

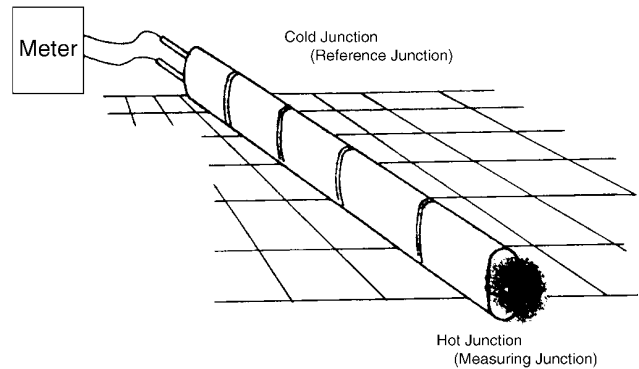
THERMOCOUPLE



Thermocouple (MODEL : DTC)

What is Thermocouple?

When two dissimilar metal 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 junction) 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 so generated. This combination of two dissimilar metal conductors are called "Thermocouple".



Combination of Thermocouple Wires

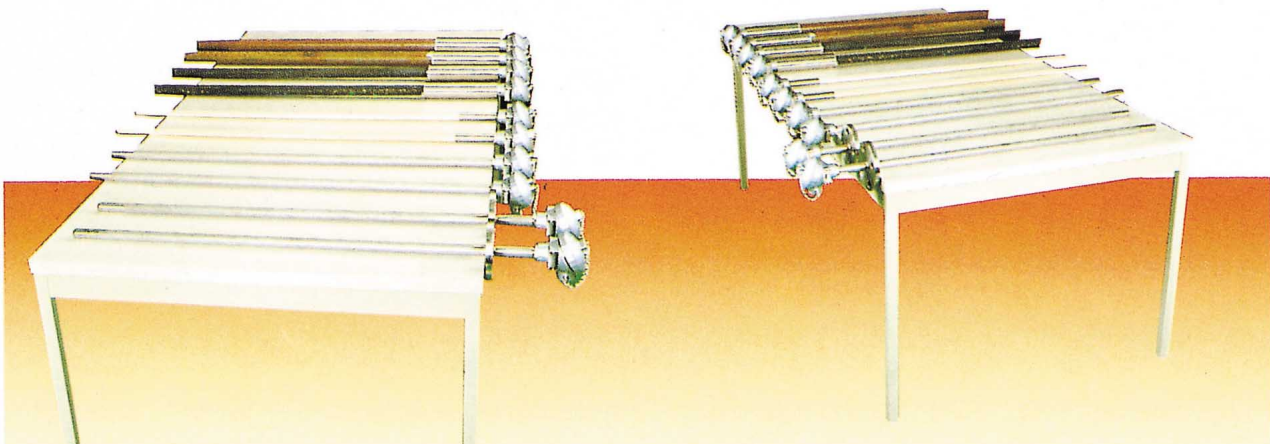
Ref : JIS C 1602-1981

TYPE	OLD JIS TYPE	COMBINATION OF ELEMENT WIRES	
		Positive (+) Leg	Negative (-) Leg
B	-	70% Platinum • 30% Rhodium	94% Platinum • 6% Rhodium
R	PR*	87% Platinum • 13% Rhodium	100% Platinum
S	-	90% Platinum • 10% Rhodium	100% Platinum
K	CA	Chromel** (90% Ni • 10% Cr)	Alumel** (95% Ni • 2% Mn • 2% Al)
E	CRC	Chromel** (90% Ni • 10% Cr)	Constantan (55% Cu • 45% Ni)
J	IC	99.5% Iron	Constantan (55% Cu • 45% Ni)
T	CC	100% Copper	Constantan (55% Cu • 45% Ni)
N	-	Nicrosil (84% Ni • 14.2% Cr • 1.45% Si)	Nisil (95% Ni • 4.4% Si • 0.15% Mg)

Note : * Old type Pr dose not correspond to the present type R because of different content of rhodium in positive (+) leg.
 ** Chromel and Alumel are registered trade marks by Hoskins Mfg. Co., U.S.A.

