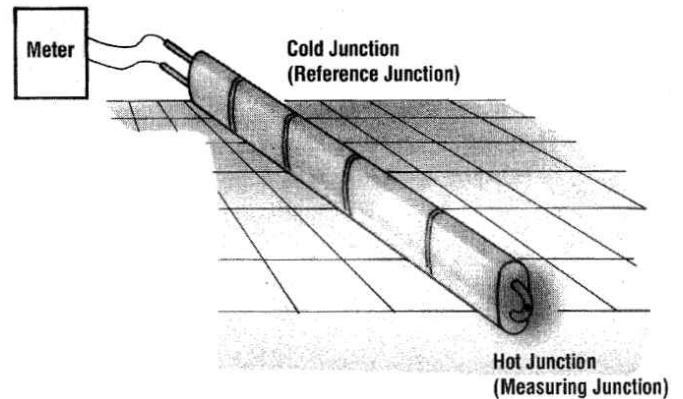


## What is thermocouple ?

### ■ General Description

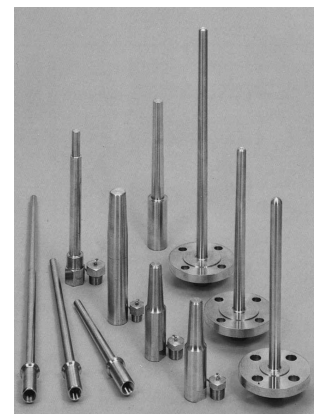
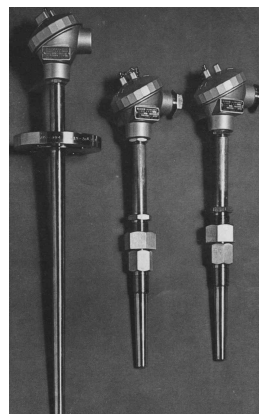
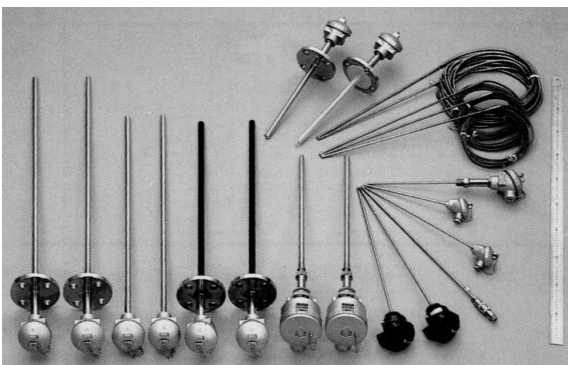
When two dissimilar conductors are connected together to form a closed circuit and the two junctions are kept in different temperatures, thermal electromotive force(EMF) is generated in the circuit (Seebeck's effect). Thus, when one end(cold junctions) is kept constant at a certain temperature, normally at 0°C, and the other end (measuring junction) is exposed to unknown temperature, the temperature at latter end can be determined by measurement of EMF generated so. This combination of two dissimilar metal conductors are called "*Thermocouple*".



### ■ Structure and Measuring Method

Generally, industrial thermocouple is inserted into an insulating tube to prevent short circuit between the element wires and, then inserted into a protection tube so as not to contact directly to the object or surrounding atmosphere.

Reference junction is compensated at a certain temperature (mostly at 0°C) for measurement. The EMF generated so is measured by means of moving-coil type, electronic type, auto-balancing type, potentiometer or other indicating instruments.



SAM HOI INDUSTRIAL CO., LTD.

#48-2, 66-BeonGil, Golden root-Ro, Juchon Myeon, Gimhae-city Gyeongnam, Korea

Tel. +82-55-321-0578 Fax. +82-55-321-0573

E-mail: [shico007@chol.com](mailto:shico007@chol.com) Homepage : [www.shico.co.kr](http://www.shico.co.kr)

# SHICO. SHEATH THERMOCOUPLE

MODEL : STC-TM Series

**Sheathed Thermocouple** is composed of a fine gauged metal shield in which high purity MgO powder tightly and compacted around thermoelement wires.

