

1.1 INTRODUCTION

Dynatherm's 300 Series is a complete line of resistance temperature detectors (RTD). High quality sensing elements and tightly controlled manufacturing processes assure you high performance sensors. RTDs have many use in the following industries;

- ◆ Food and beverage
- ◆ Pharmaceutical and biotechnology
- ◆ Medical and laboratory
- ◆ HVAC
- ◆ Water treatment
- ◆ Industrial process
- ◆ Chemical and petrochemical
- ◆ Many more...

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 RTD 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.

LEADWIRE ORDER CODES			
Protection	Leadwire Insulation And Conductor Type		
	PVC Stranded	Teflon Stranded	Fiberglass Stranded
None	A8	D8	G8
Stainless Steel Overbraid	B8	E8	H8
Stainless Steel Armor	C8	F8	I8

"Quick Ship" items are common and in stock

2.1 TOLERANCE

Accuracy of RTD elements are determined by the following equations (According to IEC 751/DIN) ;

Class A : Deviation in °C = $\pm (.15 + 0.002[T])$

Class B : Deviation in °C = $\pm (.3 + 0.005[T])$

Where [T] is temperature value in°C, for platinum 100 ohm elements only.

Listed below are the permissible deviations at different temperature values.

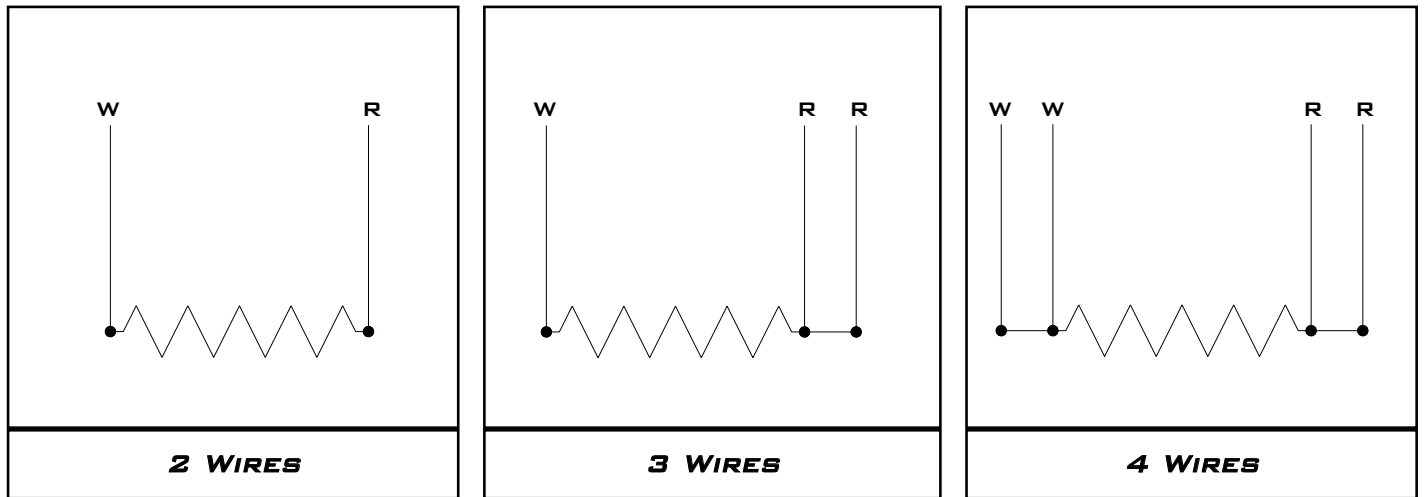
PERMISSIBLE DEVIATION FOR RTD ELEMENTS				
Temperature In °C	Class A		Class B	
	Ohm	°C	Ohm	°C
-200	± 0.24	± 0.55	± 0.56	± 1.3
-100	± 0.14	± 0.35	± 0.32	± 0.8
0	± 0.06	± 0.15	± 0.12	± 0.3
100	± 0.13	± 0.35	± 0.30	± 0.8
200	± 0.20	± 0.55	± 0.48	± 1.3
300	± 0.27	± 0.75	± 0.64	± 1.8
400	± 0.33	± 0.95	± 0.79	± 2.3
500	± 0.38	± 1.15	± 0.93	± 2.8

