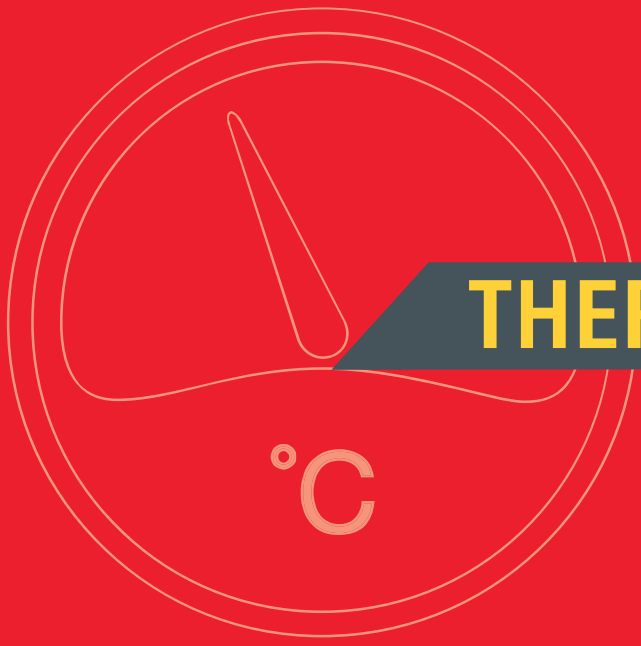
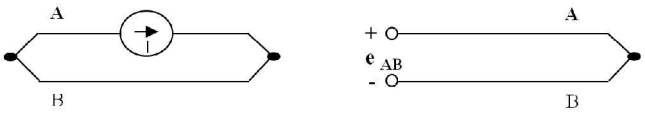


THERMO

Thermocouple Sensor (TC)

Principals of Thermocouple

Thermocouple is consist of 2 different metal or alloys.
One side is welded together and used as hot junction.
When hot junction receives heat and the other side remains read temperature, preferably at 0 °C thermal electromotive force (EMF / mV) is produced.
Temperature at hot junction is determined by EMF



UNGROUNDED
Due to hot junction insulated from sheath, slower response than that of Grounded type to temp. changes, but useable to wide applications due to it' s shielding effects and durability.

GROUNDED
Faster response to temp. Changes, and suitable for measurements at high pressure/temp., but not suitable in harmful electrical conductivity atmospheres.

EXPOSED
Most fastest response time, and used in high humidity atmospheres of up to 200°C, but not suitable in corrosive atmospheres.

Type of Thermocouple

Type	Alloy Composition of The Conductors	
	Positive (+) Leg	Negative (-) Leg
B	BP(70%Platinum - 30%Rhenium)	BN(94%Platinum - 6%Rhenium)
R	RP(87%Platinum - 13%Rhenium)	RN(100%Platinum)
S	RP(90%Platinum - 10%Rhenium)	RN(100%Platinum)
N	NP(84%Ni - 14.2%Cr - 1.45%Si)	NN(95%Ni - 4.4%Si - 0.15Mg)
K	KP(90%Ni - 10%Cr)	KN(90%Ni - 2%Mn - 2%Al)
E	EP(90%Ni - 10%Cr)	EN Constantan (55%Cu - 45%NI)
T	TP(99.5%Iron)	TN Constantan (55%Cu - 45%NI)
J	JP(100%Copper)	JN Constantan (55%Cu - 45%NI)

Type B (600 °C ~ 1700 °C.)	Thermocouple can use up to 1700 °C but EMF below 50 °C is very small output so it is not recommended to use below 100 °C. Precious thermocouple is easily contaminated.
Type R (0 °C ~ 1600 °C.)	Is recommended to use in oxidizing atmosphere. As same as type B & type S, it is easily contaminated. Alumina protection tube is necessary.
Type S (0°C ~ 1600 °C.)	Is used similarly as type R but it has less mechanical strength. Type S is used as the standard scale of melting point of gold (1064.43 °C).
Type N (-200 °C ~ 1250 °C.)	This new type of thermocouple is developed to substitute type K for high temperature. Type N has better stability and oxidation resistance than type K from 600 °C ~ 1000 °C.
Type K (-200 °C ~ 1250 °C.)	This is most widely used thermocouple in industries. It is inexpensive and has wide range of probes. This is suitable for oxidizing atmosphere but rong atmosphere should be avoided.
Type T (-200 °C ~ 350 °C.)	This is suited for low temperature. Because of its stability it is widely used in laboratories.
Type J (0 °C ~ 750 °C.)	This has the high EMF and is good for reducing atmosphere

Thermocouple Sensor (TC)

Tolerances on Temperature Reading

Sheath Thermocouple Standard				
Type		Caassification of Tolerances (JIS C 1605-1995)		
		Class 1	Class 2	Class 3
SN	Temp.	-40° C ~ 375° C	-40° C ~ 333° C	-167° C ~ +40° C
	Tolerances	± 1.5° C	± 2.5° C	± 2.5° C
	Temp.	375° C ~ 1000° C	333° C ~ 1200° C	- 200° C ~ -167° C
	Tolerances	± 0.004•(t)	± 0.0075•(t)	± 0.015•(t)
SK	Temp.	-40° C ~ 375° C	-40° C ~ 333° C	-167° C ~ +40° C
	Tolerances	± 1.5° C	± 2.5° C	± 2.5° C
	Temp.	375° C ~ 1000° C	333° C ~ 1200° C	- 200° C ~ -167° C
	Tolerances	± 0.004•(t)	± 0.0075•(t)	0.015•(t)
SJ	Temp.	-40° C ~ 375° C	-40° C ~ 333° C	-
	Tolerances	± 1.5° C	± 2.5° C	
	Temp.	375° C ~ 750° C	333° C ~ 750° C	-
	Tolerances	± 0.004•(t)	± 0.0075•(t)	
ST	Temp.	- 40° C ~ +125° C	- 40° C ~ +133 ° C	- 67° C ~ +40° C
	Tolerances	± 0.5° C	± 1.0° C	± 1.0° C
	Temp.	125° C ~ 350° C	133° C ~ 350° C	- 200° C ~ -67° C
	Tolerances	± 0.004° C	0.0075•(t)	0.015•(t)

Operating and Maximum Temperature Limist

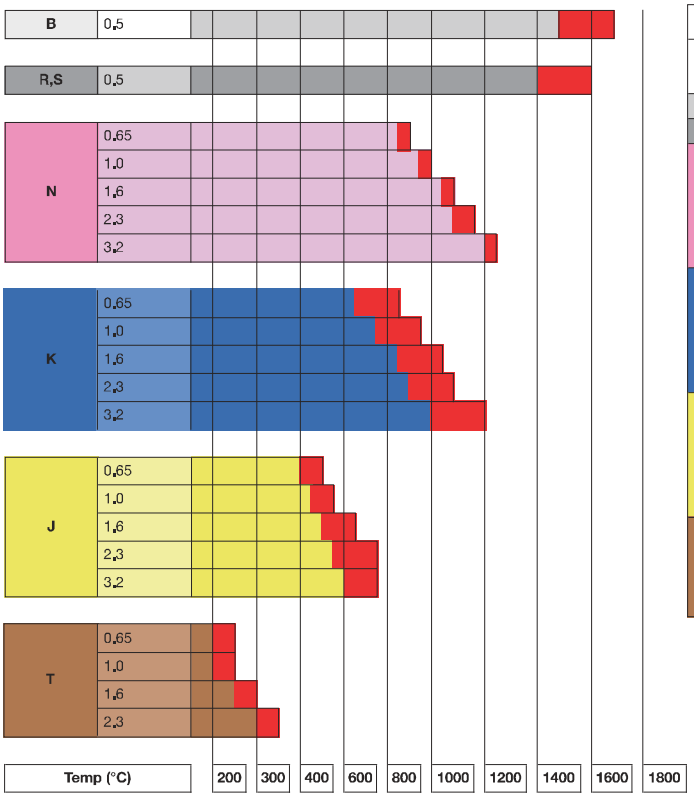
Normal Use Limit of Thermocouple Sheath (JIS C 1605 - 1995)			
Type	Material Sheath	Material Sheath °C	
	Dia. (mm)	Austennite Stainless	Rsistance Super Alloy
SN	0.5	600	
	1.0,1.5(1.6),2.0	650	
	3.0,(3.2)	750	
	4.5,(4.8)	800	900
	6.0,(6.4)	800	1000
	8.0	900	1050
SK	0.5	600	
	1.0,1.5(1.6),2.0	650	
	3.0,(3.2)	750	
	4.5,(4.8)	800	900
	6.0,(6.4)	800	1000
	8.0	900	1050
SJ	0.5	400	
	1.0,1.5(1.6),2.0	450	
	3.0,(3.2)	650	
	4.5,(4.8)	750	
	6.0,(6.4)	750	
	8.0	750	
ST	0.5	300	
	1.0,1.5(1.6),2.0	300	
	3.0,(3.2)	350	
	4.5,(4.8)	350	
	6.0,(6.4)	350	
	8.0	350	

Thermocouple Sensor (TC)

Tolerances on Temperature Reading

Element Thermocouple Standard				
Type		Caassification of Tolerances (JIS C 1602-1995)		
			Class 2	Class 3
B	Temp.	-	-	600° C ~ 800° C
	Tolerances			± 4° C
	Temp.		600° C ~ 1700° C	800° C ~ 1700° C
	Tolerances		± 0.0025•(t)	± 0.005•(t)
R, S	Temp.	1100° C ~ 1600° C	0° C ~ 600° C	-
	Tolerances	± (1+0.003(t-1100)	± 1.5° C	
	Temp.	0° C ~ 1100° C	600° C ~ 1600° C	-
	Tolerances	± 1.0° C	± 0.0025•(t)	
N	Temp.	-40° C ~ 375° C	-40° C ~ 333° C	-160° C ~ 40° C
	Tolerances	± 1.5° C	± 2.5° C	± 2.5° C
	Temp.	375° C ~ 1000° C	333° C ~ 1200° C	-200° C ~ -167° C
	Tolerances	± 0.004•(t)	± 0.0075•(t)	± 0.0015•(t)
K	Temp.	- 40° C ~ +375° C	- 40° C ~ +333 ° C	- 167° C ~ +40° C
	Tolerances	± 1.5° C	± 2.5° C	± 2.5° C
	Temp.	375° C ~ 1000° C	333° C ~ 1200° C	- 200° C ~ -167° C
	Tolerances	± 0.004•(t)	0.0075•(t)	0.015•(t)
J	Temp.	-40° C ~ 375° C	-40° C ~ 333° C	-
	Tolerances	± 1.5° C	± 2.5° C	
	Temp.	375° C ~ 750° C	333° C ~ 750° C	-
	Tolerances	± 0.004•(t)	± 0.0075•(t)	
T	Temp.	-40° C ~ 125° C	-40° C ~ 133° C	-67° C ~ +40° C
	Tolerances	± 0.5° C	± 1.0° C	± 2.5° C
	Temp.	125° C ~ 350° C	133° C ~ 350° C	- 200° C ~ - 67° C
	Tolerances	± 0.004•(t)	± 0.0075•(t)	± 0.015•(t)

Operating and Maximum Temperature Limist



Normal Use Limit of Thermocouple Sheath (JIS C 1605 - 1995)			
Type	Wire Dia. (mm)	Normal Operating Temp, Range (°C)	Max. Temp Limit (°C)
B	0.5	1500	1700
R, S	0.5	1400	1600
N	0.65	850	900
	1.0	950	1000
	1.6	1050	1100
	2.3	1100	1150
	3.2	1200	1250
K	0.65	650	850
	1.0	750	950
	1.6	850	1050
	2.3	900	1100
	3.2	1000	1200
J	0.65	400	500
	1.0	450	550
	1.6	500	650
	2.3	550	750
	3.2	600	750
T	0.32	200	250
	0.65	200	250
	1.0	250	300
	1.6	300	350

Thermocouple Sensor (TC)

Metallic Protection Tubes

Material	Code	Operating Temp °C	Features
SS400	400	Oxi. 600 Red. 800	Good resistance to reducing atmosphere but less resistant to oxidation and acids attack. Thick walled tubes are used in molten aluminium.
304 S.S.	304	980	Widely used as a common protection tube against heat and corrosion but not recommended for use in the presence of sulphur or reducing flame. Subject to stress and "pit" corrosion.
304L S.S.	304L	980	Less carbon content (C=0.3%) than 304 S.S. and better resistance to grain boundary corrosion. Subject to stress and "pit" corrosion.
321 S.S.	321	980	Higher corrosion resistance than 304 S.S. because of its Ti content to prevent carbon preticipation. Excellent resistance to grain boundary corrosion after welding due to less carbon preticipation.
316 S.S.	316	980	Contains Mo and has excellent resistance to corrosives to grain boundary corrosives, heat, acids and alkalis.
316L S.S.	316L	980	Less carbon content than 316 S.S. and has better resistance to grain boundary corrosion. Resistance to "pit" corrosion.
310S S.S.	310S	1000	High Ni-Cr content and good high temperature strength with resistance to oxidation at high temperatures. High mechanical strength.
347 S.S.	347	980	Because of its Nb-Ta content, prevents carbon preticipation. Higher corrosion resistance than 304 S.S. and excellent resistance to grain boundary corrosion.
446 S.S.	446	980	Excellent resistance to oxidizing and reducing flames containing sulphur. Suitable for use in non-ferrous molten metals and other high temperature applications but less mechanical strength.
253 MA	253	1000	Superior oxidation resistance to 310 S.S. at high temperature due to formation of dense and tight oxide layer by silicon and cerium addition.
Inconel 600	600	1050	Excellent resistance to oxidizing and reducing atmospheres at high temperature. But sulphurous atmospheres should. be avoided. Immune to stress and "pit" corrosion
Incoloy 800	800	870	Excellent to high temperature oxidizing atmospheres and thermal shock. About 10 times longer service life than 304 S.S. against high temperature corrosion.
Titanium	TI	Oxi. 250 Red. 1000	Superior corrosion resistance in cryogenic temperatures but at high temperature, easily oxidized and become brittle.

Non-Metallic Protection Tubes

Material	Code	Operating Temp °C	Features
Translucent Quartz Transparent Quartz	QT	1000	99.99% Quartz Excellent to thermal shock but fragile. Poor resistance to alkalis but good to acids. Less gas-tightness in hydrogen and reducing gases. High thermalconductivity.
Recrystallized Aluminam	PT0	1900	99.5%Alumina Superior chemical stability and better than PT1. Recommended for use in molten steel, slag and molten glass, impervious
Mullite	PT1	1600	60%Alumina-40%Silica Sintered alumina. Better than PT2 but slightly less thermal shock resistance. Recommended for use in heating furnace and regenerator, impervious.
Recrystallized Silicon Carbide	SiC	1400	99%SiC Porous but good resistance to acids and alkalis. Recommended for use in air neutral atmospheres up to 1,400°C and also in high temperature stagnant furnace atmosphere as an outer protection tube, etc. Attacked by water vapour.
Silicon Nitride (Si3N4)	Si3N4	1350	Excellent thermal shock resistance. Less corrosion to acids and alkalis. High hardness. Fairly good resistanceagainst most of molten metals.
Zirconia	ZR 1706	1800	MgO Stabilized ZrO2 Gas-tight and exceptionally good thermal shock resistance. Chemically stable against molten metals other than alkalis. Recommended for use in molten special metals, slag and glass up to 1,800°C. Suitable for use in high temp. protection tube up to 1,900°C where PTO Alumina softens.

PT100 Sensor (RTD)

Thermocouple PT100

Principles of RTD

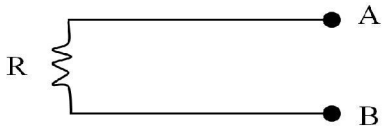
RTD (Resistance temperature detector) is temperature sensor using characteristics of metal which resistance changes acording to temperature.

Platinum (Pt), Copper (Cu) &Nickel (Ni) are used as materials usually. Especially platinum is used widely, because the changing ratio according to temp is big and it is easier to get pure material and it is more stable than others. The current used in RTD are 0.5mA/1mA/2mA. 1mA is used widely. Please choose rated current suitable for your meters.

Wire connection

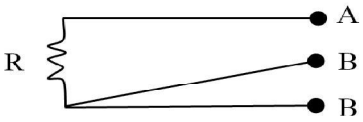
RTD 2 wires

This 2 wires type of RTD is used only where high accuracy is not required. Or Pt1000 which resistance of wiring is too small to effect is suitable for this.



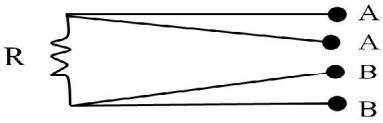
RTD 3 wires

This 3 wires type of RTD is widely used in industrial sections. When resistance of 3 wires are completely same, it can measure temperature without influence by surrounding temperature or long wiring



RTD 4 wires

This 4 wires type of RTD is recommendable for high precision measurement or standard RTD for calibration.

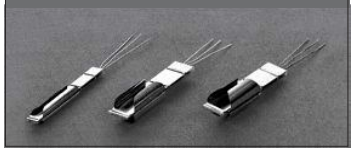


RTD PT100 Type

Thin Film Type

Ceramic Type

Mica Type



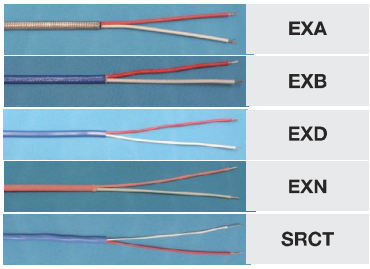
Extension Wire

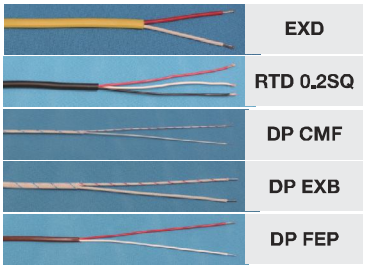
International Thermocouple Color Codes - Thermocouple and Extension Grade Wires

THERMO-COUPLE TYPE	U.S. & CANADIAN (ANSI / MC96.1, ANSI / ASTM E230)				International	International	Czech British	Netherlands German	Japanese	French
	ALLOY COMBINATION	THERMOCOUPLE GRADE	EXTENSION GRADE	PLUG & JACK	IEC 584-3	IEC 584-3 Intrinsically safe	BS 1843	DIN 43710	JIS C 1610	NFC 42-32 4
T	Copper / Constantan (Copper-Nickel)	Brown Blue + Red -	+ Blue Blue - Red	Blue	Brown Brown + White -	Blue Brown + White -	Blue White + Blue -	Brown Red + Brown -	Brown Red + White -	Blue Yellow + Blue -
J	Iron (magnetic) / Constantan (Copper-Nickel)	Brown Blue + Red -	+ Black Black - Red	Black	Black Black + White -	Blue Black + White -	Black Yellow + Blue -	Blue Red + Blue -	Yellow Red + White -	Black Yellow + Black -
E	Nicket - Chromium / Constantan (Copper-Nickel)	Brown Blue + Red -	+ Purple Purple - Red	Purple	Purple Purple + White -	Blue Purple + White -	Brown Brown + Blue -	Black Red + Black -	Purple Red + White -	Purple Yellow + Purple -
K	Nicket - Chromium / Nickel - Aluminium (magnetic)	Brown Blue + Red -	+ Yellow Yellow - Red	Yellow	Green Green + White -	Blue Green + White -	Red Brown + Blue -	Green Red + Green -	Blue Red + White -	Yellow Yellow + Purple -
N	Nicrosil / Nisil (Nickel-Silicon-Magnesium)	Brown Blue + Red -	+ Orange Orange - Red	Orange	Pink Pink + White -	Blue Pink + White -	Orange Orange + Blue -	No Standard (Use American Color Codes)	No Standard (Use American Color Codes)	No Standard (Use American Color Codes)
S	Platinum Rhodium - 10% / Platinum	None Established	+ Black Green - Red	Green	Orange Orange + White -	Blue Orange + White -	Green White + Blue -	White Red + White -	Black Red + White -	Green Yellow + Green -
R	Platinum Rhodium - 13% / Platinum	None Established	+ Black Green - Red	Green	Orange Orange + White -	Blue Orange + White -	Green White + Blue -	White Red + White -	Black Red + White -	Green Yellow + Green -
B	Platinum Rhodium - 30% / Platinum Rhodium - 6%	None Established	+ Gray Gray - Red	White (Uncompensated)	Gray Gray + White -		No Standard (Use Copper Wire)	Gray Red + Gray -	Gray Red + Gray -	No Standard (Use Copper Wire)
C	Tungsten Rhodium - 5% / Tungsten Rhodium - 26%	None Established	+ Green Red - Red	Red				No Standard (Use American Color Codes)	No Standard (Use American Color Codes)	No Standard (Use American Color Codes)

Extension Wire

DP COATING THERMOCOUPLE & LEAD WIRE





Type	Code	Exterior Material	Core Line (Line / mm.)	O.D. (mm.)	Length (M.)
B, S, R, K, J, N, T, E	EXA	Glasswool mesh SUS sealed	7/ 0.3 X 2	2.9 X 4.6	100
	EXB	Glasswool mesh		2.3 X 4.0	
	EXC	Teflon FEP		4.1 X 6.2	
	EXD	Vynil		3.5 X 5.6	
	EXE	Silicon	20/ 0.3 X 2	4.8	

Coating	Type	O.D. (mm.)	Temperrature (°C)
Vinyl VKF	K	0.1	0 - 90
	T	0.2	
	J	0.32	
	E	0.65	
Glass EXB	K	0.1	0 - 250
	T	0.2	
	J	0.32	
	E	0.65 1	
Ceramic CMF	K	0.65 1	1- 1000

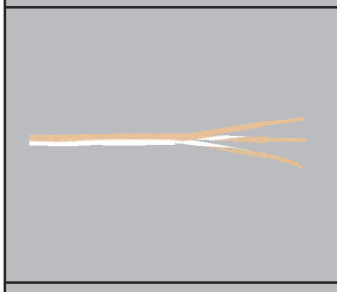
Coating	Type	O.D. (mm.)	Temperrature (°C)
Silica Glass NSBL	K	0.32	0 - 600
	T	0.65	
	J	1	
	E		
Teflon FEP	K	0.1	0 - 200
	T	0.2	
	J	0.32	
	E	0.65	

RTD COMPENSATING WIRE

Image Sample	Description				
	Type	Size	Covering	Max. Temp	Code
	3 Wire	24 Awg	Silicone	250°C	
	6 Wire	24 Awg	Silicone	250°C	
	3 Wire	24 Awg	PVC Black	105°C	
	6 Wire	24 Awg	PVC Black	105°C	
	3 Wire	28 Awg 24 Awg 20 Awg	Teflon	250°C	
	4 Wire	24 Awg	Teflon	250°C	
	6 Wire	24 Awg	Teflon	250°C	
	3 Wire	24 Awg	Teflon/Shield	250°C	
	6 Wire	24 Awg	Teflon/Shield	250°C	
	3 Wire	24 Awg	Glass Fiber/Shield	350°C	
	6 Wire	24 Awg	Glass Fiber/Shield	350°C	

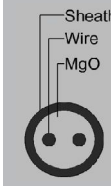
RTD PT100

RTD COMPENSATING WIRE

Image Sample	Description				
	Type	Size	Covering	Max. Temp	Code
	3 Wire	24 Awg	Silicone	250°C	
	6 Wire	24 Awg	Silicone	250°C	
	3 Wire	24 Awg	PVC Black	105°C	
	6 Wire	24 Awg	PVC Black	105°C	
	3 Wire	28 Awg	Teflon	250°C	
		24 Awg			
		20 Awg			
	4 Wire	24 Awg	Teflon	250°C	
	6 Wire	24 Awg	Teflon	250°C	
	3 Wire	24 Awg	Teflon / Shield	250°C	
	6 Wire	24 Awg	Teflon / Shield	250°C	
	3 Wire	24 Awg	Glass Fiber / Shield	350°C	
	6 Wire	24 Awg	Glass Fiber / Shield	350°C	

Accessories

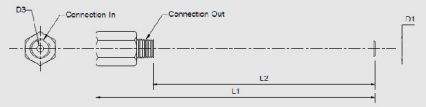
Sheath Thermocouple

	Nom. OD. (mm)	Wire Dia. (mm)	Wall Thick. (mm)	Type	Standard Sheath Material
Single Pair 	0.5	0.10	0.08	K, T, J, N	316LSS, 310SS, INCONEL 600
	1.0	0.18	0.13	K, T, J, N	316LSS, 310SS, INCONEL 600
	1.6	0.25	0.18	K, T, J, N	316LSS, 310SS, INCONEL 600
	2.3	0.36	0.25	K, T, J, N	316LSS, 310SS, INCONEL 600
	3.2	0.53	0.36	K, T, J, N	316LSS, 310SS, INCONEL 600
	4.8	0.79	0.53	K, T, J, N	316LSS, 310SS, INCONEL 600
	6.4	1.04	0.74	K, T, J, N	316LSS, 310SS, INCONEL 600
	8.0	1.30	0.91	K, T, J, N	316LSS, 310SS, INCONEL 600
Double Pair 	3.2	0.48	0.36	K, T, J, N	316LSS, 310SS, INCONEL 600
	4.8	0.74	0.53	K, T, J, N	316LSS, 310SS, INCONEL 600
	6.4	0.97	0.74	K, T, J, N	316LSS, 310SS, INCONEL 600
	8.0	1.22	0.97	K, T, J, N	316LSS, 310SS, INCONEL 600

Thermo Well

Thermo Well Standard Size

• TW1



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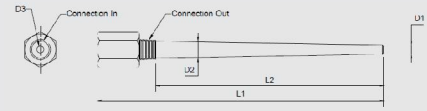

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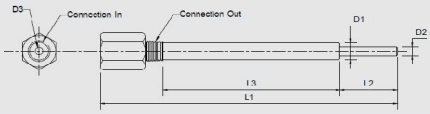

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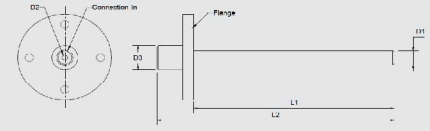

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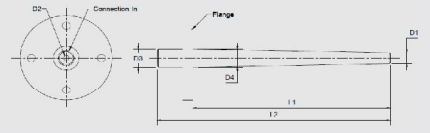
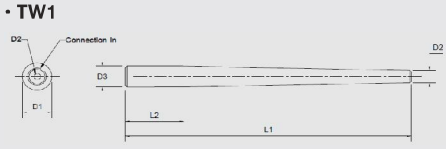
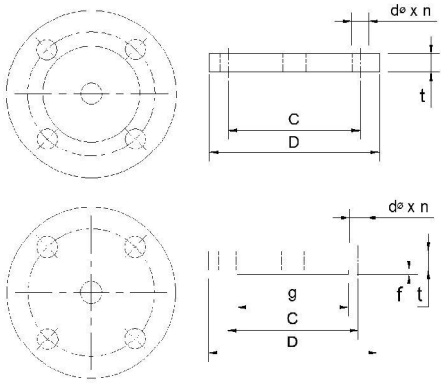


• TW1



Flange (JIS Standard)



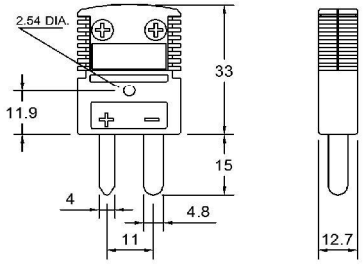
Withstand Presure	Sizes A	Sizes B	D	C	g	t	f	Dia. of Hold	No. of Hold
5K	10	3/8	75	55	42	9	1	12	4
	15	1/2	80	60	48	9	1	12	4
	20	3/4	85	65	52	10	1	12	4
	25	1	95	75	62	10	1	12	4
	32	5/4	115	90	72	12	2	15	4
	40	3/2	120	95	78	12	2	15	4
	50	2	130	105	88	14	2	15	4
10K	10	3/8	90	65	48	12	1	15	4
	15	1/2	95	70	52	12	1	15	4
	20	3/4	100	75	58	14	1	15	4
	25	1	125	90	70	14	1	19	4
	32	5/4	135	100	80	16	2	19	4
	40	3/2	140	105	85	16	2	19	4
	50	2	155	120	100	16	2	19	4
Orther									