**Sheathed Thermocouple** has high insulation and pressure resistance. It has also high reliability because of its EMF tolerance within the limits stipulated by JIS (C1602-1981), ANSI, BS, DIN, etc.

## ■ FEATURES

- **Quick Response** : By virtue of its integrated structure composed of thermoelement wires, insulating material and a protection tube, *Sheath Thermocouple* has very quick response to temperature changes.
- **High Flexibility and Mechanical Strength** : With its tightly compacted form. *Sheath Thermocouple* has high mechanical strength and pliability up to bending radius equal to 2 times of the sheath O.D,
- **Excellent Resistance to Heat, Corrosion and pressure** : As high purity MgO powder is tightly compacted in a heat resistant metal tube, Sheat Thermocouple is highly gas-tight, no corrosion from surrounding atmospheres and withstands high pressure up to 500kg/cm<sup>2</sup>
- **Wide Selection of Cable Specifications** : From very fine gauge of 0.25mm to 12.7mm in O.D. and up to 30 meters in length are available. Thermo element wires of 2-pairs and 3-pairs are also available.
- **Wide Range of Measuring Temperature** : From cryogenic -200℃ to high temperature +1,200℃ can measured.



## ■ THERMOCOUPLE REFERENCE TABLE

Type	Name of Material	Application Range
B	Platinum30% Rhodium(+) / Platinum 6% Rhodium (-)	2500~3100F (1370~1700℃)
C	W5Re Tungsten 5% Rhenium (+) / W26Re Tungsten 26% Rhenium (-)	3000~4200F (1650~2315℃)
E	Chromel (+) / Constantan (-)	200~1650F (90~900℃)
J	Iron (+) / Constantan (-)	200~1400F (95~760℃)
K	Chromel (+) / Alumel (-)	200~2300F (95~1260℃)
N	Nicrosil (+) / Nisil (-)	1200~2300F (650~1260℃)
R	Platinum 13% Rhodium (+) / Platinum (-)	1600~2640F (870~1450℃)
S	Platinum 10% Rhodium (+) / Platinum (-)	1800~2640F (980~1450℃)
T	Copper (+) / Constantan (-)	-330~660F (-200~350℃)



SAM HOI INDUSTRIAL CO., LTD.

#48-2, 66-BeonGil, Golden root-Ro, Juchon Myeon, Gimhae-city Gyeongnam, Korea

Tel. +82-55-321-0578 Fax. +82-55-321-0573

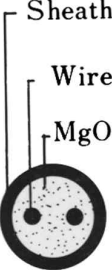


E-mail: shico007@chol.com Homepage : [www.shico.co.kr](http://www.shico.co.kr)

