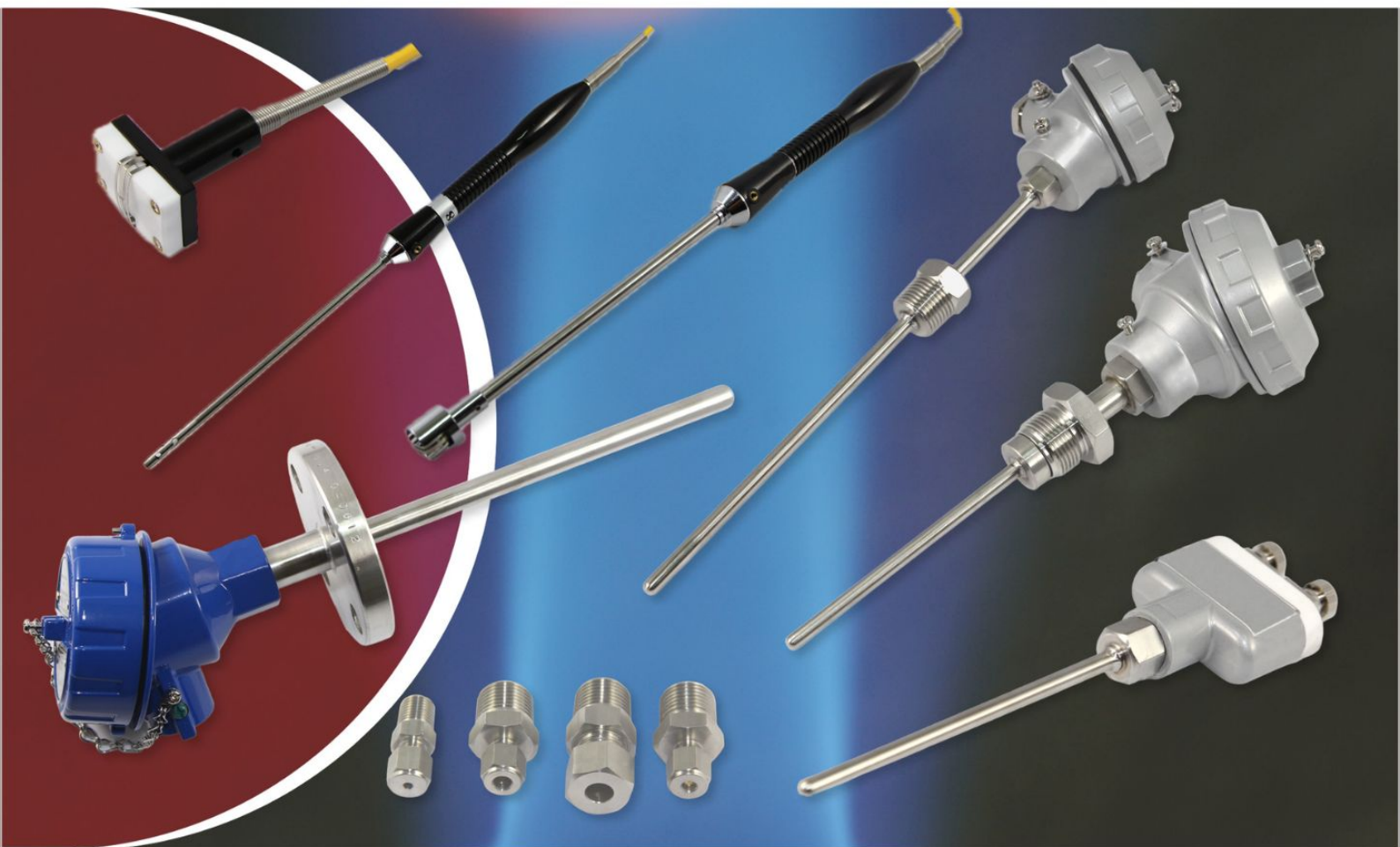


PRODUCT CATALOG



**THERMOCOUPLE
/ RESISTANCE
TEMPERATURE
DETECTOR
(RTD)**

MADE IN TAIWAN

WWW.RICHTECH.COM.TW



LS-0



LS-0-1



LS-0-2



LS-0-3



LS-0-4



LS-0-5



LS-0-6



LS-0-7



LS-1



LS-2



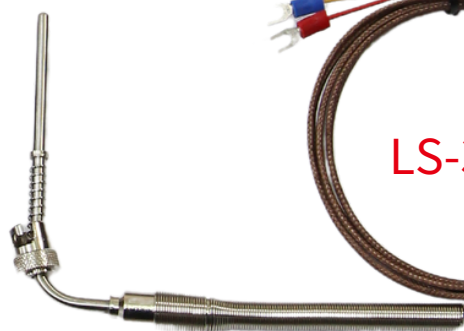
LS-2-1



LS-3



LS-3-1



LS-3-2



LS-4



LS-4-2



LS-9



LS-7-2

LS-7

LS-7-TF

LS-7-5

LS-7-1

LS-KF

LS-9-1

LS-7

LS-7-7

LS-7-6

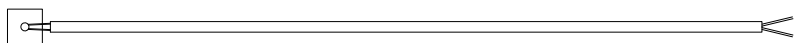
Thermowell

Diagram of temperature sensing wire and measuring rod

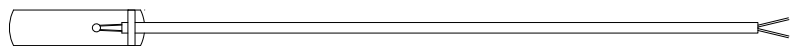
MODEL: LS-0 toothless insert type



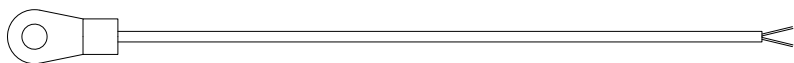
MODEL: LS-0-1 surface copper sheet type



