

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.



INDEX

AEROPAK® Sheathed Thermocouples/Characteristics	A-1	T99U/Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple/Union	A-44
Thermocouple Element Wire Constituent Materials/Operating Temperature Range (Atmospheric)	A-2	T99S/Explosion-Proof (Hydrogen Protection) Thermocouple with Support Pipe	A-45
Sheathed Thermocouple Standard Specifications/Maximum Manufacturing Length and Approximate Weight of Sheathed Thermocouples	A-3	T409N/Spring Loaded Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple	A-46
List of Thermocouple Tolerances and the Standards Applied by Each Country	A-4	T409U/Spring Loaded Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple/Union	A-47
Types of Measuring Junctions	A-5	T409S/Spring Loaded Explosion-Proof (Hydrogen Protection) Thermocouple with Support Pipe	A-48
AEROPAK® Compensating Cables	A-6	T39/T49 Series / Explosion/Flame Proof Nipple Type Temperature Sensor	A-49
AEROPAK® Inspection Standards	A-7	T35M/Multipoint Thermocouple	A-50
List of Models	A-8~A-13	T96M(6)/Multipoint Thermocouple with Connection Head	A-51
T14/Basic Type Thermocouple	A-14	T96M(12)/Multipoint Thermocouple with Connection Head	A-52
T32/Ultra-Fine Sheathed Thermocouple	A-15	T96M(24)/Multipoint Thermocouple with Connection Head	A-53
T33/Super-Fine Thermocouple with Drawn Down Tip	A-16	T97M(12)/Explosion-Proof Multipoint Thermocouple	A-54
T34/Super-Fine Thermocouple	A-17	T97M(24)/Explosion-Proof Multipoint Thermocouple	A-55
T35/Thermocouple with Lead Cable	A-18	T99M/Explosion-Proof (Hydrogen Protection) Multipoint Thermocouple	A-56
T36/Butt Welded Sleeve Thermocouple	A-19	Thermocouple/Construction	B-1
T40/Thermocouple with Flexible Armoured Lead	A-20	List of Thermocouple Tolerances and the Standards Applied by Each Country	B-2
T68/Thermocouple with Type A Connector/Flexible Armoured Lead	A-21	Types of Thermocouples	B-3
T90/Thermocouple with Type A Connector	A-22	Materials and Standard Dimensions of Metal Thermocouples	B-4
T91/Thermocouple with Type B Connector	A-23	Materials and Standard Dimensions of Non-metal Thermocouples	B-5
T102/Thermocouple with Type A Connector/Lead Cable	A-24	Operating Temperature Limits for Element Wire Diameters	B-6
T110/Thermocouple with Push-Pull Type Connector	A-25	Other Specifications	B-7
T96/Thermocouple with Connection Head	A-26	List of Models	B-8
T96N/Thermocouple with Connection Head/Nipple	A-27	EXE/Braided Glass Yarn Insulated Thermocouple	B-9
T96U/Thermocouple with Connection Head/Nipple/Union	A-28	EXS/FEP Insulated Thermocouple	B-10
T96S/Thermocouple with Connection Head/Support Pipe	A-29	T801-1/Ultra-Fine PFA-Coated Thermocouple	B-11
T96W/Thermocouple with Thermowell	A-30	T801-2/Super-Fine PFA-Coated Thermocouple	B-12
T400N/Spring Loaded Thermocouple with Head/Nipple	A-31	TC/Thermocouple with Insulator	B-13
T400U/Spring Loaded Thermocouple with Head/Nipple/Union	A-32	TCN/Thermocouple with Connection Head/Insulator	B-14
T400S/Spring Loaded Thermocouple with Head/Support Pipe	A-33	TCL/Thermocouple with Connection Head/Insulator	B-15
T97/Explosion-Proof Thermocouple	A-34	TCW/Thermocouple with Connection Head/Insulator/Thermowell	B-16
T97N/Explosion-Proof Thermocouple with Nipple	A-35	TCW-GS/GS One Touch Sensor	B-17
T97U/Explosion-Proof Thermocouple with Nipple/Union	A-36	TCG/Explosion-Proof Thermocouple with Insulator/Thermowell	B-18
T97S/Explosion-Proof Thermocouple with Support Pipe	A-37	TCP/Thermocouple with Connection Head/Insulator/Protection Tube	B-19
T97W/Explosion-Proof Thermocouple with Thermowell	A-38	TCR/Thermocouple with Connection Head/Insulator/Double Thermowell	B-20
T407N/Spring Loaded Explosion-Proof Thermocouple with Nipple	A-39	Standard Parts	Y-1~Y-3
T407U/Spring Loaded Explosion-Proof Thermocouple with Nipple/Union	A-40	Reference Thermoelectromotive Force Table	Z-1~Z-3
T407S/Spring Loaded Explosion-Proof Thermocouple with Support Pipe	A-41		
T99/Explosion-Proof (Hydrogen Protection) Thermocouple	A-42		
T99N/Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple	A-43		