E-2

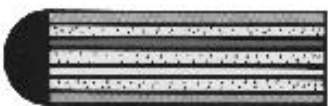
# SHICO. SHEATH THERMOCOUPLE

MODEL : STC-TM Series

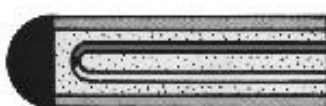
## ■ TYPE & SIZE OF SHEATH

	Nom. O.D(mm)	Wire Dia. (mm)	Wall Thick.(mm)	Type	Sheath Material	Max. Length(mm)	Weight (g/m)
 <p>Single Pair</p>	0.25	0.04	0.05	K	INCONEL 600		
	0.5	0.09	0.09	KEJ	INCONEL 600 SUS304. SUS321. SUS316. SUS310		
	1.0	0.18	0.15	KEJT	INCONEL 600 SUS304. SUS321. SUS316. SUS310		
	1.6	0.28	0.23	KEJT	INCONEL 600 SUS304. SUS321. SUS316. SUS310		
	2.2	0.40	0.33	KEJT	INCONEL 600 SUS304. SUS321. SUS316. SUS310		
	3.2	0.58	0.48	KEJT	INCONEL 600, Cupro-nickel, Hastelloy X SUS304. SUS321. SUS316. SUS310		
	4.8	0.84	0.71	KEJT	INCONEL 600, Cupro-nickel, Hastelloy X SUS304. SUS321. SUS316. SUS310		
	6.4	1.12	0.94	KEJT	INCONEL 600, Cupro-nickel, Hastelloy X SUS304. SUS321. SUS316. SUS310		
	8.0	1.37	1.17	KEJT	INCONEL 600, Cupro-nickel, Hastelloy X SUS304. SUS321. SUS316. SUS310		
 <p>Dual Pair</p>	1.6	0.23	0.23	KEJT	INCONEL 600 SUS304. SUS321. SUS316. SUS310		
	2.2	0.33	0.33	KEJT	INCONEL 600 SUS304. SUS321. SUS316. SUS310		
	3.2	0.46	0.48	KEJT	INCONEL 600 SUS304. SUS321. SUS316. SUS310		
	4.8	0.71	0.74	KEJT	INCONEL 600, Cupro-nickel, Hastelloy X SUS304. SUS321. SUS316. SUS310		
	6.4	0.94	1.02	KEJT	INCONEL 600, Cupro-nickel, Hastelloy X SUS304. SUS321. SUS316. SUS310		
	8.0	1.24	1.24	KEJT	INCONEL 600, Cupro-nickel, Hastelloy X SUS304. SUS321. SUS316. SUS310		
 <p>Triple Pair</p>	3.2	0.28	0.33	KEJT	INCONEL 600 SUS304, SUS321, SUS316, SUS310, SUS446		
	4.8	0.38	0.46	KEJT	INCONEL 600 SUS304, SUS321, SUS316, SUS310, SUS446		
	6.4	0.48	0.64	KEJT	INCONEL 600 SUS304, SUS316, SUS310, SUS446		
	8.0	0.61	0.79	KEJT	INCONEL 600 SUS304, SUS316, SUS310, SUS446		

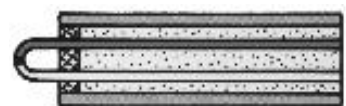
## ■ HOT JUNCTIONS OF SHEATH



Type I (Grounded)



Type II (Ungrounded)



Type III (Exposed)

## SAM HOI INDUSTRIAL CO., LTD.

#48-2, 66-BeonGil, Golden root-Ro, Juchon Myeon, Gimhae-city Gyeongnam, Korea

Tel. +82-55-321-0578 Fax. +82-55-321-0573




E-mail: shico007@chol.com Homepage : [www.shico.co.kr](http://www.shico.co.kr)



# SHICO. SHEATH THERMOCOUPLE

MODEL : STC-TM Series

## ■ NOMINAL LOOP RESISTANCE

	Nom. O.D.(mm)	Wire Dia.(mm)	K	E	J	T
	0.25	0.04	600.0	-	-	-
	0.5	0.09	152.5	191.9	106.3	-
	1.0	0.18	38.6	48.6	26.4	22.2
	1.6	0.28	15.5	19.6	10.7	9.1
	2.2	0.40	8.1	10.5	5.6	4.7
	3.2	0.58	3.9	5.5	2.7	2.3
	4.8	0.84	1.8	2.3	1.3	1.0
	6.4	1.12	1.1	1.3	-	-
	8.0	1.37	0.7	0.8	0.5	0.4
	1.6	0.23	21.0	28.7	14.11	12.3
	2.2	0.33	10.7	-	7.4	6.3
	3.2	0.46	5.9	7.2	3.8	2.8
	4.8	0.71	2.5	2.9	1.5	1.1
	6.4	0.94	1.6	1.7	1.0	0.7
	8.0	1.24	1.0	1.1	0.6	0.5
	3.2	0.28	26.8	-	-	-
	4.8	0.38	11.9	-	-	-
	6.4	0.48	6.7	-	-	-
	8.0	0.61	4.3	-	-	-