MODEL: LS-0-2 surface steel sheet type



MODEL: LS-0-3 terminal type



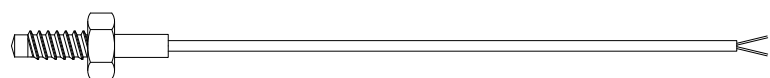
MODEL: LS-0-4 T-type



MODEL: LS-0-5 ring type



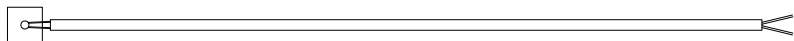
MODEL: LS-1 screw type



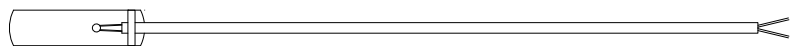
MODEL: LS-0 toothless insert type



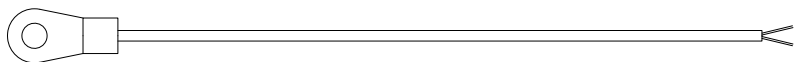
MODEL: LS-0-1 surface copper sheet type



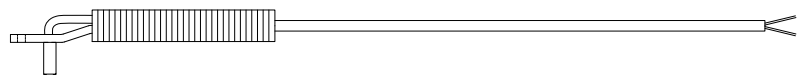
MODEL: LS-0-2 surface steel sheet type



MODEL: LS-0-3 terminal type



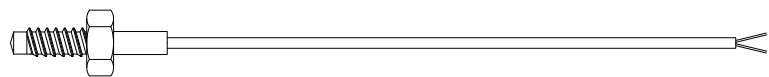
MODEL: LS-0-4 T-type



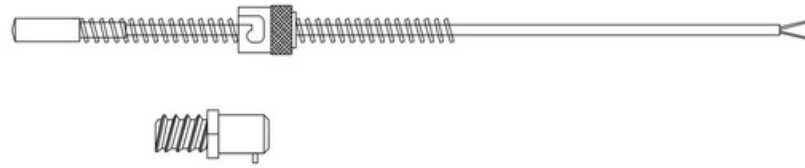
MODEL: LS-0-5 ring type



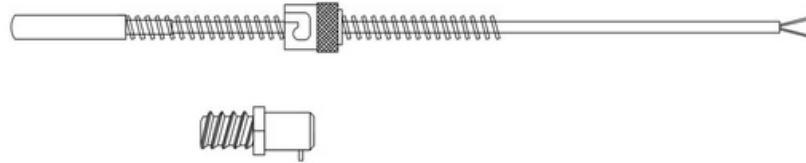
MODEL: LS-1 screw type