Accessories

Standard & Miniature Connector

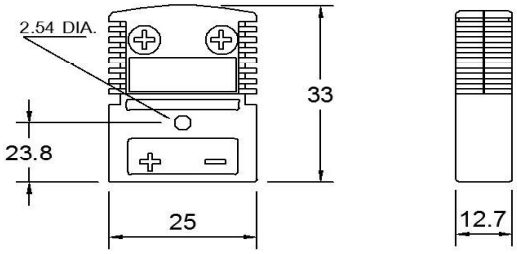
Type	Colour
K	Yellow
J	Black
N	Orange
T	Blue
R/S	Green

Code : OST - F



Standard Male	
Thermocouple Type	Material
K, J, N, E, R/S	Glass - Filled Nylon

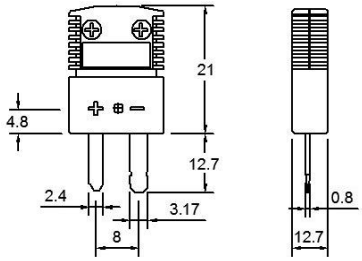
Code : OST - M



Standard Male	
Thermocouple Type	Material
K, J, N, E, R/S	Glass - Filled Nylon

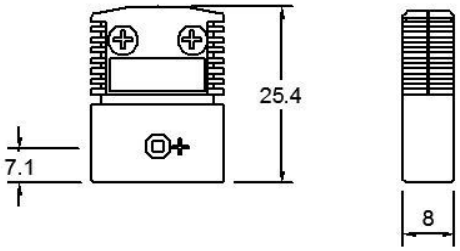
Type	Colour
K	Yellow
J	Black
N	Orange
T	Blue
R/S	Green

Code : SMP - F



Standard Male	
Thermocouple Type	Material
K, J, N, E, R/S	Glass - Filled Nylon

Code : SMP- M



Standard Male	
Thermocouple Type	Material
K, J, N, E, R/S	Glass - Filled Nylon

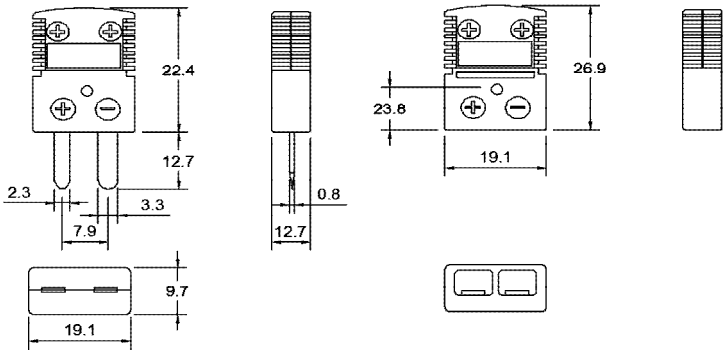
Thermocouple

Standard & Miniature Connector

Ultra High Temperature

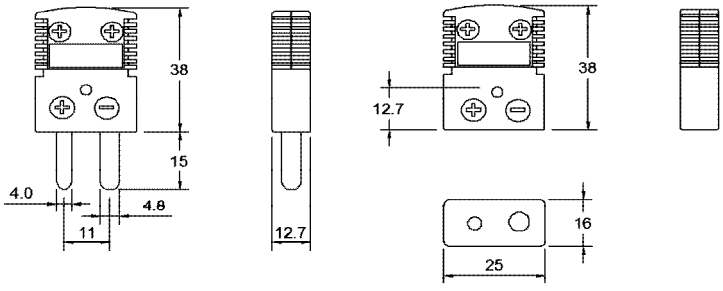
Miniture Connector
OMEGA's Exclusive-High Purity Alumina Body
Type SHX & USHX Rated to 650°C

Standard Male & Female	
Thermocouple Type	Material
K, J, N, E, R/S	Ceramic



SMP (C) - M, F

Standard Male & Female	
Thermocouple Type	Material
K, J, N, E, R/S	Ceramic



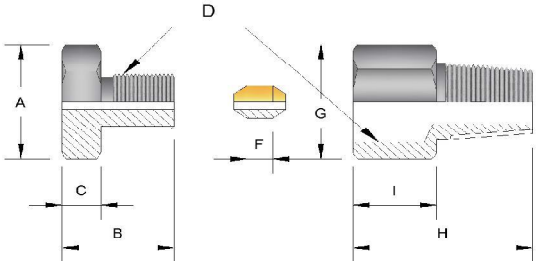
OST (C) - M, F

Accessories

Common Accessories & Part

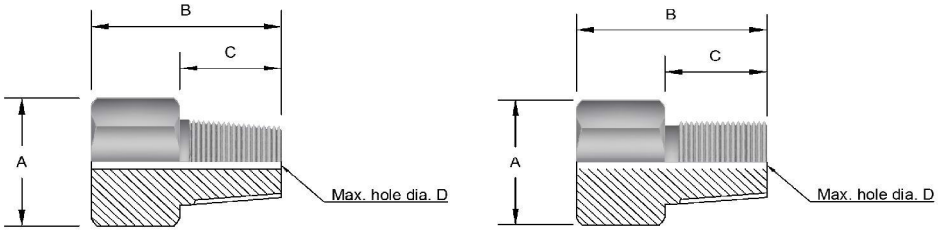
Compression Fitting (Push Type)

Configuration	Nominal Sheath O.D. (mm.)	S1	A	B
	1.0	R1/8	10	33
	1.6	R1/8	10	33
		R1/4	12	35
	2.3	R1/8	10	35
		R1/4	12	35
	3.2	R1/8	10	35
		R1/4	12	35
	4.8	R1/8	10	33
		R1/4	12	35
	6.4	R1/4	12	35
	8.0	R1/4	12	35



Dimensions Sizes	A	B	C	D	E	F	G	H	I
1/8"	13	14	5	1/8PF	8.0	3	13	21	12
1/4"	17	17	7	1/4PF	11.0	5	17	26	14
3/8"	17	17	7	3/8PF	11.0	5	19	28	15
1/2"	19	23	10	1/2PF	14.0	5	23	32	15
3/4"	26	31	13	3/4PF	18.0	6	29	40	20

Fixing Nipples (Tapered : PT. Straight : PF)



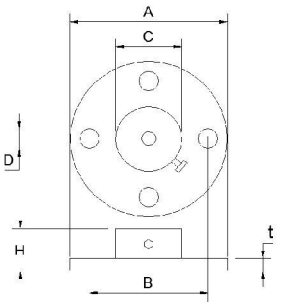
Dimensions	PT				PF			
Sizes	A	B	C	D	A	B	C	D
1/8"	13	26	12	6.0	13	26	12	6.4
1/4"	17	29	12	6.5	17	29	12	8.0
3/8"	19	29	14	6.5	21	29	14	12.0
1/2"	23	33	18	6.5	26	33	18	18.0
3/4"	29	40	20	6.5	32	40	20	22.0
1"	38	40	25	8.0	41	40	25	25.0

Accessories

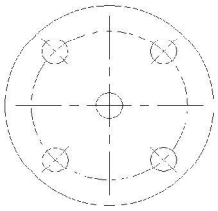
Common Accessories & Part

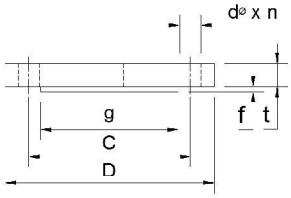
LOOSE Flange

Type	A	B	C	D	t	H
FS Flange (50 OD.)	50	35	18	4.5	3.5	15
FM Flange (85 OD.)	85	65	35	12	10	40
Other						

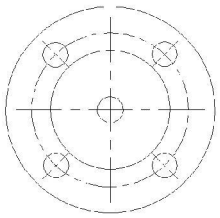


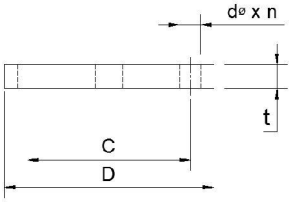
RF Pressure Flanges





FF Pressure Flanges





Flange (JIS Standard)									
Withstand Presure	Sizes		D	C	g	t	f	Dia.of Hold	No.of Hold
	A	B							
5K	10	3/8	75	55	42	9	1	12	4
	15	1/2	80	60	48	9	1	12	4
	20	3/4	85	65	52	10	1	12	4
	25	1	95	75	62	10	1	12	4
	32	5/4	115	90	72	12	2	15	4
	40	3/2	120	95	78	12	2	15	4
	50	2	130	105	88	14	2	15	4
10K	10	3/8	90	65	48	12	1	15	4
	15	1/2	95	70	52	12	1	15	4
	20	3/4	100	75	58	14	1	15	4
	25	1	125	90	70	14	1	19	4
	32	5/4	135	100	80	16	2	19	4
	40	3/2	140	105	85	16	2	19	4
	50	2	155	120	100	16	2	19	4
20K	10	3/8	90	65	48	14	1	15	4
	15	1/2	95	70	52	14	1	15	4
	20	3/4	100	75	58	16	1	15	4
	25	1	125	90	70	16	1	19	4
	32	5/4	135	100	80	18	2	19	4
	40	3/2	140	105	85	18	2	19	4
	50	2	155	120	100	18	2	19	8
Orther									

Accessories

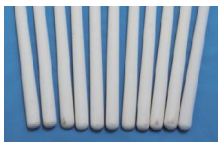
Insulation and Protection Tube

Ceramic Insulator for Thermocouple

Model	Code	OD. (mm)	ID. (mm)	Length (mm)	Element Dia. (mm)
Round 1 Bore		1.0	0.4	100	0.3
		1.2	0.8	100	0.5, 0.65
		2.0	1.0	100	0.5, 0.65
		2.5	1.5	100	1.0
		3.0	2.0	100	0.6
		5.0	3.0	100	2.3
		6.0	4.0	100	3.2
Round 2 Bore		3.0	0.8	100	0.5, 0.65
		4.0	1.0	100	0.5, 0.65
		6.0	1.5	100	0.65, 1.0
		8.0	2.0	100	0.65, 1.0, 1.6
		10.0	3.0	100	2.3
		12.0	4.0	100	3.2
Round 3 Bore		4.0	0.9	100	0.5, 0.65
		6.0	1.4	100	0.65, 1.0
Round 4 Bore		4.0	2.2	50	0.65, 1.0, 1.6
		4.0	3.0	50	2.3
		4.0	4.0	50	3.2
Round 6 Bore		4.0	0.9	50	0.5, 0.65
		6.0	1.4	50	0.65, 1.0
Oval 2 Bore		1.0	0.8	80	0.5, 0.65
		1.0	2.0	30	0.65, 1.0, 1.6
		1.0	3.0	34	2.3
		1.0	4.0	34	2.3, 3.2
		1.0	4.0	34	2.3, 3.2
		1.0	4.5	34	2.3, 3.2

Ceramic Insulator for Thermocouple

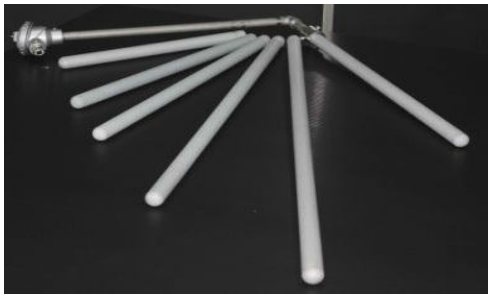
Type	OD. (mm)	ID. (mm)	Length (mm)
PT-0 Recrystallized alumina	8	5	300, 500, 600, 800, 1000
	10	6	300, 500, 600, 800, 1000
	13	9	300, 500, 600, 800, 1000
	15	11	500, 600, 800, 1000
PT-01 Alumina	17	13	500, 600, 800, 1000
	20	16	500, 600, 800, 1000
	24	20	500, 600, 800, 1000
	25	20	500, 600, 800, 1000
Other			



Si3N4

Thermocouple with Si3N4 protection tube Type K

L: 300, 400, 500, 600, 700, 800, 1000 , 1200 ,1400 mm.



Accessories

Common Accessories & Part

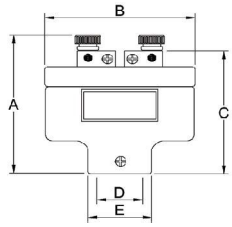
Terminal Head

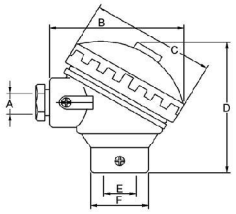
Open Type

- TS
- TL

Material : Alloy - Aluminum

Kind	Model	A	B	C	D	E	F
Open	TS	62	43	50	1/4	18	-
	TL	77	70	63	1/2	30	-
Water-Proofed	KG	3/8	56	51	69	M12	25
	KM	1/2	87	76	86	1/2	34





Water - Proofed type

- KG
- KM

Material : Alloy - Aluminum

Other

TH01
Bakelite

TH02
Alloy - Aluminum

TH03
Alloy - Aluminum

TH04
Alloy - Aluminum

TH05
Stainless Steel

TH06
Alloy - Aluminum

TH07
Alloy - Aluminum

TH08
Alloy - Aluminum

TH09
Alloy - Aluminum

Connector (Terminal Plate)

Ceramic

2P-C | 3P-C | 4P-C | 6P-C

Bakelite

2P-B | 3P-B | 4P-B | 6P-B

Accessories

Common accessories and parts

NCS Series Connectors

Feature

1. Basic type of round connectors are usable for all kinds of circuits.
2. Solid and simple construction porvides mechanical and electricalstability.
3. Thermosetting epoxy resins have been employed for insulators.
4. Seven kinds of shell size and various shell type are available for a variety of applications.

NCS-25 2-P M

- Contact shape
  M : male F: female
- Shell shape
  P : Plug
  SP : Shorting cap plug
  GP : Pipe thread plug
  R : Receptacle Ad : Adapter
  Ad (F) : Adapter with flange
- Number of contacts
- Shell size
- Series dosignation

Material and Finish

	Material	Finish
Shell	Zinc alloy die casting or Brass	Chrome plating
Insulator	Synthetic resin	
Contect	Copper alloy	Nickel, Silver Gold plating

Cable termination : Soldering

Temperature tolerance level : –40 °C to +120 °C

Plug

S Type	Number of Contacts	A	B
NCS-14*-P	1	17.5	41.0
NCS-14*-P	2	17.5	42.5
NCS-16*-P	1	21.5	43.5
NCS-16*-P	2, 3, 4	21.5	44.5
NCS-25*-P	2, 3, 4, 5, 6, 7, 8	28.5	50
NCS-30*-P	2, 3, 4, 5, 6, 7, 7H 8,13	34	55
NCS-40*-P	2, 3, 4, 5, 6, 8, 10, 12, 16, 20	46	69
NCS-50*-P	2, 3	57	100
NCS-50*-P	4, 8, 10, 15, 25	57	90
NCS-60*-P	2, 3, 4	67	115
NCS-60*-P	10, 15, 30, 32, 40	67	105

G Type	Number of Contacts	A	B
NCS-14*-PM	2, 3	21.5	44.5
NCS-25*-PM	2, 3, 4, 5, 6, 7	28.5	50.5
NCS-30*-PM	2, 3, 4, 5, 6, 7, 8	34	57
NCS-44*-PM	2, 3, 4, 5, 6, 8, 10, 12, 16, 20	52	70
NCS-54*-PM	2, 3	65	112
NCS-54*-PM	4, 8, 10, 15, 25	65	102
NCS-64*-PM	2, 3, 4	78	116
NCS-60*-PM	10, 15, 30, 32	67	107

Receplacle

S Type	Number of Contacts	A	B	D	E
NCS-14*-R	1	14	27.5	23	31
NCS-14*-R	2	14	24	23	31
NCS-16*-R	1	16	27.5	24	32
NCS-16*-R	2, 3, 4	16	23	24	32
NCS-25*-R	2, 3, 4, 5, 6, 7, 8	25	26	34	42
NCS-30*-R	2, 3, 4, 5, 6, 7, 7H 8,13	30	29	38	46
NCS-40*-R	2, 3, 4, 5, 6, 8, 10, 12, 16, 20	41	36	50	58
NCS-50*-R	4, 8, 10, 15, 25	50	45	60	68

G Type	Number of Contacts	A	B	D	E
NCS-16*-R	2, 3	16	23.5	24	32
NCS-25*-R	2, 3, 4, 5, 6, 7	25	27	34	42
NCS-30*-R	2, 3, 4, 5, 6, 7, 8	30	30	38	46
NCS-44*-R	2, 3, 4, 5, 6, 8, 10, 12, 16, 20	44	41	56	64

Receplacle (Square Flange)

S Type	Number of Contacts	A	B	D	E	V
NCS-25*-R(Square)	2, 3, 4, 5, 6, 7, 8	25	2.0	24	31	3.5
NCS-50*-R	2, 3	50	54	48	60	5.5
NCS-50*-R(Square)	2, 3, 4, 5, 6, 7, 8	50	45.0	48	60	
NCS-60*-R	2, 3, 4	60	56	56	70	
NCS-60*-R	10, 15, 30, 32, 40	60	43	56	70	

Accessories

Common Accessories & Part

NCS Series Connectors

Adapter (Jack)

S Type	Number of Contacts	A	B
NCS-14*-Ad	1, 2	17.5	41.0
NCS-16*-Ad	1, 2, 3, 4	17.5	42.5
NCS-25*-Ad	2, 3, 4, 5, 6, 7, 8	21.5	43.5
NCS-30*-Ad	2, 3, 4, 5, 6, 7, 7H 8,13	21.5	44.5
NCS-40*-Ad	2, 3, 4, 5, 6, 8, 10, 12, 16, 20	28.5	50
NCS-50*-Ad	2, 3	34	55
NCS-50*-Ad	4, 8, 10, 15, 25	46	69
NCS-60*-Ad	2, 3, 4	57	100
NCS-60*-Ad	10, 15, 30, 32, 40	57	90

G Type	Number of Contacts	A	B
NCS-16*-AdF	2, 3	21.5	44.5
NCS-25*-AdF	2, 3, 4, 5, 6, 7	28.5	50.5
NCS-30*-AdF	2, 3, 4, 5, 6, 7, 8	34	57
NCS-44*-AdF	2, 3, 4, 5, 6, 8, 10, 12, 16, 20	52	70
NCS-54*-AdF	2, 3	65	112
NCS-54*-AdF	4, 8, 10, 15, 25	65	102
NCS-64*-AdF	2, 3, 4	78	116
NCS-60*-AdF	10, 15, 30, 32	67	107

Adapter with flange (Panel Jack)

S Type	Number of Contacts	A	B	E
NCS-16*-Ad(F)	1, 2, 3, 4	49	28	37
NCS-25*-Ad(F)	2, 3, 4, 5, 6, 7, 8	57	35	42
NCS-30*-Ad(F)	2, 3, 4, 5, 6, 7, 7H 8,13	62.5	42	52
NCS-40*-Ad(F)	2, 3, 4, 5, 6, 8, 10, 12, 16, 20	81	56	65

G Type	Number of Contacts	A	B	E
NCS-16*-Ad(F)	2, 3	49	28	37
NCS-25*-Ad(F)	2, 3, 4, 5, 6, 7	57	35	42
NCS-30*-Ad(F)	2, 3, 4, 5, 6, 7, 8	62.5	42	52

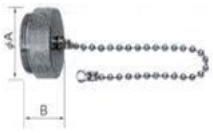
Receplacle (Square Flange)

Shorting cap plug

S Type	Number of Contacts	A	B
NCS-25*-SP	2, 3, 4, 5, 6, 7, 8	28.5	38
NCS-30*-SP	2, 3, 4, 5, 6, 7, 7H, 8, 13	34	41
NCS-40*-SP	2, 3, 4, 5, 6, 8, 10, 12, 16, 20	46	56
NCS-50*-SP	2, 3	57	82
NCS-50*-SP	4, 8, 10, 15, 25	57	72
NCS-60*-SP	2, 3, 4	67	83
NCS-60*-SP	10, 15, 30, 32	67	73

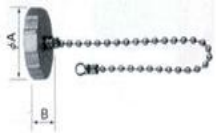
G Type	Number of Contacts	A	B
NCS-25*-SPM	2, 3, 4, 5, 6, 7	28.5	38.5
NCS-30*-SPM	2, 3, 4, 5, 6, 8	34	43
NCS-40*-SPM	2, 3, 4, 5, 6, 8, 10, 12, 16, 20	52	57
NCS-50*-SPM	2, 3	65	91
NCS-50*-SPM	4, 8, 10, 15, 25	65	81
NCS-60*-SPM	2, 3, 4	78	96
NCS-60*-SPM	10, 15, 30, 32	67	75

Plug cap (PCa)



Shell size	A	B
NCS-14-Pca	18	17
NCS-16-Pca	21.5	18
NCS-25-Pca	28.5	20
NCS-30-Pca	34	23
NCS-40-Pca	46	23
NCS-44-Pca	52	24
NCS-50-Pca	57	39
NCS-54-Pca	65	40
NCS-60-Pca	67	40
NCS-64-Pca	78	40

Receptacle cap (PCa) Also for adapter



Shell size	A	B
NCS-14-Pca	18	17
NCS-16-Pca	21.5	18
NCS-25-Pca	28.5	20
NCS-30-Pca	34	23
NCS-40-Pca	46	23
NCS-44-Pca	52	24
NCS-50-Pca	57	39
NCS-54-Pca	65	40
NCS-60-Pca	67	40
NCS-64-Pca	78	40

Accessories

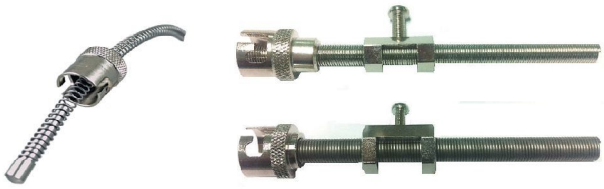
Common Accessories & Part

Other Conncetor

DAIDO

TAJIMI

Bayonets Fittings



Connector Terminals

Ring terminal
R

Spade terminal
S

Pin terminal
P

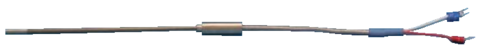
Female disconnector
Fd

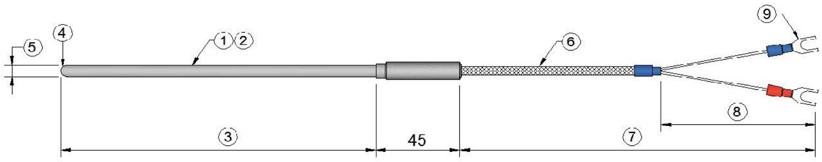
Male disconnector
MD

Thermo Product (Order Information)

Common Accessories & Part

Model : Sheath thermocouple with lead wire

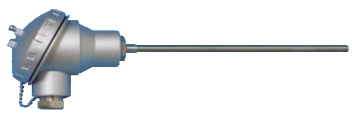


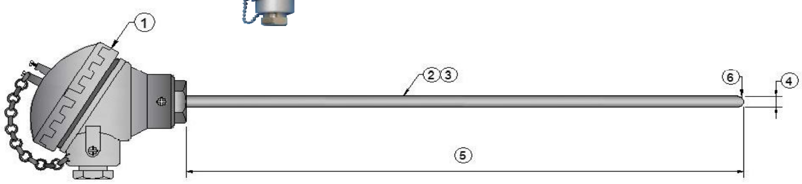


ORDER INFORMATION NO. T/C - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 | Temp | ° C

1	Thermcouple type	K			T			J			N		Others
2	Material sheath	Code		316			310			INC			
		Type		SUS316			SUS310S			INCONEL			
3	O.D. (mm)	Single	0.5	1.0	1.6	2.3	3.2	4.8	6.4	8.0			
		Double	-	-	-	-	3.2	4.8	6.4	8.0			
4	Length (mm)	(Please write by mm.)											
5	Measuring junction	Ungrounded					Ground					Exposed	
					Code : U					Code : G			Code : E
6	Cable type	EXA		EXB		EXD		FEP		SRCT		Other	
7	Cable length (mm)	(Please write by mm.)											
8	Length (mm)	(Please write by mm.)											
9	Terminal	Type	Ring terminal		Spade terminal		Pin terminal		Female disconnector		Male disconnector		
		Code	R		S		P		FD		MD		
10	Parts	(Please choose from the parts page)											

Model : Sheath thermocouple with Terminal Head



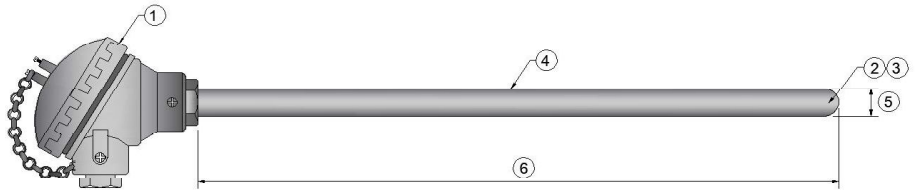


ORDER INFORMATION NO. T/C - 1 - 2 - 3 - 4 - 5 - 6 - 7 | Temp | ° C

1	Terminal head	KM		KG		TL		TS		Others		
2	Thermcouple type	K		T		J		N		Others		
3	Material sheath	Code		316		310		INC				
		Type		SUS316		SUS310S		INCONEL				
4	O.D. (mm)	Single	0.5	1.0	1.6	2.3	3.2	4.8	6.4	8.0		
		Double	-	-	-	-	3.2	4.8	6.4	8.0		
5	Length (mm)	(Please write by mm.)										
6	Measuring junction	Ungrounded				Ground				Exposed		
				Code : U				Code : G				Code : E
7	Parts	(Please choose from the parts page)										

Thermo Product (Order Information)

Model : Thermocouple with SUS protection tube

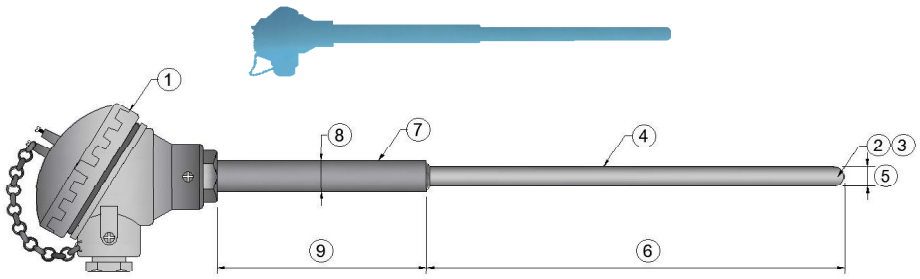


ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] Temp [ ] ° C

1	Terminal head	KG		KM		TL	TS											
2	Thermcouple type	K				Others												
3	Diameter of element (mm)	Single	1.0	1.6	2.3	3.2												
		Double	1.0	1.6	2.3	3.2												
4	Protection tube	Code	304	316	310	INC	253	446	Other									
		Type	SUS304	SUS316	SUS310	INCONEL	SUS253MA	SUS446										
5	Diameter of protection tube (mm)	6.0	6.2	8.0	9.0	9.5	10	11	12	12.7	13	13.7	13.8	14	15	15.8	16	
		16.7	17.0	17.3	18	19	20	21.3	21.7	22	23	25.6	26.7	27.1	32	34		
		Other																
6	Length (mm)	(Please write by mm.)																
7	Parts	(Please choose from the parts page)																

Model : Thermocouple with double sus protection tube



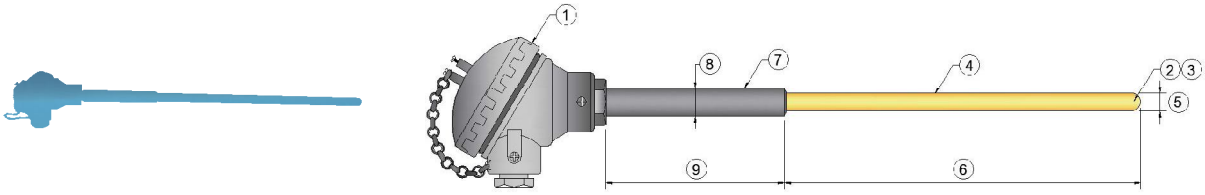
ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] - [10] Temp [ ] ° C