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



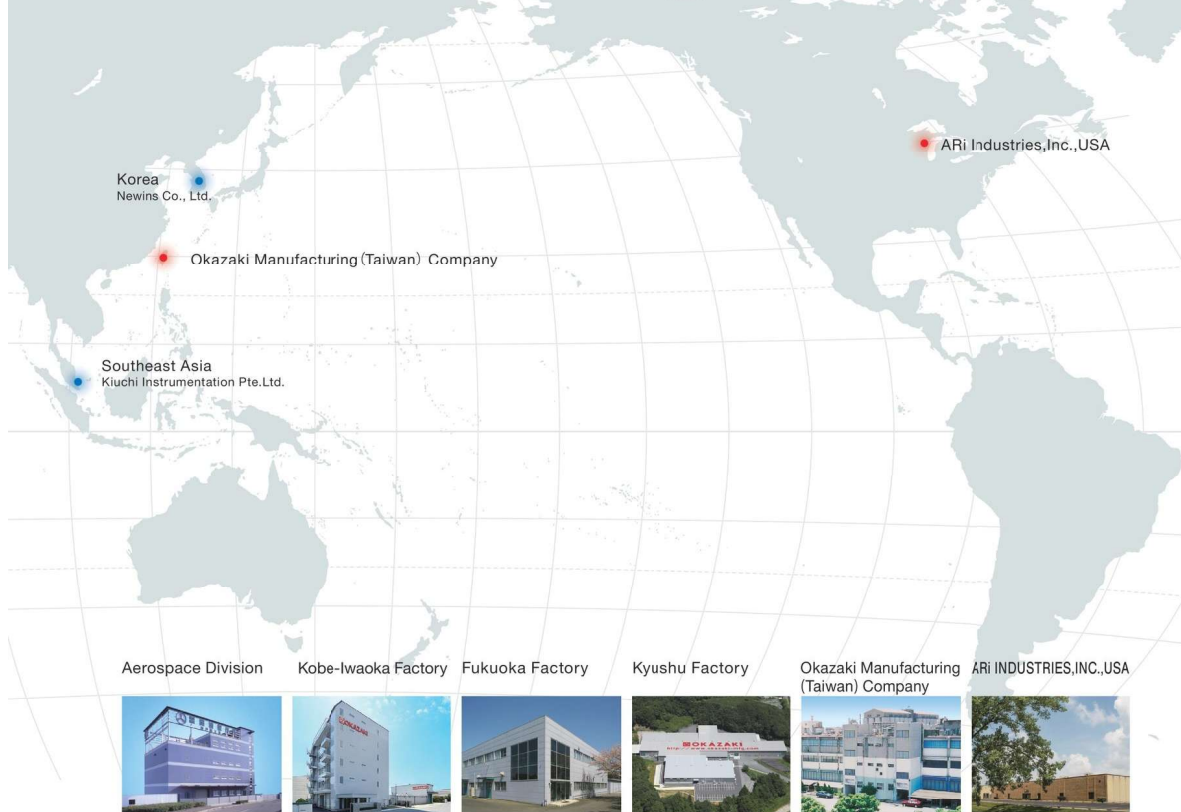
Fibers



Semiconductors



the world through “heat”