2.2 TEMPERATURE COEFFICIENT OF RESISTANCE

The temperature coefficient of resistance (TCR) defines the change in resistance of an RTD for a 1°C temperature step. Two widely popular standards exist, the **DIN** and **JIS** standards. The DIN 43760 standard curve specifies a TCR of 0.00385 ohm/ohm/°C, this is commonly referred as an "Alpha 385". The JIS 1604-1989 standard curve specifies a TCR of 0.003916 ohm/ohm/°C, this is commonly referred as an "Alpha 3916". There's no advantage of one TCR versus another, in practical application the Alpha 385 curve is the standard for industrial application.

2.3 WIRE CONFIGURATION

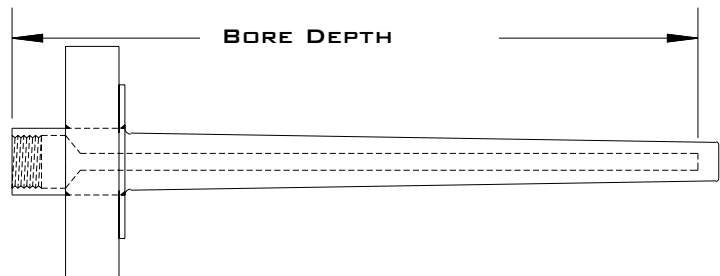
The illustrations below identify wire color codes for different RTD wire configurations.



2.4 CALCULATING SENSOR LENGTH

When specifying sensor length for use in thermowell use the following table to calculate the "X" dimension. Spring loaded probe action is suggested for use with thermowell since the probe is assured to be in contact with the bottom of the thermowell.

Probe Action	Probe Length "X" Dimension
Spring Loaded	Bore
Fixed	Bore - 0.5"



2.5 MANUFACTURING TOLERANCES

The table below lists manufacturing tolerances for 300 Series RTDs.

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%
Mounting Hardware	Up To 6"	± 0.5"
Mounting Hardware	Over 6"	± 10%

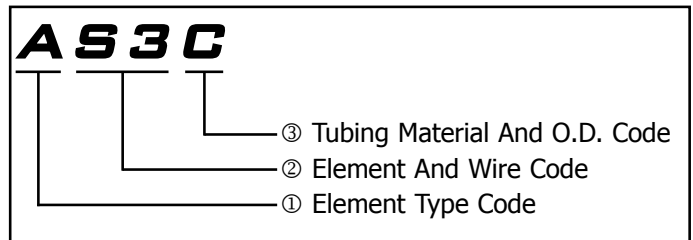
3.1 ELEMENT AND TUBE ORDER CODES

When ordering 300 Series RTD, the following information must be specified;

- ◆ Element type
- ◆ Number of elements
- ◆ Number of leads
- ◆ Tubing material
- ◆ Tubing diameter

Using the example and the tables below, build your element and tube order code in **3 easy steps**.

- Example** : The code "**AS3C**" specifies;
- ① PT 100 ohm Cl. A, 260°C DIN element
 - ② Single element, 3 wires
 - ③ SST 316, 0.250" tubing O.D.



① ELEMENT TYPE CODE Specify sensing element type.		
Element Type	Temperature Range	Order Code
PT 100 Ohm Cl. A DIN (Alpha 385)	-50°C to 260°C	A
PT 100 Ohm Cl. A DIN (Alpha 385)	-50°C to 450°C	B
PT 100 Ohm Cl. A JIS (Alpha 3916)	-50°C to 260°C	C
PT 100 Ohm Cl. A JIS (Alpha 3916)	-50°C to 450°C	D

② ELEMENT AND WIRE CODE Specify number of elements and wires.			
Element	Wires		
	2	3	4
Single	S2	S3	S4
Dual	D2	D3	D4