## ■ ANALYSIS OF SHEATH MATERIAL

Sheath	C	Si	Mn	P	S	Ni	Cr	Mo	Other
Inconel-600	< 0.15	< 0.5	< 1.0						Fe 6~10 Cu < 0.5
SUS304	< 0.08	< 0.75	< 2.0						
SUS321	< 0.08	< 0.75	< 2.0						Ti 5×Cmin
SUS316	< 0.08	< 0.75							
SUS310	< 0.15	< 0.75							
SUS446	< 0.2	< 0.75							N < 0.1~0.25
Cupro-nickel	-	-							Fe < 1.0 Zn < 1.0 Cu Bal
Hastelloy X	-	-							Fe 18.5 Co 1.5 W 0.6
Nicrosil	< 0.03	1.4							Fe 0.1

## ■ INSULATING MATERIAL

### ■ PURITY

Composit Grade	MgO	SiO <sub>2</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	B	Cd	S	C
Standard	96.3~97.3	1.45~2.06	0.73~1.25	0.16~0.30	0.06~0.30	85~1,000ppm	<10ppm	<50ppm	<200ppm
High Purity	99.47~99.72	0.142~0.14	0.14~0.21	0.034~0.104	0.30~0.08	10~20ppm	<10ppm	<50ppm	<200ppm

### ■ PHYSICAL PROPERTIES

Insulating Material	Melting Point(°C)	Resistivity		Coeff. of thermal expansion(E)°C <sup>-1</sup>		Thermal Conductivity(°C) Cal·sec <sup>-1</sup> ·cm <sup>-2</sup> ·cm <sup>-1</sup> ·°C <sup>-1</sup>			Moh's Hardness	Density g·cm <sup>-3</sup>
		°C	Ω·cm	°C	E×10 <sup>-7</sup>	°C	Porsity	C×10 <sup>4</sup>		
MgO	2,800	980	3×10 <sup>7</sup>	20~1,400	140	1,200	22	61	6	3.58

## SAM HOI INDUSTRIAL CO., LTD.

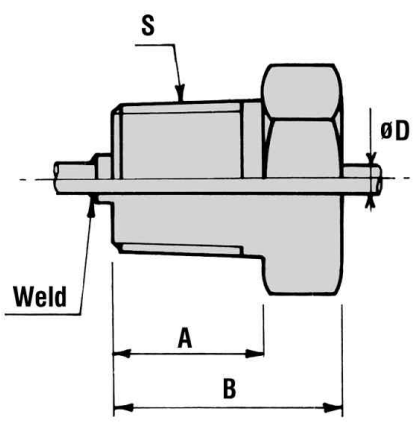
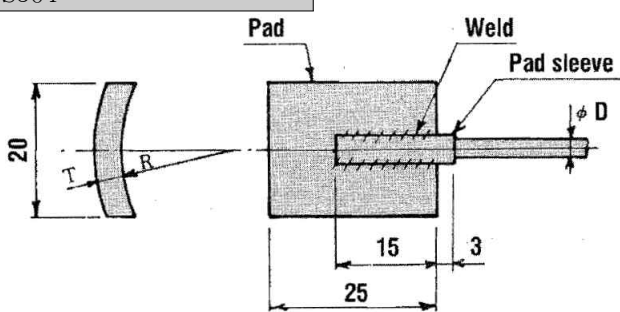


#48-2, 66-BeonGil, Golden root-Ro, Juchon Myeon, Gimhae-city Gyeongnam, Korea  
 Tel. +82-55-321-0578 Fax. +82-55-321-0573  
 E-mail: shico007@chol.com Homepage : [www.shico.co.kr](http://www.shico.co.kr)