Precautions in Practical Applications

Since there are various types of thermocouples, it is most important to select the appropriate thermocouple for the specific application. In addition, care should be given to the selection of protection tube, structure and fitting method with due consideration of resistance to heat, corrosion and vibration.



THERMOCOULPE



Standard Dimensions of Protection Tubes

Metallic Tubes

Unit : mm

Material	Nominal O.D.	Nominal I.D.	Length
304 S.S.	10	8	500~1,000
304L S.S.	* 13.8	9.4	500~1,500
316 S.S.	15	11	500~1,500
316L S.S.	* 17.3	12.7	500~4,000
310 S.S.	* 22	16	500~4,000
309 S.S.	* 27	21	500~4,000
321 S.S.			
Inconel 600			

Note : * Scheduled tubes.

Unit : mm

Material	Nominal O.D.	Nominal I.D.	Length
50Co-30Cr	22	16	500~4,000
446 S.S.	27	21	500~4,000
80Ni-20Cr			

Only 22mm and 27mm O.D tubes are available for 446 S.S., 50Co-30Cr and 80Ni 20Cr

Non - Metallic Tubes

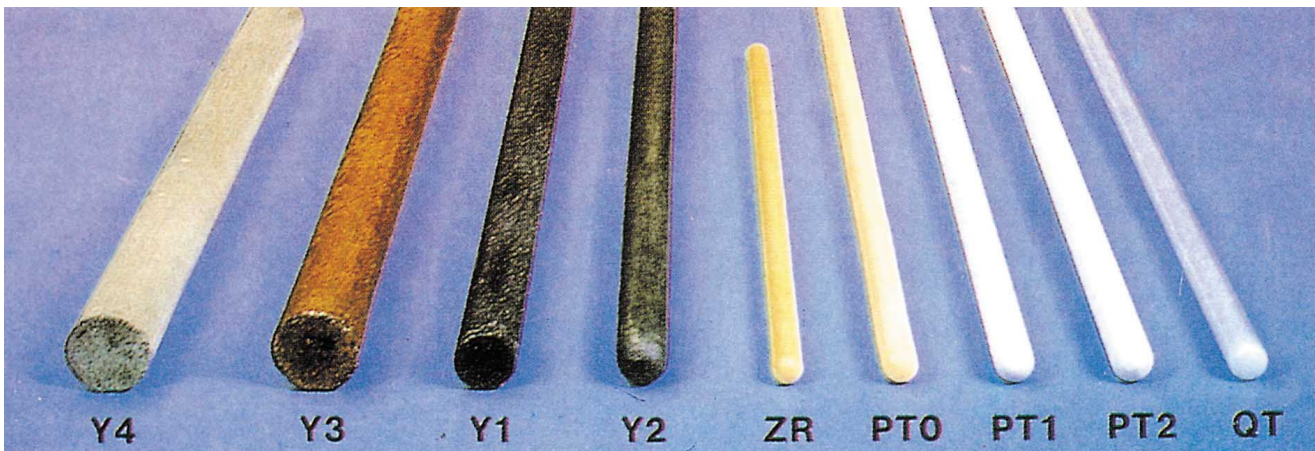
Unit : mm

Material	Nominal O.D.	Nominal I.D.	Length
PT1 PT2	6	4	150~1,400
	8	5	300~3,000
	10	6	300~3,000
	13	9	500~3,000
	15	11	500~3,000
	17	13	500~3,000
	21	16	500~3,000
	25	20	500~3,000
PT0 (Alumina coated type also available)	6	4	300~1,400
	8	5	300~3,000
	10	6	300~3,000
	13	9	500~3,000
	15	11	500~3,000
	17	13	500~3,000
	21	16	500~3,000
	25	20	500~3,000