1	Terminal head	KG		KM		TL	TS										
2	Thermcouple type	K		Others													
3	Diameter of element (mm)	Single	1.0	1.6	2.3	3.2											
		Double	1.0	1.6	2.3	3.2											
4	Protection tube	Code	304	316	310	INC	253	446	Other								
		Type	SUS304	SUS316	SUS310	INCONEL	SUS253MA	SUS446									
5	Diameter of protection tube (mm)	6.0	6.2	8.0	9.0	9.5	10	11	12	12.7	13	13.7	13.8	14	15	15.8	16
		16.7	17.0	17.3	18	19	20	21.3	21.7	22	23	25.6	26.7	27.1	32	34	
		Other															
6	Length (mm)	(Please write by mm.)															
7	Protection tube	Code	304	316	310	INC	253	446	Other								
		Type	SUS304	SUS316	SUS310	INCONEL	SUS253MA	SUS446									
8	Diameter of support (mm)	10	12.7	13	13.8	15	15.7	20	21.7	25	30	Other					
9	Length (mm)	(Please write by mm.)															
10	Parts	(Please choose from the parts page)															

Thermo Product (Order Information)

Model : Thermocouple with ceramic protection tube

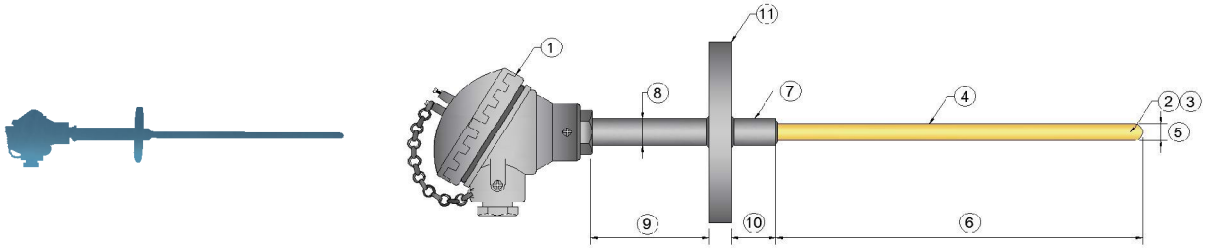


ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] - [10] Temp [ ] ° C

1	Terminal head	KG		KM		TL		TS			
2	Thermcouple type	K		R		S		Others B			
3	Diameter of element (mm)	Single	0.35	0.5	1.0	1.6	2.3	3.2			
		Double	0.35	0.5	1.0	1.6	2.3	3.2			
4	Ceramic protection tube	Code	PT-0			PT-1					
		Type	Recrystallized alumina			Alumina					
5	Diameter of protection tube (mm)	8	10	12	15	17	20	24	25	Other	
6	Length (mm)	(Please write by mm.)									
7	Support material	Code	304		316		310S		Other		
		Type	SUS304		SUS316		SUS310S				
8	Diameter of support (mm)	10	12.7	13	13.8	15	15.7	20	21.7	25	30	Other
9	Length (mm)	(Please write by mm.)									
10	Parts	(Please choose from the parts page)									

Model : Thermocouple with ceramic protection tube & Flange



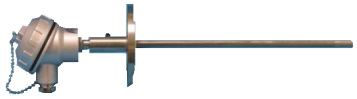
ORDER INFORMATION

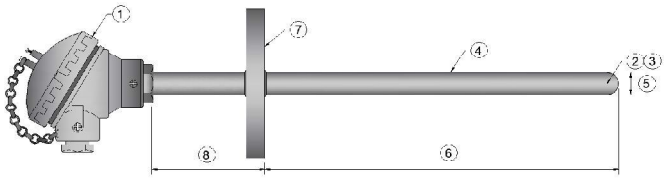
NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] - [10] - [11] - [12] Temp [ ] ° C

1	Terminal head	KG		KM		TL		TS		
2	Thermcouple type	K		R		S		Others B		
3	Diameter of element (mm)	Single	0.35	0.5	1.0	1.6	2.3	3.2		
		Double	0.35	0.5	1.0	1.6	2.3	3.2		
4	Ceramic protection tube	Code	PT-0		PT-1					
		Type	Recrystallized alumina		Alumina					
5	Diameter of protection tube (mm)	8	10	12	15	17	20	24	25	Other
6	Length (mm)	(Please write by mm.)								
7	Support material	Code	304		316		310S		Other	
		Type	SUS304		SUS316		SUS310S			
8	Diameter of support (mm)	10	12.7	13	13.8	15	15.7	15.7		
		20	21.7	25	30	Other				
9	Length (mm)	(Please write by mm.)								
10										
11	Flange size	(Please choose from the parts page)								
12	Parts	(Please choose from the parts page)								

Thermo Product (Order Information)

Model : Thermocouple with SUS protection tube Loose Flange & Fixed



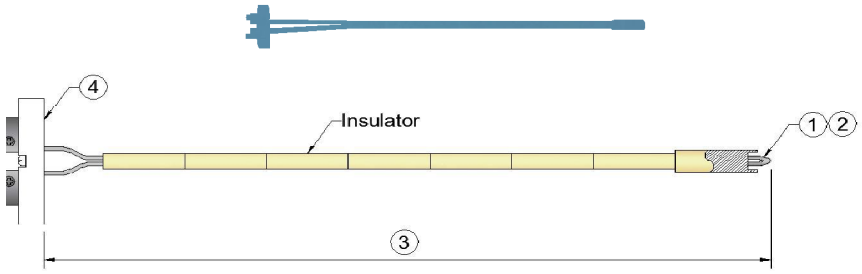


ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] Temp [ ] ° C

1	Terminal head	KG		KM		TL	TS										
2	Thermcouple type	K		Others													
3	Diameter of element (mm)	Single	1.0	1.6	2.3	3.2											
		Double	1.0	1.6	2.3	3.2											
4	Protection tube	Code	304		316		310		INC		253		446		Other		
		Type	SUS304		SUS316		SUS310		INCONEL		SUS253MA		SUS446				
5	Diameter of protection tube (mm)	6.0	6.2	8.0	9.0	9.5	10	11	12	12.7	13	13.7	13.8	14	15	15.8	16
		16.7	17.0	17.3	18	19	20	21.3	21.7	22	23	25.6	26.7	27.1	32	34	
		Other															
6	Length (mm)	(Please write by mm.)															
7	Flange	Fixed or Loose															
		Flange size (Please choose from the parts page)															
8	Length (mm)	(Please write by mm.)															
9	Parts	(Please choose from the parts page)															

Model : thermocouple element with insulator



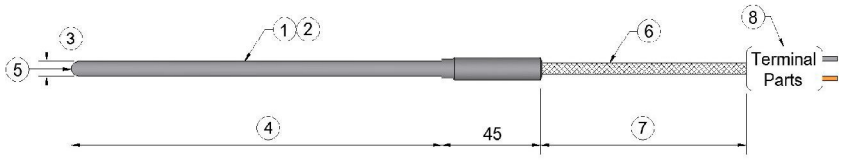
ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] Temp [ ] ° C

1	Thermcouple type	K		Others		
2	Diameter of element (mm)	Single	1.0	1.6	2.3	3.2
		Double	1.0	1.6	2.3	3.2
3	Length (mm)	(Please write by mm.)				
4	Terminal Plate	2P	4P	Other		
5	Parts	(Please choose from the parts page)				

Thermo Product (Order Information)

Model : Sheath thermocouple with connector part

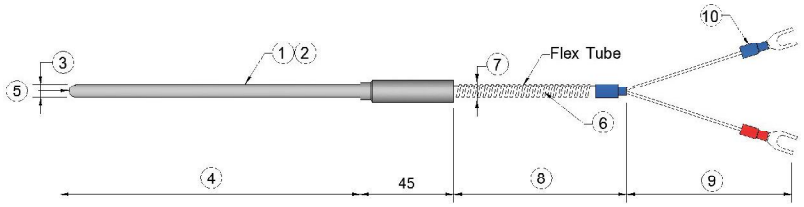


ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] Temp [ ] ° C

1	Thermcouple type	K	T	J	N	Others			
2	Material sheath	Code	316	310	INC				
		Type	SUS316	SUS310S	INCONEL				
3	O.D. (mm)	Single	0.5	1.0	1.6	2.3	3.2	4.8	6.4	8.0
		Double	-	-	-	-	3.2	4.8	6.4	8.0
4	Length (mm)	(Please write by mm.)							
5	Measuring junction	Ungrounded			Ground			Exposed	
			Code : U			Code : G			Code : E
6	Cable type	EXA	EXB	EXD	FEP	SRCT	Other		
7	Cable length (mm)	(Please write by mm.)							
8	Terminal parts	(Please choose from the parts page)							

Model : Sheath thermocouple (Sleeve & Flex tube)



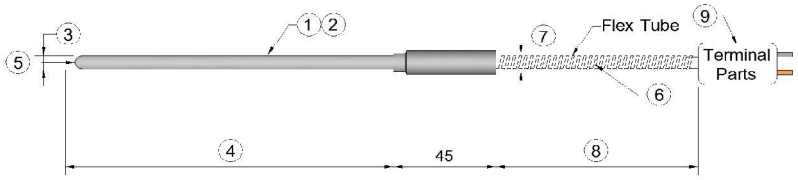
ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] - [10] - [11] Temp [ ] ° C

1	Thermcouple type	K	T	J	N	Others				
2	Material sheath	Code	316	310	INC					
		Type	SUS316	SUS310S	INCONEL					
3	O.D. (mm)	Single	0.5	1.0	1.6	2.3	3.2	4.8	6.4	8.0
		Double	-	-	-	-	3.2	4.8	6.4	8.0
4	Length (mm)	(Please write by mm.)								
5	Measuring junction	Ungrounded			Ground			Exposed		
			Code : U			Code : G			Code : E	
6	Cable type	EXA	EXB	EXD	FEP	SRCT	Other			
7	Flex tube O.D. (mm)	6.0	7.0	8.0	12.0	Others				
8	Length (mm)	(Please write by mm.)								
9										
10	Terminal	Type	Ring terminal	Spade terminal	Pin terminal	Female disconnector	Male disconnector			
		Code	R	S	P	FD	MD			
11	Parts	(Please choose from the parts page)								

Thermo Product (Order Information)

Model : Sheath thermocouple (Sleeve & Flex tube & connector)

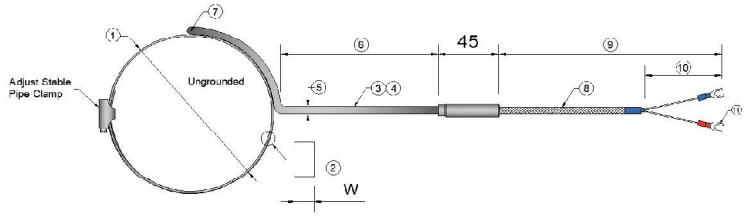


ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] Temp [ ] ° C

1	Thermcouple type	K		J		N		Others		
2	Material sheath	Code	316		310		INC			
		Type	SUS316		SUS310S		INCONEL			
3	O.D. (mm)	Single	0.5	1.0	1.6	2.3	3.2	4.8	6.4	8.0
		Double	-	-	-	-	3.2	4.8	6.4	8.0
4	Length (mm)	(Please write by mm.)								
5	Measuring junction	Ungrounded				Ground			Exposed	
				Code : U				Code : G		Code : E
6	Cable type	EXA		EXB		EXD		FEP	SRCT	Other
7	Flex tube O.D. (mm)	6.0	7.0	8.0	12.0	Others				
8	Length (mm)	(Please write by mm.)								
9	Terminal parts	(Please choose from the parts page)								

Model : Sheath thermocouple with ring



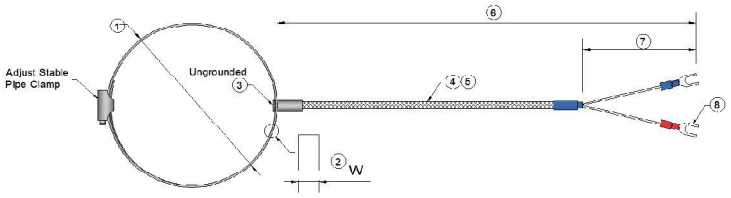
ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] - [10] - [11] - [12] Temp [ ] ° C

1	Diameter of Ring	25	30	32	34	40	Other		
2	Width of ring	6 mm	Other						
3	Thermcouple type	K	T	J	Others				
4	Material sheath	Code	316	310	INC				
		Type	SUS316	SUS310S	INCONEL				
5	O.D. (mm)	Single	1.0	1.6	2.3	3.2	4.8	6.4	8.0
		Double	-	-	-	3.2	4.8	6.4	8.0
6	Length (mm)	(Please write by mm.)							
7	Measuring junction	Ungrounded			Ground			Exposed	
			Code : U			Code : G		Code : E	
8	Cable type	EXA	EXB	EXD	FEP	SRCT	Other		
9	Length (mm)	(Please write by mm.)							
10	Length (mm)	(Please write by mm.)							
11	Terminal	Type	Ring terminal	Spade terminal	Pin terminal	Female disconnector	Male disconnector		
		Code	R	S	P	FD	MD		
12	Parts	(Please choose from the parts page)							

Thermo Product (Order Information)

Model : DP Thermocouple wire with ring

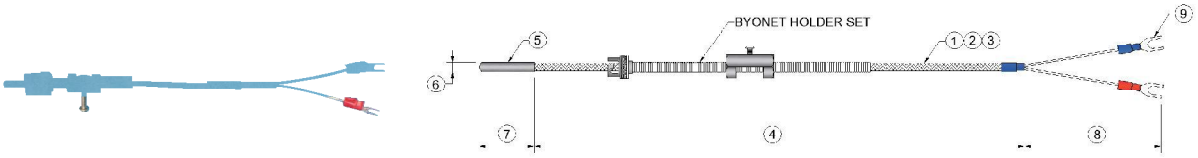


ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] | Temp | ° C

1	Diameter of Ring	25	30	32	34	40	Other
2	Width of ring	6 mm	Other				
3	Thermcouple type	K	T	J	Others		
4	Cable type	EXA	EXB	EXD	FEP	Other	
5	Dia. Of wire (mm)	0.1	0.2	0.32	0.65	1.0	Other
6	Length (mm)	(Please write by mm.)					
7	Length (mm)	(Please write by mm.)					
8	Terminal	Type	Ring terminal	Spade terminal	Pin terminal	Female disconnector	Male disconnector
		Code	R	S	P	FD	MD
9	Parts	(Please choose from the parts page)					

Model : DP thermocouple wire with Byonet holder set



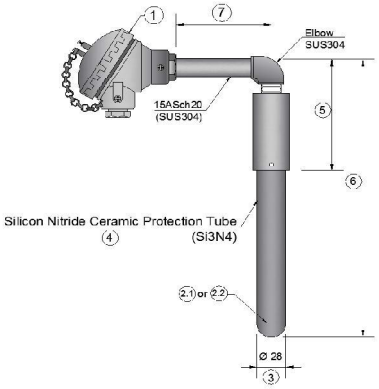
ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] - [10] | Temp | ° C

1	Thermcouple type	K		T		J		N	Others
2	Cable type	EXA		EXB		EXD		FEP	Other
3	Dia. Of wire (mm)	0.1	0.2	0.32	0.65	1.0	Other		
4	Length (mm)	(Please write by mm.)							
5	Material of support	Code	304		316		310S		
		Type	SUS304		SUS316		SUS310S		
6	O.D. (mm)	3.0	3.4	4.0	4.8	6.0	8.0	Other	
7	Length (mm)	(Please write by mm.)							
8	Cable length (mm)	(Please write by mm.)							
9	Terminal	Type	Ring terminal		Spade terminal		Pin terminal	Female disconnector	Male disconnector
		Code	R		S		P	FD	MD
10	Parts	(Please choose from the parts page)							

Thermo Product (Order Information)

Model : Thermocouple for molten aluminum (Si3N4 Tube)

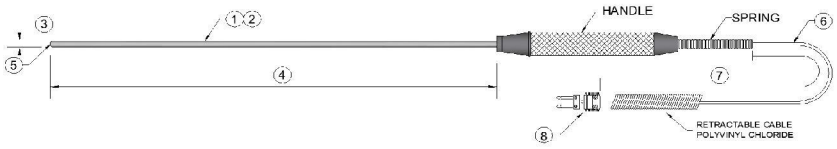


ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] Temp [ ] ° C

1	Terminal head	KG		KM		TL		Other	
2.1	Element thermocouple type	K				Other			
	Diameter of element (mm)	Single	1.0		1.6		2.3		3.2
2.2	Sheath thermocouple type	K				Other			
	Diameter of element (mm)	Single	3.2		4.8		6.4		8.0
		Double	3.2		4.8		6.4		8.0
	Material sheath	Code	316		310		INC		
		Type	SUS316		SUS310S		INCONEL		
3	Diameter (mm)	28.0				Other			
4	Si3N4	300	400	500	600	700	800	1000	1200	1400
5	Length (mm)	(Please write by mm.)							
6	Length (mm)	(Please write by mm.)							
7	Length (mm)	(Please write by mm.)							

Model : Sheath thermocouple with handle set



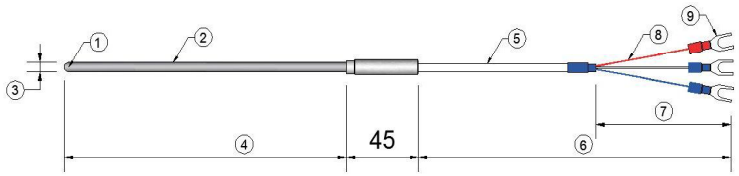
ORDER INFORMATION

NO. T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] Temp [ ] ° C

1	Thermcouple type	K		T		J		N	Others
2	Material sheath	Code	316		310		INC		
		Type	SUS316		SUS310S		INCONEL		
3	O.D. (mm)	Single	1.0		1.6		2.3	3.2	4.8	6.4	8.0
4	Length (mm)	(Please write by mm.)							
5	Measuring junction	Ungrounded				Ground			Exposed	
			Code : U				Code : G			Code : E
6	Cable type	EXA		EXB		EXD		FEP	SRCT	Other
7	Length (mm)	(Please write by mm.)							
8	Connector	(Please choose from the parts page)							
9	Terminal parts	(Please choose from the parts page)							

RTD Product (Order Information)

Model : Sheath RTD with lead wire

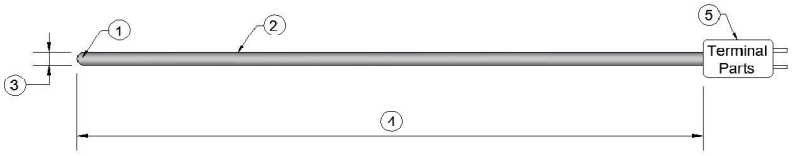


ORDER INFORMATION

NO. / T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] - [10] Temp [ ] ° C

1	RTD PT100 Type	PT100			Other			
2	Material sheath	316						
		SUS316						
3	O.D. (mm)	Single Pair	3.2	4.8	6.4			
		Double Pair	3.2	4.8	6.4			
		Triple Pair	3.2	4.8	6.4			
4	Length (mm)	(Please write by mm.)						
5	Cable type	(Please choose from the parts page)						
6	Cable length (mm)	(Please write by mm.)						
7	Length (mm)	(Please write by mm.)						
8	No. of wire	(Please write by number)						
9	Terminal	Type	Ring terminal	Spade terminal	Pin terminal	Female disconnector	Male disconnector	
		Code	R	S	P	FD	MD	
10	Parts	(Please choose from the parts page)						

Model : Sheath RTD with conector



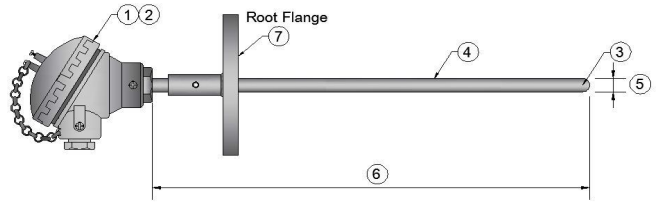
ORDER INFORMATION

NO. / T/C - [1] - [2] - [3] - [4] - [5] - [6] Temp [ ] ° C

1	Sheath RTD	PT100			Other
2	Material sheath	316			
		SUS316			
3	O.D. (mm)	Single Pair	3.2	4.8	6.4
		Double Pair	3.2	4.8	6.4
		Triple Pair	3.2	4.8	6.4
4	Length (mm)	(Please write by mm.)			
5	Length (mm)	(Please write by mm.)			
6	Parts	(Please choose from the parts page)			

RTD Product (Order Information)

Model : RTD with SUS protection tube & Loose Flange

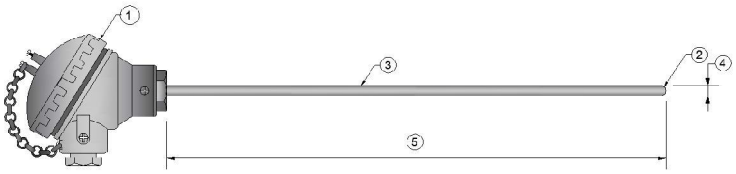


ORDER INFORMATION

NO. / T/C - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] Temp [° C

1	Terminal head	KG	KM	Other													
2	No. of RTD	2 Wire	3 Wire	4 Wire	6 Wire												
3	RTD PT100 Type	(Please choose from the parts page)															
4	Protection tube	Code	316	310	INC												
		Type	SUS316	SUS310S	INCONEL												
5	O.D. (mm)	6.0	6.2	8.0	9.0	9.5	10	11	12	12.7	13	13.7	13.8	14	15	15.8	16
		Other															
6	Length (mm)	(Please write by mm.)															
7	Root Flange	(Please choose from the parts page)															
8	Parts	(Please choose from the parts page)															

Model : Sheath RTD with therminal head



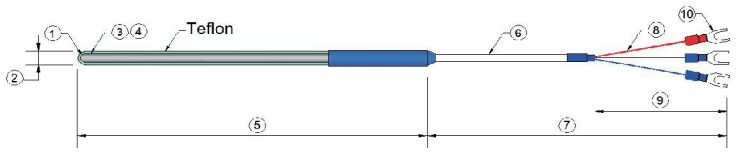
ORDER INFORMATION

NO. / T/C - [1] - [2] - [3] - [4] - [5] - [6] Temp [° C

1	Terminal head	KG	KM	Other	
2	RTD PT100 Type	PT100	Other		
3	Material sheath	316			
		SUS316			
4	O.D. (mm)	Single Pair	3.2	4.8	6.4
		Double Pair	3.2	4.8	6.4
		Triple Pair	3.2	4.8	6.4
5	Length (mm)	(Please write by mm.)			
6	Parts	(Please choose from the parts page)			

RTD Product (Order Information)

Model : RTD with teflon tube



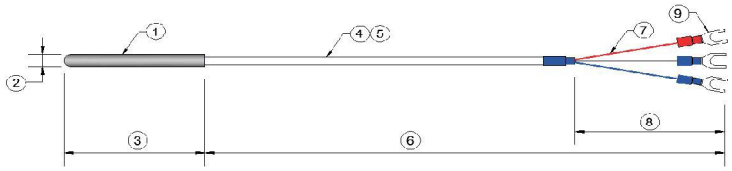
ORDER INFORMATION

NO. - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] - [10] - [11]

T/C — Temp ° C

1	RTD PT100 Type	PT100			Other													
2	Teflon O.D. (mm)	(Please write by mm.)																
3	Protection tube	Code	316		310		INC											
		Type	SUS316		SUS310S		INCONEL											
4	O.D. (mm)	6.0	6.2	8.0	9.0	9.5	10	11	12	12.7	13	13.7	13.8	14	15	15.8	16	
		Other																
5	Length (mm)	(Please write by mm.)																
6	Cable type	(Please choose from the parts page)																
7	Cable length (mm)	(Please write by mm.)																
8	No. of wire	(Please write by number)																
9	Length (mm)	(Please write by mm.)																
10	Terminal	Type	Ring terminal		Spade terminal		Pin terminal		Female disconne		Male disconnector							
		Code	R		S		P		FD		MD							
11	Parts	(Please choose from the parts page)																

Model : Protection tube with lead wire



ORDER INFORMATION

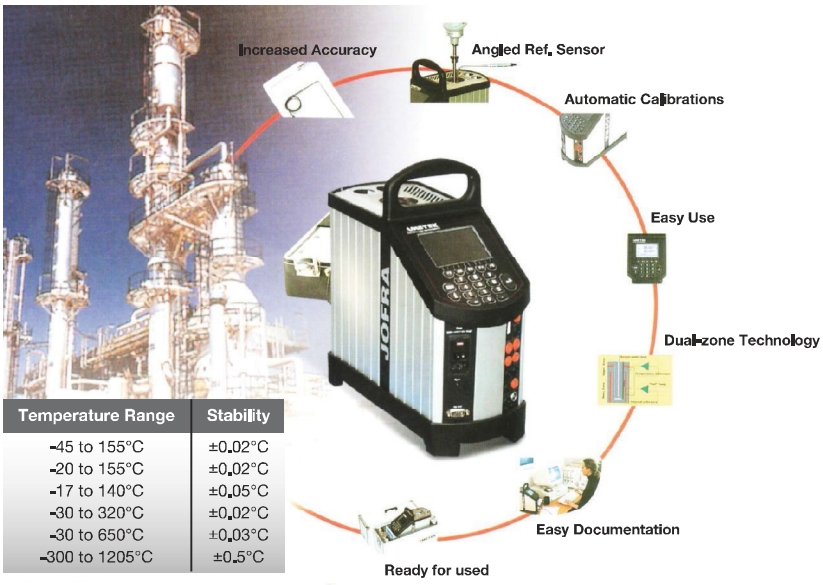
NO. - [1] - [2] - [3] - [4] - [5] - [6] - [7] - [8] - [9] - [10]

T/C — Temp ° C

1	Protection tube	Code	316			INC											
2	O.D. (mm)	6.0	6.2	8.0	9.0	9.5	10	11	12	12.7	13	13.7	13.8	14	15	15.8	16
		Other															
3	Length (mm)	(Please write by mm.)															
4	RTD Type	PT100			Other												
5	Cable type	(Please choose from the parts page)															
6	Cable length (mm)	(Please write by mm.)															
7	Length (mm)	(Please write by mm.)															
8	No. of wire	(Please write by number)															
9	Terminal	Type	Ring terminal		Spade terminal		Pin terminal		Female disconnector		Male disconnector						
		Code	R		S		P		FD		MD						
10	Parts	(Please choose from the parts page)															

Calibration Service

AMETEK
TEST & CALIBRATION INSTRUMENTS



Temperature Range	Stability
-45 to 155°C	±0.02°C
-20 to 155°C	±0.02°C
-17 to 140°C	±0.05°C
-30 to 320°C	±0.02°C
-30 to 650°C	±0.03°C
-300 to 1205°C	±0.5°C

SCOPE OF CALIBRATION

- THERMOCOUPLE (T/C)
- RESISTANCE TEMPERATURE DETECTOR
- DIGITAL THERMOMETER
- TEMPERATURE INDICATOR
- TEMPERATURE INDICATOR WITH PROBE
- TEMPERATURE RECORDER
- TEMPERATURE CONTROLLER
- TEMPERATURE CONTROLLER WITH PROBE

รายละเอียดแนบท้ายใบรับรองห้องปฏิบัติการสอบเทียบ
ที่ 14C086/0144

หมายเลขการรับรองที่ : สอบเทียบ 0246

สถานภาพห้องปฏิบัติการ ☑ ถาวร ☐ นอกสถานที่ ☐ ชั่วคราว ☐ เคลื่อนที่

สาขาการสอบเทียบ	รายการการสอบเทียบ	ขีดความสามารถของการสอบเทียบและการวัด*	วิธีการสอบเทียบ
Temperature (cont.)	Resistance thermometer detector sensor (RTD) 35 °C to 200 °C > 200 °C to 400 °C	 0.68 °C 0.71 °C	In-house method : CP-02-00 by standard resistance thermometer in dry block
* ค่าความไม่แน่นอน (±) ที่ระดับความเชื่อมั่นประมาณ 95%			

ออกให้ ณ วันที่ 5 พฤศจิกายน พ.ศ. 2557

ลงชื่อ

(นายหทัย อู่ไทย)
เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

รายละเอียดแนบท้ายใบรับรองห้องปฏิบัติการสอบเทียบ
ที่ 14C086/0144

ชื่อห้องปฏิบัติการ : บริษัท พลิค คอร์ปอเรชั่น จำกัด
ที่อยู่ : เลขที่ 138 หมู่ 5 ตำบลเชียงรากใหญ่ อำเภอสามโคก จังหวัดปทุมธานี
หมายเลขการรับรองที่ : สอบเทียบ 0246
สถานภาพห้องปฏิบัติการ ☑ ถาวร ☐ นอกสถานที่ ☐ ชั่วคราว ☐ เคลื่อนที่

สาขาการสอบเทียบ	รายการการสอบเทียบ	ขีดความสามารถของการสอบเทียบและการวัด*	วิธีการสอบเทียบ
Temperature	Thermocouple sensor		In-house method : CP-01-00 by comparison with standard thermometer in dry block
	Type R,S		
	35 °C to 400 °C	1.9 °C	
	> 400 °C to 1 000 °C	2.2 °C	
	> 1 000 °C to 1 200 °C	2.9 °C	
	Type K,J		
	35 °C to 200 °C	0.74 °C	
	> 200 °C to 400 °C	0.86 °C	
	> 400 °C to 600 °C	1.5 °C	
	> 600 °C to 1 000 °C	1.8 °C	
	> 1 000 °C to 1 200 °C	2.7 °C	

* ค่าความไม่แน่นอน (±) ที่ระดับความเชื่อมั่นประมาณ 95%

Temperature Conversion Table

TEMPERATURE EQUIVALENT							
°C	°F	°C	°F	°C	°F	°C	°F
-200	-328	25	77	240	464	540	1004
-180	-292	30	66	250	482	550	1022
-160	-256	35	95	260	500	560	1040
-140	-220	40	104	270	518	570	1058
-120	-184	45	113	280	536	580	1076
-100	-148	50	122	290	554	590	1094
-95	-139	55	131	300	572	600	1112
-90	-130	60	140	310	590	610	1130
-85	-121	65	149	320	608	620	1148
-80	-112	70	158	330	626	630	1166
-75	-103	75	167	340	644	640	1184
-70	-94	80	176	350	662	650	1202
-65	-85	85	185	360	680	660	1220
-60	-76	90	194	370	698	670	1238
-55	-67	95	203	380	716	680	1256
-50	-58	100	212	390	734	690	1274
-45	-49	110	230	400	752	700	1292
-40	-40	120	248	410	770	710	1310
-35	-31	130	266	420	788	720	1328
-30	-22	140	284	430	806	730	1346
-25	-13	150	302	440	824	740	1364
-20	-4	160	320	450	842	750	1382
-15	5	170	338	460	860	760	1400
-10	14	180	356	470	878	770	1418
-5	23	190	374	480	896	780	1436
0	32	200	392	490	914	790	1454
5	41	210	410	500	932	800	1472
10	50	212	414	510	950	810	1490
15	59	220	428	520	968	820	1508
20	68	230	446	530	986	830	1528

MM TO INCE EQUIVALENT			
1mm = 0.039 in.	8mm = 0.315 in.	15mm = 0.590 in.	22mm = 0.866 in.
2mm = 0.079 in.	9mm = 0.354 in.	16mm = 0.630 in.	23mm = 0.905 in.
3mm = 0.118 in.	10mm = 0.394 in.	17mm = 0.669 in.	24mm = 0.944 in.
4mm = 0.157 in.	11mm = 0.433 in.	18mm = 0.709 in.	25mm = 0.984 in.
5mm = 00.179 in.	12mm = 0.472 in.	19mm = 0.748 in.	25.4mm = 1.0 in.
6mm = 0.236 in.	13mm = 0.512 in.	20mm = 0.787 in.	
7mm = 0.276 in.	14mm = 0.551 in.	21mm = 0.827 in.	

