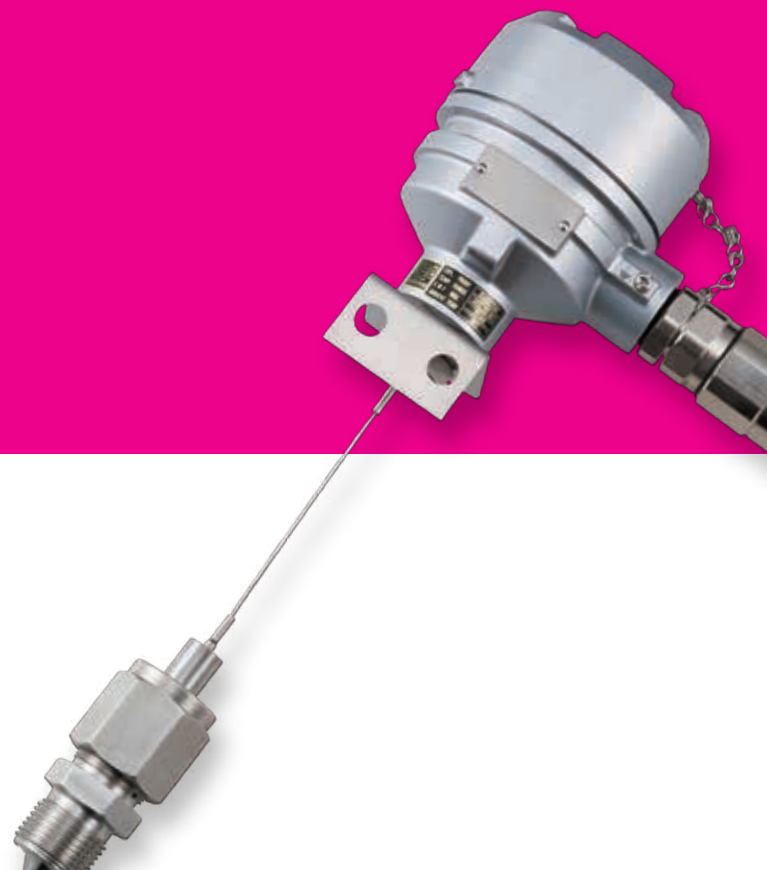


01

Thermocouples Catalog



OKAZAKI
MANUFACTURING COMPANY



Green Procurement

Okazaki Manufacturing Company has established a policy for the control of hazardous chemical substances as an environmental measure, and promotes green purchasing and procurement activities that take the environment into consideration.

Security Policy

Okazaki Manufacturing Company handles customer information as a critical asset. We thoroughly recognize the importance of ensuring confidentiality and protecting information, and have implemented security measures through company rules and regulations.

To prevent the leakage of information, we take steps such as installing anti-virus software on company computers, implementing measures to prevent data leaks when exchanging data between computers, and prohibiting employees from taking computers out of company facilities and bringing their own private computers into company facilities.

Product Warranty

Okazaki Manufacturing Company conducts appropriate product inspections based on our own company standards. If a problem occurs with the product, contact your nearest service representative with the specific details of the problem.

Warranty Period

Period of warranty will be limited to one year from the date of the delivery.

Scope of Warranty

If, during the warranty period specified above, a problem occurs due to a fault attributable to Okazaki Manufacturing Company, the product shall be replaced or repaired.

However, this warranty does not apply in the following cases:

- (1) If the product has been handled or used improperly
- (2) If the cause of the problem is attributable to factors external to the purchased product
- (3) If modifications or repairs have been performed by a party other than Okazaki Manufacturing Company
- (4) If the product is used for purposes or applications in which the product is intended as a consumable item
- (5) In other cases such as a natural disaster or accident

Furthermore, the scope of the warranty is limited to the purchased product itself, and it does not cover other damage arising from the problem with the purchased product.



Head Office

Okazaki Manufacturing Company
 UK Limited

Europe
 Kamet Trading BV

Middle East
 Petroleum Services Co.
 Haffar Petroleum Services Co W.L.L
 Petro Middle East
 Energy Support Trading Est.
 Technical Supplies International Co.LLC

- Overseas Bases
- Overseas Representatives

Main Manufacturing Factory



Okazaki Manufacturing Company
 supplies highly reliable and
 trusted products for use in
 a wide range of industries.

Aerospace



Petrochemicals



Gas



Fibers



Semiconductors



the world through “heat”



• ARI Industries, Inc., USA

• Korea
Newins Co., Ltd.

• Okazaki Manufacturing (Taiwan) Company

• Southeast Asia
Kiuchi Instrumentation Pte.Ltd.

Aerospace Division

Kobe-Iwaoka Factory

Fukuoka Factory

Kyushu Factory

Okazaki Manufacturing (Taiwan) Company

ARI INDUSTRIES, INC., USA



[Business Sites]

Sales Offices

International Division/Tokyo Branch/Ibaraki Branch/Kita-kanto Branch/Chiba Branch/Yokohama Branch/Nagoya Branch/Kyoto Branch/Osaka Branch/Kobe Sales Office/Takasago Branch/Okayama Branch/Hiroshima Branch/Kita-kyushu Branch/Nagasaki Branch

Factories

Main Manufacturing Factory/Aerospace Division in Main Manufacturing Factory/Kobe-Iwaoka Factory/Fukuoka Factory/Kyushu Factory

Overseas Bases

ARI Industries Inc., USA/Okazaki Manufacturing (Taiwan) Co., Ltd./Okazaki Manufacturing Company UK Limited

Environment



Power Generation



Medical & Food



Automobiles



Ships



Iron & Steel



Sensors and Heaters

Connecting across industries with “heat”

01 Thermocouples

AEROPAK®

02 Resistance Thermometer Sensors

RESIOPAK®



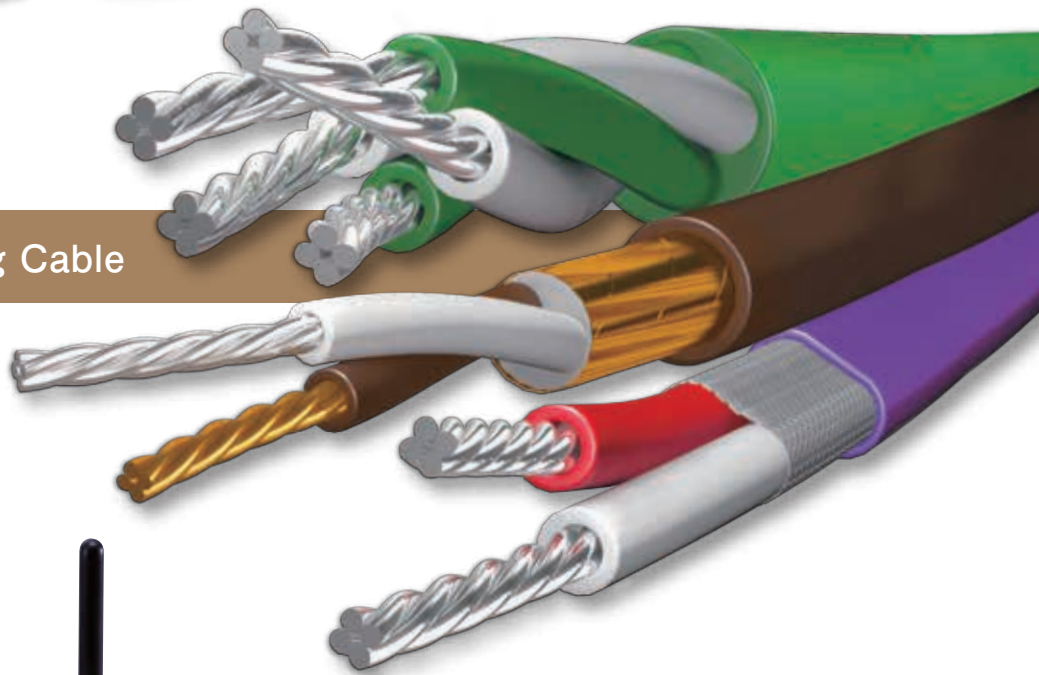
MI Cables

03 Heaters

AEROHEAT®



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05 Thermowells



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AEROPAK®

Sheathed Thermocouples

AEROPAK is the trademark for our sheathed thermocouples. AEROPAK is a sheathed thermocouple consisting of a thin tube (sheath) made of stainless steel or heat-resistant steel, which houses thermocouple element wires that are surrounded by a firmly packed layer of inorganic insulator (MgO). We manufacture a variety of products based on this structure, which vary depending on the purpose of use. Compared to general protection tube type thermocouples, sheathed thermocouples have many superior characteristics.

Characteristics

AEROPAK thermocouples have the following characteristics compared to conventional protection tube type thermocouples.

- 1. Wider application range**
- 2. Better responsiveness**
- 3. Easier handling**
- 4. Longer product life**
- 5. Greater mechanical strength and pressure resistance**

Thermocouple Element Wire Constituent Materials

JIS C1605

Code	Positive leg	Negative leg
SN (N)	Alloy consisting mainly of nickel, chromium, and silicon	Alloy consisting mainly of nickel and silicon
SK (K)	Alloy consisting mainly of nickel and chromium	Alloy consisting mainly of nickel and aluminum
SE (E)	Alloy consisting mainly of nickel and chromium	Alloy consisting mainly of copper and nickel
SJ (J)	Iron	Alloy consisting mainly of copper and nickel
ST (T)	Copper	Alloy consisting mainly of copper and nickel

AEROPAK® Operating Temperature Range (Atmospheric)

Unit: °C

Sheath outer diameter (mm)	SN/SK		SE	SJ	ST	
φ0.08	*1 400		-	-	-	
φ0.1	*1 400		-	-	-	
φ0.15	*1 400		-	-	-	
φ0.25	*1 500	*4 700	-	-	-	
φ0.5	*1 600	*4 900	-	-	-	
φ1.0	650	*3 1000 *4 900	650	450	300	
φ1.6	650	*3 1100 *4 1000 *5 800	650	450	300	
φ3.2	750	*3 1200 *4 1000 *5 900	750	650	350	
φ4.8	800	*3 1260 *5 1050	800	750	350	
φ6.4	*1 1000	*2 800	*3 1260 *5 1050	800	750	350
φ8.0	*1 1050	*2 900	*3 1260 *5 1050	800	750	350

*1: The sheath material is NCF600eq.

*2: The sheath material is 310S SS.

*3: The sheath material is HOSKINS2300.

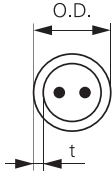
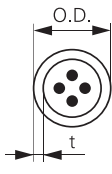
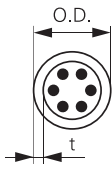
*4: The sheath material is SC1000H.

*5: The sheath material is SC1000N.

For others, the sheath material is 316SS.

AEROPAK® Sheathed Thermocouple Standard Specifications

JIS C1605

	Sheath (mm)		Core cable diameter (mm)	Thermocouple type and sheath material (representative example)				
	Outer diameter	Thickness		SN	SK	SE	SJ	ST
Single element 	φ0.08	10% or more of sheath outer diameter	10% or more of sheath outer diameter (4)	-	B	-	-	-
	φ0.1			B				
	φ0.15							
	φ0.25							
	φ0.5		15% or more of sheath outer diameter	C-B-K	C-B-K-SA	C	C	C
	φ1.0				C-B-K-SN			
	φ1.6			D-B-K				
	φ3.2			D-B-K-SN				
	φ4.8			D-B				
	φ6.4			D-B-K-V-SN				
φ8.0								
Double element 	φ1.6	10% or more of sheath outer diameter	15% or more of sheath outer diameter	C-B-K	C-B-K-SN	C	C	C
	φ3.2							
	φ4.8							
	φ6.4							
	φ8.0							
Triple element 	φ4.8	10% or more of sheath outer diameter	10% or more of sheath outer diameter (4)	C-B	C-B	C	C	C
	φ6.4							
	φ8.0							

Sheath material: B=NCF600eq⁽¹⁾ C=316SS D=310S SS K=H2300⁽²⁾ V=HASTELLOY-X SA=SC1000H⁽⁵⁾ SN=SC1000N⁽⁵⁾

(1) NCF600eq. is equivalent to Inconel 600.

(2) H2300 is a special sheath material for HOSKINS2300*.

(3) We can manufacture with sheath diameters and materials other than the above. Please contact us for details. (Example: 347SS, 321SS, 316LSS, etc.)

(4) JIS is not applicable for sheath outer diameter of φ0.25 or less, or for triple element.

(5) SC1000H and 1000N are supercouple for high temperature, and the core cable diameter is 20% or more of the sheath outer diameter.

Maximum Manufacturing Length and Approximate Weight of AEROPAK® Sheathed Thermocouples

Sheath outer diameter (mm)	φ0.08/ φ0.1	φ0.15	φ0.25	φ0.5	φ1.0	φ1.6	φ3.2	φ4.8	φ6.4	φ8.0
Maximum length of sheath (m)	*1	*1	150	290	425	165	600	260	145	90
Approximate weight (g/m)	0.1 or less		0.3	1.2	5	10	45	100	180	280

*1: Please contact us for details.

- The values above indicate the maximum manufacturing lengths for MI cables.

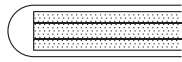
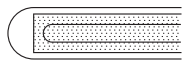
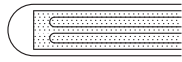
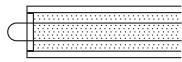
- The manufacturing lengths may vary depending on the element type.

List of Thermocouple Tolerances and the Standards Applied by Each Country

Standard Type	JIS C1605			Standard Type	IEC 60584-1			ASTM E230			
	Temperature range	Class	Tolerance in °C		Temperature range	Class	Tolerance in °C	Temperature range	Class	Tolerance in °C	
SN & SK	-40°C or higher, and lower than +375°C	1	± 1.5	N & K	-40°C or higher, and lower than +375°C	1	± 1.5	0°C or higher, and lower than +1260°C	STD.	± 2.2 or ± 0.75%	
	+375°C or higher, and lower than +1000°C		± 0.004 t		+375°C or higher, and lower than +1000°C		± 0.004 t				
	-40°C or higher, and lower than +333°C	2	± 2.5		-40°C or higher, and lower than +333°C	2	± 2.5		± 2.5	SP.	± 1.1 or ± 0.4%
	+333°C or higher, and lower than +1200°C		± 0.0075 t		+333°C or higher, and lower than +1200°C		± 0.0075 t				
	-167°C or higher, and lower than +40°C	3	± 2.5		-167°C or higher, and lower than +40°C	3	± 2.5	-200°C or higher, and lower than 0°C	STD.	± 2.2 or ± 2%	
	-200°C or higher, and lower than -167°C		± 0.015 t		-200°C or higher, and lower than -167°C		± 0.015 t				
SE	-40°C or higher, and lower than +375°C	1	± 1.5	E	-40°C or higher, and lower than +375°C	1	± 1.5	0°C or higher, and lower than +870°C	STD.	± 2.2 or ± 0.75%	
	+375°C or higher, and lower than +800°C		± 0.004 t		+375°C or higher, and lower than +800°C		± 0.004 t				
	-40°C or higher, and lower than +333°C	2	± 2.5		-40°C or higher, and lower than +333°C	2	± 2.5		± 2.5	SP.	± 1 or ± 0.4%
	+333°C or higher, and lower than +900°C		± 0.0075 t		+333°C or higher, and lower than +900°C		± 0.0075 t				
	-167°C or higher, and lower than +40°C	3	± 2.5		-167°C or higher, and lower than +40°C	3	± 2.5	-200°C or higher, and lower than 0°C	STD.	± 2.2 or ± 2%	
	-200°C or higher, and lower than -167°C		± 0.015 t		-200°C or higher, and lower than -167°C		± 0.015 t				
SJ	-40°C or higher, and lower than +375°C	1	± 1.5	J	-40°C or higher, and lower than +375°C	1	± 1.5	0°C or higher, and lower than +760°C	STD.	± 2.2 or ± 0.75%	
	+375°C or higher, and lower than +750°C		± 0.004 t		+375°C or higher, and lower than +750°C		± 0.004 t				
	-40°C or higher, and lower than +333°C	2	± 2.5		-40°C or higher, and lower than +333°C	2	± 2.5		± 2.5	SP.	± 1.1 or ± 0.4%
	+333°C or higher, and lower than +750°C		± 0.0075 t		+333°C or higher, and lower than +750°C		± 0.0075 t				
ST	-40°C or higher, and lower than +125°C	1	± 0.5	T	-40°C or higher, and lower than +125°C	1	± 0.5	0°C or higher, and lower than +370°C	STD.	± 1 or ± 0.75%	
	+125°C or higher, and lower than +350°C		± 0.004 t		+125°C or higher, and lower than +350°C		± 0.004 t				
	-40°C or higher, and lower than +133°C	2	± 1.0		-40°C or higher, and lower than +133°C	2	± 1.0		± 1.0	SP.	± 0.5 or ± 0.4%
	+133°C or higher, and lower than +350°C		± 0.0075 t		+133°C or higher, and lower than +350°C		± 0.0075 t				
	-67°C or higher, and lower than +40°C	3	± 1.0		-67°C or higher, and lower than +40°C	3	± 1.0	-200°C or higher, and lower than 0°C	STD.	± 1 or ± 1.5%	
	-200°C or higher, and lower than -67°C		± 0.015 t		-200°C or higher, and lower than -67°C		± 0.015 t				

- (1) The tolerance is the allowable maximum limit of the value of the temperature of the thermoelectromotive force converted using the reference thermoelectromotive force table, minus the temperature at the temperature measuring junction.
- (2) The tolerance of ASTM shall be either the °C or the % of the measured temperature, whichever is larger.
- (3) The |t| is the measured temperature which is indicated as a temperature (°C) unrelated to + and - signs.
- (4) Classes 1, 2, and 3 correspond to the former JIS classes of 0.4, 0.75, and 1.5.
- (5) JIS, BS and DIN standards are the same as the IEC standard.
- (6) The ASTM standard is the former ANSI standard.
- (7) The latest version is applied for the standard year.

Types of Measuring Junctions

Code	Type	Structure	Characteristics	Sheath outer diameter applied (mm)		
				Single	Double	Triple
G (#8)	Grounded		<ol style="list-style-type: none"> 1. Pressure resistance of approx. 350 MPa or more. 2. Unsuitable for places with electromagnetic induction interference. 	φ 0.5 to φ 8.0	φ 1.6 to φ 8.0	φ 4.8 to φ 8.0
U (#9)	Ungrounded		<ol style="list-style-type: none"> 1. Most commonly used due to no limitations for measurement targets, though the sensitivity is lower than the grounded type. 2. Longer product life due to the element being covered by insulator material. 	φ 0.08 to φ 8.0	φ 1.6 to φ 8.0	φ 4.8 to φ 8.0
(#5)	Ungrounded/ Separated		<ol style="list-style-type: none"> 1. The temperature measuring junction is set for each pair of double elements, and the circuit is separated from the indicator and recorder. 2. The characteristics are the same as the ungrounded type. 	-	φ 3.2 to φ 8.0	φ 4.8 to φ 8.0
(#6)	Exposed		<ol style="list-style-type: none"> 1. The sensitivity is better because the element is exposed. 2. Suitable for measuring temperature of gas such as engine exhaust gas. 3. Mechanically weaker than other temperature measuring junctions. 	φ 1.0 to φ 8.0	φ 3.2 to φ 8.0	φ 4.8 to φ 8.0

AEROPAK® Compensating Cables

* JIS C1610

Thermocouple type		For SN		For SK		For SE		For SJ		For ST	
Core cable		7/φ0.3 ×2	φ0.65 ×2	7/φ0.3 ×2	φ0.65 ×2	7/φ0.3 ×2	φ0.65 ×2	7/φ0.3 ×2	φ0.65 ×2	7/φ0.3 ×2	φ0.65 ×2
Loop resistance (Ω/m)		2.68	3.74	1.94	2.92	2.40	3.53	1.23	1.81	1.05	1.50
Surface coating identification		JIS/IEC (Former JIS category 1)		Green		Violet		Black		Brown	
		Pink		Green		Violet		Black		Brown	
		+ Pink		+ Green		+ Violet		+ Black		+ Brown	
		- White		- White		- White		- White		- White	
Former JIS category 2		-		Blue		Purple		Yellow		Brown	
		-		+ Red		+ Red		+ Red		+ Red	
		-		- White		- White		- White		- White	
Code	Type	Core cable		Specifications							
EXA	Compensating cable for heat resistance	7/φ0.3×2									
EXB	Compensating cable for heat resistance	7/φ0.3×2									
EXC	Compensating cable for general use	7/φ0.3×2									
EXD	Compensating cable for general use	7/φ0.3×2									
EXE-6 (-3)	Thermocouple cable for heat resistance	φ0.65×2 (φ0.32×2)									
EXS-6 (-3)	Thermocouple cable for heat resistance	φ0.65×2 (φ0.32×2)									
EXS-2	Thermocouple cable for heat resistance	φ0.2×2									
EXD-SS	Thermocouple cable for heat resistance	φ0.32×2									
Insulation material		Classification by use				Operating temp. range in °C					
90°C heat resistance PVC		General use				-20 to 90					
Glassfiber yarn		Heat resistance				-20 to 150					
FEP (Perfluoro ethylene propylene copolymer)		High heat resistance				-253 to 200					

AEROPAK® Inspection Standards

Dimensional inspection

AEROPAK outer diameter	$\phi 0.5$ to $\phi 4.8$ mm	± 0.05 mm
	$\phi 6.0$ to $\phi 8.0$ mm	± 0.10 mm
AEROPAK length	≤ 150 mm	± 2.0 mm
	150 mm <	$\pm 1.5\%$
	Spring type	± 3.0 mm
	Bellows type	± 2.0 mm
	Maximum length is up to 1 m. If length exceeds 1 m, details shall be provided separately.	
Nipple length		± 3 mm
Compensating cable length	≤ 1000 mm	± 15 mm
	1000 mm <	$\pm 1.5\%$

Thermoelectromotive test

ST thermocouple	100°C (Class 1 and 2 only)	Boiling point of water
SN, SK, SE, SJ thermocouple	300°C	Niter bath

The 100°C inspection is performed for $\phi 0.15$ or less.

Insulation resistance test

The resistance between the element wire and metal sheath is measured at room temperature. (However, this test is not performed for items with the grounded type measuring junction.)

AEROPAK outer diameter (mm)	Features
$\phi 0.1 \leq \text{O.D.} \leq \phi 0.15$	1 M Ω /3 VDC
$\phi 0.15 < \text{O.D.} \leq \phi 0.25$	5 M Ω /50 VDC
$\phi 0.25 < \text{O.D.} \leq \phi 2.0$	20 M Ω /100 VDC
$\phi 2.0 < \text{O.D.}$	100 M Ω /500 VDC

Documentation The inspection certificate shall be attached to the product. Detailed test report shall be available upon request.

T14 >> A-14

Basic Type Thermocouple

T36 >> A-19

Butt Welded Sleeve Thermocouple

T32 >> A-15

Ultra-Fine Sheathed Thermocouple

T40 >> A-20

Thermocouple with Flexible Armoured Lead

T33 >> A-16

Super-Fine Thermocouple with Drawn Down Tip

T68 >> A-21

Thermocouple with Type A Connector/ Flexible Armoured Lead

T34 >> A-17

Super-Fine Thermocouple

T90 >> A-22

Thermocouple with Type A Connector

T35 >> A-18

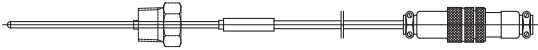
Thermocouple with Lead Cable

T91 >> A-23

Thermocouple with Type B Connector

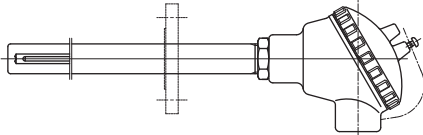
T102 >> A-24

Thermocouple with Type A Connector/
Lead Cable




T96W >> A-30

Thermocouple with Thermowell



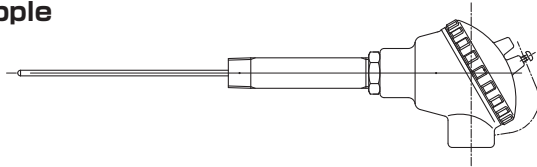
T110 >> A-25

Thermocouple with Push-Pull Type
Connector



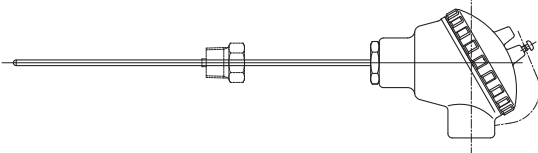
T400N >> A-31

Spring Loaded Thermocouple with Head/
Nipple



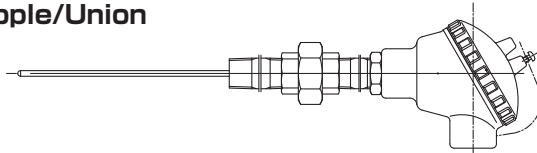
T96 >> A-26

Thermocouple with Connection Head



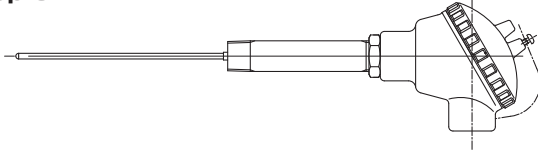
T400U >> A-32

Spring Loaded Thermocouple with Head/
Nipple/Union



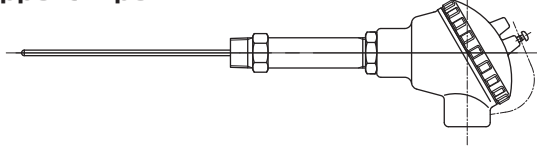
T96N >> A-27

Thermocouple with Connection Head/
Nipple



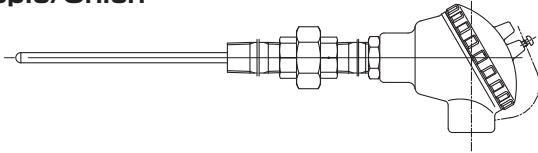
T400S >> A-33

Spring Loaded Thermocouple with Head/
Support Pipe



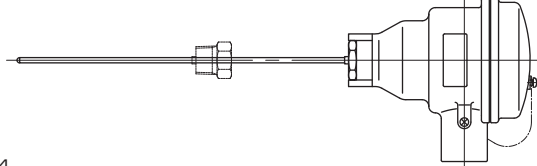
T96U >> A-28

Thermocouple with Connection Head/
Nipple/Union



T97 >> A-34

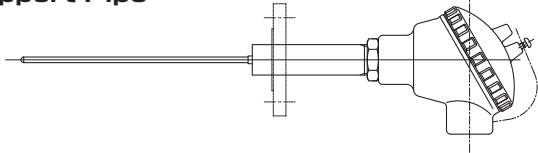
Explosion-Proof Thermocouple



d2G4

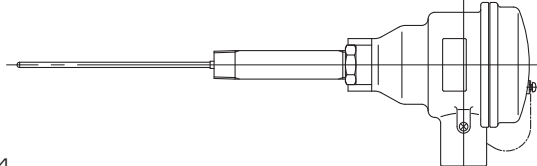
T96S >> A-29

Thermocouple with Connection Head/
Support Pipe



T97N >> A-35

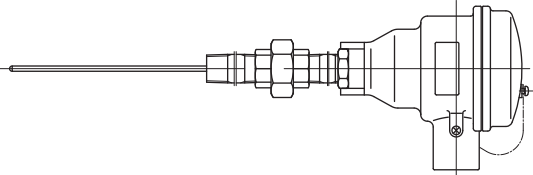
Explosion-Proof Thermocouple with Nipple



d2G4

T97U >> A-36

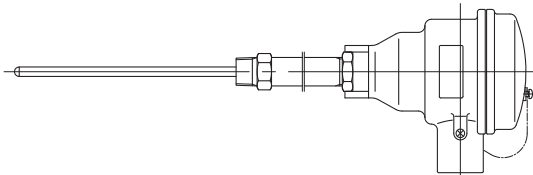
Explosion-Proof Thermocouple with Nipple/Union



d2G4

T407S >> A-41

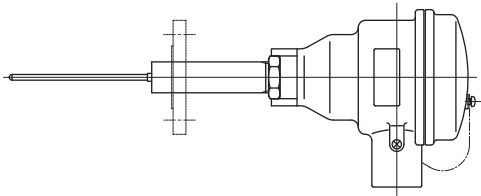
Spring Loaded Explosion-Proof Thermocouple with Support Pipe



d2G4

T97S >> A-37

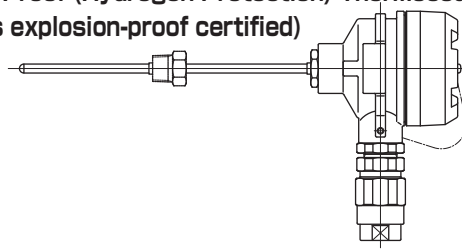
Explosion-Proof Thermocouple with Support Pipe



d2G4

T99 >> A-42

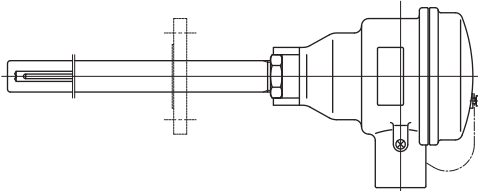
Explosion-Proof (Hydrogen Protection) Thermocouple (Overseas explosion-proof certified)



