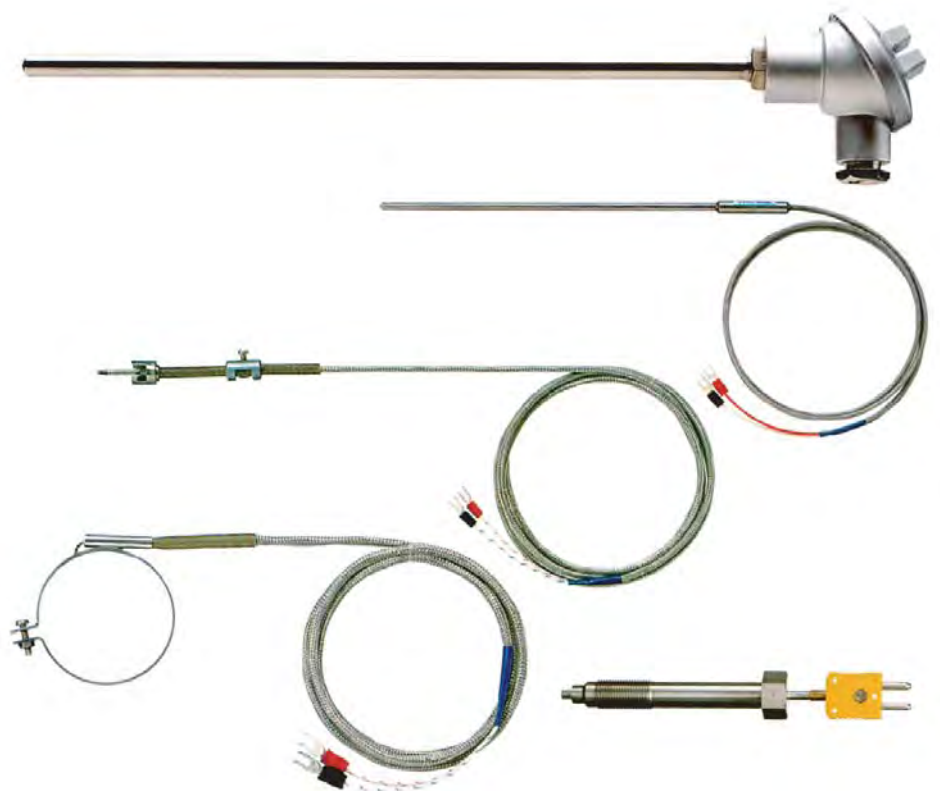


TEMPERATURE SENSOR

Temperature Sensors

- Thermocouples
- Resistance Temperature Detectors



RKC INSTRUMENT INC.

Precautions for Temperature Sensor

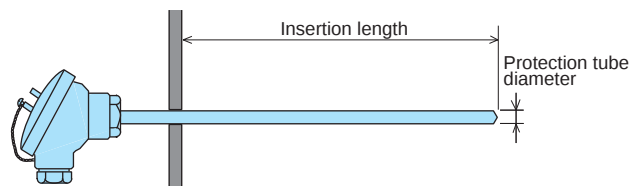
Insertion length

To measure the temperature accurately, the temperature sensor should be thermally balanced against the measuring object. If the actual insertion length of the protection tube is short, the temperature sensor will be thermally affected from the surrounding area and cause an error. The required insertion length will differ depending on the measuring object, protection tube, etc. Install the temperature sensor so that the insertion length will be longer than the values shown in Table 1.

Table 1 : Insertion of thermocouple (Melt protection tube) · Reference value

Measuring object	Insertion length
Liquid	More than 5 times of protection tube diameter
Gas	More than 10 times of protection tube diameter

· Resistance temperature detector should be inserted more deeply.
(Approx 2 times of thermocouple)



WIRING

- Check polarity when wiring for the following. Wrong polarity causes measurement error.
 - Connect temperature sensors to element wires, compensation cables, connectors or terminal blocks.
- Use appropriate compensation cables to joint between terminal boxes and instruments when thermocouple is used.
Use copper wire cables when resistance temperature detector used.
- When connecting the sensor to a terminal block or a connector, make sure all connections are properly made. If screws are not tightened firmly enough, it may cause a loose contact. A burr on the cable may cause short circuit.
- Consider heat resistance of cable. Contacting cable to heat source or putting it closer causes insulation failure, short-circuit or cable break.
- Double-element type thermocouple
When thermocouple is double-element type, measurement point is bonded together regardless of grounded junction or ungrounded junction. No need to divide into plus polar and minus polar in each element. Specify when ordering if measurement points need to be bonded individually.

HANDLING

- Connect to specified terminals of sensor inputs when connecting temperature sensors to instruments. Connecting to power supply cause burn, fire or explosion.
- Do not install sensors:
 - Near a high-voltage power supply.
 - At places where high-voltage could be applied to them due to electric leakage or other causes.
- Avoid quick heating and cooling. It causes failure or damage due to heating shock.
(Especially pay attention to it in case of using Ceramic Thermocouple Protection Tube.)
- Do not touch temperature sensors till those temperature return to ambient temperature when temperature sensors are used at high or low temperature. It causes burn injury or cold injury.
- Confirm that temperature sensors work well after installment.
- **MgO sheathed temperature sensor**
Do not bend repeatedly though it is able to bend in the range of 5 times radius of sensor's diameter. It causes failure or damage.
 - Bending work can be specified in the range of three-times radius when ordering.Do not bend at the point within 100mm from the tip of measuring points since resistance element is mounted at the tip.
If the ordered protection tube is long, it may be shipped coiled. To uncoil the tube, carefully restore it by uncoiling it into the reverse direction of coiling. (Don't pull the tube with force while it is still in coil form)
- **Temperature sensor with sleeve**
Don't bend the cable sharply near the sleeve fixed with resin. Do not use the sensor where the temperature of the sleeve parts exceeds its high limit of operating temperature. It causes disconnection, connection failure, or short-circuit.
Sheath thermocouples can be ordered with a minimum protection tube length of 50mm.
However, with a short protection tube, the temperature on the sleeve may be affected by the heat source and need longer time to get stabilized. Temperature error may be also larger. It is recommended to order the protection tube with a longer length considering the operating temperature.
- **Temperature sensor with lead wire**
Do not forcibly pull the lead wire, it may cause connection failure or short-circuit. When installing or removing sensors using stainless steel shield wire, handle with care to prevent a break of the thin shield wire. Do not bend the lead wire or slide spring excessively or repeatedly.
Protect your hands with gloves to avoid hurting by shielded cable.
- **Fluorine resin coated temperature sensor**
Fluorine resin coated temperature is sexcells in chemical resistance. However some chemicals penetrate into the internal of the sensor.
Use it within the range of the specifications.
- **Temperature sensor with porcelain protection pipe**
Porcelain protection pipe is easy to be broken. Do not apply an excessive force to the part of protection pipe.

INSPECTION IN USING

- Inspect regularly as follows.
- Inspect damaged condition of protection pipe.
 - Remove extraneous matter such as soot, dust or sludge.
 - Tighten screw at junction part.
 - Remove water drops or dew condensation
 - Inspect insulation resistance. (except grounded junction sensor)
 - Other usage environment.
 - Inspect accuracy regularly.

DISPOSAL

Dispose of sensors in compliance with the law, regulation, and any other applicable rules at the place where the sensor is used.

NOTICE

- RKC is not responsible for any damage or injury that is caused as a result of using this sensor, sensor failure or indirect damage.
- RKC is not responsible for any damage and/or injury resulting from the use of sensors made by imitating this instrument.
- Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.

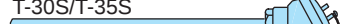
CONTENTS

1) Precautions for temperature Sensor	1	Screwed tip thermocouples T-230	34
2) Contents	2	Fixing screw type thermocouples for surface temperature measurement T-240	34
3) Temperature sensor list	3-4	Ring type thermocouples for surface temperature measurement T-250	35
4) Installation example	5	Thermocouples for resin temperature T-260	36
5) Mounting brackets	6	Thermocouples for resin temperature (Zero-heat-flow method) T-270Z	36
6) Lead wire termination • Terminal head • Measuring junction • Tip processing	7-8	Adhesive and exposed tip type temperature sensors ST-50,ST-51	37-38
7) Thermocouple connectors	9-10	Temperature sensors for extremely small surface ST-55,ST-56	39-41
8) Thermocouples	11-36	Thermocouple type non-contact temperature sensors ST-100	42
• General purpose thermocouples	11-19	Thermocouple type non-contact temperature sensors ST-100K	43
Spring loaded type thermocouples T-100,T-110	12	Rotationary roll surface temperature measuring sensors JBS-3898	44
Sleeve type thermocouples T-101,T-111	13	9) Resistance temperature detectors	45-54
No sleeve type thermocouples T-102	14	• General purpose resistance temperature detectors	45-49
Terminal head type thermocouples T-30,T-35	15	Sleeve type resistance temperature detectors R-101,R-111	46
Exposed terminal head type thermocouples T-80,T-85	16	No sleeve type resistance temperature detectors R-102	47
Metal connector type thermocouples T-90	17	Terminal head type resistance temperature detectors R-30,R-35	48
Noble Metal type thermocouples T-30,T-35	18	Metal connector type resistance temperature detectors R-90	49
Noble Metal type thermocouples T-80,T-85	19	• Sheathed type resistance temperature detectors	50-54
• Sheathed type thermocouples	20-24	Sleeve type resistance temperature detectors R-101,R-111S	50
Sleeve type thermocouples T-101S,T-111S	20	Terminal head type resistance temperature detectors R-30S,R-35S	51
Terminal head type thermocouples T-30S,T-35S	21	Metal connector type resistance temperature detectors R-90S	52
Thermocouple connector type thermocouples T-70S,T-75S	22	Sanitary type sheathed resistance temperature detectors R-31S/R-36S/R-31RS/R-36RS	53-54
Exposed terminal head type thermocouples T-80S,T-85S	23	10) PFA (Fluororesin) coated temperature sensors	
Metal connector type thermocouples T-90S	24	Thermocouple/Resistance temperature detectors FT-100,FR-100	55-56
• Microbell sheathed thermocouples	25-27	11) Reference information	57-59
Sleeve type thermocouples T-101N,T-111N	26	Thermocouples	57
Terminal head type thermocouples T-30N,T-35N	27	Resistance temperature detectors	58
• Thermocouples for various applications	28-36	Protection tubes	59
Bayonet type (With spring loaded) thermocouples T-200,T-210	29	Lead wires	59
Bayonet type (Sleeve type) thermocouples T-201,T-211	30	Compensation lead wires	59
Bayonet type (Sleeve type) sheathed thermocouples T-201S,T-211S	31	Responsiveness of sensors	59
Bayonet type sheathed thermocouples for high temperature (Variable insertion length type) T-202SH,T-212SH	32	12) Temperature sensor specification check sheet	60
Bayonet type thermocouples (Variable insertion length type) T-220,T-221	33	13) Calibration service for temperature sensors	61-62

Temperature Sensor List

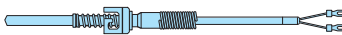
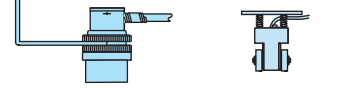
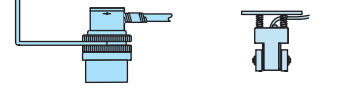
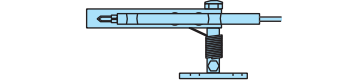
● General Purpose Temperature Sensors

Measuring range differ to protection tube diameter, etc.

Measuring Range		Type	Appearance	Features	Reference page
-200	0 200 400 600 800 1000 1200 1400 1600				
T Type 200°C(250°C) K,J Type 300°C(400°C)		Thermocouples	T-100/T-110  T-110 is protection tube 90° bend type.	Standard type. The diameter of protection tube is either φ5 or φ6.	12
T Type 250°C(300°C) J Type 450°C(550°C) E Type 500°C(550°C) K Type 750°C(950°C)		Thermocouples	T-101/T-111  T-111 is protection tube 90° bend type. T-102  T-30/35  T-80/T-85  T-90 	Standard type. A variety of kinds are available.	13 to 17
R,S Type 1400°C(1600°C) B Type 1500°C(1700°C)		Noble Metal Thermocouples	T-30/T-35  T-80 	Temperature sensor which is suitable for high temperature measurement. Platinum is used for element.	18 to 19
T Type 350°C J Type 750°C E Type 800°C K Type 900°C		Sheathed Thermocouples	T-101S/T-111S  T-101S is protection tube 90° bend type. T-30S/T-35S  T-70S/T-75S  T-80S/T-85S  T-90S 	Thin protection pipe is available. Faster responsiveness. Excellent Vibration and shock resistance.	20 to 24
K,N Type 1200°C		NICROBELL Sheathed Thermocouples	T-101N/T-111N  T-111N is protection tube 90° bend type. T-30N/T-35N 	High stability, and excellent heat and environmental resistance. Capable of high temperature measurement. Excellent Vibration and shock resistance.	25 to 27
Pt100 Type 650°C JPt100 Type 500°C		Resistance Temperature Detectors	R-101/R-111  R-111 is protection tube 90° bend type. R-102  R-30/35  R-90 	High accuracy and stability. Inexpensive compared with the MgO sheathed RTDs.	45 to 49
Pt100/Jpt100 Type 500°C		Sheathed Resistance Temperature Detectors	R-101S/R-111S  R-30S/35S  R-90S 	Excellent vibration proof and shock resistance compared with the other standard types of thermocouples.	50 to 52
Pt100/Jpt100 Type 200°C		Sanitary type Sheathed Resistance Temperature Detectors	R-31S/36S  R-31RS/36RS 	Sanitary designed sensor protected from foreign materials and microbiological contamination. Suitable for usage in food, beverage, chemical processes without concern of contamination.	53 to 54
Pt100 Type 200°C		PFA (Fluororesin) coated temperature sensors (Thermocouple, Resistance Temperature Detectors)	FT-100  FR-100 	Chemical and humid resistant PFA coated sensor. PFA coated from the sensing point to the lead wire.	55 to 56

• For thermocouple, value is normal operating temperature limit while that of in () is maximum operating temperature limit. For RTDs, it is operating temperature.

● Temperature sensors for various applications

Measuring Range		Type • Usages	Appearance	Features	Reference page
-200	0 200 400 600 800 1000				
T Type 200°C(250°C) K,J Type 300°C(400°C)	K Type 550°C	Bayonet type thermocouples [Applications] Plastic molding Cylinder Molding die Hot runner	T-200/T-210  T-210 is protection tube 90° bend type. T-201/T-211 T-201S/T-211S(Sheathed Thermocouple)  T-211(S) is protection tube 90° bend type.	The tip is going to be pressure welded to the measured object by mounting bracket. Suitable for measurement of hot runners, dies and moulds.	29 to 31
			Sheathed Thermocouple for High Temperature T-202HS/T-212HS T-212HS is protection tube 90° bend type. 	Thermocouple with bayonet. Length can be easily adjusted. Easy mounting is possible by moving the bayonet cap dependent upon the insertion length.	32
T Type 200°C(250°C) K,J Type 300°C(400°C)	T-220 		Thermocouple with bayonet. Length can be easily adjusted. Decide the position of the mounting bracket dependent upon insertion length and fix the spring by fixed screw.	33	
	T-221 		Thermocouple with bayonet. Length can be easily adjusted. Easy mounting is possible by moving the bayonet cap dependent upon the insertion length.	33	
T Type 200°C(250°C) K,J Type 300°C(400°C)	Screwed Tip Thermocouples [Applications] Plastic molding Cylinder Molding die Hot runner	T-230 	The tip is M6 size (M8 size is also available) rotary screw. Internal screws will be threaded in the fitting point. *M6, M8 is based on JIS Standard.	34	
T Type 200°C(250°C) K,J Type 300°C(400°C)	Fixing screw type thermocouples for surface temperature measurement	T-240 	Fix the sensor at a φ4.5 fixed screw hole of the tip with a screw. Suitable for temperature measurement for the tiny spaces.	34	
T Type 200°C(250°C) K,J Type 300°C(400°C)	Ring type thermocouples for surface temperature measurement [Applications] Plastic molding Cylinder Nozzle Pipe shaped objects	T-250 	Suitable for temperature measurement for the pipe shaped objects and the surface of the nozzles.	35	
K,J Type 400°C	Thermocouples for Resin Temperature [Applications] Melting resin temperature of Extruder	T-260 	Capable of measurement of the molten resin temperature, such as the inside of the extruder. M16 screw is cut and its tip directly touches to the melting resin. *M16 is based JIS Standard.	36	
K,J Type 400°C	Thermocouples for Resin Temperature [Applications] Melting resin temperature of Extruder	T-270Z 	By utilizing ZHF (zero-heat-flow) method, it eliminates thermal disturbances and temperature errors between the tip and the outside case and realizes more precise temperature measurement of the melting resin.	36	
K Type 300°C	Adhesive and exposed tip type temperature sensors [Applications] Surface of electronic parts	ST-50/ST-51 	An adhesive surface at the tip allows easy attachment and measurement of the surface temperature. Exposed type is also available.	37 to 38	
K Type 300°C Fluorine resin coating type K Type 500°C Ceramic coating type	Temperature Sensors for Extremely Small Surface [Applications] Surface of electronic parts	ST-55  ST-56 	A fine thermocouple enables measurement of a fine surface or a surface with small thermal capacity such as SMT parts.	39 to 41	
ST-100 K Type 300°C ST-100K/K1 K Type 200°C(260°C)	Thermocouple Type Non-Contacting Temperature Sensors [Applications] Surface temperature of Roller and Rotationaly objects	ST-100  ST-100K/ST-100K1 	Capable of surface temperature measurement of the rotating objects such as rollers and sheets without direct contact.	42 to 43	
K Type 300°C	Rotationary Roll Surface Temperature Measuring Sensors [Applications] Rotationary Roll Surface	JBS-3898 	Capable of surface temperature measurement of the rotating objects such as rollers and sheets with direct contact.	44	

• Temperature value : Normal operating temperature limits, () : Maximum operating temperature limits

● Normal operating temperature limits and maximum operating temperature limits

Normal operating temperature limit is a temperature limit of sensors' continuous use in the air. It is a reference temperature that ±0.75% of thermo electromotive force might not change with 10,000 hours of its successive use.

• For R, B, and S type, it is a reference temperature that ±0.5% of thermo electromotive force might not change with 2,000 hours of its successive use.

Maximum operating temperature limit is a limit of allowable temperature for short-term used in unavoidable situations. It is a reference temperature that ±0.75% of thermo electromotive force might not change with 250 hours of successive use.

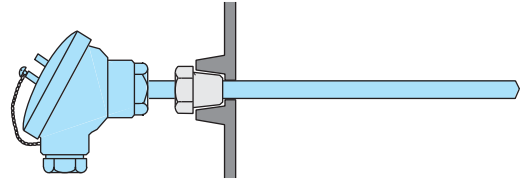
• For R, B, and S type, it is a reference temperature that ±0.5% of thermo electromotive force might not change with 50 hours of its continuous use.

(JIS C1602-1995)

Installation example

● Fixed nipple (nut), Code : A

The insertion length is fixed (specify when you order) as for the nipple is fixed on the protection tube.
Screw will be fit by welding at the fitting side or threading. Screw types will be either tapered or parallel one.

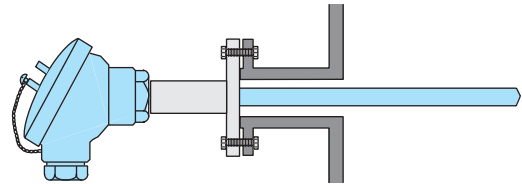


● Rotary nipple (nut), Code : B

The insertion length is fixed (specify when you order) as for the stopper of nipple which is fixed on the protection tube.
Screw will be fit by welding or threading at the fitting side. Easy fitting is realized because only the screw rotates.
There is no air tightness.
Available screw types are taper and parallel.

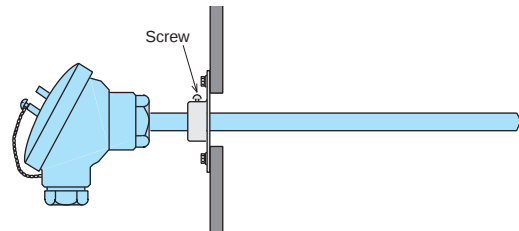
● Fixed flange (Code : C)

The insertion length is fixed (specify when you order) as for the flange is welded to the protection tube.
The flange will be welded to the fitting side in advance, and fixing it with a bolt.



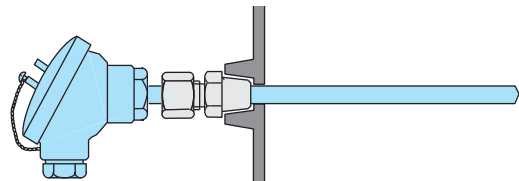
● Sliding flange

The insertion length will be decided arbitrarily. The flange will be fixed at the fitting part with a bolt, and fastened with screws. There is no air proof.



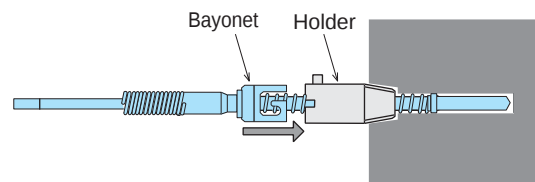
● Compression fitting (Code : E)

The insertion length is freely adjustable. Weld a screw to the mounting side or thread a hole for it. Screw the mounting bracket into the hole. Determine the length and tighten the nut to fix



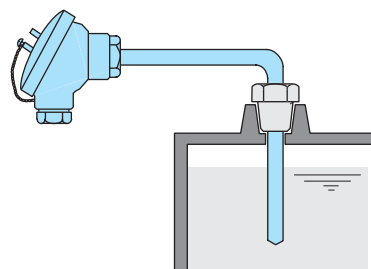
● Bayonet type thermocouple

Thread a hole in advance on the mounting side and screw the holder into the hole.
Hang the bayonet cap on the holder and fix it.
Temperature measuring junction is constantly pressed to the measuring point with the spring force.



● L shape type

Use an L-shaped type where a straight type is hard to install or where lead wire/terminal box may be corroded or thermally affected.

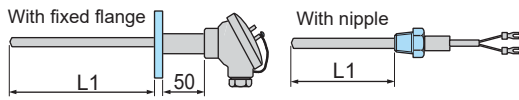


Mounting Brackets

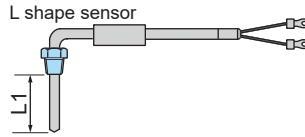
● How to specify the length (L) of the protection tube with the mounting bracket.

With fixed flange / With nipple

For the sensor with fixed flange or fixed nipple, specify length (L) by referring length of under the screw or under the flange. If a space is required between the mounting bracket and the sleeve or between the mounting bracket and the terminal box, please specify it as well.

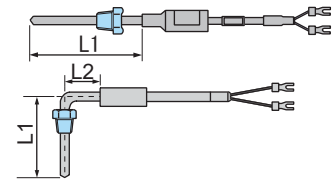


For L shape sensors, mounting bracket will be installed as the below picture.
* Please contact with our distributors in case mounting bracket is needed to install to other places.



With compression fitting

For the sensor with compression fitting, specify length (L) by referring the terminal box and the sleeve as the same order way without mounting bracket.



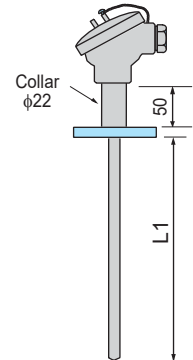
● Flange

● JIS • FF flange (Fixed type) <Material : SUS304>

Unit:mm

	Name of Size	Dimension of Flange		Bolt Hole		
		A	B	φD	t	φC φh Number of Hole
JIS 5K Flange	10	3/8	75	9	55	12 4
	15	1/2	80	9	60	12 4
	20	3/4	85	10	65	12 4
	25	1	95	10	75	12 4
	40	1 1/2	120	12	95	15 4
	50	2	130	14	105	15 4
	65	2 1/2	155	14	130	15 4
	80	3	180	14	145	19 4
JIS 10K Flange	10	3/8	90	12	65	15 4
	15	1/2	95	12	70	15 4
	20	3/4	100	14	75	15 4
	25	1	125	14	90	19 4
	40	1 1/2	140	16	105	19 4
	50	2	155	16	120	19 4
	65	2 1/2	175	18	140	19 4
	80	3	185	18	150	19 8
JIS 20K Flange	25	1	125	16	90	19 4
	40	1 1/2	140	18	105	19 4
	50	2	155	18	120	19 8
	65	2 1/2	175	20	140	23 8

* A collar will be equipped between the fixed flange and the terminal box if diameter of the protection pipe is under φ10,

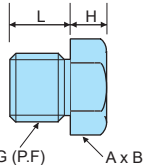


How to Specify For JIS 5K flange, please specify as JIS5K (fixed) flange 10A or specify as 3/8B.

• RF flange is also available. Please specify when you order.

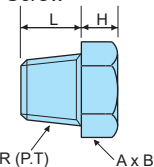
● Nipple (nut) <Material : SUS304>

Parallel Screw



G(PF)/R(PT)	Diameter of protection tube	L	H	A x B
1/8	φ6 or less	10	6	14×16.2
1/4	φ8 or less	12	6	17×19.6
3/8	φ10 or less	15	7	21×24.2
1/2	φ12 or less	18	10	26×30
3/4	φ16 or less	22	16	32×37
1	φ22 or less	22	16	41×47.3

Taper Screw



How to Specify

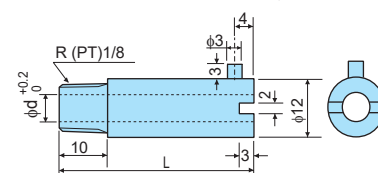
Please specify as G or PF (parallel nipple) 1/8 • R or PT (taper nipple) 1/8.

• Parallel nipple • taper nipple are both applied to the fixed and rotary nipples.

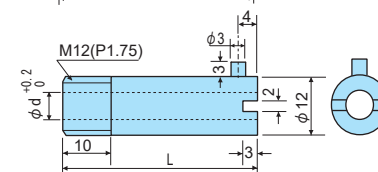
● Holder

T-220 Holder Available model (Inner diameter φd=5.2mm) : T-220,221,202SH,212SH

T-200 Holder Available model (Inner diameter φd=7.2mm) : T-200,201,210,211



Screw : R(PT)1/8
L=32,40,62
(Please specify when you order)

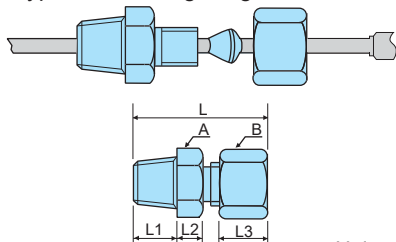


Screw : M12(P1.75)
L=32,62
(Please specify when you order)

• Different types of screws are also available.

● Compression Fitting

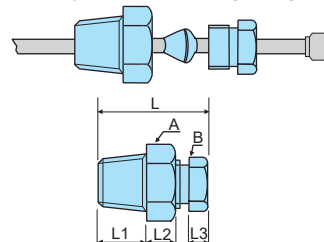
Cap nut type <Fastening Ring Material : SUS304>



Unit:mm

R(PT)	Diameter of protection tube	L	L1	L2	L3	A	B
1/8	1.6	33	10	6	12	12×13.7	12×13.7
	3.2	33	10	6	12	12×13.7	12×13.7
	4.8	35	10	6	14	12×13.7	14×16.2
1/4	3.2	37	14	6	12	14×16.2	12×13.7
	4.8	38	14	6	14	14×16.2	14×16.2
	6.4	38	14	6	14	14×16.2	14×16.2
	8.0	41	14	6	16	17×19.6	17×19.6

Push screw type <Fastening Ring Material : Brass or copper>



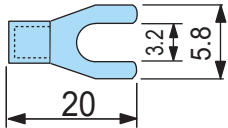
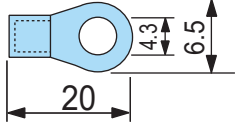
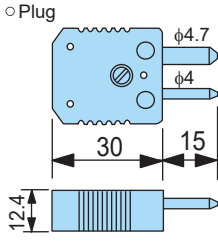
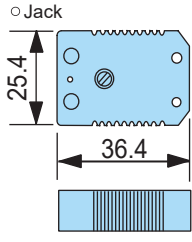
Unit:mm

R(PT)	Diameter of protection tube	L	L1	L2	L3	A	B
3/8	3.2	39	16	15	5	22×25.4	14×16.2
	4.8	40	16	15	5	22×25.4	14×16.2
	6.4	45	16	19	5	22×25.4	17×19.6
	8.0	44	16	19	5	22×25.4	17×19.6
1/2	3.2	43	20	15	5	24×27.7	14×16.2
	4.8	44	20	15	5	24×27.7	14×16.2
	6.4	49	20	19	5	24×27.7	17×19.6
	8.0	48	20	19	5	24×27.7	17×19.6

Lead wire termination

● Lead wire termination

For lead wire termination (compensation wire and copper wire), Spade lugs, Ring lugs, connector, and TC type connector are available. We also can provide requested termination type.

Spade lugs	Ring lugs	Thermocouple connectors
JIS standard "M3" size screw	JIS standard "M4" size screw	Composition of the leadwire will be as follows [(plug) + (clamp) + (jack)] when TC connector [code : TE] is specified. For other types and combinations, please refer to p.10.
		 Model Code : CSP01-□  Model Code : CSP02-□
V1.25-B3A (Manufactured by J.S.T MFG CO., LTD.)	V1.25-M4 (Manufactured by J.S.T MFG CO., LTD.)	

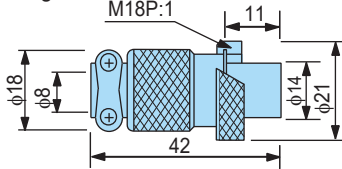
Metal connectors

Connector is manufactured by Sanwa Connector laboratory Co., Ltd..

Metal connector manufactured by Nanaboshi Electric Mfg. Co., Ltd. is also available.

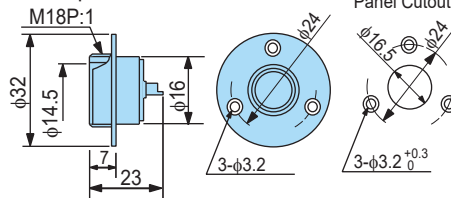
Manufactured by Sanwa Connector Laboratory Co., Ltd. (Standard)

○ Plug



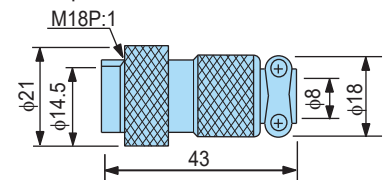
Specification	Model Code
Thermocouple (Single element)	SCK-1602-P
Thermocouple (Double element)	SCK-1604-P
Resistance Temperature Detector (Single element)	SCK-1603-P
Resistance Temperature Detector (Double element)	SCK-1606-P

○ Receptacle



Specification	Model Code
Thermocouple (Single element)	SCK-1602-R
Thermocouple (Double element)	SCK-1604-R
Resistance Temperature Detector (Single element)	SCK-1603-R
Resistance Temperature Detector (Double element)	SCK-1606-R

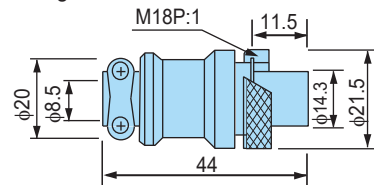
○ Adaptor



Specification	Model Code
Thermocouple (Single element)	SCK-1602-A
Thermocouple (Double element)	SCK-1604-A
Resistance Temperature Detector (Single element)	SCK-1603-A
Resistance Temperature Detector (Double element)	SCK-1606-A

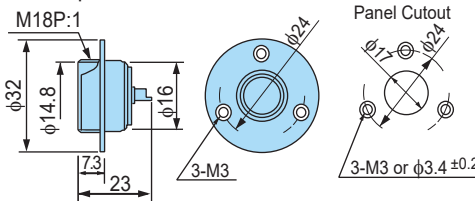
Manufactured by Nanaboshi Electric Mfg. Co., Ltd.

○ Plug



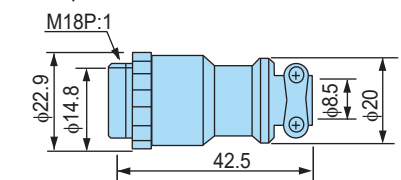
Specification	Model Code
Thermocouple (Single element)	NCS-162-P-CH
Resistance Temperature Detector (Single element)	NCS-163-P-CH

○ Receptacle



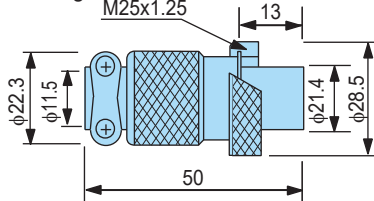
Specification	Model Code
Thermocouple (Single element)	NCS-162-R-CH
Resistance Temperature Detector (Single element)	NCS-163-R-CH

○ Adaptor



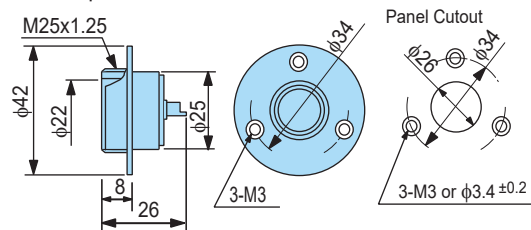
Specification	Model Code
Thermocouple (Single element)	NCS-162-Ad-CH
Resistance Temperature Detector (Single element)	NCS-163-Ad-CH

○ Plug



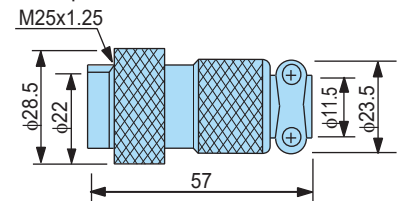
Specification	Model Code
Thermocouple (Double element)	NCS-254-P
Resistance Temperature Detector (Double element)	NCS-256-P

○ Receptacle



Specification	Model Code
Thermocouple (Double element)	NCS-254-R
Resistance Temperature Detector (Double element)	NCS-256-R

○ Adaptor



Specification	Model Code
Thermocouple (Double element)	NCS-254-Ad
Resistance Temperature Detector (Double element)	NCS-256-Ad

Connector has 2 types. One is "Female connector type (standard)", the other one is "Male connector type".