# SHICO. SHEATH THERMOCOUPLE

MODEL : STC-TM Series

## STANDARD ACCESSORIES

1. Bushing(fixed) SUS304		ØD	TYPE	S	A	B							
	1.0	1.0	BN 101	PT $\frac{1}{8}$	10	16							
	1.6	1.6	BN 161	PT $\frac{1}{8}$	10	16							
	2.2	2.2	BN 221	PT $\frac{1}{8}$	10	16							
	3.2			BN 321	PT $\frac{1}{8}$	10	16						
				BN 322	PT $\frac{1}{4}$	12	20						
				BN 324	PT $\frac{1}{2}$	20	30						
	4.8			BN 481	PT $\frac{1}{8}$	10	16						
				BN 482	PT $\frac{1}{4}$	12	20						
				BN 484	PT $\frac{1}{2}$	20	35						
				BN 486	PT $\frac{3}{4}$	20	35						
	6.4			BN 642	PT $\frac{1}{4}$	12	20						
				BN 644	PT $\frac{1}{2}$	20	35						
				BN 646	PT $\frac{3}{4}$	20	35						
	8.0			BN 802	PT $\frac{1}{4}$	12	20						
				BN 804	PT $\frac{1}{2}$	20	35						
			BN 806	PT $\frac{3}{4}$	20	35							
2. Compression Fitting SUS304		1.0	CF 101	PT $\frac{1}{8}$	10	33							
1.6			CF 161	PT $\frac{1}{8}$	10	33							
			CF 162	PT $\frac{1}{4}$	12	35							
2.2			CF 221	PT $\frac{1}{8}$	10	33							
			CF 222	PT $\frac{1}{4}$	12	35							
3.2			CF 321	PT $\frac{1}{8}$	10	33							
			CF 322	PT $\frac{1}{4}$	12	35							
			CF 324	PT $\frac{1}{2}$	20	59							
			CF 326	PT $\frac{3}{4}$	20	59							
4.8			CF 481	PT $\frac{1}{8}$	10	33							
			CF 482	PT $\frac{1}{4}$	12	35							
			CF 484	PT $\frac{1}{2}$	20	59							
			CF 486	PT $\frac{3}{4}$	20	59							
6.4			CF 642	PT $\frac{1}{4}$	12	35							
			CF 644	PT $\frac{1}{2}$	20	59							
			CF 646	PT $\frac{3}{4}$	20	59							
8.0			CF 802	PT $\frac{1}{4}$	12	35							
			CF 804	PT $\frac{1}{2}$	20	59							
			CF 806	PT $\frac{3}{4}$	20	59							
3. Pad SUS304		<table border="1"> <thead> <tr> <th>ØD</th> <th>T</th> </tr> </thead> <tbody> <tr> <td>3.2</td> <td>4</td> </tr> <tr> <td>4.8</td> <td>5</td> </tr> </tbody> </table>		ØD	T	3.2	4	4.8	5				
ØD	T												
3.2	4												
4.8	5												
		<p>Note : Specify "R" when ordering However, in case R≥50mm, it will be made as 'Flat'.</p>											

SAM HOI INDUSTRIAL CO., LTD.



#48-2, 66-BeonGil, Golden root-Ro, Juchon Myeon, Gimhae-city Gyeongnam, Korea

Tel. +82-55-321-0578 Fax. +82-55-321-0573

E-mail: shico007@chol.com Homepage : [www.shico.co.kr](http://www.shico.co.kr)

E-5



# SHICO. SHEATH THERMOCOUPLE

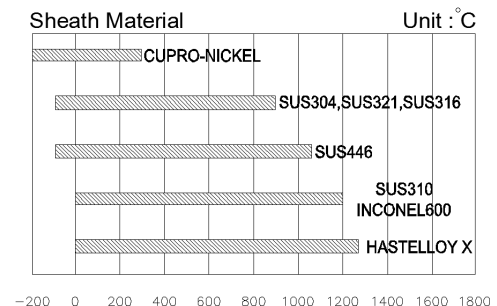
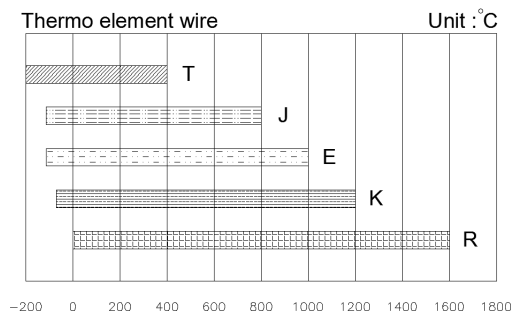
MODEL : STC-TM Series

## ■ TERMINAL BOXES

Other entry threads of PT, NPT or Metrics can be specified.

