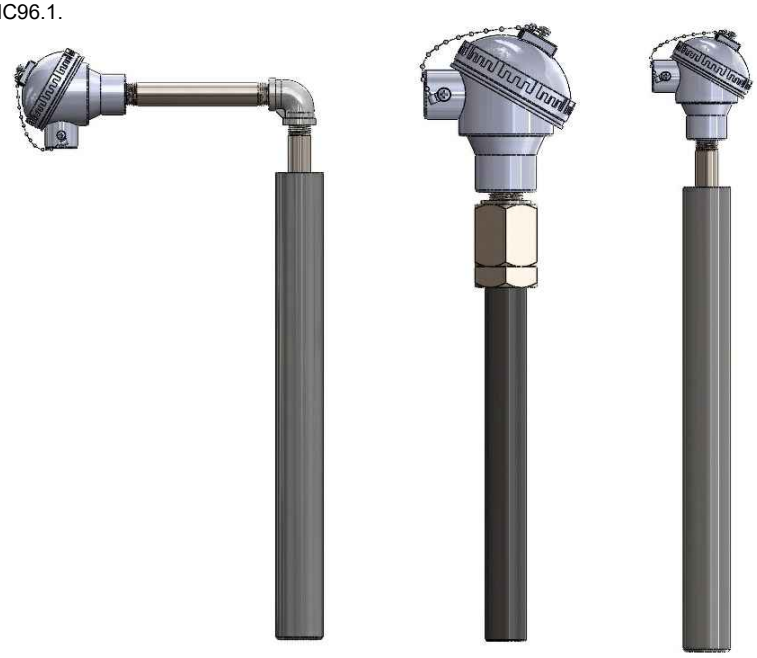
TC-300 Angled Thermocouple for Molten Metal Furnace Non-Ferrous

TEMPERATURE SENSOR

TC300-An Aluminum Holding Furnace Thermocouple with a Silicon Carbide (SiC) protective tube is a high-temperature sensor designed for continuous monitoring of molten aluminum in holding furnaces, crucibles, and ladles. The SiC sheath provides excellent thermal shock resistance, corrosion protection, and mechanical strength, making it ideal for harsh foundry environments. Its comes in straight and L-shape thermocouples.

Key Feature:

- Available in thermocouple type K with 316 SS Sheath.
- Available in single junction, Duplex avaiable with Mineral Insulated MGO-PAC style
- Available in 8 AWG,14 AWG, 20 AW
- Various protection tube options Silicon Carbide (SiC), Silicon Nitride, protective tube offers superior resistance to thermal shock, oxidation, and corrosion from molten aluminum.
- Typically operates in the temperature range of 800°C to 1600°C (1470°F to 2910°F) depending on the thermocouple type
- Available in standard and special tolerances as per IEC 60584 and ANSI MC96.1.
- Coated Protection Tube for Holding furance



Installation:

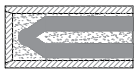
The installation of TC-300 molten metal thermocouple through a furnace wall is a straightforward procedure. The temperature probe must be inserted through the wall and secured using a fitting designed for high-temperature applications or other mounting fixture provided by the furnace manufacturer. If required TempoTech can supply custom fitting for thermocouple mounting to the furnace.

Protection tube do not require any preheating if installing into the cold furnace, but it is important to preheat the protection tube to the closest temperature of furnace before inserting into the hot furnace. This will avoid protection tube breakage due to thermal shock.

It recommended to preheat the protection tube at 500°C before inserting into the furnace.

Preheating of proetction tube helps to Gradually heat the tube, reducing the risk of thermal shock. Allow any residual moisture or contaminants to evaporate before exposure to molten aluminum.
And Ensure the protection tube reaches a uniform temperature to prevent cracking or damage when in contact with molten aluminum.

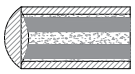
Thermocouple Junction options for TC300



Ungrounded Junction: Junction is similar to grounded junction except wire are fuse welded, which is then insulated with Mgo powder and formed cap by welding without incorporating thermocouple wires. Thus, the junction is called the ungrounded junction.