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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

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Environment



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Sensors and Heaters

Connecting across industries with “heat”

01 Thermocouples

AEROPAK®

02 Resistance Thermometer Sensors

RESIOPAK®



MI Cables



03 Heaters

AEROHEAT®



04 Compensating Cable



05 Thermowells



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	
φ 0.08	*1 400		-	-	-	
φ 0.1	*1 400		-	-	-	
φ 0.15	*1 400		-	-	-	
φ 0.25	*1 500	*4 700	-	-	-	
φ 0.5	*1 600	*4 900	-	-	-	
φ 1.0	650	*3 1000 *4 900	650	450	300	
φ 1.6	650	*3 1100 *4 1000 *5 800	650	450	300	
φ 3.2	750	*3 1200 *4 1000 *5 900	750	650	350	
φ 4.8	800	*3 1260 *5 1050	800	750	350	
φ 6.4	*1 1000	*2 800	*3 1260 *5 1050	800	750	350
φ 8.0	*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.



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A-2



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		$\phi 0.08$	10% or more of sheath outer diameter (4)	-	B	-	-	-	
	$\phi 0.1$	10% or more of sheath outer diameter		B					B-SA
	$\phi 0.15$								C-B-SA
	$\phi 0.25$				C-B-K-SA				C
	$\phi 0.5$		15% or more of sheath outer diameter	C-B-K	C-B-K-SN				
	$\phi 1.0$				D-B-K	D-B-K-SN			
	$\phi 1.6$				D-B	D-B-K-V-SN			
	$\phi 3.2$								
	$\phi 4.8$								
	$\phi 6.4$								
	$\phi 8.0$								
Double element		$\phi 1.6$	15% or more of sheath outer diameter	C-B-K	C-B-K-SN	C	C	C	
	$\phi 3.2$	10% or more of sheath outer diameter							D-B-K
	$\phi 4.8$			D-B	D-B-K-V-SN				
	$\phi 6.4$								
	$\phi 8.0$								
Triple element		$\phi 4.8$	10% or more of sheath outer diameter (4)	C-B	C-B	C	C	C	
	$\phi 6.4$	10% or more of sheath outer diameter		D-B	D-B				
	$\phi 8.0$								

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 Inccnel 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.

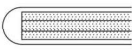
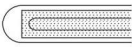
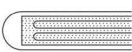
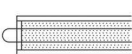
- The manufacturing lengths may vary depending on the element type.

List of Thermocouple Tolerances and the Standards Applied by Each Country

Standard	JIS C1605			Standard	IEC 60584-1			ASTM E230		
Type	Temperature range	Class	Tolerance in °C	Type	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		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		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		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		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			