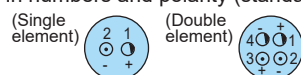
Female connector type (standard)

Specification
Socket insert plug
Pin insert receptacle
Pin insert adaptor

Male connector type

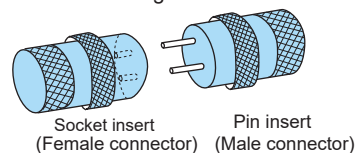
Specification
Pin insert plug
Socket insert receptacle
Pin insert adaptor

□ Pin numbers and polarity (standard)



(There are some changes in codes dependent upon production companies. For Sanwa Connector Laboratory Co., Ltd., NCF will be SCH. For Nanaboshi Electric Mfg. Co., Ltd., plugged end connector will be P to PM, receptacle will be R to RF, and adaptor will be Ad to AdF.

Plug



● Terminal head

Name		Enclosed-terminal 30 type Terminal Head	Enclosed-terminal 35 type Terminal Head	Exposed terminal 80 type Terminal Head	Exposed terminal 85 type Terminal Head	
Appearance Unit:mm						
Specifications	Material	Aluminum die cast	Aluminum die cast	Phenol resin	Phenol resin	
	Lead wire output port	PF3/8	PF1/2	Exposed terminal	Exposed terminal	
	Number of Terminals	• Thermocouple : 2 • Resistance temperature detector : 3	• Thermocouple : 2, 4 • Resistance temperature detector : 3, 6	Thermocouple : 2	Thermocouple : 2	
	Terminal board	Steatite porcelain	Steatite porcelain	Phenol resin	Phenol resin	
	Available diameter of protection tube	Metal	φ3 to φ10	φ4.8 to φ22	φ3 to φ10	φ4.8 to φ22
		Non-metal	φ6 to φ10	φ6 to φ17	φ6 to φ10	φ6 to φ17
Coating Color		Silver	Silver	Black	Black	

● Measuring junction

Grounded (Example of Thermocouple)	Ungrounded (Example of Thermocouple)	Exposed (Example of Thermocouple)
Thermocouple wires are directly welded to the sheath end. As response is faster, it is suitable for measurement under high temperature and high pressure condition. It is not recommended in the presence of hazard and noise voltages because wires are directly welded to the sheath end.	Completely insulated between the thermocouple element/resistance element and the sheath. The Hot junction is also insulated. Response is slower than the grounded type. Less EMF change by time. Can be used for a comparatively long period of time. Not affected by noise voltage.	Thermocouple wires are exposed from the sheath. As response is fastest, it can follow even a little temperature change. Avoid being used over a long period of time under corrosive atmosphere or high temperature and high pressure conditions due to no air tightness and mechanical strength.

Type		Grounded	Ungrounded	Exposed
Thermocouple	General type	Available	Available	Available
	Sheathed type	Available	Available	Available
Resistance temperature detector	General type	Not available	Available	Available
	Sheathed type	Not available	Available	Not available

● Tip processing

Type	Features
Silver soldering	Maximum heat resistance degree for welding is 500°C. Not suitable for food and plating applications since it is largely affected by corrosive.
Argon welding	Non-MgO sheathed sensors for high temperature use are welded by argon. All of MgO sheathed sensors are welded by argon.

● Lead wire termination

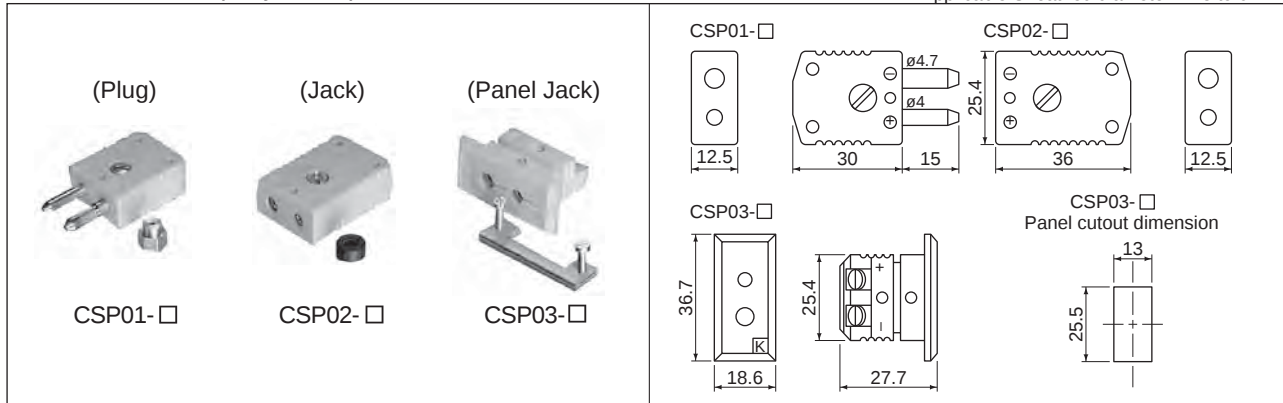
Spade lugs for JIS standard "M3" size screw	Thermocouple connector
Ring lugs for JIS standard "M4" size screw	Metal connector
No terminal lugs *terminal soldered	

Thermocouple Connectors

If standard connector is used for connecting compensating cables for thermocouple, it will cause indication error because the materials of connection terminals differ from those of leadwires and compensation cables. By using connectors for thermocouple, accuracy of thermocouple can be maintained because connection terminals of the connector are the same materials with thermocouple. There is no concern of intervention of different types of metals.

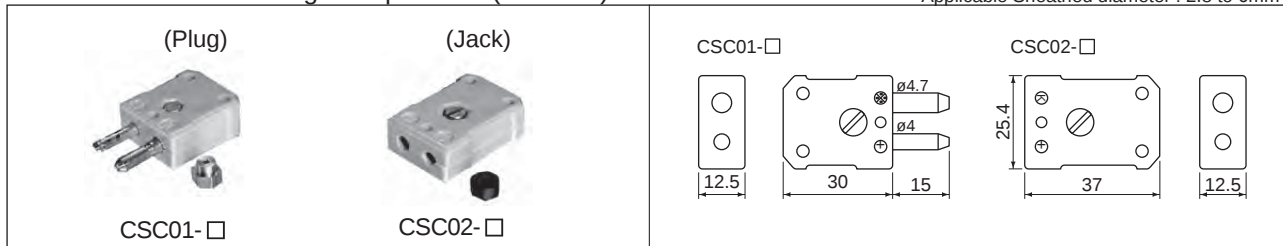
● Standard Size (Polyamide) CSP□□-□

Recommended tightening torque : 1.5kgf•cm
Applicable Sheathed diameter : 2.8 to 6mm



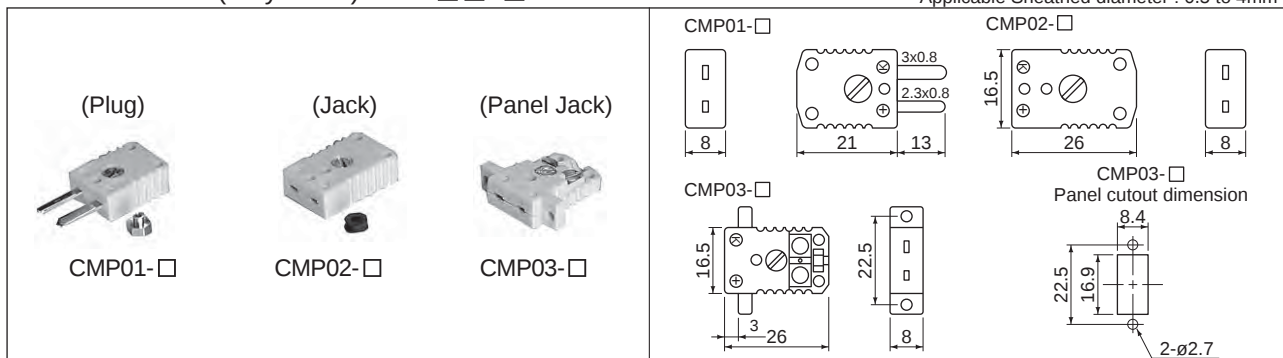
● Standard Size : For High temperature (Ceramic) CSC□□-□

Recommended tightening torque : 1.5kgf•cm
Applicable Sheathed diameter : 2.8 to 6mm



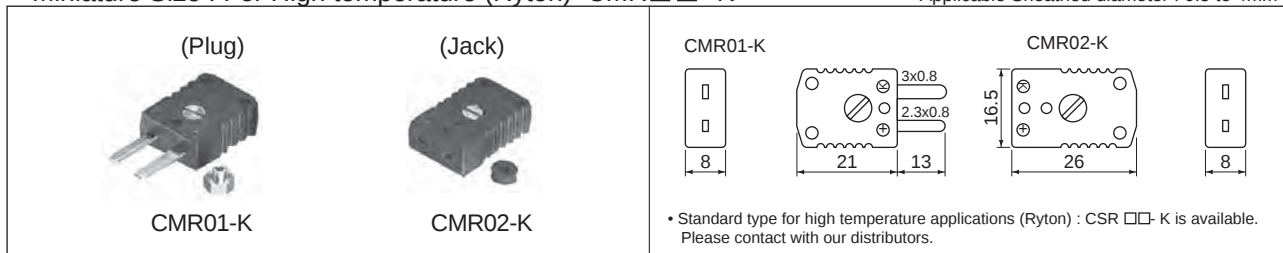
● Miniature Size (Polyamide) CMP□□-□

Recommended tightening torque : 1.5kgf•cm
Applicable Sheathed diameter : 0.5 to 4mm



● Miniature Size : For High temperature (Ryton) CMR□□-K

Recommended tightening torque : 1.5kgf•cm
Applicable Sheathed diameter : 0.5 to 4mm



- 3 thermocouple types are available : K, J, and T. (R type is available for polyamide miniature.)

Color of K type connector is yellow, J type is black, and T type is blue.
(If ryton is a material for the connector, its color is brown. This is only for K type)
Please note that color of each lead wire is different.

- The attached rubber packing and metal adaptor

Please use rubber seal or metal adaptor to stabilize in case the hole size of connector is too bigger against the size of compensation cable or MgO sheathed tube. To stabilize connection, slide rubber seal or metal adapter into the groove of thermocouple connector.
Either of seal rubber or metal adapter is standard accessory.

Thermocouple Connectors

● Model Code

Specifications	Model and Suffix Code				
	C		□ □	□ □	□
Connector Material	Standard Size (Polyamide)	Max.120°C	SP		
	Standard Size (Ceramic)	Max.900°C	SC		
	Miniature Size (Polyamide)	Max.120°C	MP		
	Miniature Size (Ryton)	Max.220°C	MR		
Type	Plug Jack			01	
	Panel Jack			02	
	Plug + Jack			03	
	Plug + Panel Jack			12	
	Plug + Panel Jack			13	
Thermocouple Type	K : Yellow J : Black T : Blue				K J T

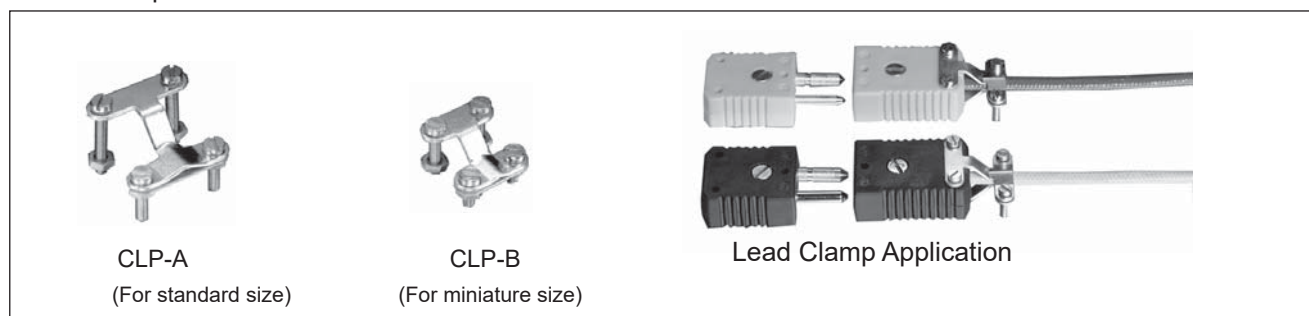
*1 : For the miniature size (ryton), only K is available. Its color is brown.

*2 : For the miniature type (polyamide), R is also available. Its color is green. Please select "R" at thermocouple material code.

*3 : Standard type (ryton) K is also available. Please contact with our distributors.

Material	Type	Model Code
Polyamide	Standard Size (Plug + Jack)	CSP12- □
	Standard Size (Plug + Panel Jack)	CSP13- □
	Standard Size (Plug)	CSP01- □
	Standard Size (Jack)	CSP02- □
	Standard Size (Panel Jack)	CSP03- □
Ceramic	Standard Size (Plug + Jack)	CSC12- □
	Standard Size (Plug)	CSC01- □
	Standard Size (Jack)	CSC02- □
Polyamide	Miniature Size (Plug + Jack)	CMP12- □
	Miniature Size (Plug + Panel Jack)	CMP13- □
	Miniature Size (Plug)	CMP01- □
	Miniature Size (Jack)	CMP02- □
	Miniature Size (Panel Jack)	CMP03- □
Ryton	Miniature Size (Plug + Jack)	CMR12-K
	Miniature Size (Plug)	CMR01-K
	Miniature Size (Jack)	CMR02-K

● Lead Clamp



● Accessories

Metal adaptor

Specifications	Model Code	Order
For standard size	ADP-AM	10 pieces per set
For miniature size	ADP-BM	

Rubber packing

Specifications	Model Code	Order
For standard size	ADP-AG	10 pieces per set
For miniature size	ADP-BG	

● Model and suffix code for thermocouple connector with lead wire

Model Code	Type
TE	CSP01 + CLP-A + CSP02 Standard Size (Plug + Clamp + Jack)
TS1	CSP01 + CLP-A Standard Size (Plug + Clamp)
TS2	CSP01 Standard Size (Plug)
TS3	CSP01 + CLP-A + CSP03 Standard Size (Plug + Clamp + Panel Jack)
TS4	CSP01 + CSP02 Standard Size (Plug + Jack)
TSA	CSP02 + CLP-A Standard Size (Jack + Clamp)
TSB	CSP02 Standard Size (Jack)
TM1	CMP01 + CLP-B Miniature Size (Plug + Clamp)
TM2	CMP01 Miniature Size (Plug)
TM3	CMP01 + CLP-B + CMP03 Miniature Size (Plug + Clamp + Panel Jack)
TM4	CMP01 + CLP-B + CMP02 Miniature Size (Plug + Clamp + Jack)
TM5	CMP01 + CMP02 Miniature Size (Plug + Jack)
TMA	CMP02 + CLP-B Miniature Size (Jack + Clamp)
TMB	CMP02 Miniature Size (Jack)

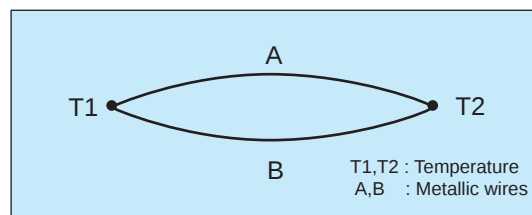
* For the other types, please contact with our distributors.

General purpose type • Sheathed Thermocouples

■ Thermocouple

A thermocouple consists of two dissimilar metallic wires, edge of its each wire is jointed, and measures a voltage produced according to a difference of the temperatures through each metallic wire. This effect is called Seebeck effect and has been known from long time ago.

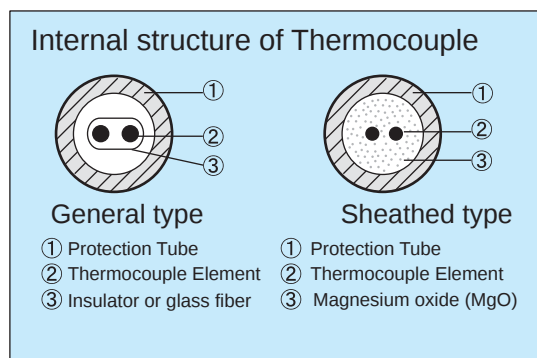
If a combination of two dissimilar metallic wires are correct, their thickness or shapes do not effect on temperature measurement. This type of sensor excels in processability for this reason, thus it is widely used in industrial plants.



■ Sheathed Thermocouple

Insulator(Magnesium oxide) is mounted between the protection tube and the measuring element.

This type of sensor features in excellent responsiveness and vibration resistances.

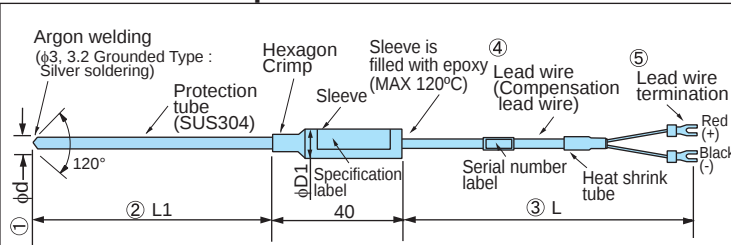


Spring loaded type (Only for General type)	Terminal head type
T-100 T-110	T-30,35(General type) T-30S,35S(Sheathed type)
Sleeve type	Thermocouple connector type
T-101(General type) T-101S(Sheathed type) T-111(General type) T-111S(Sheathed type)	T-70S,75S(Sheathed type)
No-sleeve type (Only for General type)	Exposed terminal head type
T-102	T-80,85(General type) T-80S,85S(Sheathed type)
	Metal connector type
	T-90(General type) T-90S(Sheathed type)
	Noble Metal type (For High Temperature)
	Protection tube is porcelain T-30,35 T-80

Thermocouples : T-100/T-110

T - 100 - $\frac{\phi d}{1}$ - $\frac{L1}{2}$ - $\frac{L}{3}$ - $\frac{\square\square\square}{4}$ - $\frac{\square}{5}$ - $\frac{\square}{6}$ - $\frac{\square}{7}$ - $\frac{\square}{8}$ ① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Thermocouple type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket Example :T-100-5-100-2000-EXA-Y-K-G-N		T - 110 - $\frac{\phi d}{1}$ - $\frac{L1}{2-1}$ - $\frac{L2}{2-2}$ - $\frac{L}{3}$ - $\frac{\square\square\square}{4}$ - $\frac{\square}{5}$ - $\frac{\square}{6}$ - $\frac{\square}{7}$ - $\frac{\square}{8}$ ① Diameter of protection tube ⑤ Lead wire termination ②-1, 2 Length of protection tube ⑥ Thermocouple type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket Example :T-110-5-100-30-2000-EXA-Y-K-G-N																		
①	Diameter of protection tube	φ5.0, φ6.0																		
②	Length of protection tube	Specify length by “mm” (100mm to 1,000mm) • Please contact distributors regarding other length.																		
③	Lead wire length	Specify length by “mm” (100mm or more)																		
④	Lead protection	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>EXA</td><td>Fiberglass with stainless steel</td><td>0 to 150°C</td></tr><tr><td>EXB</td><td>Fiberglass</td><td>0 to 150°C</td></tr></table>			Code	Details	Operating temperature	EXA	Fiberglass with stainless steel	0 to 150°C	EXB	Fiberglass	0 to 150°C							
Code	Details	Operating temperature																		
EXA	Fiberglass with stainless steel	0 to 150°C																		
EXB	Fiberglass	0 to 150°C																		
⑤	Lead wire termination	<table><tr><th>Code</th><th>Details</th><th>Code</th><th>Details</th></tr><tr><td>Y</td><td>Spade lugs for JIS standard "M3" size screw</td><td>TE*1</td><td>Thermocouple connector (CSP01+CLP-A+CSP02)</td></tr><tr><td>R</td><td>Ring lugs for JIS standard "M4" size screw</td><td>N</td><td>No terminal lugs *terminal soldered</td></tr><tr><td>M</td><td>Metal connector (SCK-1602-P)</td><td></td><td>•See Page7</td></tr></table> *1 : Other thermocouple connector : See Page 10			Code	Details	Code	Details	Y	Spade lugs for JIS standard "M3" size screw	TE*1	Thermocouple connector (CSP01+CLP-A+CSP02)	R	Ring lugs for JIS standard "M4" size screw	N	No terminal lugs *terminal soldered	M	Metal connector (SCK-1602-P)		•See Page7
Code	Details	Code	Details																	
Y	Spade lugs for JIS standard "M3" size screw	TE*1	Thermocouple connector (CSP01+CLP-A+CSP02)																	
R	Ring lugs for JIS standard "M4" size screw	N	No terminal lugs *terminal soldered																	
M	Metal connector (SCK-1602-P)		•See Page7																	
⑥	Thermocouple type	<table><tr><th>Code</th><th>Details</th><th>Code</th><th>Details</th></tr><tr><td>K</td><td>Type K (Chromel-Alumel)</td><td>T</td><td>Type T (Copper-Constantan)</td></tr><tr><td>J</td><td>Type J (Iron-Constantan)</td><td></td><td></td></tr></table>			Code	Details	Code	Details	K	Type K (Chromel-Alumel)	T	Type T (Copper-Constantan)	J	Type J (Iron-Constantan)						
Code	Details	Code	Details																	
K	Type K (Chromel-Alumel)	T	Type T (Copper-Constantan)																	
J	Type J (Iron-Constantan)																			
⑦	Measuring junction	<table><tr><th>Code</th><th>Details</th></tr><tr><td>G</td><td>Grounded</td></tr><tr><td>NG</td><td>Ungrounded</td></tr></table>			Code	Details	G	Grounded	NG	Ungrounded										
Code	Details																			
G	Grounded																			
NG	Ungrounded																			
⑧	Mounting bracket	<table><tr><th>Code</th><th>Details</th></tr><tr><td>E</td><td>Compression fitting</td></tr><tr><td>N</td><td>No bracket</td></tr></table> • Specify size of mounting bracket when code is "E".			Code	Details	E	Compression fitting	N	No bracket										
Code	Details																			
E	Compression fitting																			
N	No bracket																			
Specifications		Class : class 2 * Class 1 is available (Please specify when you order) Element : Single element * Double element is available (Please specify when you order) Maximum temperature for use <table><tr><th>Thermocouple type</th><th>Operating temperature for regular use</th><th>Maximum temperature</th></tr><tr><td>K</td><td>300°C</td><td>400°C</td></tr><tr><td>J</td><td>300°C</td><td>400°C</td></tr><tr><td>T</td><td>200°C</td><td>250°C</td></tr></table>			Thermocouple type	Operating temperature for regular use	Maximum temperature	K	300°C	400°C	J	300°C	400°C	T	200°C	250°C				
Thermocouple type	Operating temperature for regular use	Maximum temperature																		
K	300°C	400°C																		
J	300°C	400°C																		
T	200°C	250°C																		
Reference		• Stainless flexible lead wire is available Model Code : T-100F/T-110F SUS304 Compensation lead wire (Fiberglass) • No waterproof																		

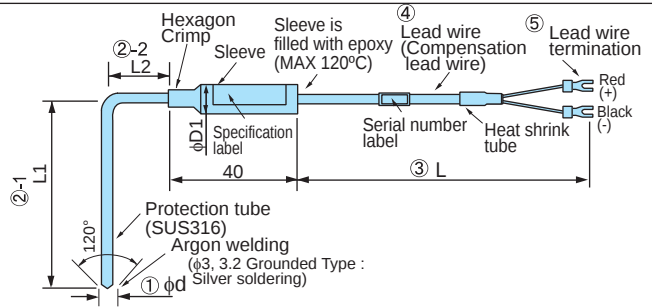
Thermocouples : T-101/T-111



T - 101 - ① - ② - ③ - ④ - ⑤ - ⑥ - ⑦ - ⑧

- ① Diameter of protection tube
- ② Length of protection tube
- ③ Lead wire length
- ④ Lead protection
- ⑤ Lead wire termination
- ⑥ Thermocouple type
- ⑦ Sensing junction
- ⑧ Mounting bracket

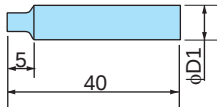
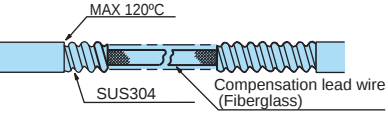
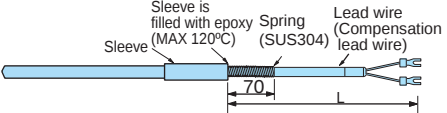
Example : T-101-5-100-2000-EXA-Y-K-G-N



T - 111 - ① - ②-1 - ②-2 - ③ - ④ - ⑤ - ⑥ - ⑦ - ⑧

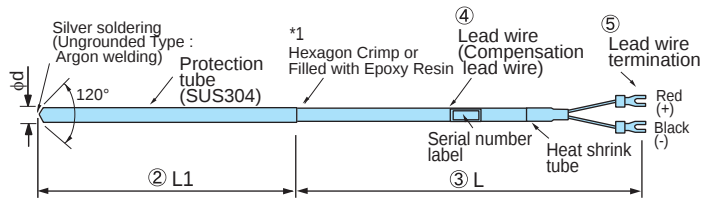
- ① Diameter of protection tube
- ②-1, 2 Length of protection tube
- ③ Lead wire length
- ④ Lead protection
- ⑤ Lead wire termination
- ⑥ Thermocouple type
- ⑦ Sensing junction
- ⑧ Mounting bracket

Example : T-111-5-100-30-2000-EXA-Y-K-G-N

①	Diameter of protection tube	φ3.0, φ3.2, φ4.8, φ5.0, φ6.0, φ6.4, φ8.0																																																																																			
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Reference	• Stainless flexible lead wire is available Model Code : T-101F/T-111F  For flexible lead wire, the dimension of the sleeve is φ10 x 40mm.(Lead protection EXB type is same to standard specification.) • No waterproof • Spring loaded type is available (Please specify when you order)  Dimensions for the spring loaded sleeve is as follows. - Protection tube φ8 with extension lead wire EXA, EXB, EXD : φ10 x 40mm - Protection tube φ3.0 to φ8.0 with extension lead wire EXC : φ10 x 40mm - Except from the above : φ8 x 40mm • Material of protection tube SUS316 is available. (Please specify when you order)																																																																																				

Thermocouples : T-102

Diameter of protection tube (ϕd) : 3.0, 3.2



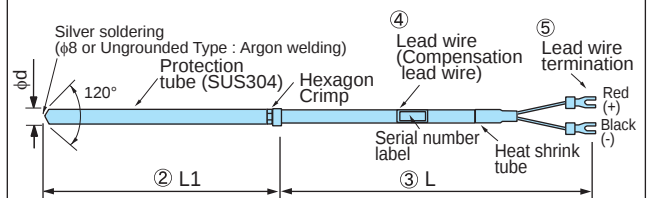
*1: Fiber glass lead protection (EXB) : Hexagon Crimp
Fluorocarbon polymers lead protection (EXF) : Filled with Epoxy Resin

T - 102 - ϕd - L1 - L - $\square\square\square$ - $\square$ - $\square$ - $\square$ - $\square$
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① Diameter of protection tube
- ② Length of protection tube
- ③ Lead wire length
- ④ Lead protection
- ⑤ Lead wire termination
- ⑥ Thermocouple type
- ⑦ Sensing junction
- ⑧ Mounting bracket

Example : T-102-3.2-300-2000-EXA-Y-K-G-N

Diameter of protection tube (ϕd) : 4.0 or more



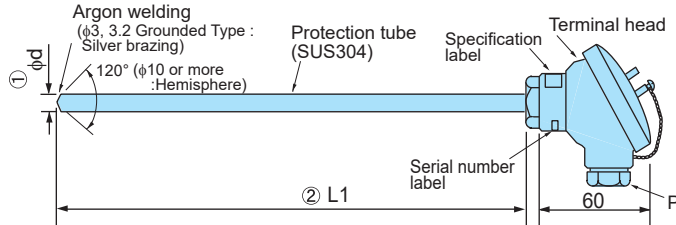
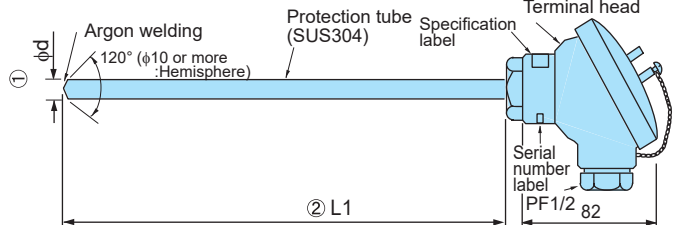
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- ① Diameter of protection tube
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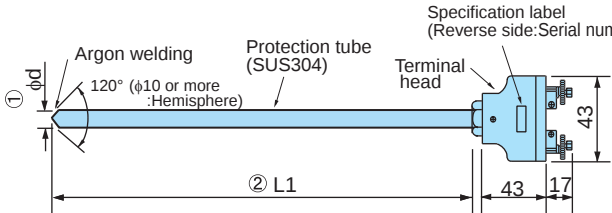
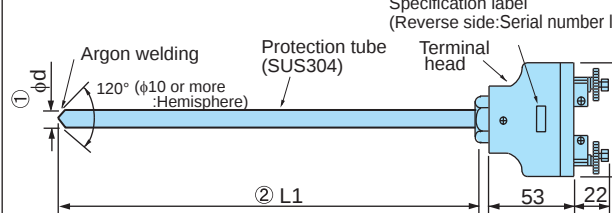
Example : T-102-5.0-300-2000-EXA-Y-K-G-N

①	Diameter of protection tube	φ3.0, φ3.2		φ4.0, φ4.8, φ5.0, φ6.0, φ8.0																						
②	Length of protection tube	Specify length by “mm” (30mm to 500mm)		• Please contact distributors regarding other length.																						
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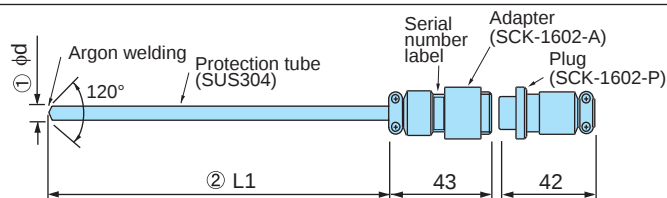
Thermocouples : T-30/T-35

																																													
No lead wire T - 30 - φd - L1 - □-□-□ ① ② ⑥ ⑦ ⑧		No lead wire T - 35 - φd - L1 - □-□-□ ① ② ⑥ ⑦ ⑧																																											
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Reference		• Material of protection tube SUS316 is available. (Please specify when you order) • High temperature type Thermocouple type R, S, B for high temperature type : See page 18.																																											

Thermocouples : T-80/T-85

 No lead wire T - 80 - φd - L1 - □ - □ - □ ① ② ⑥ ⑦ ⑧ With lead wire T - 80 - φd - L1 - L - □□□ - □ - □ - □ - □ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Thermocouple type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket Example :T-80-5-100-K-G-N (No lead wire) :T-80-5-100-2000-EXA-Y-K-G-N (With lead wire)		 No lead wire T - 85 - φd - L1 - □ - □ - □ ① ② ⑥ ⑦ ⑧ With lead wire T - 85 - φd - L1 - L - □□□ - □ - □ - □ - □ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Thermocouple type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket Example :T-85-5-100-K-G-N (No lead wire) :T-85-5-100-2000-EXA-Y-K-G-N (With lead wire)																																										
①	Diameter of protection tube	φ3.0, φ3.2, φ4.8, φ5.0, φ6.0, φ8.0, φ10.0																																										
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Reference		• Material of protection tube SUS316 is available. (Please specify when you order) • High temperature type Thermocouple type R, S, B for high temperature type : See page 19.																																										

Thermocouples : T-90



No lead wire

T - 90 - φd - L1 - □ - □ - □
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

With lead wire

T - 90 - φd - L1 - L - □□□ - □ - □ - □ - □
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

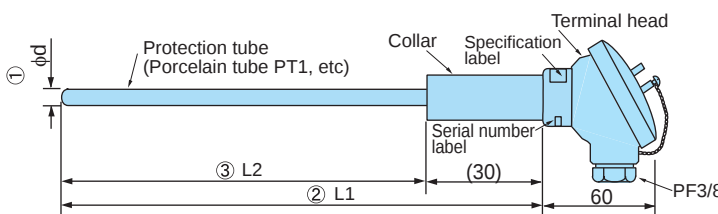
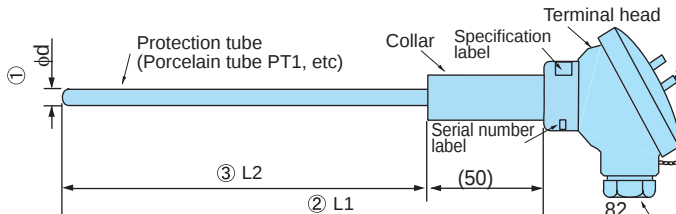
- ① Diameter of protection tube ⑤ Lead wire termination
② Length of protection tube ⑥ Thermocouple type
③ Lead wire length ⑦ Sensing junction
④ Lead protection ⑧ Mounting bracket

Example :T-90-5-100-K-G-N (No lead wire)

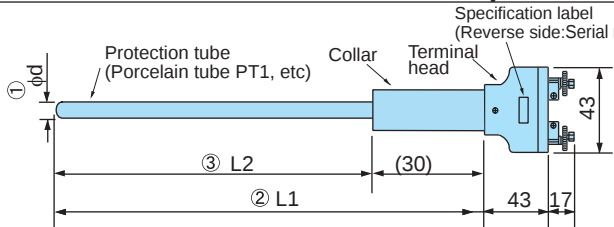
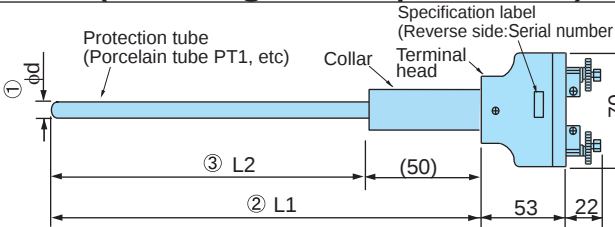
:T-90-5-100-2000-EXA-Y-K-G-N (With lead wire)

①	Diameter of protection tube	φ3.0, φ3.2, φ4.8, φ5.0, φ6.0, φ8.0																						
②	Length of protection tube	Specify length by “mm” (100mm to 1,000mm) • Please contact distributors regarding other length.																						
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④	Lead protection	No need to specify in case of without lead wire	Code	Details	Operating temperature	Code	Details	Operating temperature																
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⑤	Lead wire termination	No need to specify in case of without lead wire	Code	Details	Code	Details		*1 : Other thermocouple connector : See Page 10																
			Y	Spade lugs for JIS standard "M3" size screw	TE*1	Thermocouple connector (CSP01+CLP-A+CSP02)																		
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⑥	Thermocouple type		Code	Details	Code	Details																		
			K	Type K (Chromel-Alumel)	T	Type T (Copper-Constantan)																		
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			B	Rotary nipple (nut)	N	No bracket																		
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Specifications	Class : class 2 * Class 1 is available (Please specify when you order)																							
	Element : Single element * Double element is available. (Diameter of protection tube : φ4.8 or more) (Please specify when you order)																							
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	K	φ3.0 to φ3.2	300℃		400℃																			
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Reference	Connector																							
	Pin No.	Single Element				Double Element																		
				<table><tr><td>Pin No.</td><td>Details</td></tr><tr><td>1</td><td>+</td></tr><tr><td>2</td><td>-</td></tr></table>		Pin No.	Details	1	+	2	-			<table><tr><td>Pin No.</td><td>Details</td></tr><tr><td>1</td><td>+</td></tr><tr><td>2</td><td>-</td></tr><tr><td>3</td><td>+</td></tr><tr><td>4</td><td>-</td></tr></table>	Pin No.	Details	1	+	2	-	3	+	4	-
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	2	-																						
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	2	-																						
	3	+																						
4	-																							
	SCK-1602-□				SCK-1604-□																			
For connector for T-90, Connector manufactured by Sanwa Connector Laboratory Co., Ltd. is used as standard. Nanaboshi Electric Mfg brand is also available (Please specify when you order). Please specify in case of no need of the plug.																								