Type	Weather Proof W	Weather Proof WS	Exposed Terminal GT
Material : Conduit CONN : No. of Terminals : Terminal Block : Surface Finish : Surface Color :	Al-alloy diecast. Cast Iron PF $\frac{1}{2}$ -PF $\frac{3}{4}$ 2, 3, 4, 6 Bakelite-Ceramic Melamin baked Metallic Silver	Al-alloy diecast. Phenol Resin PF $\frac{3}{8}$ 2, 3 Bakelite-Ceramic Melamin baked Metallic Silver	Al-alloy die cast - 2 Bakelite-Ceramic Melamin baked Metallic Silver
Dimensions			
Type	*Flame Proof E(ExdII CT5)	Two Way Entry ET	Dual Cable Entry WD
Material : Conduit CONN : No. of Terminals : Terminal Block : Surface Finish : Surface Color :	Al-alloy diecast. Cast Iron, SUS M16, 20 25 2, 3, 4, 6 Bakelite-Ceramic Melamin baked Metallic Silver	Al-alloy diecast. Phenol Resin PF $\frac{1}{2}$ ×2 4, 6 Bakelite-Ceramic Melamin baked Metallic Silver	Al-alloy diecast PF $\frac{1}{2}$ ×2 4, 6 Bakelite-Ceramic Melamin baked Metallic Silver
Dimensions			

## ■ MEASURING RANGE



## ■ INSULATING MATERIAL OF SHEATH

### Purity

Grade \ Composit	MgO	SiO <sub>2</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	B	Cd	S	C
Standard	96.3~97.3	1.45~2.06	0.73~1.25	0.16~0.30	0.06~0.30	85~1,000ppm	<10ppm	<50ppm	<200ppm
High Purity	99.47~99.72	0.042~0.14	0.14~0.21	0.034~0.104	0.30~0.08	10~20ppm	<10ppm	<50ppm	<200ppm