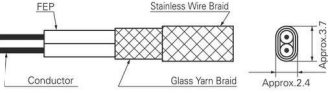
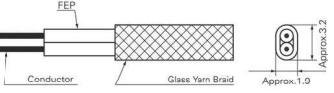
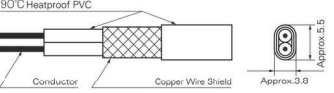
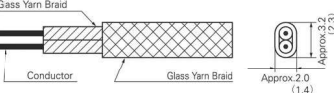
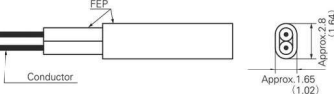
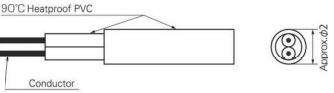
- (1) The tolerance is the allowable maximum limit of the value of the temperature of the thermoelectromotive force converted using the reference thermoelectromotive force table, minus the temperature at the temperature measuring junction.
- (2) The tolerance of ASTM shall be either the °C or the % of 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		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		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		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		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)	Pink		Green		Violet		Black		Brown	
			+ Pink	+ Green	+ Violet	+ Black	+ Brown					
			- White	- White	- White	- White	- White					
			-	Blue	Purple	Yellow	Brown					
		Former JIS category 2	-	+ Red	+ Red	+ Red	+ Red					
	-	- White	- White	- 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 $\phi 6.0$ to $\phi 8.0$ mm	± 0.05 mm ± 0.10 mm
AEROPAK length	≤ 150 mm ± 2.0 mm 150 mm <	$\pm 1.5\%$
	Spring type Bellows type Maximum length is up to 1 m. If length exceeds 1 m, details shall be provided separately.	± 3.0 mm ± 2.0 mm
Nipple length		± 3 mm
Compensating cable length	≤ 1000 mm 1000 mm <	± 15 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

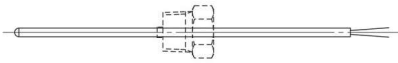
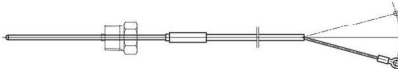
The 100°C inspection is performed for $\phi 0.15$ or less.

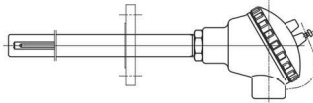
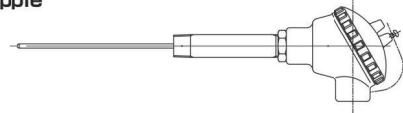
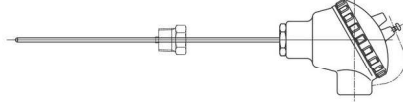
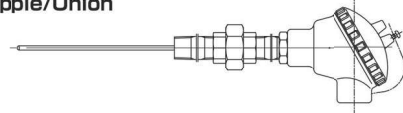
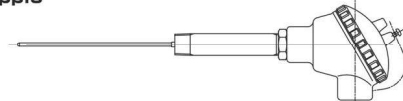
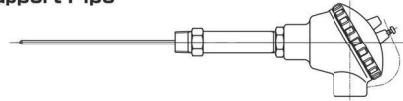
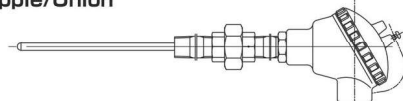
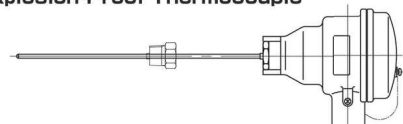
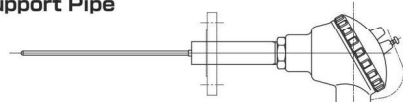
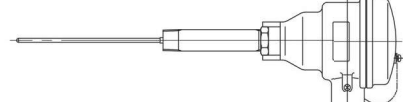
Insulation resistance test