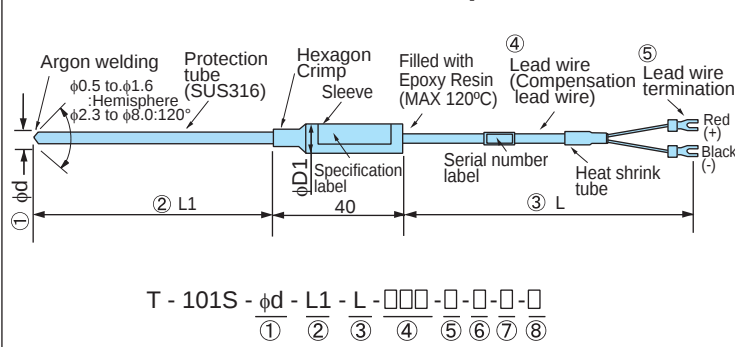
Noble Metal Thermocouples : T-30/T-35 (For High Temperature)

 No lead wire T - 30 - ① - ② - ③ - ⑦ - ⑧ - ⑨ With lead wire T - 30 - ① - ② - ③ - ④ - ⑤ - ⑥ - ⑦ - ⑧ - ⑨ ① Diameter of protection tube ④ Lead wire length ⑦ Thermocouple type ② Length of protection tube (L1) ⑤ Lead protection ⑧ Sensing junction ③ Length of protection tube (L2) ⑥ Lead wire termination ⑨ Mounting bracket Example :T-30-10-200-170-R-NG-N (No lead wire) :T-30-10-200-170-2000-EXA-Y-R-G-N (With lead wire)		 No lead wire T - 35 - ① - ② - ③ - ⑦ - ⑧ - ⑨ With lead wire T - 35 - ① - ② - ③ - ④ - ⑤ - ⑥ - ⑦ - ⑧ - ⑨ ① Diameter of protection tube ④ Lead wire length ⑦ Thermocouple type ② Length of protection tube (L1) ⑤ Lead protection ⑧ Sensing junction ③ Length of protection tube (L2) ⑥ Lead wire termination ⑨ Mounting bracket Example :T-35-10-200-150-R-NG-N (No lead wire) :T-35-10-200-150-2000-EXA-Y-R-G-N (With lead wire)																			
①	Diameter of protection tube	φ6.0, φ8.0, φ10.0		φ6.0, φ8.0, φ10.0, φ13.0, φ15.0, φ17.0																	
②	Length of protection tube (L1)	Specify length by "mm" (130mm to 1,030mm) • Please contact distributors regarding other length.		Specify length by "mm" (150mm to 1,050mm) • Please contact distributors regarding other length.																	
③	Length of protection tube (L2)	Specify length by "mm" (100mm to 1,000mm) • Please contact distributors regarding other length.		Specify length by "mm" (100mm to 1,000mm) • Please contact distributors regarding other length.																	
④	Lead wire length	Specify length by "mm" (100mm or more)																			
⑤	Lead protection	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>EXA</td><td>Fiberglass with stainless steel</td><td>0 to 150°C</td></tr><tr><td>EXB</td><td>Fiberglass</td><td>0 to 150°C</td></tr><tr><td>EXD</td><td>PVC (polyvinyl chloride)</td><td>-20 to +90°C</td></tr></table>				Code	Details	Operating temperature	EXA	Fiberglass with stainless steel	0 to 150°C	EXB	Fiberglass	0 to 150°C	EXD	PVC (polyvinyl chloride)	-20 to +90°C				
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⑥	Lead wire termination	<table><tr><th>Code</th><th>Details</th><th>Code</th><th>Details</th></tr><tr><td>Y</td><td>Spade lugs for JIS standard "M3" size screw</td><td>TE*1</td><td>Thermocouple connector (CSP01+CLP-A+CSP02)</td></tr><tr><td>R</td><td>Ring lugs for JIS standard "M4" size screw</td><td></td><td>Only for Type R</td></tr><tr><td>M</td><td>Metal connector (SCK-1602-P)</td><td>N</td><td>No terminal lugs *terminal soldered •See Page7</td></tr></table> *1 : Other thermocouple connector : See Page 10				Code	Details	Code	Details	Y	Spade lugs for JIS standard "M3" size screw	TE*1	Thermocouple connector (CSP01+CLP-A+CSP02)	R	Ring lugs for JIS standard "M4" size screw		Only for Type R	M	Metal connector (SCK-1602-P)	N	No terminal lugs *terminal soldered •See Page7
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⑦	Thermocouple type	<table><tr><th>Code</th><th>Details</th><th>Code</th><th>Details</th></tr><tr><td>R</td><td>Type R (Platinum - Platinum Rhodium13%)</td><td>B</td><td>Type B(Platinum - Platinum Rhodium6%)</td></tr><tr><td>S</td><td>Type S (Platinum - Platinum Rhodium10%)</td><td></td><td></td></tr></table>				Code	Details	Code	Details	R	Type R (Platinum - Platinum Rhodium13%)	B	Type B(Platinum - Platinum Rhodium6%)	S	Type S (Platinum - Platinum Rhodium10%)						
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⑧	Measuring junction	<table><tr><th>Code</th><th>Details</th></tr><tr><td>NG</td><td>Ungrounded</td></tr></table>				Code	Details	NG	Ungrounded												
Code	Details																				
NG	Ungrounded																				
⑨	Mounting bracket	<table><tr><th>Code</th><th>Details</th></tr><tr><td>C</td><td>Fixed flange</td></tr><tr><td>N</td><td>No bracket</td></tr></table> Specify size of flange when code is "C". • Please contact distributors regarding other mounting bracket.				Code	Details	C	Fixed flange	N	No bracket										
Code	Details																				
C	Fixed flange																				
N	No bracket																				
Specifications		Class : class 2 * Class 1 is available. (Thermocouple type : R,S) (Please specify when you order) Element : Single element * Double element is available. (Only for T-35) (Please specify when you order) Maximum temperature for use <table><tr><th>Thermocouple type</th><th>Operating temperature for regular use</th><th>Maximum temperature</th></tr><tr><td>R</td><td>1400°C</td><td>1600°C</td></tr><tr><td>S</td><td>1400°C</td><td>1600°C</td></tr><tr><td>B</td><td>1500°C</td><td>1700°C</td></tr></table> *The lists above are operating temperature limits for the element wire. For the protection tube, please refer to page.58 about reference data of protection tube.				Thermocouple type	Operating temperature for regular use	Maximum temperature	R	1400°C	1600°C	S	1400°C	1600°C	B	1500°C	1700°C				
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R	1400°C	1600°C																			
S	1400°C	1600°C																			
B	1500°C	1700°C																			
Reference																					

Noble Metal Thermocouples : T-80/T-85 (For High Temperature)

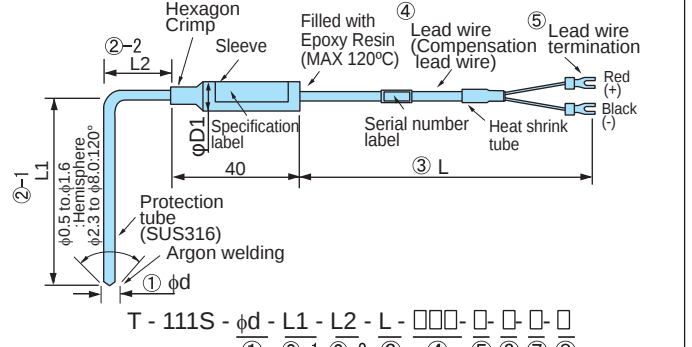
																			
No lead wire T - 80 - ① - L1 - L2 - ⑦ - ⑧ - ⑨		No lead wire T - 85 - ① - L1 - L2 - ⑦ - ⑧ - ⑨																	
With lead wire T - 80 - ① - L1 - L2 - L - ④ - ⑤ - ⑥ - ⑦ - ⑧ - ⑨		With lead wire T - 85 - ① - L1 - L2 - L - ④ - ⑤ - ⑥ - ⑦ - ⑧ - ⑨																	
① Diameter of protection tube	④ Lead wire length	⑦ Thermocouple type	① Diameter of protection tube																
② Length of protection tube (L1)	⑤ Lead protection	⑧ Sensing junction	② Length of protection tube (L1)																
③ Length of protection tube (L2)	⑥ Lead wire termination	⑨ Mounting bracket	③ Length of protection tube (L2)																
Example :T-80-10-200-170-R-NG-N (No lead wire) :T-80-10-200-170-2000-EXA-Y-R-G-N (With lead wire)		Example :T-85-10-200-150-R-NG-N (No lead wire) :T-85-10-200-150-2000-EXA-Y-R-G-N (With lead wire)																	
①	Diameter of protection tube	φ6.0, φ8.0, φ10.0																	
②	Length of protection tube (L1)	Specify length by "mm" (130mm to 1,030mm) • Please contact distributors regarding other length.																	
③	Length of protection tube (L2)	Specify length by "mm" (100mm to 1,000mm) • Please contact distributors regarding other length.																	
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S	1400°C	1600°C																	
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Reference																			

Sheathed Thermocouples : T-101S/T-111S



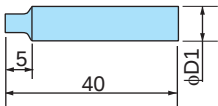
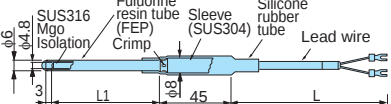
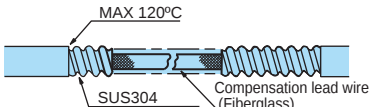
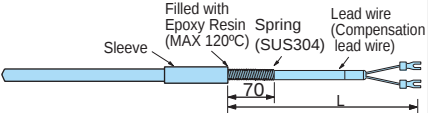
- ① Diameter of protection tube
- ② Length of protection tube
- ③ Lead wire length
- ④ Lead protection
- ⑤ Lead wire termination
- ⑥ Thermocouple type
- ⑦ Sensing junction
- ⑧ Mounting bracket

Example : T-101S-4.8-100-2000-EXA-Y-K-G-N

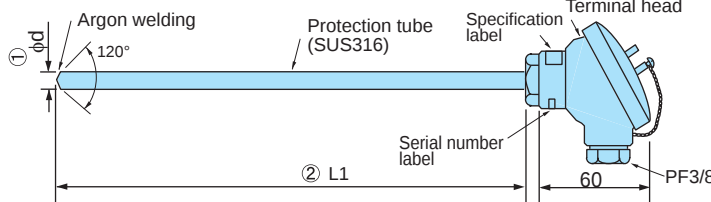
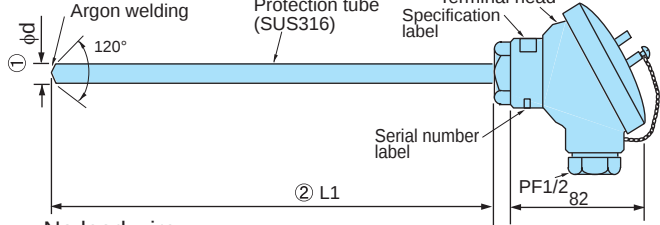
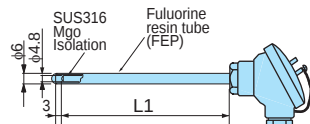


- ① Diameter of protection tube
- ②-1, 2 Length of protection tube
- ③ Lead wire length
- ④ Lead protection
- ⑤ Lead wire termination
- ⑥ Thermocouple type
- ⑦ Sensing junction
- ⑧ Mounting bracket

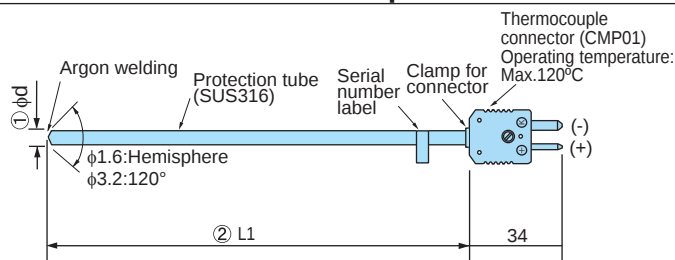
Example : T-111S-4.8-100-30-2000-EXA-Y-K-G-N

①	Diameter of protection tube	φ0.5 (Only for K,T type), φ1.0, φ1.6, φ2.3, φ3.2, φ4.8, φ6.4, φ8.0																																																							
②	Length of protection tube	Specify length by "mm" (100mm to 10,000mm)		②- 1 Specify length by "mm" (100mm or more, L1+L2=10,000mm or less) ②- 2 Specify length by "mm" (25mm or more, L1+L2=10,000mm or less) • Length is 25mm without specification.																																																					
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⑥	Thermocouple type	<table><tr><th>Code</th><th>Details</th></tr><tr><td>K</td><td>Type K (Chromel-Alumel)</td></tr><tr><td>J</td><td>Type J (Iron-Constantan)</td></tr></table>	Code	Details	K	Type K (Chromel-Alumel)	J	Type J (Iron-Constantan)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>T</td><td>Type T (Copper-Constantan)</td></tr><tr><td>E</td><td>Type E (Chromel-Constantan)</td></tr></table>	Code	Details	T	Type T (Copper-Constantan)	E	Type E (Chromel-Constantan)																																										
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⑦	Measuring junction	<table><tr><th>Code</th><th>Details</th></tr><tr><td>G</td><td>Grounded</td></tr><tr><td>NG</td><td>Ungrounded</td></tr><tr><td>O</td><td>Exposed</td></tr></table>	Code	Details	G	Grounded	NG	Ungrounded	O	Exposed	* Exposed-junction type is available depending on specification such as shapes, environment of usage, etc. Please contact with our distributors.																																														
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Thermocouple type	Diameter of protection tube	Operating temperature for regular use																																																							
K	φ0.5	600°C																																																							
	φ1.0 to φ2.3	650°C																																																							
	φ3.2	750°C																																																							
	φ4.8 to φ6.4	800°C																																																							
	φ8.0	900°C																																																							
J	φ1.0 to φ2.3	450°C																																																							
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Lead wire type	Diameter of protection tube	φ0.5, φ1.0, φ1.6, φ2.3, φ3.2, φ4.8	φ6.4, φ8.0																																																						
EXA,EXB,EXC		φ8×40	φ10×40																																																						
EXD,EXF																																																									
EXE		φ10×40																																																							
Reference		• Fluor resin coating is available It is available to cover Fluorine resin tube with φ4.8 protection tube (SUS316). Total Diameter becomes φ6.0. It is also available to do coating with T-101 whose tube is more than φ3.2. These model codes are T-101SC in this case.  Operating temperature for regular use : 180°C Maximum temperature : 200°C • Please contact distributors regarding Fluorine resin tube. • Stainless flexible lead wire is available Model Code : T-101FS/T-111FS  For flexible lead wire, the dimension of the sleeve is φ10 x 40mm. When φ1.0 to φ4.8 of the protection tube with EXB is selected as the extension lead wire, its dimension is φ8 x 40mm. • No waterproof • Spring loaded type is available (Please specify when you order)  Dimensions for the spring loaded sleeve is as follows. • Protection tube φ1.0 to φ4.8 with extension lead wire EXA, EXB, EXC, EXD : φ8 x 40mm • Except the above : φ10 x 40mm																																																							

Sheathed Thermocouples : T-30S/T-35S

																											
No lead wire T - 30S - ϕd - L1 - $\square$ - $\square$ - $\square$ ① ② ⑥ ⑦ ⑧		No lead wire T - 35S - ϕd - L1 - $\square$ - $\square$ - $\square$ ① ② ⑥ ⑦ ⑧																									
With lead wire T - 30S - ϕd - L1 - L - $\square$ - $\square$ - $\square$ - $\square$ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧		With lead wire T - 35S - ϕd - L1 - L - $\square$ - $\square$ - $\square$ - $\square$ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧																									
① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Thermocouple type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket		① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Thermocouple type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket																									
Example :T-30S-4.8-100-K-G-N (No lead wire) :T-30S-4.8-100-2000-EXA-Y-K-G-N (With lead wire)		Example :T-35S-4.8-100-K-G-N (No lead wire) :T-35S-4.8-100-2000-EXA-Y-K-G-N (With lead wire)																									
①	Diameter of protection tube	$\phi 3.2$, $\phi 4.8$, $\phi 6.4$, $\phi 8.0$																									
②	Length of protection tube	Specify length by "mm" (100mm to 10,000mm) • Please contact distributors regarding other length.																									
③	Lead wire length	Specify length by "mm" (100mm or more)																									
④	Lead protection	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>EXA</td><td>Fiberglass with stainless steel</td><td>0 to 150°C</td><td>EXD</td><td>PVC (polyvinyl chloride)</td><td>-20 to +90°C</td></tr><tr><td>EXB</td><td>Fiberglass</td><td>0 to 150°C</td><td>EXE</td><td>Silicone rubber</td><td>-55 to +180°C</td></tr><tr><td>EXC</td><td>PVC (polyvinyl chloride) with copper wire braided</td><td>-20 to +90°C</td><td></td><td></td><td></td></tr></table>		Code	Details	Operating temperature	Code	Details	Operating temperature	EXA	Fiberglass with stainless steel	0 to 150°C	EXD	PVC (polyvinyl chloride)	-20 to +90°C	EXB	Fiberglass	0 to 150°C	EXE	Silicone rubber	-55 to +180°C	EXC	PVC (polyvinyl chloride) with copper wire braided	-20 to +90°C			
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C	Fixed flange																										
Specifications		Class : class 2 * Class 1 is available (Please specify when you order) Element : Single element * Double element is available. (Only for T-35S) (Please specify when you order) Operating temperature for regular use <table><tr><th>Thermocouple type</th><th>Diameter of protection tube</th><th>Operating temperature for regular use</th></tr><tr><td rowspan="3">K</td><td>$\phi 3.0$ to $\phi 3.2$</td><td>750°C</td></tr><tr><td>$\phi 4.8$ to $\phi 6.4$</td><td>800°C</td></tr><tr><td>$\phi 8.0$</td><td>900°C</td></tr><tr><td rowspan="2">J</td><td>$\phi 3.2$</td><td>750°C</td></tr><tr><td>$\phi 4.8$ or more</td><td>800°C</td></tr><tr><td>T</td><td>$\phi 3.2$ or more</td><td>350°C</td></tr><tr><td rowspan="2">E</td><td>$\phi 3.0$ to $\phi 3.2$</td><td>650°C</td></tr><tr><td>$\phi 4.8$ or more</td><td>750°C</td></tr></table>		Thermocouple type	Diameter of protection tube	Operating temperature for regular use	K	$\phi 3.0$ to $\phi 3.2$	750°C	$\phi 4.8$ to $\phi 6.4$	800°C	$\phi 8.0$	900°C	J	$\phi 3.2$	750°C	$\phi 4.8$ or more	800°C	T	$\phi 3.2$ or more	350°C	E	$\phi 3.0$ to $\phi 3.2$	650°C	$\phi 4.8$ or more	750°C	
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Reference		• Fluor resin coating is available It is available to cover Fuluorine resin tube with $\phi 4.8$ protection tube (SUS316). Total Diameter becomes $\phi 6.0$. It is also available to do coating with T-30S/T-35S whose tube is more than $\phi 3.2$. These model codes are T-30SC/T-35SC in this case.  Operating temperature for regular use : 180°C Maximum temperature : 200°C Example of Model Code T-30SC-6.0-100-PDM-NG-N (No lead wire) ① ② ⑥ ⑦ ⑧ • Please contact distributors regarding Fuluorine resin coating.																									

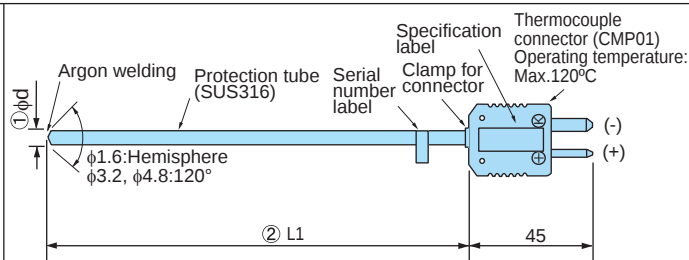
Sheathed Thermocouples : T-70S/T-75S



T - 70S - ϕd - L1 - $\square$ - $\square$ - $\square$
① ② ③ ④ ⑤

- ① Diameter of protection tube ④ Sensing junction
② Length of protection tube ⑤ Mounting bracket
③ Thermocouple type

Example : T-70S-1.6-100-K2-G-N



T - 75S - ϕd - L1 - $\square$ - $\square$ - $\square$
① ② ③ ④ ⑤

- ① Diameter of protection tube ④ Sensing junction
② Length of protection tube ⑤ Mounting bracket
③ Thermocouple type

Example : T-75S-3.2-100-K1-G-N

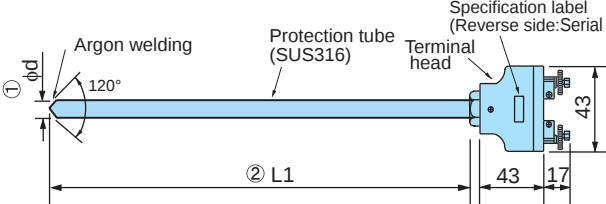
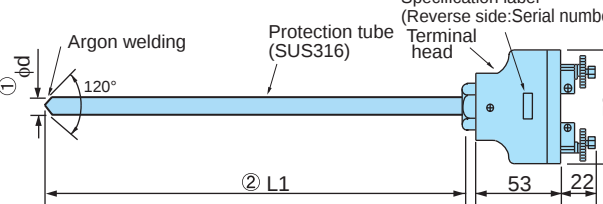
①	Diameter of protection tube	φ1.0, φ1.6, φ3.2			φ1.6, φ3.2, φ4.8					
②	Length of protection tube	Specify length by “mm” (100mm to 2000mm)								
③	Thermocouple type	Code	Details		Code	Details		Code	Details	
		K1	Type K (Chromel-Alumel) class 1		J1	Type J (Iron-Constantan) class 1		T1	Type T (Copper-Constantan) class 1	
		K2	Type K (Chromel-Alumel) class 2		J2	Type J (Iron-Constantan) class 2		T2	Type T (Copper-Constantan) class 2	
④	Measuring junction	Code	Details		* Exposed-junction type is available depending on specification such as shapes, environment of usage, etc. Please contact with our distributors.					
		G	Grounded							
		NG	Ungrounded							
		O	Exposed							
⑤	Mounting bracket	Code	Details		Code	Details		Specify size of mounting bracket when code is “A”, “B”, or “E”. Specify size of flange when code is “C”.		
		A	Fixed nipple (nut)		E	Compression fitting				
		B	Rotary nipple (nut)		N	No bracket				
		C	Fixed flange							

Specifications	Class : class 1 or class 2		
	Element : Single element		
	Operating temperature for regular use		
	Thermocouple type	Diameter of protection tube	Operating temperature for regular use
	K	φ1.0, φ1.6	650°C
		φ3.2	750°C
		φ4.8	800°C
	J	φ1.0, φ1.6	450°C
		φ3.2	650°C
		φ4.8	750°C
Thermocouple type	Diameter of protection tube	Operating temperature for regular use	
T	φ1.0, φ1.6	300°C	
	φ3.2	350°C	
	φ4.8	350°C	
Regarding thermocouple connectors for high-temperature use, please contact distributors			
Miniature connector: (Material: Ryton): CMR-01 operating temperature limit 220°C			
Standard connector: (Material: Ceramic): CSC-01 operating temperature limit 900°C			

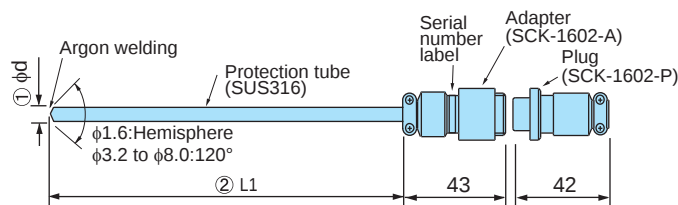
Reference	Thermocouple connector (jack)	*Sold separately	Thermocouple connector (jack)	*Sold separately
	CMP02- $\square$		CSP02- $\square$	
Thermocouple connector (jack) with lead wire	*Sold separately		*Sold separately	
	③ Thermocouple connector (CMP02) ② Lead wire ④ Terminal Treatment ⑤ L		③ Thermocouple connector (CMP02) ② Lead wire ④ Terminal Treatment ⑤ L	

Model and suffix code for thermocouple connector (jack) with lead wire	Specifications	Model and Suffix Code			
		W-BL-	- $\square\square\square\square$ - $\square\square\square\square$ - $\square\square\square\square$		
① Thermocouple type	Type K (class 2) Type J (class 2)	K2 J2			
② Lead protection	Fiberglass with stainless steel Fiberglass PVC (polyvinyl chloride) Silicone rubber	EXA EXB EXD EXE			
③ Thermocouple connector	Thermocouple connector CMP02 jack (with clamp) Thermocouple connector CSP02 jack (with clamp)	TMA TSA			
④ Lead wire termination	Spade lugs for JIS standard "M3" size screw Spade lugs for JIS standard "M4" size screw Ring lugs for JIS standard "M3" size screw Ring lugs for JIS standard "M4" size screw No terminal lugs No terminal lugs *terminal soldered	Y3 Y4 R3 R4 C N			
⑤ Lead wire length (unit: mm)	Specify length by "mm" (100mm each)				$\square\square\square\square\square$
Please contact distributors regarding T type thermocouple.					

Sheathed Thermocouples : T-80S/T-85S

 Argon welding Protection tube (SUS316) Terminal head Specification label (Reverse side: Serial number label) ① ϕd ② L1 43 17		 Argon welding Protection tube (SUS316) Terminal head Specification label (Reverse side: Serial number label) ① ϕd ② L1 53 22																																								
No lead wire T - 80S - ϕd - L1 - □-□-□ ① ② ⑥ ⑦ ⑧		No lead wire T - 85S - ϕd - L1 - □-□-□ ① ② ⑥ ⑦ ⑧																																								
With lead wire T - 80S - ϕd - L1 - L - □□□-□-□-□ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧		With lead wire T - 85S - ϕd - L1 - L - □□□-□-□-□ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧																																								
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Example :T-80S-4.8-100-K-G-N (No lead wire) :T-80S-4.8-100-2000-EXA-Y-K-G-N (With lead wire)		Example :T-85S-4.8-100-K-G-N (No lead wire) :T-85S-4.8-100-2000-EXA-Y-K-G-N (With lead wire)																																								
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	<table><tr><th>Thermocouple type</th><th>Diameter of protection tube</th><th>Operating temperature for regular use</th></tr><tr><td rowspan="3">K</td><td>$\phi 3.2$</td><td>750°C</td></tr><tr><td>$\phi 4.8$ to $\phi 6.4$</td><td>800°C</td></tr><tr><td>$\phi 8.0$</td><td>900°C</td></tr><tr><td rowspan="2">J</td><td>$\phi 3.2$</td><td>650°C</td></tr><tr><td>$\phi 4.8$ or more</td><td>750°C</td></tr><tr><td>T</td><td>$\phi 3.2$ or more</td><td>350°C</td></tr><tr><td rowspan="2">E</td><td>$\phi 3.0$ to $\phi 3.2$</td><td>750°C</td></tr><tr><td>$\phi 4.8$ or more</td><td>800°C</td></tr></table>		Thermocouple type	Diameter of protection tube	Operating temperature for regular use	K	$\phi 3.2$	750°C	$\phi 4.8$ to $\phi 6.4$	800°C	$\phi 8.0$	900°C	J	$\phi 3.2$	650°C	$\phi 4.8$ or more	750°C	T	$\phi 3.2$ or more	350°C	E	$\phi 3.0$ to $\phi 3.2$	750°C	$\phi 4.8$ or more	800°C	<table><tr><th>Thermocouple type</th><th>Diameter of protection tube</th><th>Operating temperature for regular use</th></tr><tr><td rowspan="3">K</td><td>$\phi 4.8, \phi 6.4$</td><td>800°C</td></tr><tr><td>$\phi 8.0$</td><td>900°C</td></tr><tr><td>$\phi 4.8$ to $\phi 8.0$</td><td>750°C</td></tr><tr><td>T</td><td>$\phi 4.8$ to $\phi 8.0$</td><td>350°C</td></tr><tr><td>E</td><td>$\phi 4.8$ to $\phi 8.0$</td><td>800°C</td></tr></table>	Thermocouple type	Diameter of protection tube	Operating temperature for regular use	K	$\phi 4.8, \phi 6.4$	800°C	$\phi 8.0$	900°C	$\phi 4.8$ to $\phi 8.0$	750°C	T	$\phi 4.8$ to $\phi 8.0$	350°C	E	$\phi 4.8$ to $\phi 8.0$	800°C
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Reference																																										

Sheathed Thermocouples : T-90S



No lead wire

T - 90S - ϕd - L1 - $\square$ - $\square$ - $\square$
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

With lead wire

T - 90S - ϕd - L1 - L - $\square$ - $\square$ - $\square$ - $\square$ - $\square$ - $\square$
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① Diameter of protection tube ⑤ Lead wire termination
 ② Length of protection tube ⑥ Thermocouple type
 ③ Lead wire length ⑦ Sensing junction
 ④ Lead protection ⑧ Mounting bracket

Example : T-90S-4.8-100-K-G-N (No lead wire)

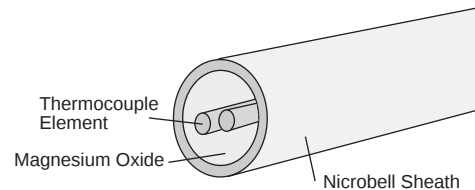
: T-90S-4.8-100-2000-EXA-Y-K-G-N (With lead wire)

①	Diameter of protection tube	φ1.6, φ3.2, φ4.8, φ6.4, φ8.0								
②	Length of protection tube	Specify length by “mm” (100mm to 10,000mm)								
③	Lead wire length	Specify length by “mm” (100mm or more)								
④	Lead protection	No need to specify in case of without lead wire	Code	Details		Operating temperature	Code	Details		Operating temperature
			EXA	Fiberglass with stainless steel		0 to 150°C	EXD	PVC (polyvinyl chloride)		-20 to +90°C
			EXB	Fiberglass		0 to 150°C	EXE	Silicone rubber		-55 to +180°C
			EXC	PVC (polyvinyl chloride) with copper wire braided		-20 to +90°C				
⑤	Lead wire termination	No need to specify in case of without lead wire	Code	Details		Code	Details		*1 : Other thermocouple connector : See Page 10 •See Page7	
			Y	Spade lugs for JIS standard "M3" size screw		TE*1	Thermocouple connector (CSP01+CLP-A+CSP02)			
			R	Ring lugs for JIS standard "M4" size screw		N	No terminal lugs *terminal soldered			
			M	Metal connector (SCK-1602-P)						
⑥	Thermocouple type	Code	Details		Code	Details				
		K	Type K (Chromel-Alumel)		T	Type T (Copper-Constantan)				
		J	Type J (Iron-Constantan)		E	Type E (Chromel-Constantan)				
⑦	Measuring junction	Code	Details		* Exposed-junction type is available depending on specification such as shapes, environment of usage, etc. Please contact with our distributors.					
		G	Grounded							
		NG	Ungrounded							
		O	Exposed							
⑧	Mounting bracket	Code	Details		Code	Details		Specify size of mounting bracket when code is "A", "B", or "E". Specify size of flange when code is "C".		
		A	Fixed nipple (nut)		E	Compression fitting				
		B	Rotary nipple (nut)		N	No bracket				
		C	Fixed flange							
• Please contact distributors regarding other mounting bracket.										
Specifications	Class : class 2 * Class 1 is available (Please specify when you order) Element : Single element * Double element is available. (Diameter of protection tube : φ3.2 or more) 									

Nicrobell Sheathed Thermocouples

■ Nicrobell Sheathed Thermocouple

Wires of traditional metallic sheath (stainless steel, inconel, etc) is likely to receive chemical erosion or metallic fatigue under high temperature circumstance, and these give negative effects on their stability and longevity. Nicrobell Sheath is an epoch making heat resistant alloy and has chemical composition very close to that of the type N (Nicrosil) element, minimizing chemical erosion and metal fatigue.



■ Nicrobell Sheathed N Thermocouple

High Stability

Nicrobell sheath has chemical composition very close to that of the type N element and does not generate any metal gas in high temperature range different from conventional alloys such as stainless steel (SUS316, SUS310) and Inconel, thus prevents the element of type N thermocouple from contamination.

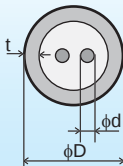
High Accuracy

Our Nicrobell sheath (N) thermocouple is class 1. It is capable of high temperature measurement with high accuracy compared with traditional sheath types. Moreover, its high stability shows the same or higher realization with PL II (platinum II) and R around 1200°C.

Environmental Resistance

Nicrobell sheath (N) thermocouple has chemical composition very close to that of the type N element and does not generate any metal gas in high temperature range different from conventional alloys such as stainless steel (316SS, 310SS) and Inconel, thus prevents the element of type N thermocouple from contamination.

t : More than 10% of ϕD
 ϕd : More than 18% of ϕD



Long Life

Nicrobell sheath (N) thermocouple, which has high stability and environmental resistance, has a longer cycle of periodic replacement and economical for it will less change over the time and has a long life span compared with traditional sheaths.

■ Nicrobell Sheathed K Thermocouple

Because Nicrobell sheath is a nickel based alloy as K type, it minimizes corrosion by metallic gas expansion to its wires under high temperature range, and improves stability, environmental resistance, and thermal resistance of its thermoelectromotive force.

Low Cost

Nicrobell K thermocouple realizes high stability and environmental resistance with almost same price with traditional Inconel sheath. Progress of basic function results in low cost due to long-term use by stabilizing accuracy of thermoelectromotive force in long-term and by extending periodic replacement by reinforcing K type strength (thermal resistance) in high temperature range.