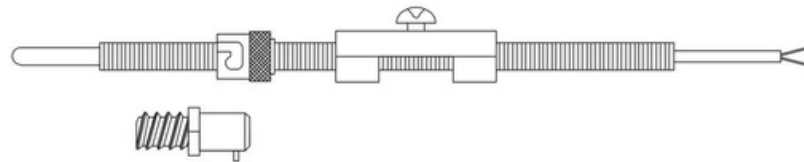
MODEL: LS-4 withholding type



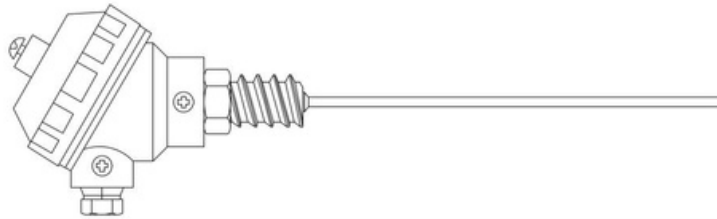
MODEL: LS-4-1 extended withholding type



MODEL: LS-4-2 tension spring insertion type



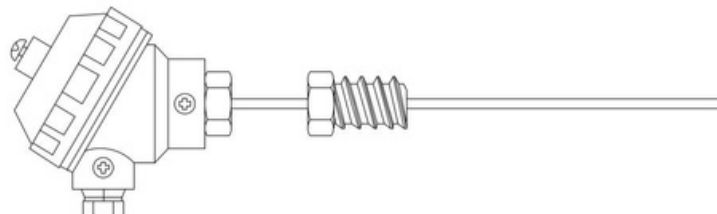
MODEL: LS-7 round head type



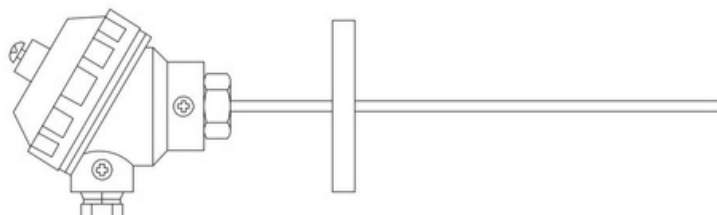
MODEL: LS-7 round head type (no teeth)



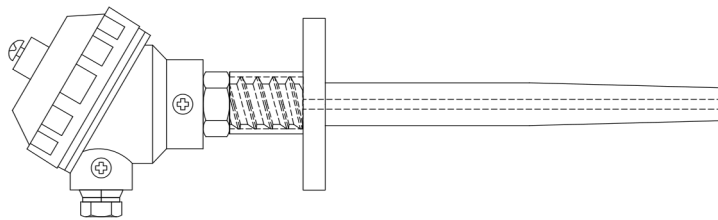
MODEL: LS-7-1 round head type



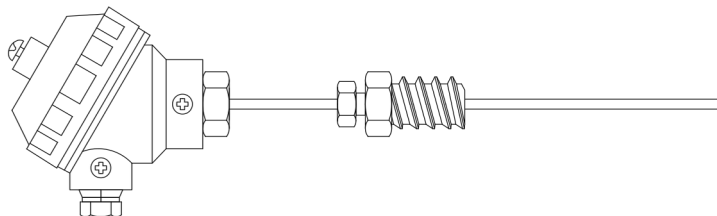
MODEL: LS-7-2 round head flange type



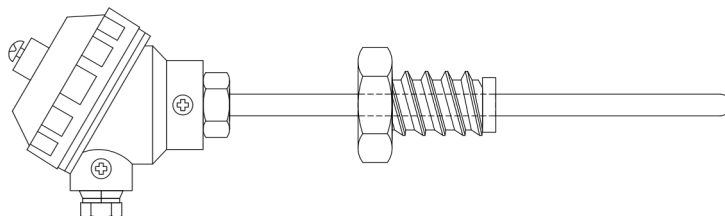
MODEL: LS-7-3 round head flange casing type



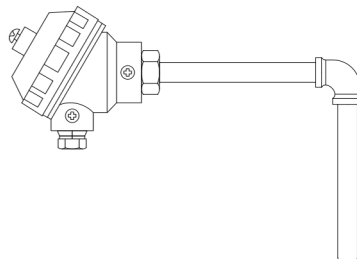
MODEL: LS-7-4 round head movable tooth type (Fitting)