AREA EQUIVALENT						
To / From	cm^2	m^2	km^2	in^2	ft^2	$mile^2$
cm^2	1	0.0001	$1x10^{-10}$	0.155	0.00108	$3.86x10^{-11}$
m^2	$1x10^4$	1	$1x10^{-6}$	1560	10.76	$3.86x10^{-7}$
km^2	$1x10^{10}$	$1x10^5$	1	$1055x10^9$	$1.08x10^7$	0.3861
in^2	6.452	$6.45x10^{-4}$	$6.45x10^{-10}$	1	0.0694	$2.49x10^{-10}$
ft^2	929	0.0929	$2.29x10^{-8}$	144	1	$3.59x10^{-8}$
$mile^2$	$2.59x10^{10}$	$2.59x10^5$	2.59	$4.01x10^9$	$2.79x10^7$	1

VELOCITY EQUIVALENT					
To / From	mm/s	ft/min	cm/s	ft/s	m/s
mm/s	1	0.19685	0.1	0.003281	0.001
ft/min	5.08	1	0.508	0.016667	0.00508
cm/s	10	1.9685	1	0.032808	0.01
ft/s	304.8	60	30.48	1	0.3048
m/s	1,000	196.85	100	3.2808	1

PRESSURE EQUIVALENT											
To / From	PSI	kPa	kg/cm2	cm H2O	feet H2O	inches Hg	mm Hg	inches H2O	Atm.	Bar	mPa
PSI	1	6.894757	0.070307	70.306927	2.306723	2.03602	51.71486	27.68068	0.068046	0.0689476	0.00689
kPa	0.1450377	1	0.0101972	10.19745	0.3345618	0.2952997	7.50061	4.01472	0.0096692	0.01	0.001
kg/cm2	14.223343	98.06694	1	1,000.03	32.809312	28.95901	735.5588	393.71181	0.9678416	0.9806649	0.09806
cm H2O	0.0142229	0.0980634	0.001	1	0.032808	0.0289581	0.735537	0.3937	0.0009678	0.0009806	0.00098
feet H2O	0.433515	2.968961	0.0304791	30.48	1	0.882646	22.4192	12	0.029499	0.0296896	0.00298
inches Hg	0.4911542	3.386389	0.0345316	34.53253	1.132957	1	25.4	13.595484	0.0334211	0.0338639	0.00386
mm Hg	0.0193368	0.1333225	0.0013595	1.359554	0.0446046	0.0393701	1	0.535255	0.0013158	0.0013332	0.00013
inches H2O*	0.0361263	0.2490819	0.0025422	2.54	0.08333	0.0735539	1.868268	1	0.0024583	0.0024908	0.000249
Atm.	14.696	101.32535	1.033231	1,033.26	33.8995	29.9213	760	406.794	1	1.0132535	0.1013
Bar	14.5038	100	1.019716	1019.7466	33.4833	29.53	750.0626	401.8596	0.986923	1	0.1

Heater

FORMULAS

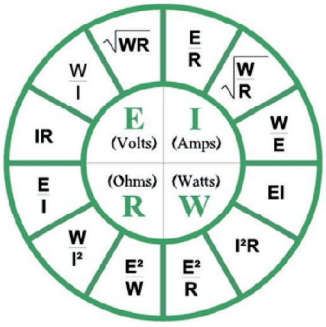
OHMS

$$\text{Ohms} = \frac{\text{VOLTS}^2}{\text{WATTS}}$$

$$\text{Ohms} = \frac{\text{VOLTS}}{\text{AMPERES}}$$

$$\text{Ohms} = \frac{\text{WATTS}^2}{\text{AMPERES}}$$

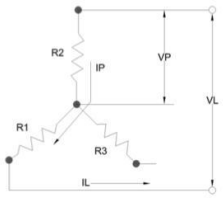
$$\text{3 PHASE AMPERES} = \frac{\text{TOTAL WATTS}}{\text{VOLTS x 1.732}}$$



3 PHASE WYE (BALANCED LOAD)

$I_P = I_L$

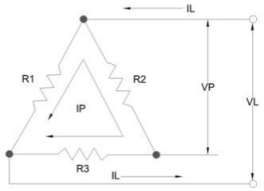
$V_P = \frac{V_L}{1.73}$



3-PHASE DELTA (BALANCED LOAD)

$I_P = \frac{I_L}{1.73}$

$V_P = V_L$



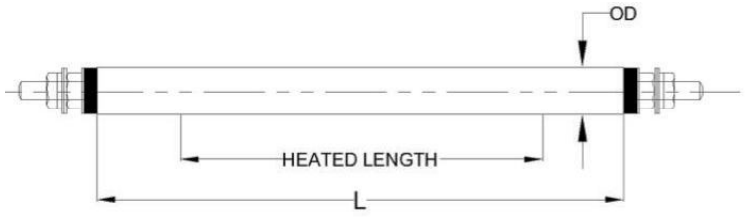
ESTIMATE OF WATTAGE REQUIREMENTS

$$\text{KW} = \frac{\text{WEIGHT (KG) x SPECIFIC HEAT x TEMPERATURE RISE (°C)}}{860} \times \text{HEAT UP TIMES (HRS) + LOSS + } \alpha$$

SPECIFIC HEATED

SUBSTANCE	KCAL / KG
ALUMINIUM	0.23
COPPER	0.1
STAINLESS	0.11
GLASS	0.186
RUBBER	0.27 - 0.48
STEEL / IRON	0.12
BENZINE	0.45
ZINC	0.095
WATER	1
ALCHOL	0.65
HELIUM	1.25
ETHYLENE	0.4
CO2	0.203
NITROGEN	0.245
AIR	0.237

WATTS DENSITY



$$\text{WATT DENSITY} = \frac{\text{WATTS}}{\text{OD OF HEATERS (CM) x 3.14 x HEATED LENGTH (CM)}}$$

Heater

MAXIMUM WATT DENSITY OF EACH HEATER

HEATER	WATTS DENSITY	MAX TEMPERATURE
BAND HEATER	4 - 5 W/CM^2	-
CARTRIDGE HEATER	15 W/CM^2	-
SHEATH HEATER		
• WATER	8.0 W/CM^2	100 °C
• MACHINING OIL	2.8 W/CM^2	120 °C
• COATING BATH	3.8 W/CM^2	200 °C
WITHOUT OIL	3.0 W/CM^2	300 °C

USAGE TEMPERATURE OF SHEATH HEATER

APPLICATION	TEMPERATURE
WATER	100 °C
AIR	120 °C
STEAM	100 - 450 °C
OIL	260 °C
ELECTRIC FURNACE	540 °C
ANNEAL	580 °C

SHEATH HEATER WITH CURRENT CAPACITY

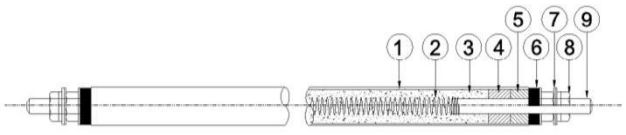
SHEATH "OD"	TERMINAL	FITTING	CURRENT
Ø7, Ø8	Ø3.0	M3	10A
Ø9, Ø10	Ø4.0	M4	15A
Ø12, Ø14	Ø5.0	M5	25A
Ø16	Ø6.0	M6	35A

PROTECTION TUBE CHOICE

APPLICATION	PIPE MATERIAL
WATER	SUS316L
AIR	SUS321, SUS316L, INC800, INC600
OIL	SUS321, STPT
MOLD	SUS304, SUS321
CORROSION	SUS316L, INC800, INC600, TITANIUM

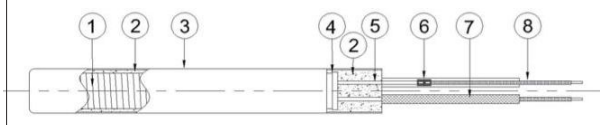
STRUCTURE OF HEATER

SHEATH HEATER



(1) SHEATH PIPE
(2) HEATING ELEMENT
(3) INSULATION POWDER
(4) SPECIAL INSULATOR-1
(5) SPECIAL INSULATOR-2
(6) TERMINAL INSULATOR
(7) WASHER
(8) NUT
(9) TERMINAL

CARTRIDGE HEATER



(1) HEATING ELAMENT
(2) INSULATION POWDER
(3) SHEATH PIPE
(4) CERAMIC CORE
(5) NIKEL PIN
(6) TERMINAL
(7) INSULATOR
(8) HEAT WIRE

Heater

APPLICATION

CARTRIDGE HEATER

Continues to provide superior heat transfer, uniform temperature and resistance to oxidation and corrosion even at high temperatures.

Applications

- Molds
- Dies
- Platens
- Hot plates

IMMERTION HEATER

Tubular elements and assemblies are primarily used for direct immersion in water oils, viscous materials, solvents, process wel as air and gases.

Heating assemblies, including

- Screw plug
- Flange
- Circulation

FINNED HEATER

Aluminized steel fins are attached in a way that maximizes surface and transferred into the air faster.

Applications

- Drying ovens
- Air heating
- Ink drying
- Moisture protection

TUBULAR HEATER

Tubular elements and assemblies are primarily used for direct immersion in water, oils, viscous materials, solvents, process wel as air and gases.

Heating assemblies, including

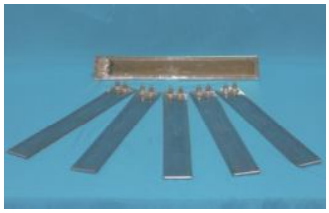
- Screw plug
- Flange
- Circulation

BAND HEATER

Operating temperature to 1400°F (760°C) make it possible to safely melt even the newest resins, like peek , Teflon

Applications

- Extruders
- Blown film dies
- Injection molding machines
- Other cylinder heating applications



STRIP HEATER / PLATE HEATER

The heater resheathed in rust-resistance steel or in stainless steel sheath as it provides strength and good thermal conductivity. These heater are available with various terminal

Option

Screw / Pin / Flexible lead wire

BOBBIN / PIPE HEATER

Robbin and pipe heater are inserted into a thermowell, offer a large heated area to the liquid. It is suitable for usage of oil, wax and fat. The advantage of this heater is, it can be removed for repair.

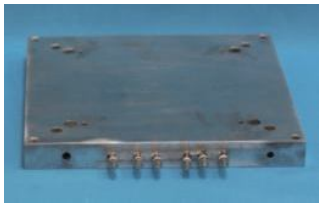
Heater

APPLICATION

HOT RUNNER

The heater can be formed into a compact coiled nozzle heater for use on plastic injection molding equipment supplying a full 360 degrees of heat with optional distributed wattage.

Flat spiral configurations are used in semiconductor manufacturing while a star wound cable is used for air and gas heating.



ALUMINIUM CATTING HERTER

The heater part consists of a formed cable or tubular heater cast into aluminum.
For high temperature applications, The part is then customized to meet specific application needs including machining, termination, coatings and assembly

INFRARED CERAMIC HEATER

Infrared heater provides medium wave infrared energy and fast heat up and cool down.
With element temperature around 1700°F (930°C) the heater produces infrared radiation with a peak energy wavelength of 2.5 microns.

Applications

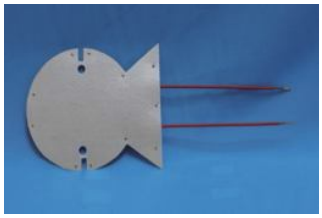
- Shrink packaging
- Vulcanizing and curing rubber
- Lamination
- Drying processes : photos, textiles, coatings and sand core castings.

SILICON RUBBER HEATER

Silicone rubber heaters is limited only by the imagination. With these heaters, heat can be placed where it is needed and operating temperatures up to 500°F (260°C)

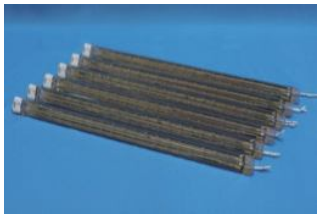
Applications

- Computer peripherals such as laser printers
- Curing of plastic laminates
- Photo processing equipment
- Semiconductor processing equipment
- Medical equipment such as blood analyzers and test tube heaters



MICA HEATER

Mica heaters are an excellent choice when cost and performance supersede substrate flexibility. Mica is a rigid substrate able to withstand very high temperatures and are suited for applications up to 500°F (260°C). Mica heaters can be configured in a wide range of sizes and watt densities. Mica heaters offer several distinct advantages over other flexible heater technologies, including extremely low leakage, lower material costs, and higher operating temperatures.



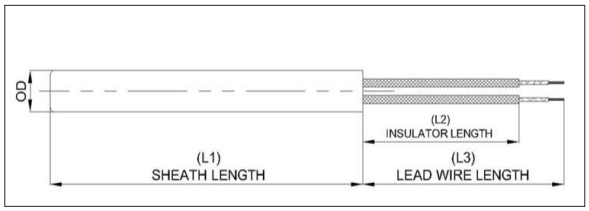
QUARTZ /INFRARED HEATER

Quartz infrared heating elements provide medium wave infrared radiation. They are favoured in industrial applications where a more rapid heater response is necessary, including systems with long heater off cycles.

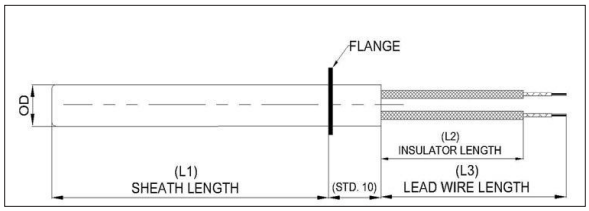
Heater

CARTRIDGE HEATER

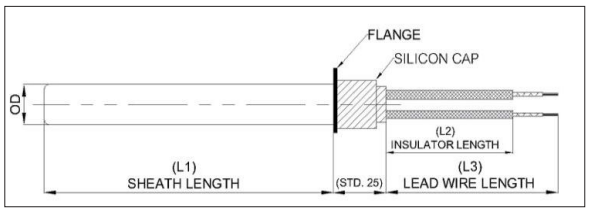
CARTRIDGE HEATER



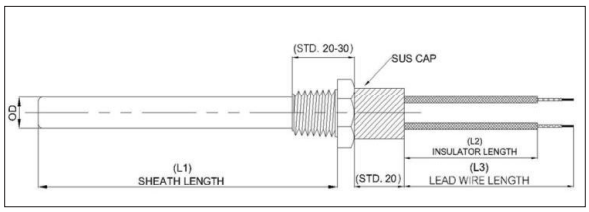
CARTRIDGE HEATER WITH FLANGE OR RING



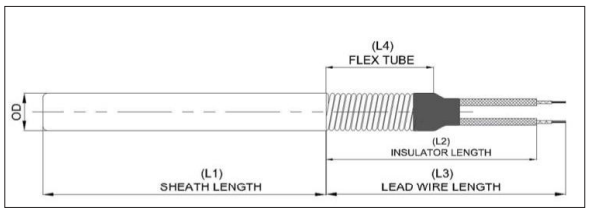
CARTRIDGE HEATER WITH FLANGE AND SILICON CAP



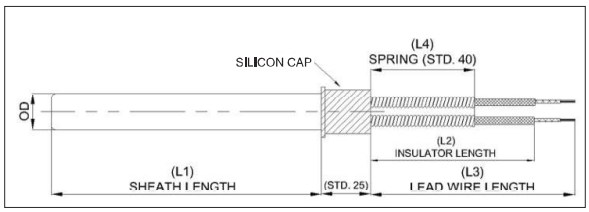
CARTRIDGE HEATER WITH SCREW



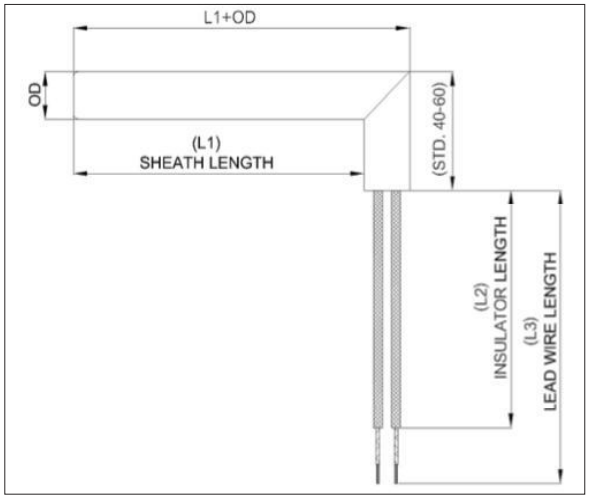
CARTRIDGE HEATER WITH FLEX TUBE



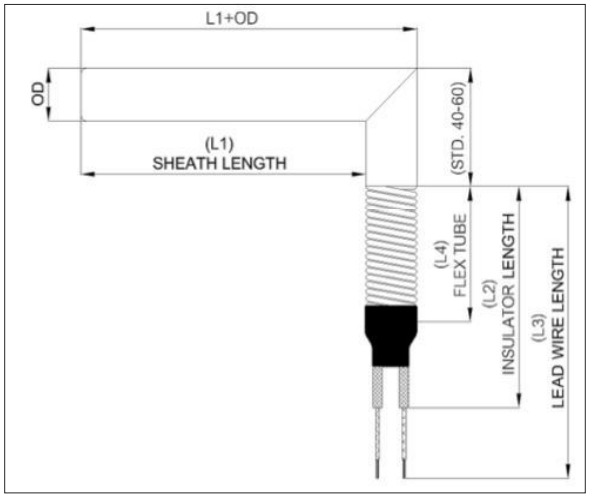
CARTRIDGE HEATER WITH SILICON CAP AND SPRING



CARTRIDGE HEATER " L " SHAPE

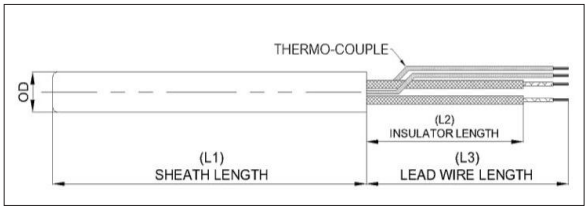


CARTRIDGE HEATER " L " SHAPE WITH FLEX TUBE

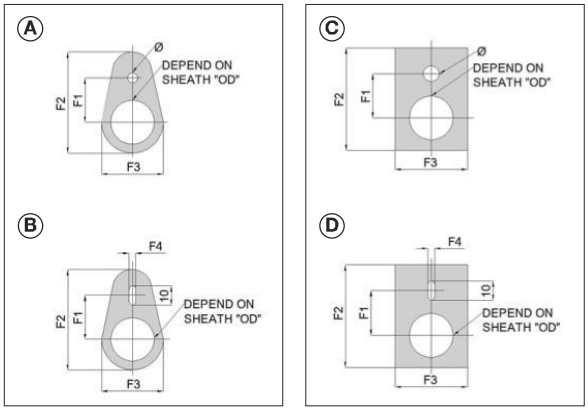


Heater

CARTRIDGE HEATER WITH THERMO - COUPLE



FLANGE



DATA REQUIREMENT FOR CARTRIDGE HEATER

1: Size OD [Ø] SEATH LENGTH L1 [mm]

2: Voltage V [V] W [W]

3: Insulator LENGTH L2 [mm]

4: Lead Wire LENGTH L3 [mm]

5: Accessories FLANGE [A | B | C | D] F1 [mm] F2 [mm] F3 [mm] F4 [mm]

SCREW [PT | PF] DIAMETER [Ø]

[FLEX TUBE | SPRING] L4 [Ø]

[SILICON CAP | SUS CAP]

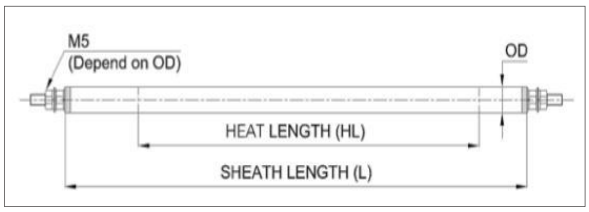
6: Usage Temp. TEMP. [°C]

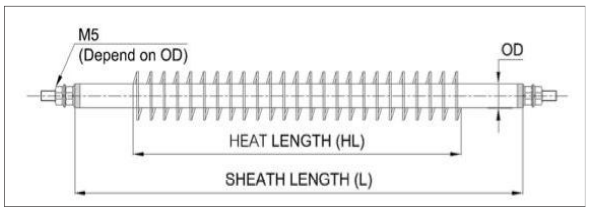
7: Other Information

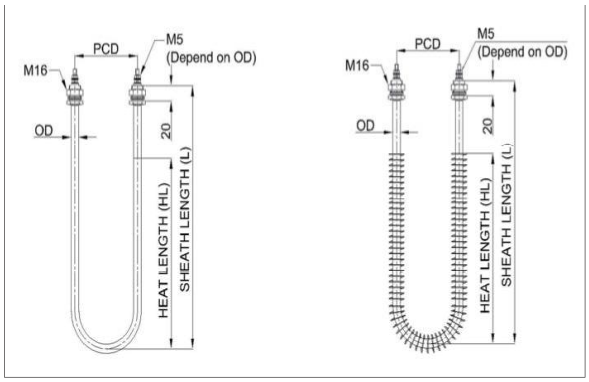
Heater

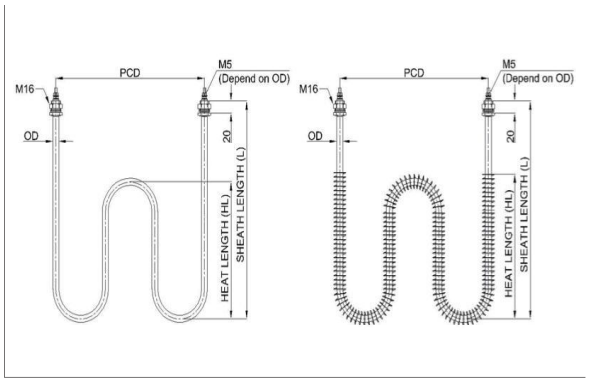
ORDERING FOR SHEATH HEATER

DRAWING









DATA REQUIREMENT FOR SHEATH HEATER

1: Size	OD	Ø	PCD	mm	SHEATH LENGTH L	mm	HEAT LENGTH HL	mm
2: Voltage	V	V	W	W				

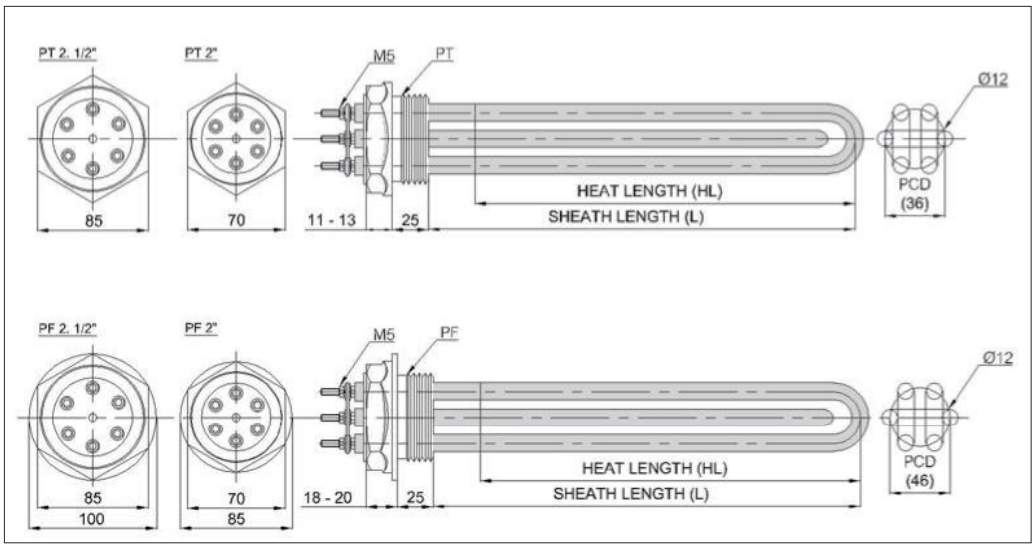
3: Type of Heater	Heater Only	Unit	Immersion	
4: Application	Water	Air	Oil	
5: Accessories	Fin	Flange	Terminal Screw	Terminall Box
6: Usage Temp.	TEMP.	°C		
7: In Case of Unit	WIRING	△	Y	SERIES / PARALLEL

8: Other Information

Heater

ORDERING FOR PLUG HEATER

DRAWING



DATA REQUIREMENT FOR PLUG HEATER

1: Size OD [Ø] SHEATH LENGTH L [mm] HEAT LENGTH HL [mm]

2: Plug TYPE [PT] [PF] MATERIAL [SUS] [IRON]

SCREW [2"] [2. ½"] [OTHER]

3: Voltage PHASE [P] V [V.] W [W.]