Improved Reliability

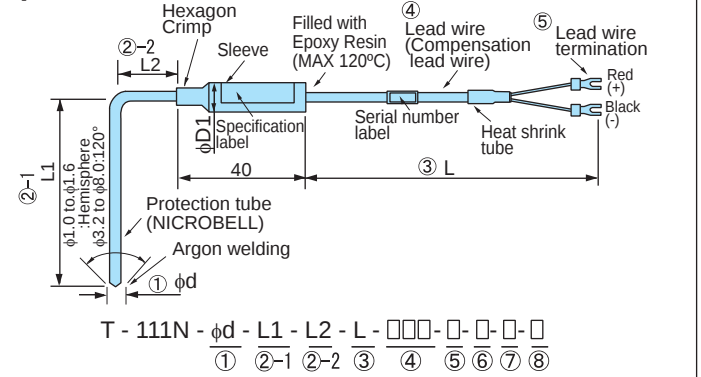
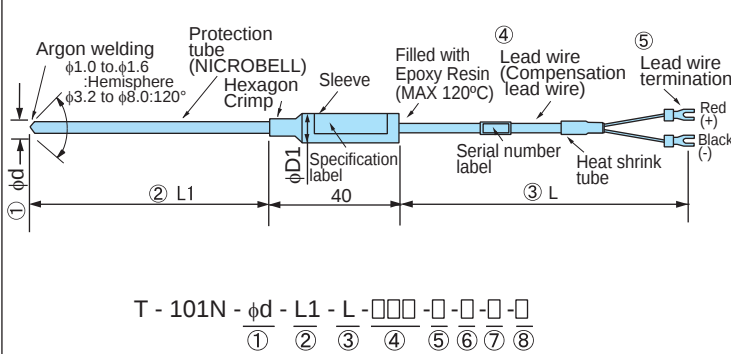
Traditionally, when talking about environmental resistance for selection of thermocouple metallic sheath, people were likely to more focus on its materials and did not pay much attention on relationship between its materials and wire. Nicrobell sheath is a new created metallic sheath balancing its traditional matter, thus its accountability will be highly progressed

Long Life

Nicrobell sheath K type thermocouple can be used for long duration of time in a high temperature range by the difference of performance and traditional thick wire.

Sleeve type	Terminal head type
T-101N T-111N	T-30N Terminal head type T-35N

NICROBELL Sheathed Thermocouples : T-101N/T-111N



Example : T-101N-4.8-100-2000-EXA-Y-K-G-N

Example : T-111N-4.8-100-30-2000-EXA-Y-K-G-N

①	Diameter of protection tube	φ1.0, φ1.6, φ2.3, φ3.2, φ4.8, φ6.4, φ8.0																									
②	Length of protection tube	Specify length by “mm” (100mm to 10,000mm)	②- 1 Specify length by “mm” (100mm or more, L1+L2=10,000mm or less) ②- 2 Specify length by “mm” (25mm or more, L1+L2=10,000mm or less) • Length is 25mm without specification.																								
③	Lead wire length	Specify length by “mm” (100mm or more)																									
④	Lead protection	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>EXA</td><td>Fiberglass with stainless steel</td><td>0 to 150°C</td></tr><tr><td>EXB</td><td>Fiberglass</td><td>0 to 150°C</td></tr><tr><td>EXC</td><td>PVC (polyvinyl chloride) with copper wire braided</td><td>-20 to +90°C</td></tr></table>	Code	Details	Operating temperature	EXA	Fiberglass with stainless steel	0 to 150°C	EXB	Fiberglass	0 to 150°C	EXC	PVC (polyvinyl chloride) with copper wire braided	-20 to +90°C	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>EXD</td><td>PVC (polyvinyl chloride)</td><td>-20 to +90°C</td></tr><tr><td>EXE</td><td>Silicone rubber (Only for Type K)</td><td>-55 to +180°C</td></tr><tr><td>EXF</td><td>Fluorocarbon polymers (FEP) (Only for Type K)</td><td>0 to 200°C</td></tr></table>	Code	Details	Operating temperature	EXD	PVC (polyvinyl chloride)	-20 to +90°C	EXE	Silicone rubber (Only for Type K)	-55 to +180°C	EXF	Fluorocarbon polymers (FEP) (Only for Type K)	0 to 200°C
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⑤	Lead wire termination	<table><tr><th>Code</th><th>Details</th></tr><tr><td>Y</td><td>Spade lugs for JIS standard "M3" size screw</td></tr><tr><td>R</td><td>Ring lugs for JIS standard "M4" size screw</td></tr><tr><td>M</td><td>Metal connector (SCK-1602-P)</td></tr></table>	Code	Details	Y	Spade lugs for JIS standard "M3" size screw	R	Ring lugs for JIS standard "M4" size screw	M	Metal connector (SCK-1602-P)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>TE *1</td><td>Thermocouple connector (CSP01+CLP-A+CSP02) (Only for Type K)</td></tr><tr><td>N</td><td>No terminal lugs *terminal soldered</td></tr></table> •See Page7 *1 : Other thermocouple connector : See Page 10	Code	Details	TE *1	Thermocouple connector (CSP01+CLP-A+CSP02) (Only for Type K)	N	No terminal lugs *terminal soldered										
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N	No bracket																										

Specifications

Class : class 1

Element : Single element

Operating temperature for regular use

Thermocouple type	Diameter of protection tube	Operating temperature for regular use
K	φ1.0	900°C
	φ1.6, φ2.3	1000°C
	φ3.2, φ4.8	1100°C
	φ6.4	1150°C
	φ8.0	1200°C
N	φ1.6, φ2.3	1000°C
	φ3.2, φ4.8	1100°C
	φ6.4	1150°C
	φ8.0	1200°C

Sleeve Dimension (φD1)

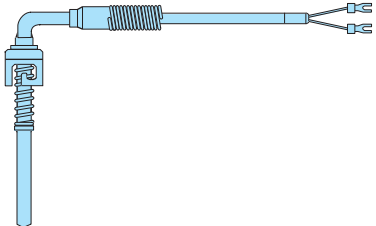
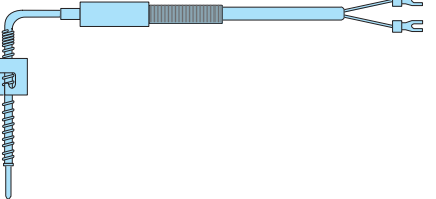
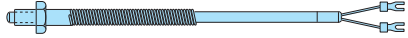
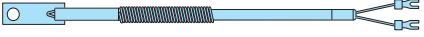
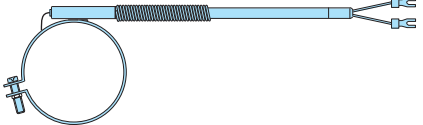
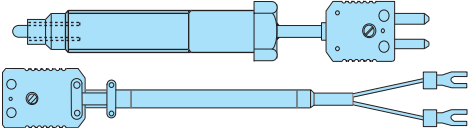
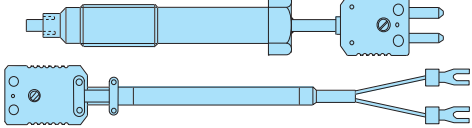
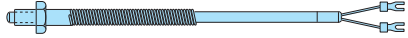
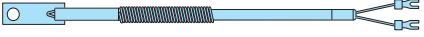
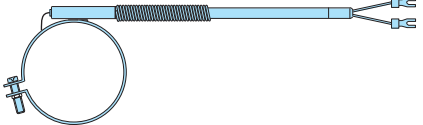
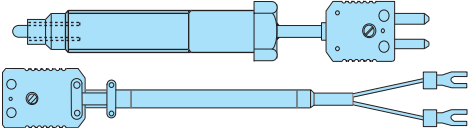
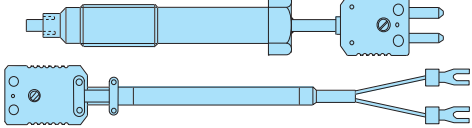
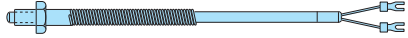
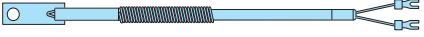
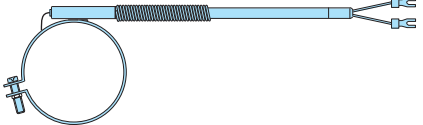
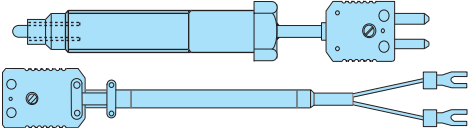
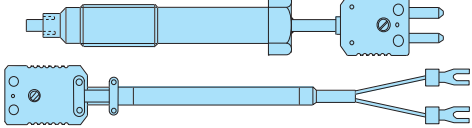
Lead wire type	Diameter of protection tube	φ1.0, φ1.6, φ2.3 φ3.2, φ4.8	φ6.4, φ8.0
EXA, EXB, EXC EXD, EXF		φ8×40	φ10×40
EXE		φ10×40	

Reference	• Stainless flexible lead wire is available Model Code : T-101FS/T-111FS For flexible lead wire, the dimension of the sleeve is φ10 x 40mm. When φ1.0 to φ4.8 of the protection tube with EXB is selected as the extension lead wire, its dimension is φ8 x 40mm. • No waterproof
	• Spring loaded type is available (Please specify when you order) Dimensions for the spring loaded sleeve is as follows. • Protection tube φ1.0 to φ4.8 with extension lead wire EXA, EXB, EXC, EXD : φ8 x 40mm • Except the above : φ10 x 40mm

NICROBELL Sheathed Thermocouples : T-30N/T-35N

Argon welding 120° Protection tube (NICROBELL) Specification label Terminal head Serial number label ① φd ② L1 ③ ④ ⑤ ⑥ ⑦ ⑧ 60 PF3/8 No lead wire T - 30N - φd - L1 - □-□-□ ① ② ⑥ ⑦ ⑧ With lead wire T - 30N - φd - L1 - L - □□□-□-□-□ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Thermocouple type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket Example :T-30N-4.8-100-K-G-N (No lead wire) :T-30N-4.8-100-2000-EXA-Y-K-G-N (With lead wire)		Argon welding 120° Protection tube (NICROBELL) Serial number label Specification label Terminal head ① φd ② L1 ③ ④ ⑤ ⑥ ⑦ ⑧ 82 PF1/2 No lead wire T - 35N - φd - L1 - □-□-□ ① ② ⑥ ⑦ ⑧ With lead wire T - 35N - φd - L1 - L - □□□-□-□-□ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Thermocouple type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket Example :T-30N-4.8-100-K-G-N (No lead wire) :T-30N-4.8-100-2000-EXA-Y-K-G-N (With lead wire)																											
①	Diameter of protection tube	φ3.2, φ4.8, φ6.4, φ8.0		φ4.8, φ6.4, φ8.0																									
②	Length of protection tube	Specify length by “mm” (100mm to 10,000mm)		Specify length by “mm” (100mm to 10,000mm)																									
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	φ8.0	1200°C																											
Reference																													

Temperature sensors for various applications

Bayonet Type	Bayonet Type (Variable insertion length type)														
The tip is going to be pressure welded to the measured object by mounting bracket. Suitable for measurement of hot runners, dies and moulds. ● Spring loaded type - T-200  - T-210  ● Sleeve type - T-201  - T-201S (Sheathed type)  - T-211  - T-211S (Sheathed type)  ● Sheathed Thermocouple for High Temperature (550°C) - T-202SH  - T-212SH 	Thermocouple with bayonet. Length can be easily adjusted. Easy mounting is possible by moving the bayonet cap dependent upon the insertion length. T-221  <tr> <th data-bbox="801 589 1481 645">Screwed Tip Type</th><td data-bbox="801 645 1481 790"> The tip is M6 size (M8 size is also available) rotary screw. Internal screws will be threaded in the fitting point. *M6, M8 is based on JIS Standard. T-230  </td></tr> <tr> <th data-bbox="801 790 1481 846">Fixing Screw Type for Surface Temperature</th><td data-bbox="801 846 1481 1003"> Fix the sensor at a $\phi 4.5$ fixed screw hole of the tip with a screw. Suitable for temperature measurement for the tiny spaces. T-240  </td></tr> <tr> <th data-bbox="801 1003 1481 1059">Ring Type for Surface Temperature</th><td data-bbox="801 1059 1481 1238"> Suitable for temperature measurement for the pipe shaped objects and the surface of the nozzles. T-250  </td></tr> <tr> <th data-bbox="801 1238 1481 1294">For Resin Temperature</th><td data-bbox="801 1294 1481 1563"> Capable of measurement of the molten resin temperature, such as the inside of the extruder. M16 screw is cut and its tip directly touches to the melting resin. T-260 Withstand pressure : 70MPa (at 250°C)  </td></tr> <tr> <th data-bbox="801 1563 1481 1619">For Resin Temperature</th><td data-bbox="801 1619 1481 1899"> By utilizing ZHF (zero-heat-flow) method, it eliminates thermal disturbances and temperature errors between the tip and the outside case and realizes more precise temperature measurement of the melting resin. T-270Z Withstand pressure : 100MPa (at 250°C)  </td></tr> <tr> <th data-bbox="108 1608 794 1664">Bayonet Type (Variable insertion length type)</th><td data-bbox="801 1608 1481 1664"></td></tr> <tr> <td data-bbox="108 1664 794 1899"> Thermocouple with bayonet. Length can be easily adjusted. Decide the position of the mounting bracket dependent upon insertion length and fix the spring by fixed screw. T-220  </td><td data-bbox="801 1664 1481 1899"></td></tr>	Screwed Tip Type	The tip is M6 size (M8 size is also available) rotary screw. Internal screws will be threaded in the fitting point. *M6, M8 is based on JIS Standard. T-230 	Fixing Screw Type for Surface Temperature	Fix the sensor at a $\phi 4.5$ fixed screw hole of the tip with a screw. Suitable for temperature measurement for the tiny spaces. T-240 	Ring Type for Surface Temperature	Suitable for temperature measurement for the pipe shaped objects and the surface of the nozzles. T-250 	For Resin Temperature	Capable of measurement of the molten resin temperature, such as the inside of the extruder. M16 screw is cut and its tip directly touches to the melting resin. T-260 Withstand pressure : 70MPa (at 250°C) 	For Resin Temperature	By utilizing ZHF (zero-heat-flow) method, it eliminates thermal disturbances and temperature errors between the tip and the outside case and realizes more precise temperature measurement of the melting resin. T-270Z Withstand pressure : 100MPa (at 250°C) 	Bayonet Type (Variable insertion length type)		Thermocouple with bayonet. Length can be easily adjusted. Decide the position of the mounting bracket dependent upon insertion length and fix the spring by fixed screw. T-220 	
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Ring Type for Surface Temperature	Suitable for temperature measurement for the pipe shaped objects and the surface of the nozzles. T-250 														
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Bayonet Type Thermocouples : T-200/T-210

T - 200 - ϕd - L1 - L - $\square\square\square$ - $\square$ - $\square$ - $\square$ - $\square$

① Diameter of protection tube ⑤ Lead wire termination
② Length of protection tube ⑥ Thermocouple type
③ Lead wire length ⑦ Sensing junction
④ Lead protection ⑧ Mounting bracket

Example :T-200-5-100-2000-EXA-Y-K-G-N

T - 210 - ϕd - L1 - L - $\square\square\square$ - $\square$ - $\square$ - $\square$ - $\square$

① Diameter of protection tube ⑤ Lead wire termination
② Length of protection tube ⑥ Thermocouple type
③ Lead wire length ⑦ Sensing junction
④ Lead protection ⑧ Mounting bracket

Example :T-210-5-100-2000-EXA-Y-K-G-N

①	Diameter of protection tube	$\phi 5.0$																	
②	Length of protection tube	Specify length by "mm" (50mm to 1,000mm) • Please contact distributors regarding other length.	Specify length by "mm" (50mm to 1,000mm) • Please contact distributors regarding other length. • L2 is 25mm. Other length is available. (Please specify when you order)																
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Specifications	Class : class 2 * Class 1 is available (Please specify when you order) Element : Single element * Double element is available (Please specify when you order) Maximum temperature for use <table><tr><th>Thermocouple type</th><th>Operating temperature for regular use</th><th>Maximum temperature</th></tr><tr><td>K</td><td>300°C</td><td>400°C</td></tr><tr><td>J</td><td>300°C</td><td>400°C</td></tr><tr><td>T</td><td>200°C</td><td>250°C</td></tr></table> Spring press bonding * Install bayonet so that its amount of spring compression should be 10mm to 20mm.			Thermocouple type	Operating temperature for regular use	Maximum temperature	K	300°C	400°C	J	300°C	400°C	T	200°C	250°C				
Thermocouple type	Operating temperature for regular use	Maximum temperature																	
K	300°C	400°C																	
J	300°C	400°C																	
T	200°C	250°C																	
Reference	• Stainless flexible lead wire is available Model Code : T-200F/T-210F • No waterproof • Diameter $\phi 6$ protection tube is available. For diameter $\phi 6$ protection tube, thermocouple holder is a special type. Please contact distributors. Bayonet SUS304 Holder Screw:R(PT)1/8 L=32,40,62 (Specify by ordering) Screw : M12(P1.75) L=32,62 (Please specify when you order) • Different types of screws are also available.																		

T-201

Protection tube (SUS304)
Argon welding
Silver soldering
Bayonet Spring
Hexagon Crimp
Sleeve (SUS304)
Filled with Epoxy Resin (MAX 120°C)
Lead wire (Compensation lead wire)
Lead wire termination
Serial number label
Heat shrink tube

① Diameter of protection tube
② Length of protection tube
③ Lead wire length
④ Lead protection
⑤ Lead wire termination
⑥ Thermocouple type
⑦ Sensing junction
⑧ Mounting bracket

Example :T-201-5-100-2000-EXA-Y-K-G-G

T-211

25 Crimp
Sleeve (SUS304)
Filled with Epoxy Resin (MAX 120°C)
Lead wire (Compensation lead wire)
Lead wire termination
Serial number label
Heat shrink tube
Bayonet
Spring
Silver soldering
Protection tube (SUS304)
Argon welding

① Diameter of protection tube
② Length of protection tube
③ Lead wire length
④ Lead protection
⑤ Lead wire termination
⑥ Thermocouple type
⑦ Sensing junction
⑧ Mounting bracket

Example :T-211-5-100-2000-EXA-Y-K-G-G

①	Diameter of protection tube	φ5.0														
②	Length of protection tube	Specify length by "mm" (50mm to 1,000mm) • Please contact distributors regarding other length.														
③	Lead wire length	Specify length by "mm" (100mm or more)														
④	Lead protection	<table border="1"> <thead> <tr> <th>Code</th> <th>Details</th> <th>Operating temperature</th> </tr> </thead> <tbody> <tr> <td>EXA</td> <td>Fiberglass with stainless steel</td> <td>0 to 150°C</td> </tr> <tr> <td>EXB</td> <td>Fiberglass</td> <td>0 to 150°C</td> </tr> <tr> <td>EXC</td> <td>PVC (polyvinyl chloride) with copper wire braided</td> <td>-20 to +90°C</td> </tr> </tbody> </table>	Code	Details	Operating temperature	EXA	Fiberglass with stainless steel	0 to 150°C	EXB	Fiberglass	0 to 150°C	EXC	PVC (polyvinyl chloride) with copper wire braided	-20 to +90°C		
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Code	Details															
G	Holder (Specify screw type and length. See Reference.)															
N	No bracket															

Specifications

Class : class 2
* Class 1 is available (Please specify when you order)
Element : Single element
* Double element is available (Please specify when you order)

Maximum temperature for use

Thermocouple type	Operating temperature for regular use	Maximum temperature
K	300°C	400°C
J	300°C	400°C
T	200°C	250°C

Spring press bonding

Sleeve Dimension (φD1)

Lead wire type	φD1
EXA, EXB, EXC	φ8
EXD, EXF	φ10

Install bayonet so that its amount of spring compression should be 10mm to 20mm.

Reference

- Stainless flexible lead wire is available
Model Code : T-201F/T-211F

• No waterproof
- Diameter φ6 protection tube is available.
For diameter φ6 protection tube, thermocouple holder is a special type.
Please contact distributors.

Bayonet SUS304

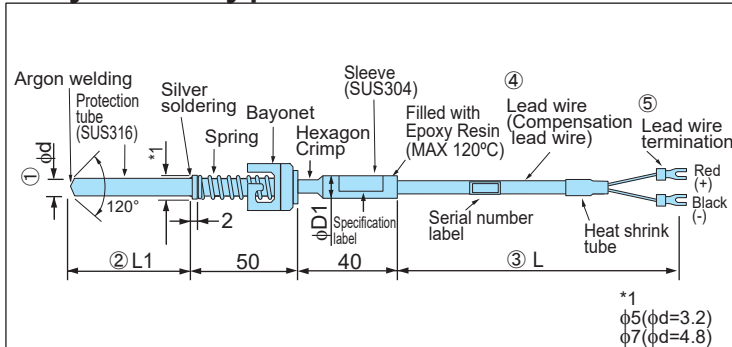
Holder

Screw: R(PT)1/8 L=32,40,62 (Specify by ordering)

Screw : M12(P1.75) L=32,62 (Please specify when you order)

• Different types of screws are also available.

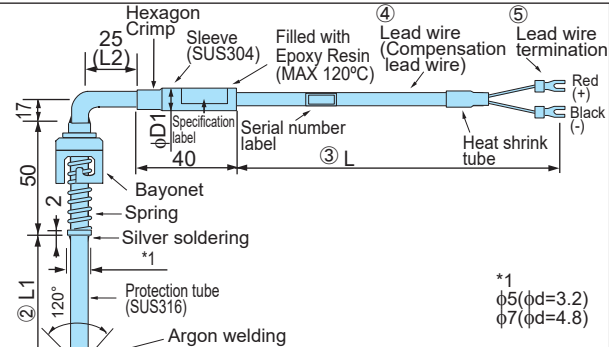
Bayonet Type Sheathed Thermocouples : T-201S/T-211S



T - 201S - φd - L1 - L - □□□ - □ - □ - □ - □
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① Diameter of protection tube
- ② Length of protection tube
- ③ Lead wire length
- ④ Lead protection
- ⑤ Lead wire termination
- ⑥ Thermocouple type
- ⑦ Sensing junction
- ⑧ Mounting bracket

Example :T-201S-4.8-100-2000-EXA-Y-K-G-G



T - 211S - φd - L1 - L - □□□ - □ - □ - □ - □
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① Diameter of protection tube
- ② Length of protection tube
- ③ Lead wire length
- ④ Lead protection
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- ⑧ Mounting bracket

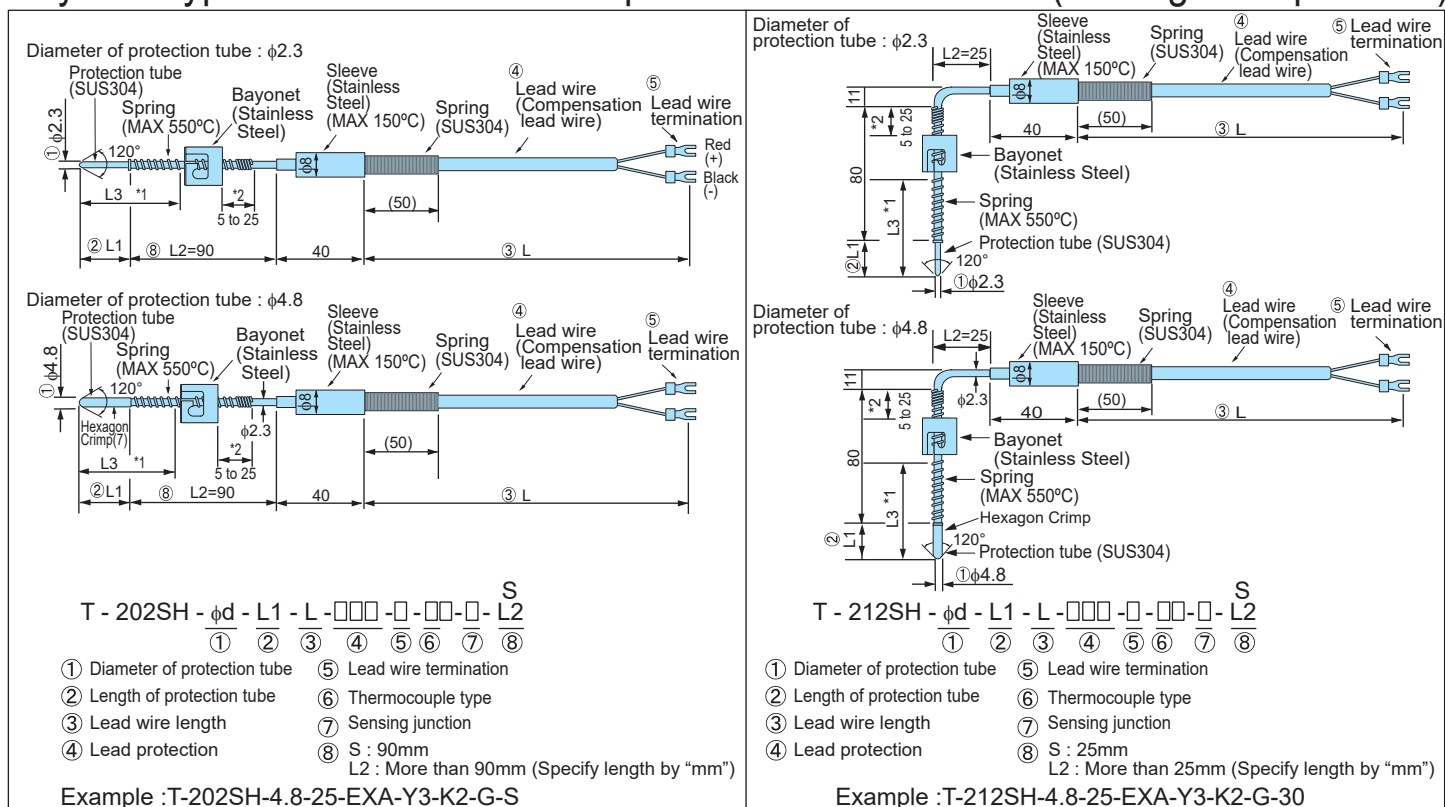
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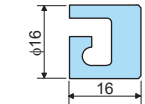
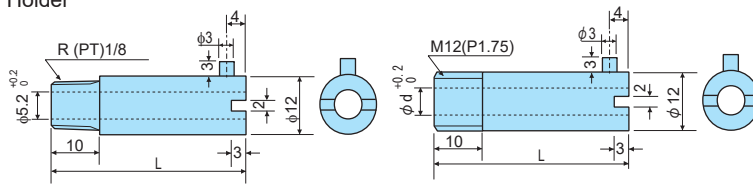
①	Diameter of protection tube	φ3.2, φ4.8									
②	Length of protection tube	Specify length by “mm” (50mm to 1,000mm) • Please contact distributors regarding other length.			Specify length by “mm” (50mm to 1,000mm) • Please contact distributors regarding other length. • L2 is 25mm. Other length is available. (Please specify when you order)						
③	Lead wire length	Specify length by “mm” (100mm or more)									
④	Lead protection	Code	Details		Operating temperature		Code	Details		Operating temperature	
		EXA	Fiberglass with stainless steel		0 to 150°C		EXD	PVC (polyvinyl chloride)		-20 to +90°C	
		EXB	Fiberglass		0 to 150°C		EXE	Silicone rubber		-55 to +180°C	
		EXC	PVC (polyvinyl chloride) with copper wire braided		-20 to +90°C		EXF	Fluorocarbon polymers (FEP)		0 to 200°C	
⑤	Lead wire termination	Code	Details			Code	Details			*1 : Other thermocouple connector : See Page 10 •See Page7	
		Y	Spade lugs for JIS standard "M3" size screw			TE *1	Thermocouple connector (CSP01+CLP-A+CSP02)				
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⑦	Measuring junction	Code	Details								
		G	Grounded								
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⑧	Mounting bracket	Code	Details								
		G	Holder (Specify screw type and length. See Reference.)								
		N	No bracket								

Specifications	Class : class 2 * Class 1 is available (Please specify when you order)		Sleeve Dimension (φD1)							
	Element : Single element * Double element is available (Please specify when you order)		Lead wire type	φD1						
	Maximum temperature for use		EXA, EXB, EXC	φ8						
			EXD, EXF	φ10						
			EXE	φ10						
<table><tr><th>Thermocouple type</th><th>Operating temperature for regular use</th></tr><tr><td>K</td><td>400°C</td></tr><tr><td>J</td><td>400°C</td></tr><tr><td>T</td><td>250°C</td></tr></table>	Thermocouple type	Operating temperature for regular use	K	400°C	J	400°C	T	250°C		
Thermocouple type	Operating temperature for regular use									
K	400°C									
J	400°C									
T	250°C									
In case of selecting silicon cover (code:EXE), temperature range for usage changes to 180°C.										

Reference	• Stainless flexible lead wire is available Model Code : T-201FS/T-211FS • No waterproof Bayonet SUS304 Pin (φ3) Holder Diameter of protection tube : φ3.2, φd=5.2mm Diameter of protection tube : φ4.8, φd=7.2mm Screw:R(PT)1/8 L=32,40,62 (Specify by ordering) M12(P1.75) Screw : M12(P1.75) L=32,62 (Please specify when you order) • Different types of screws are also available.
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Bayonet Type Sheathed Thermocouples : T-202SH/T-212SH (For High Temperature)



①	Diameter of protection tube	φ2.3, φ4.8																																			
②	Length of protection tube	Specify length by “mm” (25mm to 500mm)																																			
③	Lead wire length	Specify length by “mm” (1000mm to 8000mm)																																			
④	Lead protection	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>EXA</td><td>Fiberglass with stainless steel</td><td>0 to 150°C</td></tr><tr><td>EXB</td><td>Fiberglass</td><td>0 to 150°C</td></tr></table>				Code	Details	Operating temperature	EXA	Fiberglass with stainless steel	0 to 150°C	EXB	Fiberglass	0 to 150°C																							
Code	Details	Operating temperature																																			
EXA	Fiberglass with stainless steel	0 to 150°C																																			
EXB	Fiberglass	0 to 150°C																																			
⑤	Lead wire termination	<table><tr><th>Code</th><th>Details</th><th>Code</th><th>Details</th></tr><tr><td>Y3</td><td>Spade lugs for JIS standard "M3" size screw</td><td>TS1</td><td>Thermocouple connector (CSP01+CLP-A)</td></tr><tr><td>R3</td><td>Ring lugs for JIS standard "M3" size screw</td><td>TS2</td><td>Thermocouple connector (CSP01)</td></tr><tr><td>MS1</td><td>Metal connector (SCK-1602-P)</td><td>TS3</td><td>Thermocouple connector (CSP01+CLP-A+CSP03)</td></tr><tr><td>MN1</td><td>Metal connector (NCS-162-P-CH)</td><td>TM1</td><td>Thermocouple connector (CMP01+CLP-B)</td></tr><tr><td>MN2</td><td>Metal connector (NCS-162-AdF-CH)</td><td>TM2</td><td>Thermocouple connector (CMP01)</td></tr><tr><td>MN3</td><td>Metal connector (NCS-162-PM-CH)</td><td>TM3</td><td>Thermocouple connector (CMP01+CLP-B+CMP03)</td></tr><tr><td></td><td></td><td>N</td><td>No terminal lugs *terminal soldered</td></tr></table>				Code	Details	Code	Details	Y3	Spade lugs for JIS standard "M3" size screw	TS1	Thermocouple connector (CSP01+CLP-A)	R3	Ring lugs for JIS standard "M3" size screw	TS2	Thermocouple connector (CSP01)	MS1	Metal connector (SCK-1602-P)	TS3	Thermocouple connector (CSP01+CLP-A+CSP03)	MN1	Metal connector (NCS-162-P-CH)	TM1	Thermocouple connector (CMP01+CLP-B)	MN2	Metal connector (NCS-162-AdF-CH)	TM2	Thermocouple connector (CMP01)	MN3	Metal connector (NCS-162-PM-CH)	TM3	Thermocouple connector (CMP01+CLP-B+CMP03)			N	No terminal lugs *terminal soldered
Code	Details	Code	Details																																		
Y3	Spade lugs for JIS standard "M3" size screw	TS1	Thermocouple connector (CSP01+CLP-A)																																		
R3	Ring lugs for JIS standard "M3" size screw	TS2	Thermocouple connector (CSP01)																																		
MS1	Metal connector (SCK-1602-P)	TS3	Thermocouple connector (CSP01+CLP-A+CSP03)																																		
MN1	Metal connector (NCS-162-P-CH)	TM1	Thermocouple connector (CMP01+CLP-B)																																		
MN2	Metal connector (NCS-162-AdF-CH)	TM2	Thermocouple connector (CMP01)																																		
MN3	Metal connector (NCS-162-PM-CH)	TM3	Thermocouple connector (CMP01+CLP-B+CMP03)																																		
		N	No terminal lugs *terminal soldered																																		
⑥	Thermocouple type	<table><tr><th>Code</th><th>Details</th></tr><tr><td>K1</td><td>Type K (Chromel-Alumel) Class 1</td></tr><tr><td>K2</td><td>Type K (Chromel-Alumel) Class 2</td></tr></table>				Code	Details	K1	Type K (Chromel-Alumel) Class 1	K2	Type K (Chromel-Alumel) Class 2																										
Code	Details																																				
K1	Type K (Chromel-Alumel) Class 1																																				
K2	Type K (Chromel-Alumel) Class 2																																				
⑦	Measuring junction	<table><tr><th>Code</th><th>Details</th></tr><tr><td>G</td><td>Grounded</td></tr><tr><td>NG</td><td>Ungrounded</td></tr></table>				Code	Details	G	Grounded	NG	Ungrounded																										
Code	Details																																				
G	Grounded																																				
NG	Ungrounded																																				
⑧	Length of L2	<table><tr><th colspan="2">T-202SH</th><th colspan="2">T-212SH</th></tr><tr><th>Code</th><th>Details</th><th>Code</th><th>Details</th></tr><tr><td>S</td><td>90mm</td><td>S</td><td>25mm</td></tr><tr><td>91 to □□□</td><td>More than 90mm (Specify length by “mm”)</td><td>26 to □□□</td><td>More than 26mm (Specify length by “mm”)</td></tr></table> • L2 should be within L1+L2=500mm. (Maximum) • L2 should be within L1+L2+80=500mm. (Maximum) ⚠ If temperature of the sleeve may exceed 150°C, make the L2 longer and insulate the sleeve.				T-202SH		T-212SH		Code	Details	Code	Details	S	90mm	S	25mm	91 to □□□	More than 90mm (Specify length by “mm”)	26 to □□□	More than 26mm (Specify length by “mm”)																
T-202SH		T-212SH																																			
Code	Details	Code	Details																																		
S	90mm	S	25mm																																		
91 to □□□	More than 90mm (Specify length by “mm”)	26 to □□□	More than 26mm (Specify length by “mm”)																																		
Specifications		Class : class 2 * Class 1 is available (Please specify when you order) Element : Single element Operating temperature for regular use : 550°C																																			
Reference		*1: L3= holder length (excluding screw) + mounting hole length. More than 60 mm is recommended. *2: Bayonet cap should be fit to the holder in the range of 5 to 25 mm. 6~8mm is recommended as the amount of spring compression. (The gap between the pin holder and the bayonet should be 0 to 2 mm for setting.) Bayonet  Holder  Screw:R(PT)1/8 L=32,40,62 (Specify by ordering) Screw : M12(P1.75) L=32,62 (Please specify when you order) • Different types of screws are also available.																																			