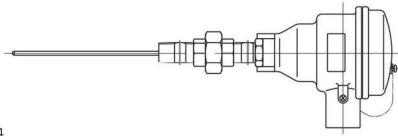
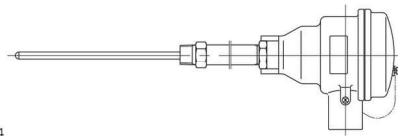
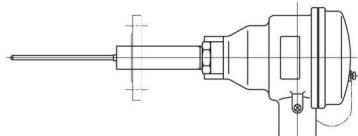
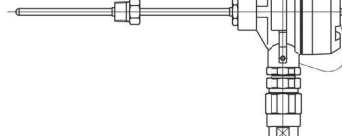
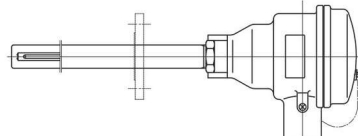
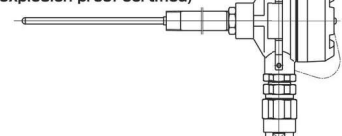
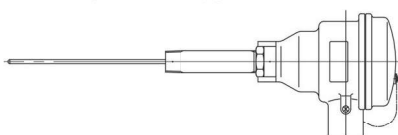
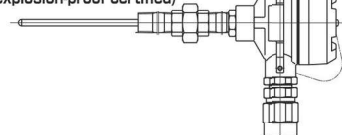
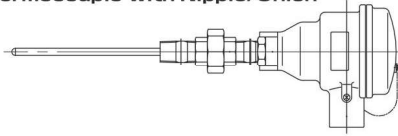
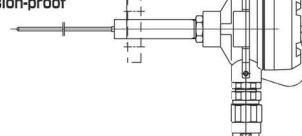
The resistance between the element wire and metal sheath is measured at room temperature. (However, this test is not performed for items with the grounded type measuring junction.)

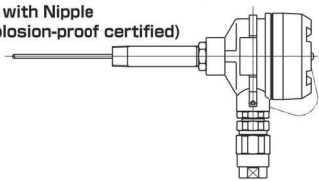
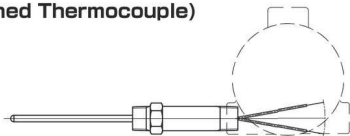
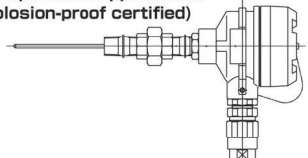
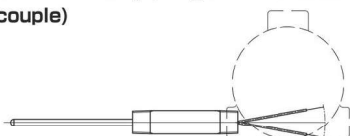
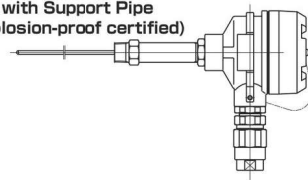
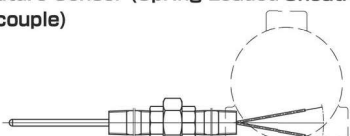
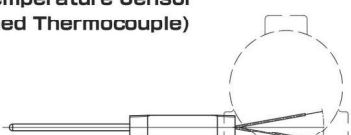
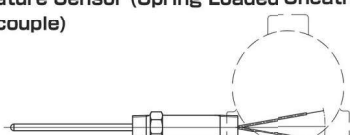
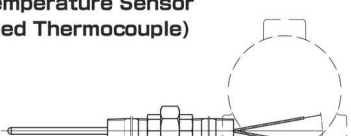
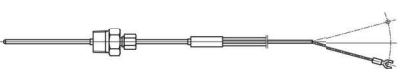
AEROPAK outer diameter (mm)	Features
$\phi 0.1 \leq \text{O.D.} \leq \phi 0.15$	1 M Ω /3 VDC
$\phi 0.15 < \text{O.D.} \leq \phi 0.25$	5 M Ω /50 VDC
$\phi 0.25 < \text{O.D.} \leq \phi 2.0$	20 M Ω /100 VDC
$\phi 2.0 < \text{O.D.}$	100 M Ω /500 VDC