4: Wiring [△] [Y] [SERIES] [PARALLEL]

5: Application

WATER	OIL	OTHER
FOOD	MEDICAL	MACHINERY

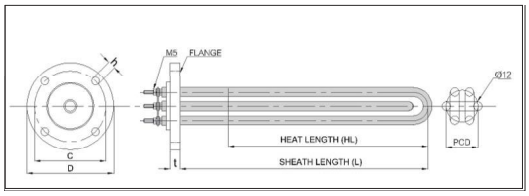
6: Usage Temp. TEMP. [°C]

7: Other Information

Heater

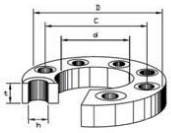
ORDERING FOR FLANGE HEATER

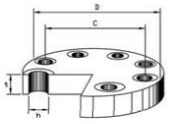
DRAWING



JIS B2220 – FLANGES 5K & 10K

(AVAILABLE IN CARBON STEEL AND 316L STAINLESS STEEL)





	JIS 5K								JIS 10K							
							Weight (kg)								Weight (kg)	
SIZE	d	D	C	No.	h	t	SO	BL	d	D	C	No.	h	t	SO	BL
10	17.8	75	55	4	12	9	0.27	0.3	17.8	90	65	4	15	12	0.52	0.54
15	22.2	80	60	4	12	9	0.3	0.4	22.2	95	70	4	15	12	0.57	0.61
20	27.7	85	65	4	12	10	0.37	0.5	27.7	100	75	4	15	14	0.73	0.79
25	34.5	95	75	4	12	10	0.45	0.6	34.5	125	90	4	19	14	1.13	1.24
32	43.2	115	90	4	15	12	0.78	0.9	43.2	135	100	4	19	16	1.48	1.66
40	49.1	120	95	4	15	12	0.83	1	49.1	140	105	4	19	16	1.56	1.81
50	61.1	130	105	4	15	14	1.07	1.4	61.1	155	120	8	19	16	1.88	2.23
65	77.1	155	130	4	15	14	1.49	2	77.1	175	140	8	19	18	2.6	3.24
80	90	180	145	4	19	14	1.99	2.7	90	185	150	8	19	18	2.61	3.5
90	102.6	190	155	4	19	14	2.09	3	102.6	195	160	8	19	18	2.76	4
100	115.4	200	165	8	19	16	2.39	3.7	115.4	210	175	8	19	18	3.14	4.6
125	141.2	235	200	8	19	16	3.23	5.2	141.2	250	210	8	23	20	4.77	7.3
150	166.6	265	230	8	19	18	4.41	7.5	166.6	280	240	8	23	22	6.34	10.1
175	192.1	300	260	8	23	18	5.51	9.5	192.1	302	265	12	23	22	6.82	11.8
200	218	320	280	8	23	20	6.33	12.2	218	330	290	12	23	22	7.53	14
250	269.5	385	345	12	23	22	9.45	19.3	269.5	400	355	12	25	24	11.8	22.7
300	321	430	390	12	23	22	10.3	24.3	321	445	400	16	25	24	13.5	29.5
350	358.1	480	435	12	24	24	14	33.2	358.1	490	445	16	25	26	16.4	37.1
400	409	540	495	16	24	24	16.9	41.9	409	560	510	16	27	28	23	52.5
450	460	605	555	16	24	24	21.6	53	460	620	565	20	27	30	29.5	68.8
500	511	655	605	20	24	24	23.1	61.9	511	675	620	20	27	30	33.5	82.1
550	562	720	665	20	26	26	30.3	81.2	562	745	680	20	33	32	43.1	105.8
600	613	770	715	20	26	26	32.7	93.2	613	795	730	24	33	32	45.7	120.2

DATA REQUIREMENT FOR FLANGE HEATER

1: Size OD [Ø] SHEATH LENGTH L [mm] HEAT LENGTH HL [mm]

2: Flange JIS5K [ ] JIS10K [ ]

MATERIAL [SUS] [IRON]

SPECIFY D [mm] C [mm] h [mm] t [mm]

3: Voltage PHASE [P] V [V.] W [W.]

4: Wiring [△] [Y] [SERIES] [PARALLEL]

5: Application [WATER] [OIL] [OTHER]
[FOOD] [MEDICAL] [MACHINERY]

6: Usage Temp. TEMP. [°C]

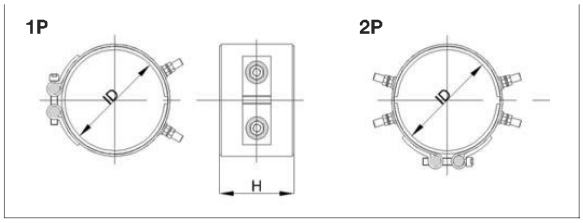
7: Other Information [ ]

Heater

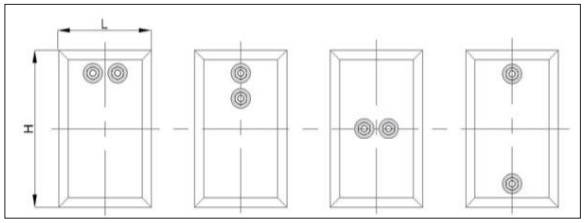
ORDERING FOR BAND AND STRIP HEATER

DRAWING

Band Heater



Strip Heater



DATA REQUIREMENT FOR BAND AND STRIP HEATER

1: Size	BAND HEATER	ID	Ø	H	mm	
	STRIP HEATER	L	mm	H	mm	
2: Shape	1P	2P	3P	4P		
3: Material	SUS304	BONDE RIZED	BRASS			
4: Voltage	V	V.	W	W.		
5: Position	TERMINAL SPECIFY					
	CLAMPING SPECIFY					
	LEAD WIRE LENGTH					
6: Usage Temp.	TEMP.	°C				
7: Accessories	SOCKET	COVER	TERMINAL BOX	OTHER		

8: Other Information

Heater

Heat Wire

600V LKGB

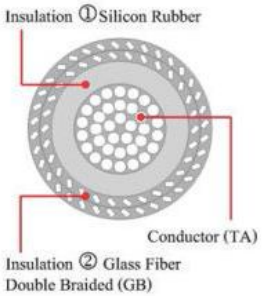
Temp. Range	Rated Voltage
- 60 - 180°C	600V

Silicon Rubber and Glass Fiber Double Braided (GB) Wire

Conductor : TA (Tin-coated Copper Wire)

Insulator : ① Silicon Rubber
② Glass Fiber Double Braided (GB)

Main Usage : As a lead wire for an Electric generator, an Electric Motor, an Electric Furnace, and Other.



Product	size	Standard electric current value	50°C	60°C	70°C	80°C	90°C	100°C	110°C	120°C	130°C	140°C	150°C	160°C	170°C
600V LKGB	0.5SQ	10	20.8	20	19.1	18.3	17.3	16.3	15.3	14.1	12.9	11.5	10	8.2	5.8
	0.75 SQ	14	29.1	28	26.8	25.6	24.2	22.9	21.4	19.8	18.1	16.2	14	11.4	8.1
	1.25 SQ	19	39.6	38	36.4	34.7	32.9	31	29	26.9	24.5	21.9	19	15.5	11
	2 SQ	27	56.2	54	51.7	49.3	46.8	44.1	41.2	28.2	34.9	31.2	27	22	15.6
	3.5 SQ	37	77	74	70.8	67.6	64.1	60.4	56.5	52.3	47.8	42.7	37	30.2	21.4
	5.5 SQ	49	102	98	93.8	89.5	84.9	80	74.8	69.3	63.3	56.6	49	40	28.3
	8 SQ	61	127	122	116.8	111.4	105.7	99.6	93.2	86.3	78.8	70.4	61	49.8	35.2
	14 SQ	88	183.2	176	168.5	160.7	152.4	143.7	134.4	124.5	113.6	101.6	88	71.9	50.8
	22 SQ	115	239.4	230	220.2	210	199.2	187.8	175.7	162.6	148.5	132.8	115	93.9	66.4
	38 SQ	162	337.2	324	310.2	295.8	280.6	264.5	247.5	229.1	209.1	187.1	162	132.3	93.5
	60 SQ	217	451.7	434	415.5	396.2	375.9	354.4	331.5	306.9	280.1	250.6	217	177.2	125.3
	80 SQ	257	535	514	492.1	469.2	445.1	419.7	392.6	363.5	331.8	296.8	257	209.8	148.4
	100 SQ	298	620.3	596	570.6	544.1	516.2	486.6	455.2	421.4	384.7	344.1	298	243.3	172.1
	150 SQ	395	822.3	790	756.4	721.2	684.2	645	603.4	558.6	509.9	456.1	395	322.5	228.1
	200 SQ	469	976.3	938	898.1	856.3	812.3	765.9	716.4	663.3	605.5	541.6	469	382.9	270.8
	250 SQ	556	1157	1112	1065	1015	963	907.9	849.3	786.3	717.8	642	556	454	321

FEP/ PFA/ ETFE/ PTFE

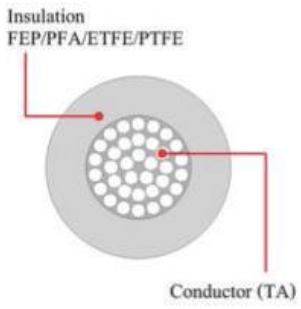
Temp. Range	Rated Voltage
-253 ~ 260°C	600V

Teflon (FEP/PFA/ETFE/PTFE) Wire

Conductor : TA (Tin-coated Copper Wire)

Insulator : ETFE (-100 ~ 150°C), FEP (-253 ~ 200°C), PFA (-195 ~ 260°C), PTFE (-253 ~ 260°C)

Main Usage : As a lead wire for an Electric generator, Heating apparatus, Refrigerator and Other



Heater

600V FRW

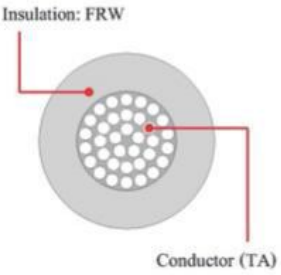
Flexible Fluorine-Contained Heat-resistant Rubber (FRW) Wire

Temp. Range	Rated Voltage
- 60 - 200°C	600V

Conductor : TA (Tin-coated Copper Wire)

Insulator : Flexible Fluorine-Contained Heat-resistant Rubber

Main Usage :
- As a lead wire for an Electric generator, Heating apparatus, Refrigerator and other
- As a lead wire for Heat-resistant Motor, Car, Work apparatus wiring, Wiring in the board which need a space-saving, Resistor, Anti- oil device, Measuring apparatus etc
- As a lead wire for wiring inside an equipment with a severe environmental condition



Product	size	Standard electric current value	50°C	60°C	70°C	80°C	90°C	100°C	110°C	120°C	130°C	140°C	150°C	160°C	170°C	180°C	190°C
600V FEP 600V FRW	0.3SQ	7	14.1	13.6	13.1	12.6	12.1	11.5	10.9	10.3	9.6	8.9	8.1	7.3	6.3	5.1	3.6
	0.5 SQ	10	20.1	19.4	18.7	18	17.2	16.4	15.6	14.7	13.7	12.7	11.6	10.4	9	7.3	5.2
	0.75 SQ	14	28.2	27.2	26.2	25.2	24.1	23	21.8	20.6	19.2	17.8	16.3	14.5	12.6	10.3	7.3
	1.25 SQ	19	38.2	36.9	35.6	34.2	32.7	31.2	29.6	27.9	26.1	24.2	22.1	19.7	17.1	14	9.9
	2 SQ	27	54.3	52.5	50.6	48.6	46.5	44.4	42.1	39.7	37.1	34.4	31.4	28.1	24.3	19.8	14
	3.5 SQ	37	74.5	71.9	69.3	66.6	63.8	60.8	57.7	54.4	50.9	47.1	43	38.5	33.3	27.2	19.2
	5.5 SQ	49	98.6	95.3	91.8	88.2	84.4	80.5	76.4	72	67.4	62.4	56.9	50.9	44.1	36	25.5
	8 SQ	61	122.8	118.6	114.3	109.8	105.1	100.2	95.1	89.7	83.9	77.6	70.9	63.4	54.9	44.8	31.7
	14 SQ	88	177.1	171.1	164.9	158.4	151.7	144.6	137.2	129.3	121	112	102.2	91.5	79.2	64.7	45.7
	22 SQ	115	231.4	223.6	215.5	207	198.2	189	179.3	169	158.1	146.4	133.6	119.5	103.5	84.5	59.8
	38 SQ	162	326	315	303.5	291.6	279.2	266.2	252.5	238.1	222.7	206.2	188.2	168.4	145.8	119	84.2
	60 SQ	217	436.7	421.9	406.5	390.6	374	356.6	338.3	318.9	298.3	276.2	252.1	225.5	195.3	159.5	112.8
	80 SQ	257	517.2	499.6	481.4	462.6	442.9	422.2	400.6	377.7	353.3	327.1	298.6	267	231.3	188.8	133.5
	100 SQ	298	599.7	579.3	558.3	536.4	513.5	489.6	464.5	437.9	409.6	379.2	346.2	309.6	268.2	218.9	154.8

NIGB

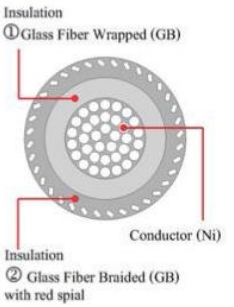
Glass Fiber Wrapped and Braided Insulation (GB) Wire

Max. Temp.	Rated Voltage
300°C	200V

Conductor : Nickel (Ni)

Insulator : ① Glass Fiber Wrapped (GB)
② Glass Fiber Braided (GB)

Main Usage :
- As a lead wire for Electric Furnace, High temperature Furnace, an Electric generator in high temperature etc.



Product	size	Standard electric current value	100°C	110°C	120°C	130°C	140°C	150°C	160°C	170°C	180°C	190°C
NIGB	0.75SQ	8	7.5	7.3	7.1	6.9	6.7	6.5	6.2	6.0	5.8	5.5
	1.25SQ	10	9.3	9.1	8.8	8.6	8.3	8.1	7.8	7.5	7.2	6.9
	2SQ	15	14	13.6	13.3	12.9	12.5	12.1	11.7	11.3	10.8	10.4
	3.5SQ	25	23.3	22.7	22.1	21.5	20.9	20.2	19.5	18.8	18.1	17.3
	5.5SQ	30	28	27.3	26.5	25.8	25	24.2	23.4	22.6	21.7	20.7
	8SQ	40	37.3	36.4	35.4	34.4	33.4	32.3	31.2	30.1	28.9	27.7
	14SQ	55	51.3	50	48.7	47.3	45.9	44.4	42.9	41.3	39.7	38
	22SQ	70	65.3	63.6	61.9	60.2	58.4	56.5	54.6	52.6	50.6	48.4
	38SQ	100	93.3	90.9	88.5	86	83.4	80.8	78	75.2	72.2	69.2
	size	Standard electric current value	200°C	210°C	220°C	230°C	240°C	250°C	260°C	270°C	280°C	290°C
	0.75SQ	8	5.3	5	4.7	4.4	4.1	3.7	3.3	2.9	2.4	1.7
	1.25SQ	10	6.6	6.3	5.9	5.5	5.1	4.7	4.2	3.6	2.9	2.1
	2SQ	15	9.9	9.4	8.8	8.3	7.7	7	6.3	5.4	4.4	3.1
	3.5SQ	25	16.5	15.6	14.7	13.8	12.8	11.7	10.4	9	7.4	5.2
	5.5SQ	30	19.8	18.8	17.7	16.6	15.3	14	12.5	10.8	8.8	6.3
	8SQ	40	26.4	25	23.6	22.1	20.4	18.7	16.7	14.4	11.8	8.3
	14SQ	55	36.3	34.4	32.4	30.3	28.1	25.6	22.9	19.9	16.2	11.5
	22SQ	70	46.2	43.8	41.3	38.6	35.8	32.6	29.2	25.3	20.6	14.6
	38SQ	100	65.9	62.6	59	55.2	51.1	46.6	41.7	36.1	29.5	20.9

Heater

NSBL

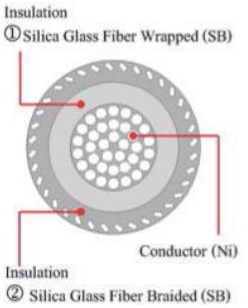
Max. Temp.	Rated Voltage
400°C	200V

Silica Glass Fiber Wrapped and Braided Insulation (SB) Wire

Conductor : Nickel (Ni)

Insulator : ① Silica Glass Fiber Wrapped (SB)
② Silica Glass Fiber Braided (SB)

Main Usage : As a lead wire for high temperature furnace and other high temperature apparatus, etc.



NSBL 6x4-I

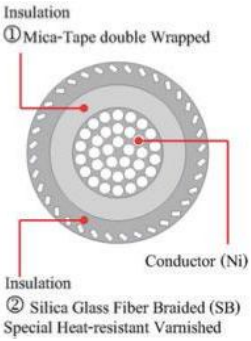
Max. Temp.	Rated Voltage
400°C	600V

Mica-Tape Double Wrapped and Silica Glass Fiber Braided Insulation (SB) Wire

Conductor : Nickel (Ni)

Insulator : ① Mica-Tape Double Wrapped
② Silica Glass Fiber Braided (SB),
Special Heat-resistant Varnished

Main Usage : As a lead wire for a high temperature furnace and high temperature apparatus, etc



Product	size	Standard electric current value	150°C	200°C	210°C	220°C	230°C	240°C	250°C	260°C	270°C	280°C	
	0.75SQ	10	10.4	9.3	9.1	8.8	8.6	8.3	8.1	7.8	7.5	7.2	
	1.25SQ	15	15.6	14	13.6	13.3	12.9	12.5	12.1	11.7	11.3	10.8	
	2SQ	20	20.9	18.7	18.2	17.7	17.2	16.7	16.2	15.6	15	14.4	
	3.5SQ	30	31.3	28	27.3	26.5	25.8	25	24.2	23.4	22.6	21.7	
	5.5SQ	40	41.7	37.3	36.4	35.4	34.4	33.4	32.3	31.2	30.1	28.9	
	8SQ	50	52.1	46.6	45.4	44.2	43	41.7	40.4	39	37.6	36.1	
	14SQ	70	73	65.3	63.6	61.9	60.2	58.4	56.5	54.6	52.6	50.6	
	22SQ	90	93.8	83.9	81.8	79.6	77.4	75.1	72.7	70.2	67.7	65	
	38SQ	130	135.5	121.2	118.2	115	111.8	108.4	105	101.4	97.7	93.9	
	60SQ	170	177.2	158.5	154.5	150.4	146.2	141.8	137.3	132.6	127.8	122.8	
	size	Standard electric current value	290°C	300°C	310°C	320°C	330°C	340°C	350°C	360°C	370°C	380°C	390°C
NSBL 6x4-I	0.75SQ	10	6.9	6.6	6.3	5.9	5.5	5.1	4.7	4.2	3.6	2.9	2.1
	1.25SQ	15	10.4	9.9	9.4	8.8	8.3	7.7	7	6.3	5.4	4.4	3.1
	2SQ	20	13.8	13.2	12.5	11.8	11	10.2	9.3	8.3	7.2	5.9	4.2
	3.5SQ	30	20.7	19.8	18.8	17.7	16.6	15.3	14	12.5	10.8	8.8	6.3
	5.5SQ	40	27.7	26.4	25	23.6	22.1	20.4	18.7	16.7	14.4	11.8	8.3
	8SQ	50	34.6	33	31.3	29.5	27.6	25.5	23.3	20.9	18.1	14.7	10.4
	14SQ	70	48.4	46.2	43.8	41.3	38.6	35.8	32.6	29.2	25.3	20.6	14.6
	22SQ	90	62.2	59.3	56.3	53.1	49.7	46	42	37.5	32.5	26.5	18.8
	38SQ	130	89.9	85.7	81.3	76.7	71.7	66.4	60.6	54.2	47	38.3	27.1
	60SQ	170	117.6	112.1	106.3	100.3	93.8	86.8	79.3	70.9	61.4	50.1	35.4
	80SQ	220	152.1	145.1	137.6	129.7	121.4	112.4	102.6	91.7	79.5	64.9	45.9
	100SQ	240	166	158.3	150.1	141.5	132.4	112.6	111.9	100.1	86.7	70.8	50

Heater

TYPE OF CONDUCTOR MATERIAL

Material Type	Symbols	Heat Resistance (temp.)	Density	Temp. Coefficient (20°C)	Resistance peculiar to volumeu Ω. Cm	Properties
Tin Coated Copper	TA	150°C	8.89	0.0039	1.8	It is used widely because Copper wire is uniformly electricitycoated by Tin. The soldering characteristics are good.
Silver-Coated Copper	SA	200°C	8.95	0.0039	1.72	Heat Resistance is improved because Copper wire is uniformly electricity-coated by Silver.
Nickel-Coated Copper	NA	260°C	8.89	0.004	1.83	Excellence in Heat Resistance because Copper wire is uniformly electricity-coated by Nickle.
Nickel	Ni	500°C	8.79	0.006	9.6	To be use in high temperature, Excellence in Anticorrosion.
28 % Nickel Coated copper	28N	400°C	8.8	0.0039	2.46	This conductor is coated by 28% Nickle of peculiar to volume, it is of Super-Heat-resistant to the temperature of 400°C, High conductivity as well.

THE TABLE OF PROPERTIED AND MATERIAL TYPE OF INSULATION AND SHEATH

Material Type		Symbols	Water-proof	Oil-proof	Chemical-proof	Environment	Insulation Resistance	Cold-proof(°C)	Temp. proof(°C)
Braided	Glass Fiber	GB	-	-	-	Excellent	Invalid	Frost	350
	Silica Glass Fiber	SB	-	-	-	Excellent	Invalid	Frost	700
	Alumina Fiber	CB	-	-	-	Excellent	Invalid	Frost	1100
Teflon®	Flexible Teflon®	FRW	Good	Good	Good	Invalid	Excellent	-60	200
	FEP	FEB	Excellent	Excellent	Excellent	Invalid	Excellent	-253	200
	PFA	PFA	Good	Excellent	Excellent	Invalid	Excellent	-195	260
	PTFE	PTFE	Excellent	Excellent	Excellent	Invalid	Excellent	-253	260
	ETFE	ETFE	Good	Excellent	Excellent	Invalid	Excellent	-100	150
	Elastomer	SPH	Good	Good	Good	Good	Excellent	-60	135
Others	Silicone Rubber	K	Normal	Invalid	Normal	Good	Good	-60	180

Digital Controller

SHIMADEN

SR1 / SR3 / SR4 36P Series

BASIC FEATURES

- Multi-input and multi-range performance
- Large 20mm bright display (SR3)
- Dust and splash proof front panel NEMA4X / IP66

ORDERING INFORMATION

ITEM	CODE			SPECIFICATIONS
SERIES	SR1—			MPU-Based Auto-Tuning PID Digital Controller, DIN H48 x W48 x D111mm
	SR3—			MPU-Based Auto-Tuning PID Digital Controller, DIN H96 x W96 x D111mm
	SR4—			MPU-Based Auto-Tuning PID Digital Controller, DIN H96 x W48 x D111mm
INPUT		8	Multi input	Thermocouple: B, R, S, K, E, J, T, N, PLII, WRe5-26 {U, L (DIN 43710)}
				R.T.D.: Pt100/JPt100
				Voltage(mV): -10~10, 0~10, 0~20, 0~50, 10~50, 0~100mV DC
		6		Voltage (V): -1~1, 0~1, 0~2, 0~5, 1~5, 0~10V DC
				Current (mA): 0~20mA DC:(V) 0~5V DC, 4~20mA DC:(V) 1~5V DC (applied via enclosed 250 Ω shunt resistor)
				Scaling possible Range : -1999~9999 Span : 10~5000
CONTROL OUTPUT		Y—		Contact 1a Contact capacity: 240V AC 2.0A/resistive load Proportional cycle: 1~120 seconds
		I—		Current 4~20mA DC Load Resistance: 600 Ω max.
		P—		SSR drive voltage 12V ±1.5V DC 30mA max. Proportional cycle:1~120 seconds
		V—		Voltage 0~10V DC Load current: 2mA max.
EVENT OUTPUT			1	Event output (1a) x 2 points, Contact capacity: 240V AC 1A/resistive load
REMARKS			W	Without
			X	With (Please consult before ordering.)

MEASURING RANGE CODES

Type of input		Code	Scaling range	
Thermocouple	B *1	01	0 ~ 1800 °C	0 ~ 3300 °F
	R	02	0 ~ 1700 °C	0 ~ 3100 °F
	S	03	0 ~ 1700 °C	0 ~ 3100 °F
	K *3	04	−199.9 ~ 400.0 °C	−300 ~ 750 °F
		05	0.0 ~ 800.0 °C	0 ~ 1500 °F
		06	0 ~ 1200 °C	0 ~ 2200 °F
	E	07	0 ~ 700 °C	0 ~ 1300 °F
	J	08	0 ~ 600 °C	0 ~ 1100 °F
	T *3	09	−199.9 ~ 200.0 °C	−300 ~ 400 °F
	N	10	0 ~ 1300 °C	0 ~ 2300 °F
	PLII *4	11	0 ~ 1300 °C	0 ~ 2300 °F
	WRe5-26 *5	12	0 ~ 2300 °C	0 ~ 4200 °F
	U *2, *3	13	−199.9 ~ 200.0 °C	−300 ~ 400 °F
	L *2	14	0 ~ 600 °C	0 ~ 1100 °F
R.T.D.	Pt100	31	−200 ~ 600 °C	−300 ~ 1100 °F
		32	−100.0 ~ 100.0 °C	−150.0 ~ 200.0 °F
		33	−50.0 ~ 50.0 °C	−50.0 ~ 120.0 °F
		34	0.0 ~ 200.0 °C	0.0 ~ 400.0 °F
	JPt100	35	−200 ~ 500 °C	−300 ~ 1000 °F
		36	−100.0 ~ 100.0 °C	−150.0 ~ 200.0 °F
		37	−50.0 ~ 50.0 °C	−50.0 ~ 120.0 °F
		38	0.0 ~ 200.0 °C	0.0 ~ 400.0 °F

Type of input		Code	Scaling range
Voltage (mV)	−1010 ~	71	Optional setting of Measuring range is possible by the scaling function as shown below. Scaling range: 1999~9999 count Span: 10~5000 count Lower limit value < Upper limit value Position of decimal point : None : Decimal point below digits, 1, 2, 3
	0 ~ 10	72	
	0 ~ 20	73	
	0 ~ 50	74	
	10 ~ 50	75	
	0 ~100	76	
Voltage (V)	−11 ~	81	
	0 ~ 1	82	
	0 ~ 2	83	
	0 ~ 5	84	
	1 ~ 5	85	
	0 ~10	86	

Note : *1 Ther mocouple B: Accuracy guarantee not applicable Temp. below 400 °C
*2 Thermocouple U, L: DIN 43710
*3 Thermocouple K, T, U: Accuracy guarantee not applicable Temp below −100.0°C. ± (1.0%FS+1digit) & −100.0 ~ 0.0 °C ± (0.5%FS+1digit)
*4 Thermocouple PLII: Platinel
*5 Thermocouple WRe5-26: ASTM988
*Unless otherwise specified, following setting will be applied for shipment.

Input	Specification/Rating	Measuring range
Multi input	K thermocouple	0.0~800.0C
Voltage (V)	0~10V DC	0.0~100.0

Control Output	Control Mode
Y	ON-OFF (P=OFF)
I, P, V	PID Control (P=3.0)

Digital Controller

SHIMADEN

SR90 Series

BASIC FEATURES

- Multi-input and multi-range performance
- Large 20mm bright display (SR93)
- Readable from a distance and in a low light area
- 2-output heating and cooling control available
- RS232C or RS485 interface available
- Dust and splash proof front panel equivalent to IP66
- A wide selection of additional functions (optional) is available to suit various needs.