IEC IECEx

T97W >> A-38

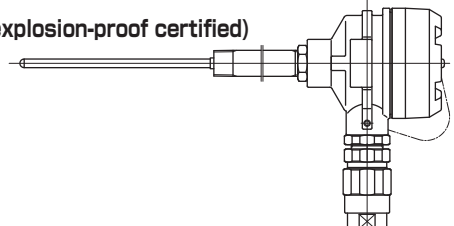
Explosion-Proof Thermocouple with Thermowell



d2G4

T99N >> A-43

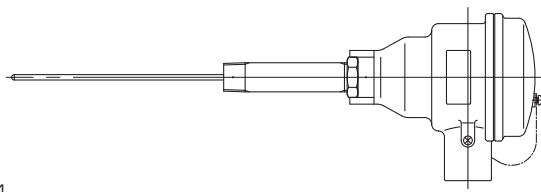
Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple (Overseas explosion-proof certified)



IEC IECEx

T407N >> A-39

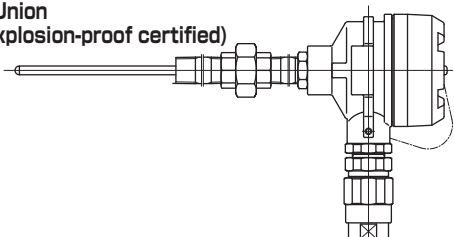
Spring Loaded Explosion-Proof Thermocouple with Nipple



d2G4

T99U >> A-44

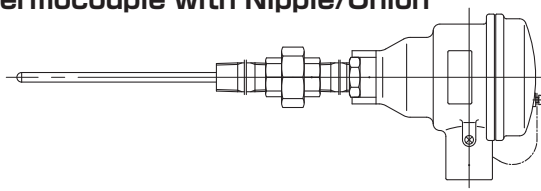
Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple/Union (Overseas explosion-proof certified)



IEC IECEx

T407U >> A-40

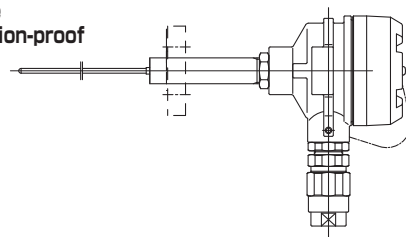
Spring Loaded Explosion-Proof Thermocouple with Nipple/Union



d2G4

T99S >> A-45

Explosion-Proof (Hydrogen Protection) Thermocouple with Support Pipe (Overseas explosion-proof certified)



IEC IECEx

T409N >> A-46 IEC IECEx

Spring Loaded Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple
(Overseas explosion-proof certified)

T39S >> A-49 IEC IECEx

Series / Explosion/Flame Proof Nipple Type Temperature Sensor
(Sheathed Thermocouple)

T409U >> A-47 IEC IECEx

Spring Loaded Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple/Union
(Overseas explosion-proof certified)

T49N >> A-49 IEC IECEx

Series / Explosion/Flame Proof Nipple Type Temperature Sensor (Spring Loaded Sheathed Thermocouple)

T409S >> A-48 IEC IECEx

Spring Loaded Explosion-Proof (Hydrogen Protection) Thermocouple with Support Pipe
(Overseas explosion-proof certified)

T49U >> A-49 IEC IECEx

Series / Explosion/Flame Proof Nipple Type Temperature Sensor (Spring Loaded Sheathed Thermocouple)

T39N >> A-49 IEC IECEx

Series / Explosion/Flame Proof Nipple Type Temperature Sensor
(Sheathed Thermocouple)

T49S >> A-49 IEC IECEx

Series / Explosion/Flame Proof Nipple Type Temperature Sensor (Spring Loaded Sheathed Thermocouple)

T39U >> A-49 IEC IECEx

Series / Explosion/Flame Proof Nipple Type Temperature Sensor
(Sheathed Thermocouple)

T35M >> A-50

Multipoint Thermocouple

T96M(6) >> A-51

Multipoint Thermocouple with Connection Head

T99M >> A-56

Explosion-Proof (Hydrogen Protection) Multipoint Thermocouple (Overseas explosion-proof certified)

T96M(12) >> A-52

Multipoint Thermocouple with Connection Head

T35EC

Explosion-Proof Thermocouple with Compression Fitting (European Spec.)

Main explosion proof and protection standards: Exde II C T6&T5, IP66

Approved areas/countries
ATEX (Europe) NEPSI (China)
PESO (India)
Contact us for more details.

Certified sensor product with compression fitting.
Can be used in combination with temperature transmitter and terminal box certified in each area and country.
Not approved for use in Japan.

T96M(24) >> A-53

Multipoint Thermocouple with Connection Head

T35FM

Explosion-Proof Thermocouple with Compression Fitting (US Spec.)

Main explosion proof and protection standards: Class I, Div 1 Gr.C and D, NEMA4&4X

Approved area/country
FM (US)
With specified terminal box (excluding hydrogen support)
Contact us for more details.

Certified sensor product with compression fitting.
Can be used in combination with temperature transmitter and terminal box certified in each area and country.
Not approved for use in Japan.

T97M(12) >> A-54

Explosion-Proof Multipoint Thermocouple

d2G4

T35EC (Example of multilevel assembly)

Explosion-Proof Thermocouple with Compression Fitting (European Spec.)

T97M(24) >> A-55

Explosion-Proof Multipoint Thermocouple

d2G4

T35FM (Example of multilevel assembly)

Explosion-Proof Thermocouple with Compression Fitting (US Spec.)

Models with Intrinsic Safety Explosion-Proof Specifications

- Received approval for combined use of terminal box with intrinsic safety explosion-proof specifications + certified safety protection device in each country/area + simple apparatus (thermocouples) *1
- Received approval for combined use of specified safety protection device + sensors (thermocouples) *2

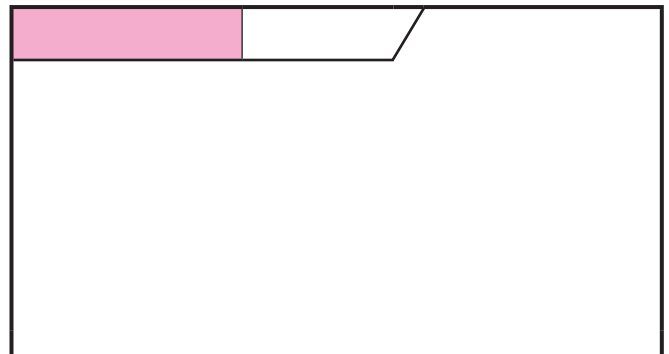
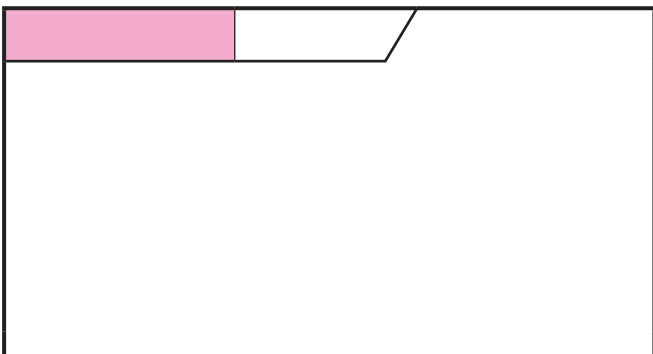
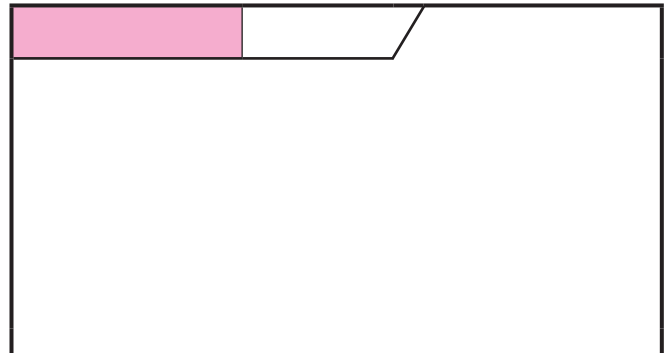
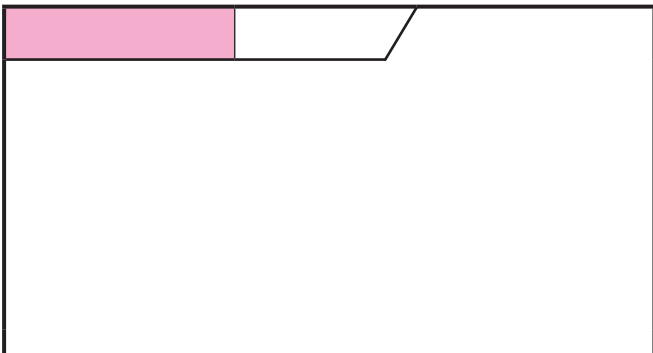
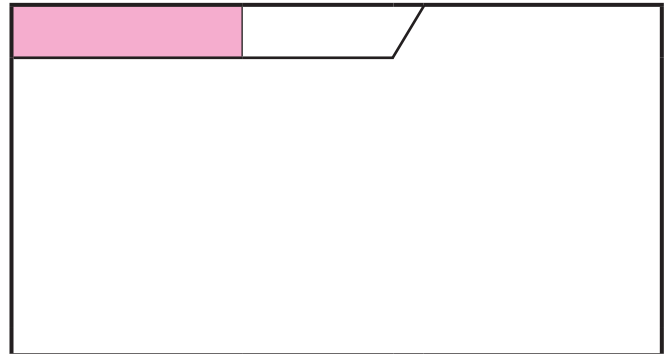
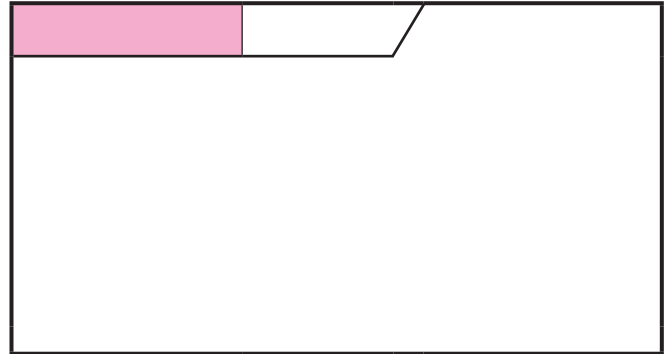
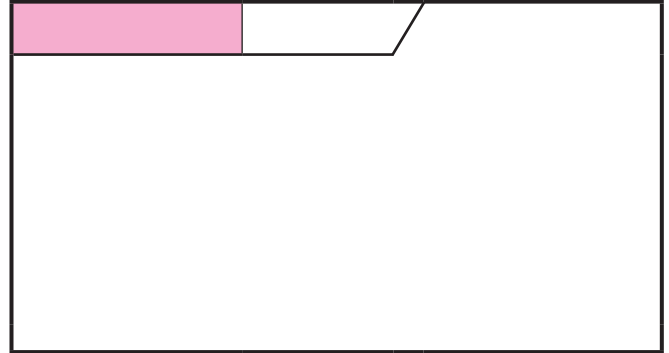
Typical example of explosion proof markings
 *1 Exia II C T6
 *2 i3aG5/Exia II C T2 to T6

Approved areas/countries
 *1 ATEX (Europe)
 *1 NEPSI (China)
 *1 PESO (India)
 *2 TIIS (Japan)

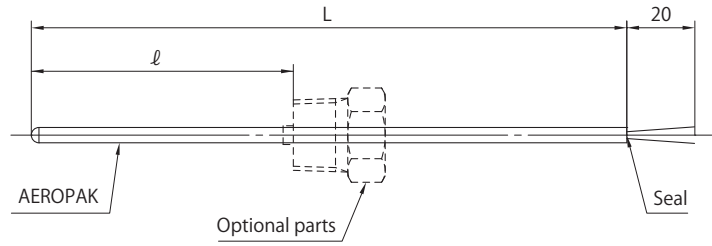
*1 European specifications (not for use in Japan)
 *2 Japan specifications

*1 Simple apparatus
 For electrical devices that do not exceed the rated values listed below, approval and description are not required.
 (According to EN 50020 section 5.4)
 Rated voltage: 1.5 V
 Rated current: 0.1 A
 Output: 25 mV
 (Thermocouples meet the definition of simple apparatus.)

*1 Terminal box with intrinsic safety explosion-proof specifications
 We have received certification for our standard terminal boxes, except ES and EP models.
 *2 Contact us for more details about specified safety protection devices.



Basic Type Thermocouple

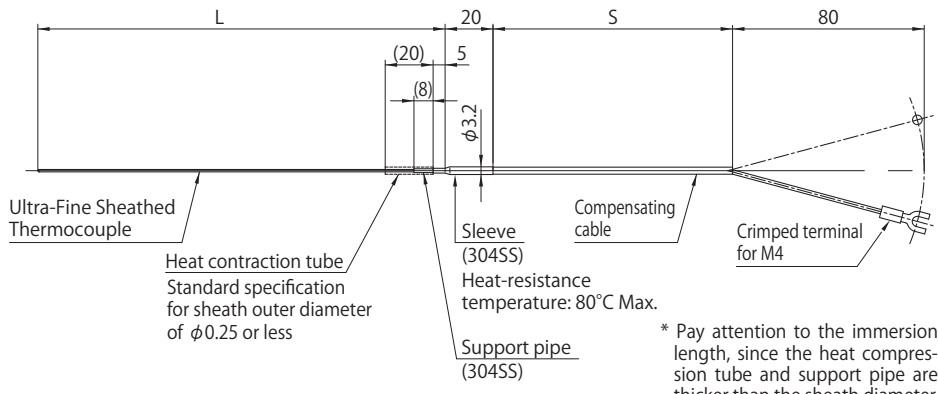


Model code T14

T14- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____

①	Length (Unit: mm)	L	
②	Sheath outer diameter (Unit: mm)	B D E F G	φ 1.6 φ 3.2 φ 4.8 φ 6.4 φ 8.0
③	Number of element wires	2 4	Single Double
④	Type	N K E J T	Ni-CrSi/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni
⑤	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded
⑥	Sheath material	C D B K	316SS 310S SS NCF600eq. (Inconel 600) HOSKINS2300
⑦	Class	01 02 03 04 05 06 07 08	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD ASTM SP 1 (IEC) 2 (IEC) 3 (IEC)
⑧	Optional parts		See "Standard Parts" section
⑨	Immersion length (Unit: mm)	-l	

Ultra-Fine Sheathed Thermocouple



Model code T32

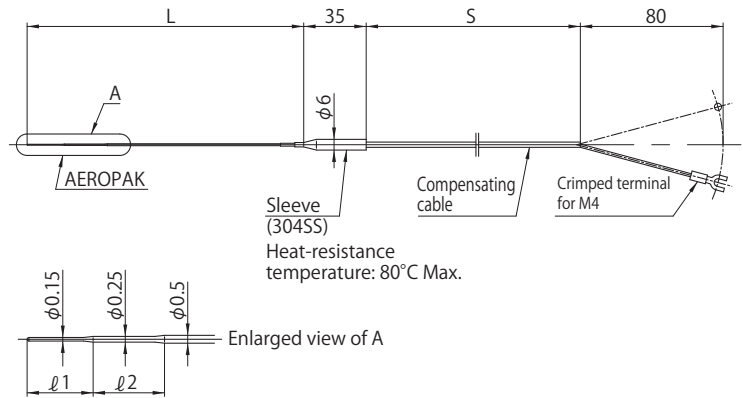
T32- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Length (Unit: mm)	L			
②	Sheath outer diameter (Unit: mm)	FH FP N	φ 0.08 φ 0.1 φ 0.15	M L	φ 0.25 φ 0.5
③	Number of element wires	2	Single		
④	Type	K	Ni-Cr/Ni-Al		
⑤	Measuring junction	9	U (#9) Ungrounded		
⑥	Sheath material	B	NCF600eq. (Inconel 600)		
⑦	Class	01 02	01 (Former JIS class 0.4) 02 (Former JIS class 0.75)		
⑧	Compensating cable length (Unit: mm)	S			
⑨	Type (See A-6)	EXD-SS EXE-3	For general use Thermocouple cable for heat resistance	EXS-3 EXS-2	Thermocouple cable for heat resistance Thermocouple cable for heat resistance*
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length		N/A		

* For compensating cables with outer sheath diameter of φ 0.15 or less, the type is EXS-2.
 Note: For models with an outer sheath diameter of φ 0.25 or less, the diameter at the tip is normally larger than the specified value.
 If you wish to have cables that are manufactured with a constant diameter, please contact us in advance.
 Note: <Length tolerance>
 φ 0.15 or less +40 mm
 -10 mm

Sheath outer diameter (mm)	φ 0.08	φ 0.1	φ 0.15	φ 0.25	φ 0.5
Insulation resistance value	1 MΩ/3 VDC			5 MΩ/25 VDC	
Produced length (mm)	300	300	500	Free	
Operating temp. range (°C)	400	400	400	500	600
Standard testing temp. (°C)	100			300	

Super-Fine Thermocouple with Drawn Down Tip



Model code T33

T33- ① ② ③ ④ ⑤ ⑥ ⑦ / ⑧ ⑨ / ⑩ / ⑪ - ⑫

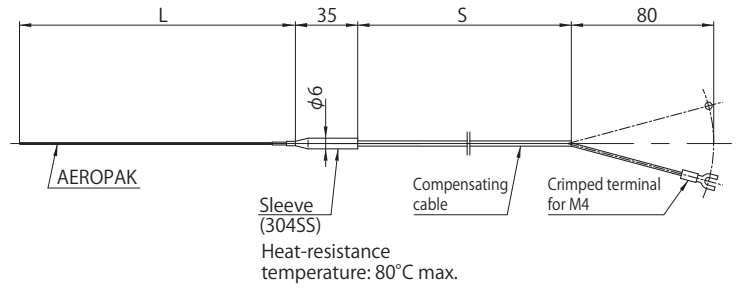
①	Length (Unit: mm)	L	
②	Sheath outer diameter (Unit: mm)	SP	φ0.15 / φ0.25 / φ0.5
③	Number of element wires	2	Single
④	Type	K	Ni-Cr/Ni-Al
⑤	Measuring junction	9	U (#9) Ungrounded
⑥	Sheath material	B	NCF600eq.(Inconel 600)
⑦	Class	02	2 (Former JIS class 0.75)
⑧	Compensating cable length (Unit: mm)	S	
⑨	Type (See A-6)	EXD-SS EXE-3	For general use Thermocouple cable for heat resistance
⑩	Optional parts		See "Standard Parts" section
⑪	Sheath length (Unit: mm)	ℓ 1	
⑫	Sheath length (Unit: mm)	ℓ 2	

Note: The φ0.15 sheath is larger at the tip of the sheath.

Manufacturable dimensions

Unit: mm	L	ℓ 1	ℓ 2	S
Manufacturable range	MAX.8000	10 to 200	15 to 50	Specified dimensions
Dimensional tolerance	<150 ±2.0 150≤ ±1.5%	±3.0		<1000 ±15 1000≤ ±1.5%

Super-Fine Thermocouple



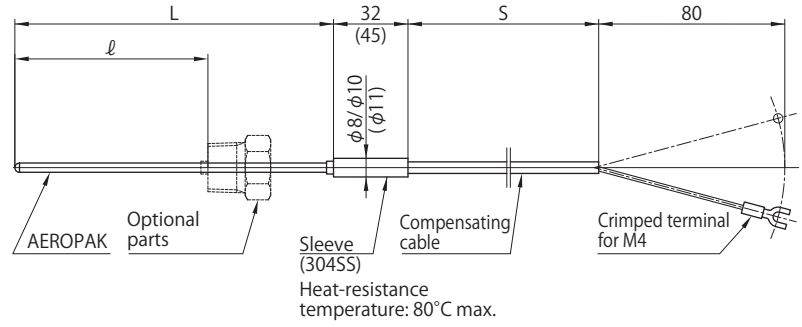
Model code T34

T34- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Length (Unit: mm)	L	
②	Sheath outer diameter (Unit: mm)	M L	φ0.25 φ0.5
③	Number of element wires	2	Single
④	Type	K	Ni-Cr/Ni-Al
⑤	Measuring junction	9	U (#9) Ungrounded
⑥	Sheath material	B	NCF600eq.(Inconel 600)
⑦	Class	01 02	1 (Former JIS class 0.4) 2 (Former JIS class 0.75)
⑧	Compensating cable length (Unit: mm)	S	
⑨	Type (See A-6)	EXD-SS EXE-3	For general use Thermocouple cable for heat resistance
⑩	Optional parts		See "Standard Parts" section
⑪	Immersion length		N/A

Note: For models with an outer sheath diameter of φ0.25 or less, the diameter at the tip is normally larger than the specified value.

Thermocouple with Lead Cable



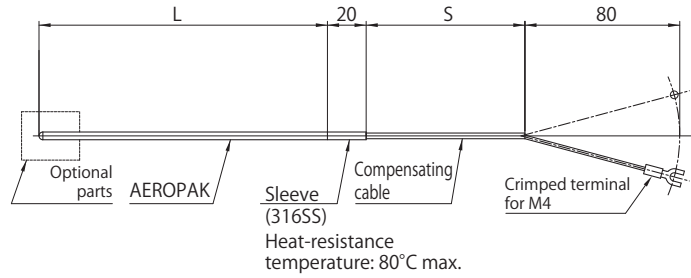
Model code T35

T35- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Length (Unit: mm)	L			
②	Sheath outer diameter (Unit: mm)	A B D	φ 1.0 φ 1.6 φ 3.2	E F G	φ 4.8 φ 6.4 φ 8.0
③	Number of element wires	2 4	Single Double		
④	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑤	Measuring junction	5 8 9	#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded		
⑥	Sheath material	C D B K	316SS 310S SS NCF600eq.(Inconel 600) HOSKINS2300		
⑦	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑧	Compensating cable length (Unit: mm)	S			
⑨	Type (See A-6)	EXA EXB EXC	Compensating cable for heat resistance Compensating cable for heat resistance Compensating cable for general use	EXD EXE	Compensating cable for general use Thermocouple cable for heat resistance
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length (Unit: mm)	- ℓ			

Sheath outer diameter	Sleeve outer diameter		
	Single	Double	
φ 1.0	φ 8	-	
φ 1.6	φ 8	-	
φ 3.2	φ 8	φ 11	φ 8
φ 4.8	φ 8	φ 11	φ 8
φ 6.4	φ 8	φ 11	φ 8
φ 8.0	φ 10	φ 11	φ 10
Compensating cables	EXA, EXB, EXC, EXD, EXE	EXA, EXB, EXC, EXD	EXE

Butt Welded Sleeve Thermocouple

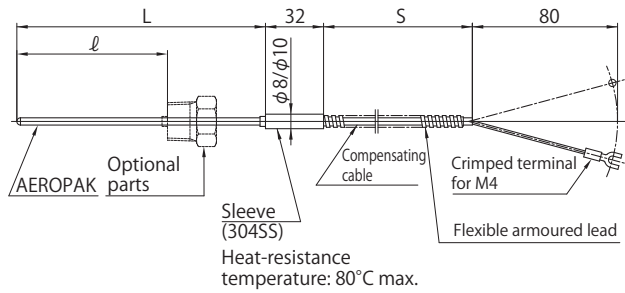


Model code T36

T36- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Length (Unit: mm)	L	
②	Sheath outer diameter (Unit: mm)	D E F G	φ 3.2 (single) φ 4.8 φ 6.4 φ 8.0
③	Number of element wires	2 4	Single Double
④	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni
⑤	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded
⑥	Sheath material	C D B K	316SS 310S SS NCF600eq. (Inconel 600) HOSKINS2300
⑦	Class	01 02 03 04 05 06 07 08	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD. ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑧	Compensating cable length (Unit: mm)	S	
⑨	Type (See A-6)	EXS-6 EXS-3 EXE-6 EXE-3	Thermocouple cable for heat resistance, for single Thermocouple cable for heat resistance, for double Thermocouple cable for heat resistance, for single Thermocouple cable for heat resistance, for double
⑩	Optional parts		See "Standard Parts" section
⑪	Immersion length		N/A

Thermocouple with Flexible Armoured Lead



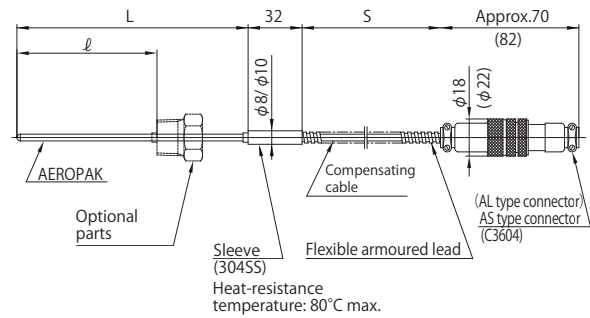
Model code T40

T40- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Length (Unit: mm)	L			
②	Sheath outer diameter (Unit: mm)	A B D	φ 1.0 φ 1.6 φ 3.2	E F G	φ 4.8 φ 6.4 φ 8.0
③	Number of element wires	2 4	Single Double		
④	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑤	Measuring junction	5 8 9	#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded		
⑥	Sheath material	C D B K	316SS 310S SS NCF600eq.(Inconel 600) HOSKINS2300		
⑦	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑧	Compensating cable length (Unit: mm)	S			
⑨	Type (See A-6)	EXB EXE	Compensating cable for heat resistance Thermocouple cable for heat resistance		
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length (Unit: mm)	- ℓ			