Key Benefits :

· Wires are protected from any mechanical damage
· Offers rugged construction, the same as the grounded junction.
· Strain due to differential expansion between wire and sheath is minimized with insulated wires.



Grounded Junction: In grounded junction thermocouple wires and sheath of the mineral insulated cable is welded together to form a junction. Thermocouple wires and sheath becomes an integral part of the junction. Thus, the wire is grounded to the sheath.

Key Benefits:

- Slower response than Exposed junction, but offers rugged construction.
- Can hold higher pressure than exposed junction and Ungrounded junction.

Beaded thermocouple Junction: Beaded junction thermocouple elements are most inexpensive thermocouple type. Thermocouple wires fuse-welded to form a junction. It is not recommended to use in highly oxidizing environment.

Key Benefits:

- Fast response time due to the less mass.

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Suggested Maximum Temperature Limit As per ASTM E608/608M

Thermocouple Type	°C (F)	°C (F)	°C (F)	°C (F)	°C (F)
OD	1/8"	3/16"	1/4"	3/8"	1/2"
T	315(600)	370 (700)	370 (700)	370 (700)	370 (700)
J	520 (970)	620(1150)	720 (1330)	720 (1330)	720 (1330)
K	1070 (1960)	1150 (2100)	1150 (2100)	1150 (2100)	1150 (2100)
E	650 (1200)	730 (1350)	820(1510)	820(1510)	820(1510)

The suggested maximum temperature limit is based on information available in the ASTM standard and test performed in our facility. The maximum temperature limit may change based on the type of process and material/ liquid it is going to be used in. These limits apply to protected thermocouples.

Temperature Accuracy As per ASTM E608/608M/ IEC 60584 & ANSI MC 96.1 standard tolerances

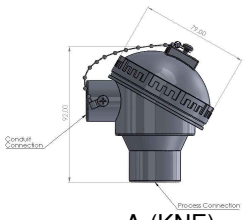
Type	Temperature	Standard Limit	Special Limit
T	-200 °C to 0 °C	± 1 °C or 1.5% Whichever is greater	N/A
	0 °C to 350 °C	± 1 °C or .75% Whichever is greater	± 0.5 °C or 0.4% Whichever is greater
J	0 °C to 750 °C	± 2.2 °C or .75% Whichever is greater	± 1.1 °C or 0.4% Whichever is greater
E	-200 °C to 0 °C	± 1.7 °C or 1.0% Whichever is greater	N/A
	0 °C to 900 °C	± 1.7 °C or .5% Whichever is greater	± 1 °C or 0.4% Whichever is greater
KORN	-200 °C to 0 °C	± 2.2 °C or 2.0 % Whichever is greater	N/A
	0 °C to 1250 °C	± 2.2 °C or .75% Whichever is greater	± 1.0 °C or 0.4% Whichever is greater

Notes:

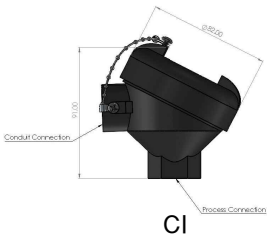
-All the thermocouples are manufactured as ASTM E608/608M

-Calibration is available as per ASTM E220 on request

Connection Head Options



A-(KNE)



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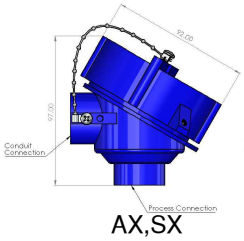
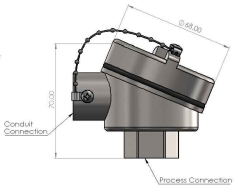


AX,SX



SS

EA

Protection Tube Options

Protection Tube			
	Silicone Carbide Nitride Bonded	Silicone Carbide Isopressed	Silicone Nitride
MODELS	5C3	SN01,SN02	SN01,SN02
MAX TEMP. RATING	1550° C (2800° F)	1550° C (2800° F)	1250° C (2282° F)
Application	Molten Aluminum, other Ferrous and Non Ferrous Molten metal	Molten Aluminum, other Ferrous and Non Ferrous Molten metal	Molten Aluminum, other Ferrous and Non Ferrous Molten metal
Thermal Shock	Fair	Excellent	Excellent
Non Wetting Properties	Fair	Excellent	Excellent
Oxidation and Reducing Resistance	Fair	Excellent	Excellent