ORDERING INFORMATION SR91

ITEM	CODE			SPECIFICATIONS	
SERIES	SR91-			MPU-Based Auto-Tuning PID Digital Controller, DIN H48 x W48 x D110mm	
INPUT	8	Multi input		Thermocouple: B, R, S, K, E, J, T, N, PLII, Wre5-26 {U, L (DIN 43710)} R.T.D.: Pt100Ω /JPt100Ω Voltage: -10~10, 0~10, 0~20, 0~50, 10~50, 0~100mV DC	For voltage and current input: Scaling Possible Range: -1999~9999 Span: 10~5000 Note: Inverse scaling is not possible
	4			Current (mA): 0~20, 4~20mA DC Receiving impedance: 250 Ω	
	6			Voltage (V): -1~1, 0~1, 0~2, 0~5, 1~5, 0~10V DC	
CONTROL OUTPUT (1)	Y-			Contact: 1a, Contact capacity: 240V AC 2.5A/resistive load Proportional cycle: 1~120 sec.	
	I-			Current: 4~20mA DC Load resistance: 600Ω max.	
	P-			SSR drive voltage: 12V1.5V DC/30mA max. Proportional cycle: 1~120 sec.	
	V-			Voltage: 0~10V DC Load current: 2mA max.	
POWER SUPPLY	90-			100~240V AC10%, 50/60Hz	
	08-			24V AC/DC10%, 50/60Hz	
EVENT OUTPUT (OPTION)	0			None	
	1			Contact output (2a) Ev1, Ev2: 240V AC 1A/resistive load	
OPTION			N	None	
	Control output (2)		Y	Contact: 1a, Contact capacity: 240V AC 2.5A/resistive load Proportional cycle: 1~120 sec.	
			I	Current: 4~20mA DC Load resistance: 600 Ω max.	
			P	SSR drive voltage: 12±1.5V DC/30mA max. Proportional cycle: 1~120 sec.	
			V	Voltage: 0~10V DC Load current: 2mA max.	
	Heater break alarm		1	Current setting range: 0.1~30.0A (with CT 30A)	Note: Available only when control output (1) is Y or P and when event output is selected.
			2	Current setting range: 0.1~50.0A (with CT 50A)	
	Analog output		3	Voltage: 0~10mV DC, Output resistance: 10 Ω	
			4	Current: 4~20mA DC, Load resistance: 300 Ω max.	
			6	Voltage: 0~10V DC, Load current: 2mA max.	
	Communication		5	RS-485	
	Set value bias		8	1 point (setting range: -1999~5000), Non-voltage contact or Open collector input Open collector input rating: approx. 5V/1mA max.	
REMARKS			0	Without	
			9	With (Please consult before ordering.)	

Note:
- When you purchase a two-output type controller and use it in a one output capacity, larger overshooting or undershooting may ha a result of integral operation.
- Therefore, we recommend you to choose a one-output type.
- The cause of the above-mentioned problem is that the positional relationship between the proportional band (PB) and the set val of a one-output type controller differs from that of a two-output type.

Digital Controller

SHIMADEN

SR90 Series

ORDERING INFORMATION SR92

- Multi-input and multi-range performance
- Large 20mm bright display (SR3)
- Dust and splash proof front panel NEMA4X / IP66

ORDERING INFORMATION

ITEM	CODE			SPECIFICATIONS
SERIES	SR92-			MPU-Based Auto-Tuning PID Digital Controller, DIN H72 x W72 x D110mm
INPUT	8	Multi input		Thermocouple: B, R, S, K, E, J, T, N, PLII, Wre5-26 {U, L (DIN 43710)} R.T.D.: Pt100Ω /JPt100Ω Voltage (mV): -10~10, 0~10, 0~20, 0~50, 10~50, 0~100mV DC For voltage and current input: Scaling Possible Range: -1999~9999 Span: 10~5000 Note: Inverse scaling is not possible.
	4			Current (mA): 0~20, 4~20mA DC Receiving impedance: 250Ω
	6			Voltage (V): -1~1, 0~1, 0~2, 0~5, 1~5, 0~10V DC Input resistance: 500kΩ min.
CONTROL OUTPUT (1)	Y-			Contact: 1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1~120 sec.
	I-			Current: 4~20mA DC Load resistance: 600Ω max.
	P-			SSR drive voltage: 12V±1.5V DC/30mA max. Proportional cycle: 1~120 sec.
	V-			Voltage: 0~10V DC Load current: 2mA max.
CONTROL OUTPUT (2) (OPTION)	N-			None
	Y-			Contact: 1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1~120 sec.
	I-			Current: 4~20mA DC Load resistance: 600Ω max. (RA when shipped)
	P-			SSR drive voltage: 12V±1.5V DC/30mA max. Proportional cycle: 1~120 sec.
	V-			Voltage: 0~10V DC Load current: 2mA max.
POWER SUPPLY		90-		100V~240V AC ±10%, 50/60Hz
		08-		24V AC/DC±10%, 50/60Hz
EVENT OUTPUT/ HEATER BREAK ALARM (OPTION)			0	None
			1	Event output (2a) Ev1, Ev2 Contact capacity: 240V AC 1A/resistive load
			2	Event output (Ev1) + Heater break alarm (with CT30A)
			3	Event output (Ev1) + Heater break alarm (with CT50A) Note: Available only when control output (1) is Y or P is selected.
ANALOG OUTPUT (OPTION)			0	None
			3	Voltage: 0~10mV DC, Output resistance: 10Ω
			4	Current: 4~20mA DC, Load resistance: 300Ω max.
			6	Voltage: 0~10V DC, Load current: 2mA max.
COMMUNICATION OR SV BIAS (OPTION)			0	None
			5	RS-485
			7	RS-232C
			8	1 point (setting range: -1999~5000), Non-voltage contact or Open collector input Open collector input rating: approx. 5V/1mA max.
REMARKS				0 Without
				9 With (Please consult before ordering.)

Note:

- When you purchase a two-output type controller and use it in a one output capacity, larger overshooting or undershooting may happen as a result of integral operation. Therefore, we recommend you to choose a one-output type.
- A result of integral operation. Therefore, we recommend you to choose a one-output type.
- The cause of the above-mentioned problem is that the positional relationship between the proportional band (PB) and the set value (SV) of a one-output type controller differs from that of a two-output type.

Digital Controller

SHIMADEN

SR90 Series

ORDERING INFORMATION SR93 / SR94

ITEM	CODE							SPECIFICATIONS
SERIES	SR93-							MPU-Based Auto-Tuning PID Digital Controller, DIN H96 × W96 × D110mm
	SR94-							MPU-Based Auto-Tuning PID Digital Controller, DIN H96 × W48 × D110mm
INPUT		8						Thermocouple: B, R, S, K, E, J, T, N, PLII, Wre5-26 {U, L (DIN 43710)} R.T.D.: Pt100Ω / JPt100Ω Voltage: -10~10, 0~10, 0~20, 0~50, 10~50, 0~100mV DC For voltage and current input: Scaling Possible, Range: -1999~9999, Span: 10~5000, Note: Inverse scaling is not possible
		4						Current (mA): 0~20, 4~20mA DC Receiving impedance: 250Ω
		6						Voltage (V): -1~1, 0~1, 0~2, 0~5, 0~10V DC Load resistance: 600Ω max.
CONTROL OUTPUT (1)			Y-					Contact: 1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1~120 sec.
			I-					Current: 4~20mA DC Load resistance: 600Ω max.
			P-					SSR drive voltage: 12V ± 1.5V DC/30mA max. Proportional cycle: 1~120 sec.
			V-					Voltage: 0~10V DC Load current: 2mA max.
CONTROL OUTPUT (2) (OPTION)				N-				None
				Y-				Contact: 1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1~120 sec.
				I-				Current: 4~20mA DC Load resistance: 600Ω max.
				P-				SSR drive voltage: 12V ± 1.5V DC/30mA max. Proportional cycle: 1~120 sec.
				V-				Voltage: 0~10V DC Load current: 2mA max.
POWER SUPPLY					90-			100~240V AC±10%, 50/60Hz
					08-			24V AC/DC±10%, 50/60Hz
EVENT OUTPUT/ HEATER BREAK ALARM (OPTION)						0		None
						1		Event output (2a) Ev1, Ev2 Contact capacity: 240V AC 1A/resistive load
						2		Event output (Ev1) + Heater break alarm (with CT30A) Note: Available only when control output (1) is Y or P is selected.
						3		Event output (Ev1) + Heater break alarm (with CT50A)
OPTION							00	None
	Analog output						30	Voltage: 0~10mV DC, Output resistance: 10Ω
							40	Current: 4~20mA DC, Load resistance: 300Ω max.
							60	Voltage: 0~10V DC, Load current: 2mA max.
	Set value bias (S V bias)						08	1 point (setting range: -1999~5000), Non-voltage contact or Open collector input Open collector input rating: approx. 5V/1mA max.
	Analog output + Set value bias (S V bias)						38	Voltage: 0~10mV DC, Output resistance: 10Ω SV bias 1 point
							48	Current: 4~20mA DC, Load resistance: 300Ω max. SV bias 1 point
							68	Voltage: 0~10V DC, Load current: 2mA max. SV bias 1 point
	Communication						05	RS-485
							07	RS-232C
REMARKS							0	Without
							9	With (Please consult before ordering.)

Note:

- When you purchase a two-output type controller and use it in a one output capacity, larger overshooting or undershooting may happen as a result of integral operation. Therefore, we recommend you to choose a one-output type.
- The cause of the above-mentioned problem is that the positional relationship between the proportional band (PB) and the set value (SV) of a one-output type controller differs from that of a two-output type.

Digital Controller

SHIMADEN

SRS11A / 12A / 13A /14A Series

BASIC FEATURES

- Multi-input and multi-range performance
- Small instrument depths (62mm-65mm) save space, thus securing a larger installation area.
- SV setting: 3 points
- PID Value: 3 types
- 2-output heating and cooling control available (optional)
- Total 32 steps Program available (optional) (1-4 pattern, 32-8 step)
- RS-485 Interface available (optional) (Master/slave function, Modbus/Shimaden Protocol)
- Heater break/heater loop alarm (optional)
- A wide selection of additional functions (optional) is available to suit various needs.
- Possible to switch off SV/PV value by key operation
- Parameter mask (non-display) / lock (key lock) function

ORDERING INFORMATION

ITEM	CODE		SPECIFICATIONS	
SERIES	SRS11A-		DIN 48x48 Digital Controller	
INPUT	8	Multi-input	Thermocouple: B, R, S, K, E, J, T, N, PLII, WRe5-26, {U, L (DIN43710)}, AuFe-Cr	
			R.T.D.: Pt100/JPt100 Voltage (mV): -10 – 10, 0 – 10, 0 – 20, 0 – 50, 0 – 100, 10 – 50mV DC	Scaling Possible (inverse scaling impossible) Range: -1999 – 9999 Span: 10 – 10000
	6	Voltage (V)	-1 – 1, 0 – 1, 0 – 2, 0 – 5, 1 – 5, 0 – 10V DC Input resistance: Min. 500kΩ	
CONTROL OUTPUT 1	Y		Contact: 1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1 – 120 sec.	
	I		Current: 4 – 20mA DC Load resistance: 600Ω max.	
	P		SSR drive voltage: 12V±1.5V DC/30mA max. Proportional cycle: 1 – 120 sec.	
	V		Voltage: 0 – 10V DC Load current: 2mA max.	
CONTROL OUTPUT 2 (OPTION)	N-		None	
	Y-		Contact: 1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1 – 120 sec.	
	I-		Current: 4 – 20mA DC Load resistance: 600Ω max.	
	P-		SSR drive voltage: 12V±1.5V DC/30mA max. Proportional cycle: 0.5 – 120 sec.	
	V-		Voltage: 0 – 10V DC Load current: 2mA max.	
Additional event output	E-		Additional event output 1 point (EV3)	
Additional external control input signal (DI)	D-		Additional external control input 1 point (DI4)	
POWER SUPPLY	90-		100 – 240V AC±10%, 50/60Hz	
	08-		24V AC/DC±10%, 50/60Hz	
PROGRAM FUNCTION (OPTION)	N		None	
	P		Max. 4 patterns Total number of steps: 32	
EVENT OUTPUT (OPTION)	0		None	
	1		Event output 2 points (EV1, EV2)	
ANALOG OUTPUT/ CONNMMUNICATION FUNCTION (OPTION)	0		None	
	3		0 – 10mVDC Output resistance: 10Ω	
	4		4 – 20mADC Resistive load: 300Ω max.	
	6		0 – 10VDC Load current: 2mA max.	
	5		RS-485 (Shimaden standard protocol, MODBUS protocol)	
EXTERNAL INPUT CONTROL SIGNAL (DI)/ CT INPUT (OPTION)/**Note: CT sold separately**	0		None	
	1		CT input 2 points	Note: Available only when control output 1 or 2 is Y or P.
	2		Control input 3 points (DI1, DI2, DI3)	
REMARKS	0		Without	
	9		With	

Digital Controller

SHIMADEN

SRS11A / 12A / 13A /14A Series

ORDERING INFORMATION

ITEM	CODE		SPECIFICATIONS	
SERIES	SRS12A-		DIN 72x72 Digital Controller	
	SRS13A-		DIN 96x96 Digital Controller	
	SRS14A-		DIN 96x48 Digital Controller	
INPUT	8	Multi-input	Thermocouple: B, R, S, K, E, J, T, N, PLII, WRe5-26, {U, L (DIN43710)}, AuFe-Cr R.T.D.: Pt100/JPt100 Voltage (mV): -10 – 10, 0 – 10, 0 – 20, 0 – 50, 0 – 100, 10 – 50mV DC	Scaling Possible (inverse scaling impossible)
	6	Voltage (V)	-1 – 1, 0 – 1, 0 – 2, 0 – 5, 1 – 5, 0 – 10V DC Input resistance: Min. 500kΩ	Range: -1999 – 9999 Span: 10 – 10000
CONTROL OUTPUT 1	Y		Contact: 1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1 – 120 sec.	
	I		Current: 4 – 20mA DC Load resistance: 600Ω max.	
	P		SSR drive voltage: 12V±1.5V DC/30mA max. Proportional cycle: 1 – 120 sec.	
	V		Voltage: 0 – 10V DC Load current: 2mA max.	
CONTROL OUTPUT 2 (OPTION)	N-		None	
	Y-		Contact: 1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1 – 120 sec.	
	I-		Current: 4 – 20mA DC Load resistance: 600Ω max.	
	P-		SSR drive voltage: 12V±1.5V DC/30mA max. Proportional cycle: 1 – 120 sec.	
	V-		Voltage: 0 – 10V DC Load current: 2mA max.	
Additional event output	E-		Additional event output 1 point (EV3)	
Additional external control input signal (DI)	D-		Additional external control input 1 point (DI4)	
POWER SUPPLY	90-		100 – 240V AC±10%, 50/60Hz	
	08-		24V AC/DC±10%, 50/60Hz	
PROGRAM FUNCTION (OPTION)	N		None	
	P		Max. 4 patterns Total number of steps: 32	
EVENT OUTPUT (OPTION)	0		None	
	1		Event output 2 points (EV1, EV2)	
ANALOG OUTPUT (OPTION)	0		None	
	3		0 – 10mVDC Output resistance: 10Ω	
	4		4 – 20mADC Resistive load: 300Ω max.	
	6		0 – 10VDC Load current: 2mA max.	
CT INPUT (OPTION)/**Note: CT sold separately**	0		None	
	1		CT input 2 points	Note: Available only when control output 1 or 2 is Y or P.
EXTERNAL INPUT CONTROL SIGNAL (DI) (OPTION)	0		None	
	2		Control input 3 points (DI1, DI2, DI3)	
CONMMUNICATION FUNCTION (OPTION)	0		None	
	5		RS-485 (Shimaden standard protocol, MODBUS protocol)	
REMARKS	0		Without	
	9		With	

Digital Controller

SHIMADEN

SRS80 Series

BASIC FEATURES

- High accuracy: ± (0.25% FS + digit)
- Only SR83 (96 x 96) Large 20 mm bright display
  Make reading from long distance and low light location easier.
- 2-output heating and cooling control available for SR83 (96 x 96) and SR 84 (48 x 96)
- Auto tuning function for both heating and cooling outputs in a high performance individual expert PID control
- Both RS232C/RS485 and CC-Link are communication interface ready. (CC-Link available only for SR83)
- Dust and splash proof front panel Equivalent to IP66
- A wide selection of additional functions (optional) is available to suit various needs.

ORDERING INFORMATION

ITEMS	CODE	SPECIFICATIONS		
SERIES	SR82-	MPU-Based Auto-Tuning PID Digital Controller DIN H72 × W72 mm		
INPUT	1	Thermocouple	User-selectable inputs and ranges	
	2	R.T.D.	User-selectable ranges	
	3	DC Voltage	User-selectable 0~10, 10~50, -10~10, 0~20, 0~50, 0~100mV DC linear inputs	Programmable Range
	4	DC Current	User-selectable 4~20, 0~20mA DC linear inputs	
	6	DC Voltage	User-selectable 0~1, 1~5, -1~1, 0~2, 0~5, 0~10V DC linear inputs	
CONTROL OUTPUT 1	Y-	Contact	PB Cycle: 1~120 seconds, Contact Capacity: 240V AC 2.5A / resistive load, 1A / inductive load	
	I-	Current	4~20mA DC Load resistance: 600 Ω Max.	
	P-	SSR Voltage	PB Cycle 1~120 seconds, Output rating: 12V ±1.5V DC 30mA Max.	
	V-	Voltage	0~10V DC Maximum load current: 2mA Max.	
CONTROL OUTPUT 2	N-	None		
POWER SUPPLY	90-	100~240V AC ±10% 50/60Hz		
	10-	24V AC ±10% 50/60Hz		
	02-	24V DC ±10%		
EVENT OUTPUT (2 points) [OPTION]	0	None		
	1	Contact output, Contact capacity: 240V AC 1A / resistive load		
	2	Contact output + Heater break alarm (with 30A CT)		Selectable only for Y or P Control output
	3	Contact output + Heater break alarm (with 50A CT)		
REMOTE INPUT (Not selectable together with Heater break alarm function) [OPTION]	00	None		
	14	Current 4~20mA DC Receiving resistance: 250 Ω		Non-Isolated input
	15	Voltage 1~5V DC Input resistance: 500k Ω Min.		
	16	Voltage 0~10V DC Input resistance: 500k Ω Min.		
ANALOG OUTPUT (Not selectable together with Interface function) [OPTION]	0	None		
	3	Voltage 0~10mV DC, Output resistance: 10 Ω		
	4	Current 4~20mA DC, Load resistance: 300 Ω Max.		
	6	Voltage 0~10V DC, Load current: 2mA Max.		
INTERFACE FUNCTION (Not selectable together with Analog output function) [OPTION]	0	None		
	5	RS-485		
	7	RS-232C		
EXTERNAL INPUT CONTROL SIGNAL / SET VALUE BIAS [OPTION]	0	None		
	1	Control input 2 points, Non-voltage contact, Open collector input (about 5V / 2mA impress)		
REMARKS	0	Without		
	9	With (Please consult before ordering.)		

Digital Controller

SHIMADEN

SRS80 Series

ORDERING INFORMATION

ITEMS	CODE	SPECIFICATIONS		
SERIES	SR83-	MPU-Based Auto-Tuning PID Digital Controller DIN H96 × W96 mm		
INPUT	1	Thermocouple	User-selectable inputs and ranges	
	2	R.T.D.	User-selectable ranges	
	3	DC Voltage	User-selectable 0~10, 10~50, -10~10, 0~20, 0~50, 0~100mV DC linear inputs	Programmable Range
	4	DC Current	User-selectable 4~20, 0~20mA DC linear inputs	
	6	DC Voltage	User-selectable 0~1, 1~5, -1~1, 0~2, 0~5, 0~10V DC linear inputs	
CONTROL OUTPUT 1	Y-	Contact	PB Cycle: 1~120 seconds, Contact Capacity: 240V AC 2.5A / resistive load, 1A / inductive load	
	I-	Current	4~20mA DC Load resistance: 600 Ω Max.	
	P-	SSR Voltage	PB Cycle 1~120 seconds, Output rating: 12V ±1.5V DC 30mA Max.	
	V-	Voltage	0~10V DC Maximum load current: 2mA Max.	
CONTROL OUTPUT 2 [OPTION]	N-	None		
	Y-	Contact	PB Cycle: 1~120 seconds, Contact Capacity: 240V AC 2.5A / resistive load, 1A / inductive load	
	I-	Current	4~20mA DC Load resistance: 600 Ω Max.	
	P-	SSR Voltage	PB Cycle: 1~120 seconds, Output rating: 12V ±1.5V DC 30mA Max.	
	V-	Voltage	0~10V DC Maximum load current: 2mA Max.	
POWER SUPPLY	90-	100~240V AC ±10% 50/60Hz		
	10-	24V AC ±10% 50/60Hz		
	02-	24V DC ±10%		
EVENT OUTPUT (3 points) (2 points when 2 output option is added) [OPTION]	0	None		
	1	Contact output, Contact capacity: 240V AC 1A / resistive load		
	2	Contact output + Heater break alarm (with 30A CT)		Selectable only for Y or P Control output
	3	Contact output + Heater break alarm (with 50A CT)		
REMOTE INPUT (Not selectable together with Heater break alarm function) [OPTION]	00	None		
	14	Current 4~20mA DC Receiving resistance: 250 Ω		Non-Isolated input
	15	Voltage 1~5V DC Input resistance: 500k Ω Min.		
	16	Voltage 0~10V DC Input resistance: 500k Ω Min.		
ANALOG OUTPUT (Not selectable together with CC-Link function) [OPTION]	0	None		
	3	Voltage 0~10mV DC, Output resistance: 10 Ω		
	4	Current 4~20mA DC, Load resistance: 300 Ω Max.		
	6	Voltage 0~10V DC, Load current: 2mA Max.		
INTERFACE FUNCTION (When CC-Link function is selected, simultaneous selection of Analog output is not possible) [OPTION]	0	None		
	5	RS-485		
	7	RS-232C		
	8	CC-Link (Conforming with Mitsubishi Electric Company's CC-Link) (Not selectable together with Analog output function)		
EXTERNAL INPUT CONTROL SIGNAL / SET VALUE BIAS [OPTION]	0	None		
	1	Control input 2 points, Non-voltage contact, Open collector input (about 5V / 2mA impress)		
REMARKS	0	Without		
	9	With (Please consult before ordering.)		

Note: Selection together with ANALOG OUTPUT and INTERFACE FUNCTION (RS485 or RS232C) is possible.

Digital Controller

SHIMADEN

SRS80 Series

ORDERING INFORMATION

ITEMS	CODE	SPECIFICATIONS		
SERIES	SR84-	MPU-Based Auto-Tuning PID Digital Controller DIN H96 × W48 mm		
INPUT	1	Thermocouple	User-selectable inputs and ranges	
	2	R.T.D.	User-selectable ranges	
	3	DC Voltage	User-selectable 0~10, 10~50, -10~10, 0~20, 0~50, 0~100mV DC linear inputs	Programmable Range
	4	DC Current	User-selectable 4~20, 0~20mA DC linear inputs	
	6	DC Voltage	User-selectable 0~1, 1~5, -1~1, 0~2, 0~5, 0~10V DC linear inputs	
CONTROL OUTPUT 1	Y-	Contact	PB Cycle: 1~120 seconds, Contact Capacity: 240V AC 2.5A / resistive load, 1A / inductive load	
	I-	Current	4~20mA DC Load resistance: 600 Ω Max.	
	P-	SSR Voltage	PB Cycle: 1~120 seconds, Output rating: 12V ±1.5V DC 30mA Max.	
	V-	Voltage	0~10V DC Maximum load current: 2mA Max.	
CONTROL OUTPUT 2 [OPTION]	N-	None		
	Y-	Contact	PB Cycle: 1~120 seconds, Contact Capacity: 240V AC 2.5A / resistive load, 1A / inductive load	
	I-	Current	4~20mA DC Load resistance: 600 Ω Max.	
	P-	SSR Voltage	PB Cycle 1~120 seconds, Output rating: 12V ±1.5V DC 30mA Max.	
	V-	Voltage	0~10V DC Maximum load current: 2mA Max.	
POWER SUPPLY	90-	100~240V AC ±10% 50/60Hz		
	10-	24V AC ±10% 50/60Hz		
	02-	24V DC ±10%		
EVENT OUTPUT (3 points) (2 points when 2 output option is added) [OPTION]	0	None		
	1	Contact output, Contact capacity: 240V AC 1A / resistive load		
	2	Contact output + Heater break alarm (with 30A CT)		Selectable only for Y or P Control output
	3	Contact output + Heater break alarm (with 50A CT)		
REMOTE INPUT (Not selectable together with Heater break alarm function) [OPTION]	00	None		
	14	Current 4~20mA DC Receiving resistance: 250 Ω		Non-Isolated input
	15	Voltage 1~5V DC Input resistance: 500k Ω Min.		
	16	Voltage 0~10V DC Input resistance: 500k Ω Min.		
ANALOG OUTPUT (Not selectable together with Interface function) [OPTION]	0	None		
	3	Voltage 0~10mV DC, Output resistance: 10 Ω		
	4	Current 4~20mA DC, Load resistance: 300 Ω Max.		
	6	Voltage 0~10V DC, Load current: 2mA Max.		
INTERFACE FUNCTION (Not selectable together with Analog output function) [OPTION]	0	None		
	5	RS-485		
	7	RS-232C		
EXTERNAL INPUT CONTROL SIGNAL / SET VALUE BIAS [OPTION]	0	None		
	1	Control Input 2 points, Non-voltage contact, Open collector input (about 5V / 2mA impress)		
REMARKS	0	Without		
	9	With (Please consult before ordering.)		

Digital Controller

SHIMADEN

MR13 Series

BASIC FEATURES

- 3-channel controller, 3-channel input, 3-channel setting and simultaneous 3-channel display are possible
- Accuracy: ± (0.3% FS + 1 digit)
- Follow-up type PV input function
- Follow-up type SV setting function
- Remote/local and DI input function
- Programmable 1 pattern with 9-step function
- Included a new processing system, Expet PID, remarkably improved PID control efficiency; overshoot and undershoot are controlled effectively.
- Interface RS232/RS485

ORDERING INFORMATION

ITEMS	CODE									SPECIFICATIONS	
SERIES	MR13-									MPU-Based 3 Channel Auto-Tuning PID Controller DIN 96 × 96mm	
INPUT		1								Thermocouple B, R, S, K, E, J, T, N, PLII, WRe5-26, U, L	Multi-input Multi-range
		2								R.T.D. Pt100 / JPt100	Multi-range
		3								Voltage (mV) -10-10, 0-10, 0-20, 0-50, 10-50, 0-100mV DC	Multi-input Programmable Range
		4								Current (mA) 0-20, 4-20mA DC	
		6								Voltage (V) -1-1, 0-1, 0-2, 0-5, 1-5, 0-10V DC	
CONTROL OUTPUT			Y1-							Contact: Proportional Cycle 0.5-120.0 sec. Contact capacity: 240V AC 2.5A / resistive load	
			I1-							Current: 4-20, 0-10mA DC Load resistance: 600Ω max.	
			P1-							SSR drive voltage: Proportional Cycle 0.5-120.0 sec. Output rating: 15V±3V DC / 20mA max.	
			V1-							Voltage: 0-10V DC Load current: 2mA max.	
PROGRAM FUNCTION (OPTION)				N						None	
				P						1 Pattern, 9 step	
EVENT OUTPUT (OPTION)					0					None	
					1					Contact (1a common): 240V AC 1A / resistive load EV1, EV2, EV3 / 3 Point	
REMOTE OR DI INPUT (OPTION)						00				None	
						04				4-20mA DC Receiving resistance: 250Ω	
						05				1-5V DC Input resistance: 500kΩ min.	
						06				0-10V DC Input resistance: 500kΩ min.	
						51				DI Non-Voltage Contact, Open Collector Input	
ANALOG OUTPUT OR COMMUNICATION FUNCTION (OPTION)							00			None	
							03			Voltage 0-10mV DC, Output resistance: 10Ω	
							04			Current 4-20mA DC, Load resistance: 300Ω max.	
							06			Voltage 0-10V DC, Load current: 1mA max.	
							15			RS-485	
							17			RS-232C	
REMARKS								0		Without	
								9		With (Please consult before ordering.)	