Unit : mm

Material	Nominal O.D.	Nominal I.D.	Length
Q.T	8.5	6	100~1,000
	15	12	100~2,000
	18	15.5	100~2,000
LT	22	15	500~900
Y1	25	17	1,000~1,400
	30	15	1,000~1,700
	35	25	1,000~1,800
Y2	25	12	150~900
Y3	40	20	400~1,000
Y4	40	20	400~1,000
2040	8	5	600
ZR1706	10	6	500
	6	4	500

Non - Metallic Protection Tubes



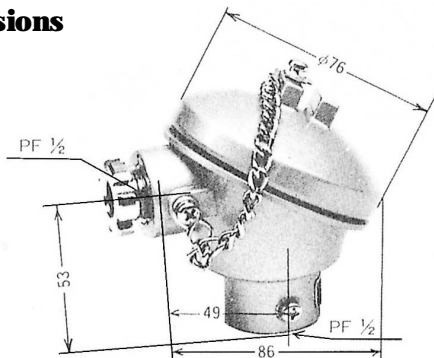
THERMOCOULPE



Terminal Box

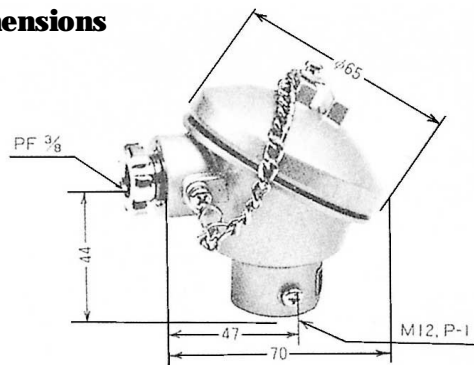
Type	Weather Proof SN
Material	Al-alloy diecast, Cast Iron
Conduit Dia.	PF 1/2 • PF 3/4
No. of Terminal	2 • 3 • 4 • 6
Terminal Block	Bakelite, Ceramic
Surface Finish	Melamine baked
Surface Color	Metallic silver

Dimensions



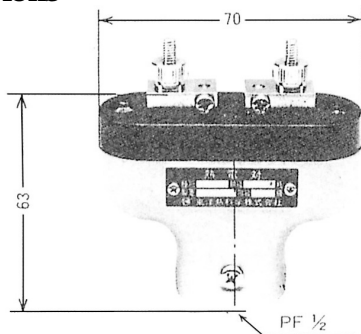
Type	Weather Proof SS
Material	Al-alloy diecast, Phenol Resin
Conduit Dia.	PF 3/8
No. of Terminal	2 • 3
Terminal Block	Bakelite, Ceramic
Surface Finish	Melamine baked
Surface Color	Metallic silver

Dimensions



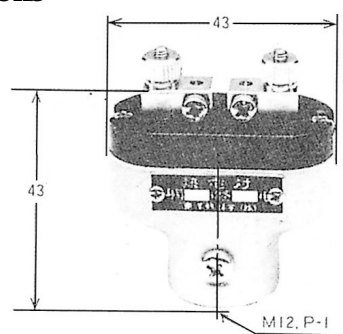
Type	Wall Mount SW
Material	Al-alloy diecast
Conduit Dia.	PF 1/2 • PF 3/4
No. of Terminal	2 • 3 • 4 • 6
Terminal Block	Bakelite, Ceramic
Surface Finish	Melamine baked
Surface Color	Metallic silver

Dimensions



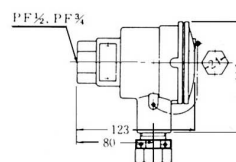
Type	Exposed Terminal SL
Material	Al-alloy diecast
Conduit Dia.	-
No. of Terminal	2
Terminal Block	Bakelite, Ceramic
Surface Finish	Melamine baked
Surface Color	Metallic silver

Dimensions



Type	*Flame Proof KG (d2 G4)
Material	Al-alloy diecast, Cast Iron Stainless Steel
Conduit Dia.	M16 • 20 • 25 • PF 1/2 • PF 3/4
No. of Terminal	2 • 3 • 4 • 6
Terminal Block	Bakelite (Ceramic)
Surface Finish	Melamine baked
Surface Color	Metallic silver

