ♦ Stainless Steel 304 cap and run-up armor.



670-J36SG-.25-4-18-24-AE

1 2 3 4 5 6

1 TUBING & CALIBRATION ORDER CODE (See Section 3.1)

2 TUBING LENGTH IN INCHES "X"

3 BOLT LENGTH IN INCHES "Z"

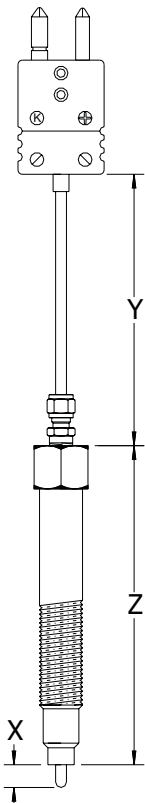
4 LEADWIRE ORDER CODE (See Section 3.2)

5 LEADWIRE LENGTH IN INCHES "Y"

6 TERMINATION ORDER CODE (See Section 3.3 & 3.4)

FEATURES

- ♦ Stainless steel 304 bolt, standard lengths 3", 4", 6" and 9".



671-J36SG-.25-4-6-AE

1 2 3 4 5

1 TUBING & CALIBRATION ORDER CODE (See Section 3.1)

2 TUBING LENGTH IN INCHES "X"

3 BOLT LENGTH IN INCHES "Z"

4 TUBING LENGTH IN INCHES "Y"

5 TERMINATION ORDER CODE (See Section 3.3 & 3.4)

FEATURES

- ♦ Stainless steel 304 bolt, standard lengths 3", 4", 6" and 9".
- ♦ Standard stainless steel ferrule.
- ♦ Field adjustable.