The diagram shows two side-by-side technical drawings of thermocouples, labeled T-220 and T-221. Both drawings include a list of components and dimensions.

Left Drawing (T-220):

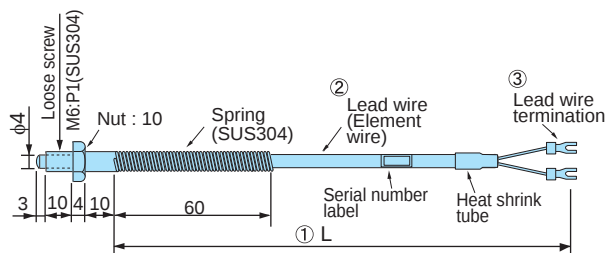
- Components:** Silver soldering, Protection tube (SUS304), Element wire (Fiberglass with stainless steel), Bayonet, Spring (SUS304), Spring Lock, Serial number label, Heat shrink tube, Lead wire termination.
- Dimensions:**
 - Tip diameter: $\phi 4.8$
 - Tip angle: 120°
 - Tip length: 25
 - Bayonet length: 80
 - Lock screw: M4 x 8
 - Serial number label length: ① L

Right Drawing (T-221):

- Components:** Brass (Ni-3 Plating), Crimp, Bayonet, Spring, Element wire (Fiberglass with stainless steel), Serial number label, Heat shrink tube, Lead wire termination.
- Dimensions:**
 - Tip diameter: $\phi 4.8$
 - Tip length: 15
 - Bayonet length: 200
 - Serial number label length: ① L

Screwed Tip Thermocouples : T-230

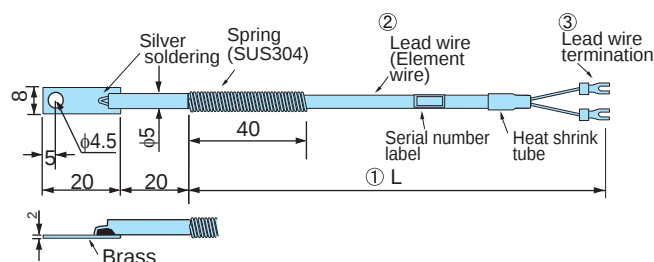
Fixing Screw Type Thermocouples for Surface Temperature Measurement : T-240



T - 230 - L - ① - ② - ③ - ④

- ① Lead wire length
- ② Lead protection
- ③ Lead wire termination
- ④ Thermocouple type

Example :T-230-2000-EXA-Y-K



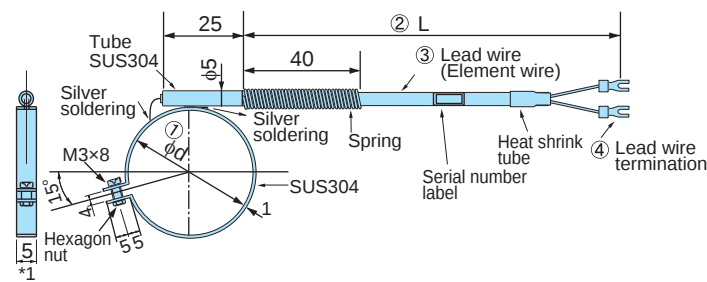
T - 240 - L - ① - ② - ③ - ④

- ① Lead wire length
- ② Lead protection
- ③ Lead wire termination
- ④ Thermocouple type

Example :T-240-2000-EXA-Y-K

①	Lead wire length	Specify length by “mm” (500mm to 10,000mm)																			
②	Lead protection	<table><tr><td>Code</td><td colspan="3">Details</td></tr><tr><td>EXA</td><td colspan="3">Element wire (Fiberglass with stainless steel) (0.3/7X2)</td></tr><tr><td>EXB</td><td colspan="3">Element wire (Fiberglass) (0.3/7X2)</td></tr><tr><td>EXE</td><td colspan="3">Element wire [PVC (polyvinyl chloride) with copper wire braided] (0.1/30X2)</td></tr></table>				Code	Details			EXA	Element wire (Fiberglass with stainless steel) (0.3/7X2)			EXB	Element wire (Fiberglass) (0.3/7X2)			EXE	Element wire [PVC (polyvinyl chloride) with copper wire braided] (0.1/30X2)		
		Code	Details																		
EXA	Element wire (Fiberglass with stainless steel) (0.3/7X2)																				
EXB	Element wire (Fiberglass) (0.3/7X2)																				
EXE	Element wire [PVC (polyvinyl chloride) with copper wire braided] (0.1/30X2)																				
* EXE type is Thermocouple K only.(Protection : Black, Flat type)																					
③	Lead wire termination	<table><tr><td>Code</td><td>Details</td></tr><tr><td>Y</td><td>Spade lugs for JIS standard "M3" size screw</td></tr><tr><td>R</td><td>Ring lugs for JIS standard "M4" size screw</td></tr><tr><td>M</td><td>Metal connector (SCK-1602-P)</td></tr></table>		Code	Details	Y	Spade lugs for JIS standard "M3" size screw	R	Ring lugs for JIS standard "M4" size screw	M	Metal connector (SCK-1602-P)	<table><tr><td>Code</td><td>Details</td></tr><tr><td>TE*1</td><td>Thermocouple connector (CSP01+CLP-A+CSP02)</td></tr><tr><td>N</td><td>No terminal lugs *terminal soldered</td></tr></table>		Code	Details	TE*1	Thermocouple connector (CSP01+CLP-A+CSP02)	N	No terminal lugs *terminal soldered	*1 : Other thermocouple connector : See Page 10	
		Code	Details																		
Y	Spade lugs for JIS standard "M3" size screw																				
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M	Metal connector (SCK-1602-P)																				
Code	Details																				
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N	No terminal lugs *terminal soldered																				
•See Page7																					
④	Thermocouple type	<table><tr><td>Code</td><td>Details</td></tr><tr><td>K</td><td>Type K (Chromel-Alumel)</td></tr><tr><td>J</td><td>Type J (Iron-Constantan)</td></tr></table>		Code	Details	K	Type K (Chromel-Alumel)	J	Type J (Iron-Constantan)	<table><tr><td>Code</td><td>Details</td></tr><tr><td>T</td><td>Type T (Copper-Constantan)</td></tr></table>		Code	Details	T	Type T (Copper-Constantan)						
		Code	Details																		
K	Type K (Chromel-Alumel)																				
J	Type J (Iron-Constantan)																				
Code	Details																				
T	Type T (Copper-Constantan)																				
Specifications		Class : class 2 * Class 1 is available (Please specify when you order) Element : Single element Measuring junction : Grounded Maximum temperature for use <table><tr><td>Thermocouple type</td><td>Operating temperature for regular use</td><td>Maximum temperature</td></tr><tr><td>K</td><td>300°C</td><td>400°C</td></tr><tr><td>J</td><td>300°C</td><td>400°C</td></tr><tr><td>T</td><td>200°C</td><td>250°C</td></tr></table> In case of selecting silicon cover (code:EXE), temperature range for usage change to 180°C.				Thermocouple type	Operating temperature for regular use	Maximum temperature	K	300°C	400°C	J	300°C	400°C	T	200°C	250°C				
Thermocouple type	Operating temperature for regular use	Maximum temperature																			
K	300°C	400°C																			
J	300°C	400°C																			
T	200°C	250°C																			
Reference		Screw Type <table><tr><td>Standard</td><td>M6:P1</td></tr><tr><td rowspan="2">Optional</td><td>M8:P1.25</td></tr><tr><td>W1/4</td></tr></table> (Please specify when you order)				Standard	M6:P1	Optional	M8:P1.25	W1/4											
Standard	M6:P1																				
Optional	M8:P1.25																				
	W1/4																				

Ring Type Thermocouples for Surface Temperature Measurement : T-250



T - 250 - ϕ d - L - $\square\square\square$ - $\square$ - $\square$
① ② ③ ④ ⑤

- ① Diameter of ring
- ② Lead wire length
- ③ Lead protection
- ④ Lead wire termination
- ⑤ Thermocouple type

Example :T-250-50-2000-EXA-Y-K

①	Diameter of ring	Specify length by “mm” (25mm to 150mm) (Standard : φ30, φ35, φ40, φ45, φ50, φ55, φ60, φ65)																	
②	Lead wire length	Specify length by “mm” (500mm to 10,000mm)																	
③	Lead protection	<table><tr><th>Code</th><th colspan="3">Details</th></tr><tr><td>EXA</td><td colspan="3">Element wire (Fiberglass with stainless steel) (0.3/7X2)</td></tr><tr><td>EXB</td><td colspan="3">Element wire (Fiberglass) (0.3/7X2)</td></tr></table>				Code	Details			EXA	Element wire (Fiberglass with stainless steel) (0.3/7X2)			EXB	Element wire (Fiberglass) (0.3/7X2)				
Code	Details																		
EXA	Element wire (Fiberglass with stainless steel) (0.3/7X2)																		
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④	Lead wire termination	<table><tr><th>Code</th><th>Details</th></tr><tr><td>Y</td><td>Spade lugs for JIS standard “M3” size screw</td></tr><tr><td>R</td><td>Ring lugs for JIS standard “M4” size screw</td></tr><tr><td>M</td><td>Metal connector (SCK-1602-P)</td></tr></table>	Code	Details	Y	Spade lugs for JIS standard “M3” size screw	R	Ring lugs for JIS standard “M4” size screw	M	Metal connector (SCK-1602-P)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>TE*1</td><td>Thermocouple connector (CSP01+CLP-A+CSP02)</td></tr><tr><td>N</td><td>No terminal lugs *terminal soldered</td></tr></table> •See Page7	Code	Details	TE*1	Thermocouple connector (CSP01+CLP-A+CSP02)	N	No terminal lugs *terminal soldered	*1 : Other thermocouple connector : See Page 10	
Code	Details																		
Y	Spade lugs for JIS standard “M3” size screw																		
R	Ring lugs for JIS standard “M4” size screw																		
M	Metal connector (SCK-1602-P)																		
Code	Details																		
TE*1	Thermocouple connector (CSP01+CLP-A+CSP02)																		
N	No terminal lugs *terminal soldered																		
⑤	Thermocouple type	<table><tr><th>Code</th><th>Details</th></tr><tr><td>K</td><td>Type K (Chromel-Alumel)</td></tr><tr><td>J</td><td>Type J (Iron-Constantan)</td></tr></table>	Code	Details	K	Type K (Chromel-Alumel)	J	Type J (Iron-Constantan)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>T</td><td>Type T (Copper-Constantan)</td></tr></table>	Code	Details	T	Type T (Copper-Constantan)						
Code	Details																		
K	Type K (Chromel-Alumel)																		
J	Type J (Iron-Constantan)																		
Code	Details																		
T	Type T (Copper-Constantan)																		
Specifications		Class : class 2 * Class 1 is available (Please specify when you order) Element : Single element Measuring junction : Grounded Maximum temperature for use <table><tr><th>Thermocouple type</th><th>Operating temperature for regular use</th><th>Maximum temperature</th></tr><tr><td>K</td><td>300°C</td><td>400°C</td></tr><tr><td>J</td><td>300°C</td><td>400°C</td></tr><tr><td>T</td><td>200°C</td><td>250°C</td></tr></table>			Thermocouple type	Operating temperature for regular use	Maximum temperature	K	300°C	400°C	J	300°C	400°C	T	200°C	250°C			
Thermocouple type	Operating temperature for regular use	Maximum temperature																	
K	300°C	400°C																	
J	300°C	400°C																	
T	200°C	250°C																	
Reference		*1 : Ring width 7mm or 10mm are also available <table><tr><th>*1</th><th>Width of Ring</th><th>Lock screw size</th></tr><tr><td>Standard</td><td>5mm</td><td>M3X8</td></tr><tr><td rowspan="2">Optional</td><td>7mm</td><td>M4X8</td></tr><tr><td>10mm</td><td>M4X8</td></tr></table>			*1	Width of Ring	Lock screw size	Standard	5mm	M3X8	Optional	7mm	M4X8	10mm	M4X8				
*1	Width of Ring	Lock screw size																	
Standard	5mm	M3X8																	
Optional	7mm	M4X8																	
	10mm	M4X8																	

Technical drawings of two types of thermocouples: T-260 and T-270Z.

T-260 Dimensions:

- Lead wire length (L): 115
- Lead protection (P): 19
- Thermocouple type (T): 260
- Thermocouple connector (CSP01): 26x30 (SUS304)
- Lead wire termination (CSP02): 26x30 (SUS304)

T-270Z Dimensions:

- Lead wire length (L): 115
- Lead protection (P): 19
- Thermocouple type (T): 270Z
- Thermocouple connector (CSP01): 23x26 (SUS304)
- Lead wire termination (CSP02): 23x26 (SUS304)

Legend:

- ① Lead wire length
- ② Lead protection
- ③ Lead wire termination
- ④ Thermocouple type

Example: T-260-2000-EXA-Y-K2

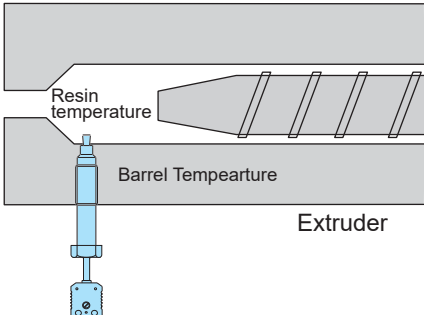
Specifications	Class : class 2 Measuring junction : Grounded (T-260 is available for ungrounded type. Please specify when you order) Maximum temperature for use : 400°C Material of protection tube : SUS304(T-260), SUS316(T-270Z) Material body : SUS304 withstand pressure : 70MPa (T-260, at 250°C), 100MPa (T-270Z, at 250°C)
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Thermocouple for Resin Temperature

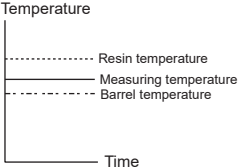
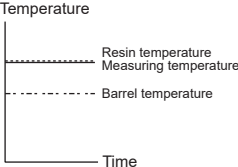
Accurate measurement of resin temperature was difficult in general as there are many thermal disturbances as well as high temperature and high pressure.

T-260/T-270Z has an excellent resistance against high temperature and high pressure. Moreover, T-270Z can measure resin temperature change even there are thermal disturbances because of its Zero-Heat-Flow structure. That leads to be stable resin temperature control.

Because the barrel temperature will be transferred to the protection tube, traditional sensors negatively effects on their measurements. T-270Z realizes its accurate measurement of the resin temperature by compensating the barrel temperature.

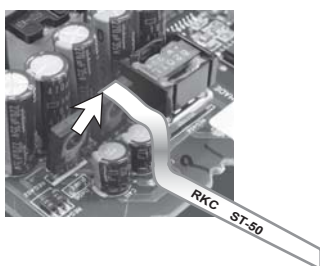


Condition where resin temperature is higher than barrel temperature

Conventional sensor	T-270Z
	

When the resin temperature is lower than the barrel temperature, traditional sensors detects a slightly higher degree than the actual resin temperature.

Adhesive and exposed tip type temperature sensor ST-50/51



Adhesive type temperature sensor : Max. 300°C

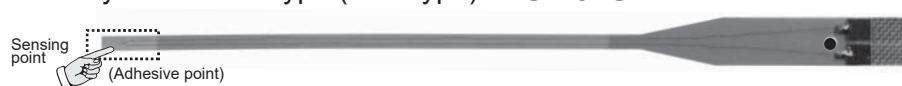
■ Glass cloth base type **ST-50**



■ Polyimide sheet type **ST-51**



■ Polyimide sheet type (Fine type) **ST-51S**



Exposed tip type temperature sensor : Max. 300°C

■ Glass cloth base type **ST-50B**

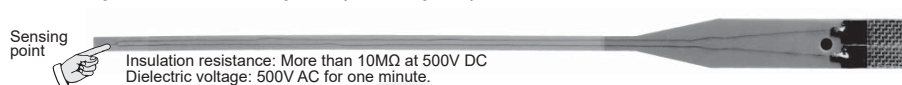


■ Polyimide sheet type **ST-51B**

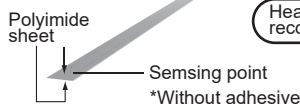


Insulated type temperature sensor : Max. 300°C

■ Polyimide sheet type (Fine type) **ST-51SC**



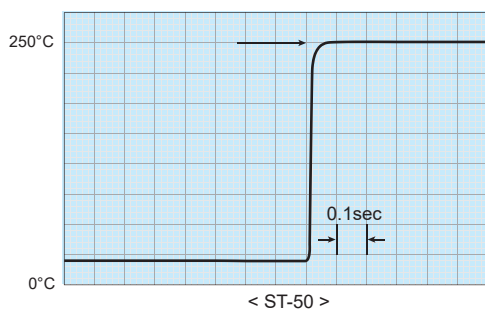
Insulation resistance: More than 10MΩ at 500V DC
Dielectric voltage: 500V AC for one minute.



Heat resistant tapes or similar products are recommended while sticking the sensor to the target.

Fast response

As the heat capacity of the sensor is very small temperature can be measured instantly.



Measuring up to 300°C (572°F)

Up to 300°C(572°F) can be measured by the tip with an adhesive tape.

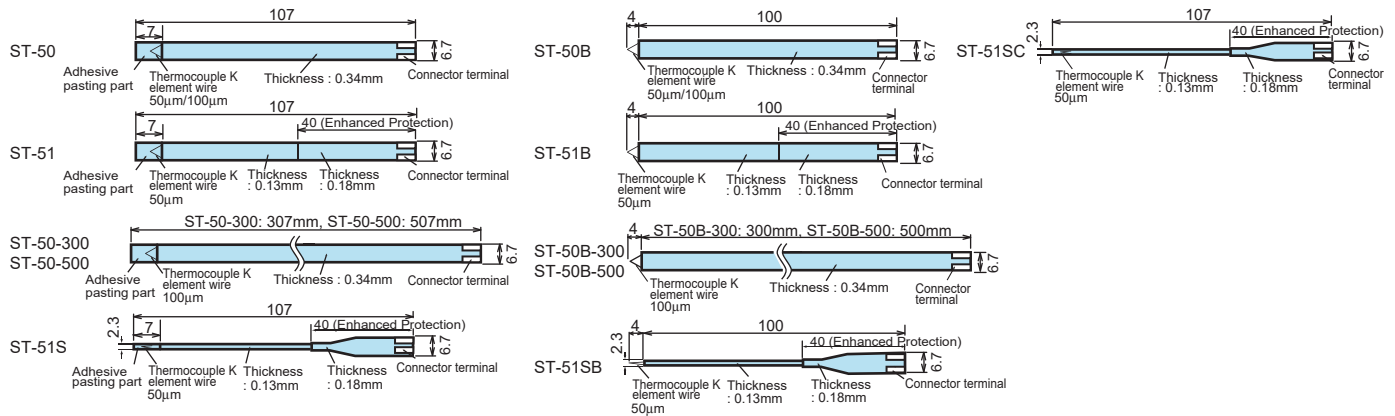
Durable adhesive tape

The adhesive tape can be repeatedly applied to and detached from various types of surfaces.

<Durability of adhesive tape>

- Up to 150°C (302°F) : Repeated use and detachment is available.
- Up to 200°C (393°F)
When temperature stays above 150°C (302°F), repeated use and detachment is available.
- Up to 250°C (482°F)
When temperature stays above 200°C (392°F), repeated use and detachment is available.
- Higher than 250°C (482°F)
Adhesive part will be burnt. Repeated use is not available.

External Dimensions



Specifications

<ST-50/ST-51/ST-51S>

Sheet Material	ST-50/50B : Glass cloth base sheet ST-51/51S/51B/SC : Polyimide sheet
Operating Temperature	ST-51S/51SC : -40 to 300°C (-40 to 577°F) ST-50/50B/51S/51B : 0 to 300°C (32 to 577°F)
Thermocouple	Type K
Sensor Length	ST-50/50B : 100/300/500mm Type ST-51/51S/51B/51SC : 100mm Type
Sensor Thickness	ST-50/50B : 0.34mm ST-51/51S/51B/SC : 0.13mm
Element wire diameter	ST-50/50B : 50μm/100μm (100mm Type) 100μm (300/500mm Type) ST-51/51S/51B/SC : 50μm

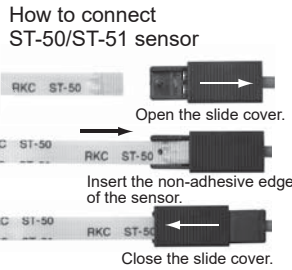
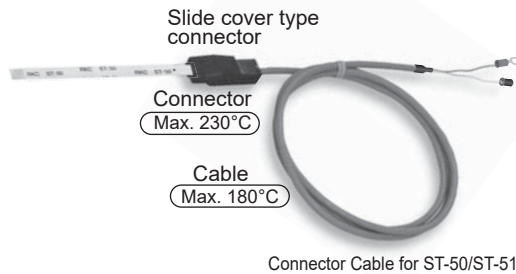
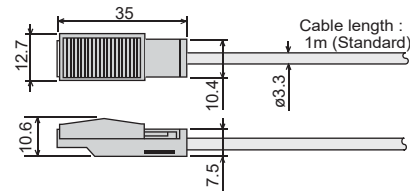
	Response of *1 95.0%	Resistance value (With cable 1m)	Accuracy *2
ST-50	0.08秒	51Ω	±1.3°C
ST-50-100-D	0.08秒	17Ω	±1.5°C
ST-50-300	0.08秒	41Ω	±1.5°C
ST-50-500	0.08秒	66Ω	±1.5°C
ST-50B	0.03秒	51Ω	±1.3°C
ST-50B-100-D	0.03秒	17Ω	±1.5°C
ST-50B-300	0.03秒	41Ω	±1.5°C
ST-50B-500	0.03秒	66Ω	±1.5°C
ST-51	0.08秒	51Ω	±1.3°C
ST-51B	0.03秒	51Ω	±1.3°C
ST-51S	0.08秒	51Ω	±1.2°C
ST-51SB	0.03秒	51Ω	±1.2°C
ST-51SC	0.32秒	51Ω	±1.2°C

Response of Metal Surface (Adhesive type)
50μm element wire type : 0.4sec
100μm element wire type : 0.9sec

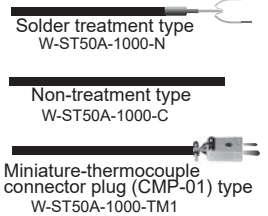
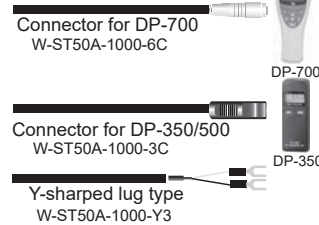
<W-ST50A> Connector Cable for ST-50/ST-51

Connector material	PPS resin
Connector Max. temperature	230°C
Cable	φ3.3 Extended cable, Standard 1m
Cable material	Silicon rubber coated (Green)
Resistance value	7.0Ω or less (1m)
Cable Max. temperature	180°C
Weight	Approx 20g (Cable 1m, Y-sharped terminal lug type)

*1 : Response when temperature of paraffin is 250°C (482°F).
*2 : Accuracy when temperature on metal surface is 100°C (212°F).



Terminal



Model and Suffix Code

<ST-50> Glass cloth base type ST-50 (Adhesive type)

Model Code	Contents
ST-50	Length : 107mm, Element Wire Diameter 50μm, 5 pieces per set
ST-50-100-D	Length : 107mm, Element Wire Diameter 100μm, 5 pieces per set
ST-50-300	Length : 307mm, Element Wire Diameter 100μm, 1 piece
ST-50-500	Length : 507mm, Element Wire Diameter 100μm, 1 piece

<ST-51> Polyimide sheet type ST-51 (Adhesive type)

Model Code	Contents
ST-51-100-C	Length : 107mm, Element Wire Diameter 50μm, 5 pieces per set

<ST-51S> Polyimide sheet type ST-51S (Adhesive type)

Model Code	Contents
ST-51S-100-C	Length : 107mm, Element Wire Diameter 50μm, 5 pieces per set

<ST-51SC> Polyimide sheet type ST-51S (Insulated type)

Model Code	Contents
ST-51SC-100-C	Length : 107mm, Element Wire Diameter 50μm, 5 pieces per set

ST-50B (Exposed tip type)

Model Code	Contents
ST-50B-100-04	Length : 104mm, Element Wire Diameter 50μm, 5 pieces per set
ST-50B-100-04-D	Length : 104mm, Element Wire Diameter 100μm, 5 pieces per set
ST-50B-300-04	Length : 304mm, Element Wire Diameter 100μm, 1 piece
ST-50B-500-04	Length : 504mm, Element Wire Diameter 100μm, 1 piece

ST-51B (Exposed tip type)

Model Code	Contents
ST-51B-100-C	Length : 104mm, Element Wire Diameter 50μm, 5 pieces per set

ST-51SB (Exposed tip type)

Model Code	Contents
ST-51SB-100-C	Length : 104mm, Element Wire Diameter 50μm, 5 pieces per set

<ST-50 Connector>

Model Code	Contents
W-ST50A-1000-3C	ST-50/51 Connector cable for DP-350/500 connection (1m)
W-ST50A-1000-6C	ST-50/51 Connector cable for DP-700 connection (1m)
W-ST50A-1000-Y3	Y-sharped terminal lug type ST-50/51 Connector cable (1m)
W-ST50A-1000-N	Solder treatment type ST-50/51 Connector cable (1m)
W-ST50A-1000-C	Non-treatment type ST-50/51 Connector cable (1m)
W-ST50A-1000-TM1	Miniature-thermocouple connector plug (CMP-01) type ST-50/51 Connector cable

Temperature Sensors for Extremely Small Surface ST-55/56

■ Features

Measuring temperature in a small surface area

A fine thermocouple enables measurement of a fine surface or a surface with small thermal capacity such as SMT parts.

Measuring up to 500 °C (932°F) (Ceramic coating type)

Ceramic coating type can measure up to 500°C (932°F) and fluorine resin coating type up to 260°C (500°F).

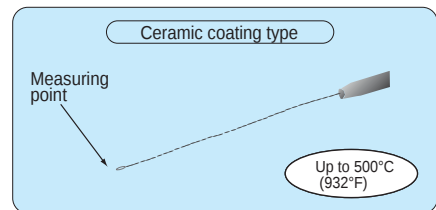
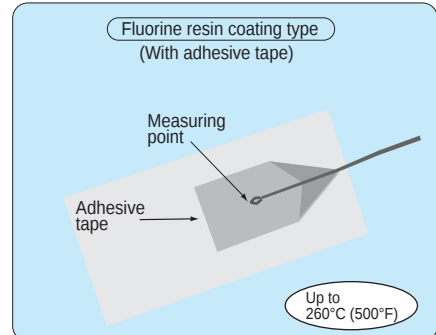
Optional adhesive tape on the tip (Fluorine resin coating type)

Optional adhesive tape on the fluorine resin coating type allows the tip to stick to an exact spot for measurement.

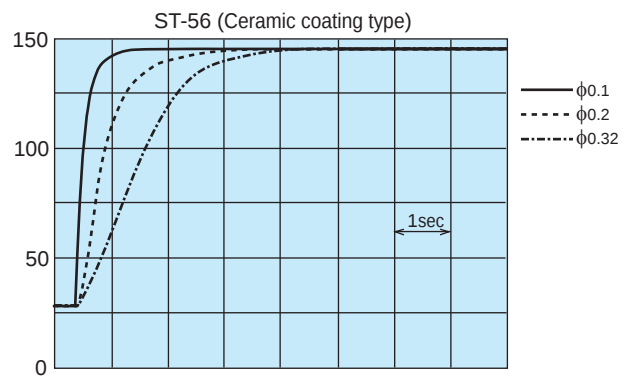
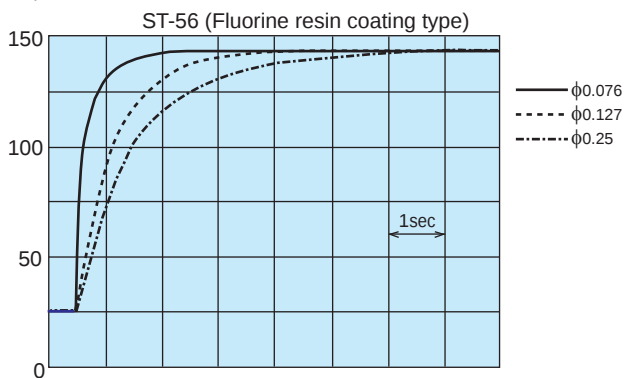
Fast response with fine thermocouple

As the heat capacity of the sensor is very small temperature can be measured instantly.

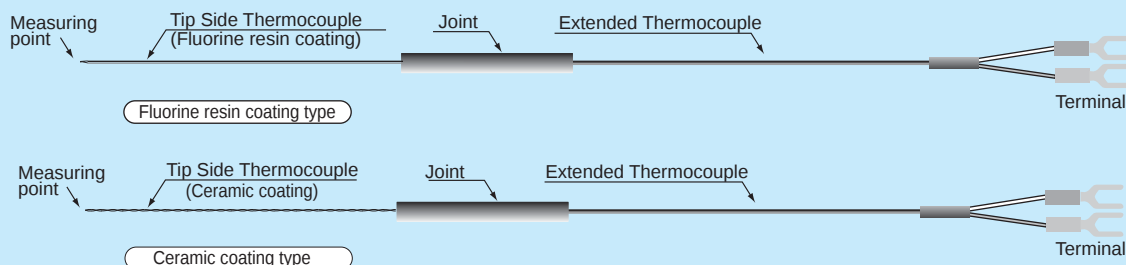
Measuring point on the tip



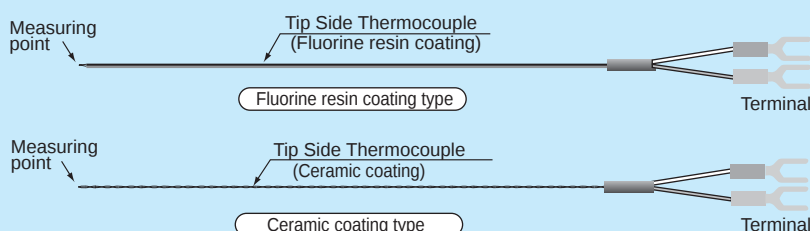
Response of Metal Surface



ST-55 ST-55 has a joint which enables a longer length



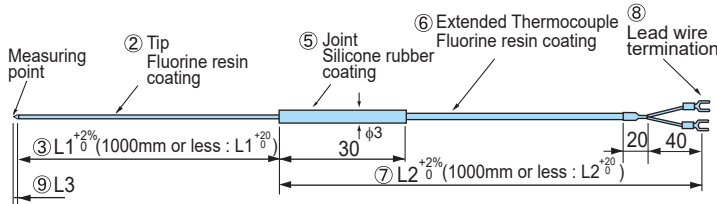
ST-56 ST-56 is a seamless thermocouple



Temperature Sensors for Extremely Small Surface ST-55

Fluorine resin coating type : ST-55K-T ☐

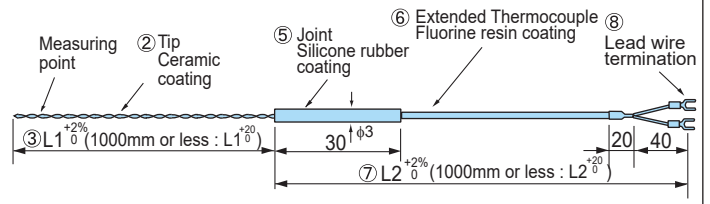
Ceramic coating type : ST-55K-C ☐



ST - 55K - ☐ L1 ☐ - G - ☐ L2 - ☐ L3
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

- ① Thermocouple type
- ② Shape of Thermocouple (Element wire diameter/Coating)
- ③ Length of thermocouple element wire
- ④ Adhesive tape for tip
- ⑤ Joint specifications
- ⑥ Shape of extended thermocouple (Element wire diameter/Coating)
- ⑦ Length of extended thermocouple element wire
- ⑧ Lead wire termination
- ⑨ Length of exposed tip

Example : ST-55K-TA0300P-G-TD1000-Y-05



ST - 55K - ☐ L1 N - G - ☐ L2 - ☐
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① Thermocouple type
- ② Shape of Thermocouple (Element wire diameter/Coating)
- ③ Length of thermocouple element wire
- ④ Adhesive tape for tip
- ⑤ Joint specifications
- ⑥ Shape of Extended Thermocouple (Element wire diameter/Coating)
- ⑦ Length of extended thermocouple element wire
- ⑧ Lead wire termination