Dimensions



THERMOCOUPLE



Standard Models

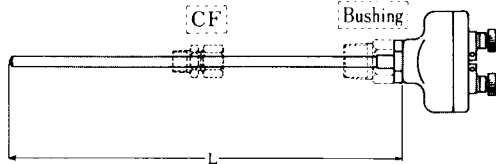
<p>DTC-001 Basic Type with Terminal Box</p> <p>1/2NPT</p> <p>L</p> <p>l</p>	<p>DTC-008 Ceramic Protection Tube Type (Metal Support)</p> <p>L</p> <p>l</p>
<p>DTC-002 Screwed Type</p> <p>L</p> <p>l</p>	<p>DTC-009 Ceramic Protection Tube Type (Flanged)</p> <p>L</p> <p>l</p>
<p>DTC-003 Flanged Type</p> <p>L</p> <p>l</p>	<p>DTC-010 Dual Protection Tube Type (Inner: Ceramic, Outer: Metal)</p> <p>L</p> <p>l</p>
<p>DTC-004 Spring-Loaded Type (Screwed)</p> <p>≈ 10 Spring Return</p> <p>L</p> <p>l</p>	<p>DTC-011 Dual Ceramic protection Tube Type (Metal Support)</p> <p>L</p> <p>l</p>
<p>DTC-005 Metal Protection Tube Type</p> <p>L</p> <p>l</p>	<p>DTC-012 Dual Ceramic Protection Tube Type (Flanged Type I)</p> <p>L</p> <p>l</p>
<p>DTC-006 Metal Protection Tube Type (Screwed)</p> <p>L</p> <p>l</p>	<p>DTC-013 Dual Ceramic protection Tube Type (Flanged Type II)</p> <p>L</p> <p>l</p> <p>E</p>
<p>DTC-007 Metal Protection Tube Type (Flanged)</p> <p>L</p> <p>l</p>	<p>DTC-014 Metal Connector Type</p> <p>CF</p> <p>Bushing</p> <p>L</p> <p>l</p>

THERMOCOUPLE

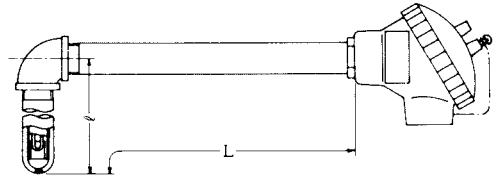


Thermocouple Ordering Information

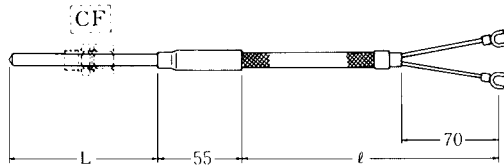
DTC-015 Exposed Terminal Type



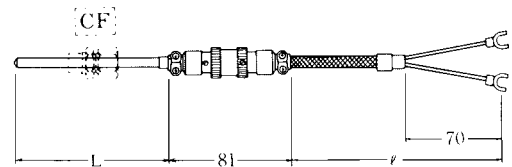
DTC-018 L Type Assembly



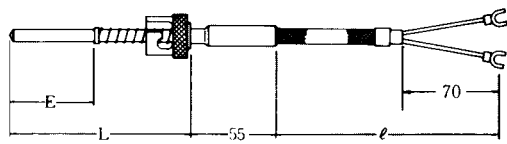
DTC-016 Flexible Lead Type



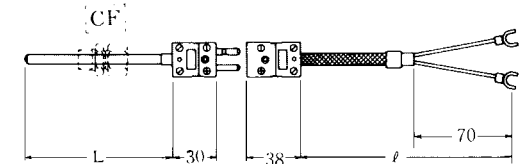
DTC-019 Metal Connector type



DTC-017 Bayonet spring Load Type



DTC-020 Quick Connector Type
(Compensated Contact pins)