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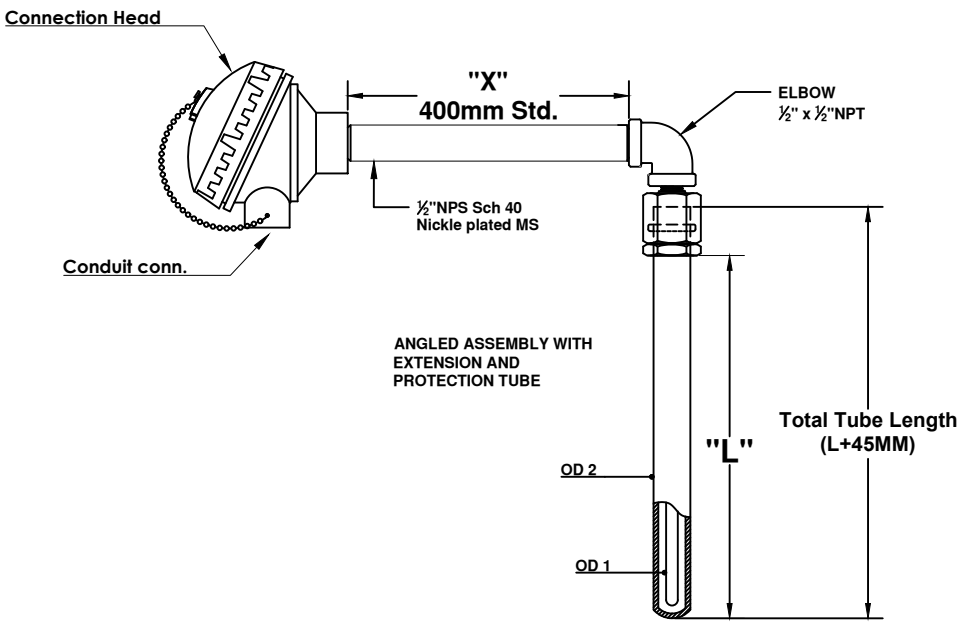
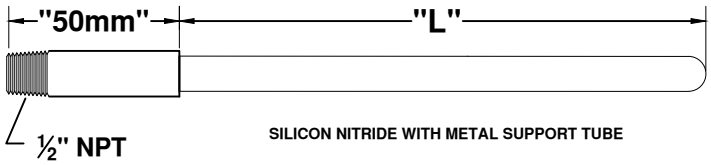
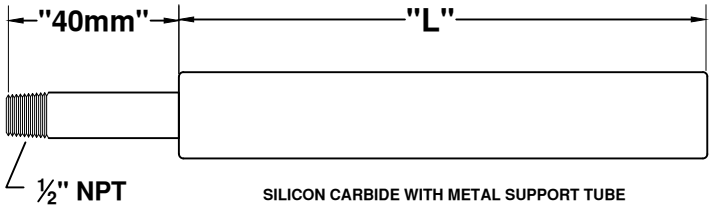
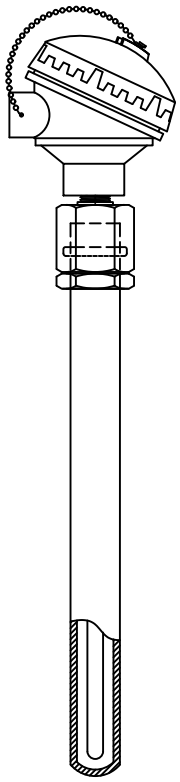