Digital Controller

SHIMADEN

SR23 Series

BASIC FEATURES

- 2-channel controller (Basic type: 1-channel controller)
- Independent 2-loop / Internal cascade / 2-input operation control
- High accuracy ± (0.1% FS + 1 digit)
- High sampling cycle 0.1 sec.
- High resolution 1/1000 °C display achieved
  *Only for R.T.D. input (scale: 0.000~30.000 °C)
- Auto-tuning PID / Expert PID / Self-tuning PID
- Multi-setting of 10 set values
- Independent universal-input
- User friendly operation (Menu driven: 4 lines LCD display)
- Esay setting & Maintenance via infrared COM port on the front panel
- Interface RS-232 / RS-485 (MODBUS / Shimaden)
- The front dust / splash-proof IP66
- Universal power supply (100~240V AC ± 10%)
- Sensor power supply

ORDERING INFORMATION

ITEM	CODE	SPECIFICATIONS	
SERIES	SR23-	96 × 96 DIN size, high-performance digital controller	
BASIC FUNCTIONS	SS	Universal-input, 1-input/1-output control, 3 event outputs	
CONTROL OUTPUT 1	Y	Contact 1c, contact rating: 240V AC 2.5A/resistive load, 1A/inductive load	
	I	Current 4 ~ 20mA DC, Load resistance: max. 600Ω	
	P	SSR drive voltage output 12V±1.5V DC, Load current: max. 30mA	
	V	Voltage 0 ~ 10V DC, Load current: max. 2mA	
CONTROL OUTPUT 2	N-	None	
REMOTE SETTING INPUT /HEATER BREAK ALARM (FOR SINGLE-PHASE)	standard 06	0 ~ 10V DC, Input resistance: approx. 500kΩ	Non-insulated input
	04	4 ~ 20mA DC, Input resistance: 250Ω	
	05	1 ~ 5V DC, Input resistance: approx. 500kΩ	
	14	4 ~ 20mA DC, Input resistance: 250Ω	Insulated input
	15	1 ~ 5V DC, Input resistance: approx. 500kΩ	
	16	0 ~ 10V DC, Input resistance: approx. 500kΩ	
	31	Heater break alarm* (heater current 30A with CT)	* Selectable only when Control Output 1 is Y or P
	32	Heater break alarm* (heater current 50A with CT)	
ANALOG OUTPUT 1	0	None	
	3	0 ~ 10mV DC, Output resistance: 10Ω	
	4	4 ~ 20mA DC, Load resistance: max. 300Ω	
	6	0 ~ 10V DC, Load current: max. 2mA	
ANALOG OUTPUT 2/ SENSOR POWER SUPPLY	0	None	
	3	0 ~ 10mV DC, Output resistance: 10Ω	
	4	4 ~ 20mA DC, Load resistance: max. 300Ω	
	6	0 ~ 10V DC, Load current: max. 2mA	
	8	Sensor power supply 24V DC 25mA	
EXTERNAL INPUT/ OUTPUT CONTROL SIGNAL (DI/DO) *1	standard 0	DI 4 points, DO 5 points (SV No. switching not available)	
	1	DI 10 points, DO 9 points (SV No. switching available)	
	2	DI 10 points, DO 13 points (SV No. switching available)	
COMMUNICATION FUNCTION	0	None	
	5	RS-485	Shimaden standard protocol / MODBUS (RTU/ASCII) communication protocol
	7	RS-232C	
REMARKS	A	Without	
	9	With	

*1 When switching the SV No. by DI, 10 points of DI (CODE 1 or 2) are required.
*2 Ten DI points (code 1 or 2) are required for switching the SV No. by DI.

Digital Controller

FP93 Series

SHIMADEN

BASIC FEATURES

- Full multi-input and multi-range performance
  User selectable Thermocouple, RTD, V, mV and Current inputs
  A 250 Ω resistor is required across the input terminal for 4-20mA DC.
- Large 20mm bright display
- Readable from a distance and in a low light area
- 40-step programs function
- RS232C or RS485 Interface available
- Dust and splash proof front panel equivalent to IP66

ORDERING INFORMATION

ITEMS	CODE	SPECIFICATIONS
SERIES	FP93-	96×96 DIN size Program controller (External control input 4 points, event output 3 points - standard)
INPUT	8	Multi: Thermocouple: B, R, S, K, E, J, T, N, PLII, Wre5-26, U, L R.T.D.: Pt100, JPt100 Voltage: mV: -10~10, 0~10, 0~20, 0~50, 10~50, 0~100mV DC; V: -1~1, 0~1, 0~2, 0~5, 1~5, 0~10V DC Scaling possible Range:-1999~9999 Span: 10~5000
	4	Current: 4~20, 0~20mA DC (equipped with external 250Ω shunt resistor)
CONTROL OUTPUT	Y-	Contact 1c Contact capacity: 240AC 2.5A/resistive load Proportional cycle: 1~120 seconds
	I-	Current 4~20mA DC Load Resistance: 600Ω max.
	P-	SSR drive voltage 12V ±1.5V DC 30mA max. Proportional cycle:1~120 seconds
	V-	Voltage 0~10V DC Load current: 2mA max.
POWER SUPPLY	90-	100~240V AC ±10% 50/60Hz
	08-	24V AC/DC ±10% 50/60Hz
STATUS OUTPUT (DO) (OPTION)	0	None
	1	Open collector darlington output Rating: 24 V DC max. 20mA
ANALOG OUTPUT (OPTION)	0	None
	3	Voltage: 0~10mV DC Output resistance: 10Ω
	4	Current: 4~20mA DC Load resistance: 300Ω max.
	6	Voltage: 0~10V DC Load current: 2mA max.
COMMUNICATION FUNCTION (OPTION)	0	None
	5	RS-485 Connectable instruments: up to 31 (Depending on condition)
	7	RS-232C Connectable instruments: 1
REMARKS	0	Without
	9	With (Please consult before ordering.)

MEASURING RANGE CODES

	Type of input	Code	Scaling range (°C)	Scaling range (°F)
Thermocouple	B *1	01	0 ~ 1800 °C	0 ~ 3300 °F
	R	02	0 ~ 1700 °C	0 ~ 3100 °F
	S	03	0 ~ 1700 °C	0 ~ 3100 °F
	K *3	04	-199.9 ~ 400.0 °C	-300 ~ 750 °F
	K	05	0.0 ~ 800.0 °C	0 ~ 1500 °F
	K	06	0 ~ 1200 °C	0 ~ 2200 °F
	E	07	0 ~ 700 °C	0 ~ 1300 °F
	J	08	0 ~ 600 °C	0 ~ 1100 °F
	T *3	09	-199.9 ~ 200.0 °C	-300 ~ 400 °F
	N	10	0 ~ 1300 °C	0 ~ 2300 °F
	PLII *4	11	0 ~ 1300 °C	0 ~ 2300 °F
	Wre5-26 *5	12	0 ~ 2300 °C	0 ~ 4200 °F
	U *2, *3	13	-199.9 ~ 200.0 °C	-300 ~ 400 °F
	L *2	14	0 ~ 600 °C	0 ~ 1100 °F
R.T.D.	Pt100	31	-200 ~ 600 °C	-300 ~ 1100 °F
	Pt100	32	-100.0 ~ 100.0 °C	-150.0 ~ 200.0 °F
	Pt100	33	-50.0 ~ 50.0 °C	-50.0 ~ 120.0 °F
	Pt100	34	0.0 ~ 200.0 °C	0.0 ~ 400.0 °F
	JPt100	35	-200 ~ 500 °C	-300 ~ 1000 °F
	JPt100	36	-100.0 ~ 100.0 °C	-150.0 ~ 200.0 °F
	JPt100	37	-50.0 ~ 50.0 °C	-50.0 ~ 120.0 °F
	JPt100	38	0.0 ~ 200.0 °C	0.0 ~ 400.0 °F

	Type of input	Code	Scaling range
Voltage (mV)	-1010 ~	71	Optional setting of Measuring range is possible by the scaling function as shown below. Scaling range:- 1999~9999 count Span: 10~5000 count Upper limit value/Lower limit value Position of decimal point : None : Decimal point below digits, 1, 2, 3
	0 ~ 10	72	
	0 ~ 20	73	
	0 ~ 50	74	
	10 ~ 50	75	
	0 ~ 100	76	
Voltage (V)	-11 ~	81	
	0 ~ 1	82	
	0 ~ 2	83	
	0 ~ 5	84	
	1 ~ 5	85	
	0 ~ 10	86	
Current (V)	0 ~ 20	91	
	4 ~ 20	92	

Note: *1 Thermocouple B: Accuracy guarantee not applicable temperature below 400°C.
*2 Thermocouple U, L: DIN 43710
*3 Thermocouple K, T, U: Accuracy guarantee not applicable temperature below -100°C. ± (0.7%FS+1digit)
*4 Thermocouple PLII: Platinel
*5 Thermocouple Wre5-26: A product of Hoskins

Note: Unless otherwise specified, the measuring range will be set as listed below during the shipment from the factory.

Input	Specification/Rating	Measuring range
Multi input	K thermocouple	0.0 ~ 800.0 °C
Current (mA)	4 ~ 20mA DC	0.0 ~ 100.0

TERMINAL COVER (AVAILABLE SEPARATELY)

Model	Mounting
QCR003	One-touch mount

Digital Controller

FP23 Series

SHIMADEN

BASIC FEATURES

- 2-channel controller (Basic type: 1-channel controller)
- Independent 2-loop / 2-input operation control
- High accuracy ± (0.1% FS + 1 digit)
- High Sampling Cycle 0.1 sec.
- Highresolution 1/1000°Cdisplayachieved
  *Only for R.T.D. input (scale: 0.000~30.000 °C)
- Programmable Max. 400 steps
  (400 steps x 1 pattern to 20 steps x 20 patterns)
- Auto-Tuning PID / Expert PID
- Max. 10 Zone PID control available
- Independent Universal-Input
- User Friendly Operation (Menu Driven: 4 Lines LCD Display)
- Easy Setting & Maintenance via Infrared COM port on the front panel
- Interface RS-232C/RS-485 (MODBUS / Shimaden)
- The front dust/splash-proof IP66
- Universal Power Supply (100~240V AC ±10%)
- Sensor power supply

ORDERING INFORMATION

1-input Specification
- 1-output control

ITEM	CODE	SPECIFICATIONS
SERIES	FP23-	96 x 96 DIN size, high-performance programmable controller
BASIC FUNCTIONS	SS	Universal-input, 1-input/1-output control, 3 event outputs
CONTROL OUTPUT 1	Y	Contact 1c, contact rating: 240V AC 2.5A/resistive load, 1A/inductive load
	I	Current 4 ~ 20mA DC, Load resistance: max. 600Ω
	P	SSR drive voltage output 12V±1.5V DC, Load current: max. 30mA
	V	Voltage 0 ~ 10V DC, Load current: max. 2mA
CONTROL OUTPUT 2	N-	None
HEATER BREAK ALARM (FOR SINGLE-PHASE)	00	None
	31	Heater break alarm* (heater current 30A with CT) — * Selectable only when Control Output 1 is Y or P
	32	Heater break alarm* (heater current 50A with CT)
ANALOG OUTPUT 1	0	None
	3	0 ~ 10mV DC, Output resistance: 10Ω
	4	4 ~ 20mA DC, Load resistance: max. 300Ω
	6	0 ~ 10V DC, Load current: max. 2mA
ANALOG OUTPUT 2/ SENSOR POWER SUPPLY	0	None
	3	0 ~ 10mV DC, Output resistance: 10Ω
	4	4 ~ 20mA DC, Load resistance: max. 300Ω
	6	0 ~ 10V DC, Load current: max. 2mA
	8	Sensor power supply 24V DC 25mA
EXTERNAL INPUT/ OUTPUT CONTROL SIGNAL (DI/DO) *1	standard 0	DI 4 points, DO 5 points (start pattern No. switching not available)
	1	DI 10 points, DO 9 points (start pattern No. switching available)
	2	DI 10 points, DO 13 points (start pattern No. switching available)
COMMUNICATION FUNCTION	0	None
	5	RS-485 — Shimaden standard protocol / MODBUS (RTU/ASCII) communication protocol
	7	RS-232C
REMARKS	A	Without
	9	With

*1 When switching the start pattern No. by DI, 10 points of DI (CODE 1 or 2) are required.

OPTIONAL ACCESSORIES

Name	Model	Description
Infra-red Communication Adapter	S5004	USB connector cable (2m), Setup Software (CD-ROM)
Shunt Resistor	QCS002	250Ω ± 0.1%, external input resistance at current input
Relay Unit	AP2MC	Converts open collector output to contact output. 2 circuits built-in

Digital Controller

SD16A Series

SHIMADEN

BASIC FEATURES

- DIN Size 48 x 96 mm
- ± 0.3% High Accuracy Indication
- Large 20 mm bright display
  Make reading from long distance and low light location easier
- Multi-inputs & Multi-ranges
  User selectable Thermocouple, RTD, V, mV and Current inputs
  A 250Ω resistor is required across the input terminal for 4-20mA DC
- Inverse scaling possible
  With voltage and current input signals, normal and inverse scaling is possible.
  Additionally, normal and inverse scaling is possible for the analog output signals.
- Dust and splash proof front panel Equivalent to IP66
- Wide range of optional features
  Alarms, analog output signals and communication interface (RS-232C or RS-485: MODBUS / Shimaden)
  available Sensor power supply 24V DC available
- A six-point selector switch, (the KR16 series), is available for combined use.

ORDERING INFORMATION

	ITEM	CODE	SPECIFICATIONS	
1	SERIES	SD16A-	Digital Indicator DIN Size 48 x 96 mm	
		4	Current (4~20mA DC) Applied via enclosed 250Ω shunt resistor	Scaling possible (Inverse scaling possible) (Note:1)
2	INPUT	8	Multi input *Thermocouple B, R, S, K, E, J, T, N, {U, L (DIN 43710)} *R.T.D. Pt100Ω / JPt100Ω *Voltage (mV, V) 0~10mV DC, 0~5V DC, 0~10V DC, 1~5V DC	Value set at K 0~1200°C when shipped Voltage input: Scaling possible (Inverse scaling possible) (Note:1)
3	POWER SUPPLY	90-	100~240V AC±10% (50/60Hz)	
		08-	24V AC ±10% (50/60Hz) / 24V DC ±10% (Note:2)	
4	ALARM OUTPUT (OPTION)	0	None	
		1	Individual setting, individual output 2 points (a contact) Contact capacity:250V AC 1.5A / resistive load	
5	ANALOG OUTPUT (OPTION) OR SENSOR POWER SUPPLY (Note:2)	0	None	
		3	0~10mV DCOutput resistance:10Ω	Scaling possible (Inversescaling possible) within a measuring range code
		4	4~20mA DCLoad resistance:300Ω max.	
		6	0~10V DCLoad resistance:1mA max.	
		8	Sensor power supply 24V DC 25mA max.(Note:2)	
6	COMMUNICATION FUNCTION (OPTION)	0	None	
		5	RS-485 Shimaden standard protocol/MODBUS (RTU/ASCII) communication protocol	
		7	RS-232C Shimaden standard protocol/MODBUS (RTU/ASCII) communication protocol	
7	REMARKS	0	Without	
		9	With (Please consult before ordering)	

Notes:
1.Scaling range:-1999~9999 unit, Span:10~10000 unit
2.The sensor power supply may not be used when you select the Power Supply Code 08 (24V AC/DC).

MEASURING RANGE CODES

INPUT	TYPE	CODE	RANGE (°C)	RANGE (°F)
THERMOCOUPLE	B	01	0 ~ 1800	0 ~ 3300
	R	02	0 ~ 1700	0 ~ 3100
	S	03	0 ~ 1700	0 ~ 3100
	K	04	-199.9 ~ 800.0	-300 ~ 1500
	K	05	0 ~ 12000 ~ 2200	0 ~ 12000 ~ 2200
	E	06	0 ~ 7000 ~ 1300	0 ~ 7000 ~ 1300
	J	07	0 ~ 6000 ~ 1100	0 ~ 6000 ~ 1100
	T	08	-199.9 ~ 300.0	-300 ~ 600
	N	09	0 ~ 13000 ~ 2300	0 ~ 13000 ~ 2300
	*1U	10	-199.9 ~ 300.0	-300 ~ 600
	*1L	11	0 ~ 600	0 ~ 1100
	*2WRe5-26	12	0 ~ 2300	0 4200
R.T.D.	Pt	31	-199.9 ~ 600.0	-300 ~ 1100
		32	-100.0 ~ 100.0	-150.0 ~ 200.0
	JPt	*33	-199.9 ~ 500.0	-300 ~ 1000
		*34	-100.0 ~ 100.0	-150.0 ~ 200.0
VOLTAGE	0 ~ 10mV	71	Initial value: 0.0 ~ 100.0 Scaling possible (Inverse scaling possible) Scaling setting range:-1999 ~ 9999 Span: 10~10000 unit	Thermocouple B, R, S, K, E, J, T, N: JIS/ANSI/IEC *1 Thermocouple U, L: DIN 43710 *2 Thermocouple WRe 5-26 : Made of Hoskins
	0 ~ 5V	81		
	1 ~ 5V	82		
CURRENT	0 ~ 10V	83		
	4 ~ 20mA	95		

Factory Setting:
Universal-InputK:0~1200°C
Current Input4~20mA 0.0~100.0 (Without unit)
Thermocouple T, U:Accuracy = ±0.5%FS for -100~0°C
±1%FS for -100°C or less
Thermocouple B:Accuracy=±5%FS for 400°C or less
* Scaleover occurs at -240.0°C at Pt (Code 31) or JPt (Code 33).

Any decimal position shown in the measuring ranges of thermocouple and R.T.D.inputs may be concealed.

Digital Controller

SHIMADEN

SD24 & KR16 Series

BASIC FEATURES

- High accuracy ± 0.1% FS + digit
- 1/1000°C Resolution indication possible
- 3 Display modes (Peak hold, Boottom hold, Display hold)
- External control input (2 points) as a standard feature
- C contact (2 points) or a contact (4 points) can be selected for alrarm output.
- Analog output hold function (Hold display value output)
- Communication function RS-485/RS-232C (Shimaden standard protcol/MODBUS)
- Linear approximation operation function (Voltage/Current input only)

ORDERING INFORMATION

ITEM	CODE						SPECIFICATIONS	
SERIES	SD24-						DIN 48x96 Digital Indicator, DI 2 points	
INPUT		8					Universal-input Input resistance: 500kΩ minimum • Thermocouple • R.T.D.: Pt100/JPt100 • Voltage (mV): -10 – 10, 0 – 10, 0 – 20, 0 – 50, 10 – 50, 0 – 100, -100 – 100mV DC	Refer to "Measuring Range Codes" for details of input type and measuring range.
		6					Voltage (V) Input resistance: 500kΩ minimum -1 – 1, 0 – 1, 0 – 2, 0 – 5, 1 – 5, 0 – 10, -10 – 10V DC	Voltage mV, V, Current mA range Scaling Possible (inverse scaling possible) Range: -9999 – 30000 units Span: 10 – 40000 units
		4					Current (mA) Receiving impedance: 250Ω 0 – 20, 4 – 20mA DC	
POWER SUPPLY			90-				100 – 240V AC±10%, (50/60 Hz)	
			08-				24V AC (50/60 Hz)/DC±10%	
ALARM (OPTION)				0			None	
				1			Individually set/output 4 points (a contact)	
				2			Individually set/output 2 points (c contact)	
ANALOG OUTPUT/ CONMMUNICATION FUNCTION (OPTION)					00		None	
					03		0 – 10mV DC Output resistance: 10Ω	Scaling Possible (inverse scaling possible) (within measuring range)
					04		4 – 20 mA DC Resistive load: 300Ω max.	
					06		0 – 10V DC Load current: 2 mA max.	
					50		RS-485	
					70		RS-232C	
SENSOR DC POWER SUPPLY (OPTION)						0	Without	
						1	With 24V DC 50 mA	
REMARKS							0	Without
							9	With

Digital Controller

SHIMADEN

KR16A Series

SPECIFICATIONS

* No of switching points	:	6
* No of switching circuits	:	2
* Swtiching operation	:	Rotary switching
* Applicable signal	:	Thermocouples, voltage (R.T.D. not applicable)
* Contact rating		
Contact method	:	Slide type
Voltage	:	30V DC Maximum
Current	:	100mA DC maximum
Contact resistance	:	300m ohms maximum
* Ambient temperature/humidity range conditions for operation	:	-10 - +50℃/90% RH maximum (no dew condensation)
* Material	:	Resin molding
* Color		
Front and case	:	Mansel value N1 equivalent
* External dimensions	:	H48 x W96 x D118mm (in panel 100mm)
* Panel cutout	:	H45 x W92 mm
* Mounting	:	Flush in panel (snap-in)
* Panel thickness	:	1 - 4mm
* Weight	:	Approx. 250g

ORDERING INFORMATION

ITEMS	CODE		SPECIFICATIONS
SERIES	KR16A-		Rotary type 6 points selector switch
REMARKS		0	Without
		9	With

Hybrid Recorder

SHIMADEN

SR106A / 186A Series

BASIC FEATURES

- Compact Housing
- High-Quality Ink Jet Clear Recording
- Fully Configurable Input
- Varied Digital Printing
- Menu Driven Easy Operation
- Easy Handling and Maintenance
- Chart Paper Illumination Available (Option)
- Communication Interfaces RS-485 Available (Option)

ORDERING INFORMATION

ITEMS	CODE	SPECIFICATIONS
SERIES	SR106A-	Hybrid recorder, DIN 144 × 144mm
RECORDING SYSTEM	1	1 Continuous recording
	2	2 Continuous recording
	3	3 Continuous recording
	6	6 Continuous recording
	7	6 Dot recording
INPUT	1	Thermocouples B, R, S, K, E, J, T, N, W, L, U, PN
	2	R.T.D (Pt100)
	3	±50mV, ±500mV, ±5V, ±50V DC 4~20mA Availble with shunt resistor (option)
MENU INSTRUCTION	J	Japanese
	E	English
POWER SUPPLY	84-	85~150V AC, 50 / 60Hz
	85-	150~300V AC, 50 / 60Hz
CHART PAPER ILLUMINATION	0	Without
	1	With
ALARM OUTPUT / EXTERNAL CONTROL	0	Without
	1	6-points alarm output / 3-points external control
INTERFACE FUNCTION	0	Without
	5	RS-485
REMARKS	0	Without
	9	With (Please consult before ordering.)

Spare and Optional Parts

Items	Type	Remarks
Chart paper (50 divisions) × 6 charts / box	SRX00DL-5000S	
Recording head × 1	SRZH1001 (PHZH 1001)	
Alarm output / external control unit	SRZK1601	6-points alarm output / 3-points external control
Chart paper illumination	SRZL1001	With cable connector
Shunt resistor 10 ± 0.1%	SRZT1101	For 4~20mA or 10~50mA input
Interface unit	SR7D6467C	RS-485

Standard Range (Factory-set when shipped)

Code	Input	Standard / Rating	Range
1	Thermocouple	K	K0~1200°C
2	R.T.D.	Pt	1000~ 500°C
3	DC voltage	-5	~5V0~ 100

Hybrid Recorder

ORDERING INFORMATION

SHIMADEN

ITEMS	CODE								SPECIFICATIONS
SERIES	SR186A-								Hybrid recorder, DIN 288 × 288mm
RECORDING SYSTEM		1							1 Continuous recording
		2							2 Continuous recording
		3							3 Continuous recording
		6							6 Continuous recording
		7							6 Dot recording
		8							12 Dot recording
INPUT			1						Thermocouples B, R, S, K, E, J, T, N, W, L, U, PN
			2						R.T.D (Pt100)
			3						± 50mV, ±500mV, ±5V, ±50V DC 4~ 20mA Available with shunt resistor (option)
MENU INSTRUCTION				J					Japanese
				E					English
POWER SUPPLY					86-				85~300V AC, 50 / 60Hz
CHART PAPER ILLUMINATION						0			0Without
						1			1With
ALARM OUTPUT / EXTERNAL CONTROL							0		0Without
							1		6-points alarm output / 3-points external control
							2		212-points alarm output / 3-points external control
INTERFACE FUNCTION								0	0Without
								5	5RS-485
REMARKS								0	0Without
								9	9With (Please consult before ordering.)

Spare and Optional Parts

Items	Type	Remarks
Chart paper (100 divisions) × 6 charts / box	SRX00BL-1000R	
Recording head × 1	SRZH8001 (PHZH8001)	
Alarm output / external control unit	SRZK8601	6-points alarm output / 3-points external control
Alarm output / external control unit	SRZK8201	12-points alarm output / 3-points external control
Chart paper illumination	SRZL8001	With cable connector
Shunt resistor 10Ω ± 0.1%	SRZT8101	For 4~20mA or 10~50mA input
Interface unit	SR7D0834C2RS-485	

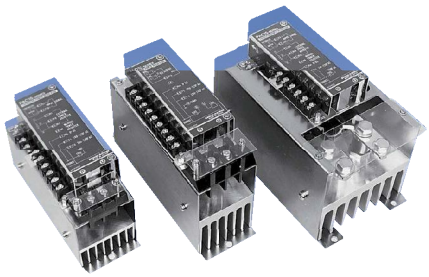
Standard Range (Factory-set when shipped)

Code	Input	Standard / Rating	Range
1	Thermocouple	K	0 ~ 1200℃
2	R.T.D.	Pt100	0 ~ 500℃
3	DC voltage	-5~5V	0 ~ 100

Hybrid Recorder

SHIMADEN

PCA15 Series



BASIC FEATURES

- Phase Angle or Zero Voltage Switching
- Current Capacity: 20~100 Amperes
- Power Supply: 100~120 / 200~240V AC

SPECIFICATIONS

Control Mode:	Phase angle (PAC15P) Zero voltage switching (PAC15C)
Possible Loads:	All resistance loads (PAC15P) Constant resistance loads (PAC15C)
Power Supply Cycle:	50/60Hz. (internally selectable-PAC15P) 50/60Hz. common (PAC15C)
Output Voltage Control Range:	0~95% min. 50/60Hz. of inut voltage (PAC15P) 0~95% min. of load power (PAC15C)
Powr Lamp:	Green LED lamp (PAC15P)
Output Indication:	Green LED lamp (when load 'ON'-PAC15C)
Current Capacity:	20, 30, 45, 60, 80 and 100 Amps.
Power Supply:	100~120V/200~240V AC ± 10%
Control Input:	Current = 4~20mADC (Receiving impedance: 100 ohms) Contact = Zero voltage contact
Power Adjuster:	Current input = Internal installation as standard (External installation as option) Contact input = External installation as standard
Auto/Manual Power Adjuster:	Only current input type is available - optional
Thyristor Element Cooling:	Natural air
Over-Current Protection:	None available (Use a fuse for semiconductor)
Minimum Load:	10% min. of current capacity (no operation at no load)
Operating Ambient Temperature and Humidity:	-10~50°C, 90%RH maximum
Insulation Resistance:	500V DC 20M ohms between power supply terminals and chassis 500V DC 20M ohms between power supply terminals and input terminals
Dielectric Strength:	1 min. at 2000V AC between power supply terminals and chassis
Dimensions and Weight:	See page 4.

ORDERING INFORMATION

ITEMS	CODE	SPECIFICATIONS	
SERIES	PAC15P	Phase Angle Single Phase Power Regulator	
	PAC15C	Cycle Base Zero Voltage Switching Single Phase Power Regulator	
CONTROL INPUT	0	4~20mA DC, Receiving impedance: 100Ω	
	2	Non-voltage contact	
	9	Others (Please consult before ordering.)	
CURRENT CAPACITY	020	20A	
	030	30A	
	045	45A	
	060	60A	
	080	80A	
	100	100A	
POWER SUPPLY	81-	100~120V / 200~240V AC ±10%, 50 / 60Hz	
	99-	Others (Please consult before ordering.)	
EXTERNAL POWER ADJUSTER	N	None (Internal installation as standard)	
	P	External power adjuster	Current input
	M	Manual power adjuster	Current input
	B	Base power adjuster	Current input
	W	External power adjuster + manual power adjuster	Current input
	Y	External power adjuster + base power adjuster	Current input
	P	High power adjuster (standard)	Contact input
	B	High power adjuster (standard) + Low power adjuster	Contact input
	X	Others (Please consult before ordering.)	
REMARKS	0	Without	
	9	With (Please consult before ordering.)	

Single Phase Power Regulator

SHIMADEN

PAC26 Series

BASIC FEATURES

- Wide application with variety of functions
- Suitable for air conditioning, electric, furnace, dryer, bio engineering, food industry, chemical industry, plastic formation and control of heat source applications.