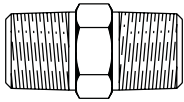
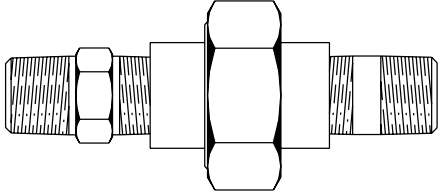
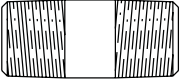
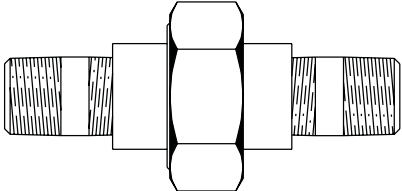
③ TUBING MATERIAL AND O.D. CODE Specify tubing material and diameter.			
Tubing Material	Tubing O.D.		
	1/8"	3/16"	1/4"
SST 316	A	B	C
Inconel 601	D	E	F

Ask about our other elements;

- ◆ Nickel 120 Ohm
- ◆ Copper 10 Ohm
- ◆ Platinum 500 & 1000 Ohm
- ◆ Thermistors
- ◆ Cryogenic Sensors

3.2 HARDWARE ORDER CODES

Mounting hardware is available in fixed or spring loaded configuration. In a fixed mounting hardware, the mounting hardware is welded to the tubing forming a pressure tight seal, this type of configuration is typically used when the sensor is screwed directly to the process. Spring loaded configurations allow the probe to travel back and forth (travel is approximately 1/2"), this configuration is typically used with thermowell, ensuring a contact with the bottom of the thermowell. Use the information below to select hardware mountings.

Illustration	Hardware Type	Illustration	Hardware Type
	Bushing Standard Length 1.5"		Bushing-Union-Nipple BUN Standard Length 3.0" to 6"
	Nipple Standard Length 1.5" to 6"		Nipple-Union-Nipple NUN Standard Length 3.0" to 6"

HARDWARE ORDER CODES				
Material And Action	Hardware Type			
	Bushing	Nipple	Bushing-Union Nipple (BUN)	Nipple-Union-Nipple (NUN)
1/2" Galvanized Steel Fixed	-	A	-	B
1/2" Galvanized Steel Spring Loaded	-	C	-	D
1/2" Stainless Steel Fixed	E	F	G	H
1/2" Stainless Steel Spring Loaded	I	J	K	L
3/4" Galvanized Steel Fixed	-	M	-	N
3/4" Galvanized Steel Spring Loaded	-	O	-	P
3/4" Stainless Steel Fixed	-	Q	-	R
3/4" Stainless Steel Spring Loaded	-	S	-	T

3.3 CONNECTION HEAD & TRANSMITTER ORDER CODES

A wide variety of connection heads and transmitters are available. Use the tables below to select a connection head and transmitter if required. When ordering with in head transmitter, specify calibration parameters (low scale, high scale and burnout mode).

Material	Rating	Application Notes
Aluminum	NEMA 4	Lightweight general purpose and economical. Not recommended for hot environments.
Cast Iron	NEMA 4	Suitable for hot environments and heavy industrial applications.
Stainless Steel 316	NEMA 4X	Excellent corrosion and chemical resistance. Can withstand extremely harsh environments. Good for sanitary application in food and pharmaceutical.
Polypropylene	NEMA 4X	Lightweight head with excellent resistance to acids, alkalis and most process chemicals. FDA compliant for use in sanitary applications.

TRANSMITTER AND CONNECTION HEAD ORDER CODES

Transmitter	Connection Head Material			
	Aluminum	Cast Iron	Stainless Steel 316	Polypropylene
None (Terminal Block)	AN	BN	CN	DN
Isolated	AA	BA	CA	DA
Non-Isolated	AB	BB	CB	DB

3.4 LEADWIRE ORDER CODES

Use the table below to select leadwire insulation and protection. Standard wire is 20 AWG, other gauges available on demand. Refer to our wire brochure for more detailed specifications.