Sheath outer diameter	Sleeve outer diameter	
	Single element	Double element
φ 1.0	φ 8	-
φ 1.6	φ 8	-
φ 3.2	φ 8	φ 8
φ 4.8	φ 8	φ 8
φ 6.4	φ 8	φ 8
φ 8.0	φ 10	φ 10
Compensating cables	EXB, EXE	EXE

Thermocouple with Type A Connector/ Flexible Armoured Lead



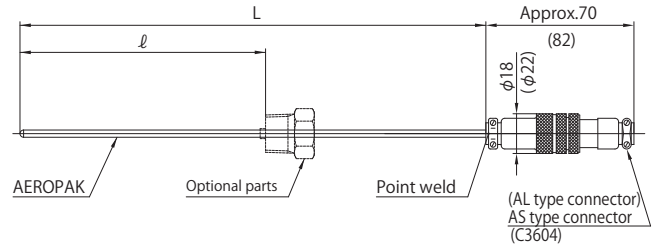
Model code T68

T68- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Length (Unit: mm)	L				
②	Sheath outer diameter (Unit: mm)	A	φ 1.0	E	φ 4.8	
		B	φ 1.6	F	φ 6.4	
		D	φ 3.2	G	φ 8.0	
③	Number of element wires	2	Single			
		4	Double			
④	Type	N	Ni-Cr-Si/Ni-Si	J	Fe/Cu-Ni	
		K	Ni-Cr/Ni-Al	T	Cu/Cu-Ni	
		E	Ni-Cr/Cu-Ni			
⑤	Measuring junction	5	#5) Ungrounded/Separated			
		8	G (#8) Grounded			
		9	U (#9) Ungrounded			
⑥	Sheath material	C	316SS			
		D	310S SS			
		B	NCF600eq.(Inconel 600)			
		K	HOSKINS2300			
⑦	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.	
		02	2 (Former JIS class 0.75)	06	1 (IEC)	
		03	3 (Former JIS class 1.5)	07	2 (IEC)	
		04	ASTM STD.	08	3 (IEC)	
⑧	Compensating cable length (Unit: mm)	S				
⑨	Type (See A-6)	EXB	Compensating cable for heat resistance			
		EXE	Thermocouple cable for heat resistance			
⑩	Optional parts		See "Standard Parts" section			
⑪	Immersion length (Unit: mm)	- ℓ				

Sheath outer diameter	Sleeve outer diameter	
	Single element	Double element
φ 1.0	φ 8	-
φ 1.6	φ 8	-
φ 3.2	φ 8	φ 8
φ 4.8	φ 8	φ 8
φ 6.4	φ 8	φ 8
φ 8.0	φ 10	φ 10
Compensating cables	EXB, EXE	EXE

Thermocouple with Type A Connector

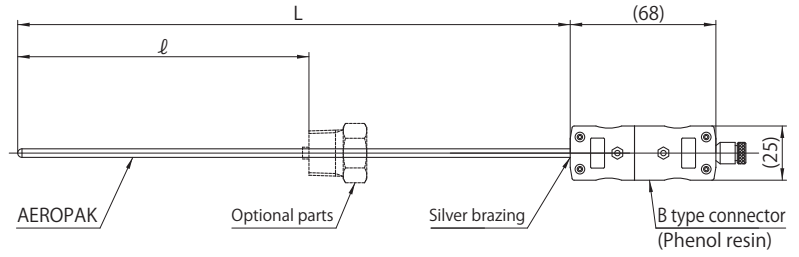


Model code T90

T90- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____

①	Length (Unit: mm)	L	
②	Sheath outer diameter (Unit: mm)	A B D E F G	φ 1.0 φ 1.6 φ 3.2 φ 4.8 φ 6.4 φ 8.0
③	Number of element wires	2 4	Single Double
④	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni
⑤	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded
⑥	Sheath material	C D B K	316SS 310S SS NCF600eq. (Inconel 600) HOSKINS2300
⑦	Class	01 02 03 04 05 06 07 08	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD. ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑧	Optional parts		See "Standard Parts" section
⑨	Immersion length (Unit: mm)	-ℓ	

Thermocouple with Type B Connector



Model code T91

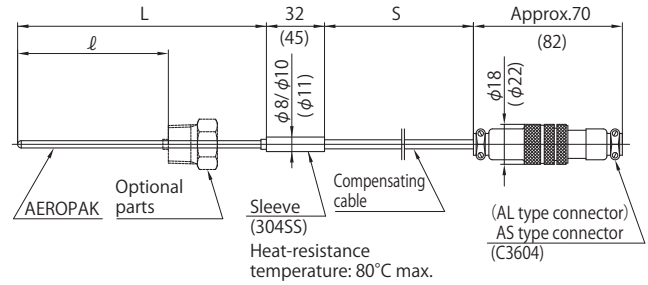
T91- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____

①	Length (Unit: mm)	L	
②	Sheath outer diameter (Unit: mm)	D E	φ3.2 φ4.8
③	Number of element wires	2	Single
④	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni
⑤	Measuring junction	8 9	G (#8) Grounded U (#9) Ungrounded
⑥	Sheath material	C D B K	316SS 310S SS NCF600eq. (Inconel 600) HOSKINS2300
⑦	Class	01 02 03 04 05 06 07 08	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD. ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑧	Optional parts		See "Standard Parts" section
⑨	Immersion length (Unit: mm)	- l	

Characteristics

- The contact pin of connector is the same material as that of the thermocouple.
- The thermocouple color code is applied to the connector body. However, note that the colors correspond to former JIS category 2 or ASTM.

Thermocouple with Type A Connector/Lead Cable



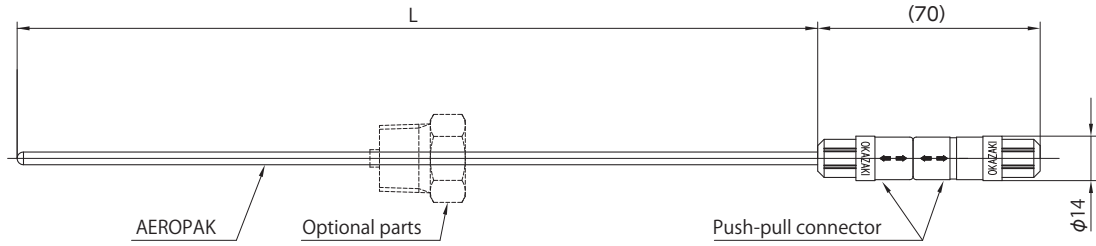
Model code T102

T102- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Length (Unit: mm)	L				
②	Sheath outer diameter	A	φ 1.0	E	φ 4.8	
		B	φ 1.6	F	φ 6.4	
		D	φ 3.2	G	φ 8.0	
③	Number of element wires	2	Single			
		4	Double			
④	Type	N	Ni-Cr-Si/Ni-Si	J	Fe/Cu-Ni	
		K	Ni-Cr/Ni-Al	T	Cu/Cu-Ni	
		E	Ni-Cr/Cu-Ni			
⑤	Measuring junction	5	#5) Ungrounded/Separated			
		8	G (#8) Grounded			
		9	U (#9) Ungrounded			
⑥	Sheath material	C	316SS			
		D	310S SS			
		B	NCF600eq. (Inconel 600)			
		K	HOSKINS2300			
⑦	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.	
		02	2 (Former JIS class 0.75)	06	1 (IEC)	
		03	3 (Former JIS class 1.5)	07	2 (IEC)	
		04	ASTM STD.	08	3 (IEC)	
⑧	Compensating cable length (Unit: mm)	S				
⑨	Type (See A-6)	EXA	Compensating cable for heat resistance	EXD	Compensating cable for general use	
		EXB	Compensating cable for heat resistance	EXE	Thermocouple cable for heat resistance	
		EXC	Compensating cable for general use			
⑩	Optional parts		See "Standard Parts" section			
⑪	Immersion length (Unit: mm)	- ℓ				

Sheath outer diameter	Sleeve outer diameter		
	Single	Double	
φ 1.0	φ 8	-	
φ 1.6	φ 8	-	
φ 3.2	φ 8	φ 11	φ 8
φ 4.8	φ 8	φ 11	φ 8
φ 6.4	φ 8	φ 11	φ 8
φ 8.0	φ 10	φ 11	φ 10
Compensating cables	EXA,EXB,EXC,EXD,EXE	EXA,EXB EXC,EXD	EXE

Thermocouple with Push-Pull Type Connector



Model code T110

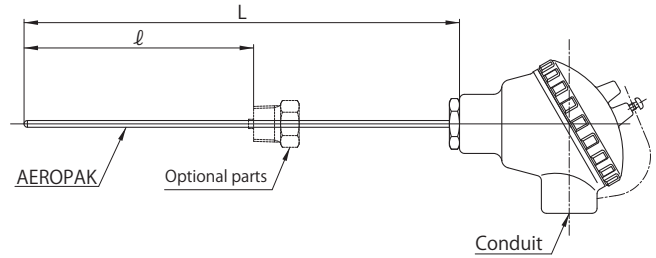
T110- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____

①	Length (Unit: mm)	L	
②	Sheath outer diameter (Unit: mm)	D E FN F	φ3.2* φ4.8* φ6.0* φ6.4*
③	Number of element wires	2 4	Single Double
④	Element type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni
⑤	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded
⑥	Sheath material	C D B K	316SS 310S SS NCF600eq.(Inconel 600) HOSKINS2300
⑦	Class	01 02 03 04 05 06 07 08	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD ASTM SP 1 (IEC) 2 (IEC) 3 (IEC)
⑧	Optional parts		See "Standard Parts" section

Characteristics

- Please specify the applicable cable diameter range up to φ6.5.
- Thermocouple compensating cables can be applied as an option.
- Items such as a screw adapter can be attached to the sheath.
- It is also possible to manufacture thermocouples with small diameter sheaths other than those indicated with an asterisk (*). (Example: φ0.5 to φ1.6)
- The connector parts are heat resistant up to 80° C.
- Never bend a sheathed thermocouple within 5 mm from the tip (sheath diameter φD≤3.2).
- Refer to the information above when attaching an item such as a screw adapter to the sheath. If you have any questions, please contact us.

Thermocouple with Connection Head

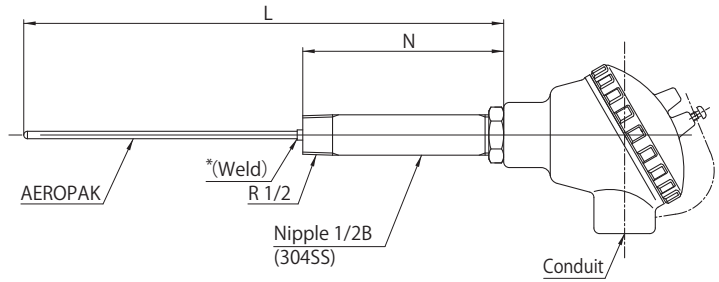


Model code T96

T96- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ / ⑨ _____ ⑩ _____

①	Terminal box	ES	Aluminum die-cast (ADC) (small)
		EL	Aluminum die-cast (ADC) (large)
		ED	Aluminum die-cast (ADC) (two-way)
		EF	Cast iron
		EP	Resin
②	Length (Unit: mm)	L	
③	Sheath outer diameter (Unit: mm)	D	φ3.2
		E	φ4.8
		F	φ6.4
		G	φ8.0
④	Number of element wires	2	Single
		4	Double
⑤	Type	N	Ni-Cr-Si/Ni-Si
		K	Ni-Cr/Ni-Al
		E	Ni-Cr/Cu-Ni
		J	Fe/Cu-Ni
		T	Cu/Cu-Ni
⑥	Measuring junction	5	(#5) Ungrounded/Separated
		8	G (#8) Grounded
		9	U (#9) Ungrounded
⑦	Sheath material	C	316SS
		D	310S SS
		B	NCF600eq. (Inconel 600)
		K	HOSKINS2300
⑧	Class	01	1 (Former JIS class 0.4)
		02	2 (Former JIS class 0.75)
		03	3 (Former JIS class 1.5)
		04	ASTM STD.
		05	ASTM SP.
		06	1 (IEC)
		07	2 (IEC)
		08	3 (IEC)
⑨	Optional parts		See "Standard Parts" section
⑩	Immersion length (Unit: mm)	- l	

Thermocouple with Connection Head/Nipple

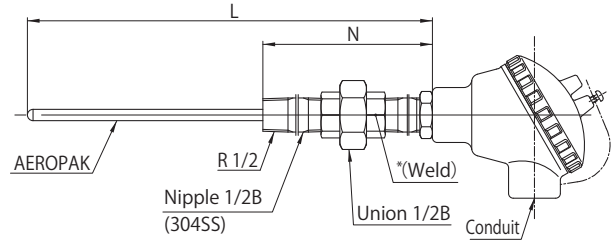


Model code T96N

T96N- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	1	N=100 *Not welded		
		2	N=150 *Not welded		
		3	N=100 *Welded		
		4	N=150 *Welded		
②	Terminal box	EL	Aluminum die-cast (ADC)		
		ED	Aluminum die-cast (ADC) (two-way)		
		EF	Cast iron		
		EP	Resin		
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	D	φ 3.2		
		E	φ 4.8		
		F	φ 6.4		
		G	φ 8.0		
⑤	Number of element wires	2	Single		
		4	Double		
⑥	Type	N	Ni-Cr-Si/Ni-Si		
		K	Ni-Cr/Ni-Al		
		E	Ni-Cr/Cu-Ni		
		J	Fe/Cu-Ni		
		T	Cu/Cu-Ni		
⑦	Measuring junction	5	#5) Ungrounded/Separated		
		8	G (#8) Grounded		
		9	U (#9) Ungrounded		
⑧	Sheath material	C	316SS		
		D	310S SS		
		B	NCF600eq. (Inconel 600)		
		K	HOSKINS2300		
⑨	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.
		02	2 (Former JIS class 0.75)	06	1 (IEC)
		03	3 (Former JIS class 1.5)	07	2 (IEC)
		04	ASTM STD.	08	3 (IEC)
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length		N/A		

Thermocouple with Connection Head/Nipple/Union

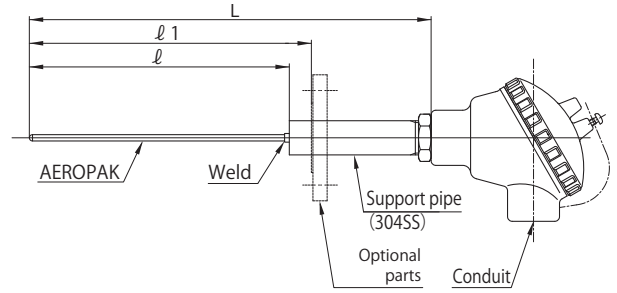


Model code T96U

T96U- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	2	N=150 *Not welded
		4	N=150 *Welded
②	Terminal box	EL	Aluminum die-cast (ADC)
		ED	Aluminum die-cast (ADC) (two-way)
		EF	Cast iron
		EP	Resin
③	Length (Unit: mm)	L	
④	Sheath outer diameter (Unit: mm)	D	φ3.2
		E	φ4.8
		F	φ6.4
		G	φ8.0
⑤	Number of element wires	2	Single
		4	Double
⑥	Type	N	Ni-Cr-Si/Ni-Si
		K	Ni-Cr/Ni-Al
		E	Ni-Cr/Cu-Ni
		J	Fe/Cu-Ni
		T	Cu/Cu-Ni
⑦	Measuring junction	5	(#5) Ungrounded/Separated
		8	G (#8) Grounded
		9	U (#9) Ungrounded
⑧	Sheath material	C	316SS
		D	310S SS
		B	NCF600eq. (Inconel 600)
		K	HOSKINS2300
⑨	Class	01	1 (Former JIS class 0.4)
		02	2 (Former JIS class 0.75)
		03	3 (Former JIS class 1.5)
		04	ASTM STD.
		05	ASTM SP.
		06	1 (IEC)
		07	2 (IEC)
		08	3 (IEC)
⑩	Optional parts		See "Standard Parts" section
⑪	Immersion length		N/A

Thermocouple with Connection Head/Support Pipe

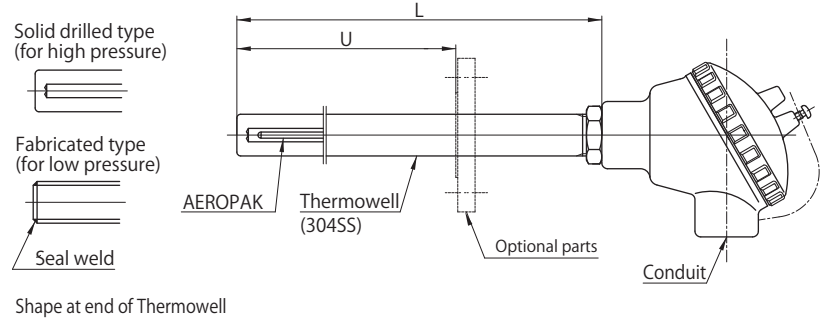


Model code T96S

T96S- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	1	1/2B support pipe
		2	φ 15 support pipe
		3	φ 12 support pipe
②	Terminal box	EL	Aluminum die-cast (ADC)
		ED	Aluminum die-cast (ADC) (two-way)
		EF	Cast iron
		EP	Resin
③	Length (Unit: mm)	L	
④	Sheath outer diameter (Unit: mm)	D	φ 3.2
		E	φ 4.8
		F	φ 6.4
		G	φ 8.0
⑤	Number of element wires	2	Single
		4	Double
⑥	Type	N	Ni-Cr-Si/Ni-Si
		K	Ni-Cr/Ni-Al
		E	Ni-Cr/Cu-Ni
		J	Fe/Cu-Ni
		T	Cu/Cu-Ni
⑦	Measuring junction	5	(#5) Ungrounded/Separated
		8	G (#8) Grounded
		9	U (#9) Ungrounded
⑧	Sheath material	C	316SS
		D	310S SS
		B	NCF600eq. (Inconel 600)
		K	HOSKINS2300
⑨	Class	01	1 (Former JIS class 0.4)
		02	2 (Former JIS class 0.75)
		03	3 (Former JIS class 1.5)
		04	ASTM STD.
		05	ASTM SP.
		06	1 (IEC)
		07	2 (IEC)
		08	3 (IEC)
⑩	Optional parts		See "Standard Parts" section
⑪	Immersion length (Unit: mm)	-l	(-l 1)

Thermocouple with Thermowell



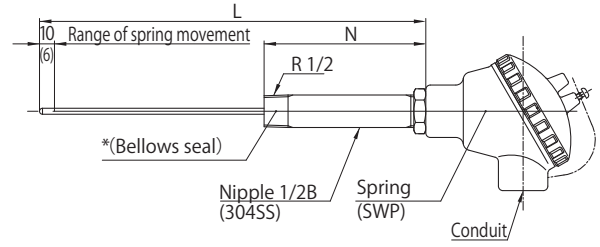
Model code T96W

T96W- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ / ⑫ ⑬

①	Structure	1	Fabricated type		
		2	Solid drilled type		
②	Terminal box	EL	Aluminum die-cast (ADC)	EF	Cast iron
		ED	Aluminum die-cast (ADC) (two-way)	EP	Resin
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	D	φ 3.2	F	φ 6.4
		E	φ 4.8	G	φ 8.0
⑤	Number of element wires	2	Single		
		4	Double		
⑥	Type	N	Ni-Cr-Si/Ni-Si	J	Fe/Cu-Ni
		K	Ni-Cr/Ni-Al	T	Cu/Cu-Ni
		E	Ni-Cr/Cu-Ni		
⑦	Measuring junction	5	#5 Ungrounded/Separated		
		8	G (#8) Grounded		
		9	U (#9) Ungrounded		
⑧	Sheath material	C	316SS	B	NCF600eq. (Inconel 600)
		D	310S SS	K	HOSKINS2300
⑨	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.
		02	2 (Former JIS class 0.75)	06	1 (IEC)
		03	3 (Former JIS class 1.5)	07	2 (IEC)
		04	ASTM STD.	08	3 (IEC)
⑩	Thermowell dimensions	-10	See the table below		
		-12			
		-15			
		-22			
⑪	Thermowell material	A	304SS		
		C	316SS		
		P	SANDVIKP4		
⑫	Optional parts		See "Standard Parts" section		
⑬	Immersion length (Unit: mm)	-U			

Code	Outer diameter	Pipe inner diameter	Diameter of hollow area
-10	φ 10	φ 7	φ 5 to φ 7
-12	φ 12	φ 9	φ 7 to φ 9
-15	φ 15	φ 11	φ 9 to φ 11
-22	φ 21.7	φ 16.1	-
	φ 22	-	φ 9 to φ 16

Spring Loaded Thermocouple with Head/Nipple



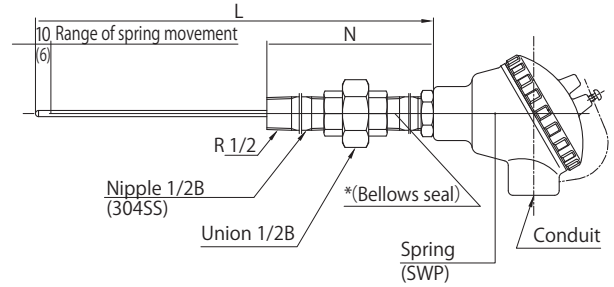
Dimensions in parentheses () are for bellows type

Model code T400N

T400N- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	1	N=100		
		2	N=150		
		3	N=100 *Bellows seal		
		4	N=150 *Bellows seal		
②	Terminal box	EL	Aluminum die-cast (ADC)		
		ED	Aluminum die-cast (ADC) (two-way)		
		EF	Cast iron		
		EP	Resin		
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	D	φ 3.2		
		E	φ 4.8		
		F	φ 6.4		
		G	φ 8.0		
⑤	Number of element wires	2	Single		
		4	Double		
⑥	Type	N	Ni-Cr-Si/Ni-Si		
		K	Ni-Cr/Ni-Al		
		E	Ni-Cr/Cu-Ni		
		J	Fe/Cu-Ni		
		T	Cu/Cu-Ni		
⑦	Measuring junction	5	#5) Ungrounded/Separated		
		8	G (#8) Grounded		
		9	U (#9) Ungrounded		
⑧	Sheath material	C	316SS		
		D	310S SS		
		B	NCF600eq. (Inconel 600)		
		K	HOSKINS2300		
⑨	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.
		02	2 (Former JIS class 0.75)	06	1 (IEC)
		03	3 (Former JIS class 1.5)	07	2 (IEC)
		04	ASTM STD.	08	3 (IEC)
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length		N/A		

Spring Loaded Thermocouple with Head/Nipple/Union



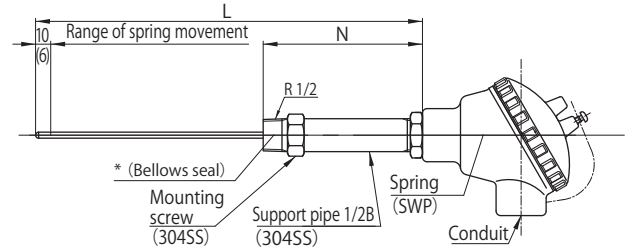
Dimensions in parentheses () are for bellows type

Model code **T400U**

T400U- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	2	N=150
		4	N=150 *Bellows seal
②	Terminal box	EL	Aluminum die-cast (ADC)
		ED	Aluminum die-cast (ADC) (two-way)
		EF	Cast iron
		EP	Resin
③	Length (Unit: mm)	L	
④	Sheath outer diameter (Unit: mm)	D	φ3.2
		E	φ4.8
		F	φ6.4
		G	φ8.0
⑤	Number of element wires	2	Single
		4	Double
⑥	Type	N	Ni-Cr-Si/Ni-Si
		K	Ni-Cr/Ni-Al
		E	Ni-Cr/Cu-Ni
		J	Fe/Cu-Ni
		T	Cu/Cu-Ni
⑦	Measuring junction	5	(#5) Ungrounded/Separated
		8	G (#8) Grounded
		9	U (#9) Ungrounded
⑧	Sheath material	C	316SS
		D	310S SS
		B	NCF600eq. (Inconel 600)
		K	HOSKINS2300
⑨	Class	01	1 (Former JIS class 0.4)
		02	2 (Former JIS class 0.75)
		03	3 (Former JIS class 1.5)
		04	ASTM STD.
		05	ASTM SP.
		06	1 (IEC)
		07	2 (IEC)
		08	3 (IEC)
⑩	Optional parts		See "Standard Parts" section
⑪	Immersion length		N/A

Spring Loaded Thermocouple with Head/Support Pipe



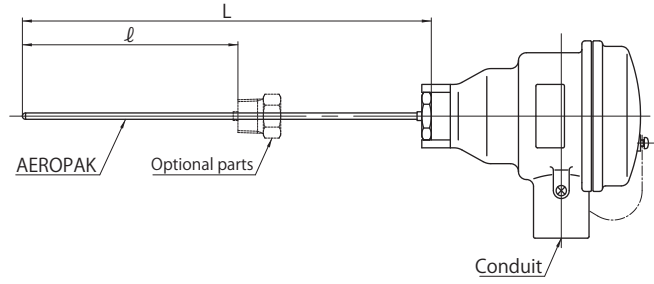
Dimensions in parentheses () are for bellows type

Model code T400S

T400S- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	1	N=100		
		2	N=150		
		3	N=100 *Bellows seal		
		4	N=150 *Bellows seal		
②	Terminal box	EL	Aluminum die-cast (ADC)		
		ED	Aluminum die-cast (ADC) (two-way)		
		EF	Stainless steel		
		EP	Resin		
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	D	φ 3.2		
		E	φ 4.8		
		F	φ 6.4		
		G	φ 8.0		
⑤	Number of element wires	2	Single		
		4	Double		
⑥	Type	N	Ni-Cr-Si/Ni-Si		
		K	Ni-Cr/Ni-Al		
		E	Ni-Cr/Cu-Ni		
		J	Fe/Cu-Ni		
		T	Cu/Cu-Ni		
⑦	Measuring junction	5	#5) Ungrounded/Separated		
		8	G (#8) Grounded		
		9	U (#9) Ungrounded		
⑧	Sheath material	C	316SS		
		D	310S SS		
		B	NCF600eq. (Inconel 600)		
		K	HOSKINS2300		
⑨	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.
		02	2 (Former JIS class 0.75)	06	1 (IEC)
		03	3 (Former JIS class 1.5)	07	2 (IEC)
		04	ASTM STD.	08	3 (IEC)
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length		N/A		

Explosion-Proof Thermocouple d2G4



Model code **T97**

T97- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ / ⑨ _____ ⑩ _____

①	Terminal box	GA GS	Aluminum die-cast (ADC) Stainless steel (ST/ST)	GAD GM	Aluminum die-cast (ADC) (two-way) Stainless steel (two-way)
②	Length (Unit: mm)	L			
③	Sheath outer diameter (Unit: mm)	B D E	φ 1.6 φ 3.2 φ 4.8	F G	φ 6.4 φ 8.0
④	Number of element wires	2 4	Single Double		
⑤	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑥	Measuring junction	5 9	#5) Ungrounded/Separated U (#9) Ungrounded		
⑦	Sheath material	C D B K	316SS 310S SS NCF600eq. (Inconel 600) HOSKINS2300 (*Except for φ 8.0)		
⑧	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑨	Optional parts		See "Standard Parts" section		
⑩	Immersion length (Unit: mm)	- l			

Notes

The structure of the terminal head for the GM type is different from the standard structure. (See Y-2.)