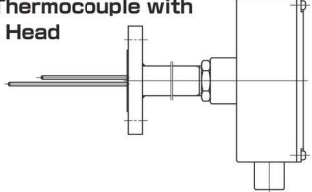
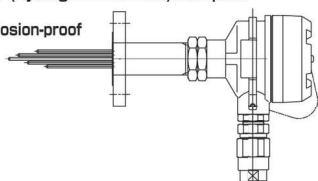
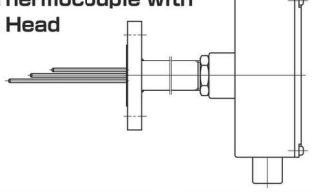
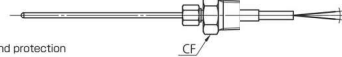
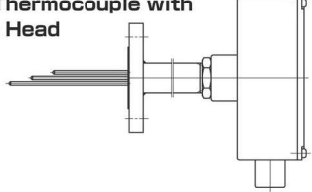
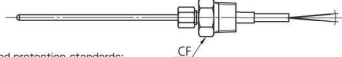
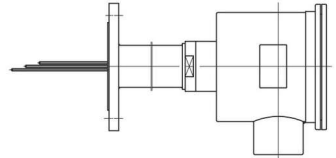
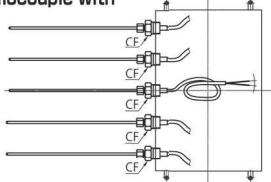
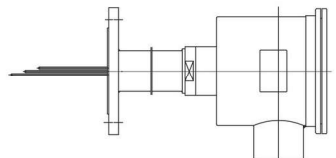
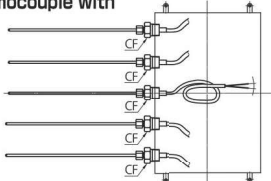
Documentation The inspection certificate shall be attached to the product. Detailed test report shall be available upon request.

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)  IEC IECEx
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 , 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

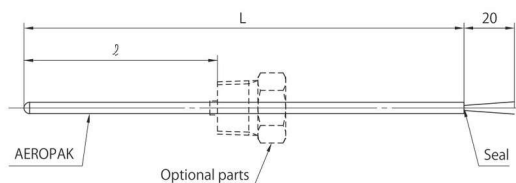
*1 Simple apparatus

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

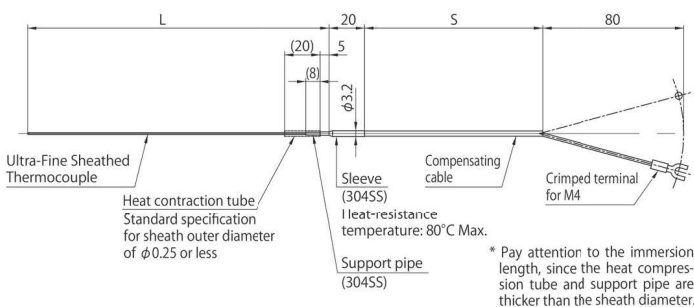


Model code T14

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

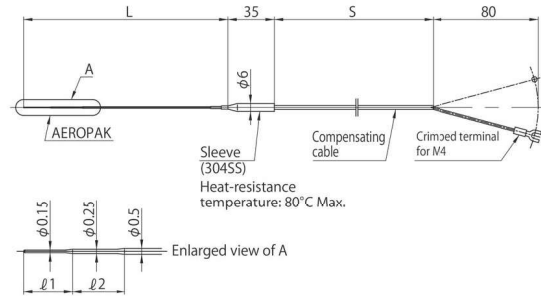
T32- ① ② ③ ④ ⑤ ⑥ ⑦ / ⑧ ⑨ / ⑩ ⑪

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 $\phi 0.15$ or less, the type is EXG-2.
Note: For models with an outer sheath diameter of $\phi 0.25$ 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>
 $\phi 0.15$ or less +40 mm
-10 mm

Sheath outer diameter (mm)	$\phi 0.08$	$\phi 0.1$	$\phi 0.15$	$\phi 0.25$	$\phi 0.5$
Insulation resistance value	1 M Ω /3 VDC			5 M Ω /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