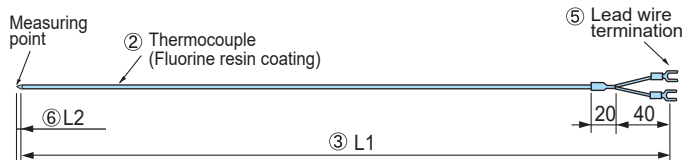
Example : ST-55K-CA0300N-G-TD1000-Y

①	Thermocouple type	Type K															
②	Shape of Thermocouple (Element wire diameter/Coating)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>TA</td><td>ø0.076 Fluorine resin coating (Single thermocouple type)</td></tr><tr><td>TB</td><td>ø0.076 Fluorine resin coating (Paired thermocouple type)</td></tr><tr><td>TC</td><td>ø0.127 Fluorine resin coating (Paired thermocouple type)</td></tr></table>	Code	Details	TA	ø0.076 Fluorine resin coating (Single thermocouple type)	TB	ø0.076 Fluorine resin coating (Paired thermocouple type)	TC	ø0.127 Fluorine resin coating (Paired thermocouple type)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>CA</td><td>ø0.1 Ceramic coating (Single thermocouple type)</td></tr><tr><td>CB</td><td>ø0.2 Ceramic coating (Single thermocouple type)</td></tr></table>	Code	Details	CA	ø0.1 Ceramic coating (Single thermocouple type)	CB	ø0.2 Ceramic coating (Single thermocouple type)
		Code	Details														
TA	ø0.076 Fluorine resin coating (Single thermocouple type)																
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TC	ø0.127 Fluorine resin coating (Paired thermocouple type)																
Code	Details																
CA	ø0.1 Ceramic coating (Single thermocouple type)																
CB	ø0.2 Ceramic coating (Single thermocouple type)																
③	Length of thermocouple element wire	Specify every 50mm unit															
④	Adhesive tape for tip	<table><tr><th>Code</th><th>Details</th></tr><tr><td>P</td><td>Polymide tape</td></tr><tr><td>G</td><td>Glass cloth base tape</td></tr><tr><td>N</td><td>None</td></tr></table>	Code	Details	P	Polymide tape	G	Glass cloth base tape	N	None	N: None						
Code	Details																
P	Polymide tape																
G	Glass cloth base tape																
N	None																
⑤	Joint specifications	Silicone rubber coating (Max. temperature : 170°C)															
⑥	Shape of extended thermocouple (Element wire diameter/Coating)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>TC</td><td>ø0.127 Fluorine resin coating (Paired thermocouple type)</td></tr><tr><td>TD</td><td>ø0.254 Fluorine resin coating (Paired thermocouple type)</td></tr></table>	Code	Details	TC	ø0.127 Fluorine resin coating (Paired thermocouple type)	TD	ø0.254 Fluorine resin coating (Paired thermocouple type)									
Code	Details																
TC	ø0.127 Fluorine resin coating (Paired thermocouple type)																
TD	ø0.254 Fluorine resin coating (Paired thermocouple type)																
⑦	Length of extended thermocouple element wire	Unit : mm (Min.200mm) Specify every 50mm unit • Please select length so that a total resistance of thermocouple become 100Ω or less.															
⑧	Lead wire termination	<table><tr><th>Code</th><th>Details</th></tr><tr><td>C1</td><td>CMP01-K (RKC product) Material : Polyamide (Max. temperature : 140°C (284°F))</td></tr><tr><td>C2</td><td>CMR01-K (RKC product) Material : PPS resin (Max. temperature : 220°C (428°F))</td></tr><tr><td>C3</td><td>1260-K (MARINE product) (Max. temperature : 205°C (401°F))</td></tr><tr><td>Y</td><td>Spade lugs for JIS standard "M3" size screw *1</td></tr><tr><td>G</td><td>Conforming to cable connector for DP-350/700 connection</td></tr><tr><td>N</td><td>No terminal lugs *terminal soldered</td></tr></table> *1 Spade lugs for JIS standard "M3" size screw is not available if extended thermocouple was specified ø0.127 (Code : TC).	Code	Details	C1	CMP01-K (RKC product) Material : Polyamide (Max. temperature : 140°C (284°F))	C2	CMR01-K (RKC product) Material : PPS resin (Max. temperature : 220°C (428°F))	C3	1260-K (MARINE product) (Max. temperature : 205°C (401°F))	Y	Spade lugs for JIS standard "M3" size screw *1	G	Conforming to cable connector for DP-350/700 connection	N	No terminal lugs *terminal soldered	
		Code	Details														
C1	CMP01-K (RKC product) Material : Polyamide (Max. temperature : 140°C (284°F))																
C2	CMR01-K (RKC product) Material : PPS resin (Max. temperature : 220°C (428°F))																
C3	1260-K (MARINE product) (Max. temperature : 205°C (401°F))																
Y	Spade lugs for JIS standard "M3" size screw *1																
G	Conforming to cable connector for DP-350/700 connection																
N	No terminal lugs *terminal soldered																
⑨	Length of exposed tip (Only for ST-55K-T□)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>No symbol</td><td>Length of exposed tip : 2mm (Standard)</td></tr><tr><td>03 to 30</td><td>Length of exposed tip : 3 to 30mm (Specify every 1mm unit)</td></tr></table>	Code	Details	No symbol	Length of exposed tip : 2mm (Standard)	03 to 30	Length of exposed tip : 3 to 30mm (Specify every 1mm unit)									
Code	Details																
No symbol	Length of exposed tip : 2mm (Standard)																
03 to 30	Length of exposed tip : 3 to 30mm (Specify every 1mm unit)																
Specifications		Class : Equal to JIS class 2 (Only for fluorine resin coating type) Accuracy : ±0.5%±1°C Response time : ø0.076 Fluorine resin coating 0.2 sec (Response of 63.2%) 0.8 sec (Response of 95.0%) ø0.1 x 2 Ceramic coating 0.2 sec (Response of 63.2%) 0.5 sec (Response of 95.0%) • Accuracy when temperature on metal surface is measured.	Maximum operating temperature 1) Measuring point : Fluorine resin coating : 300°C (Coating section 260°C) Ceramic coating : 500°C 2) Adhesive tape : 300°C 3) Joint section : 170°C 4) Extended section : 260°C Thermocouple resistance per 100mm ø0.076mm : 20Ω, ø0.127mm : 8Ω, ø0.254mm : 2Ω, ø0.10mm : 13Ω, ø0.20mm : 3.1Ω														
Reference		Adhesive tape for tip (For fluorine resin coating type) The adhesive tape permits the tip to stick to various types of surfaces. Repeated peeling and sticking is possible. <Durability of adhesive tape> - Up to 150°C (302°F) : Repeated use. - Up to 200°C (392°F) : Repeated use, as long as temperature stays above 150°C (302°F). - Up to 250°C (482°F) : Repeated use, as long as temperature stays above 200°C (392°F). - More than 250°C (482°F) : Adhesive will burn and no longer be used. However, the number of sticking times differs depending on the environment where the adhesive is used.															

Temperature Sensors for Extremely Small Surface ST-56

Fluorine resin coating type : ST-56K-T ☐

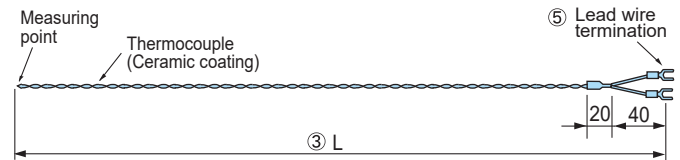
Ceramic coating type : ST-56K-C ☐



ST - 56K - ☐ ☐ L1 ☐ ☐ - ☐ L2
① ② ③ ④ ⑤ ⑥

- ① Thermocouple type
- ② Shape of Thermocouple (Element wire diameter/Coating)
- ③ Length of thermocouple element wire
- ④ Adhesive tape for tip
- ⑤ Lead wire termination
- ⑥ Length of exposed tip

Example : ST-56K-TA0500P-Y-05



ST - 56K - ☐ ☐ L N - ☐
① ② ③ ④ ⑤

- ① Thermocouple type
- ② Shape of Thermocouple (Element wire diameter/Coating)
- ③ Length of thermocouple element wire
- ④ Adhesive tape for tip
- ⑤ Lead wire termination
- ⑥ Length of exposed tip

Example : ST-56K-CA0500N-Y

①	Thermocouple type	Type K														
②	Shape of Thermocouple (Element wire diameter/Coating)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>TA</td><td>ø0.076 Fluorine resin coating (Single thermocouple type)</td></tr><tr><td>TB</td><td>ø0.076 Fluorine resin coating (Paired thermocouple type)</td></tr><tr><td>TC</td><td>ø0.127 Fluorine resin coating (Paired thermocouple type)</td></tr><tr><td>TD</td><td>ø0.254 Fluorine resin coating (Paired thermocouple type)</td></tr></table> ø0.076 Code : TA ø0.076 Code : TB ø0.127 Code : TC ø0.254 Code : TD	Code	Details	TA	ø0.076 Fluorine resin coating (Single thermocouple type)	TB	ø0.076 Fluorine resin coating (Paired thermocouple type)	TC	ø0.127 Fluorine resin coating (Paired thermocouple type)	TD	ø0.254 Fluorine resin coating (Paired thermocouple type)				
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TC	ø0.127 Fluorine resin coating (Paired thermocouple type)															
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<table><tr><th>Code</th><th>Details</th></tr><tr><td>CA</td><td>ø0.1 Ceramic coating (Single thermocouple type)</td></tr><tr><td>CB</td><td>ø0.2 Ceramic coating (Single thermocouple type)</td></tr><tr><td>CC</td><td>ø0.32 Ceramic coating (Single thermocouple type)</td></tr></table> ø0.1 x 2 Code : CA ø0.2 x 2 Code : CB ø0.32 x 2 Code : CC	Code	Details	CA	ø0.1 Ceramic coating (Single thermocouple type)	CB	ø0.2 Ceramic coating (Single thermocouple type)	CC	ø0.32 Ceramic coating (Single thermocouple type)								
Code	Details															
CA	ø0.1 Ceramic coating (Single thermocouple type)															
CB	ø0.2 Ceramic coating (Single thermocouple type)															
CC	ø0.32 Ceramic coating (Single thermocouple type)															
③	Length of thermocouple element wire	Specify every 200mm unit • Please select length so that a resistance of thermocouple become 100Ω or less.														
④	Adhesive tape for tip	<table><tr><th>Code</th><th>Details</th></tr><tr><td>P</td><td>Polymide tape</td></tr><tr><td>G</td><td>Glass cloth base tape</td></tr><tr><td>N</td><td>None</td></tr></table> N: None	Code	Details	P	Polymide tape	G	Glass cloth base tape	N	None						
Code	Details															
P	Polymide tape															
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C3	1260-K (MARINE product) (Max. temperature : 205°C (401°F))															
Y	Spade lugs for JIS standard "M3" size screw *1															
G	Conforming to cable connector for DP-350/700 connection															
N	No terminal lugs *terminal soldered															
⑥	Length of exposed tip (Only for ST-56K-T□)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>No symbol</td><td>Length of exposed tip : 2mm (Standard)</td></tr><tr><td>03 to 30</td><td>Length of exposed tip : 3 to 30mm (Specify every 1mm unit)</td></tr></table>	Code	Details	No symbol	Length of exposed tip : 2mm (Standard)	03 to 30	Length of exposed tip : 3 to 30mm (Specify every 1mm unit)								
Code	Details															
No symbol	Length of exposed tip : 2mm (Standard)															
03 to 30	Length of exposed tip : 3 to 30mm (Specify every 1mm unit)															
Specifications		Class : Equal to JIS class 2 (Only for fluorine resin coating type) Accuracy : ±0.5%±1°C • Accuracy when temperature 100°C on metal surface (copper) is measured. (Prior to to factory) Response time : ø0.076 Fluorine resin coating 0.2 sec (Response of 63.2%) 0.8 sec (Response of 95.0%) ø0.1 x 2 Ceramic coating 0.2 sec (Response of 63.2%) 0.5 sec (Response of 95.0%) • Accuracy when temperature on metal surface is measured. Maximum operating temperature 1) Measuring point : Fluorine resin coating : 300°C (Coating section 260°C) 2) Adhesive tape : 300°C 3) Joint section : 170°C 4) Extended section : 260°C Thermocouple resistance per 100mm ø0.076mm : 20Ω, ø0.127mm : 8Ω, ø0.254mm : 2Ω, ø0.10mm : 13Ω, ø0.20mm : 3.1Ω, ø0.32mm : 1.2Ω														
Reference		Adhesive tape for tip (For fluorine resin coating type) The adhesive tape permits the tip to stick to various types of surfaces. Repeated peeling and sticking is possible. <Durability of adhesive tape> • Up to 150°C (302°F) : Repeated use. • Up to 200°C (392°F) : Repeated use, as long as temperature stays above 150°C (302°F). • Up to 250°C (482°F) : Repeated use, as long as temperature stays above 200°C (392°F). • More than 250°C (482°F) : Adhesive will burn and no longer be used. However, the number of sticking times differs depending on the environment where the adhesive is used.														

Thermocouple Type Non Contact Temperature Sensors : ST-100

■ Features

When contact thermocouple was used for measuring a surface temperature of moving objects such as roller and rotationaly objects, it causes tremendous consumption to the sensor or damages to the surface of the measured object, this caused error in measurement due to friction heat.

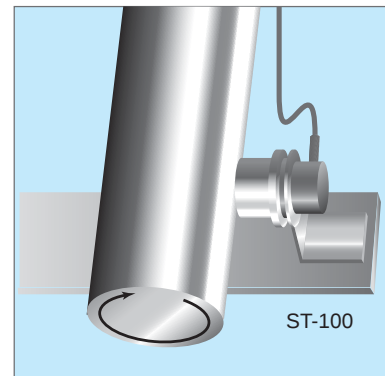
This problem can be solved by putting a distance between a sensor and a measured object, however, there still causes influence of disturbance by thermal connection failure, slower response of temperature for measuring object, poor linearization or slower response (thermocouples).

Change of connection method and use of movable structure have solved these problems.

Moreover, it can be used with connecting indicator and controller for K type thermocouple since output characteristics is similar to traditional contact-type thermocouple



Example of Application



Example of non-contact temperature measurement for rotating heat roller

■ Specifications

Application : Roller and Moving objects (Sheets)

Measuring method : Non-contact

Measuring element : Thermocouple K (Diameter of element : $\phi 0.08$)

Measuring range : Ambient temperature to 300°C

Response time : Approx.30 sec (Response of 98%)

Approx. 6 sec (Response of 63%)

* At metal surface measuring

Measuring accuracy : Within $\pm 3^{\circ}\text{C}$ (at 200°C)

* When output is adjusted at the middle of the measuring range.

Measuring distance : Distance between sensor surface of ST-100 and measured object should be kept 0.5 to 1.5mm

Keep a certain distance when measuring.

(1mm when it is with distancer)

Output signal : Thermocouple K output

Lead wire : $\phi 6$ Silicone rubber protection lead (KX type, 3m)

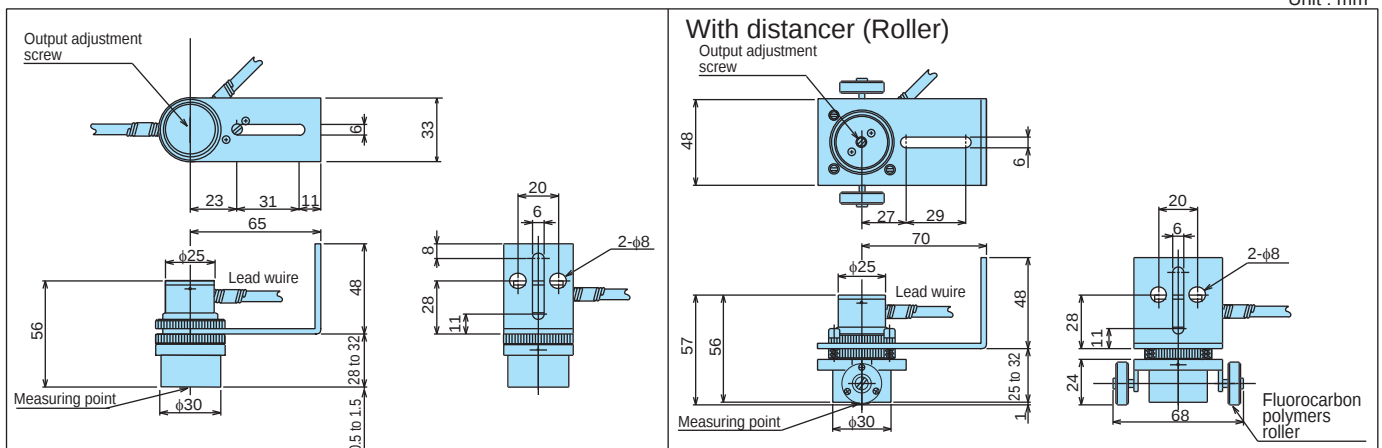
Output impedance : 50 Ω

■ Model Code

Specifications	Model and Suffix Code	
	ST-100 -	K-□□□□-□ / □*□
Thermocouple type	Type K	K
Lead wire length (unit: mm)	1000 to 20000mm (Standard :3000mm) *1000 to 5000mm (Specify 500mm each) 6000 to 20000mm (Specify 1000mm each)	□□□□
Lead wire termination	Spade lugs for JIS standard "M3" size screw Spade lugs for JIS standard "M4" size screw No terminal lugs No terminal lugs *terminal soldered	Y3 Y4 C N
Lead protection	Silicone rubber (Blue)	D
Distancer (Roller)	None With distancer (Roller)	No symbol D

■ External Dimension

Unit : mm



Thermocouple Type Non-Contact Temperature Sensors : ST-100K

Features

ST-100K, a compacted type of ST-100, is a non-contact thermocouple sensor for surface measurement of moving objects such as roller, rotating objects, and sheet.

Specifications

Application : Insulator surface (Roller and Moving objects (Sheets))
 Measuring method : Non-contact
 Measuring element : Thermocouple K, Class 2 (Diameter of element : $\phi 0.076$)
 Measuring range : Ambient temperature to 260°C
 (Maximum continuous operating temperature : 200°C)
 Measuring accuracy : Within $\pm 2^\circ\text{C}$ (Ambient temperature to 150°C)
 Within $\pm 5^\circ\text{C}$ (150 to 260°C)
 * Measuring distance : 0.5mm
 If a measuring distance will become within 0.5mm, indicated value is higher than actual temperature.
 Measuring distance : 0.5mm (Fixed)
 Spring stroke : 0.5 to 2mm (ST-100K)
 0.2 to 1mm (ST-100K1)
 Output signal : Thermocouple K output
 Lead wire : Fiberglass
 * Response time (reference values) : Approx.3.5 sec (90%) Typ.

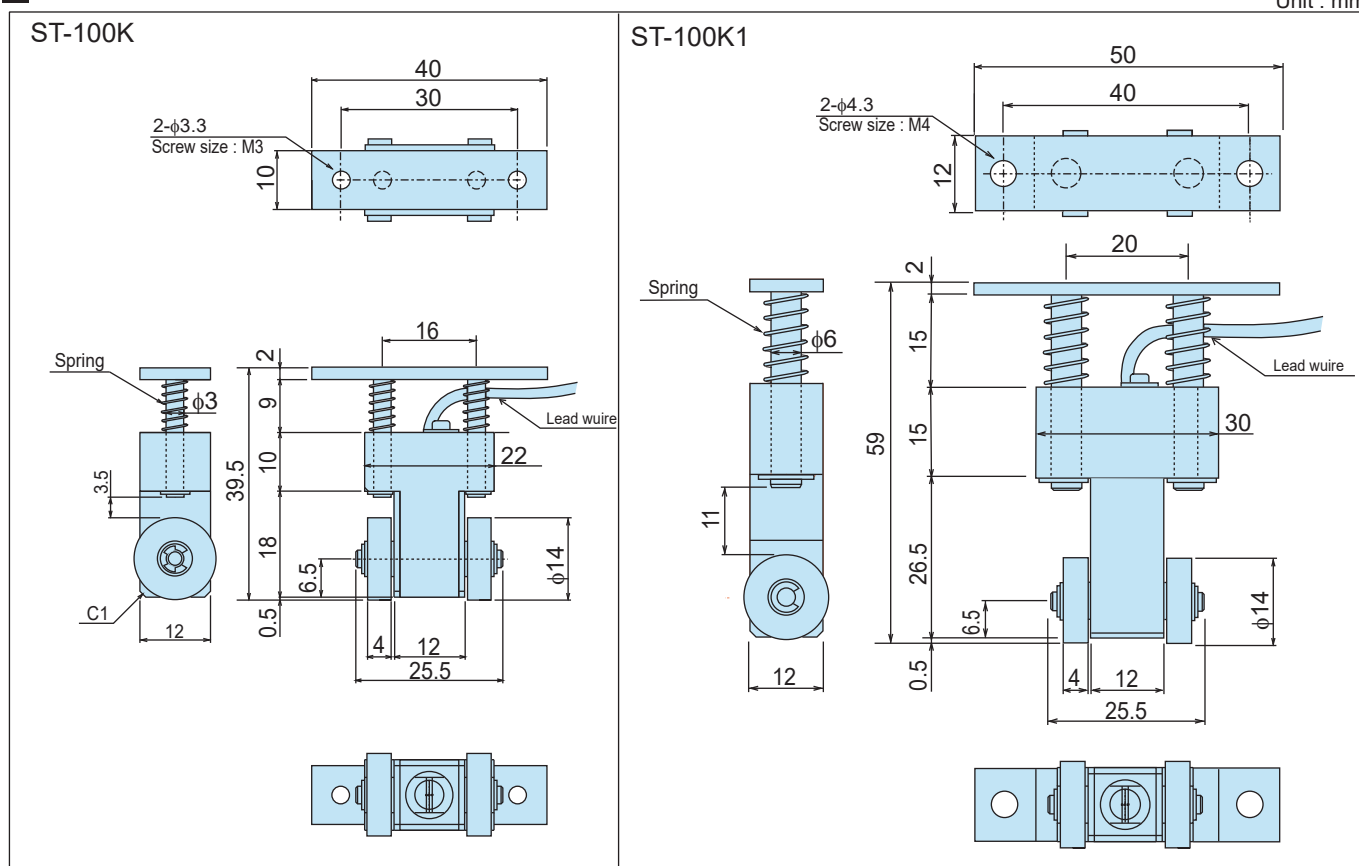


Model Code

Specifications	Model and Suffix Code		
	ST-100K- ST-100K1-	-	□□□□□-□□-□□
Lead wire length (unit: mm)	500 to 5000mm * 500 to 990mm (Specify 100mm each) 1000 to 5000mm (Specify 500mm each)	□□□□□	
Lead protection	Fiberglass		EXF
Lead wire termination	Spade lugs for JIS standard "M3" size screw Ring lugs for JIS standard "M4" size screw Thermocouple connector (CSP01-K + CLP-A) Thermocouple connector (CMP01-K + CLP-B) No terminal lugs *terminal soldered		Y3 R4 TE1 TE3 N

External Dimension

Unit : mm



Rotating Roll Surface Temperature Measuring Sensors JBS-3898

■ Features

JBS-3898 is a sensor for surface temperature measurement, and it is small and easily connectable. Pressed by the spring, a sensor touches to a measuring part and realizes a stable temperature measurement. Non contact type is capable of easy and accurate measurement for rotary roll and belt with shiny surface which is difficult to be measured.

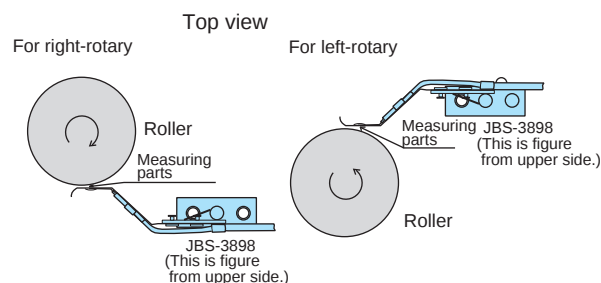
■ Specifications

Thermocouple Type	: Type K, Class 2 (JIS) Type T, Class 1 (JIS)
Measuring accuracy	: Type K $\pm 2.5^{\circ}\text{C}$ [0 to 50°C] $\pm (1.0^{\circ}\text{C} + 0.03 t)$ or $\pm 0.045 t $, whichever is larger. [50 to 300°C] t: measuring temperature Type T $\pm 2^{\circ}\text{C}$ [0 to 50°C] $\pm (1.0^{\circ}\text{C} + 0.03 t)$ [50 to 100°C] t: measuring temperature
Response time	: Type K, Fiberglass lead wire 1.0 sec (Response of 63.2%). 3.6 sec (Response of 95.0%) Type K, Fluorocarbon polymers lead wire 1.2 sec (Response of 63.2%). 6.3 sec (Response of 95.0%) Type T, Fluorocarbon polymers lead wire 2.0 sec (Response of 63.2%). 6.0 sec (Response of 95.0%)
Operating temperature	: Type K, 0 to 300°C (Fiberglass lead wire) Type K, 0 to 200°C (Fluorocarbon polymers lead wire) Type T, 0 to 100°C (Fluorocarbon polymers lead wire)
Contact plate	: SUS304, Width 7mm, Thickness: 0.15mm
Lead wire	: Fiberglass lead wire, Element diameter ($\phi 0.32$) Fluorocarbon polymers lead wire, Element diameter ($\phi 0.2$)
Weight	: 23g (Fiberglass lead wire, Lead length : 3m, Lead wire termination : Spade lugs for JIS standard "M3" size screw)



2 types are available (Right-rotary and left-rotary types)

For directions of rotation and mounting of roller, we have right-rotary and left-rotary types.

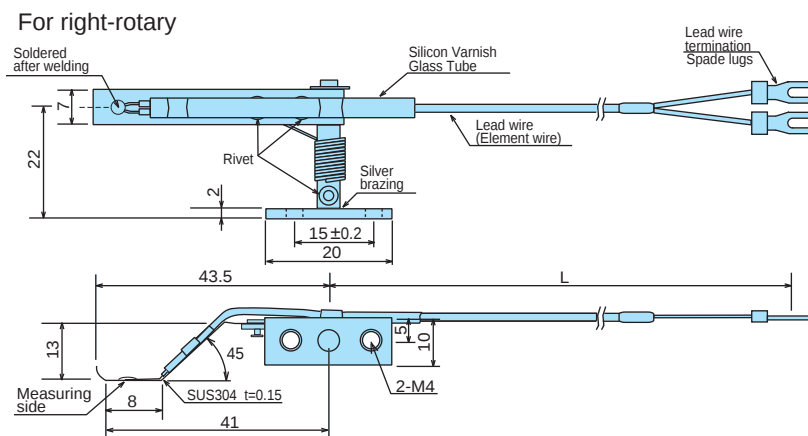


■ Model Code

Specifications	Model and Suffix Code				
	JBS-3898	-□□□□-□□□-□□-□□-□□			
Lead wire length (unit: mm)	100 to 8000mm * 100 to 990mm (Specify 10mm each) 1000 to 8000mm (Specify 500mm each)	□□□□			
Lead protection	Fiberglass lead wire (Type K only) Fluorocarbon polymers lead wire		EXB EXF		
Lead wire termination	Spade lugs for JIS standard "M3" size screw Spade lugs for JIS standard "M4" size screw No terminal lugs *terminal soldered			Y3 R4 N	
Thermocouple type	Type K Type T				K T
Directions of rotation	For right-rotary For left-rotary				R L

■ External Dimension

Unit : mm

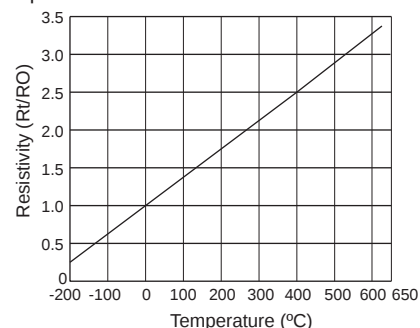


General type • Sheathed Resistance Temperature Detectors

■ Resistance Temperature Detector

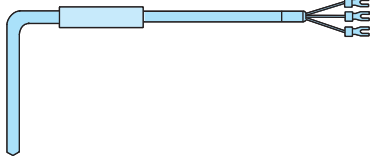
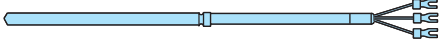
The value of metal resistance changes according to temperature change. This measuring element which utilizes a relationship between temperature and resistance is called Resistance Temperature Detectors (RTDs). Platinum, nickel, and copper are used as metals of RTDs, and utilizes a characteristic that the resistance increases as the temperature rises. Platinum is the most excellent element in accuracy and stability and is defined in "JIS" standard. Platinum is fragile compared with the other elements, be cautious about its usage at a place where vibrations and shocks will occur. All of our RTDs are platinum ones of the type Pt100.

Platinum Resistance Temperature Detector (Pt100) Temperature Characteristic



■ Sheathed Resistance Temperature Detector

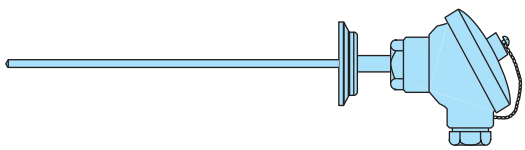
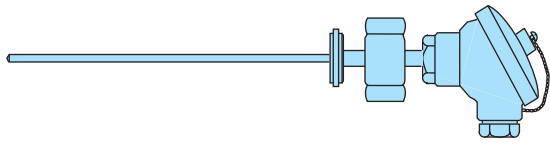
Inside the thin stainless steel pipe, element is located, and then Stainless pipe is filled with a MgO. This type of sensor features in excellent responsiveness and vibration resistances.

Sleeve type	Terminal head type
R-101(General type)/R-101S(Sheathed type)  R-111(General type)/R-111S(Sheathed type) 	R-30,35(General type)/R-30S,35S(Sheathed type) 
No-sleeve type (Only for General type)	Metal connector type
R-102 	R-90(General type)/R-90S(Sheathed type) 

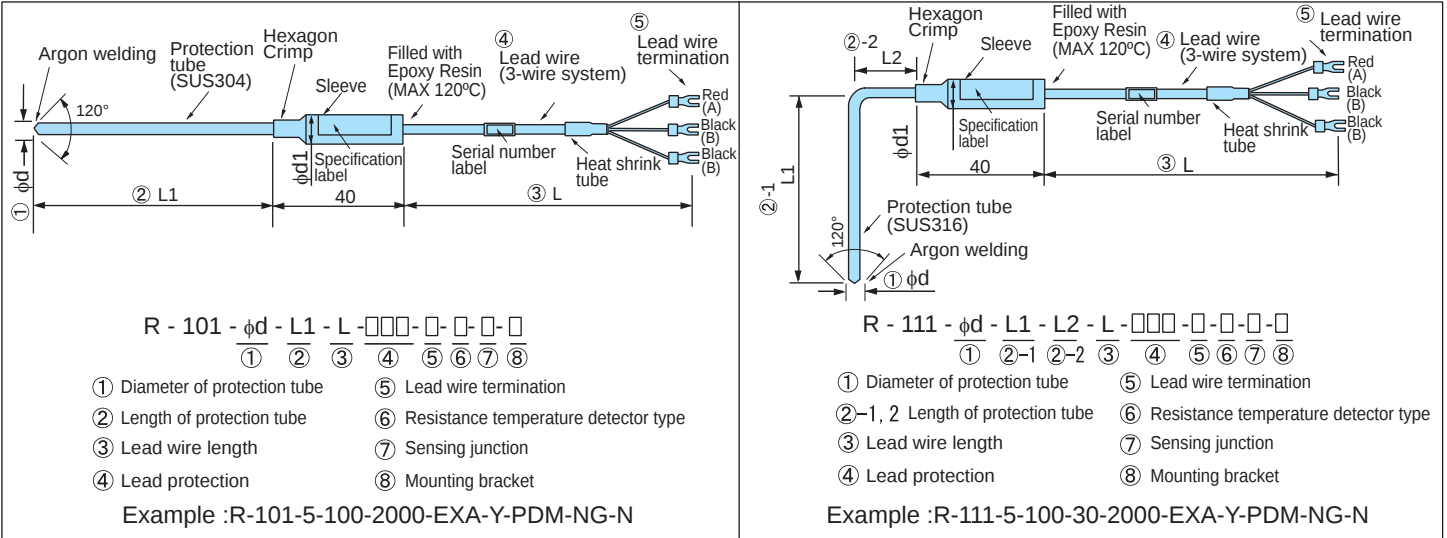
■ Sanitary type Resistance Temperature Detector

Sanitary Sensors are able to keep cleanness of foreign matters and bacteria, users can relief to apply them in food, beverage, and chemical processing applications.

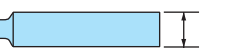
- Protection tube is #400 polish finishing.
- Ferrule cap and hexagon nut and linear cap are available.
- Protection tube material is SUS316.
- Electropolishing is available (Specify from "option" code).