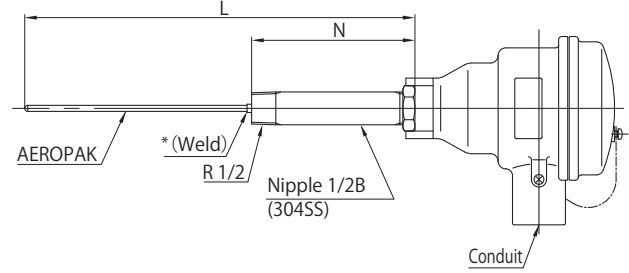
Model Codes and Sheath Outer Diameters

Model code	φ 1.6	φ 3.2	φ 4.8	φ 6.4	φ 8.0
-GA	△	△	○	○	○
-GS	△	△	△	-	○
-GAD	-	△	○	○	○
-GM	-	-	△	○	○

For the combinations indicated by the triangle symbol (△), consider a support that holds the terminal head for safety purposes. There is no HOSKINS GS-GM head.

Explosion-Proof Thermocouple with Nipple

d2G4



Model code **T97N**

T97N- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	1	N=100 *Not welded	3	N=100 *Welded
		2	N=150 *Not welded	4	N=150 *Welded
②	Terminal box	GA	Aluminum die-cast (ADC)	GAD	Aluminum die-cast (ADC) (two-way)
		GS	Stainless steel (ST/ST)	GM	Stainless steel (two-way)
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	D	φ 3.2	F	φ 6.4
		E	φ 4.8	G	φ 8.0
⑤	Number of element wires	2	Single		
		4	Double		
⑥	Type	N	Ni-Cr-Si/Ni-Si	J	Fe/Cu-Ni
		K	Ni-Cr/Ni-Al	T	Cu/Cu-Ni
		E	Ni-Cr/Cu-Ni		
⑦	Measuring junction	5	(#5) Ungrounded/Separated		
		9	U (#9) Ungrounded		
⑧	Sheath material	C	316SS		
		D	310S SS		
		B	NCF600eq. (Inconel 600)		
		K	HOSKINS2300 (*Except for φ 8.0)		
⑨	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.
		02	2 (Former JIS class 0.75)	06	1 (IEC)
		03	3 (Former JIS class 1.5)	07	2 (IEC)
		04	ASTM STD.	08	3 (IEC)
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length		N/A		

Notes

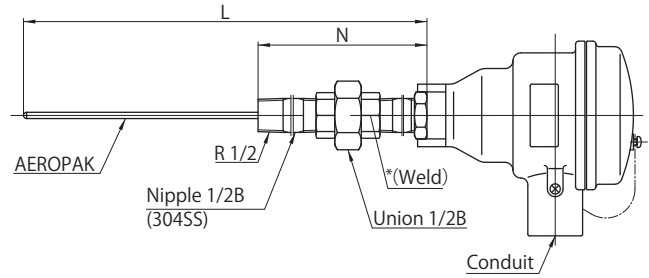
The structure of the terminal head for the GM type is different from the standard structure. (See Y-2.)

Model Codes and Sheath Outer Diameters

Model code	φ 1.6	φ 3.2	φ 4.8	φ 6.4	φ 8.0
-GA	○	○	○	○	○
-GS	○	○	○	-	○
-GAD	-	○	○	○	○
-GM	-	-	○	○	○

Explosion-Proof Thermocouple with Nipple/Union

d2G4



Model code **T97U**

T97U- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	2	N=150 *Not welded		
		4	N=150 *Welded		
②	Terminal box	GA	Aluminum die-cast (ADC)	GAD	Aluminum die-cast (ADC) (two-way)
		GS	Stainless steel (ST/ST)	GM	Stainless steel (two-way)
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	D	φ 3.2	F	φ 6.4
		E	φ 4.8	G	φ 8.0
⑤	Number of element wires	2	Single		
		4	Double		
⑥	Type	N	Ni-Cr-Si/Ni-Si	J	Fe/Cu-Ni
		K	Ni-Cr/Ni-Al	T	Cu/Cu-Ni
		E	Ni-Cr/Cu-Ni		
⑦	Measuring junction	5	#5 Ungrounded/Separated		
		9	U (#9) Ungrounded		
⑧	Sheath material	C	316SS		
		D	310S SS		
		B	NCF600eq. (Inconel 600)		
		K	HOSKINS2300 (*Except for φ 8.0)		
⑨	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.
		02	2 (Former JIS class 0.75)	06	1 (IEC)
		03	3 (Former JIS class 1.5)	07	2 (IEC)
		04	ASTM STD.	08	3 (IEC)
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length		N/A		

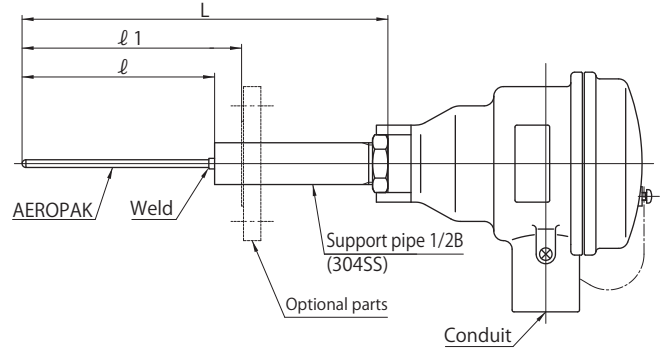
Notes

The structure of the terminal head for the GM type is different from the standard structure. (See Y-2.)

Model Codes and Sheath Outer Diameters

Model code	φ 1.6	φ 3.2	φ 4.8	φ 6.4	φ 8.0
-GA	○	○	○	○	○
-GS	○	○	○	-	○
-GAD	-	○	○	○	○
-GM	-	-	○	○	○

Explosion-Proof Thermocouple with Support Pipe d2G4



Model code **T97S**

T97S- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	1	Support pipe		
②	Terminal box	GA GS	Aluminum die-cast (ADC) Stainless steel (ST/ST)	GAD GM	Aluminum die-cast (ADC) (two-way) Stainless steel (two-way)
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	B D E	φ 1.6 φ 3.2 φ 4.8	F G	φ 6.4 φ 8.0
⑤	Number of element wires	2 4	Single Double		
⑥	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑦	Measuring junction	5 9	(#5) Ungrounded/Separated U (#9) Ungrounded		
⑧	Sheath material	C D B K	316SS 310S SS NCF600eq.(Inconel 600) HOSKINS2300 (*Except for φ 8.0)		
⑨	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑩	Optional parts (Unit: mm)		See "Standard Parts" section		
⑪	Immersion length (Unit: mm)	-l	(-l 1)		

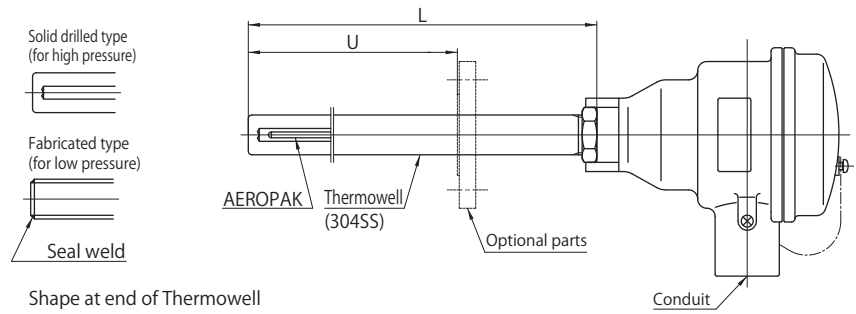
Notes

The structure of the terminal head for the GM type is different from the standard structure. (See Y-2.)

Model Codes and Sheath Outer Diameters

Model code	φ 1.6	φ 3.2	φ 4.8	φ 6.4	φ 8.0
-GA	○	○	○	○	○
-GS	○	○	○	-	○
-GAD	-	○	○	○	○
-GM	-	-	○	○	○

Explosion-Proof Thermocouple with Thermowell d2G4



Model code T97W

T97W-① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ / ⑫ ⑬

①	Structure	1	Fabricated type				
		2	Solid drilled type				
②	Terminal box	GA	Aluminum die-cast (ADC)	GAD	Aluminum die-cast (ADC) (two-way)		
		GS	Stainless steel (ST/ST)	GM	Stainless steel (two-way)		
③	Length (Unit: mm)	L					
④	Sheath outer diameter (Unit: mm)	E	φ 4.8				
		F	φ 6.4				
		G	φ 8.0				
⑤	Number of element wires	2	Single				
		4	Double				
⑥	Type	N	Ni-Cr-Si/Ni-Si	J	Fe/Cu-Ni		
		K	Ni-Cr/Ni-Al	T	Cu/Cu-Ni		
		E	Ni-Cr/Cu-Ni				
⑦	Measuring junction	5	#5 Ungrounded/Separated				
		9	U (#9) Ungrounded				
⑧	Sheath material	C	316SS	B	NCF600eq. (Inconel 600)		
		D	310S SS	K	HOSKINS2300 (*Except for φ 8.0)		
⑨	Class	01	1 (Former JIS class 0.4)	04	ASTM STD.	07	2 (IEC)
		02	2 (Former JIS class 0.75)	05	ASTM SP.	08	3 (IEC)
		03	3 (Former JIS class 1.5)	06	1 (IEC)		
⑩	Thermowell dimensions	-10 -12 -15 -22	See the table below				
⑪	Thermowell material	A C P	304SS 316SS SANDVIKP4				
⑫	Optional parts		See "Standard Parts" section				
⑬	Immersion length (Unit: mm)	-U					

Notes

The structure of the terminal head for the GM type is different from the standard structure. (See Y-2.)

Model Codes and Sheath Outer Diameters

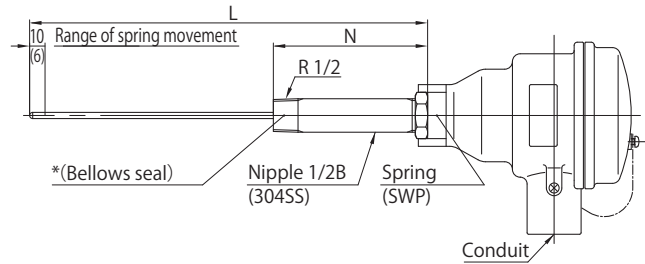
Model code	φ 1.6	φ 3.2	φ 4.8	φ 6.4	φ 8.0
-GA	○	○	○	○	○
-GS	○	○	○	-	○
-GAD	-	○	○	○	○
-GM	-	-	○	○	○

Protection tube dimensions

Code	Outer diameter	Pipe inner diameter	Diameter of hollow area
-10	φ 10	φ 7	φ 5 to φ 7
-12	φ 12	φ 9	φ 7 to φ 9
-15	φ 15	φ 11	φ 9 to φ 11
-22	φ 21.7	φ 16.1	-
	φ 22	-	φ 14.5 to φ 16

Spring Loaded Explosion-Proof Thermocouple with Nipple

d2G4



Model code **T407N**

Dimensions in parentheses () are for bellows type

T407N- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	1	N=100	3	N=100 *Bellows seal
		2	N=150	4	N=150 *Bellows seal
②	Terminal box	GA	Aluminum die-cast (ADC)	GAD	Aluminum die-cast (ADC) (two-way)
		GS	Stainless steel (ST/ST)	GM	Stainless steel (two-way)
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	D	φ 3.2	F	φ 6.4
		E	φ 4.8	G	φ 8.0
⑤	Number of element wires	2	Single		
		4	Double		
⑥	Type	N	Ni-Cr-Si/Ni-Si	J	Fe/Cu-Ni
		K	Ni-Cr/Ni-Al	T	Cu/Cu-Ni
		E	Ni-Cr/Cu-Ni		
⑦	Measuring junction	5	(#5) Ungrounded/Separated		
		9	U (#9) Ungrounded		
⑧	Sheath material	C	316SS		
		D	310S SS		
		B	NCF600eq. (Inconel 600)		
		K	HOSKINS2300 (*Except for φ 8.0)		
⑨	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.
		02	2 (Former JIS class 0.75)	06	1 (IEC)
		03	3 (Former JIS class 1.5)	07	2 (IEC)
		04	ASTM STD.	08	3 (IEC)
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length		N/A		

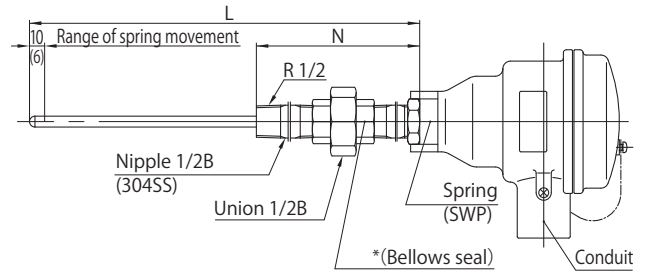
Notes

The structure of the terminal head for the GM type is different from the standard structure. (See Y-2.)

Model Codes and Sheath Outer Diameters

Model code	φ 1.6	φ 3.2	φ 4.8	φ 6.4	φ 8.0
-GA	-	○	○	○	○
-GS	-	-	○	○	○
-GAD	-	○	○	○	○
-GM	-	-	○	○	○

Spring Loaded Explosion-Proof Thermocouple with Nipple/Union d2G4



Dimensions in parentheses () are for bellows type

Model code T407U

T407U- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	2	N=150		
		4	N=150 *Bellows seal		
②	Terminal box	GA	Aluminum die-cast (ADC)	GAD	Aluminum die-cast (ADC) (two-way)
		GS	Stainless steel (ST/ST)	GM	Stainless steel (two-way)
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	D	φ 3.2	F	φ 6.4
		E	φ 4.8	G	φ 8.0
⑤	Number of element wires	2	Single		
		4	Double		
⑥	Type	N	Ni-Cr-Si/Ni-Si	J	Fe/Cu-Ni
		K	Ni-Cr/Ni-Al	T	Cu/Cu-Ni
		E	Ni-Cr/Cu-Ni		
⑦	Measuring junction	5	#5 Ungrounded/Separated		
		9	U (#9) Ungrounded		
⑧	Sheath material	C	316SS		
		D	310S SS		
		B	NCF600eq.(Inconel 600)		
		K	HOSKINS2300 (*Except for φ 8.0)		
⑨	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.
		02	2 (Former JIS class 0.75)	06	1 (IEC)
		03	3 (Former JIS class 1.5)	07	2 (IEC)
		04	ASTM STD.	08	3 (IEC)
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length		N/A		

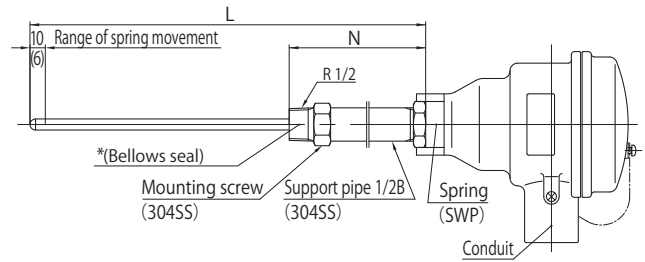
Notes

The structure of the terminal head for the GM type is different from the standard structure. (See Y-2.)

Model Codes and Sheath Outer Diameters

Model code	φ 1.6	φ 3.2	φ 4.8	φ 6.4	φ 8.0
-GA	-	○	○	○	○
-GS	-	-	○	○	○
-GAD	-	○	○	○	○
-GM	-	-	○	○	○

Spring Loaded Explosion-Proof Thermocouple with Support Pipe d2G4



Dimensions in parentheses () are for bellows type

Model code T407S

T407S- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Structure	1	N=100	3	N=100 *Bellows seal
		2	N=150	4	N=150 *Bellows seal
②	Terminal box	GA	Aluminum die-cast (ADC)	GAD	Aluminum die-cast (ADC) (two-way)
		GS	Stainless steel (ST/ST)	GM	Stainless steel (two-way)
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	D	φ 3.2	F	φ 6.4
		E	φ 4.8	G	φ 8.0
⑤	Number of element wires	2	Single		
		4	Double		
⑥	Type	N	Ni-Cr-Si/Ni-Si	J	Fe/Cu-Ni
		K	Ni-Cr/Ni-Al	T	Cu/Cu-Ni
		E	Ni-Cr/Cu-Ni		
⑦	Measuring junction	5	(#5) Ungrounded/Separated		
		9	U (#9) Ungrounded		
⑧	Sheath material	C	316SS		
		D	310S SS		
		B	NCF600eq. (Inconel 600)		
		K	HOSKINS2300 (*Except for φ 8.0)		
⑨	Class	01	1 (Former JIS class 0.4)		
		02	2 (Former JIS class 0.75)		
		03	3 (Former JIS class 1.5)		
		04	ASTM STD.		
⑨	Class	05	ASTM SP.		
		06	1 (IEC)		
⑨	Class	07	2 (IEC)		
		08	3 (IEC)		
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length		N/A		

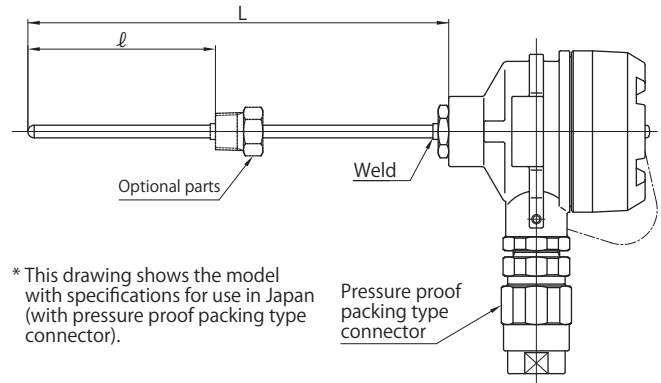
Notes

The structure of the terminal head for the GM type is different from the standard structure. (See Y-2.)

Model Codes and Sheath Outer Diameters

Model code	φ 1.6	φ 3.2	φ 4.8	φ 6.4	φ 8.0
-GA	-	○	○	○	○
-GS	-	-	○	○	○
-GAD	-	○	○	○	○
-GM	-	-	○	○	○

Explosion-Proof (Hydrogen Protection) Thermocouple



Model code T99

T99- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

①	Certifying organization	Blank JP EX EC FM FC	TIIS (Japan) CML (Japan) IECEX (International) ATEX (Baseefa) (Europe) FM (US) FMC (Canada)	NP KS TR PS TS IN	NEPSI (China) KOSHA (South Korea) TR CU (Russia/Kazakhstan/Belarus) PESO (India) OSHA (Taiwan) INMETRO (Brazil)
②	Terminal box	GE GE-CFT GED	Aluminum die-cast (ADC) Aluminum die-cast (ADC) ^{2,3} (COPPER-FREE) Aluminum die-cast (ADC) (two-way)	GED-CFT GES GEDS	Aluminum die-cast (ADC) ^{2,3} (COPPER-FREE) Stainless steel ² Stainless steel (two-way) ²
③	Length (Unit: mm)	L			
④	Sheath outer diameter (Unit: mm)	B,CN D,DN E,EN	φ 1.6, φ 2.0 φ 3.2, φ 3.0 φ 4.8, φ 4.5	F, FN G	φ 6.4, φ 6.0 φ 8.0
⑤	Number of element wires	2 4	Single Double		
⑥	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑦	Measuring junction	5 8	(#5) Ungrounded/Separated G (#8) Grounded	9	U (#9) Ungrounded
⑧	Sheath material	C D	316SS 310S SS	B	NCF600eq. (Inconel 600)
⑨	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑩	Optional parts		See "Standard Parts" section		
⑪	Immersion length (Unit: mm)	- l			

Characteristics

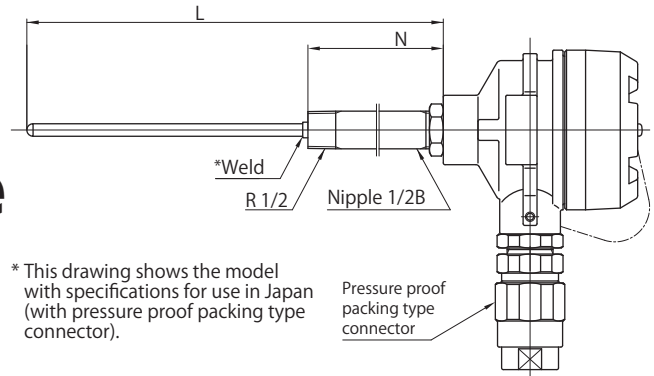
- New technical standards that conform to IEC standard (TIIS)
Explosion proof class: Ex d II C T6 (for Japan/TIIS)
Explosion proof class: Ex db eb II C T6 or T5 Gb
Ex tb III C T85°C or T100°C Db (for Japan/CML)
- Suitable for use in environments with gas vapor, dust, etc. in conformance with IECEx and ATEX directives, and supplied with CE marking
Explosion proof class: Ex db eb II C T6 & T5 Gb
Ex tb III C T85°C & T100°C Db
- Suitable for use in environments with gas vapor, dust, etc. in conformance with NEC standard/CSA standard
Explosion proof class: Class I, Div. 1 Gr. A, B, C & D (for US)
Gr. B, C & D (for Canada)
Class II/III, Div. 1 Gr. E, F & G (for US/Canada)
- Conforms to GB China explosion proof standards
Explosion proof class: Ex de II C T5/T6 Gb Ex tD A21 IP66 T85°C/T100°C
- Conforms to South Korea safety standards
Explosion proof class: Ex de II C T5/T6

- Conforms to EAC TR CU customs union regulations for Russia, Kazakhstan, and Belarus
Explosion proof class: 1Ex de II C T5/T6 Gb X Ex tb III C T95°C/80°C Db X
- Conforms to India safety standards
Explosion proof class: Ex de II C T6 Ta
- Excellent protection class: IP66 (for Japan, international, Europe, China, South Korea, Russia, Kazakhstan, Belarus, Taiwan, and India), NEMA4 & 4X (for US), and Type 4 & 4X (for Canada)
- Models with two-wire temperature transmitters (4 to 20 mA output) also supported
- Light and compact body: Made of aluminum die-cast (stainless steel also available)
- Pressure proof packing type connector equipped as standard (for Japan)
- Multi-paired type also available (for Japan, certified by IECEx, ATEX, FM, NEPSI, and PESO)

*1: The type names on the certification certificates are indicated in the table on the right.
*2: Cannot be used as product with type approval in Japan (TIIS).
*3: The standard coating color is blue.

Japan (TIIS) type approved product	T99
Japan (CML) certified product	OFF
International/ATEX (Baseefa) certified product	OFF
FM certified product	T99
NEPSI certified product	OFF
TR CU certified product	OFF
KOSHA certified product	OFF
PESO certified product	OFF
OSHA certified product	OFF
INMETRO certified product	OFF

Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple



Model code **T99N**

T99N*1- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ / ⑪ ⑫

①	Certifying organization	Blank JP EX EC FM FC	TIIS (Japan) CML (Japan) IECEX (International) ATEX (Baseefa) (Europe) FM (US) FMC (Canada)	NP KS TR PS TS IN	NEPSI (China) KOSHA (South Korea) TR CU (Russia/Kazakhstan/Belarus) PESO (India) OSHA (Taiwan) INMETRO (Brazil)
②	Structure	-1 -2	N=100 *Not welded N=150 *Not welded	-3 -4	N=100 *Welded N=150 *Welded
③	Terminal box	GE GE-CFT GED	Aluminum die-cast (ADC) Aluminum die-cast (ADC) ^{2 3} (COPPER-FREE) Aluminum die-cast (ADC) (two-way)	GED-CFT GES GEDS	Aluminum die-cast (ADC) ^{2 3} (COPPER-FREE) Stainless steel ² Stainless steel (two-way) ²
④	Length (Unit: mm)	L			
⑤	Sheath outer diameter	D, DN E, EN	φ 3.2, φ 3.0 φ 4.8, φ 4.5	F, FN G	φ 6.4, φ 6.0 φ 8.0
⑥	Number of element wires	2	Single	4	Double
⑦	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑧	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded		
⑨	Sheath material	C D	316SS 310S SS	B	NCF600eq. (Inconel 600)
⑩	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑪	Optional parts		See "Standard Parts" section		
⑫	Immersion length		N/A		

Characteristics

- New technical standards that conform to IEC standard (TIIS)
Explosion proof class: Ex d II C T6 (for Japan/TIIS)
Explosion proof class: Ex db eb II C T6 or T5 Gb
Ex tb III C T85°C or T100°C Db (for Japan/CML)
- Suitable for use in environments with gas vapor, dust, etc. in conformance with IECEx and ATEX directives, and supplied with CE marking
Explosion proof class: Ex db eb II C T6 & T5 Gb
Ex tb III C T85°C & T100°C Db
- Suitable for use in environments with gas vapor, dust, etc. in conformance with NEC standard/CSA standard
Explosion proof class: Class I, Div. 1 Gr. A, B, C & D (for US)
Gr. B, C & D (for Canada)
Class II/III, Div. 1 Gr. E, F & G (for US/Canada)
- Conforms to GB China explosion proof standards
Explosion proof class: Ex de II C T5/T6 Gb Ex tD A21 IP66 T85°C/T100°C
- Conforms to South Korea safety standards
Explosion proof class: Ex de II C T5/T6

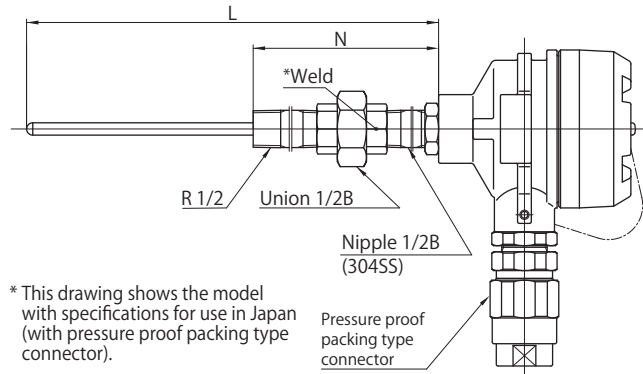
- Conforms to EAC TR CU customs union regulations for Russia, Kazakhstan, and Belarus
Explosion proof class: 1Ex de II C T5/T6 Gb X Ex tb III C T95°C/80°C Db X
- Conforms to India safety standards
Explosion proof class: Ex de II C T6 Ta
- Excellent protection class: IP66 (for Japan, international, Europe, China, South Korea, Russia, Kazakhstan, Belarus, Taiwan, and India), NEMA4 & 4X (for US), and Type 4 & 4X (for Canada)
- Models with two-wire temperature transmitters (4 to 20 mA output) also supported
- Light and compact body: Made of aluminum die-cast (stainless steel also available)
- Pressure proof packing type connector equipped as standard (for Japan)
- Multi-paired type also available (for Japan, certified by IECEX, ATEX, FM, NEPSI, and PESO)

*1: The type names on the certification certificates are indicated in the table on the right.
*2: Cannot be used as product with type approval in Japan (TIIS).
*3: The standard coating color is blue.