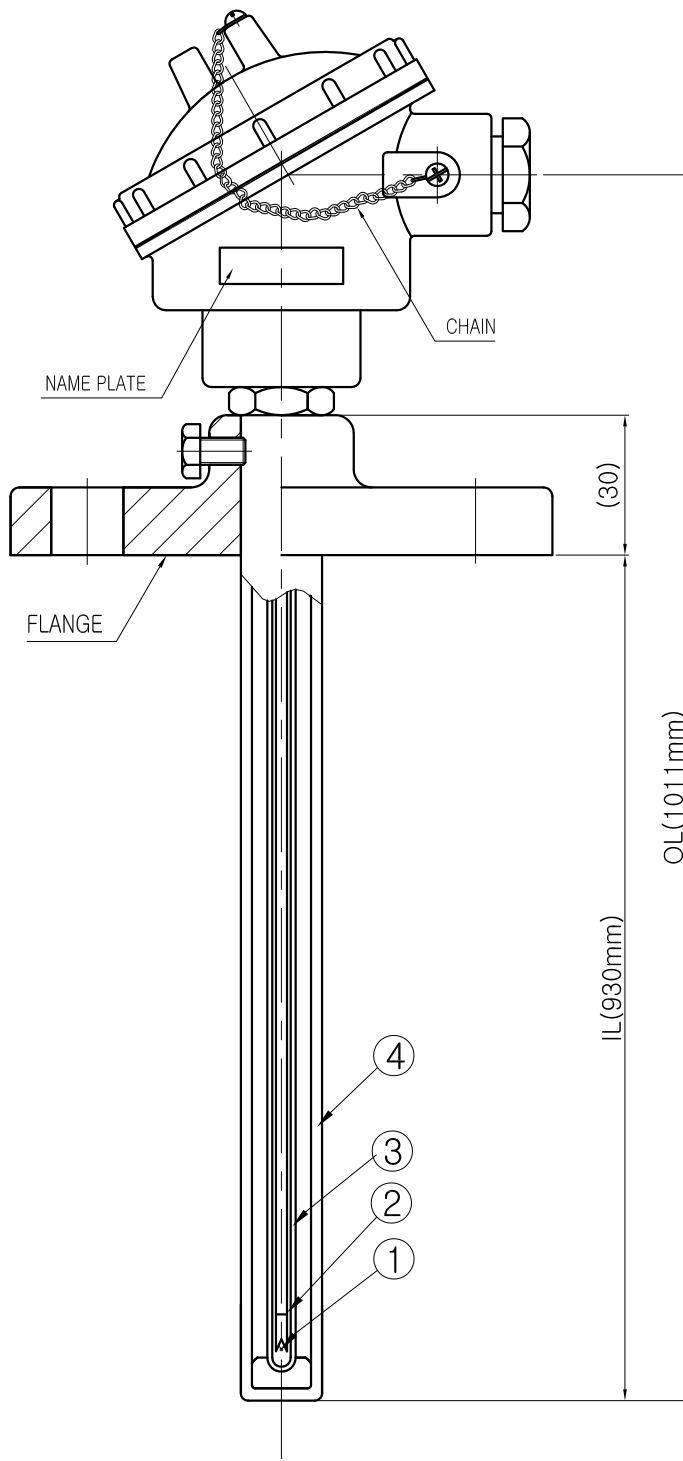


THERMOCOUPLE



Thermocouple Ordering Information

MODELS	SUFFIX CODES	DESCRIPTION
Thermocouple	DTC-001~020 -----	형태를 참고하여 선정
Element	Type and Single or Double -----	K, J, T, E, N, R, S, B ex)K.S = K Type Single E.D = E Type Double
	OP -----	Option
Element Outdia(mm)	□□(직경 직접표기) -----	0.65, 1.0, 1.6, 2.3, 3.2 etc
Protection Tube Material	CS -----	Carbon Steel
	4S(4L) -----	304SS(304L SS)
	6S(6L) -----	316SS(316L SS)
	I6 -----	Inconel600
	P4 -----	446SS
	10 -----	310SS
	AS -----	SSA-S(Al2O3 99%)
	GK -----	GK-SIC
	HB -----	HB(Al2O3 60%)
	OP -----	Option(재질 직접 표기)
Notes : 이중 보호관의 경우 Inner Tube/Outlet Tube를 표기 예)AS/I6 : SSA-S/Inconel600, AS/GK : SSA-S/GK-SIC etc		
Protection Tube Diameter	A-----	8.0mm
	B-----	12.7mm
	C-----	17.3mm
	D-----	21.7mm
	OP -----	Option(직경 직접 표기)
Length(L/I)	□□□-----	직접표기(단위mm)
Mounting Connection	15-----	PT1/2 NPT의 경우 N15
	20-----	PT3/4 NPT의 경우 N20
	25-----	PT1 NPT의 경우 N20
	1025-----	10K 25A Flange
	1040-----	10K 40A Flange
	1050-----	10K 50A Flange