Ferrule cap (Sheathed Resistance Temperature Detector)	Hexagon nut and Linear cap (Sheathed Resistance Temperature Detector)
R-31S, R-36S 	R-31RS, R-36RS 

Resistance Temperature Detectors : R-101/R-111

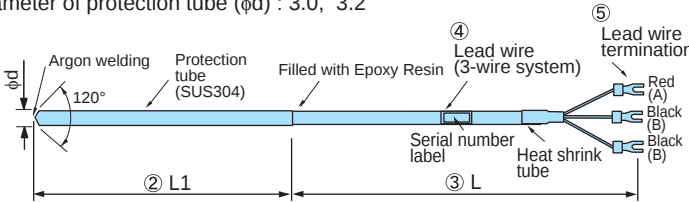
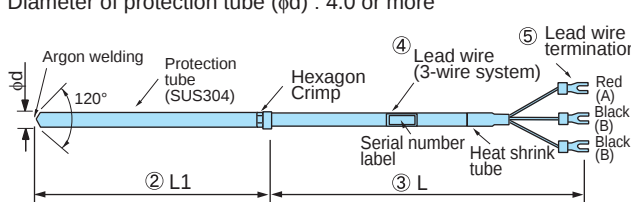
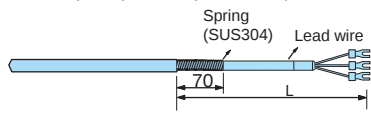


①	Diameter of protection tube	φ3.0, φ3.2, φ4.0, φ4.8, φ5.0, φ6.0, φ8.0																													
②	Length of protection tube	Specify length by “mm” (100mm to 1,000mm) • Please contact distributors regarding other length.			②-1: Specify length by “mm” (100mm or more, L1+L2=1,000mm or less) ②-2: Specify length by “mm” (25mm or more, L1+L2=1,000mm or less) • Length is 25mm without specification. • Please contact distributors regarding other length.																										
③	Lead wire length	Specify length by “mm” (100mm or more)																													
④	Lead protection	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>EXA</td><td>Fiberglass with stainless steel</td><td>0 to 150°C</td><td>EXD</td><td>PVC (polyvinyl chloride)</td><td>-20 to +90°C</td></tr><tr><td>EXB</td><td>Fiberglass</td><td>0 to 150°C</td><td>EXE</td><td>Silicone rubber</td><td>-55 to +180°C</td></tr><tr><td>EXC</td><td>PVC (polyvinyl chloride) with copper wire braided</td><td>-20 to +90°C</td><td>EXF</td><td>Fluorocarbon polymers (FEP)</td><td>0 to 200°C</td></tr></table>						Code	Details	Operating temperature	Code	Details	Operating temperature	EXA	Fiberglass with stainless steel	0 to 150°C	EXD	PVC (polyvinyl chloride)	-20 to +90°C	EXB	Fiberglass	0 to 150°C	EXE	Silicone rubber	-55 to +180°C	EXC	PVC (polyvinyl chloride) with copper wire braided	-20 to +90°C	EXF	Fluorocarbon polymers (FEP)	0 to 200°C
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⑤	Lead wire termination	<table><tr><th>Code</th><th>Details</th><th>Code</th><th>Details</th></tr><tr><td>Y</td><td>Spade lugs for JIS standard “M3” size screw</td><td>N</td><td>No terminal lugs * terminal soldered</td></tr><tr><td>R</td><td>Ring lugs for JIS standard “M4” size screw</td><td></td><td></td></tr><tr><td>M</td><td>Metal connector (SCK-1603-P)</td><td></td><td></td></tr></table> •See Page7						Code	Details	Code	Details	Y	Spade lugs for JIS standard “M3” size screw	N	No terminal lugs * terminal soldered	R	Ring lugs for JIS standard “M4” size screw			M	Metal connector (SCK-1603-P)										
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⑥	Resistance temperature detector type	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>PDP</td><td>Pt100 Middle Temperature Type (φ3.0 to φ4.0)</td><td>0 to 220°C</td><td>PAP</td><td>JPt100 Middle Temperature Type (φ3.0 to φ4.0)</td><td>0 to 220°C</td></tr><tr><td>PDM</td><td>Pt100 Middle Temperature Type (φ4.8 or more)</td><td>0 to 350°C</td><td>PAM</td><td>JPt100 Middle Temperature Type (φ4.8 or more)</td><td>0 to 350°C</td></tr><tr><td>PDH</td><td>Pt100 High Temperature Type (φ4.8 or more)</td><td>0 to 500°C</td><td>PAH</td><td>JPt100 High Temperature Type (φ4.8 or more)</td><td>0 to 500°C</td></tr></table>						Code	Details	Operating temperature	Code	Details	Operating temperature	PDP	Pt100 Middle Temperature Type (φ3.0 to φ4.0)	0 to 220°C	PAP	JPt100 Middle Temperature Type (φ3.0 to φ4.0)	0 to 220°C	PDM	Pt100 Middle Temperature Type (φ4.8 or more)	0 to 350°C	PAM	JPt100 Middle Temperature Type (φ4.8 or more)	0 to 350°C	PDH	Pt100 High Temperature Type (φ4.8 or more)	0 to 500°C	PAH	JPt100 High Temperature Type (φ4.8 or more)	0 to 500°C
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⑦	Measuring junction	<table><tr><th>Code</th><th>Details</th></tr><tr><td>NG</td><td>Ungrounded</td></tr><tr><td>O</td><td>Exposed</td></tr></table> * Exposed-junction type is available depending on specification such as shapes, environment of usage, etc. Please contact with our distributors.						Code	Details	NG	Ungrounded	O	Exposed																		
Code	Details																														
NG	Ungrounded																														
O	Exposed																														
⑧	Mounting bracket	<table><tr><th>Code</th><th>Details</th><th>Code</th><th>Details</th></tr><tr><td>A</td><td>Fixed nipple (nut)</td><td>E</td><td>Compression fitting</td></tr><tr><td>B</td><td>Rotary nipple (nut)</td><td>N</td><td>No bracket</td></tr><tr><td>C</td><td>Fixed flange</td><td></td><td></td></tr></table> Specify size of mounting bracket when code is “A”, “B”, or “E”. (See Page 6) Specify size of flange when code is “C”. (See Page 6) • Please contact distributors regarding other mounting bracket.						Code	Details	Code	Details	A	Fixed nipple (nut)	E	Compression fitting	B	Rotary nipple (nut)	N	No bracket	C	Fixed flange										
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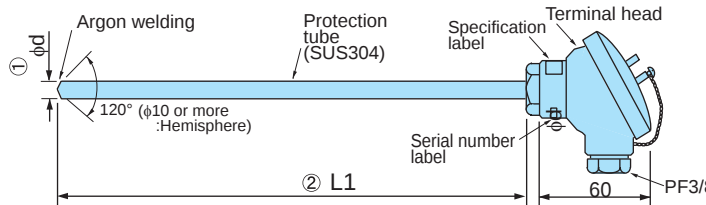
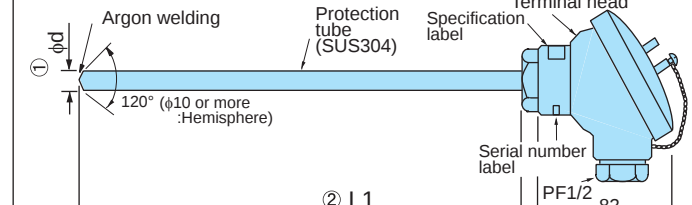
Specifications	Class : class B * Class A is available (Please specify when you order) Element : Single element * Double element is available. (Diameter of protection tube : $\phi 4.8$ or more) (Please specify when you order)		Sleeve Dimension ($\phi d1$)								
	Maximum temperature for use		<table><tr><td>Diameter of protection tube / Lead wire type</td><td>$\phi 3.0$ to $\phi 5.0$</td><td>$\phi 6.0$ to $\phi 8.0$</td></tr><tr><td>EXA, EXB, EXC EXD, EXE, EXF</td><td>$\phi 8 \times 40$</td><td>$\phi 10 \times 40$</td></tr></table>		Diameter of protection tube / Lead wire type	$\phi 3.0$ to $\phi 5.0$	$\phi 6.0$ to $\phi 8.0$	EXA, EXB, EXC EXD, EXE, EXF	$\phi 8 \times 40$	$\phi 10 \times 40$	
	Diameter of protection tube / Lead wire type	$\phi 3.0$ to $\phi 5.0$	$\phi 6.0$ to $\phi 8.0$								
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$\phi 4.8$ or more (Middle temperature type : Code PDM/PAM)	0 to 350°C										
$\phi 4.8$ or more (High temperature type : Code PDH/PAH)	0 to 500°C										

Reference	• Stainless flexible lead wire is available Model Code : R-101F/R-111F For flexible lead wire, the dimension of the sleeve is $\phi 10 \times 40$ mm. • No waterproof		• Spring loaded type is available (Please specify when you order) Dimensions for the spring loaded sleeve is as follows. • Protection tube $\phi 1.0$ to $\phi 4.8$ with extension lead wire EXC, EXD : $\phi 10 \times 40$ mm • Protection tube $\phi 6.0$ to $\phi 8.0$: $\phi 10 \times 40$ mm • Except from the above : $\phi 8 \times 40$ mm	
	• Material of protection tube SUS316 is available. (Please specify when you order)			

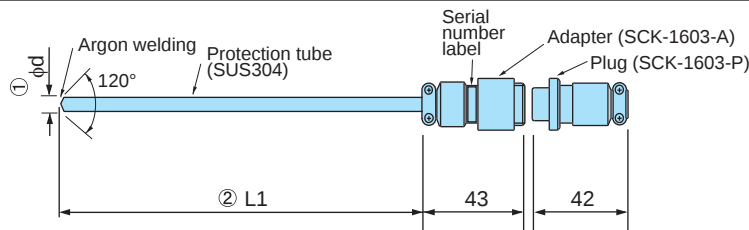
Resistance Temperature Detectors : R-102

Diameter of protection tube (φd) : 3.0, 3.2		Diameter of protection tube (φd) : 4.0 or more																												
																														
R - 102 - φd - L1 - L - □□□ - □ - □ - □ - □ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧		R - 102 - φd - L1 - L - □□□ - □ - □ - □ - □ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧																												
① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Resistance temperature detector type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket		① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Resistance temperature detector type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket																												
Example :R-102-3.2-100-2000-EXF-Y-PDM-NG-N		Example :R-102-5-100-2000-EXA-Y-PDM-NG-N																												
①	Diameter of protection tube	φ3.0, φ3.2																												
②	Length of protection tube	Specify length by “mm” (50mm to 500mm) • Please contact distributors regarding other length.																												
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④	Lead protection	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>EXF</td><td>Fluorocarbon polymers (FEP)</td><td>0 to 200°C</td></tr></table>	Code	Details	Operating temperature	EXF	Fluorocarbon polymers (FEP)	0 to 200°C	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>EXA</td><td>Fiberglass with stainless steel (Diameter of protection tube : φ4.8 or more)</td><td>0 to 150°C</td></tr><tr><td>EXB</td><td>Fiberglass (Diameter of protection tube : φ4.8 or more)</td><td>0 to 150°C</td></tr><tr><td>EXC</td><td>PVC (polyvinyl chloride) with copper wire braided (Diameter of protection tube : φ5.0 or more)</td><td>-20 to +90°C</td></tr><tr><td>EXD</td><td>PVC (polyvinyl chloride) (Diameter of protection tube : φ5.0 or more)</td><td>-20 to +90°C</td></tr><tr><td>EXE</td><td>Silicone rubber (Diameter of protection tube : φ5.0 or more)</td><td>-55 to +180°C</td></tr><tr><td>EXF</td><td>Fluorocarbon polymers (FEP) (Diameter of protection tube : φ4.0 or more)</td><td>0 to 200°C</td></tr></table>	Code	Details	Operating temperature	EXA	Fiberglass with stainless steel (Diameter of protection tube : φ4.8 or more)	0 to 150°C	EXB	Fiberglass (Diameter of protection tube : φ4.8 or more)	0 to 150°C	EXC	PVC (polyvinyl chloride) with copper wire braided (Diameter of protection tube : φ5.0 or more)	-20 to +90°C	EXD	PVC (polyvinyl chloride) (Diameter of protection tube : φ5.0 or more)	-20 to +90°C	EXE	Silicone rubber (Diameter of protection tube : φ5.0 or more)	-55 to +180°C	EXF	Fluorocarbon polymers (FEP) (Diameter of protection tube : φ4.0 or more)	0 to 200°C
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EXD	PVC (polyvinyl chloride) (Diameter of protection tube : φ5.0 or more)	-20 to +90°C																												
EXE	Silicone rubber (Diameter of protection tube : φ5.0 or more)	-55 to +180°C																												
EXF	Fluorocarbon polymers (FEP) (Diameter of protection tube : φ4.0 or more)	0 to 200°C																												
⑤	Lead wire termination	<table><tr><th>Code</th><th>Details</th></tr><tr><td>Y</td><td>Spade lugs for JIS standard "M3" size screw</td></tr><tr><td>R</td><td>Ring lugs for JIS standard "M4" size screw</td></tr><tr><td>M</td><td>Metal connector (SCK-1603-P)</td></tr></table>	Code	Details	Y	Spade lugs for JIS standard "M3" size screw	R	Ring lugs for JIS standard "M4" size screw	M	Metal connector (SCK-1603-P)	<table><tr><th>Code</th><th>Details</th></tr><tr><td>N</td><td>No terminal lugs * terminal soldered</td></tr></table> •See Page7	Code	Details	N	No terminal lugs * terminal soldered															
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Specifications		Class : class B * Class A is available (Please specify when you order) Element : Single element * Double element is available. (Diameter of protection tube : φ8.0 or more) (Please specify when you order) Maximum temperature for use <table><tr><th>Diameter of protection tube</th><th>Operating temperature</th></tr><tr><td>φ4.0 (Middle temperature type : Code PDP/PAP)</td><td>0 to 220°C</td></tr><tr><td>φ4.8 or more (Middle temperature type : Code PDM/PAM)</td><td>0 to 300°C</td></tr></table>		Diameter of protection tube	Operating temperature	φ4.0 (Middle temperature type : Code PDP/PAP)	0 to 220°C	φ4.8 or more (Middle temperature type : Code PDM/PAM)	0 to 300°C																					
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Reference		• Spring loaded type is available (Please specify when you order)  • Material of protection tube SUS316 of protection tube is available. (Please specify when you order)																												

Resistance Temperature Detectors : R-30/R-35

																												
No lead wire R - 30 - φd - L1 - □-□-□ ① ② ⑥ ⑦ ⑧		No lead wire R - 35 - φd - L1 - □-□-□ ① ② ⑥ ⑦ ⑧																										
With lead wire R - 30 - φd - L1 - L - □□□-□-□-□-□ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧		With lead wire R - 35 - φd - L1 - L - □□□-□-□-□-□ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧																										
① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Resistance temperature detector type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket		① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Resistance temperature detector type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket																										
Example :R-30-5-100-PDM-NG-N (No lead wire) :R-30-5-100-2000-EXA-Y-PDM-NG-N (With lead wire)		Example :R-35-5-100-PDM-NG-N (No lead wire) :R-35-5-100-2000-EXA-Y-PDM-NG-N (With lead wire)																										
①	Diameter of protection tube	φ3.0, φ3.2, φ4.8, φ5.0, φ6.0 φ6.4, φ8.0, φ10.0, φ12.0																										
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⑥	Resistance temperature detector type	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>PDP</td><td>Pt100 Middle Temperature Type (φ3.0 to φ4.0)</td><td>0 to 220°C</td><td>PAP</td><td>JPt100 Middle Temperature Type (φ3.0 to φ4.0)</td><td>0 to 220°C</td></tr><tr><td>PDM</td><td>Pt100 Middle Temperature Type (φ4.8 or more)</td><td>0 to 300°C</td><td>PAM</td><td>JPt100 Middle Temperature Type (φ4.8 or more)</td><td>0 to 300°C</td></tr><tr><td>PDH</td><td>Pt100 High Temperature Type (φ4.8 or more)</td><td>0 to 500°C</td><td>PAH</td><td>JPt100 High Temperature Type (φ4.8 or more)</td><td>0 to 500°C</td></tr></table>			Code	Details	Operating temperature	Code	Details	Operating temperature	PDP	Pt100 Middle Temperature Type (φ3.0 to φ4.0)	0 to 220°C	PAP	JPt100 Middle Temperature Type (φ3.0 to φ4.0)	0 to 220°C	PDM	Pt100 Middle Temperature Type (φ4.8 or more)	0 to 300°C	PAM	JPt100 Middle Temperature Type (φ4.8 or more)	0 to 300°C	PDH	Pt100 High Temperature Type (φ4.8 or more)	0 to 500°C	PAH	JPt100 High Temperature Type (φ4.8 or more)	0 to 500°C
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Specifications		Class : class B * Class A is available (Please specify when you order) Element : Single element * Double element is available. (Only R-35) (Please specify when you order) Maximum temperature for use <table><tr><th>Diameter of protection tube</th><th>Operating temperature</th></tr><tr><td>φ3.0 to φ4.0 (Middle temperature type : Code PDP/PAP)</td><td>0 to 220°C</td></tr><tr><td>φ4.8 or more (Middle temperature type : Code PDM/PAM)</td><td>0 to 300°C</td></tr><tr><td>φ4.8 or more (High temperature type : Code PDH/PAH)</td><td>0 to 500°C</td></tr></table>			Diameter of protection tube	Operating temperature	φ3.0 to φ4.0 (Middle temperature type : Code PDP/PAP)	0 to 220°C	φ4.8 or more (Middle temperature type : Code PDM/PAM)	0 to 300°C	φ4.8 or more (High temperature type : Code PDH/PAH)	0 to 500°C																
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φ4.8 or more (High temperature type : Code PDH/PAH)	0 to 500°C																											
Reference		• Material of protection tube SUS316 is available. (Please specify when you order)																										

Resistance Temperature Detectors : R-90



No lead wire
R - 90 - φd - L1 - □ - □ - □
① ② ⑥ ⑦ ⑧

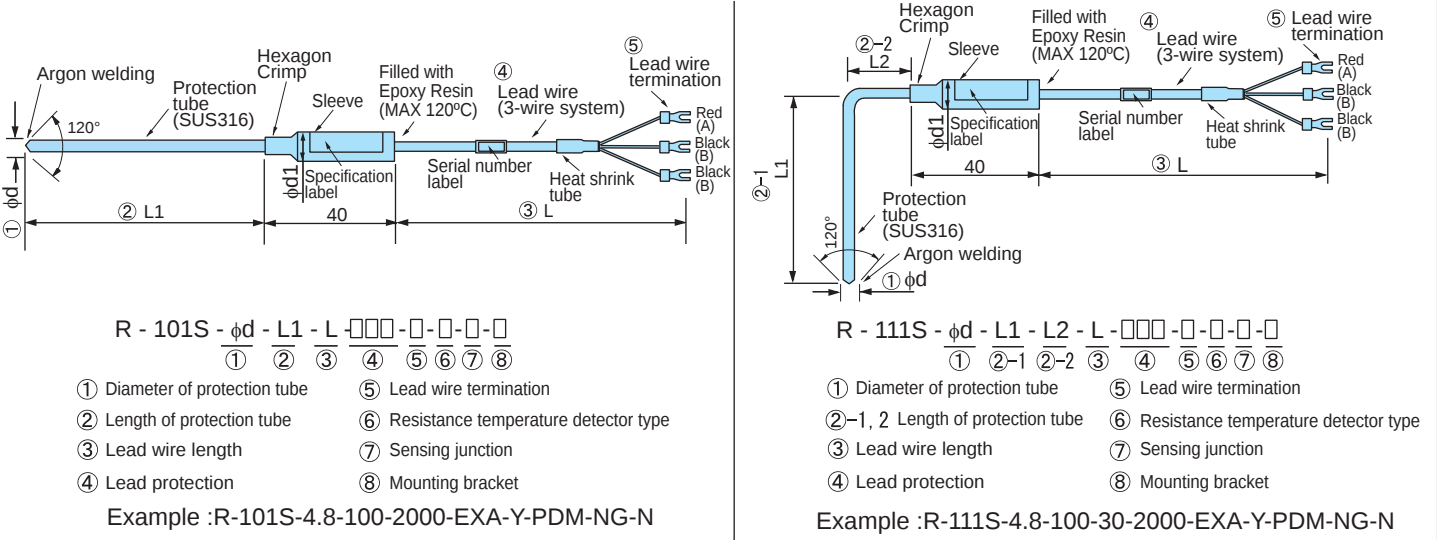
With lead wire
R - 90 - φd - L1 - L - □□□ - □ - □ - □ - □
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① Diameter of protection tube
② Length of protection tube
③ Lead wire length
④ Lead protection
- ⑤ Lead wire termination
⑥ Resistance temperature detector type
⑦ Sensing junction
⑧ Mounting bracket

Example :R-90-5-100-PDM-NG-N (No lead wire)
:R-90-5-100-2000-EXA-Y-PDM-NG-N (With lead wire)

①	Diameter of protection tube	φ3.0, φ3.2, φ4.8, φ5.0, φ6.0, φ8.0																				
②	Length of protection tube	Specify length by “mm” (100mm to 1,000mm) • Please contact distributors regarding other length.																				
③	Lead wire length	Specify length by “mm” (100mm or more)																				
④	Lead protection	No need to specify in case of without lead wire	Code	Details	Operating temperature	Code	Details	Operating temperature														
			EXA	Fiberglass with stainless steel	0 to 150°C	EXD	PVC (polyvinyl chloride)	-20 to +90°C														
			EXB	Fiberglass	0 to 150°C	EXE	Silicone rubber	-55 to +180°C														
			EXC	PVC (polyvinyl chloride) with copper wire braided	-20 to +90°C																	
⑤	Lead wire termination	No need to specify in case of without lead wire	Code	Details	Code	Details																
			Y	Spade lugs for JIS standard "M3" size screw	N	No terminal lugs * terminal soldered																
			R	Ring lugs for JIS standard "M4" size screw																		
			M	Metal connector (SCK-1603-P)			•See Page7															
⑥	Resistance temperature detector type	Code	Details	Operating temperature	Code	Details	Operating temperature															
		PDP	Pt100 Middle Temperature Type (φ3.0 to φ4.0)	0 to 220°C	PAP	JPt100 Middle Temperature Type (φ3.0 to φ4.0)	0 to 220°C															
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⑦	Measuring junction	Code	Details	* Exposed-junction type is available depending on specification such as shapes, environment of usage, etc. Please contact with our distributors.																		
⑧	Mounting bracket	Code	Details	Code	Details	Specify size of mounting bracket when code is "A", "B", or "E". (See Page 6) Specify size of flange when code is "C". (See Page 6)																
		A	Fixed nipple (nut)	E	Compression fitting																	
		B	Rotary nipple (nut)	N	No bracket																	
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		• Please contact distributors regarding other mounting bracket.																				
Specifications		Class : class B * Class A is available (Please specify when you order) Element : Single element * Double element is available. (Diameter of protection tube : φ4.8 or more) (Please specify when you order) Maximum temperature for use																				
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Reference			• Material of protection tube SUS316 is available. (Please specify when you order)				Connector Pin No.															
			Single Element		Double Element																	
			<table><tr><td>Pin No.</td><td>Details</td></tr><tr><td>1</td><td>A</td></tr><tr><td>2</td><td>B</td></tr><tr><td>3</td><td>b</td></tr></table>		Pin No.	Details	1	A	2	B	3	b	<table><tr><td>Pin No.</td><td>Details</td></tr><tr><td>1</td><td>A</td></tr><tr><td>2</td><td>B</td></tr><tr><td>3</td><td>b</td></tr></table>		Pin No.	Details	1	A	2	B	3	b
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			3	b																		
			Pin No.	Details																		
			1	A																		
2	B																					
3	b																					
SCK-1603-□		SCK-1606-□																				
For connector for R-90, Connector manufactured by Sanwa Connector Laboratory Co., Ltd. is used as standard. Nanaboshi Electric Mfg brand is also available (Please specify when you order). Please specify in case of no need of the plug.																						

Sheathed Resistance Temperature Detectors : R-101S/R-111S



①	Diameter of protection tube	φ3.2, φ4.8, φ6.4, φ8.0																											
②	Length of protection tube	Specify length by "mm" (100mm to 1,000mm) • Please contact distributors regarding other length.		②-1: Specify length by "mm" (100mm or more, L1+L2=1,000mm or less) ②-2: Specify length by "mm" (25mm or more, L1+L2=1,000mm or less) • Length is 25mm without specification. • Please contact distributors regarding other length.																									
③	Lead wire length	Specify length by "mm" (100mm or more)																											
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A	Fixed nipple (nut)	E	Compression fitting																										
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C	Fixed flange																												
• Please contact distributors regarding other mounting bracket.																													

Specifications

Class : class B * Class A is available (Please specify when you order)
Element : Single element * Double element is available.
(Diameter of protection tube : $\phi 4.8$ or more)
(Please specify when you order)

Maximum temperature for use

Diameter of protection tube	Operating temperature
$\phi 3.0$ to $\phi 4.0$ (Low temperature type : Code PDL/PAL)	-200 to +100°C
$\phi 4.8$ or more (Middle temperature type : Code PDM/PAM)	0 to 350°C
$\phi 4.8$ or more (High temperature type : Code PDH/PAH)	0 to 500°C

Sleeve Dimension ($\phi d1$)

Lead wire type	Diameter of protection tube	
EXA, EXB, EXC	$\phi 3.2, \phi 4.8$	$\phi 8 \times 40$
EXD, EXE, EXF	$\phi 6.4, \phi 8.0$	$\phi 10 \times 40$

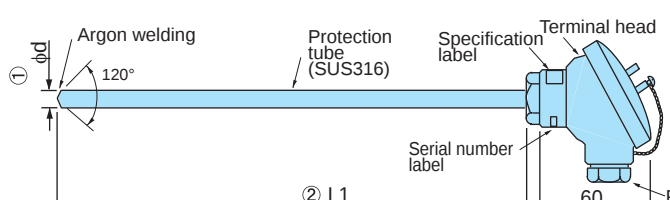
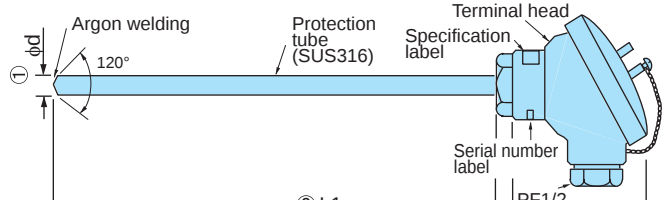
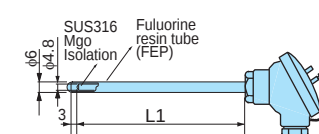
Reference

- Fluor resin coating is available
It is available to cover Fluorine resin tube with $\phi 4.8$ protection tube (SUS316). Total Diameter becomes $\phi 6.0$. It is also available to do coating with R-101S whose tube is more than $\phi 3.2$. These model codes are R-101SC in this case.
- Stainless flexible lead wire is available
Model Code : R-101S/R-111S

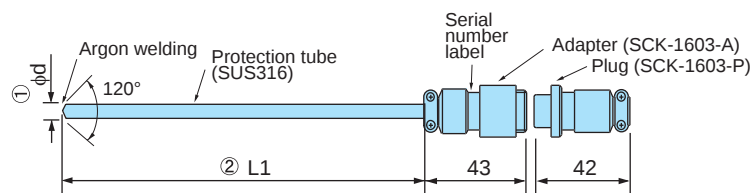
For flexible lead wire, the dimension of the sleeve is $\phi 10 \times 45$ mm.
• No waterproof
- Spring loaded type is available (Please specify when you order)

Dimensions for the spring loaded sleeve is as follows.
 - Protection tube $\phi 3.2$ with extension lead wire EXE : $\phi 8 \times 40$ mm
 - Protection tube $\phi 4.8$ to $\phi 8.0$ with extension lead wire : $\phi 8 \times 45$ mm
 - Except from the above : $\phi 10 \times 45$ mm

Sheathed Resistance Temperature Detectors : R-30S/R-35S

 No lead wire R - 30S - ϕd - L1 - □ - □ - □ ① ② ⑥ ⑦ ⑧ With lead wire R - 30S - ϕd - L1 - L - □□□ - □ - □ - □ - □ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Resistance temperature detector type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket Example :R-30S-4.8-100-PDM-NG-N (No lead wire) :R-30S-4.8-100-2000-EXA-Y-PDM-NG-N (With lead wire)		 No lead wire R - 35S - ϕd - L1 - □ - □ - □ ① ② ⑥ ⑦ ⑧ With lead wire R - 35S - ϕd - L1 - L - □□□ - □ - □ - □ - □ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ① Diameter of protection tube ⑤ Lead wire termination ② Length of protection tube ⑥ Resistance temperature detector type ③ Lead wire length ⑦ Sensing junction ④ Lead protection ⑧ Mounting bracket Example :R-35S-5-100-PDM-NG-N (No lead wire) :R-35S-5-100-2000-EXA-Y-PDM-NG-N (With lead wire)																										
① Diameter of protection tube	ϕ 3.2, ϕ 4.8, ϕ 6.4, ϕ 8.0		ϕ 4.8, ϕ 6.4, ϕ 8.0																									
② Length of protection tube	Specify length by "mm" (100mm to 1,000mm) • Please contact distributors regarding other length.		Specify length by "mm" (100mm to 1,000mm) • Please contact distributors regarding other length.																									
③ Lead wire length	Specify length by "mm" (100mm or more)																											
④ Lead protection	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>EXA</td><td>Fiberglass with stainless steel</td><td>0 to 150°C</td><td>EXD</td><td>PVC (polyvinyl chloride)</td><td>-20 to +90°C</td></tr><tr><td>EXB</td><td>Fiberglass</td><td>0 to 150°C</td><td>EXE</td><td>Silicone rubber</td><td>-55 to +180°C</td></tr><tr><td>EXC</td><td>PVC (polyvinyl chloride) with copper wire braided</td><td>-20 to +90°C</td><td></td><td></td><td></td></tr></table>				Code	Details	Operating temperature	Code	Details	Operating temperature	EXA	Fiberglass with stainless steel	0 to 150°C	EXD	PVC (polyvinyl chloride)	-20 to +90°C	EXB	Fiberglass	0 to 150°C	EXE	Silicone rubber	-55 to +180°C	EXC	PVC (polyvinyl chloride) with copper wire braided	-20 to +90°C			
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⑤ Lead wire termination	<table><tr><th>Code</th><th>Details</th><th>Code</th><th>Details</th></tr><tr><td>Y</td><td>Spade lugs for JIS standard "M3" size screw</td><td>N</td><td>No terminal lugs * terminal soldered</td></tr><tr><td>R</td><td>Ring lugs for JIS standard "M4" size screw</td><td></td><td></td></tr><tr><td>M</td><td>Metal connector (SCK-1603-P)</td><td></td><td></td></tr></table> • See Page7				Code	Details	Code	Details	Y	Spade lugs for JIS standard "M3" size screw	N	No terminal lugs * terminal soldered	R	Ring lugs for JIS standard "M4" size screw			M	Metal connector (SCK-1603-P)										
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⑥ Resistance temperature detector type	<table><tr><th>Code</th><th>Details</th><th>Operating temperature</th><th>Code</th><th>Details</th><th>Operating temperature</th></tr><tr><td>PDL</td><td>Pt100 Low Temperature Type</td><td>-200 to +100°C</td><td>PAL</td><td>JPt100 Low Temperature Type</td><td>-200 to 100°C</td></tr><tr><td>PDM</td><td>Pt100 Middle Temperature Type</td><td>0 to 350°C</td><td>PAM</td><td>JPt100 Middle Temperature Type</td><td>0 to 350°C</td></tr><tr><td>PDH</td><td>Pt100 High Temperature Type</td><td>0 to 500°C</td><td>PAH</td><td>JPt100 High Temperature Type</td><td>0 to 500°C</td></tr></table>				Code	Details	Operating temperature	Code	Details	Operating temperature	PDL	Pt100 Low Temperature Type	-200 to +100°C	PAL	JPt100 Low Temperature Type	-200 to 100°C	PDM	Pt100 Middle Temperature Type	0 to 350°C	PAM	JPt100 Middle Temperature Type	0 to 350°C	PDH	Pt100 High Temperature Type	0 to 500°C	PAH	JPt100 High Temperature Type	0 to 500°C
Code	Details	Operating temperature	Code	Details	Operating temperature																							
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PDM	Pt100 Middle Temperature Type	0 to 350°C	PAM	JPt100 Middle Temperature Type	0 to 350°C																							
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⑦ Measuring junction	<table><tr><th>Code</th><th>Details</th></tr><tr><td>NG</td><td>Ungrounded</td></tr></table>				Code	Details	NG	Ungrounded																				
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A	Fixed nipple (nut)	E	Compression fitting																									
B	Rotary nipple (nut)	N	No bracket																									
C	Fixed flange																											
Specifications	Class : class B * Class A is available (Please specify when you order) Element : Single element * Double element is available. (Only for R-35S) (Please specify when you order) Maximum temperature for use <table><tr><th>Diameter of protection tube</th><th>Operating temperature</th></tr><tr><td>Low temperature type : Code PDL/PAL</td><td>-200 to +100°C</td></tr><tr><td>Middle temperature type : Code PDM/PAM</td><td>0 to 350°C</td></tr><tr><td>High temperature type : Code PDH/PAH</td><td>0 to 500°C</td></tr></table>				Diameter of protection tube	Operating temperature	Low temperature type : Code PDL/PAL	-200 to +100°C	Middle temperature type : Code PDM/PAM	0 to 350°C	High temperature type : Code PDH/PAH	0 to 500°C																
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Reference	• Fluor resin coating is available It is available to cover Fuluorine resin tube with ϕ4.8 protection tube (SUS316). Total Diameter becomes ϕ6.0. It is also available to do coating with R-101S whose tube is more than ϕ3.2. These model codes are R-30SC/R-35SC in this case.  Operating temperature for regular use : 180°C Maximum temperature : 200°C Example : R-30SC-6.0-100-PDM-NG-N (No lead wire) ① ② ⑥ ⑦ ⑧ • Please contact distributors regarding Fuluorine coating type.																											

Sheathed Resistance Temperature Detectors : R-90S



No lead wire

R - 90S - ϕ d - L1 - □ - □ - □
 ① ② ⑥ ⑦ ⑧

With lead wire

R - 90S - ϕ d - L1 - L - □□□ - □ - □ - □ - □
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

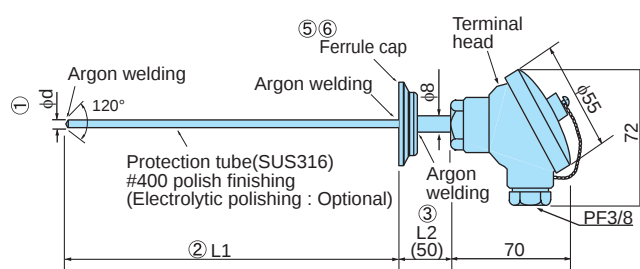
- ① Diameter of protection tube ⑤ Lead wire termination
 ② Length of protection tube ⑥ Resistance temperature detector type
 ③ Lead wire length ⑦ Sensing junction
 ④ Lead protection ⑧ Mounting bracket

Example : R-90S-4.8-100-PDM-NG-N (No lead wire)

: R-90S-4.8-100-2000-EXA-Y-PDM-NG-N (With lead wire)

①	Diameter of protection tube	φ3.2, φ4.8, φ6.4, φ8.0												
②	Length of protection tube	Specify length by “mm” (100mm to 1,000mm) • Please contact distributors regarding other length.												
③	Lead wire length	Specify length by “mm” (100mm or more)												
④	Lead protection	No need to specify in case of without lead wire	Code		Details		Operating temperature		Code		Details		Operating temperature	
			EXA		Fiberglass with stainless steel		0 to 150°C		EXD		PVC (polyvinyl chloride)		-20 to +90°C	
			EXB		Fiberglass		0 to 150°C		EXE		Silicone rubber		-55 to +180°C	
EXC			PVC (polyvinyl chloride) with copper wire braided		-20 to +90°C									
⑤	Lead wire termination	Code		Details		Code		Details						
		Y		Spade lugs for JIS standard “M3” size screw		N		No terminal lugs * terminal soldered						
		R		Ring lugs for JIS standard “M4” size screw										
		M		Metal connector (SCK-1603-P)						•See Page7				
⑥	Resistance temperature detector type	Code		Details		Operating temperature		Code		Details		Operating temperature		
		PDL		Pt100 Low Temperature Type		-200 to +100°C		PAL		JPt100 Low Temperature Type		-200 to 100°C		
		PDM		Pt100 Middle Temperature Type		0 to 350°C		PAM		JPt100 Middle Temperature Type		0 to 350°C		
		PDH		Pt100 High Temperature Type		0 to 500°C		PAH		JPt100 High Temperature Type		0 to 500°C		
⑦	Measuring junction	Code		Details										
		NG		Ungrounded										
⑧	Mounting bracket	Code		Details		Code		Details						
		A		Fixed nipple (nut)		E		Compression fitting						
		B		Rotary nipple (nut)		N		No bracket						
		C		Fixed flange										
		• Please contact distributors regarding other mounting bracket.												
		Specify size of mounting bracket when code is "A", "B", or "E". (See Page 6) Specify size of flange when code is "C". (See Page 6)												
Specifications		Class : class B * Class A is available (Please specify when you order) Element : Single element * Double element is available. (Diameter of protection tube : φ4.8 or more) (Please specify when you order)												
		Maximum temperature for use												
		Diameter of protection tube						Operating temperature						
		Low temperature type : Code PDL/PAL						-200 to +100°C						
		Middle temperature type : Code PDM/PAM						0 to 350°C						
		High temperature type : Code PDH/PAH						0 to 500°C						
Reference		Connector Pin No.												
		Single Element						Double Element						
														
		Pin No.		Details		Pin No.		Details		Pin No.		Details		
		1		A		1		A		1		A		
		2		B		2		B		2		B		
		3		b		3		b		3		b		
		SCK-1603-□						SCK-1606-□						
		For connector for R-90S, Connector manufactured by Sanwa Connector Laboratory Co., Ltd. is used as standard. Nanaboshi Electric Mfg brand is also available (Please specify when you order). Please specify in case of no need of the plug.												