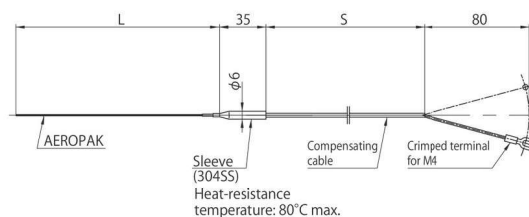
①	Length (Unit: mm)	L	
②	Sheath outer diameter (Unit: mm)	SP	φ0.15 / φ0.25 / φ0.5
③	Number of element wires	2	Single
④	Type	K	Ni-Cr/Ni-Al
⑤	Measuring junction	9	U (#9) Ungrounded
⑥	Sheath material	B	NCF600eq.(Inconel 600)
⑦	Class	02	2 (Former JIS class 0.75)
⑧	Compensating cable length (Unit: mm)	S	
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)	1	
⑫	Sheath length (Unit: mm)	2	

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

Manufacturable dimensions

Unit: mm	L	1	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



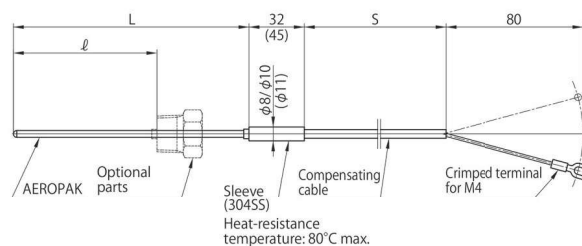
Model code T34

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	$\phi 0.25$ $\phi 0.5$
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	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 $\phi 0.25$ or less, the diameter at the tip is normally larger than the specified value.

Thermocouple with Lead Cable



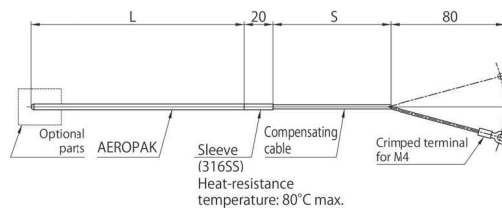
Model code T35

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

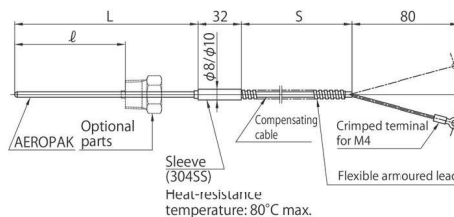


Model code T36

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



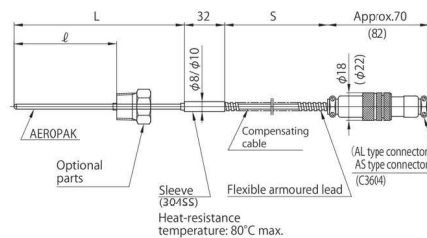
Model code T40

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



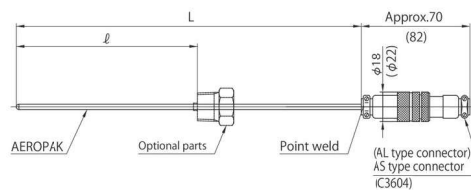
Model code T68

T68- ① ② ③ ④ ⑤ ⑥ ⑦ / ⑧ ⑨ / ⑩ ⑪

①	Length (Unit: mm)	L				
②	Sheath outer diameter (Unit: mm)	A 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

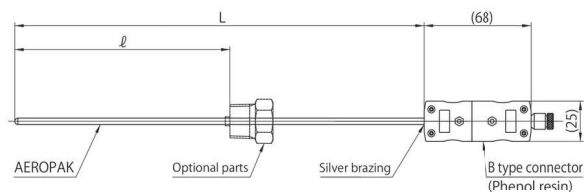


Model code T90

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

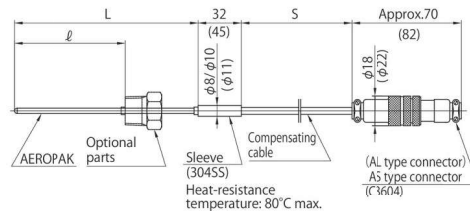
T91- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____ ⑨ _____

①	Length (Unit: mm)	L	
②	Sheath outer diameter (Unit: mm)	D E	φ 3.2 φ 4.8
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