	OP-----	Option(Connection 직접 표기)
Enclosure	W-----	Weather Proof
	E-----	Explosion Proof
Conduit Connection	1-----	PF1/2
	2-----	PF3/4
	OP-----	Option(Connection 직접 표기)
Option	/□□□	



GENERAL SPECIFICATION

1. MODEL : DTC-009-R x 0.5 x INCONEL600 x 22 ϕ x 930/1011 x 10K 32A
2. CONSTRUCTION : WEATHER PROOF
3. HEAD
MATERIAL : ALUMINUM ALLOY
SURFACE COLOR : METALLIC SILVER
4. TERMINAL BLOCK MATERIAL : CERAMIC
5. ELEMENT
 ANSI K ANSI J ANSI E
 ANSI T ANSI B ANSI S
 ANSI R
6. GRADE : 0.25 0.5 0.75
7. ELEMENT WIRE DIAMETER
 0.5 0.65 1.0 1.6 2.3 3.2
8. PROTECTING TUBE MATERIAL OUTLET/INNER
INCONEL600
9. PROTECTING TUBE DIAMETER OUTLET/INNER
 ϕ 22/ ϕ 8
10. FLANGE SIZE, MAT'L : JIS 10K 32A FF 이동식
11. TERMINAL BLOCK
 SINGLE DOUBLE
12. CABLE GRIP
 JIS 15a JIS 15b JIS 15c
 JIS 20a JIS 20b JIS 20c
13. LEAD WIRE
 2WIRE 4WIRE
14. LENGTH OL 1011 (mm)
 IL 930 (mm)

6					
5					
4	OUTLET PROTECTION TUBE		INCONEL600		ϕ 22
3	INNER PROTECTION TUBE		INCONEL600		ϕ 8
2	INSULATOR		INCONEL600		ϕ 4.0
1	ELEMENT		R		0.5
NO.	PART NAME	DESCRIPTION	MAT'L	Q'TY	REMARKS