## SAM HOI INDUSTRIAL CO., LTD.



#48-2, 66-BeonGil, Golden root-Ro, Juchon Myeon, Gimhae-city Gyeongnam, Korea

Tel. +82-55-321-0578 Fax. +82-55-321-0573

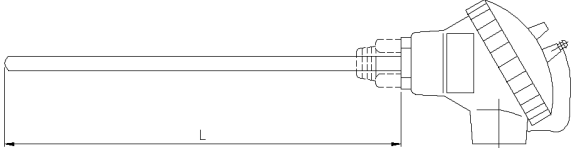
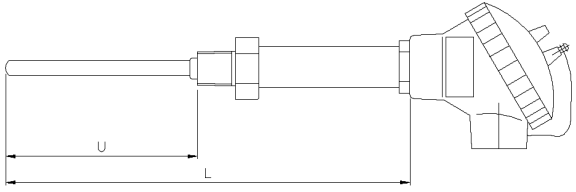
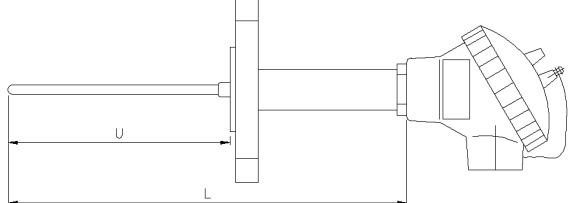
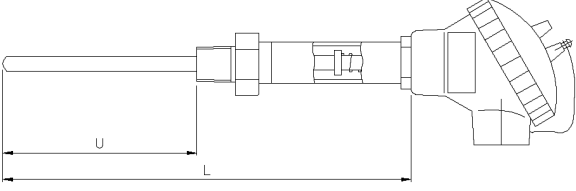
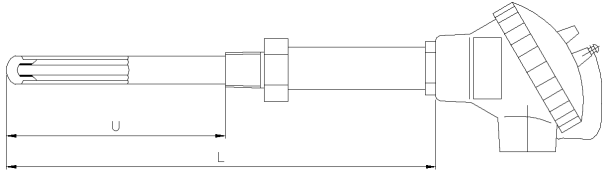
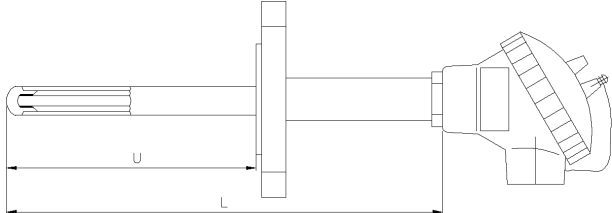
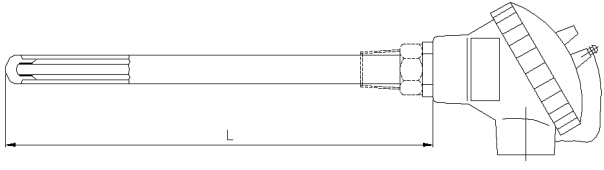
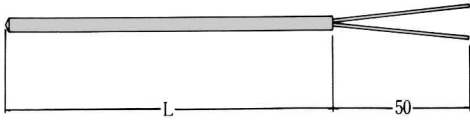
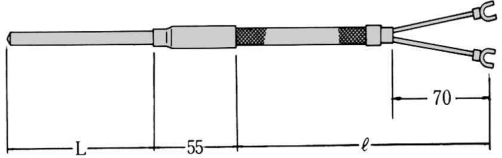
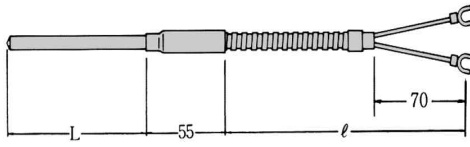
E-mail: shico007@chol.com Homepage : [www.shico.co.kr](http://www.shico.co.kr)

E-6

# SHICO. SHEATH THERMOCOUPLE

MODEL : STC-TM Series

## ■ STANDARD MODEL OF SHEATH THERMOCOUPLE ASSEMBLY (Weather Proof, General type)

<p>STC-TM-H, Basic Type with Terminal Head</p> 	<p>STC-TM-NB, Screwed-in Type</p> 
<p>STC-TM-NF, Flanged Type</p> 	<p>STC-TM-NS, Spring-Loaded Type (Screwed)</p> 
<p>STC-TM-PB, Metal Protection Tube Type (Screwed)</p> 	<p>STC-TM-PF, Metal Protection Type (Flanged)</p> 
<p>STC-TM-P, Metal Protection Tube Type</p> 	<p>STC-TM-A, Basic Type, Projecting Conductors</p> 
<p>STC-TM-B, Flexible Lead Type</p> 	<p>STC-TM-BF Armoured Lead Type</p> 



SAM HOI INDUSTRIAL CO., LTD.