LEADWIRE ORDER CODES

Protection	Leadwire Insulation And Conductor Type		
	PVC Stranded	Teflon Stranded	Fiberglass Stranded
None	A8	D8	G8
Stainless Steel Overbraid	B8	E8	H8
Stainless Steel Armor	C8	F8	I8

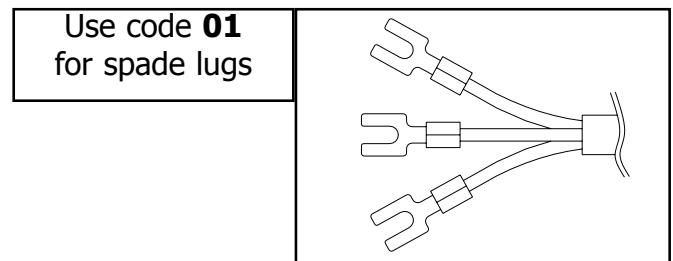
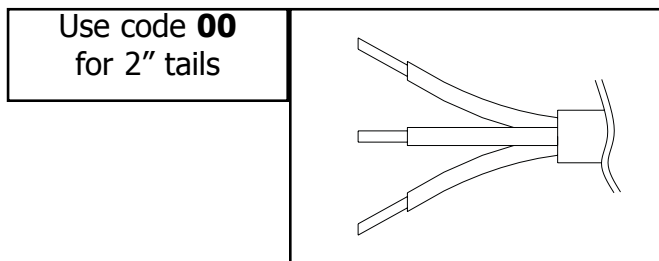
3.5 CONNECTOR TERMINATION ORDER CODES

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	-	-	-	-	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

3.6 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.



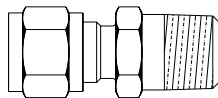
3.7 COMPRESSION ADAPTER ORDER CODES

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

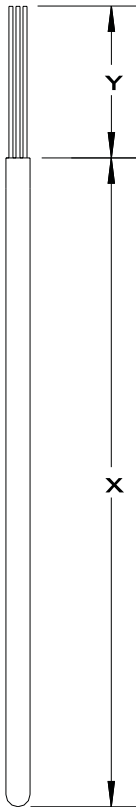
CF-SD-M7

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"		0.125"	0.188"	0.250"
Stainless Steel	SA	SB	SC	SD	SE	Metal	M5	M6	M7
Brass	BA	BB	BC	BD	BE	Teflon	T5	T6	T7



310-AS3C-12-6

1 2 3

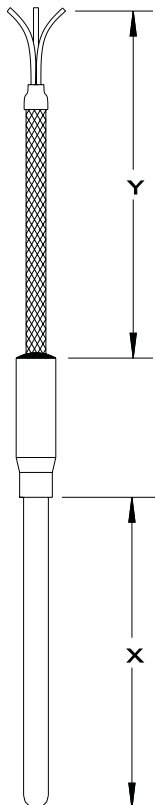
1 ELEMENT AND TUBE ORDER CODE (See Section 3.1)

2 PROBE LENGTH IN INCHES "X"

3 WIRE LENGTH IN INCHES "Y"

FEATURES

- ◆ Cold end epoxy sealed.
- ◆ Standard wire length is 6".



320-AS3C-12-DB-72-00

1 2 3 4 5

1 ELEMENT AND TUBE ORDER CODE (See Section 3.1)

2 PROBE LENGTH IN INCHES "X"

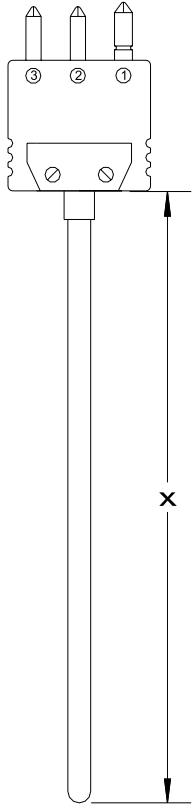
3 LEADWIRE ORDER CODE (See Section 3.4)