Japan (TIIS) type approved product	T99
Japan (CML) certified product	OFF
International/ATEX (Baseefa) certified product	OFF
FM certified product	T99
NEPSI certified product	OFF
TR CU certified product	OFF
KOSHA certified product	OFF
PESO certified product	OFF
OSHA certified product	OFF
INMETRO certified product	OFF

Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple/Union

Model code T99U



T99U*1- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ / ⑪ ⑫

①	Certifying organization	Blank JP EX EC FM FC	TIIS (Japan) CML (Japan) IECEX (International) ATEX (Baseefa) (Europe) FM (US) FMC (Canada)	NP KS TR PS TS IN	NEPSI (China) KOSHA (South Korea) TR CU (Russia/Kazakhstan/Belarus) PESO (India) OSHA (Taiwan) INMETRO (Brazil)
②	Structure	-2 -4	N=150 *Not welded N=150 *Welded		
③	Terminal box	GE GE-CFT GED	Aluminum die-cast (ADC) Aluminum die-cast (ADC) ² ³ (COPPER-FREE) Aluminum die-cast (ADC) (two-way)	GED-CFT GES GEDS	Aluminum die-cast (ADC) ² ³ (COPPER-FREE) Stainless steel ² Stainless steel (two-way) ²
④	Length (Unit: mm)	L			
⑤	Sheath outer diameter	D,DN E,EN	φ 3.2, φ 3.0 φ 4.8, φ 4.5	F, FN G	φ 6.4, φ 6.0 φ 8.0
⑥	Number of element wires	2	Single	4	Double
⑦	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑧	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded		
⑨	Sheath material	C D	316SS 310S SS	B	NCF600eq. (Inconel 600)
⑩	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑪	Optional parts		See "Standard Parts" section		
⑫	Immersion length		N/A		

Characteristics

- New technical standards that conform to IEC standard (TIIS)
Explosion proof class: Ex d II C T6 (for Japan/TIIS)
Explosion proof class: Ex db eb II C T6 or T5 Gb
Ex tb III C T85°C or T100°C Db (for Japan/CML)
- Suitable for use in environments with gas vapor, dust, etc. in conformance with IECEx and ATEX directives, and supplied with CE marking
Explosion proof class: Ex db eb II C T6 & T5 Gb
Ex tb III C T85°C & T100°C Db
- Suitable for use in environments with gas vapor, dust, etc. in conformance with NEC standard/CSA standard
Explosion proof class: Class I, Div. 1 Gr. A, B, C & D (for US)
Gr. B, C & D (for Canada)
Class II/III, Div. 1 Gr. E, F & G (for US/Canada)
- Conforms to GB China explosion proof standards
Explosion proof class: Ex de II C T5/T6 Gb Ex td A21 IP66 T85°C/T100°C
- Conforms to South Korea safety standards
Explosion proof class: Ex de II C T5/T6

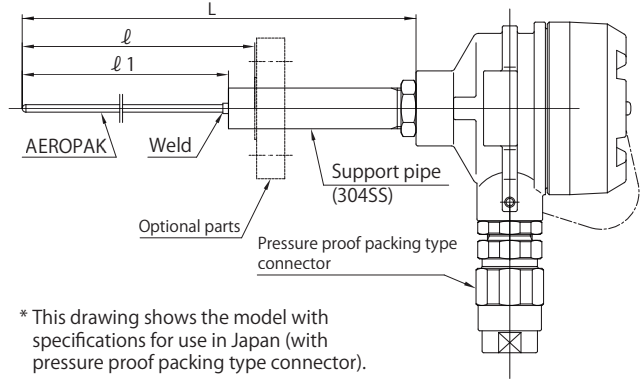
- Conforms to EAC TR CU customs union regulations for Russia, Kazakhstan, and Belarus
Explosion proof class: 1Ex de II C T5/T6 Gb X Ex tb III C T95°C/80°C Db X
- Conforms to India safety standards
Explosion proof class: Ex de II C T6 Ta
- Excellent protection class: IP66 (for Japan, international, Europe, China, South Korea, Russia, Kazakhstan, Belarus, Taiwan, and India), NEMA4 & 4X (for US), and Type 4 & 4X (for Canada)
- Models with two-wire temperature transmitters (4 to 20 mA output) also supported
- Light and compact body: Made of aluminum die-cast (stainless steel also available)
- Pressure proof packing type connector equipped as standard (for Japan)
- Multi-paired type also available (for Japan, certified by IECEX, ATEX, FM, NEPSI, and PESO)

*1: The type names on the certification certificates are indicated in the table on the right.
*2: Cannot be used as product with type approval in Japan (TIIS).
*3: The standard coating color is blue.

Japan (TIIS) type approved product	T99
Japan (CML) certified product	OFF
International/ATEX (Baseefa) certified product	OFF
FM certified product	T99
NEPSI certified product	OFF
TR CU certified product	OFF
KOSHA certified product	OFF
PESO certified product	OFF
OSHA certified product	OFF
INMETRO certified product	OFF

Explosion-Proof (Hydrogen Protection) Thermocouple with Support Pipe

Model code T99S



* This drawing shows the model with specifications for use in Japan (with pressure proof packing type connector).

T99S*1- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ / ⑪ ⑫

①	Certifying organization	Blank JP EX EC FM FC	TIIS (Japan) CML (Japan) IECEX (International) ATEX (Baseefa) (Europe) FM (US) FMC (Canada)	NP KS TR PS TS IN	NEPSI (China) KOSHA (South Korea) TR CU (Russia/Kazakhstan/Belarus) PESO (India) OSHA (Taiwan) INMETRO (Brazil)
②	Structure	-1	φ22 support pipe		
③	Terminal box	GE GE-CFT GED	Aluminum die-cast (ADC) Aluminum die-cast (ADC) ^{2,3} (COPPER-FREE) Aluminum die-cast (ADC) (two-way)	GED-CFT GES GEDS	Aluminum die-cast (ADC) ^{2,3} (COPPER-FREE) Stainless steel ² Stainless steel (two-way) ²
④	Length (Unit: mm)	L			
⑤	Sheath outer diameter	B,CN D,DN E,EN	φ 1.6, φ 2.0 φ 3.2, φ 3.0 φ 4.8, φ 4.5	F,FN G	φ 6.4, φ 6.0 φ 8.0
⑥	Number of element wires	2	Single	4	Double
⑦	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑧	Measuring junction	5 8	(#5) Ungrounded/Separated G (#8) Grounded	9	U (#9) Ungrounded
⑨	Sheath material	C D	316SS 310S SS	B	NCF600eq. (Inconel 600)
⑩	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑪	Optional parts		See "Standard Parts" section		
⑫	Immersion length		N/A		

Characteristics

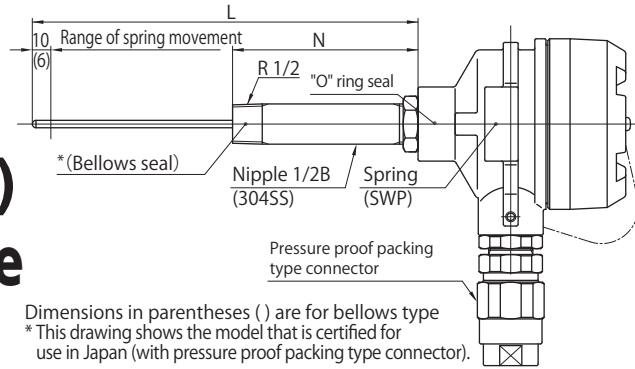
- New technical standards that conform to IEC standard (TIIS)
Explosion proof class: Ex d II C T6 (for Japan/TIIS)
Explosion proof class: Ex db eb II C T6 or T5 Gb
Ex tb III C T85°C or T100°C Db (for Japan/CML)
- Suitable for use in environments with gas vapor, dust, etc. in conformance with IECEx and ATEX directives, and supplied with CE marking
Explosion proof class: Ex db eb II C T6 & T5 Gb
Ex tb III C T85°C & T100°C Db
- Suitable for use in environments with gas vapor, dust, etc. in conformance with NEC standard/CSA standard
Explosion proof class: Class I, Div. 1 Gr. A, B, C & D (for US)
Gr. B, C & D (for Canada)
Class II/III, Div. 1 Gr. E, F & G (for US/Canada)
- Conforms to GB China explosion proof standards
Explosion proof class: Ex de II C T5/T6 Gb Ex td A21 IP66 T85°C/T100°C
- Conforms to South Korea safety standards
Explosion proof class: Ex de II C T5/T6

- Conforms to EAC TR CU customs union regulations for Russia, Kazakhstan, and Belarus
Explosion proof class: 1Ex de II C T5/T6 Gb X Ex tb III C T95°C/80°C Db X
 - Conforms to India safety standards
Explosion proof class: Ex de II C T6 Ta
 - Excellent protection class: IP66 (for Japan, international, Europe, China, South Korea, Russia, Kazakhstan, Belarus, Taiwan, and India), NEMA4 & 4X (for US), and Type 4 & 4X (for Canada)
 - Models with two-wire temperature transmitters (4 to 20 mA output) also supported
 - Light and compact body: Made of aluminum die-cast (stainless steel also available)
 - Pressure proof packing type connector equipped as standard (for Japan)
 - Multi-paired type also available (for Japan, certified by IECEx, ATEX, FM, NEPSI, and PESO)
- *1: The type names on the certification certificates are indicated in the table on the right.
*2: Cannot be used as product with type approval in Japan (TIIS).
*3: The standard coating color is blue.

Japan (TIIS) type approved product	T409
Japan (CML) certified product	OFF
International/ATEX (Baseefa) certified product	OFF
FM certified product	T409
NEPSI certified product	OFF
TR CU certified product	OFF
KOSHA certified product	OFF
PESO certified product	OFF
OSHA certified product	OFF
INMETRO certified product	OFF

Spring Loaded Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple

Model code T409N



T409N*1- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ / ⑪ ⑫

①	Certifying organization	Blank JP EX EC FM FC	TIIS (Japan) CML (Japan) IECEX (International) ATEX (Baseefa) (Europe) FM (US) FMC (Canada)	NP KS TR PS TS IN	NEPSI (China) KOSHA (South Korea) TR CU (Russia/Kazakhstan/Belarus) PESO (India) OSHA (Taiwan) INMETRO (Brazil)
②	Structure	-1 -2	N=100 N=150	-3 -4	N=100 *Bellows seal N=150 *Bellows seal
③	Terminal box	GE GE-CFT GED	Aluminum die-cast (ADC) Aluminum die-cast (ADC) ^{2,3} (COPPER-FREE) Aluminum die-cast (ADC) (two-way)	GED-CFT GES GEDS	Aluminum die-cast (ADC) ^{2,3} (COPPER-FREE) Stainless steel ² Stainless steel (two-way) ²
④	Length (Unit: mm)	L			
⑤	Sheath outer diameter	D,DN E,EN	φ 3.2, φ 3.0 φ 4.8, φ 4.5	F, FN G	φ 6.4, φ 6.0 φ 8.0
⑥	Number of element wires	2	Single	4	Double
⑦	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑧	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded		
⑨	Sheath material	C D	316SS 310S SS	B	NCF600eq. (Inconel 600)
⑩	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑪	Optional parts		See "Standard Parts" section		
⑫	Immersion length		N/A		

Characteristics

- New technical standards that conform to IEC standard (TIIS)
Explosion proof class: Ex d II C T6 (for Japan/TIIS)
Explosion proof class: Ex db eb II C T6 or T5 Gb
Ex tb III C T85°C or T100°C Db (for Japan/CML)
- Suitable for use in environments with gas vapor, dust, etc. in conformance with IECEx and ATEX directives, and supplied with CE marking
Explosion proof class: Ex db eb II C T6 & T5 Gb
Ex tb III C T85°C & T100°C Db
- Suitable for use in environments with gas vapor, dust, etc. in conformance with NEC standard/CSA standard
Explosion proof class: Class I, Div. 1 Gr. A, B, C & D (for US)
Gr. B, C & D (for Canada)
Class II/III, Div. 1 Gr. E, F & G (for US/Canada)
- Conforms to GB China explosion proof standards
Explosion proof class: Ex de II C T5/T6 Gb Ex ID A21 IP66 T85°C/T100°C
- Conforms to South Korea safety standards
Explosion proof class: Ex de II C T5/T6

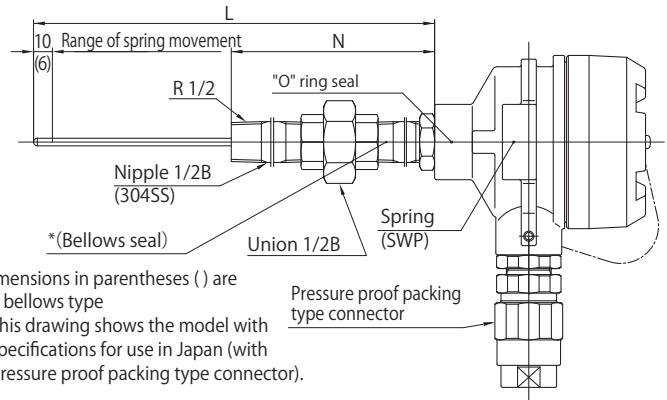
- Conforms to EAC TR CU customs union regulations for Russia, Kazakhstan, and Belarus
Explosion proof class: 1Ex de II C T5/T6 Gb X Ex tb III C T95°C/80°C Db X
- Conforms to India safety standards
Explosion proof class: Ex de II C T6 Ta
- Excellent protection class: IP66 (for Japan, international, Europe, China, South Korea, Russia, Kazakhstan, Belarus, Taiwan, and India), NEMA4 & 4X (for US), and Type 4 & 4X (for Canada)
- Models with two-wire temperature transmitters (4 to 20 mA output) also supported
- Light and compact body: Made of aluminum die-cast (stainless steel also available)
- Pressure proof packing type connector equipped as standard (for Japan)
- Multi-paired type also available (for Japan, certified by IECEX, ATEX, FM, NEPSI, and PESO)

*1: The type names on the certification certificates are indicated in the table on the right.
*2: Cannot be used as product with type approval in Japan (TIIS).
*3: The standard coating color is blue.

Japan (TIIS) type approved product	T409
Japan (CML) certified product	OFF
International/ATEX (Baseefa) certified product	OFF
FM certified product	T409
NEPSI certified product	OFF
TR CU certified product	OFF
KOSHA certified product	OFF
PESO certified product	OFF
OSHA certified product	OFF
INMETRO certified product	OFF

Spring Loaded Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple/Union

Model code T409U



T409U*1- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ / ⑪ ⑫

①	Certifying organization	Blank JP EX EC FM FC	TIIS (Japan) CML (Japan) IECEX (International) ATEX (Baseefa) (Europe) FM (US) FMC (Canada)	NP KS TR PS TS IN	NEPSI (China) KOSHA (South Korea) TR CU (Russia/Kazakhstan/Belarus) PESO (India) OSHA (Taiwan) INMETRO (Brazil)
②	Structure	-2 -4	N=150 N=150 *Bellows seal		
③	Terminal box	GE GE-CFT GED	Aluminum die-cast (ADC) Aluminum die-cast (ADC) ² ³ (COPPER-FREE) Aluminum die-cast (ADC) (two-way)	GED-CFT GES GEDS	Aluminum die-cast (ADC) ² ³ (COPPER-FREE) Stainless steel ² Stainless steel (two-way) ²
④	Length (Unit: mm)	L			
⑤	Sheath outer diameter	D,DN E,EN	φ 3.2, φ 3.0 φ 4.8, φ 4.5	F, FN G	φ 6.4, φ 6.0 φ 8.0
⑥	Number of element wires	2	Single	4	Double
⑦	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑧	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded		
⑨	Sheath material	C D	316SS 310S SS	B	NCF600eq. (Inconel 600)
⑩	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑪	Optional parts		See "Standard Parts" section		
⑫	Immersion length		N/A		

Characteristics

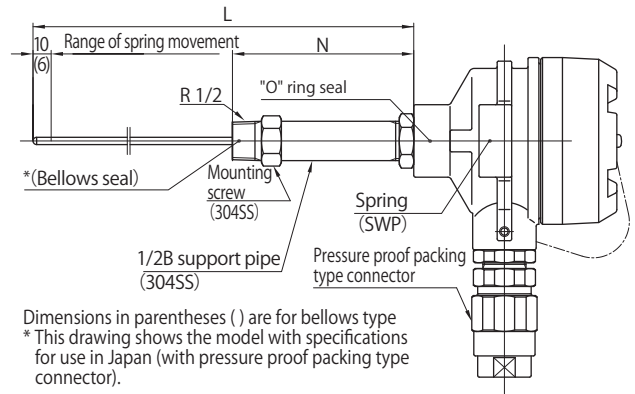
- New technical standards that conform to IEC standard (TIIS)
Explosion proof class: Ex d II C T6 (for Japan/TIIS)
Explosion proof class: Ex db eb II C T6 or T5 Gb
Ex tb III C T85°C or T100°C Db (for Japan/CML)
- Suitable for use in environments with gas vapor, dust, etc. in conformance with IECEx and ATEX directives, and supplied with CE marking
Explosion proof class: Ex db eb II C T6 & T5 Gb
Ex tb III C T85°C & T100°C Db
- Suitable for use in environments with gas vapor, dust, etc. in conformance with NEC standard/CSA standard
Explosion proof class: Class I, Div. 1 Gr. A, B, C & D (for US)
Gr. B, C & D (for Canada)
Class II/III, Div. 1 Gr. E, F & G (for US/Canada)
- Conforms to GB China explosion proof standards
Explosion proof class: Ex de II C T5/T6 Gb Ex tD A21 IP66 T85°C/T100°C
- Conforms to South Korea safety standards
Explosion proof class: Ex de II C T5/T6
- Conforms to EAC TR CU customs union regulations for Russia, Kazakhstan, and Belarus
Explosion proof class: 1Ex de II C T5/T6 Gb X Ex tb III C T95°C/80°C Db X
- Conforms to India safety standards
Explosion proof class: Ex de II C T6 Ta
- Excellent protection class: IP66 (for Japan, international, Europe, China, South Korea, Russia, Kazakhstan, Belarus, Taiwan, and India), NEMA4 & 4X (for US), and Type 4 & 4X (for Canada)
- Models with two-wire temperature transmitters (4 to 20 mA output) also supported
- Light and compact body: Made of aluminum die-cast (stainless steel also available)
- Pressure proof packing type connector equipped as standard (for Japan)
- Multi-paired type also available (for Japan, certified by IECEx, ATEX, FM, NEPSI, and PESO)

*1: The type names on the certification certificates are indicated in the table on the right.
 *2: Cannot be used as product with type approval in Japan (TIIS).
 *3: The standard coating color is blue.

Japan (TIIS) type approved product	T409
Japan (CML) certified product	OFF
International/ATEX (Baseefa) certified product	OFF
FM certified product	T409
NEPSI certified product	OFF
TR CU certified product	OFF
KOSHA certified product	OFF
PESO certified product	OFF
OSHA certified product	OFF
INMETRO certified product	OFF

Spring Loaded Explosion-Proof (Hydrogen Protection) Thermocouple with Support Pipe

Model code T409S



T409S*1- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ / ⑪ ⑫

①	Certifying organization	Blank JP EX EC FM FC	TIIS (Japan) CML (Japan) IECEX (International) ATEX (Baseefa) (Europe) FM (US) FMC (Canada)	NP KS TR PS TS IN	NEPSI (China) KOSHA (South Korea) TR CU (Russia/Kazakhstan/Belarus) PESO (India) OSHA (Taiwan) INMETRO (Brazil)
②	Structure	-1 -2	N=100 N=150	-3 -4	N=100 *Bellows seal N=150 *Bellows seal
③	Terminal box	GE GE-CFT GED	Aluminum die-cast (ADC) Aluminum die-cast (ADC) ^{2,3} (COPPER-FREE) Aluminum die-cast (ADC) (two-way)	GED-CFT GES GEDS	Aluminum die-cast (ADC) ^{2,3} (COPPER-FREE) Stainless steel ² Stainless steel (two-way) ²
④	Length (Unit: mm)	L			
⑤	Sheath outer diameter	D,DN E,EN	φ 3.2, φ 3.0 φ 4.8, φ 4.5	F, FN G	φ 6.4, φ 6.0 φ 8.0
⑥	Number of element wires	2	Single	4	Double
⑦	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑧	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded		
⑨	Sheath material	C D	316SS 310S SS	B	NCF600eq. (Inconel 600)
⑩	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1(IEC) 2(IEC) 3(IEC)
⑪	Optional parts		See "Standard Parts" section		
⑫	Immersion length		N/A		

Characteristics

- New technical standards that conform to IEC standard (TIIS)
Explosion proof class: Ex d II C T6 (for Japan/TIIS)
Explosion proof class: Ex db eb II C T6 or T5 Gb
Ex tb III C T85°C or T100°C Db (for Japan/CML)
- Suitable for use in environments with gas vapor, dust, etc. in conformance with IECEx and ATEX directives, and supplied with CE marking
Explosion proof class: Ex db eb II C T6 & T5 Gb
Ex tb III C T85°C & T100°C Db
- Suitable for use in environments with gas vapor, dust, etc. in conformance with NEC standard/CSA standard
Explosion proof class: Class I, Div. 1 Gr. A, B, C & D (for US)
Gr. B, C & D (for Canada)
Class II/III, Div. 1 Gr. E, F & G (for US/Canada)
- Conforms to GB China explosion proof standards
Explosion proof class: Ex de II C T5/T6 Gb Ex tD A21 IP66 T85°C/T100°C
- Conforms to South Korea safety standards
Explosion proof class: Ex de II C T5/T6

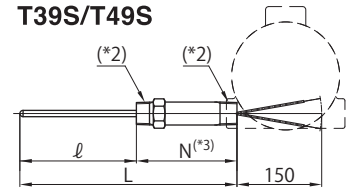
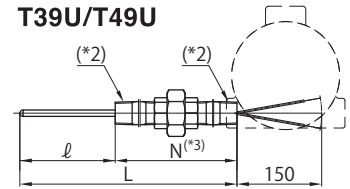
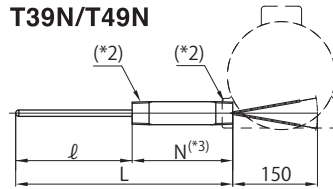
- Conforms to EAC TR CU customs union regulations for Russia, Kazakhstan, and Belarus
Explosion proof class: 1Ex de II C T5/T6 Gb X Ex tb III C T95°C/80°C Db X
- Conforms to India safety standards
Explosion proof class: Ex de II C T6 Ta
- Excellent protection class: IP66 (for Japan, international, Europe, China, South Korea, Russia, Kazakhstan, Belarus, Taiwan, and India), NEMA4 & 4X (for US), and Type 4 & 4X (for Canada)
- Models with two-wire temperature transmitters (4 to 20 mA output) also supported
- Light and compact body: Made of aluminum die-cast (stainless steel also available)
- Pressure proof packing type connector equipped as standard (for Japan)
- Multi-paired type also available (for Japan, certified by IECEx, ATEX, FM, NEPSI, and PESO)

*1: The type names on the certification certificates are indicated in the table on the right.
*2: Cannot be used as product with type approval in Japan (TIIS).
*3: The standard coating color is blue.

Japan (TIIS) type approved product	T409
Japan (CML) certified product	OFF
International/ATEX (Baseefa) certified product	OFF
FM certified product	T409
NEPSI certified product	OFF
TR CU certified product	OFF
KOSHA certified product	OFF
PESO certified product	OFF
OSHA certified product	OFF
INMETRO certified product	OFF

Series / Explosion/Flame Proof Nipple Type Temperature Sensor

Model code



- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

①	Basic model ^{(*)1}	T39N T39U T39S	With nipple With nipple/union With support pipe	T49N T49U T49S	Spring loaded with nipple Spring loaded with nipple/union Spring loaded with support pipe
②	Certification classification	-EX -EC -NP -TR -PS -IN	IECEx certified ATEX (Baseefa) certified NEPSI certified TR CU certified PESO certified INMETRO certified product (Brazil)	(T49N, U, and S only) -FM -KS	FM certified KOSHA certified
③	Nipple length ^{(*)3}	-1 -2	N=75 (39N, 49N) N=160 (39U, 49U)		
④	Length (Unit: mm)	L			
⑤	Sheath outer diameter	B,CN D,DN E,EN	φ 1.6, φ 2.0 φ 3.2, φ 3.0 φ 4.8, φ 4.5	F,EN G	φ 6.4, φ 6.0 φ 8.0
⑥	Number of element wires	2 4	Single Double		
⑦	Type	N K E	Ni-Cr-Si/ Ni-Si Ni-Cr/Ni-Ai Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/CU-Ni
⑧	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded		
⑨	Sheath material	C D B	SUS316 SUS310S NCF600eq. (Inconel 600)		
⑩	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑪	Optional parts		See "Standard Parts" section		
⑫	Immersion length (Unit: mm)	-ℓ			

(*)1: The type name is "FPN" on certificates for IECEx, EC, NP, TR, PS, IN, and KS certified products, regardless of the construction.

(*)2: NPT 1/2, BSPT 1/2, BSPP 1/2, M20x1.5... (EX) (EC) (NP) (TP) (TR) (IN) (KS); NPT 1/2, R1/2... (FM)

(*)3: Standard dimensions. Contact us if other dimensions are required. Pay attention to the ambient temperature in the place where the terminal box is installed.

EX, EC, NP, TR, PS, IN, KS: -50 to 60°C (T6), -50 to 75°C (T5)
FM: -50 to 75°C

For IECEx, an application procedure such as certification exemption confirmation

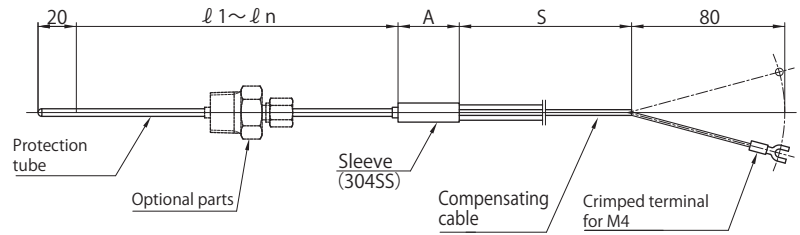
may be required due to the requirements of the accepting country.

Please specify the screw size of the temperature transmitter or terminal box to be combined.

Basically, the country (agency) that has certified the sensor must be the same as the country (agency) that has certified the temperature transmitter or terminal box in order to be combined with the sensor. Make sure to check manufacturer's latest information on acquisition. In addition, they cannot be used in dangerous places where Japanese explosion proof certification is required.

Note: Only for China (NEPSI), the screw sizes of G1/2 and G3/4 cannot be used to combine with the TM or terminal box.