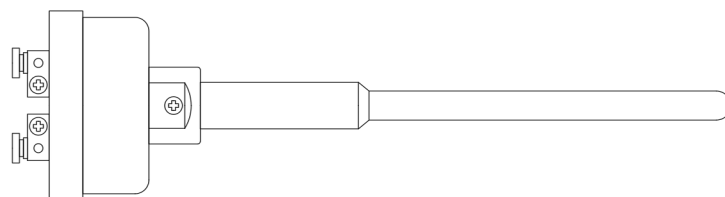
MODEL: LS-7-5 round head movable tooth type



MODEL: LS-7-6
round head L type



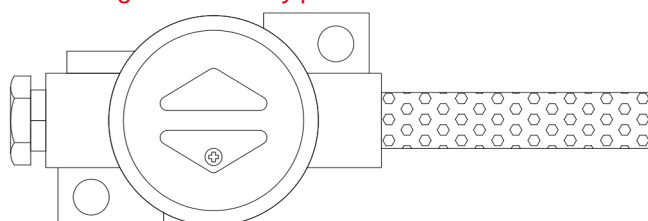
MODEL: LS-7-7 round head porcelain tube type



MODEL: LS-9 Insert type (Sheath)

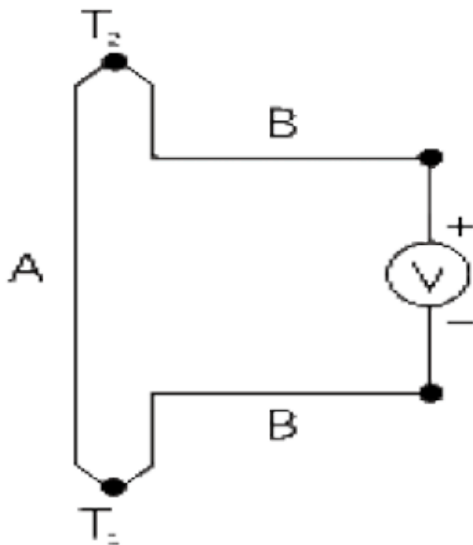


MODEL: LS-KF refrigeration type



Thermocouple principle (Seebeck Effect)

Connect the end points of two different metal materials (i.e. hot junction), and then keep the other end contact at 0 degrees C (i.e. cold junction) to form a closed loop. During the temperature change of the hot junction, a tiny thermoelectric electromotive force (EMF) is generated.), and because the magnitude of the thermoelectric electromotive force is converted into the temperature, this is a thermocouple.



Sheath Thermocouple

The thermocouple is covered with metal material for protection, and the inside of the tube is tightly filled with inorganic mineral insulation (high-purity magnesium oxide powder), which is then annealed and integrally drawn to improve the pressure resistance and oxidation resistance, and is flexible and responsive. The speed has also been greatly improved. This is a fine-speed thermocouple, also called an armored thermocouple.

Grounding Type	Non-grounded type	Exposure type

Allowable error and temperature measurement range DIN43760 IEC751 BS1904

Temp	1/10 DIN		1/5 DIN		1/3 DIN		CLASS A		CLASS B		CLASS C	
°C	±°C	±Ω	±°C	±Ω	±°C	±Ω	±°C	±Ω	±°C	±Ω	±°C	±Ω
-200	0.13	0.06	0.26	0.11	0.44	0.19	0.55	0.24	1.3	0.56	2.27	1.15
-100	0.08	0.03	0.16	0.06	0.27	0.11	0.35	0.14	0.8	0.32	1.17	0.71
0	0.03	0.01	0.06	0.02	0.1	0.04	0.15	0.06	0.3	0.12	1.27	0.5
100	0.08	0.03	0.16	0.05	0.27	0.1	0.35	0.13	0.8	0.3	1.77	0.67
200	0.13	0.05	0.26	0.1	0.44	0.16	0.55	0.2	1.3	0.48	2.27	0.83
300	0.18	0.06	0.36	0.13	0.6	0.21	0.75	0.27	1.8	0.64	2.77	0.98
400	0.23	0.08	0.46	0.16	0.77	0.26	0.95	0.33	2.3	0.79	2.77	1.1
500	0.28	0.09	0.56	0.19	0.94	0.31	1.15	0.38	2.8	0.93	3.27	1.22
600	0.33	0.1	0.66	0.21	1.1	0.35	1.35	0.43	3.3	1.06	3.77	1.32
650	0.36	0.11	0.72	0.23	1.2	0.38	1.45	0.46	3.6	1.13	4.27	1.36
700	~	~	~	~	~	~	~	~	3.8	1.17	4.52	1.41
800	~	~	~	~	~	~	~	~	4.3	1.28	5.27	1.49
850	~	~	~	~	~	~	~	~	4.6	1.34	5.52	1.56