350A, 450A　150A, 250A　80A, 100A　45A, 60A　20A, 30A

ORDERING INFORMATION (PAC26P)

ITEMS	CODE	SPECIFICATIONS
SERIES	PAC26P	Phase Angle Control Single Phase Power Regulator
CONTROL INPUT	2	Contact
	3	1~5V DC Input Impedance: 200kΩ
	4	4~20mA DC Receiving Impedance: 100Ω
	6	0~10V DC Input Impedance: 200kΩ
	9	Others (Please consult before ordering.)
POWER SUPPLY	13-	100~110V AC
	14-	110~120V AC
	15-	200~220V AC
	16-	220~240V AC
	17-	380~400V AC　Note: 200V power supply is separetely required for electric sourse and power for fan.
	18-	400~440V AC
CURRENT CAPACITY	100~240V AC: 021 20A; 031 30A; 041 45A; 061 60A; 081 80A; 101 100A; 151 150A; 251 250A; 351 350A; 451 450A	AC380~440V AC: 022 20A; 032 30A; 042 45A; 062 60A; 082 80A; 102 100A; 152 150A; 252 250A; 352 350A; 452 450A
FEEDBACK FUNCTION	0	Constant voltage (standard feature)
	1	Constant current
	2	Constant power
	3	Voltage Square-root
OUTPUT CONTROL FUNCTION	0	None
	1	Startup time output control limiting (0~60%, 1~60sec.)
	2	Current limiting
	3	Startup time output control + Current limiting
EXTERNAL POWERH ADJUSTER	CONTACT INPUT: N	NNone (Internal installation as standard)
	CONTACT INPUT: P	PExternal power adjuster
	CONTACT INPUT: B	BBase (low) power adjuster
	CONTACT INPUT:	High / Low power adjuster
	CURRENT / VOLTAGE INPUT: P	External power adjuster
	CURRENT / VOLTAGE INPUT: M	MManual power adjuster
	CURRENT / VOLTAGE INPUT: B	Base power adjuster
	CURRENT / VOLTAGE INPUT: W	WExternal power + Manual power
	CURRENT / VOLTAGE INPUT: Y	YExternal power + Base power
HEATER BREAK ALARM	0	Without
	1	With (0~100% setting of rated current)
RAPID FUSE	0	Without
	1	With (See rapid fuse option.)
AUTO POWER ADJUSTMENT FUNCTIONS	0	Without
	4	4~20mA DC Receiving Impedance: 100Ω
	6	0~10V DC Input Impedance: 200kΩ
REMARKS	0	Without
	9	With (Please consult before ordering.)

Rapid Fuse Option

CONSTANT CURRENT / VOLTAGE		PARTS NO.
20A	100~240V	25SHA 30S
	380~440V	50SHA 30S
30A	100~240V	25SHA 40S
	380~440V	50SHA 40S
45A / 100~440V		50SHA 60S
60A / 100~440V		50SHA 80S
80A / 100~440V		50SHB 120S
100A / 100~440V		50SHB 150S
150A / 100~440V		50SHB 200S
250A / 100~440V		50SHB 350S
350A / 100~440V		CSSF 500
450A / 100~440V		CSSF 600

Ordering Information PAC26C

SHIMADEN

ITEMS		CODE	SPECIFICATIONS
SERIES		PAC26C	Cycle Base Zero Voltage Switching Single Phase Power Regulator
CONTROL INPUT		2	Contact
		3	1~5V DC Input Impedance: 200kΩ
		4	4~20mA DC Receiving Impedance: 100Ω
		6	0~10V DC Input Impedance: 200kΩ
		9	Others (Please consult before ordering.)
POWER SUPPLY		13-	100~110V AC
		14-	110~120V AC
		15-	200~220V AC
		16-	220~240V AC
		17-	380~400V AC (Note: 200V power supply is separately required for electic sourse and power for fan.)
		18-	400~440V AC (Note: 200V power supply is separately required for electic sourse and power for fan.)
CURRENT CAPACITY	100~240V AC	021	20A
		031	30A
		041	45A
		061	60A
		081	80A
		101	100A
		151	150A
		251	250A
		351	350A
		451	450A
	380~440V AC	022	220A
		032	230A
		042	245A
		062	260A
		082	280A
		102	100A
		152	150A
		252	250A
		352	350A
		452	450A
EXTERNAL POWER ADJUSTER		N	None (Internal installation as standard)
	CONTACT INPUT	P	External power adjuster
		B	Base (low) power adjuster
		H	High / Low power adjuster
	CURRENT / VOLTAGE INPUT	P	External power adjuster
		M	Manual power adjuster
		B	Base power adjuster
		W	External power + Manual power
		Y	External power + Base power
HEATER BREAK ALARM		0	Without
		1	With
RAPID FUSE		0	Without
		1	With (See rapid fuse option.)
AUTO POWER ADJUSTMENT FUNCTIONS		0	Without
		4	4~20mA DC Receiving Impedance: 100Ω
		6	0~10V DC Input Impedance: 200kΩ
OPERATING OUTPUT INDICATOR		0	Without
		1	With
REMARKS		0	Without
		9	With (Please consult before ordering.)

Rapid Fuse Option

CONSTANT CURRENT / VOLTAGE		PARTS NO.
20A	100~240V	25SHA 30S
	380~440V	50SHA 30S
30A	100~240V	25SHA 40S
	380~440V	50SHA 40S
45A / 100~440V		50SHA 60S
60A / 100~440V		50SHA 80S
80A / 100~440V		50SHB 120S
100A / 100~440V		50SHB 150S
150A / 100~440V		50SHB 200S
250A / 100~440V		50SHB 350S
350A / 100~440V		CSSF 500
450A / 100~440V		CSSF 600

Three-Phase Power Regulator

SHIMADEN

PAC35 Series

BASIC FEATURES

- Phase Angle or Zero Voltage Switching
- Current Capacity: 20, 30, 45, 60, 90, 135A
- Power Supply: 200–240 or 380 – 440V AC

ORDERING INFORMATION PAC35P

ITEMS	CODE								SPECIFICATIONS	
SERIES	PAC35P								Phase Angle 3-phase Power Regulator With Soft-Start	
CONTROL INPUT		0							4 – 20mA DC/Receiving Resistance: 100Ω	
		2							Non-voltage contact	
		9							Others (Please consult before ordering.)	
CURRENT CAPACITY			020						20A	
			030						30A	
			045						45A	
			060						60A	
			090						90A	
			135						135A	
POWER SUPPLY				37–					200 – 240V AC ±10% 50/60Hz	
				35–					380 – 440V AC ±10% 50/60Hz	
				99–					Others (Please consult before ordering.)	
EXTERNAL POWER ADJUSTER					N				None (Internal standard)	Current input
					P				External power adjuster	
					M				Manual power adjuster	
					B				Base power adjuster	
					W				External power adjuster + Manual power adjuster	
					Y				External power adjuster + Base power adjuster	
					P				High power adjuster (standard)	Contact input
					B				High power adjuster (standard) + Low power adjuster	
					X				Others (Please consult before ordering.)	
REMARKS						0			Without	
						9			With (Please consult before ordering.)	

ORDERING INFORMATION PAC35C

ITEMS	CODE								SPECIFICATIONS	
SERIES	PAC35C								Cycle Base Zero Voltage Switching (3-Phase)	
CONTROL INPUT		0							4-20mA DC/Receiving Resistance: 100Ω	
		2							Non-voltage contact	
		9							Others (Please consult before ordering.)	
CURRENT CAPACITY			020						20A	
			030						30A	
			045						45A	
			060						60A	
			090						90A	
			135						135A	
POWER SUPPLY				37–					200 – 240V AC ±10% 50/60Hz	
				35–					380 – 440V AC ±10% 50/60Hz	
				99–					Others (Please consult before ordering.)	
EXTERNAL POWER ADJUSTER					N				None (Internal standard)	Current input
					P				External power adjuster	
					M				Manual power adjuster	
					B				Base power adjuster	
					W				External power adjuster + Manual power adjuster	
					Y				External power adjuster + Base power adjuster	
					P				High power adjuster (standard)	Contact input
					B				High power adjuster (standard) + Low power adjuster	
					X				Others (Please consult before ordering.)	
MANIPULATED VARIABLE (POWER) OUTPUT AND/OR INDICATOR						0			None	
						1			Manipulated variable output	
						2			Manipulated variable + indicator	
REMARKS							0		Without	
							9		With (Please consult before ordering.)	

Ordering Information PAC35Z

SHIMADEN

ITEMS	CODE									SPECIFICATIONS	
SERIES	PAC35Z									Time Base Zero Voltage Switching (3-Phase)	
CONTROL INPUT		0								4 – 20mA DC/Receiving Resistance: 100Ω	
		2								Non-voltage contact	
		9								Others (Please consult before ordering.)	
CURRENT CAPACITY			020							20A	
			030							30A	
			045							45A	
			060							60A	
			090							90A	
			135							135A	
POWER SUPPLY				37–						200 – 240V AC ±10% 50/60Hz	
				35–						380 – 440V AC ±10% 50/60Hz	
				99–						Others (Please consult before ordering.)	
EXTERNAL POWER ADJUSTER					N					None (Internal standard)	Current input
					P					External power adjuster	
					M					Manual power adjuster	
					B					Base power adjuster	
					W					External power adjuster + Manual power adjuster	
					Y					External power adjuster + Base power adjuster	
					P					High power adjuster (standard)	Contact input
					B					High power adjuster (standard) + Low power adjuster	
					X					Others (Please consult before ordering.)	
MANIPULATED VARIABLE (POWER) OUTPUT AND/OR INDICATOR						0				None	
						1				Manipulated variable output	
						2				Manipulated variable + indicator	
REMARKS							0			Without	
							9			With (Please consult before ordering.)	

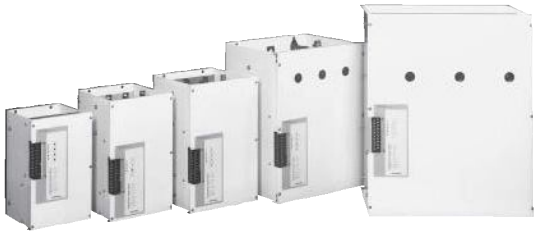
Three-Phase Power Regulator

SHIMADEN

PAC36P Series

BASIC FEATURES

- Wide application with variety of functions
- Suitable for air conditioning, electric, furnace, dryer, bio engineering, food industry, chemical industry, plastic formation and control of heat source applications.



2030A, 45A60A, 90A135A, 180A450A, 240A, 300A 600A

ORDERING INFORMATION

ITEMS	CODE	SPECIFICATIONS
SERIES	PAC36P	Phase Angle Control 3-Phase Power Regulator
CONTROL INPUT	3	1~5V DC, Input Impedance: 200kΩ / contact signal
	4	4~20mA DC, Receiving Impedance: 100Ω / contact signal
	6	0~10V DC, Input Impedance: 200kΩ / contact signal
	9	Others (Please consult before ordering.)
POWER SUPPLY	15-	200~220V
	16-	220~240V
	17-	380~400V
	18-	400~440V

CURRENT CAPACITY	200~240V		380~440V	
	CODE		CODE	
	021	20A	022	20A
	031	30A	032	30A
	041	45A	042	45A
	061	60A	062	60A
	091	90A	092	90A
	131	135A	132	135A
	181	180A	182	180A
	241	240A	242	240A
	301	300A	302	300A
	451	450A	452	450A
	601	600A	602	600A

FEEDBACK FUNCTION	0	Constant voltage (standard feature)
	1	Constant current
	2	Constant power
	3	Voltage Square-root
OUTPUT CONTROL FUNCTIONS	0	None
	1	Startup time output control limiting (0~60%, 1~60sec.)
	2	Current limiting
	3	Startup time output control + Current limiting

EXTERNAL POWER ADJUSTER	WHEN USED WITH VOLTAGE AND CURRENT OUTPUT CONTROLLER	N	None (Internal installation as standard)
		P	External power adjuster
		M	Manual power adjuster
		B	Base power adjuster
		W	External power + Manual power
		Y	External power + Base power
	WHEN USED WITH CONTACT OUTPUT	P	External power adjuster
		H	High-Low power adjuster

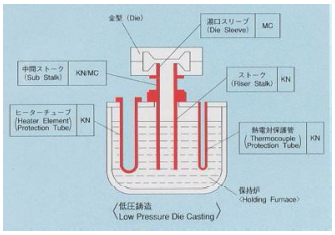
HEATER BREAK ALARM	0	Without
	1	With (0~100% setting of rated current)
RAPID FUSE	0	Without
	1	With (See rapid fuse table.)
AUTO POWER ADJUSTMENT FUNCTIONS	0	Without
	4	4~20mA DC, Receiving Impedance: 100Ω
	6	0~10V DC, Input Impedance: 200kΩ
REMARKS	0	Without
	9	With (Please consult before ordering.)

KUBOTA Ceramics for Molten Aluminium

Low-Pressure Casting

Heater Element Protection Tube (KN)

Kubota heater element protection tube increase the life and reliability of heater elements. We can provide protection tube for vertical of horizontal applications.



Riser stalk for Low Pressure Casting (KN)

Riser stalk life can be increased due to the superior corrosion resistance of Kubota's KN material.
We also offer the versatility of providing either a ceramic or metal flange to suit your requirements.

Thermocouple Protection Tube (KN)

(Standard Size)
OD = 28 mm. , ID = 16 mm.
Length = from 300 to 1400 mm.
Special shapes & assemble can be made upon your request.

MELTING AND TRANSFER

Rotor and shaft for De-gassing and Rotating (KN)

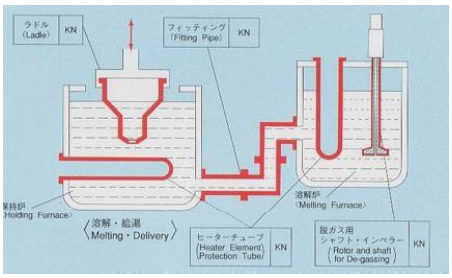
In treatment process of molten aluminum, rotor and shaft is used for de-gassing and rotating. Kubota ceramic rotor and shaft has good thermal shock resistance and gives stable performance over a long period of time.

Fitting pipe (KN)

Fitting pipes are used to supply molten aluminum to the holding furnace from the melting furnace. Using Kubota's unique joining method , L-shaped and T-shaped components can be produced.

Ladle (KN)

In squeeze casting, the molten aluminum is supplied through the ladle show above. Kubota ladles have good thermal shock resistance and provide stable performance for a greater period of time.



KUBOTA Ceramics for Molten Aluminium

Die Casting / Squeeze Casting

Shot Sleeve (MC/MI)

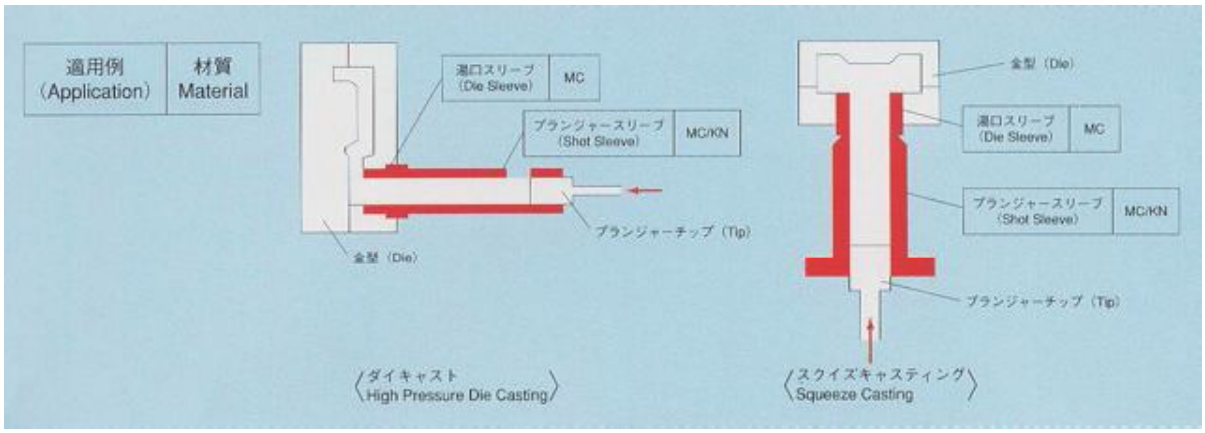
Kubota high performance shot sleeves have insulation properties, and are manufactured by HIP process. MC type and MI type are available. MC sleeve has high anticorrosion resistance against molten aluminum, and MI sleeve is easy to handle. Both type of sleeves have high insulation property, so than they could make a contribution to the quality improvement of aluminum casting products.

Die Sleeve (MC)

MC offers superior insulating properties to the die sleeve shown above. This technology may be utilized in various die casting processes, including low and high pressure die casting.

・Pipe (KN)

KN can be applied to various kinds of pipe including gas injection pipe.



Hicom

- Variation of the consumption type analysis cups for casting iron.
- Consumption type R thermocouple for casting iron and steel.
- Combination probes for steel.

Portable handy - thermocouple

Handy type digital thermometer

CE-METER

Thermo analysis devices for metal.

Immersion thermocouple

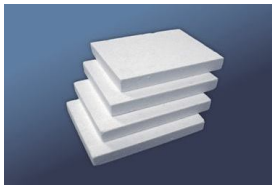
Easy to maintain for consumption
Easy handling and high accuracy measurement
Varied product for customer' s usage

Consumed CE - cup

High precision CE-CUP for thermal analysis
Easy handling
The analysis of the high precision "Maintenance is easy"
Cartridges are selectable for each molten metal' s characteristics

Ceramic Fiber

CERAMIC FIBER BLANKET



CERAMIC FIBER TEXTILE

CERAMIC FIBER BOARD

CERAMIC FIBER PAPER

VARIOUS PRODUCTS LINE

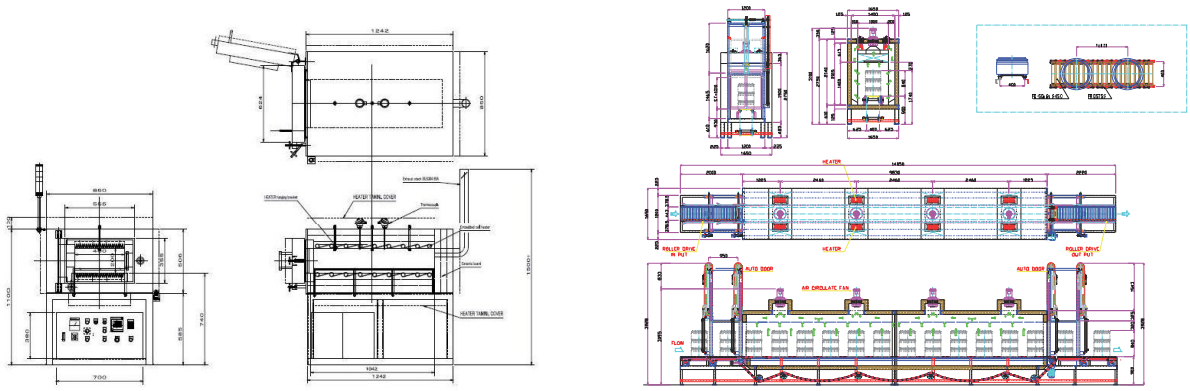
PANEL HEATER

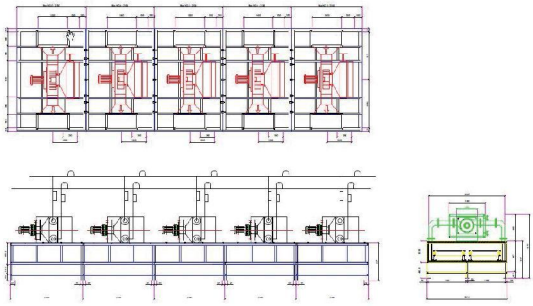
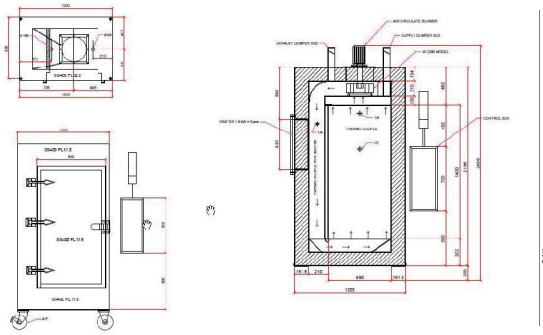
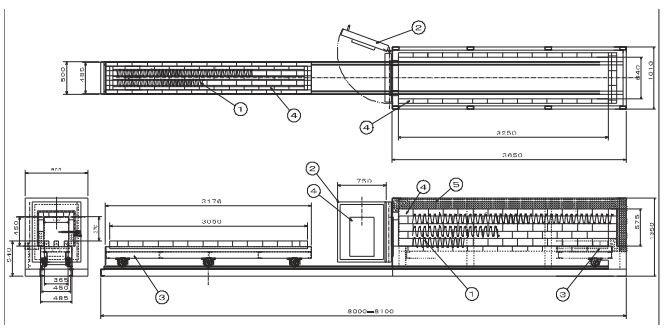
Oven

Features of PLIC made oven

- plating line and other production equipment can be interlocking control
- We can make the furnace body from the normal temperature range 30 °C up to a high temperature range 1,000 °C.
- We are making heater in accordance with the demands of customers.





Environmental Test Apparatus

Bench Top Type Test Chamber

Model: HRM

Product name : Desk Top Temperature & Humidity Test Chamber

Description

Desk Top Temperature & Humidity Test
Chamber provides superior performance over a wide range of applications.
Pharmaceutical quality assurance and reliabikity testing, electronic, military, research testing and production process have all found these models to be useful for temperature/ humidity testing.

Temperature & Humidity Test Chamber

Model: MHK-120

Product name : Programmable Compact Temperature & Humidity Chamber

Description

Programmable Compact Temperrature & Humidity Chamber provides a wide range of industries including electronic parts such as semiconductors and printed circuit boards, electronic components, automobile parts and etc.

Model: MHK

Product name : Temperature & Humidity Test Chamber

Description

Temperature & Humidity Test Chamber provides a wide range of industries inculuding electronic parts such as semiconductors and printed circuit boards, electronic components, automobile parts and products, notebook and etc.

Oven Series

Model: CKN

Product name : Anaerobic Temperature Chamber

Description

Anaerobic Temperature Chamber is a complete anaerobic system, providing all of the components needed to safety inoculate, incubate, eamine and so on. with a sirocco fan circulation ensures that deviation in cabinet temperature is kept best temperature unifomity.
Anaerobic Temperature Chamber can be widely used for basic to applied experimentation in the area of scientific, industrial and environment testing. (The content of oxygen is below 2 %)

Model: CKC

Product name : Clean Oven

Description

Sirocco fan circulation keeps variations in inner cabinet temperaturs with best temperature uniformity.
Compared with natural convection, Clean Oven is drying quickly than ever. Clean Oven is designed to meet the strict requirements of semiconductor and electronic component manufactures. Class 100 cleanliness is achived by employing a HEPA filter and the air-tight interior wall welds.

Environmental Test Apparatus

Oven Series

Model: CK

Product name : Programmable Oven

Description

Programmable Oven features sirocco fan circulation keeps variations in inner cabinet temperature with a best temperature uniformity at a moderate price, and high precision temperature controller that provides precision and stable constant temperature condition to ensure the progress of testing and drying.
This constant Programmable Oven are specialized in 8 standard sizes to fulfil different needs of users.

Thermal Shock Chamber Series

Model: TS

Product name : Thermal Shock Test Chamber

Description

It is a Air to Air thermal Shock Test Chamber, which are common for general product testing as they are able to handle large devices and are easier to maintain , lower the temperature without coolant like liquid nitrogen (LN2) and LCO2.
Thermal Shock Test Chamber are especially designed to perform tailored environmental stress screening of component and board level electronic assembles.The chabers provide superior performance for manufacturing environment testing.

Model: TS2

Product name : Thermal Shock Test Chamber

Description

Air to Air Thermal Shock Testing Chamber are designed for general product testing as they are able to handle larger devices and are easier to maintain, lower the temperature without coolant like liquid nitrogen (LK2) and LCO2. This Air to Air Thermal Shock Testing Chamber are deighned to perform tailored environmental stress screening of component and board level electronic assemblies.

Walk - in Chamber

Model: MHW

Product name : Programmable Walk-in Temperature & Humidity Chamber

Description

Programmable Walk-in Temperature & Humidity Chamber can be used to large components, assemblies and finished products,from computers and copies to automobiles and satellites through a wide range of temperature and humidity enviropments.
Whatever the application, each Walk-in Environment Test Chamber consists of a self-contained conditioning module such as control panel, electrical control system, insulated solid walls, air circulator and heating/cooling unit.
Standard templet sutable to combine together for various dimensions, it is covenient to remove or expand.
The chamber is optimal for testing the specimen with large quantity or big in size. The chambers are specialized in 6 standard sizes and 24 stabdard conditioning modules.

Environmental Test Apparatus

Burn - in Chamber

Model: BIR

Product name : Burn in Room

Description

Burn in Room is the process of forcing defective microcelectronic devices to fail before they are incorporated into assemblies where they can cause reliability problems in the end product.
The BIO is a high performance in a cost-effective design and provides a stable enviroment for testing in your Design Validation, Quality & Reliablity, and burn-in application. The DC powersupplier and transducer can be tasted by this chamber.

Weather Meter

Model: RT

Product name : Rain Tester

Description

Rain Tester is designed to tests the automotive parts after the moisture, scatters the water, the spraying of water, immeres examines this material to bear the moisture and the water resistance.

Model: DT

Product name : Dust Tester

Description

Dust Tester is designed to tests the automotive parts, such as electical machinery switch, electric appliance appendix flows either the floating dust regarding the dust attaches the dust or dust fastness.

Model: SST

Product name : Salt Spray Tester

Description

Salt Spray Tester offer the most realistic and dependable corrosion test, it is widely used to test components and coated panels for corrosion resistance throughout the automative, paint, surface coating, chemical, aerospace, electronic, offshore and defence industries.

Boilers

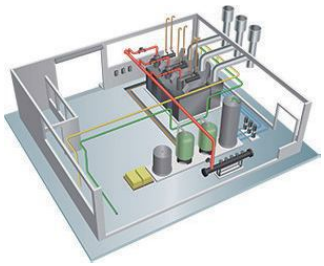
MIURA

WITH THE PRESS OF A SINGLE BUTTON, MIURA BOILERS PRODUCE STEAM IN FIVE MINUTES OR LESS.

There' s no-warm up necessary. In five minutes or less from start-up, you' ve got steam to run your processes, heat your facility or whatever you need it for, when you need it. Miura' s boilers feature fast starts that track precisely to drastic load swings. With our innovative "MI (Multiple Installation) system, you can build an on-demand steam plant customized to meet your specific demand requirements. Our MI system provides the flexibility to build to current steam loads within very tight tolerances, and our more efficient boilers are synchronized to give you the steam you need and cycle on and off when you don' t need it. Miura boilers meet lower NOx standards, reduce maintenance and monitoring needs, and reduce space requirements. And they do it with the most real-world, in-service efficiency possible, saving you up to 20% on fuel costs.

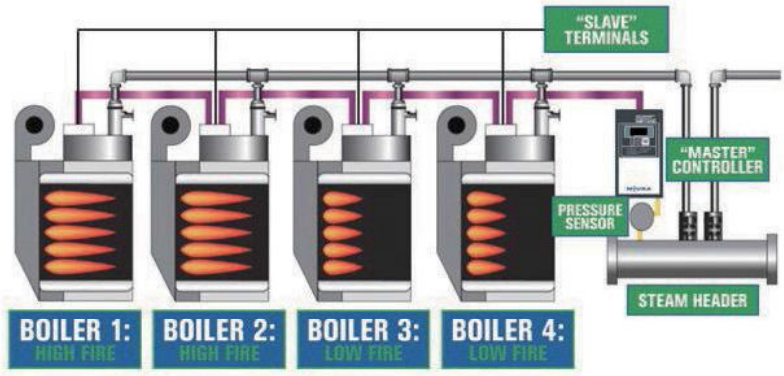
SMALLER IS BETTER

Miura' s unique, compact modular design utilizes a low-volume pressure vessel, offering output capacities comparable to much larger traditional, outdated boilers. The resulting smaller boiler footprint provides design flexibility, reduced construction costs and more options with existing spaces. Miura boilers eliminate tube pull-space and door-swing space requirements typical of conventional designs. This allows configuration of the boiler room for double the output of an existing boiler plant or reduction of its size by over fifty percent. And a Miura boiler system is so flexible, you can have multiple boilers working on the same system in separate installations or install Miura boilers at the point-of-use in order to eliminate energy loss through line transmission.



The Modular Difference

For larger loads, multiple Miura boilers are far superior to a single large conventional boiler.



With our innovative "MI" (Multiple Installation) system, you can build an on-demand steam plant customized to meet your specific demand requirements. The MI system provides the flexibility to build to current steam loads within very tight tolerances while allowing easier future expansion of system capacity. The multiple modular units also enhance a facility' s energy management capability by providing higher efficiency during part-load/standby conditions via the MI system' s ability to stage multiple units on or off in response to demand fluctuations. And because boilers cycle on and off independently, there' s no shutdown for routine maintenance. With a half-day inspection per boiler, you never lose steam and never experience plant shutdown.

- Automatically stage boilers to meet demand fluctuations
- Provide equivalent boiler capacity in less than half the space
- Save up to 20% in annual fuel costs