Multipoint Thermocouple



Model code T35M

T35M- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ / ⑨ _____ ⑩ _____ / ⑪ _____

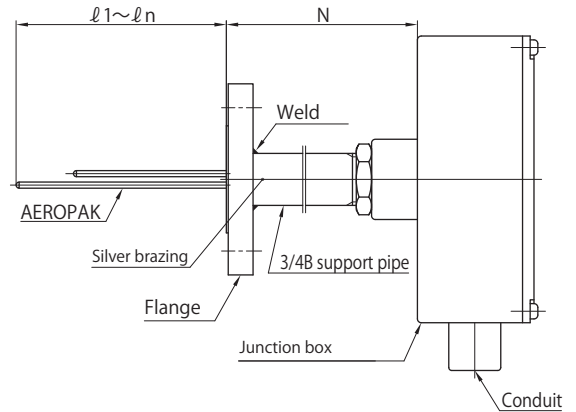
①	Length	ℓ 1 to ℓ n	Measuring junction position			
②	Number	2	Single			
③	Protection tube outer diameter	E	φ 4.8			
		F	φ 6.4			
		G	φ 8.0			
④	Sleeve outer diameter	10	φ 10			
		12	φ 12			
		15	φ 15			
		18	φ 18			
⑤	Type	N	Ni-Cr-Si/Ni-Si	J	Fe/Cu-Ni	
		K	Ni-Cr/Ni-Al	T	Cu/Cu-Ni	
		E	Ni-Cr/Cu-Ni			
⑥	Measuring junction	8	G (#8) Grounded			
		9	U (#9) Ungrounded			
⑦	Protection tube material	C	316SS			
		D	310S SS			
		B	NCF600eq. (Inconel 600)			
⑧	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.	
		02	2 (Former JIS class 0.75)	06	1 (IEC)	
		03	3 (Former JIS class 1.5)	07	2 (IEC)	
		04	ASTM STD.	08	3 (IEC)	
⑨	Compensating cable length (Unit: mm)	S				
⑩	Type	EXD-M	Compensating cable for general use			
		EXE-M	Compensating cable for heat resistance			
⑪	Optional parts		See "Standard Parts" section			

Cross-section diagram	Protection tube outer diameter	Number stored	Storage sheath diameter
	φ 4.8	2 to 6	φ 1.0
	φ 6.4	2 to 12	
	φ 8.0	2 to 15	φ 1.6

Sleeve length (A)					
Sleeve diameter	φ 18	φ 15	φ 12	φ 10	
Number measured	12 to 15	200	-	-	-
	9 to 11	150	200	-	-
	5 to 8	-	150	150	120
	2 to 4		-	120	

Note: Dimensions from ℓ 1 to ℓ n
 Specification method
 Example: 3-point model
 ℓ 1=3000
 ℓ 2=2000
 ℓ 3=1000
 Please indicate each position

Multipoint Thermocouple with Connection Head



Model code **T96M(6)**

T96M(6)- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

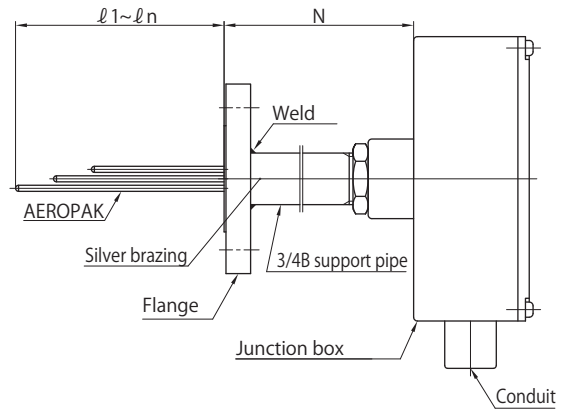
①	Number of terminals	4 to 6	Number of terminals (support pipe)	
②	Terminal box	T Y	Vertical type JB6 Horizontal type JB6	
③	Sheath length		ℓ 1 to ℓ 3	
④	Sheath outer diameter	B D E F	φ 1.6 φ 3.2 φ 4.8 φ 6.4	
⑤	Number of element wires	2 4	Single Double	
⑥	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni	
⑦	Measuring junction	5 8 9	#5 Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded	
⑧	Sheath material	C D B	316SS 310S SS NCF600eq. (Inconel 600)	
⑨	Class	01 02 03 04 05	06 07 08	1 (IEC) 2 (IEC) 3 (IEC)
⑩	Support pipe length	-N	200 mm or more (specified)	
⑪	Optional parts		See "Standard Parts" section	

Notes

The illustration shows the model with the horizontal terminal box. For the model with the vertical terminal box, the temperature sensor is connected where the conduit is shown. Construction may vary depending on the sheath diameter. Please contact our branch office nearest you.

Note: Dimensions from ℓ 1 to ℓ n
Specification method
Example: 3-point model
ℓ 1=3000
ℓ 2=2000
ℓ 3=1000 } Please indicate each position

Multipoint Thermocouple with Connection Head



Model code **T96M(12)**

T96M(12)- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ / ⑩ _____ ⑪ _____

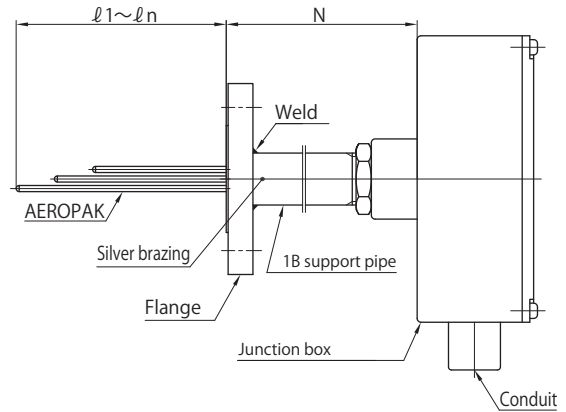
①	Number of terminals	8 to 12	Number of terminals (support pipe)		
②	Terminal box	T Y	Vertical type JB12 Horizontal type JB12		
③	Sheath length		ℓ 1 to ℓ 6		
④	Sheath outer diameter	B D E F	φ 1.6 φ 3.2 φ 4.8 φ 6.4		
⑤	Number of element wires	2 4	Single Double		
⑥	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni		
⑦	Measuring junction	5 8 9	#5 Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded		
⑧	Sheath material	C D B	316SS 310S SS NCF600eq. (Inconel 600)		
⑨	Class	01 02 03 04 05	06 07 08	1 (IEC) 2 (IEC) 3 (IEC)	
⑩	Support pipe length	-N	200 mm or more (specified)		
⑪	Optional parts		See "Standard Parts" section		

Notes

The illustration shows the model with the horizontal terminal box. For the model with the vertical terminal box, the temperature sensor is connected where the conduit is shown. Construction may vary depending on the sheath diameter. Please contact our branch office nearest you.

Note: Dimensions from ℓ 1 to ℓ n
Specification method
Example: 5-point model
ℓ 1=5000
ℓ 2=4000
ℓ 3=3000
ℓ 4=2000
ℓ 5=1000
Please indicate each position

Multipoint Thermocouple with Connection Head



Model code **T96M(24)**

T96M(24)- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ ⑩ _____ / ⑪ _____

①	Number of terminals	14 to 24	Number of terminals (support pipe)	
②	Terminal box	T Y	Vertical type JB24 Horizontal type JB24 (shown in illustration above)	
③	Sheath length		ø 1 to ø 12	
④	Sheath outer diameter	B D E F	ø 1.6 ø 3.2 ø 4.8 ø 6.4	
⑤	Number of element wires	2 4	Single Double	
⑥	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni	
⑦	Measuring junction	5 8 9	#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded	
⑧	Sheath material	C D B	316SS 310S SS NCF600eq. (Inconel 600)	
⑨	Class	01 02 03 04 05	06 07 08	1 (IEC) 2 (IEC) 3 (IEC)
⑩	Support pipe length	-N	200 mm or more (specified)	
⑪	Optional parts		See "Standard Parts" section	

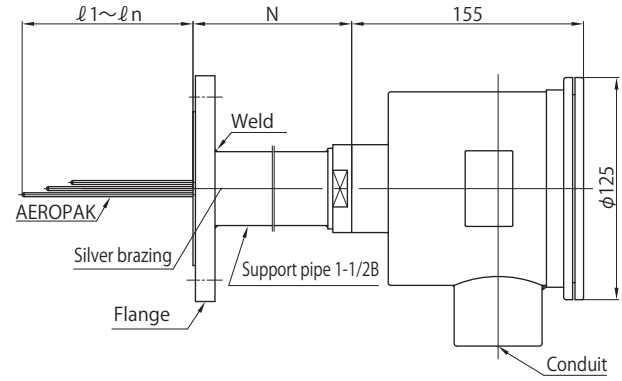
Notes

The illustration shows the model with the horizontal terminal box. For the model with the vertical terminal box, the temperature sensor is connected where the conduit is shown. Construction may vary depending on the sheath diameter. Please contact our branch office nearest you.

Note: Dimensions from ø 1 to ø n
Specification method
Example: 9-point model
ø 1=5000
ø 2=4000
.
.
ø 8=2000
ø 9=1000
Please indicate each position

Explosion-Proof Multipoint Thermocouple

d2G4 (Note 1)



Model code **T97M(12)**

T97M(12)- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ ⑩ _____ / ⑪ _____

①	Number of terminals	4 to 12	4 to 12 terminals		
②	Terminal box	GM12 15-n 20-n 25-n	Stainless steel (ST/ST) G1/2 1 to 4 places G3/4 1 to 4 places G1 1 to 4 places		
③	Sheath length		φ 1 to φ 6 (2 to 6 pairs)		
④	Sheath outer diameter	B D E	φ 1.6 φ 3.2 φ 4.8		
⑤	Number of element wires	2	Single		
⑥	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni		
⑦	Measuring junction	9	U (#9) Ungrounded		
⑧	Sheath material	C D B	316SS 310S SS NCF600eq. (Inconel 600)		
⑨	Class	01 02 03 04 05	06 07 08	1 (IEC) 2 (IEC) 3 (IEC)	
⑩	Support pipe length	-N	200 mm or more (specified) (support pipe)		
⑪	Optional parts		See "Standard Parts" section		

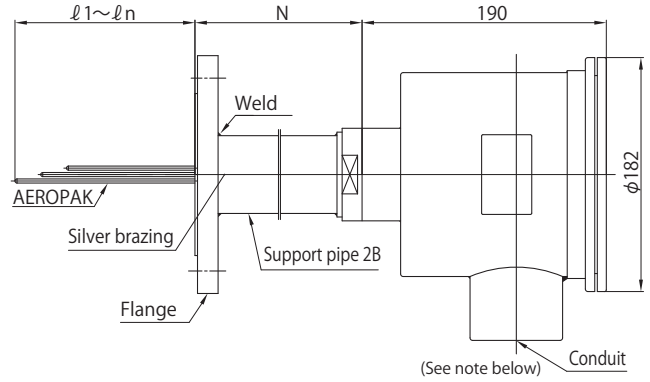
For this model, there are some cases that have not received certification due to the combination of the sheath outer diameter and the conduit. Please contact us to confirm the details. Construction may vary depending on the sheath diameter. Please contact our branch office nearest you.

Note: Dimensions from φ 1 to φ n
Specification method
Example: 5-point model
φ 1=5000
φ 2=4000
φ 3=3000
φ 4=2000
φ 5=1000
Please indicate each position

(Note1)
The T98M(12) model, which conforms to explosion proof class of Ex d II B T4 (SUS terminal box or ADC terminal box), is also available.

Explosion-Proof Multipoint Thermocouple

d2G4 (Note 1)



Model code **T97M(24)**

T97M(24)- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ ⑩ _____ / ⑪ _____

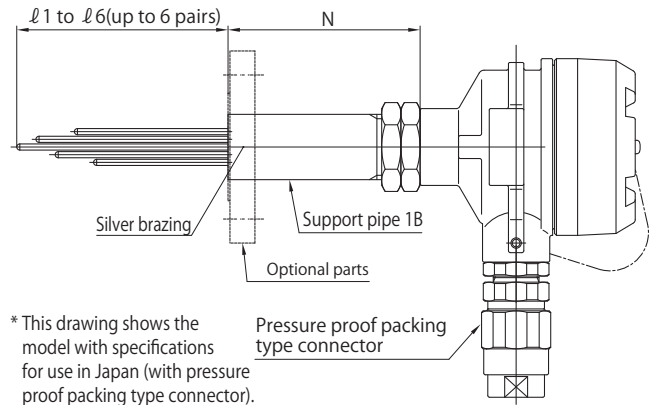
①	Number of terminals	4 to 24	4 to 24 terminals		
②	Terminal box	GM24 25-n 40-n 60-n	Stainless steel (ST/ST) G1 1 to 4 places G1-1/2 1 to 4 places G2 1 to 4 places		
③	Sheath length		φ 1 to φ 12 (2 to 12 pairs) φ 1 to φ 6 (φ 4.8 double)		
④	Sheath outer diameter	B D E F	φ 1.6 φ 3.2 φ 4.8 φ 6.4		
⑤	Number of element wires	2 4	Single Double (φ 4.8 only)		
⑥	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni		
⑦	Measuring junction	9	U (#9) Ungrounded		
⑧	Sheath material	C D B	316SS 310S SS NCF600eq. (Inconel 600)		
⑨	Class	01 02 03 04 05	06 07 08	1 (IEC) 2 (IEC) 3 (IEC)	
⑩	Support pipe length	-N	200 mm or more (specified) (support pipe 2B)		
⑪	Optional parts		See "Standard Parts" section		

For this model, there are some cases that have not received certification due to the combination of the sheath outer diameter and the conduit. Please contact us to confirm the details. Construction may vary depending on the sheath diameter. Please contact our branch office nearest you.

Note: Dimensions from $\phi 1$ to ϕn
Specification method
Example: 9-point model
 $\phi 1=5000$
 $\phi 2=4000$
 .
 .
 $\phi 8=2000$
 $\phi 9=1000$
 Please indicate each position

(Note1)
The T98M(24) model, which conforms to explosion proof class of Ex d II B T4 (SUS terminal box or ADC terminal box), is also available.

Explosion-Proof (Hydrogen Protection) Multipoint Thermocouple



Model code **T99M**

T99M*1- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ / ⑩

①	Certifying organization	Blank JP EX EC FM	TIIS (Japan) CML (Japan) IECEX (International) ATEX (Baseefa) (Europe) FM (US)		
②	Terminal box	GE GED GES GESD	Aluminum die-cast (ADC) Aluminum die-cast (ADC) (two-way) Stainless steel ² Stainless steel (two-way) ²		
③	Sheath outer diameter	B,CN D,DN E,EN	φ 1.6, φ 2.0 φ 3.2, φ 3.0 φ 4.8, φ 4.5	F,FN G	φ 6.4, φ 6.0 φ 8.0
④	Number of element wires	2 4	Single Double		
⑤	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑥	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded		
⑦	Sheath material	C D B	316SS 310S SS NCF600eq. (Inconel 600)		
⑧	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑨	Optional parts		See "Standard Parts" section		
⑩	Immersion length (Unit: mm)		l 1 to l 6		

Construction may vary depending on the sheath diameter. Please contact our branch office nearest you.

Characteristics

- New technical standards that conform to IEC standard (TIIS)
Explosion proof class: Exd II C T6 (for Japan/TIIS)
Explosion proof class: Ex db eb II C T6 or T5 Gb
Ex tb III C T85°C or T100°C Db (for Japan/CML)
- Suitable for use in environments with gas vapor, dust, etc. in conformance with NEC standard
Explosion proof class: Class I, Div.1 Gr. A, B, C & D
Class II/III, Div. 1 Gr. E, F & G (for US)
- Excellent protection class: IP66 (for Japan, international, and Europe), NEMA4 & 4X (for US)
- Light and compact body: Made of aluminum die-cast (stainless steel also available)
- Pressure proof packing type connector equipped as standard (for Japan)

*1: The type names on the certification certificates are indicated in the table on the right.

Japan (TIIS) type approved product	T99
Japan (CML) certified product	OFF
International/ATEX (Baseefa) certified product	OFF
FM certified product	T99

OKAZAKI

Thermocouple

A thermocouple consists of two different types of metal wires that are connected at both ends, so that when a temperature difference occurs between the contacts at both ends, thermoelectromotive force is generated and current flows within this closed circuit. The amount and the polarity of this thermoelectromotive force depend on the temperature of both ends and the combination of the two metal wires, and are not affected by the thickness or length of the metal wires. As a result, if you know in advance the amount of thermoelectromotive force that is generated by the particular thermocouple at each temperature, you can measure the temperature. A wide assortment of element wires are available for our thermocouples, which suit various factors such as the desired temperature measurement range, the conditions at the measurement location, and the required accuracy, and they are designed to always maintain the same performance even when used over a long time. In addition to manufacturing B, R, S, N, K, E, J, and T type thermocouples as defined by the JIS standard, we also manufacture W-5Re and W-26Re type thermocouples, so that a wide range of products are available to suit your purposes.

Construction

In practical applications, thermocouples consist of various components such as the thermocouple element wire, protection tube, terminal box, insulator, and required mounting brackets.

1. Thermocouple element wire
2. Protection tube
3. Terminal box
4. Insulator
5. Mounting bracket

List of Thermocouple Tolerances and the Standards Applied by Each Country

Standard Type	JIS C1602			IEC 60584-1		ASTM E230			
	Temperature range	Class	Tolerance in °C	Class	Tolerance in °C	Temperature range	Class	Tolerance in °C	
B	600°C or higher, and lower than 1700°C	2	±0.0025 t	2	±0.0025 t	870°C or higher, and lower than 1700°C	STD.	±0.5%	
	600°C or higher, and lower than 800°C	3	±4	3	±4				
	800°C or higher, and lower than 1700°C		±0.005 t		±0.005 t				
R&S	0°C or higher, and lower than 1100°C	1	±1	1	±1	0°C or higher, and lower than 1450°C	STD.	±1.5 or ±0.25%	
	0°C or higher, and lower than 600°C	2	±1.5	2	±1.5		SP.	±0.6 or ±0.1%	
	600°C or higher, and lower than 1600°C		±0.0025 t		±0.0025 t				
N&K	-40°C or higher, and lower than +375°C	1	±1.5	1	±1.5	0°C or higher, and lower than +1260°C	STD.	±2.2 or ±0.75%	
	+375°C or higher, and lower than +1000°C		±0.004 t		±0.004 t				
	-40°C or higher, and lower than +333°C	2	±2.5	2	±2.5		SP.	±1.1 or ±0.4%	
	+333°C or higher, and lower than +1200°C		±0.0075 t		±0.0075 t				
	-167°C or higher, and lower than +40°C	3	±2.5	3	±2.5		-200°C or higher, and lower than 0°C	STD.	±2.2 or ±2%
	-200°C or higher, and lower than -167°C		±0.015 t		±0.015 t				
E	-40°C or higher, and lower than +375°C	1	±1.5	1	±1.5	0°C or higher, and lower than +870°C	STD.	±1.7 or ±0.5%	
	+375°C or higher, and lower than +800°C		±0.004 t		±0.004 t				
	-40°C or higher, and lower than +333°C	2	±2.5	2	±2.5		SP.	±1 or ±0.4%	
	+333°C or higher, and lower than +900°C		±0.0075 t		±0.0075 t				
	-167°C or higher, and lower than +40°C	3	±2.5	3	±2.5		-200°C or higher, and lower than 0°C	STD.	±1.7 or ±1%
	-200°C or higher, and lower than -167°C		±0.015 t		±0.015 t				
J	-40°C or higher, and lower than +375°C	1	±1.5	1	±1.5	0°C or higher, and lower than +760°C	STD.	±2.2 or ±0.75%	
	+375°C or higher, and lower than +750°C		±0.004 t		±0.004 t				
	-40°C or higher, and lower than +333°C	2	±2.5	2	±2.5		SP.	±1.1 or ±0.4%	
	+333°C or higher, and lower than +750°C		±0.0075 t		±0.0075 t				
T	-40°C or higher, and lower than +125°C	1	±0.5	1	±0.5	0°C or higher, and lower than +370°C	STD.	±1 or ±0.75%	
	+125°C or higher, and lower than +350°C		±0.004 t		±0.004 t				
	-40°C or higher, and lower than +133°C	2	±1.0	2	±1.0		SP.	±0.5 or ±0.4%	
	+133°C or higher, and lower than +350°C		±0.0075 t		±0.0075 t				
	-67°C or higher, and lower than +40°C	3	±1.0	3	±1.0		-200°C or higher, and lower than 0°C	STD.	±1 or ±1.5%
	-200°C or higher, and lower than -67°C		±0.015 t		±0.015 t				

(1) The tolerance is the allowable maximum limit of the value of the temperature of the thermoelectromotive force converted using the standard thermoelectromotive force table, minus the temperature at the temperature measuring junction.

(2) The tolerance of ASTM shall be either the °C or the % of the measured temperature, whichever is larger.

(3) The |t| is the measured temperature which is indicated as a temperature (°C) unrelated to + and - signs.

(4) Classes 1, 2, and 3 correspond to the former JIS classes of 0.4, 0.75, and 1.5.

(5) JIS, BS and DIN standards are the same as the IEC standard.

(6) The ASTM standard is the former ANSI standard.

(7) The latest version is applied for the standard year.

Types of Thermocouples

JIS C1602

Type		Characteristics
Code	Constituent materials	
B	Pt-30Rh/Pt-6Rh	Thermocouples that combine a positive leg made of a platinum (70%)-rhodium (30%) alloy and a negative leg made of a platinum (94%)-rhodium (6%) alloy. The heat-resistance and mechanical strength are better than type R thermocouples, and the heat-resistant temperature is up to 1700°C.
R	Pt-13Rh/Pt	Thermocouples that combine a positive leg made of a platinum (87%)-rhodium (13%) alloy and a negative leg made of pure platinum. They generally have good accuracy with excellent heat resistance and stability in an oxidizing atmosphere. They have a tendency to be weak in a reducing atmosphere or against metal vapor.
S	Pt-10Rh/Pt	Thermocouples that combine a positive leg made of a platinum (90%)-rhodium (10%) alloy and a negative leg made of pure platinum.
N	Ni-Cr-Si/Ni-Si	These thermocouples are called Nicrosil (positive leg) Nisil (negative leg), and their composition and characteristics are very similar to type K thermocouples. They are an improved version of type K thermocouples, with a larger amount of added Si and better heat resistance.
K	Ni-Cr/Ni-Al	These thermocouples combine a positive leg made of an alloy of mainly nickel and chromium, and a negative leg made of an alloy of mainly nickel and aluminum. They are used the most frequently for industrial purposes, and they show great resistance in an oxidizing atmosphere. However, they are weak in a reducing atmosphere and are not suitable for use in atmospheres with carbon monoxide, sulfurous acid gas, hydrogen sulfide, etc.
E	Ni-Cr/Cu-Ni	These thermocouples combine a positive leg consisting of a type K thermocouple, and a negative leg consisting of a type J thermocouple. They have an extremely large thermoelectromotive force for temperature and are suitable for use in an oxidizing atmosphere.
J	Fe/Cu-Ni	These thermocouples combine a positive leg made of iron, and a negative leg made of an alloy of mainly copper and nickel. They are strong in a reducing atmosphere and robust for hydrogen and carbon. They are not suitable for use in an oxidizing atmosphere due to the rapid oxidation of iron. The relatively inexpensive price makes them suitable for use at medium temperatures.
T	Cu/Cu-Ni	These thermocouples combine a positive leg made of copper, and a negative leg made of an alloy of mainly copper and nickel. They show high accuracy at 300°C or lower, and are especially suitable for use at low temperatures of -200 to 100°C. They are also suitable for use in a weak oxidizing and reducing atmosphere.

Materials and Standard Dimensions of Metal Thermowells

Type Code in the () is the JIS code	Material code	Dimensions (ϕ /mm)		Max. length (mm)	Maximum operating temperature (°C) ^{*1}	Characteristics
		Outer diameter	Inner diameter			
304SS (SUS304)	A	10	7	2000	900	Excellent heat/acid/alkali resistance. Weak against sulfur and reducing gas.
		12	9			
		15	11	3950		
		21.7	15.7			
316SS (SUS316)	C	10	7	2000	900	The heat/acid/alkali resistance is the same as that of 304SS, and the corrosion resistance is excellent at high temperatures.
		12	9			
		15	11	3950		
		21.7	15.7			
316LSS (SUS316L)	CL	10	7	2000	900	The amount of C is less than that of 316SS, and the material has grain-boundary corrosion resistance.
		12	9			
		15	11	3950		
		21.7	16.1			
310S SS (SUS310S)	D	15	11	3950	1000	This heat-resistant steel has a high content rate of Ni-Cr and is strong in oxidizing atmospheres at high temperature.
		21.7	16.1			
		27.2	21.4			
SANDVIK P4 (SUH446)	P	21.7	16.1	3950	1000	The 27Cr steel is heat-resistant and strong against reducing flame and sulfur gas.
		21.3	16			
		26.9	21.6			
UMCo50	U	22	16	3950	1150	The cobalt-base alloy has strong heat-resistance/wear-resistance and is also strong against sulfur gas.
		27	21			
INCONEL600 (NCF600eq.)	B	22	16	3950	1050	This material is strong in high temperature oxidizing and reducing atmospheres.
TITANIUM	T	15	11	3950	250	This material shows excellent corrosion resistance at low temperatures, but the material becomes fragile with oxidation at high temperatures.
		17.3	12.7			
		21.7	16.1			
		27.2	21.6			

*1 The maximum operating temperatures listed here are reference values from JIS and the manufacturer's catalog. These are not guaranteed values.
For additional information, refer to "Protection Tubes/Thermowells."

Materials and Standard Dimensions of Non-metal Thermowells

Type	Material code	Dimensions (φ/mm)		Max. length (mm)	Maximum operating temperature (°C)*1	Characteristics
		Outer diameter	Inner diameter			
Alumina	P1	8	5	1000	1500	Equivalent to JIS R1401 PT1. Extremely stable in oxidizing/reducing atmospheres at high temperatures, with excellent corrosion resistance at high temperatures. Suitable for measuring temperatures within a furnace at 1600° C or higher, as well as molten metal.
		10	6			
		13	9			
		15	11			
		17	13			
		20	15			
High-alumina	P0	8	5	1000	1600	Equivalent to JIS R1401 PT0. Excellent heat resistance/corrosion resistance/ electric insulation/mechanical strength. Excellent wear resistance due to high hardness.
		10	6			
		13	9			
		15	11			
		20	16			
		15	6			
		20	10			
Silicon carbide	GK	20	12	1000	1600	High refractoriness and high heat conduction rate. Not easily affected by zinc, aluminum, lead, acid, and alkali. Strong against rapid heating/cooling, with excellent spalling resistance. Suitable for use as outer tube in double protection tubes.
		25	17			
		30	20			
		35	25			
		40	25			
		45	30			
		50	30			
		60	40			

*1 The maximum operating temperatures listed here are reference values from JIS and the manufacturer's catalog. These are not guaranteed values.