PARTS LIST

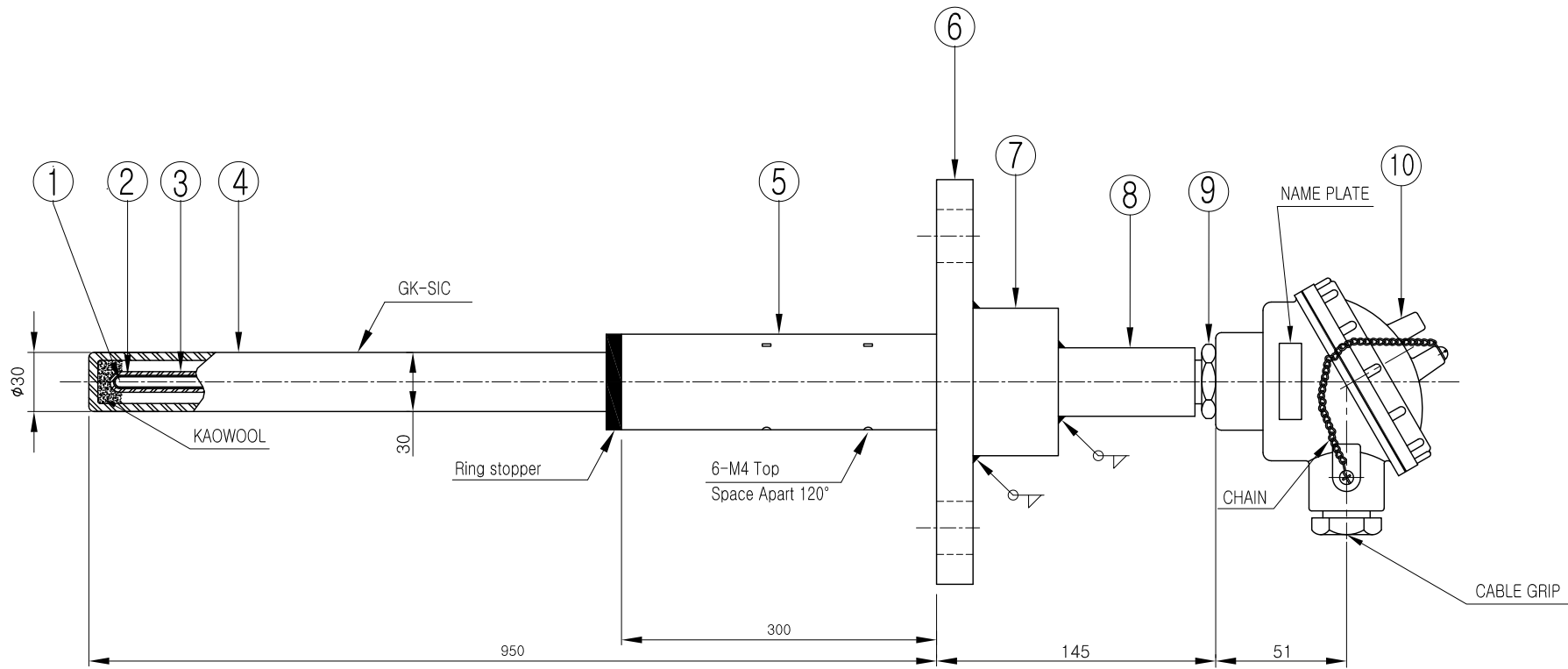
PROJECT NAME					
TITLE THERMOCOUPLE					
DRAWN	CHECKED	REVIEWED	APPROVED	SCALE	REV. No
				N/S	
DATE :		TAG NO		DRAWING NO	
SHEET : OF				DST-002-001.dwg	



DAEHAN INSTRUMENT CO.,LTD.

8 7 6 5 4 3 2 1

F
E
D
C
B
A



Note.

- 1. ELEMENT WIRE : R-TYPE, ϕ 0.5 SINGLE, UNGROUNDED
- 2. GRADE : 0.25 CLASS
- 3. MODEL NO. : DTC-013
- 4. REFERENCE TABLE

NO.	PART NAME	DESCRIPTION	MAT'L	Q'TY	REMARKS
10	HEAD & HEAD COVER		ADC10	1	
9	HEAD CONNECTOR		STS304	1	
8	NIPPLE		STS304	1	
7	FLANGE HUB		STS304	1	
6	FLANGE		STS316	1	NOTE 4
5	SUPPORT		STS446	1	ø42.7
4	OUTLET PROTECTING TUBE			1	NOTE 4
3	INNER PROTECTING TUBE		PT0	1	
2	INSULATION TUBE		P50	1	
1	ELEMENT WIRE		Pt(\leq 0.5)	1	NOTE 1,2

PROJECT NAME					
TITLE					
DRAWN		CHECKED	REVIEWED	APPROVED	SCALE
Kim Jin		Park Il Hwan	Choi Won Hee	Lim Yeong Soo	N/S
DATE : 2013. 1. 29.	TAG NO		DRAWING NO		
SHEET : 1 OF 1	-		-		