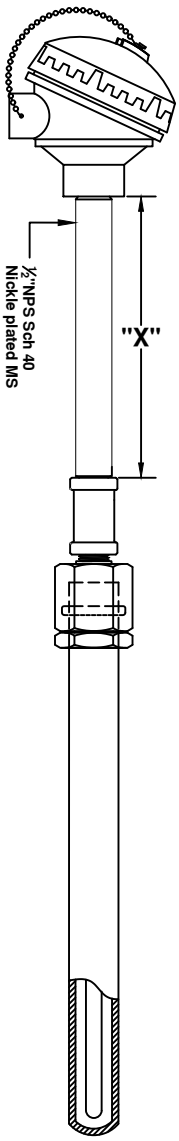
SILICON NITRIDE WITH METAL SUPPORT TUBE



SILICON CARBIDE WITH METAL SUPPORT TUBE



STRAIGHT ASSEMBLY
WITHOUT EXTENSION
PROTECTION TUBE



STRAIGHT ASSEMBLY
WITH EXTENSION
PROTECTION TUBE

	1	2	3	4	5	6	7	8	9	10	11
TC 300											

Eample: TC300-K-0-D-G-8-SC1-22M-18i-CG-01-TB

1. THERMOCOUPLE TYPE	
CODE	
K	Chromel(+) vs Alumel(-)
USE "S" WITH CODE FOR SPECIAL LIMITS	

2. THERMOCOUPLE ANGLE	
CODE	
0	Straight
90	90°

3. MEASURING JN	
CODE	
S	Single
D	Duplex

4. JUNCTION TYPE	
CODE	Beaded thermocouple elements are only offered for straight connection assembly. For angled assembly use MGO-PAC from table 5-2
1	Twist and Tig weld (Only available in single element for beaded element)
2	Insulated hot junction for beaded element
3	Standard Tig Weld for beaded element
G	Grounded Junction for MGO-PAC
UG	Ungrounded Junction for MGO-PAC

5-1. WIRE SIZE FOR BEADED ELEMENT	
CODE	
8	8 AWG
14	14 AWG
16	16 AWG
20	20 AWG

Beaded thermocouple elements are only offered for straight connection assembly. For angled assembly use MGO-PAC from table 5-2

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5-2. MGO-PAC ELEMENT (With 316 SS Sheath)		
CODE	IMPERIAL SIZE	METRIC SIZE
2	1/8"	3.2 mm
3	3/16"	4.76 mm
4	1/4"	6.35 mm
5	5/16"	7.9mm
6	3/8"	9.5 mm
7	0.215"	5.46 mm
2M	0.079	3.0mm
3M	0.197"	5.0mm
4M	0.236"	6.0 mm
5M	0.315"	8.0mm
6M	0.354"	9.0 mm
7M	0.394"	10.0 mm

6. CERAMIC PROTECTION TUBE SIZE		
CODE	MATERIAL	SIZE(OD)
5C2	Silicon Carbide	1- 7/64" (28mm)
5C3	Silicon Carbide	1.0" (25mm)
SN01	Silicon Nitride	1.1" (28mm)
SN03	Silicon Nitride	0.63" (16mm)
SC1	Silicon Carbide with Metal Support tube	1- 3/4"(45mm)

7. CERAMIC PROTECTION TUBE LENGTH (L)		
CODE	"L" inches	"L" mm
Length for 5C2 AND 5C3		
12M	11.8	300
18M	17.7	450
20M	19.6	500
22M	21.6	550
Length for SN01 AND SN03		
Specify length - use "I" for inches and "M" for millimeters. For example use 305M to order 305 mm long tube in metric and 29.5i to order 29.5 inch long tube in imperial size.		
Length for SC1		
18M	17.7	450
22M	21.6	550
24M	23.6	600

8. EXTENSION LENGTH "X"	
0	When ordering without pipe extension.
Specify length - use "I" for inches and "M" for millimeters. For example use 400M to order 400 mm long extension in metric and 18i to order 18 inch long extension in imperial size.	

9. CONNECTION HEAD	
CODE	
A	Gen purpose Aluminum head IP68
EA	Economical Aluminum gen purpose head(non-rated)
S	SS general purpose
CG	Cast iron
SX	SS Explosion proof
AX	Aluminum explosion proof (CSA,FM,ATEX,IECE'x approved)
10	Aluminum connection head (CCOE approved)

10. CONDUIT CONNECTION	
CODE	
01	1/2"
02	3/4"

11. HEAD TERMINATION	
CODE	
TB	Ceramic Terminal Block