Operating Temperature Limits for Element Wire Diameters

Thermocouple type	Element wire diameter		Operating temp. limit (°C)		Dimensions of the protection tubes used	
	Code	Outer diameter	Limit in general operation	Overheating limit in operation	Metal protection tube (φ mm)	Non-metal protection tube (φ mm)
B	L	0.5	1500	1700	-	15×11
R	L	0.5	1400	1600	-	15×11
S	L	0.5	1400	1600	-	15×11
N	D	3.2	1200	1250	21.7×16.1	-
	C	2.3	1100	1150	21.7×16.1	-
	B	1.6	1050	1100	15×11	-
	A	1.0	950	1000	12×9	-
K	D	3.2	1000	1200	21.7×16.1	-
	C	2.3	900	1100	21.7×16.1	-
	B	1.6	850	1050	15×11	-
	A	1.0	750	950	12×9	-
	H	0.65	650	850	10×7	-
E	B	1.6	550	600	15×11	-
	A	1.0	500	550	12×9	-
	H	0.65	450	500	10×7	-
	T	0.32	300	400	10×7	-
J	C	2.3	550	750	21.7×16.1	-
	B	1.6	500	650	15×11	-
	A	1.0	450	550	12×9	-
	H	0.65	400	500	10×7	-
T	B	1.6	300	350	15×11	-
	A	1.0	250	300	12×9	-
	H	0.65	200	250	10×7	-
	T	0.32	200	250	10×7	-

Inspection standards

External/Structural inspection

Perform visual inspection of terminal head, welds, brazed parts, fastened parts, nameplate, and other parts. Perform liquid penetrant test and airtightness inspection for welds and brazed parts as required.

Dimensional inspection

Thermocouple length	≤150 mm	±2.0 mm
	150 mm<	±1.5%
Nipple length		±3 mm
Other parts	Use a measuring instrument to measure the dimensions of parts specified in the production drawings. Perform measurements in accordance with JIS B0405 medium grade, unless specified otherwise.	

Thermoelectromotive test

T thermocouple	100°C	Boiling point of water
B, R, S, N, K, E, J thermocouple	300°C	Niter bath

Insulation resistance test


The resistance between the element wire and metal protection tube is measured at room temperature. (However, this test is not performed for items with the grounded type measuring junction.)
10 MΩ/500 VDC (only for thermocouple with metal protection tube)

Documentation

The inspection certificate shall be attached to the product. Detailed test report shall be available upon request.

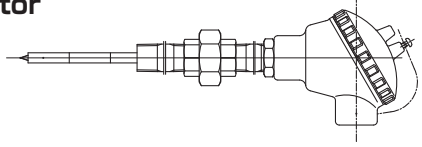
EXE >> B-9

Braided Glass Yarn Insulated Thermocouple



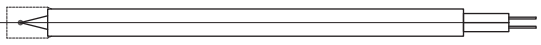
TCU >> B-15

Thermocouple with Connection Head/Insulator



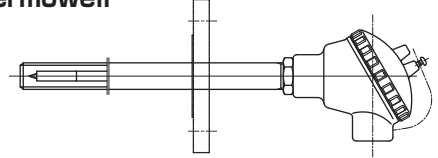
EXS >> B-10

FEP Insulated Thermocouple



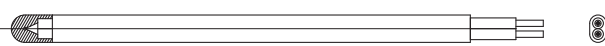
TCW >> B-16

Thermocouple with Connection Head/Insulator/Thermowell



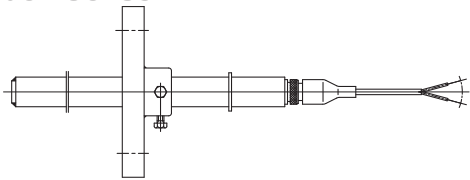
T801-1 >> B-11

Ultra-Fine PFA-Coated Thermocouple



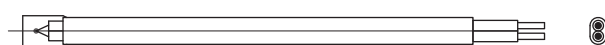
TCW-GS >> B-17

GS One Touch Sensor



T801-2 >> B-12

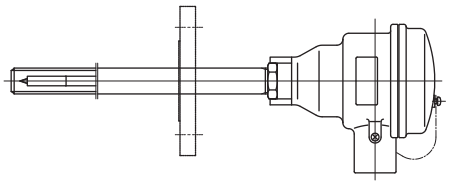
Super-Fine PFA-Coated Thermocouple



TCG >> B-18

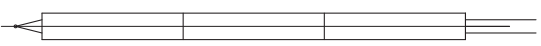
Explosion-Proof Thermocouple with Insulator/Thermowell

d2G4



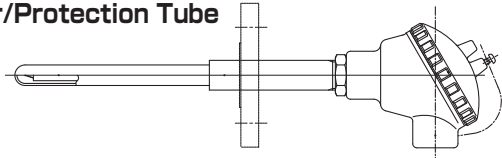
TC >> B-13

Thermocouple with Insulator



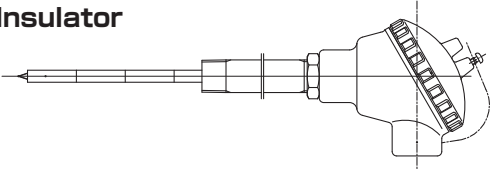
TCP >> B-19

Thermocouple with Connection Head/Insulator/Protection Tube



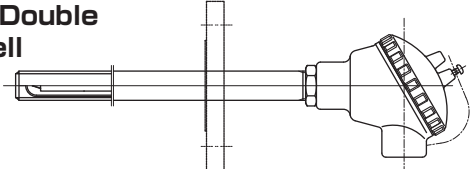
TCN >> B-14

Thermocouple with Connection Head/Insulator

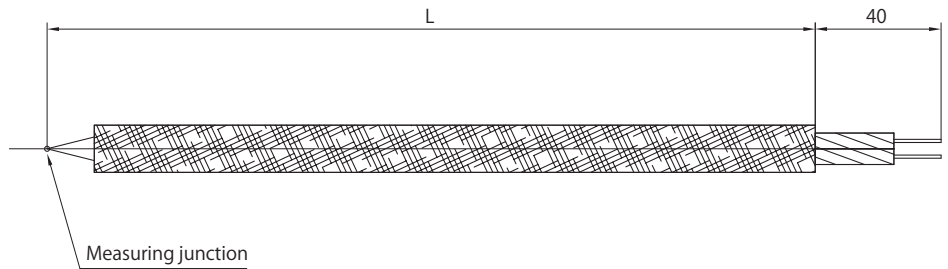


TCR >> B-20

Thermocouple with Connection Head/Insulator/Double Thermowell



Braided Glass Yarn Insulated Thermocouple



Model code EXE

EXE- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____

①	Length (Unit: mm)	L			
②	Element outer diameter	T H	φ 0.32 φ 0.65		
③	Number of element wires	2	Single		
④	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑤	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)

Braided Glass Yarn Insulated Thermocouple Standard Specifications

Specifications				
Element wire diameter	A	B	Temp. limit in operation	
φ 0.65	Approx. 3.2	Approx. 2.0	200°C	
φ 0.32	Approx. 2.3	Approx. 1.4	200°C	

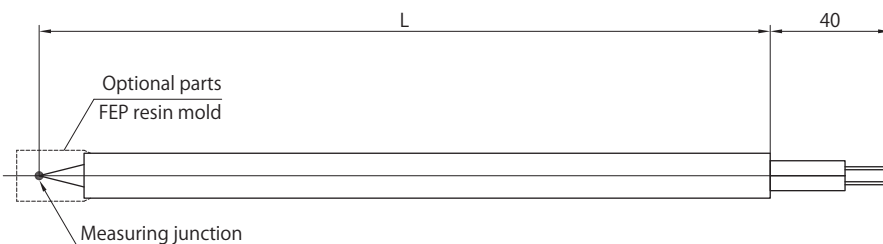
Color Type		*JIS C 1610 (IEC60584-3)			
		Color code for overall jacket		Color code for polarity	
		JIS-2012	JIS-1995 (Category 2)	JIS-2012	JIS-1995 (Category 2)
EXE	N	Pink	-	+ side: Same as overall jacket color - side: White	+ side: Red - side: White
	K	Green	Blue		
	E	Purple	Purple		
	J	Black	Yellow		
	T	Brown	Brown		

The latest version is applied for the standard year.

* JIS C1610 was revised and integrated into the IEC standard (Category 1) in 2012. However, we will also continue to use the former standard (Category 2) for a while.

Note: The glass fiber binder emits a small amount of smoke at temperatures exceeding 150°C. As long as the burning of the binder can be tolerated, this product can be used at temperatures of up to approximately 400°C (or 350°C for element T).

FEP Insulated Thermocouple



Model code EXS

EXS- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ / ⑥ _____

①	Length (Unit: mm)	L			
②	Element outer diameter	T	φ0.32		
		H	φ0.65		
③	Number of element wires	2	Single		
④	Type	N	Ni-Cr-Si/Ni-Si		
		K	Ni-Cr/Ni-Al		
		E	Ni-Cr/Cu-Ni		
		J	Fe/Cu-Ni		
		T	Cu/Cu-Ni		
⑤	Class	01	1 (Former JIS class 0.4)	06	1 (IEC)
		02	2 (Former JIS class 0.75)	07	2 (IEC)
		03	3 (Former JIS class 1.5)	08	3 (IEC)
		04	ASTM STD.		
		05	ASTM SP.		
⑥	Optional parts	M	Mold		

FEP Insulated Thermocouple Standard Specifications

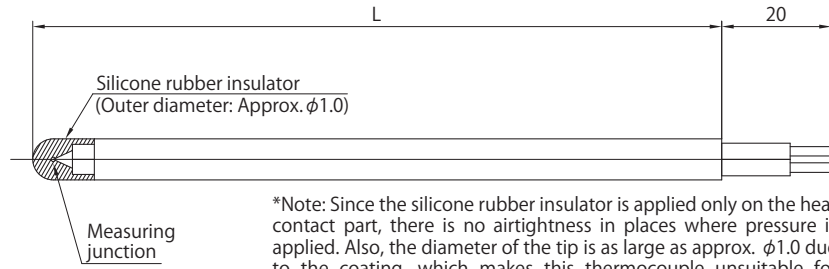
Specifications				
Element wire diameter	A	B	Temp. limit in operation	
φ0.65	Approx. 2.8	Approx. 1.7	-200 to 200°C (-200 to 150°C) *Mold type	
φ0.32	Approx. 1.7	Approx. 1.0	-200 to 200°C (-200 to 150°C) *Mold type	

Color Type		*JIS C 1610 (IEC60584-3)			
		Color code for overall jacket		Color code for polarity	
		JIS-2012	JIS-1995 (Category 2)	JIS-2012	JIS-1995 (Category 2)
EXS	N	Pink	-	+ side: Same as overall jacket color - side: White	+ side: Red - side: White
	K	Green	Blue		
	E	Purple	Purple		
	J	Black	Yellow		
	T	Brown	Brown		

The latest version is applied for the standard year.

* JIS C1610 was revised and integrated into the IEC standard (Category 1) in 2012. However, we will also continue to use the former standard (Category 2) for a while.

Ultra-Fine PFA-Coated Thermocouple



*Note: Since the silicone rubber insulator is applied only on the heat contact part, there is no airtightness in places where pressure is applied. Also, the diameter of the tip is as large as approx. $\phi 1.0$ due to the coating, which makes this thermocouple unsuitable for performing measurement in minuscule places.

Model code **T801-1**

T801-1- ① _____ ② _____

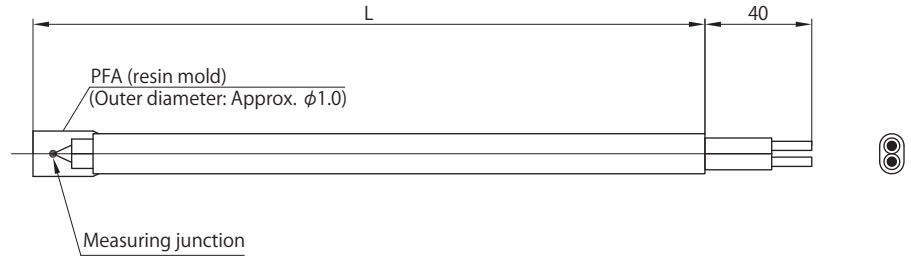
①	Length (Unit: mm)	L	
②	Element	K T	Ni-Cr/Ni-Al Cu/Cu-Ni

Specifications

Element	Element wire outer diameter	Insulation coating	Coating outer diameter	Measuring junction	Maximum operating temp.
K & T Class 2	$\phi 0.06$	PFA resin	Approx. 0.31×0.49	Silicone rubber insulator	180°C

Note: The colors of the insulation coating comply with JIS C 1610:2012.
The outer layer is transparent.

Super-Fine PFA-Coated Thermocouple



Model code **T801-2**

T801-2- ① _____ ② _____

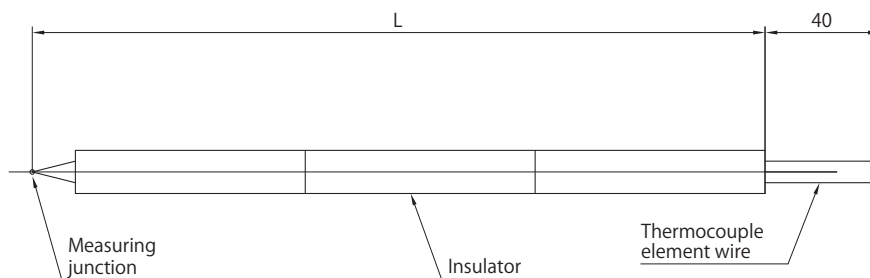
①	Length (Unit: mm)	L	
②	Element	K	Ni-Cr/Ni-Al

Specifications

Element	Element wire outer diameter	Insulation coating	Coating outer diameter	Measuring junction	Maximum operating temp.
K Class 2	φ0.1	PFA resin	Approx. 0.42×0.68	PFA resin mold	180°C

Note: The colors of the insulation coating comply with JIS C 1610:1995 Category 2.

Thermocouple with Insulator



Model code TC

TC- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____

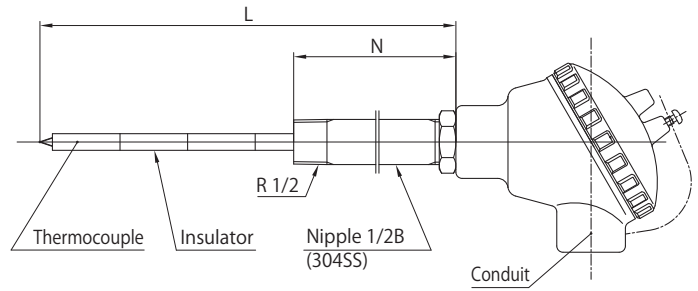
①	Length (Unit: mm)	L				
②	Element outer diameter	T	φ0.5			
		H	φ0.65			
		A	φ1.0			
		B	φ1.6			
		C	φ2.3			
		D	φ3.2			
③	Number of element wires	2	Single			
		4	Double			
④	Type	B	Pt-Rh30/Pt-Rh6	K	Ni-Cr/Ni-Al	
		R	Pt-Rh13/Pt	E	Ni-Cr/Cu-Ni	
		S	Pt-Rh10/Pt	J	Fe/Cu-Ni	
		N	Ni-Cr-Si/Ni-Si	T	Cu/Cu-Ni	
				01	1 (Former JIS class 0.4)	05
⑤	Class	02	2 (Former JIS class 0.75)	06	1 (IEC)	
		03	3 (Former JIS class 1.5)	07	2 (IEC)	
		04	4 (Former JIS class 0.25) (B, R, and S are former JIS class 0.25)	08	3 (IEC)	
			(B is former JIS class 0.5)			
			ASTM STD.			

Standard Specifications of Thermocouple with Insulator

Element wire types and element wire diameter								Insulator dimensions		Insulator
B	R	S	N	K	E	J	T	D	A×B	
φ0.5	φ0.5	φ0.5	-	-	-	-	-	φ4.0	-	Single element
-	-	-	φ0.65	φ0.65	φ0.65	φ0.65	φ0.65	φ4.0	-	
-	-	-	φ1.0	φ1.0	φ1.0	φ1.0	φ1.0	φ6.0	-	
-	-	-	φ1.6	φ1.6	φ1.6	φ1.6	φ1.6	φ8.0	-	
-	-	-	φ2.3	φ2.3	φ2.3	φ2.3	φ2.3	-	10×7.5	
-	-	-	φ3.2	φ3.2	φ3.2	φ3.2	φ3.2	-	12×7.5	
										Double element
-	-	-	φ1.0	φ1.0	φ1.0	φ1.0	φ1.0	φ8.0	-	
-	-	-	φ1.6	φ1.6	φ1.6	φ1.6	φ1.6	φ8.0	-	
-	-	-	φ2.3	φ2.3	-	φ2.3	-	φ12	-	
-	-	-	φ3.2	φ3.2	-	-	-	φ14	-	

Note: R and S Class 1, as well as ASTM SP., are suitable for use in standard thermometers.

Thermocouple with Connection Head/Insulator

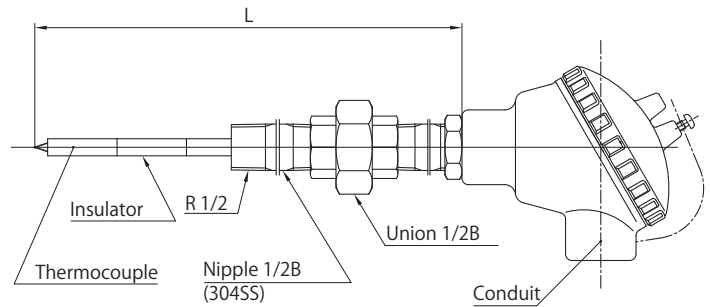


Model code TCN

TCN- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ / ⑨ _____

①	Structure	1	N=100
		2	N=150
②	Terminal box	-EL	Aluminum die-cast (ADC)
		-ED	Aluminum die-cast (ADC) (two-way)
		-EF	Cast iron
		-EP	Resin
③	Length (Unit: mm)	L	
④	Element outer diameter	H	φ0.65
		A	φ1.0
		B	φ1.6
		C	φ2.3
		D	φ3.2
⑤	Number of element wires	2	Single
		4	Double
⑥	Type	N	Ni-Cr-Si/Ni-Si
		K	Ni-Cr/Ni-Al
		E	Ni-Cr/Cu-Ni
		J	Fe/Cu-Ni
		T	Cu/Cu-Ni
⑦	Measuring junction	5	(#5) Ungrounded/Separated
		9	U (#9) Ungrounded
⑧	Class	01	1 (Former JIS class 0.4)
		02	2 (Former JIS class 0.75)
		03	3 (Former JIS class 1.5)
		04	ASTM STD.
		05	ASTM SP.
		06	1 (IEC)
		07	2 (IEC)
		08	3 (IEC)
⑨	Optional parts		Refer to protection tube catalog

Thermocouple with Connection Head/Insulator

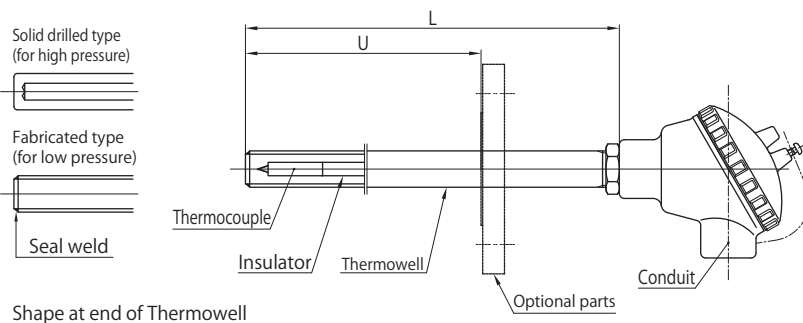


Model code TCU

TCU- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ / ⑨ _____

①	Structure	2	N=150
②	Terminal box	-EL -ED -EF -EP	Aluminum die-cast (ADC) Aluminum die-cast (ADC) (two-way) Cast iron Resin
③	Length (Unit: mm)	L	
④	Element outer diameter	H A B C D	φ0.65 φ1.0 φ1.6 φ2.3 φ3.2
⑤	Number of element wires	2 4	Single Double
⑥	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni Fe/Cu-Ni Cu/Cu-Ni
⑦	Measuring junction	5 9	(#5) Ungrounded/Separated U (#9) Ungrounded
⑧	Class	01 02 03 04 05 06 07 08	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD. ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑨	Optional parts		Refer to protection tube catalog

Thermocouple with Connection Head/ Insulator/Thermowell



Model code TCW

TCW- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ ⑩ _____ / ⑪ _____ ⑫ _____

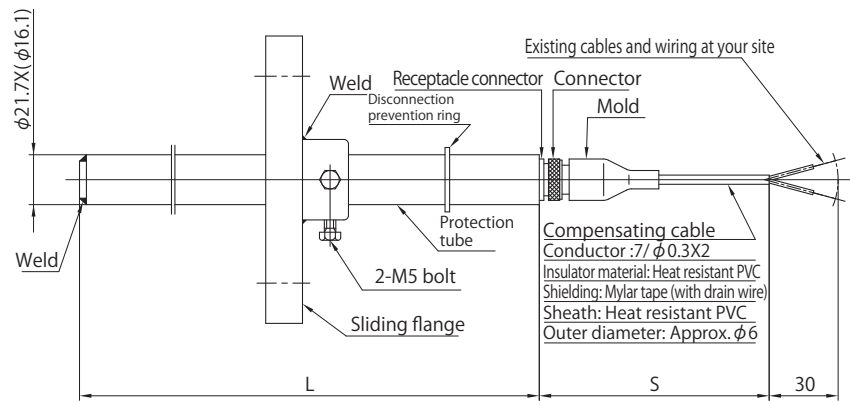
①	Structure	1 2	Fabricated type Solid drilled type		
②	Terminal box	-EL -ED	Aluminum die-cast (ADC) Aluminum die-cast (ADC) (two-way)	-EF -EP	Cast iron Resin
③	Length (Unit: mm)	L			
④	Element outer diameter	H A B	φ0.65 φ1.0 φ1.6	C D	φ2.3 φ3.2
⑤	Number of element wires	2 4	Single Double		
⑥	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑦	Measuring junction	5 9	(#5) Ungrounded/Separated U (#9) Ungrounded		
⑧	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑨	Thermowell dimensions	-10 -12 -15 -22	See the table below		
⑩	Thermowell material	A C	304SS 316SS		
⑪	Optional parts		See "Standard Parts" section		
⑫	Immersion length (Unit: mm)	-U			

Protection tube dimensions

Code	Outer diameter	Pipe inner diameter	Diameter of hollow area
-10	φ10	φ7	φ7
-12	φ12	φ9	φ9
-15	φ15	φ11	φ9
-22	φ21.7	φ16.1	-
	φ22	-	φ9

Please contact us for details about sizes other than the above.

GS One Touch Sensor



Model code **TCW-GS**

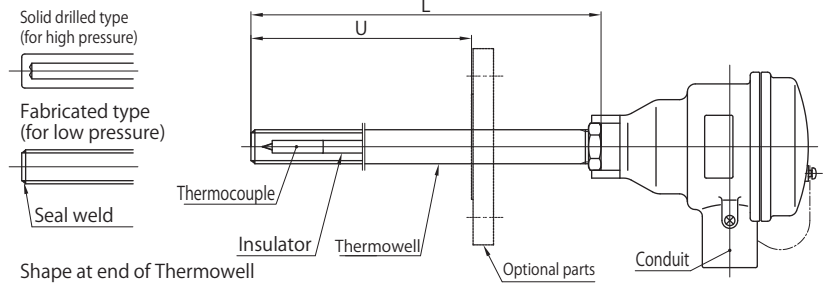
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 ⑨ _____ ⑩ _____ / ⑪ _____ ⑫ _____ ⑬ _____ / ⑭ _____ / ⑮ _____

①	Structure	1 2	Pipe type (standard) Hollowed-out type		
②	Connector	GS	Waterproof connector		
③	Length (Unit: mm)	L			
④	Element outer diameter	C D	φ 2.3 φ 3.2 (standard)		
⑤	Number of element wires	2 4	Single Double		
⑥	Type	K	Ni-Cr/Ni-Al		
⑦	Measuring junction	9	Ungrounded		
⑧	Class	01 02	1 (Former JIS class 0.4) 2 (Former JIS class 0.75)		
⑨	Protection tube dimensions	-22 -27			
⑩	Protection tube material	A C D	304SS 316SS 310S SS	N P	NCF600eq. (Inconel 600) SUH446
⑪	Compensating cable length (Unit: mm)	S	Standard: 3000, 5000 Max. length: 10000		
⑫	Flange material	A C Z	304SS 316SS Other (Please specify)		
⑬	Flange rating	J 05 J 10 J20	JIS 5K JIS 10K JIS 20K		
⑭	Flange size	20 25 40	20A 25A 40A	50 Z	50A Other (Please specify)
⑮	Flange face	RF FF	Raised face Flat face		

Explosion-Proof Thermocouple with Insulator/ Thermowell

d2G4

Model code TCG



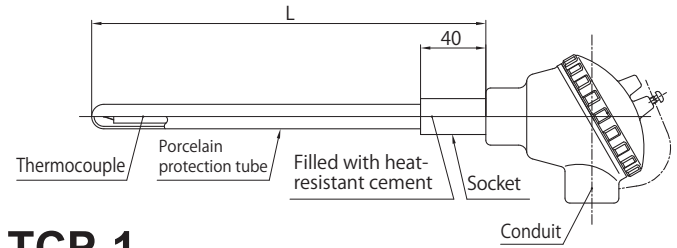
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①	Structure	1 2	Fabricated type Solid drilled type		
②	Terminal box	GA	Aluminum die-cast (ADC)		
③	Length (Unit: mm)	L			
④	Element outer diameter	H A B	φ 0.65 φ 1.0 φ 1.6	C D	φ 2.3 φ 3.2
⑤	Number of element wires	2 4	Single Double		
⑥	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni
⑦	Measuring junction	5 9	(#5) Ungrounded/Separated U (#9) Ungrounded		
⑧	Class	01 02 03 04	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD.	05 06 07 08	ASTM SP. 1 (IEC) 2 (IEC) 3 (IEC)
⑨	Thermowell dimensions	-10 -12 -15 -22	See the table below		
⑩	Thermowell material	A C	304SS 316SS		
⑪	Optional parts		See "Standard Parts" section		
⑫	Immersion length (Unit: mm)	-U			

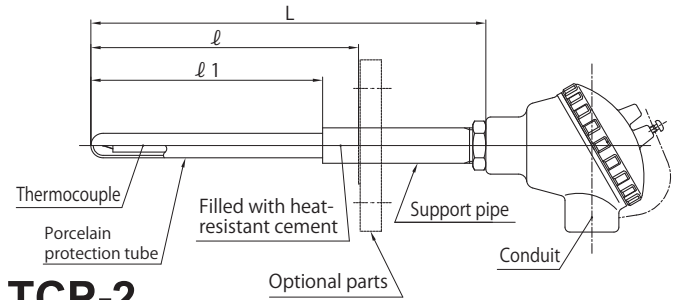
Protection tube dimensions

Code	Outer diameter	Pipe inner diameter	Diameter of hollow area
-10	φ 10	φ 7	φ 5 to φ 7
-12	φ 12	φ 9	φ 7 to φ 9
-15	φ 15	φ 11	φ 9 to φ 11
-22	φ 21.7	φ 16.1	-
	φ 22	-	φ 14.5 to φ 16