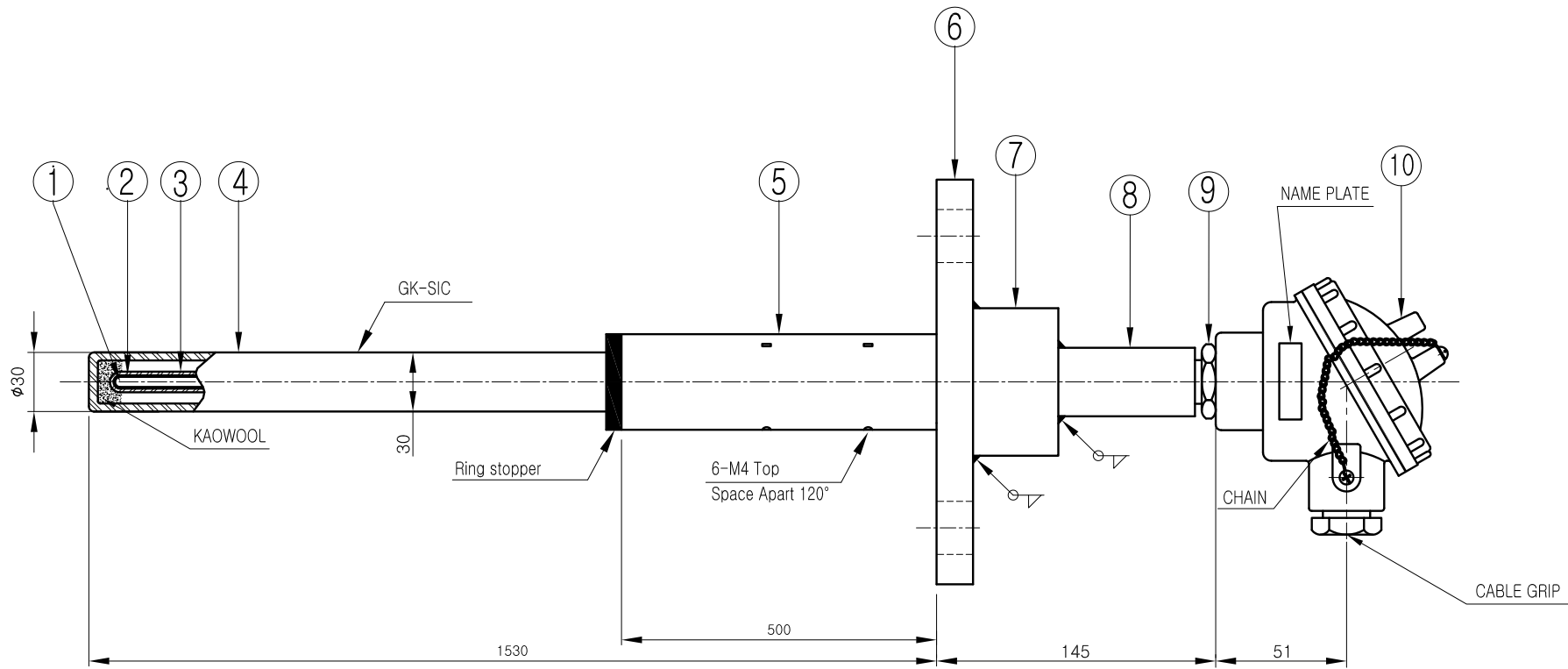


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8 7 6 5 4 3 2 1

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5	SUPPORT		STS446	1	ϕ 42.7
4	OUTLET PROTECTING TUBE			1	NOTE 4
3	INNER PROTECTING TUBE		PT0	1	
2	INSULATION TUBE		P50	1	
1	ELEMENT WIRE		Pt(\pm 0.5)	1	NOTE 1,2

PROJECT NAME					
TITLE					
THERMOCOUPLE					
DRAWN	CHECKED	REVIEWED	APPROVED	SCALE	REV. No
Choi Won Hee	Park Il Hwan	Choi Won Hee	Lim Yeong Soo	N/S	
DATE : 2013. 09. 30.		TAG NO		DRAWING NO	
SHEET : 1 OF 1		-		-	
DAEHAN INSTRUMENT CO.,LTD.					

8 7 6 5 4 3 2 1