Maximum operating temperature and material of thermocouple

Code	Old Code	Material	Normal Working °C	Highest Working °C	Sensitivity
D-TYPE	W3	(+) W.Re 3% (-) W.Re 25%	2000	2300	-
C-TYPE	W5	(+) W.Re 5% (-) W.Re 26%	2000	2300	-
B-TYPE	PR 30 %	(+) Pt.Ph 30% (-) Pt.Ph 6%	1500	1700	-
R-TYPE	PR 13 %	(+) Pt.Ph 13% (-) Pt	1400	1600	-
S-TYPE	PR 10 %	(+) Pt.Ph 10% (-) Pt	1400	1600	-
K-TYPE	CA	(+) Ni-Cr (-) Ni-Al	1000	1200	41 $\mu\text{V}/^\circ\text{C}$
N-TYPE	-	(+) Ni-Cr-Si (-) Ni-Si	1000	1200	39 $\mu\text{V}/^\circ\text{C}$
E-TYPE	CRC	(+) Ni-Cr (-) Ni-Cu	700	800	68 $\mu\text{V}/^\circ\text{C}$
J-TYPE	IC	(+) Fe (-) Ni-Cr	600	750	50 $\mu\text{V}/^\circ\text{C}$
T-TYPE	CC	(+) Cr (-) Ni-Cr	300	350	43 $\mu\text{V}/^\circ\text{C}$

Thermocouple error range

Code	CLASS 1	CLASS 2	CLASS 3
B-TYPE	-	-	600°C ~ 800°C ±4°C
	-	600°C ~ 1700°C ±0.0025. t	800°C ~ 1700°C ±0.005. t
R-TYPE	0°C ~ 1100°C ±1°C	0°C ~ 600°C ±1.5°C	-
	-	600°C ~ 1600°C ±0.0025. t	-
S-TYPE	0°C ~ 1100°C ±1°C	0°C ~ 600°C ±1.5°C	-
	-	0°C ~ 1600°C ±0.0025. t	-
K-TYPE	-40°C ~ +375°C ±1.5°C	-40°C ~ +333°C ±2.5°C	-167°C ~ +40°C ±2.5°C
	375°C ~ 1000°C ±0.004. t	333°C ~ 1200°C ±0.0075. t	-200°C ~ -167°C ±0.015. t
N-TYPE	-40°C ~ +375°C ±1.5°C	-40°C ~ +333°C ±2.5°C	-167°C ~ +40°C ±2.5°C
	375°C ~ 1000°C ±0.004. t	333°C ~ 1200°C ±0.0075. t	-200°C ~ -167°C ±0.015. t
E-TYPE	40°C ~ +375°C ±1.5°C	-40°C ~ +333°C ±2.5°C	-167°C ~ +40°C ±2.5°C
	375°C ~ 800°C ±0.004. t	333°C ~ 900°C ±0.0075. t	-200°C ~ -167°C ±0.015. t
J-TYPE	-40°C ~ +375°C ±1.5°C	-40°C ~ +333°C ±2.5°C	-
	375°C ~ 750°C ±0.004. t	333°C ~ 750°C ±0.0075. t	-
T-TYPE	-40°C ~ +125°C ±0.5°C	-40°C ~ +133°C ±1°C	-67°C ~ +40°C ±1°C
	125°C ~ 350°C ±0.004. t	133°C ~ 350°C ±0.0075. t	-200°C ~ -67°C ±0.0015. t