4 LEADWIRE LENGTH IN INCHES "Y"

5 TERMINATION ORDER CODE (See Section 3.5 & 3.6)

FEATURES

- ◆ Standard transition max. 200°C, higher temperatures available optional.
- ◆ For connector termination, use wire clamp mounting adapter (See Section 3.5)



330-AS3C-12-AA

1 2 3

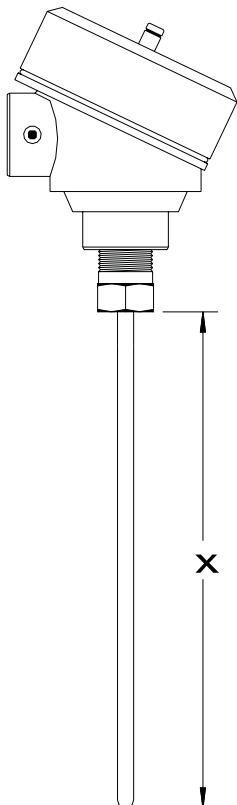
1 ELEMENT AND TUBE ORDER CODE (See Section 3.1)

2 PROBE LENGTH IN INCHES "X"

3 TERMINATION ORDER CODE (See Section 3.5)

FEATURES

- ♦ Available in single element, 2 and 3 wires.
- ♦ Standard size connector, tubing diameter max. 0.375".
- ♦ Miniature size connector, tubing diameter max. 0.125".



340-AS3C-12-AN

1 2 3

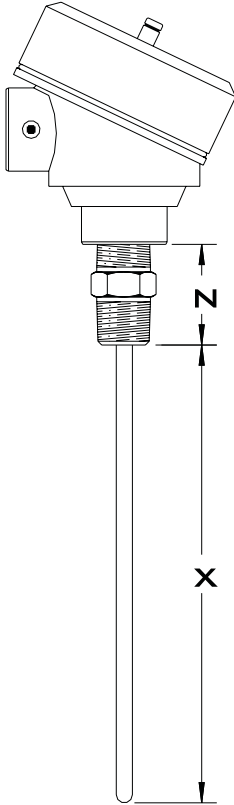
1 ELEMENT AND TUBE ORDER CODE (See Section 3.1)

2 PROBE LENGTH IN INCHES "X"

3 CONNECTION HEAD ORDER CODE (See Section 3.3)

FEATURES

- ♦ Tubing welded to bushing.



350-AS3C-12-I-1,5-AN

1 2 3 4 5

1 ELEMENT AND TUBE ORDER CODE (See Section 3.1)

2 PROBE LENGTH IN INCHES "X"

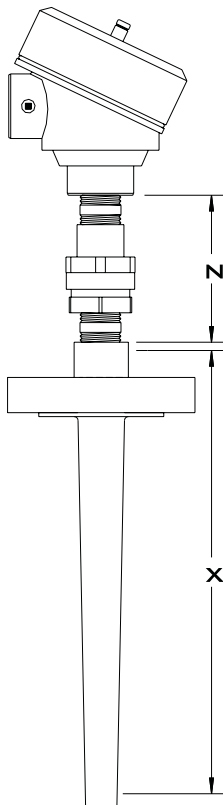
3 HARDWARE ORDER CODE (See Section 3.2)

4 HARDWARE LENGTH IN INCHES "N"

5 CONNECTION HEAD ORDER CODE (See Section 3.3)

FEATURES

- ♦ Available spring loaded or fixed.



360-AS3C-12-L-1,5-AN

1 2 3 4 5

1 ELEMENT AND TUBE ORDER CODE (See Section 3.1)

2 PROBE LENGTH IN INCHES "X" (See Section 2.4)

3 HARDWARE ORDER CODE (See Section 3.2)

4 HARDWARE LENGTH IN INCHES "N"

5 CONNECTION HEAD ORDER CODE (See Section 3.3)

FEATURES

- ♦ Specify thermowell part number when ordering.
- ♦ Tubing diameter standard 0.250".