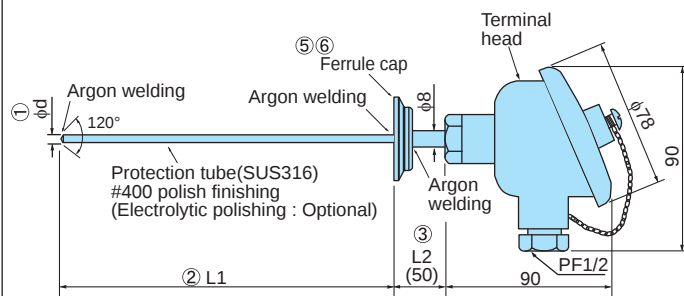
Sanitary type Sheathed Resistance Temperature Detectors : R-31S/R-36S



R - 31S - ϕd - L1 - L2 - □□□ - □ - □ - □
① ② ③ ④ ⑤ ⑥ ⑦

- ① Diameter of protection tube
- ② Length of protection tube (L1)
- ③ Length of Terminal head - ferrule cap (L2)
- ④ Resistance temperature detector type
- ⑤ Ferrule cap type
- ⑥ Ferrule cap material
- ⑦ Optional (Electrolytic polishing)

Example : R-31S-4.8-500-50-DMA-10S-1-E



R - 36S - ϕd - L1 - L2 - □□□ - □ - □ - □
① ② ③ ④ ⑤ ⑥ ⑦

- ① Diameter of protection tube
- ② Length of protection tube (L1)
- ③ Length of Terminal head - ferrule cap (L2)
- ④ Resistance temperature detector type
- ⑤ Ferrule cap type
- ⑥ Ferrule cap material
- ⑦ Optional (Electrolytic polishing)

Example : R-36S-4.8-500-50-DMA-10A-2-E

①	Diameter of protection tube	φ3.2, φ4.8, φ6.4, φ8.0					
②	Length of protection tube (L1)	Specify length by “mm” (100mm to 500mm)					
③	Length of Terminal head - ferule cap (L2)	50mm (Standard)					
④	Resistance temperature detector type	Code	Details		Code	Details	
		DMA	Pt100 (Class A)		AMA	JPt100 (Class A)	
		DMB	Pt100 (Class B)		AMB	JPt100 (Class B)	
⑤	Ferrule cap type	Code	Details		Code	Details	
		8A	8A *1		10S	1.0S	
		10A	10A *1		15S	1.5S	
		15A	15A *1		20S	2.0S	
					25S	2.5S	
⑥	Ferrule cap material	Code	Details				
		1	SUS304			*1 : 8A,10A,15A : Only SUS316 (Code :2)	
		2	SUS316L *1				
⑦	Optional (Electrolytic polishing)	Code	Details				
		E	Electrolytic polishing				
		N	No electrolytic polishing				

Specifications	Class : class A or B Element : Single element * Double element is available. (Only R-36S) (Please specify when you order) Specified current : 2mA Operating temperature: -40 to +200°C
----------------	--

Reference

Ferrule cap dimensions

A technical drawing of a ferrule cap, which is a light blue L-shaped component. The vertical leg has a total height dimensioned as 'A'. The horizontal leg has a total width dimensioned as 'B'. The top horizontal edge of the horizontal leg is dimensioned as '11'. The vertical leg features two semi-circular notches, one at the top and one at the bottom, each with a diameter dimensioned as '11'.

Size	A	B
8A,10A,15A	34	21.7
1S, 1.5S	50.5	38.1
2S	64	50.8
2.5S	77.5	63.5
3S	91	76.3

R - 31RS

① Diameter of protection tube
 ② Length of protection tube (L1)
 ③ Length of Terminal head - Linear cap (L2)
 ④ Resistance temperature detector type
 ⑤ Hexagon nut type
 ⑥ Liner cap material
 ⑦ Optional (Electrolytic polishing)

R - 36RS

① Diameter of protection tube
 ② Length of protection tube (L1)
 ③ Length of Terminal head - Linear cap (L2)
 ④ Resistance temperature detector type
 ⑤ Hexagon nut type
 ⑥ Liner cap material
 ⑦ Optional (Electrolytic polishing)

①	Diameter of protection tube	φ3.2, φ4.8, φ6.4, φ8.0			
②	Length of protection tube (L1)	Specify length by “mm” (100mm to 500mm)			
③	Length of Terminal head - Liner cap (L2)	50mm (Standard)			
④	Resistance temperature detector type	Code	Details	Code	Details
		DMA	Pt100 (Class A)	AMA	JPt100 (Class A)
		DMB	Pt100 (Class B)	AMB	JPt100 (Class B)
⑤	Hexagon nut type	Code	Details	Code	Details
		10S	1.0S	25S	2.5S
		15S	1.5S	30S	3.0S
		20S	2.0S		
⑥	Liner cap material	Code	Details		
		1	SUS304		
		2	SUS316L		
⑦	Optional (Electrolytic polishing)	Code	Details		
		E	Electrolytic polishing		
		N	No electrolytic polishing		

Class : class A or B
 Element : Single element * Double element is available. (Only R-36RS) (Please specify when you order)
 Specified current : 2mA
 Operating temperature: -40 to +200°C

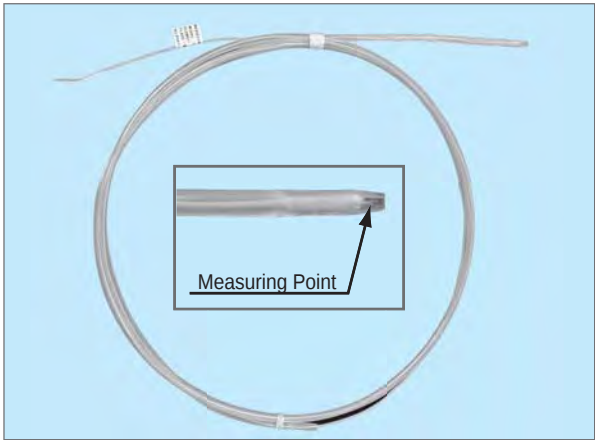
■ Liner cap																					
<table border="1"> <thead> <tr> <th>Size</th><th>A</th><th>L</th></tr> </thead> <tbody> <tr> <td>1S</td><td>33.8</td><td>11.5</td></tr> <tr> <td>1.5S</td><td>47</td><td>11.5</td></tr> <tr> <td>2S</td><td>60.5</td><td>11.5</td></tr> <tr> <td>2.5S</td><td>74</td><td>11.5</td></tr> <tr> <td>3S</td><td>87.5</td><td>11.5</td></tr> </tbody> </table>				Size	A	L	1S	33.8	11.5	1.5S	47	11.5	2S	60.5	11.5	2.5S	74	11.5	3S	87.5	11.5
Size	A	L																			
1S	33.8	11.5																			
1.5S	47	11.5																			
2S	60.5	11.5																			
2.5S	74	11.5																			
3S	87.5	11.5																			

■ Hexagon nut (SUS304)																					
<table border="1"> <thead> <tr> <th>Size</th><th>A</th><th>B</th></tr> </thead> <tbody> <tr> <td>1S</td><td>30</td><td>46</td></tr> <tr> <td>1.5S</td><td>30</td><td>56</td></tr> <tr> <td>2S</td><td>30</td><td>71</td></tr> <tr> <td>2.5S</td><td>30</td><td>85</td></tr> <tr> <td>3S</td><td>30</td><td>100</td></tr> </tbody> </table>				Size	A	B	1S	30	46	1.5S	30	56	2S	30	71	2.5S	30	85	3S	30	100
Size	A	B																			
1S	30	46																			
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2S	30	71																			
2.5S	30	85																			
3S	30	100																			

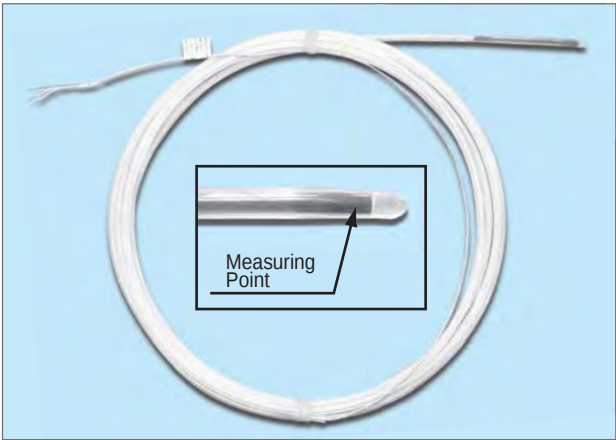
PFA (Fluororesin) coated temperature sensors

FT-100 (Thermocouple)
FR-100 (Resistance Temperature Detector)

Temperature sensor with perfluoroalkoxy polymer resin coating (PFA) excels in chemical and moisture resistance.



Thermocouple : FT-100



Resistance Temperature Detector : FR-100

Specifications

FT-100 (Thermocouple)	
Type	Thermocouple K, Class 1
Measuring range	0 to 200°C Do not condensate except for the protection tube
Measuring accuracy	±2.5°C (Immersion length : 100mm or more)
Protection tube material	PFA (fluororesin)
Acceptable radius for protection tube bending	15mm (Except 90mm from tip)
Lead wire diameter	1.0×1.6mm
Lead wire configure	φ3.2mm X 1
Lead coating material	PFA (fluororesin), Green

FR-100 (Resistance Temperature Detector)	
Type	Pt100, 3-wire system, Class A
Measuring range	0 to 200°C Do not condensate except for the protection tube
Measuring accuracy	±(0.15 + 0.002 t)°C (t:Measuring temperature) Specified current : 2mA (Immersion length : 100mm or more)
Protection tube material	PFA (fluororesin)
Lead wire diameter	φ1.7mm
Lead wire configure	φ0.1mm X 7
Lead coating material	PFA (fluororesin), Gray

Application

Cleaning Chemicals

A 3D illustration of a PFA coated temperature sensor with a coiled lead wire, submerged in a rectangular tank containing a liquid.

Gas Exhaust Pipe

A 3D illustration of a PFA coated temperature sensor inserted into a horizontal gas exhaust pipe, with an arrow indicating the flow direction.

Battery electrolyte

A 3D illustration of a PFA coated temperature sensor with a coiled lead wire, inserted into a "Dark Moon" brand battery.

Chemical liquid supplying device

A 3D illustration of a PFA coated temperature sensor with a coiled lead wire, connected to a complex chemical liquid supplying device.

Environmental test chambers

A 3D illustration of a PFA coated temperature sensor with a coiled lead wire, placed inside an open environmental test chamber.

Thermal reaction

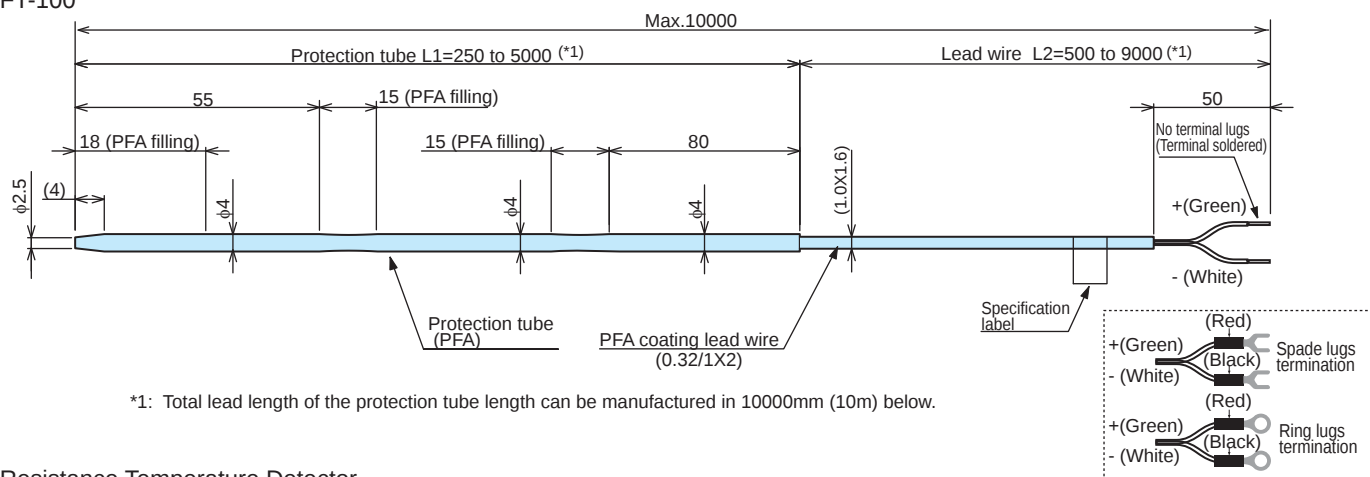
A 3D illustration of a PFA coated temperature sensor with a coiled lead wire, placed in a flask on a stand, connected to a beaker, illustrating a thermal reaction setup.

PFA (Fluororesin) coated temperature sensors

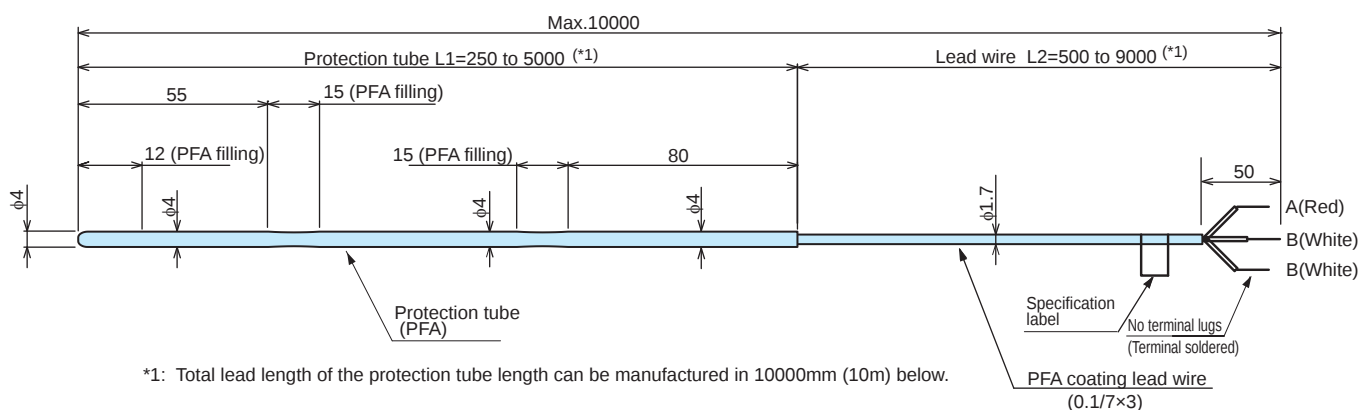
FT-100 (Thermocouple)
FR-100 (Resistance Temperature Detector)

External Dimensions Unit : mm

Thermocouple FT-100



Resistance Temperature Detector FR-100



Model Code

Thermocouple FT-100

Specifications	Model and Suffix Code						
	FT-100 - K- 42- A- □□□□ - □□□□ - □ -AW						
Thermocouple type	Thermocouple K, Class 1	K					
Diameter of protection tube	φ4	42					
Protection tube	PFA (Fluororesin)	A					
Length of protection tube (L1) *2	250mm to 5000mm (Each 500mm)		250 to 5000				
Lead wire length (L2) *2	500mm to 9000mm (Each 500mm)			500 to 9000			
Lead wire termination	No terminal lugs *terminal soldered Spade lugs for JIS standard "M3" size screw Spade lugs for JIS standard "M4" size screw Ring lugs for JIS standard "M3" size screw Ring lugs for JIS standard "M4" size screw				W Y3 Y4 R3 R4		
Pure water cleaning	Pure water cleaning & Clean packing						AW

Resistance Temperature Detector FR-100

Specifications	Model and Suffix Code						
	FR-100 - DPA - 42- A- □□□□ - □□□□ - □ -AW						
Resistance temperature detector type	Pt100, Class A, Middle temperature type	DPA					
Diameter of protection tube	φ4	42					
Protection tube	PFA (Fluororesin)	A					
Length of protection tube (L1) *3	250mm to 5000mm (Each 500mm)		250 to 5000				
Lead wire length (L2) *3	500mm to 9000mm (Each 500mm)			500 to 9000			
Lead wire termination	No terminal lugs * terminal soldered					N	
Pure water cleaning	Pure water cleaning & Clean packing						AW

*3 : Total length of Protection tube and lead wire can be up to 10000mm (10m).

*2 : Total length of Protection tube and lead wire can be up to 10000mm (10m).

Reference information

● Thermocouple

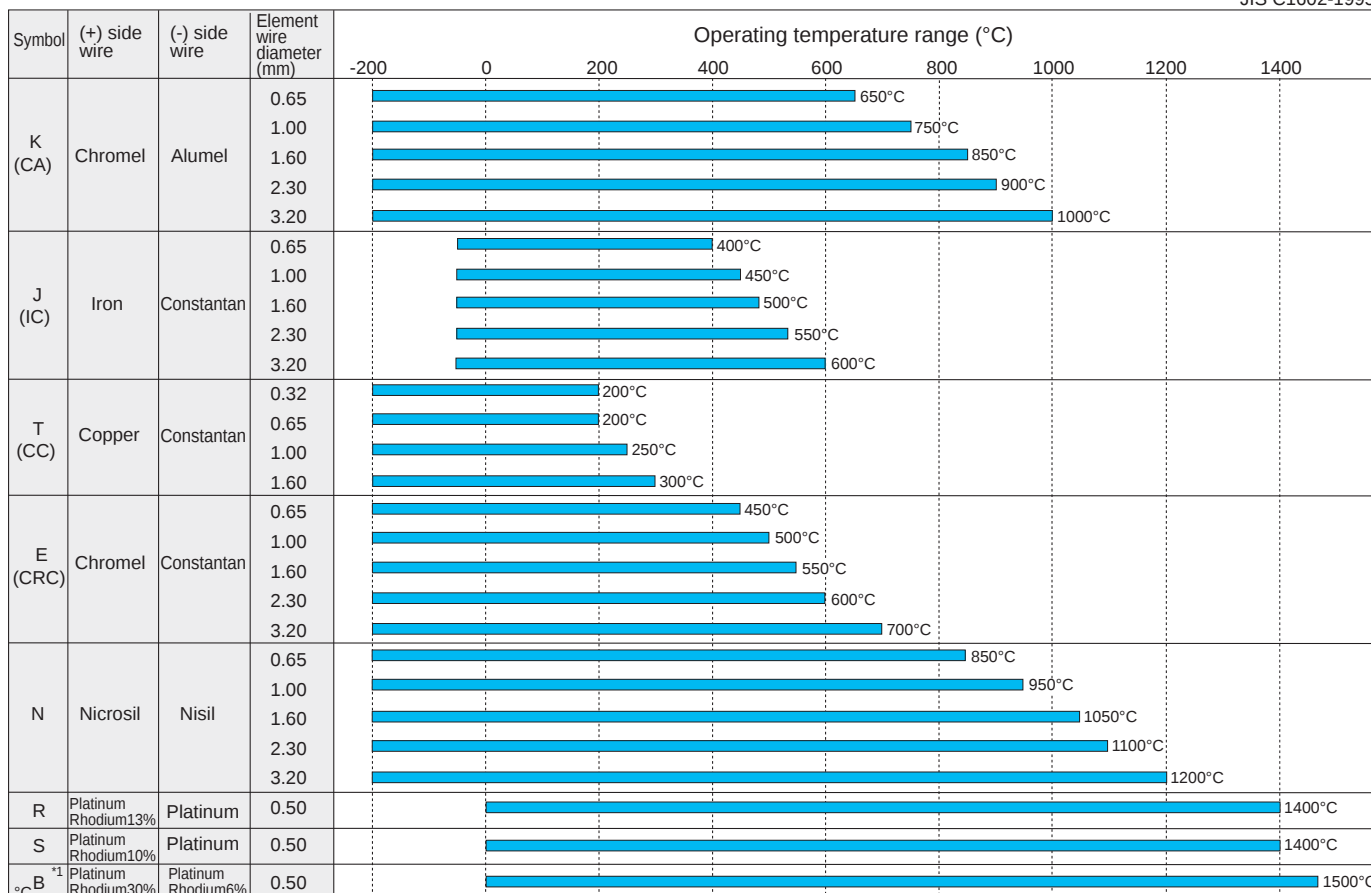
(1) Thermocouple element type

Thermocouple elements K(CA), J(IC), T(CC), E(CRC), N, R, S, B are available. Please find the below chart and choose them according to applications.

Thermocouple classes are standard as class 2 and an accurate type as class 1. (see the differences of temperature allowance section)

All standard types are class 2. (Only standard type for B is class 3)

JIS C1602-1995



*1 Maximum operating temperature is normal operating temperature limit (temperature limit for continuous operation). For overheating use limitation (temperature limitation for a short time use for an unavoidable situation), please find JIS standards (JIS C1602).

Consider the above chart only as a guide. Operating temperature limit is subject to change dependent upon the types of the protection tube.
For B type, measurement below 600°C is out of the tolerance range.

(2) Tolerance to temperature

JIS C1602-1995

Type		Class 1	Class 2	Class 3
K	Temperature range	-40°C to +375°C	-40°C to +333°C	-167°C to +40°C
	Tolerance	±1.5°C	±2.5°C	±2.5°C
J	Temperature range	+375°C to +1000°C	+333°C to +1200°C	-200°C to -167°C
	Tolerance	±0.004• t	±0.0075• t	±0.015• t
T	Temperature range	-40°C to +375°C	-40°C to +333°C	—
	Tolerance	±1.5°C	±2.5°C	—
E	Temperature range	+375°C to +750°C	+333°C to +750°C	—
	Tolerance	±0.004• t	±0.0075• t	—
N	Temperature range	-40°C to +125°C	-40°C to +133°C	-67°C to +40°C
	Tolerance	±0.5°C	±1°C	±1°C
R,S	Temperature range	+125°C to +350°C	+133°C to +350°C	-200°C to -67°C
	Tolerance	±0.004• t	±0.0075• t	±0.015• t
B	Temperature range	-40°C to +375°C	-40°C to +333°C	-167°C to +40°C
	Tolerance	±1.5°C	±2.5°C	±2.5°C
S	Temperature range	+375°C to +800°C	+333°C to +900°C	-200°C to -167°C
	Tolerance	±0.004• t	±0.0075• t	±0.015• t
N	Temperature range	-40°C to +375°C	-40°C to +333°C	-167°C to +40°C
	Tolerance	±1.5°C	±2.5°C	±2.5°C
R,S	Temperature range	+375°C to +1100°C	+333°C to +1200°C	-200°C to -167°C
	Tolerance	±0.004• t	±0.0075• t	±0.015• t
B	Temperature range	0°C to +1100°C	0°C to +600°C	—
	Tolerance	±1°C	±1.5°C	—
S	Temperature range	—	+600°C to +1600°C	—
	Tolerance	—	±0.0025• t	—
B	Temperature range	—	—	+600°C to +800°C
	Tolerance	—	—	±4°C
B	Temperature range	—	+600°C to +1700°C	+800°C to +1700°C
	Tolerance	—	±0.0025• t	±0.005• t

• |t| is a value which represents regardless of + or - symbols of temperature (°C).

Reference information

● Resistance Temperature Detector

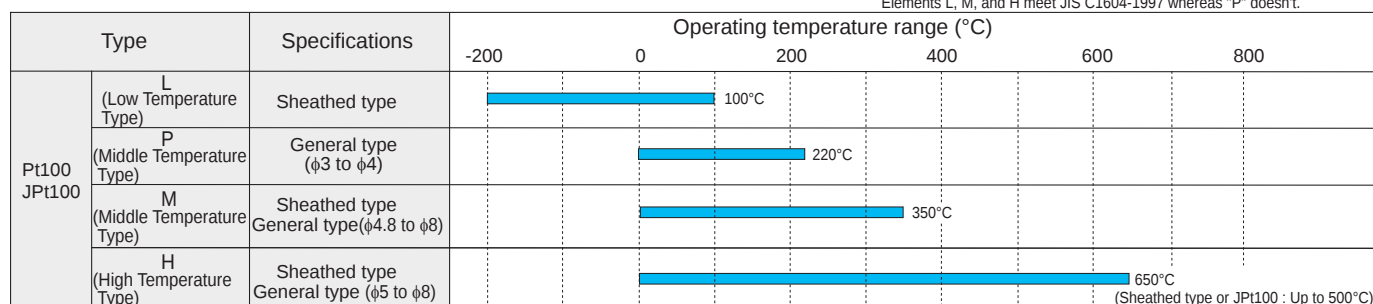
(1) Resistance Temperature Detector Type

Platinum RTD (resistance temperature detector) can be divided into either Pt100 or JPt100 (former). It is more often used for low temperature applications than thermocouples, and has a high accuracy.

On the other hand, it is not suitable in a situation where the responsiveness and measurement of surface or tiny spaces are required.

Pt100 classes are either B as standard or A as accurate. For standard type, its class is B and its specified current is 2mA.

Elements L, M, and H meet JIS C1604-1997 whereas "P" doesn't.



Consider the above chart only as a guide.

(2) Tolerance to temperature JIS C 604-1997

Class	Tolerance (°C)
Class A	$\pm(0.15+0.002 t)$
Class B	$\pm(0.3+0.005 t)$

* |t| is a value which represents regardless of + or - symbols of temperature (°C).

Measuring temperature (°C)	-200	-100	0	100	200	300	400	500	600	650	700	800	850
Tolerance (°C) Class A	±0.55	±0.35	±0.15	±0.35	±0.55	±0.75	±0.95	±1.15	±1.35	±1.45			
Class B	±1.3	±0.8	±0.3	±0.8	±1.3	±1.8	±2.3	±2.8	±3.3	±3.6	±3.8	±4.3	±4.6

● Protection Tube

SUS304, SUS316(for sheath), and Nicrobell are available as materials for the protection tube for standard type. It is available to select its material based on measured objects and measurement conditions.

<Normal operating temperature limits> <Sheathed type> JIS C 1605 (Nicrobell is out of JIS standard)

Thermocouple	Diameter Protection tube	φ1.0	φ1.6	φ3.2	φ4.8	φ6.4	φ8.0
K	SUS316	650°C	650°C	750°C	800°C	800°C	900°C
	SUS310S	650°C	650°C	750°C	800°C	800°C	900°C
	Inconel				900°C	1000°C	1050°C
	Nicrobell	900°C	1000°C	1100°C	1100°C	1150°C	1200°C
J	SUS316	450°C	450°C	650°C	750°C	750°C	750°C
T	SUS316	300°C	300°C	350°C	350°C	350°C	350°C
N	Nicrobell		1000°C	1100°C	1100°C	1150°C	1200°C

(1) Special Protection Tube

Metal protection tube

Material	Operating temperature for regular use (°C)	Maximum temperature (°C)	Features
Sandvik P4 (SUH446)	1000°C	1200°C	Excellent heat resistance and contained 27% chromium steel. Excellent salt-bath, melted metal, and acid resistance under high temperature. It can be used for sulfate containing reducing flame.
Titanium	250°C	500°C	Extremely excellent corrosion resistance, however this feature will be fragile under high temperature by oxidation.
Cast Iron	700°C	800°C	Extreme mechanical resistance.
Fluor resin coating	180°C	200°C	Fluor resin (FEP) coating with SUS316 sheath. Incredible chemical resistance under low temperature.

Non-metal protection tube

Material	Operating temperature for regular use (°C)	Maximum temperature (°C)	Features
Hard glass	500°C	600°C	Heatproof temperature limit is low. Fragile to thermal and mechanical shock and has a resistance to alkaline and acid.
Silica glass	1000°C		Has a resistance to sudden cooling and heating. Meanwhile, its strength is small. Vulnerable to alkaline, and resistant to acidity. Airtightness is deteriorated in hydrogen and reducing atmosphere.
High alumina Ceramic tube	1400°C 1500°C	1450°C 1550°C	Incredible air proof. Melted metal and combustion gas resistance. Vulnerable to metallic oxide and alkaline.
Pure sintering alumina	1700°C	1900°C	Incredible air proof. It is a neutral refractory. Melted metal, glass, and lead slag resistant. Vulnerable to thermal shock.
Zirconia	1900°C	2100°C	It is thermal resistant and air proof. Excellent resistance to corrosion from glass and metallic slag.
Silicon carbide	1500°C	1700°C	Good electrical and thermal conductivity. Withstand sudden heating, cooling, and oxidizing for its massive thermal strengths.
Silicon nitride	1200°C	1600°C	Excellent corrosion resistance to non-ferrous metals. Its thermal shock resistance is also excellent.
Ceramic JIS Special	1600°C		Available to be stable measurement in a oxidized, reducing atmosphere, and high vacuum ambient environment.
Ceramic JIS Type 1	1500°C		Excellent thermal and corrosion resistance. Good thermal characteristics.
Ceramic JIS Type 2	1400°C		Less thermal softening and good thermal shock resistant.

* Temperature for regular use and maximum temperature vary dependent upon the diameter of the protection tube.

Reference information

● Lead Wire : Compensation cable (Thermocouple), Copper wire (Resistance temperature detector)

Compensation cable is used for thermocouple. Copper wire is used for RTD. There are other types of the lead wire such as glass fiber (EXB), vinyl coating(EXD) and so on. Please specify its type.

To use the copper lead wire for thermocouple result in inaccurate temperature measurement. Characteristics of lead wire should be same as the element of thermocouple.

Copper lead wire is used for RTD. Pay attention for wiring due to three-wires. Make sure that a resistance value of each wire is balanced.

Below chart is the plain specification for each compensation lead wire.

JIS C 1610-1995

Type	Applications	Code (JIS)	Composition of core ^{*1}		Shearh		Contact point compensation temperature (°C)	Error (μV) ^{*3}
			(+) Side	(-) Side	Material ^{*2}	Color		
K	Standard	KCC-G	Copper 0.3 × 7	Alloy of Copper and Nichel 0.3 × 7	Vinyl	Blue	0 to 100	±100
	For heat-resistive	KCB-H	Iron 0.3 × 7	Alloy of Copper and Nichel 0.3 × 7	Fiberglass		0 to 150	
J	Standard	JX-G	Iron 0.3 × 7	Alloy of Copper and Nichel 0.3 × 7	Vinyl	Yellow	-25 to 200	±140
	For heat-resistive	JX-H			Fiberglass			
T	Standard	TX-G	Copper 0.3 × 7	Alloy of Copper and Nichel 0.3 × 7	Vinyl	Brown	-25 to 100	±60
	For heat-resistive	TX-H			Fiberglass			
E	Standard	EX-G	Alloy of Nichel and Chrome 0.3 × 7	Alloy of Copper and Nichel 0.3 × 7	Vinyl	Purple	-25 to 200	±200
	For heat-resistive	EX-H			Fiberglass			
N	Standard	NX-G	Alloy of Nichel and Chrome 0.3 × 7	Alloy of Nichel and Silicon 0.3 × 7	Vinyl	Pink	-25 to 200	±100
	For heat-resistive	NX-H			Fiberglass			
R	Standard	RCM-G	Copper 0.3 × 7	Alloy of Copper and Nichel 0.3 × 7	Vinyl	Black	0 to 100	±30
	For heat-resistive	RCM-H			Fiberglass			
S	Standard	SCA-G			Vinyl			
	For heat-resistive	SCA-H			Fiberglass			
B	Standard	BC-G	Copper 0.3 × 7	Copper 0.3 × 7	Vinyl	Gray	0 to 100	— ^{*4}

*1:0.65 × 4 wires is available for both (+) and (-).

*2:Codes and types for external material (Coating) is based on JIS. Please refer to the below chart for the other types.

*3:It is concerning temperature of the junction with element and compensation cable.

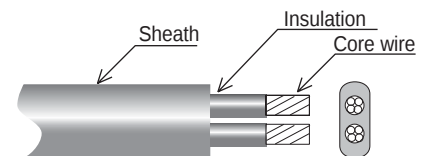
*4:Tolerance value is not specified since a material for + core wire and - core wire is identical.

● Compensation cable

JIS C 1610-1995 (EXE, EXF is out of JIS standard)

Code	Details	Operating temperature
EXA	For heat-resistive, Fiberglass with stainless steel	0 to 150°C
EXB	For heat-resistive, Fiberglass	
EXC	For standard, PVC (polyvinyl chloride) with copper wire braided	-20 to +90°C (KCB,RCA,SCA,BC : 0 to 90°C)
EXD	For standard, PVC (polyvinyl chloride)	
EXE	For heat-resistive, Silicone rubber	-55 to +180°C
EXF	For heat-resistive, Fluorocarbon polymers (FEP)	0 to 200°C

Composition of Compensation cable



● Responsiveness of sensors

It takes a certain time for measuring junction of thermocouple or element of RTD to reach the same temperature with measuring object. The shorter the pipe is, the faster the response is. Meanwhile mechanical resistance becomes weaker. It is important to select a sensor according to purpose and condition. Please refer to following chart as a guide.

Response time (Atmospheric temperature to boiling water)

Type		Reference values	
Thermocouple (General type)	φ3.2	0.3 sec	0.9 sec
	φ5.0	0.8 sec	2.6 sec
Sheathed Thermocouple	φ1.0	0.05 sec	0.2 sec
	φ1.6	0.15 sec	0.6 sec
	φ3.2	0.5 sec	1.8 sec
	φ4.8	1.0 sec	2.6 sec
	φ8.0	2.7 sec	10.7 sec

Type		Reference values	
Resistance temperature detector (General type)	φ3.0	3.6 sec	9.2 sec
	φ5.0	5.5 sec	15 sec
	φ6.0	7.1 sec	19 sec
	φ8.0	11.8 sec	33 sec
Sheathed resistance temperature detector (General type)	φ3.2	3.2 sec	8.7 sec
	φ4.8	4.2 sec	11.5 sec
	φ8.0	8.7 sec	21 sec

● Please make a copy of this specification check sheet and send it to our distributors.

60



· This product is intended for use with industrial machines, test and measuring equipment. It is not designed for use with medical equipment.
· If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.

Caution for the export trade

All transactions must comply with laws, regulations, and treaties.

Caution for imitated products

As products imitating our product now appear on the market, be careful that you don't purchase these imitated products. We will not warrant such products nor bear the responsibility for any damage and/or accident caused by their use.

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