#48-2, 66-BeonGil, Golden root-Ro, Juchon Myeon, Gimhae-city Gyeongnam, Korea

Tel. +82-55-321-0578 Fax. +82-55-321-0573

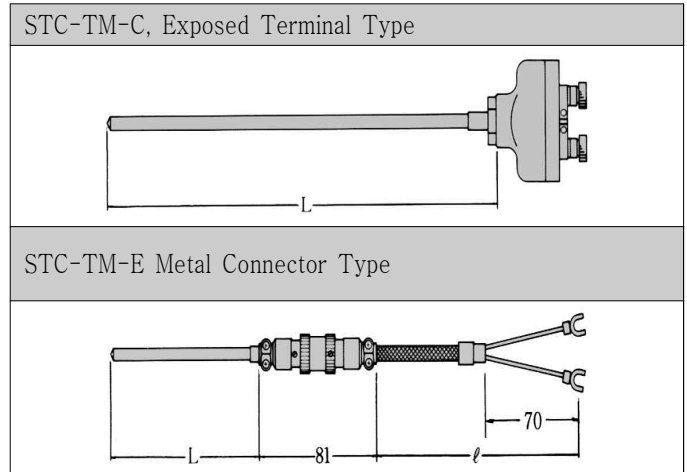
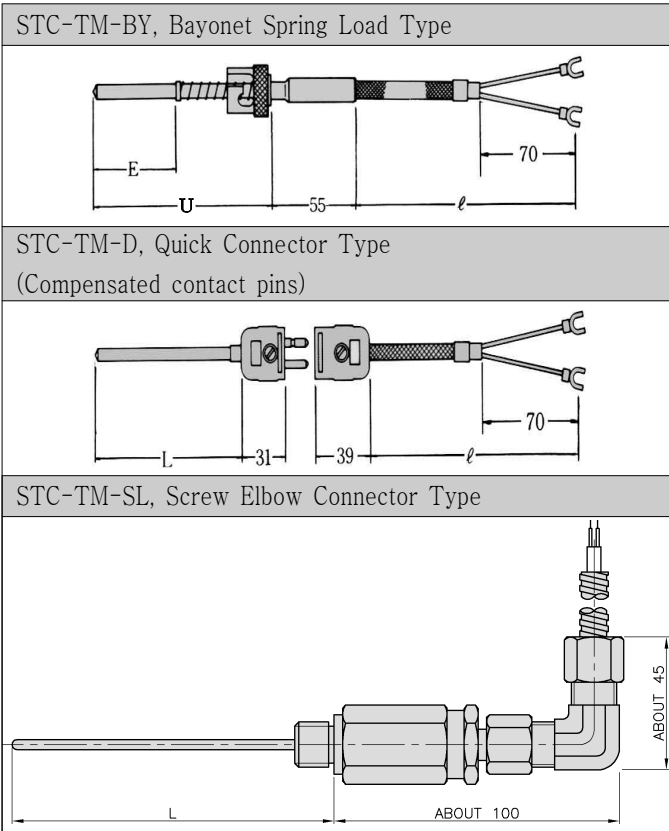
E-mail: shico007@chol.com Homepage : [www.shico.co.kr](http://www.shico.co.kr)

E-7

# SHICO. SHEATH THERMOCOUPLE

MODEL : STC-TM Series

(Weather Proof, General type)



## ■ INSTALLATION

- The Sheath Thermocouple should be connected with bolt and nuts made by each size separately.
- The cables extracted from cables inserted in the The Sheath Thermocouple are connected to the junction box and they are connected to the Buzzer, Lamp and Power Supply.
- The cables should be connected to the Connection terminal with + and - polarity correctly.

## ■ ORDERING INFORMATION

	STC-TM-H	K(E)	Ø4.8	150 / 250	PT $\frac{1}{2}$	SUS316	W
SAM HOI Thermocouple							
Thermocouple							
Ex) H : Terminal Head							
NF : Flanged Type							
Element Style							
Ex) K, E, J, T							
Sheath Dia(D/A) : 0.25~8.0 or							
User Information							
Insert Length(U) :							
User Information							
Ex) 150mm							
Total Length(L)							
Conn : User Information							
Ex) PT1/2", PT 3/4"							
Flange JIS 10K50A							
Sheath Mat'l							
Ex) SUS304							
Terminal Boxes Type							



SAM HOI INDUSTRIAL CO., LTD.

#48-2, 66-BeonGil, Golden root-Ro, Juchon Myeon, Gimhae-city Gyeongnam, Korea

Tel. +82-55-321-0578 Fax. +82-55-321-0573

E-mail: shico007@chol.com Homepage : [www.shico.co.kr](http://www.shico.co.kr)

E-8