Metal Thermowell

Material	Temperature		Properties
	Normal °C	Highest °C	
SUS304	800	900	Heat-resistant, corrosion-resistant, weak in reducing atmospheres.
SUS304L	800	900	Lower carbon content than SUS304, better corrosion resistance.
SUS316	800	900	Corrosion-resistant material, superior for various media, especially seawater.
SUS316L	800	900	Lower carbon content than SUS316, resists intergranular corrosion. High nickel and chromium content, good high-temperature oxidation resistance.
SUS310S	900	1050	High nickel and chromium content, good high-temperature oxidation resistance, used for heat-resistant steel.
SUS321	900	1000	Contains titanium, good corrosion resistance.
Sandvik-P4(446)	1000	1100	Strong resistance to high temperature corrosion,(not easy to rust) up to 1082°C, resistant to sulfur corrosion.
Sandvik-253MA	900	1100	Excellent anti-oxidation and anti-carbonization performance at high temperatures. High temperature strength does not bend or deform.
INCONEL 600	1000	1200	Excellent corrosion resistance in high temperature oxidation, reducing atmospheres.
INCONEL 800	800	1000	High impact resistance and high temperature oxidation resistance.
Hastelloy B	900	1050	High nickel alloy, excellent heat resistance, corrosion resistance, salt resistance, and nitric acid resistance.
Hastelloy C -276	900	1050	Applicable for high temperature oxidation and reducing oxygen. Good in chlorine gas.
UMCO 50	1000	1200	Contains cobalt, heat shock resistant, wear-resistant material, resistant to sulfur corrosion, high temperature strength.
Titanium	400	1000	Excellent corrosion resistance at low temperatures. But, it is easily oxidized and brittle at high temperatures.
Molybdenum	1500	2000	Suitable for use in vacuum, reducing, and inert gases.

Nonmetal Thermowell

Material	Temperature		Properties
	Normal °C	Highest °C	
Perfluoroalkoxy (PFA)	200	260	Resistant to strong acids and alkalis, excellent electrical properties, no aging issues.
Quartz (SiO2)	1000	1200	Capable of withstanding extreme temperature changes, good thermal conductivity, high temperature resistance, corrosion resistance, relatively poor mechanical strength.
Alumina PT1 (610) 58%	1500	1600	Strong heat resistance, minimal hot softening, better PT2.
Alumina PT2 (610) 55%	1400	1500	Strong heat resistance, minimal hot softening.
Recrystallized Alumina PT0 (710) 99.7%	1600	1800	Excellent corrosion resistance, high thermal strength and good air tightness.
Recrystallized Silicon Carbide (RSiC)	1400	1600	Resistant to rapid cooling and rapid heat, corrosion-resistant, wear-resistant, and poor air tightness.
Recrystallized Beryllium Oxide (BeO)	1800	2000	Resistant to extreme cold and heat, chemically stable.
Sintered Magnesia (MgO)	1800	2200	Excellent corrosion resistance.
Zirconia, ZrO2	1800	2200	Impact resistant, suitable for ultra-high temperature measurement.

Order Information

Thermocouple / RTD

Model :

LSO = Insert Type
LS1 = Screw Type
LS2 = Insert Type
LS3 = Sleeve Type
LS4 = Bayonet Type
LS7 = Aluminum Alloy KS
LS8 = Aluminum Alloy KN
LS9 = Sheath Type

Element: :

K = K (CA)
J = J (IC)
PT = PT 100Ω
R = (PR 13%)
S = (PS 10%)
B = (PB 30%)
T = T

Tube Material :

304
316
Teflon
Ceramic
Titanium

Tube Dia. :

1.6φ	8φ
2.3φ	9.5φ
3.2φ	12.7φ
4.8φ	13.8φ
5.0φ	15.7φ
6.0φ	17.3φ
6.35φ	20.4φ

Customized
as specific needs

Tube Length :

50L = 50mm
100L = 100mm
150L = 150mm

Customized
as specific needs

Wire Material :

304
Fiberglass
PVC
Teflon
304 + SS Hose

Thread Size :

None	
Sleeve	
1/4"-20UNC	
5/16"-18	
M6	
M8	
M10	
M12	
5/16"-16	
PT 1/8"	PT 1/8"
PT 1/4"	PT 1/4"
PT 3/8"	PT 3/8"
PT 1/2"	PT 1/2"
PT 3/4"	PT 3/4"
PT 1"	PT 1"

Lead Wire Length :

1 M	4 M
2 M	5 M
3 M	6 M

Customized
as specific needs

Junction :

G = Ground
U = Unground
E = Exposed