Thermocouple with Connection Head/ Insulator/Protection Tube



TCP-1



TCP-2

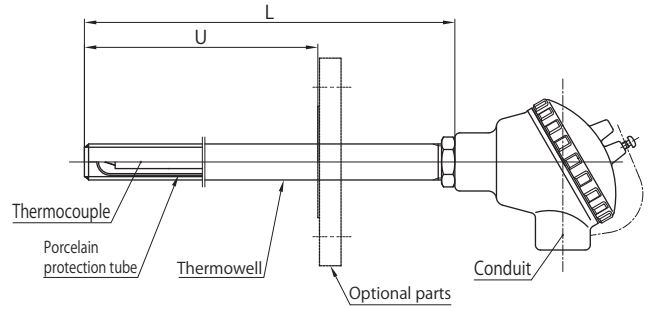
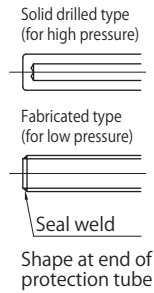
Model code TCP

TCP- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ ⑧ _____ ⑨ _____ ⑩ _____ / ⑪ _____ ⑫ _____

①	Structure	1	Socket type	
		2	Support fabricated type	
②	Terminal box	-EL	Aluminum die-cast (ADC)	-EF Cast iron
		-ED	Aluminum die-cast (ADC) (two-way)	-EP Resin
③	Length (Unit: mm)	L		
④	Element outer diameter	φ0.5	N/A	
⑤	Number of element wires	2	Single	
		4	Double	
⑥	Type	B	Pt-Rh30/Pt-Rh6	
		R	Pt-Rh13/Pt	
		S	Pt-Rh10/Pt	
⑦	Measuring junction	5	(#5) Ungrounded/Separated	
		9	U (#9) Ungrounded	
⑧	Class	02	2 (Former JIS class 0.25)	06 1 (IEC)
		03	3 (Former JIS class 0.5)	07 2 (IEC)
		04	ASTM STD.	08 3 (IEC)
		05	ASTM SP.	
⑨	Protection tube dimensions	-10	φ 10	-15 φ 15
		-13	φ 13	-17 φ 17
⑩	Protection tube material	P0	PT0 (equivalent to JIS R1401)	
		P1	PT1 (equivalent to JIS R1401)	
⑪	Optional parts		See "Standard Parts" section	
⑫	Immersion length (Unit: mm)	-l / l1		

Thermocouple with Connection Head/ Insulator/Double Thermowell

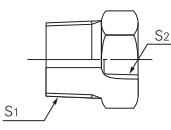
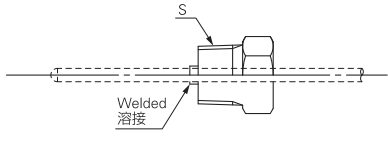
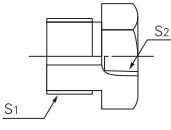
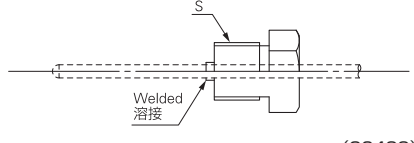
Model code TCR



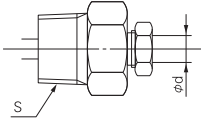
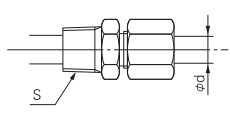
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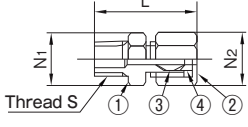
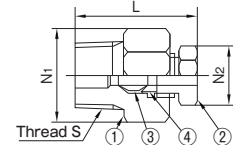
①	Structure	1	Fabricated type
		2	Solid drilled type
②	Terminal box	-EL	Aluminum die-cast (ADC)
		-ED	Aluminum die-cast (ADC) (two-way)
		-EF	Cast iron
		-EP	Resin
③	Length (Unit: mm)	L	
④	Element outer diameter	φ0.5	N/A
⑤	Number of element wires	2	Single
		4	Double
⑥	Type	B	Pt-Rh30/Pt-Rh6
		R	Pt-Rh13/Pt
		S	Pt-Rh10/Pt
⑦	Measuring junction	5	(#5) Ungrounded/Separated
		9	U (#9) Ungrounded
⑧	Class	02	2 (Former JIS class 0.25)
		03	3 (Former JIS class 0.5)
		04	ASTM STD.
		05	ASTM SP.
⑨	Thermowell dimensions	-22	Nominal diameter φ22
		-27	Nominal diameter φ27
⑩	Thermowell material	B	NCF600eq. (Inconel 600)
		D	310S SS
		P	SANDVIK P4 (SUH446)
		U	Co-Cr-Fe alloy
⑪	Optional parts		See "Standard Parts" section
⑫	Immersion length (Unit: mm)	-U	

Standard Parts

Double threaded adapter			Single threaded adapter			
AD-2T1T	S ₁ R1/4	S ₂ R1/8	 <p>(304SS)</p>	AS-1T	S R1/8	 <p>(304SS)</p>
AD-3T1T	R3/8	R1/8		AS-2T	R1/4	
AD-4T1T	R1/2	R1/8		AS-3T	R3/8	
AD-6T1T	R3/4	R1/8		AS-4T	R1/2	
AD-4T2T	R1/2	R1/4		AS-6T	R3/4	
AD-6T2T	R3/4	R1/4				
AD-2F1T	G1/4	R1/8	 <p>(304SS)</p>	AS-1F	G1/8	 <p>(304SS)</p>
AD-3F1T	G3/8	R1/8		AS-2F	G1/4	
AD-4F1T	G1/2	R1/8		AS-3F	G3/8	
AD-6F1T	G3/4	R1/8		AS-4F	G1/2	
AD-4F2T	G1/2	R1/4		AS-6F	G3/4	
AD-6F2T	G3/4	R1/4				

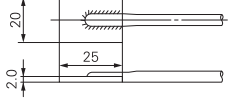
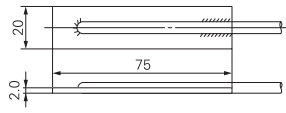
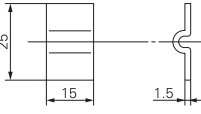
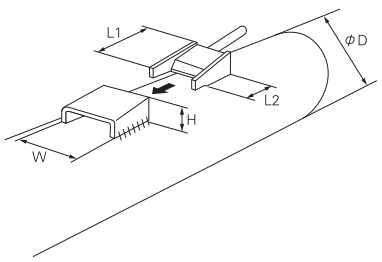
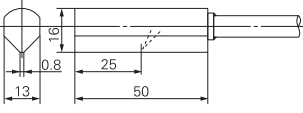
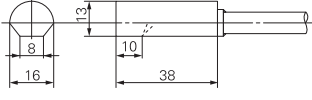
Compression fitting

	S	φd		S	φd		
CF2T64	R1/4	φ6.4	 <p>(304SS)</p>	CF1T10	R1/8	 <p>(304SS)</p>	
CF2T80	R1/4	φ8.0		CF1T16	R1/8		φ1.0
CF4T64	R1/2	φ6.4		CF1T32	R1/8		φ1.6
CF4T80	R1/2	φ8.0		CF1T48	R1/8		φ3.2
						φ4.8	

Structure	Code	Specifications					Material	Sheath outer diameter applied
		S	N1	N2	L			
	/CF1T10	R1/8	14×16.2	14×16.2	30	① Main body (304SS) ② Cap nut (304SS) ③ Ferrule (C3604) ④ Ferrule holder (SS400)	φ1.0 ^(*)	
	/CF1T16				32		φ1.6	
	/CF1T32				33		φ3.2	
	/CF1T48						φ4.8	
	/CF2T64	R1/4	17×19.6	14×16.2	40		φ6.4	
	/CF2T80			17×19.6			42	φ8.0
	/CF4T64	R1/2	24×27.7	14×16.2	36		φ6.4	
	/CF4T80			17×19.6			37	φ8.0

* The ferrule ③ for φ1.0 is made of wound ceramic yarn.

Surface pads

AEROPAD (304SS) AEROPAD PD-A φ3.2, φ4.8		RESIOPAD (304SS) RESIOPAD PD-R φ3.2, φ4.8, φ6.4																
Strap (304SS) Strap ST-D φ3.2 ST-E φ4.8		U Pad (304SS) U Pad PD-UD φ3.2 φD: φ38 to φ120																
Knife Edge Pad Knife Edge Pad (Hastelloy-X) PD-N φ8.0		PD-UE φ4.8 φD: φ80 to φ200 (Unwelded type) (Unwelded type)																
Fan Tip Pad Fan Tip Pad (Hastelloy-X) PD-F φ8.0																		
				<table border="1"> <thead> <tr> <th></th> <th>L1</th> <th>L2</th> <th>W</th> <th>H</th> </tr> </thead> <tbody> <tr> <td>PD-UD</td> <td>46</td> <td>25</td> <td>21</td> <td>13.5</td> </tr> <tr> <td>PD-UE</td> <td>47</td> <td>32</td> <td>26</td> <td>16</td> </tr> </tbody> </table>		L1	L2	W	H	PD-UD	46	25	21	13.5	PD-UE	47	32	26
	L1	L2	W	H														
PD-UD	46	25	21	13.5														
PD-UE	47	32	26	16														

Pressure proof packing type connector		S type fin anti-vibration/heat collection plate			
GL-15S-BC (BC Plated) GL-15S-SUS (304SS) S: PF1/2 or G1/2 L=107			ϕd	ϕD	L
		FN-1	$\phi 4.8$	$\phi 11$	65
		FN-2	$\phi 6.4$	$\phi 11$	65
		FN-3	$\phi 4.8$	$\phi 9$	65
GL-20S-BC (BC Plated) GL-20S-SUS (304SS) S: PF3/4 or G3/4 L=110	(for d2G4)	FN-4	$\phi 8.0$	$\phi 16$	100

Terminal boxes/Connectors		
EL type A.D.C Silver 390g 	ES type A.D.C Silver 150g 	EF type F.C Silver 1250g
ED type A.D.C Silver 670g 	EP type Phenol resin Black 380g 	GE type A.D.C Silver 750g GES type Stainless steel 2100g
GED type A.D.C Silver 800g GESD type Stainless steel 2300g 	GA type A.D.C Silver 630g GS type Stainless steel 1560g 	GAD type A.D.C Silver 700g
RC type A.D.C Silver 230g 	CB type Phenol resin Thermocouple color code (IBJIS) 150g 	AL/AS type Brass Nickel plating 70g (50g)
GM type Stainless steel 2050g 	TL/TS type Al Silver 120 g (40 g) 	Push-pull Material: PSU 20g

* Explosion-proof
 A.D.C: Aluminum die-cast
 F.C: Cast iron The weight (g) is an approximate value.

Mounting plate

Structure	Code	Specifications	Description
	/PL-KSW	Material: 304SS	For holding the terminal head (Main Manufacturing Factory)
	/CP22E	Material: 304SS	For holding the terminal head (Kobe-Iwaoka Factory)

Flange

Structure		
FF 	RF 	RJ

Model code

/ ① _____ ② _____ ③ _____ / ④ _____ ⑤ _____

①	Flange rating	J05 J10 J20 A15 A30 A60	JIS 5K JIS 10K JIS 20K ASME 150LB ASME 300LB ASME 600LB	P15 P30 P60 F-Z	JPI 150LB JPI 300LB JPI 600LB Other flange (Z=□, □)
②	Flange face	FF RF	Flat face Raised face	RJ Z	Ring joint Other seating surface (Z=□, □)
③	Flange size	15 20 25	15A or 1/2B 20A or 3/4B 25A or 1B	40 50 Z	40A or 1-1/2B 50A or 2B Other size (Z=□, □)
④	Flange material	A C	304SS 316SS	D Z	310S SS Other material (Z=□, □)
⑤	Immersion length (Unit: mm)	-ℓ			

Reference Thermoelectromotive Force Table

°C	B Thermocouple										
	0	10	20	30	40	50	60	70	80	90	100
0	0	-2	-3	-2	0	2	6	11	17	25	33
100	33	43	53	65	78	92	107	123	141	159	178
200	178	199	220	243	267	291	317	344	372	401	431
300	431	462	494	527	561	596	632	669	707	746	787
400	787	828	870	913	957	1002	1 048	1 095	1 143	1 192	1 242
500	1 242	1 293	1 344	1 397	1 451	1 505	1 561	1 617	1 675	1 733	1 792
600	1 792	1 852	1 913	1 975	2 037	2 101	2 165	2 230	2 296	2 363	2 431
700	2 431	2 499	2 569	2 639	2 710	2 782	2 854	2 928	3 002	3 078	3 154
800	3 154	3 230	3 308	3 386	3 466	3 546	3 626	3 708	3 790	3 873	3 957
900	3 957	4 041	4 127	4 213	4 299	4 387	4 475	4 564	4 653	4 743	4 834
1000	4 834	4 926	5 018	5 111	5 205	5 299	5 394	5 489	5 585	5 682	5 780
1100	5 780	5 878	5 976	6 075	6 175	6 276	6 377	6 478	6 580	6 683	6 786
1200	6 786	6 890	6 995	7 100	7 205	7 311	7 417	7 524	7 632	7 740	7 848
1300	7 848	7 957	8 066	8 176	8 286	8 397	8 508	8 620	8 731	8 844	8 956
1400	8 956	9 069	9 182	9 296	9 410	9 524	9 639	9 753	9 868	9 984	10 099
1500	10 099	10 215	10 331	10 447	10 563	10 679	10 796	10 913	11 029	11 146	11 263
1600	11 263	11 380	11 497	11 614	11 731	11 848	11 965	12 082	12 199	12 316	12 433
1700	12 433	12 549	12 666	12 782	12 898	13 014	13 130	13 246	13 361	13 476	13 591
1800	13 591	13 706	13 820								

°C	R Thermocouple										
	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
0	0	-51	-100	-145	-188	-226					
100	647	723	800	879	959	1 041	1 124	1 208	1 294	1 381	1 469
200	1 469	1 558	1 648	1 739	1 831	1 923	2 017	2 112	2 207	2 304	2 401
300	2 401	2 498	2 597	2 696	2 796	2 896	2 997	3 099	3 201	3 304	3 408
400	3 408	3 512	3 616	3 721	3 827	3 933	4 040	4 147	4 255	4 363	4 471
500	4 471	4 580	4 690	4 800	4 910	5 021	5 133	5 245	5 357	5 470	5 583
600	5 583	5 697	5 812	5 926	6 041	6 157	6 273	6 390	6 507	6 625	6 743
700	6 743	6 861	6 980	7 100	7 220	7 340	7 461	7 583	7 705	7 827	7 950
800	7 950	8 073	8 197	8 321	8 446	8 571	8 697	8 823	8 950	9 077	9 205
900	9 205	9 333	9 461	9 590	9 720	9 850	9 980	10 111	10 242	10 374	10 506
1000	10 506	10 638	10 771	10 905	11 039	11 173	11 307	11 442	11 578	11 714	11 850
1100	11 850	11 986	12 123	12 260	12 397	12 535	12 673	12 812	12 950	13 089	13 228
1200	13 228	13 367	13 507	13 646	13 786	13 926	14 066	14 207	14 347	14 488	14 629
1300	14 629	14 770	14 911	15 052	15 193	15 334	15 475	15 616	15 758	15 899	16 040
1400	16 040	16 181	16 323	16 464	16 605	16 746	16 887	17 028	17 169	17 310	17 451
1500	17 451	17 591	17 732	17 872	18 012	18 152	18 292	18 431	18 571	18 710	18 849
1600	18 849	18 988	19 126	19 264	19 402	19 540	19 677	19 814	19 951	20 087	20 222
1700	20 222	20 356	20 488	20 620	20 749	20 877	21 003				

°C	S Thermocouple										
	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
0	0	-53	-103	-150	-194	-236					
100	646	720	795	872	950	1029	1 110	1 191	1 273	1 357	1 441
200	1 441	1 526	1 612	1 698	1 786	1 874	1 962	2 052	2 141	2 232	2 323
300	2 323	2 415	2 507	2 599	2 692	2 786	2 880	2 974	3 069	3 164	3 259
400	3 259	3 355	3 451	3 548	3 645	3 742	3 840	3 938	4 036	4 134	4 233
500	4 233	4 332	4 432	4 532	4 632	4 732	4 833	4 934	5 035	5 137	5 239
600	5 239	5 341	5 443	5 546	5 649	5 753	5 857	5 961	6 065	6 170	6 275
700	6 275	6 381	6 486	6 593	6 699	6 806	6 913	7 020	7 128	7 236	7 345
800	7 345	7 454	7 563	7 673	7 783	7 893	8 003	8 114	8 226	8 337	8 449
900	8 449	8 562	8 674	8 787	8 900	9 014	9 128	9 242	9 357	9 472	9 587
1000	9 587	9 703	9 819	9 935	10 051	10 168	10 285	10 403	10 520	10 638	10 757
1100	10 757	10 875	10 994	11 113	11 232	11 351	11 471	11 590	11 710	11 830	11 951
1200	11 951	12 071	12 191	12 312	12 433	12 554	12 675	12 796	12 917	13 038	13 159
1300	13 159	13 280	13 402	13 523	13 644	13 766	13 887	14 009	14 130	14 251	14 373
1400	14 373	14 494	14 615	14 736	14 857	14 978	15 099	15 220	15 341	15 461	15 582
1500	15 582	15 702	15 822	15 942	16 062	16 182	16 301	16 420	16 539	16 658	16 777
1600	16 777	16 895	17 013	17 131	17 249	17 366	17 483	17 600	17 717	17 832	17 947
1700	17 947	18 061	18 174	18 285	18 395	18 503	18 609				

N Thermocouple											
°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
-200	-3 990	-4 083	-4 162	-4 226	-4 277	-4 313	-4 336	-4 345			
-100	-2 407	-2 612	-2 808	-2 994	-3 171	-3 336	-3 491	-3 634	-3 766	-3 884	-3 990
0	0	-260	-518	-772	-1 023	-1 269	-1 509	-1 744	-1 972	-2 193	-2 407
°C	0	10	20	30	40	50	60	70	80	90	100
0	0	261	525	793	1 065	1 340	1 619	1 902	2 189	2 480	2 774
100	2 774	3 072	3 374	3 680	3 989	4 302	4 618	4 937	5 259	5 585	5 913
200	5 913	6 245	6 579	6 916	7 255	7 597	7 941	8 288	8 637	8 988	9 341
300	9 341	9 696	10 054	10 413	10 774	11 136	11 501	11 867	12 234	12 603	12 974
400	12 974	13 346	13 719	14 094	14 469	14 846	15 225	15 604	15 984	16 366	16 748
500	16 748	17 131	17 515	17 900	18 286	18 672	19 059	19 447	19 835	20 224	20 613
600	20 613	21 003	21 393	21 784	22 175	22 566	22 958	23 350	23 742	24 134	24 527
700	24 527	24 919	25 312	25 705	26 098	26 491	26 883	27 276	27 669	28 062	28 455
800	28 455	28 847	29 239	29 632	30 024	30 416	30 807	31 199	31 590	31 981	32 371
900	32 371	32 761	33 151	33 541	33 930	34 319	34 707	35 095	35 482	35 869	36 256
1000	36 256	36 641	37 027	37 411	37 795	38 179	38 562	38 944	39 326	39 706	40 087
1100	40 087	40 466	40 845	41 223	41 600	41 976	42 352	42 727	43 101	43 474	43 846
1200	43 846	44 218	44 588	44 958	45 326	45 694	46 060	46 425	46 789	47 152	47 513
1300	47 513										

K Thermocouple											
°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
-200	-5 891	-6 035	-6 158	-6 262	-6 344	-6 404	-6 441	-6 458			
-100	-3 554	-3 852	-4 138	-4 411	-4 669	-4 913	-5 141	-5 354	-5 550	-5 730	-5 891
0	0	-392	-778	-1 156	-1 527	-1 889	-2 243	-2 587	-2 920	-3 243	-3 554
°C	0	10	20	30	40	50	60	70	80	90	100
0	0	397	798	1 203	1 612	2 023	2 436	2 851	3 267	3 682	4 096
100	4 096	4 509	4 920	5 328	5 735	6 138	6 540	6 941	7 340	7 739	8 138
200	8 138	8 539	8 940	9 343	9 747	10 153	10 561	10 971	11 382	11 795	12 209
300	12 209	12 624	13 040	13 457	13 874	14 293	14 713	15 133	15 554	15 975	16 397
400	16 397	16 820	17 243	17 667	18 091	18 516	18 941	19 366	19 792	20 218	20 644
500	20 644	21 071	21 497	21 924	22 350	22 776	23 203	23 629	24 055	24 480	24 905
600	24 905	25 330	25 755	26 179	26 602	27 025	27 447	27 869	28 289	28 710	29 129
700	29 129	29 548	29 965	30 382	30 798	31 213	31 628	32 041	32 453	32 865	33 275
800	33 275	33 685	34 093	34 501	34 908	35 313	35 718	36 121	36 524	36 925	37 326
900	37 326	37 725	38 124	38 522	38 918	39 314	39 708	40 101	40 494	40 885	41 276
1000	41 276	41 665	42 053	42 440	42 826	43 211	43 595	43 978	44 359	44 740	45 119
1100	45 119	45 497	45 873	46 249	46 623	46 995	47 367	47 737	48 105	48 473	48 838
1200	48 838	49 202	49 565	49 926	50 286	50 644	51 000	51 355	51 708	52 060	52 410
1300	52 410	52 759	53 106	53 451	53 795	54 138	54 479	54 819			

E Thermocouple											
°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
-200	-8 825	-9 063	-9 274	-9 455	-9 604	-9 718	-9 797	-9 835			
-100	-5 237	-5 681	-6 107	-6 516	-6 907	-7 279	-7 632	-7 963	-8 273	-8 561	-8 825
0	0	-582	-1 152	-1 709	-2 255	-2 787	-3 306	-3 811	-4 302	-4 777	-5 237
°C	0	10	20	30	40	50	60	70	80	90	100
0	0	591	1 192	1 801	2 420	3 048	3 685	4 330	4 985	5 648	6 319
100	6 319	6 998	7 685	8 379	9 081	9 789	10 503	11 224	11 951	12 684	13 421
200	13 421	14 164	14 912	15 664	16 420	17 181	17 945	18 713	19 484	20 259	21 036
300	21 036	21 817	22 600	23 386	24 174	24 964	25 757	26 552	27 348	28 146	28 946
400	28 946	29 747	30 550	31 354	32 159	32 965	33 772	34 579	35 387	36 196	37 005
500	37 005	37 815	38 624	39 434	40 243	41 053	41 862	42 671	43 479	44 286	45 093
600	45 093	45 900	46 705	47 509	48 313	49 116	49 917	50 718	51 517	52 315	53 112
700	53 112	53 908	54 703	55 497	56 289	57 080	57 870	58 659	59 446	60 232	61 017
800	61 017	61 801	62 583	63 364	64 144	64 922	65 698	66 473	67 246	68 017	68 787
900	68 787	69 554	70 319	71 082	71 844	72 603	73 360	74 115	74 869	75 621	76 373
1000	76 373										

Thermocouple Reference Thermoelectromotive Force Table

°C	J Thermocouple										ITS-90	
	0	-10	-20	-30	-40	-50	-60	-70	-80	-90		
-200	-7 890	-8 095										
-100	-4 633	-5 037	-5 426	-5 801	-6 159	-6 500	-6 821	-7 123	-7 403	-7 659	-7 890	
0	0	-501	-995	-1 482	-1 961	-2 431	-2 893	-3 344	-3 786	-4 215	-4 633	
°C	0	10	20	30	40	50	60	70	80	90	100	
0	0	507	1 019	1 537	2 059	2 585	3 116	3 650	4 187	4 726	5 269	
100	5 269	5 814	6 360	6 909	7 459	8 010	8 562	9 115	9 669	10 224	10 779	
200	10 779	11 334	11 889	12 445	13 000	13 555	14 110	14 665	15 219	15 773	16 327	
300	16 327	16 881	17 434	17 986	18 538	19 090	19 642	20 194	20 745	21 297	21 848	
400	21 848	22 400	22 952	23 504	24 057	24 610	25 164	25 720	26 276	26 834	27 393	
500	27 393	27 953	28 516	29 080	29 647	30 216	30 788	31 362	31 939	32 519	33 102	
600	33 102	33 689	34 279	34 873	35 470	36 071	36 675	37 284	37 896	38 512	39 132	
700	39 132	39 755	40 382	41 012	41 645	42 281	42 919	43 559	44 203	44 848	45 494	
800	45 494	46 141	46 786	47 431	48 074	48 715	49 353	49 989	50 622	51 251	51 877	
900	51 877	52 500	53 119	53 735	54 347	54 956	55 561	56 164	56 763	57 360	57 953	
1000	57 953	58 545	59 134	59 721	60 307	60 890	61 473	62 054	62 634	63 214	63 792	
1100	63 792	64 370	64 948	65 525	66 102	66 679	67 255	67 831	68 406	68 980	69 553	
1200	69 553											

°C	T Thermocouple										ITS-90	
	0	-10	-20	-30	-40	-50	-60	-70	-80	-90		
-200	-5 603	-5 753	-5 888	-6 007	-6 105	-6 180	-6 232	-6 258				
-100	-3 379	-3 657	-3 923	-4 177	-4 419	-4 648	-4 865	-5 070	-5 261	-5 439	-5 603	
0	0	-383	-757	-1 121	-1 475	-1 819	-2 153	-2 476	-2 788	-3 089	-3 379	
°C	0	10	20	30	40	50	60	70	80	90	100	
0	0	391	790	1 196	1 612	2 036	2 468	2 909	3 358	3 814	4 279	
100	4 279	4 750	5 228	5 714	6 206	6 704	7 209	7 720	8 237	8 759	9 288	
200	9 288	9 822	10 362	10 907	11 458	12 013	12 574	13 139	13 709	14 283	14 862	
300	14 862	15 445	16 032	16 624	17 219	17 819	18 422	19 030	19 641	20 255	20 872	
400	20 872											

Note: The values listed in the reference thermoelectromotive force table are

the same as those of the following four standards:





JIS C 1602-1995,

JIS C 1605-1995 (Japan)

IEC 60584-1-1995 (International)

ASTM E 230-2003 (USA)

Identification of Compensating Cables for Each National Standard

Standard Type	BC	RCA (RCB) SCA (SCB)	NX/NC	KX/KCA/ KCB	EX	JX	TX
  JIS C 1610 :2012 IEC 584-3 :2007	+	+	+	+	+	+	+
 JIS C 1610 :1995 Category 2	+	+	-	+	+	+	+
 ASTM E230	+	+	+	+	+	+	+

The JIS C 1610 standard for thermocouple compensating cables was revised in June 2012. We are continuing to apply the former JIS C 1610:1995 standard (color codes; Category 2) on a temporary basis. Please contact us if you wish to purchase products that conform to the new standard. However, note that we currently do not have all types of products in stock, so it may take some time to ship items after purchase. In addition, Category 2 has been eliminated in the 2012 version of the standard.

Identification of Thermocouple Wires for ASTM Standard

Standard Type	N	K	E	J	T
ASTM E230	+	+	+	+	+



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