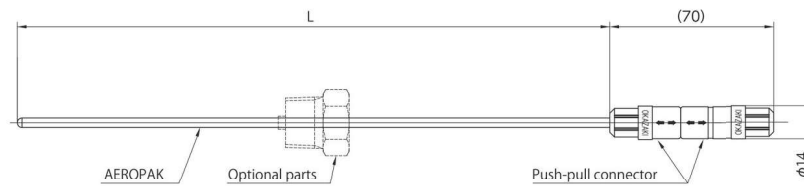
Model code T102

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

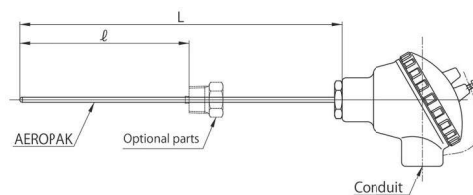
T110- ① _____ ② _____ ③ _____ ④ _____ ⑤ _____ ⑥ _____ ⑦ _____ / ⑧ _____

①	Length (Unit: mm)	L	
②	Sheath outer diameter (Unit: mm)	D E FN F	$\phi 3.2^*$ $\phi 4.8^*$ $\phi 6.0^*$ $\phi 6.4^*$
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 $\phi 6.5$.
- 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: $\phi 0.5$ to $\phi 1.6$)
- The connector parts are heat resistant up to 80°C .
- Never bend a sheathed thermocouple within 5 mm from the tip (sheath diameter $\phi D \leq 3.2$).
- 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

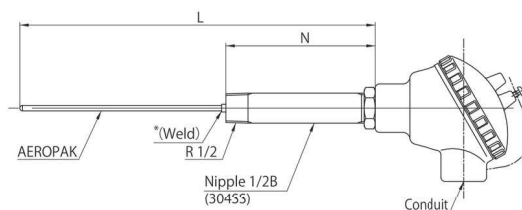


Model code T96

T96- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ / ⑨ ⑩

①	Terminal box	ES EL ED EF EP	Aluminum die-cast (ADC) (small) Aluminum die-cast (ADC) (large) Aluminum die-cast (ADC) (two-way) Cast iron Resin
②	Length (Unit: mm)	L	
③	Sheath outer diameter (Unit: mm)	D E F G	φ 3.2 φ 4.8 φ 6.4 φ 8.0
④	Number of element wires	2 4	Single Double
⑤	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
⑥	Measuring junction	5 8 9	(#5) Ungrounded/Separated G (#8) Grounded U (#9) Ungrounded
⑦	Sheath material	C D B K	316SS 310S SS NCF600eq. (Inconel 600) HOSKINS2300
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		See "Standard Parts" section
⑩	Immersion length (Unit: mm)	- L	

Thermocouple with Connection Head/Nipple

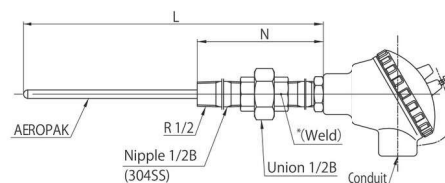


Model code T96N

T96N- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ / ⑩ ⑪

①	Structure	1 2 3 4	N=100 *Not welded N=150 *Not welded N=100 *Welded N=150 *Welded
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	Sheath outer diameter (Unit: mm)	D E F G	φ 3.2 φ 4.8 φ 6.4 φ 8.0
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 K	316SS 310S SS NCF600eq. (Inconel 600) HOSKINS2300
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		N/A

Thermocouple with Connection Head/Nipple/Union

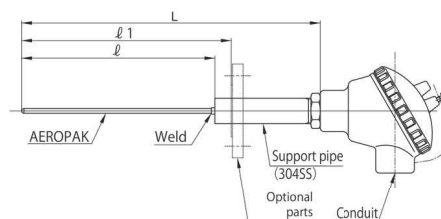


Model code T96U

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	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		N/A

Thermocouple with Connection Head/Support Pipe

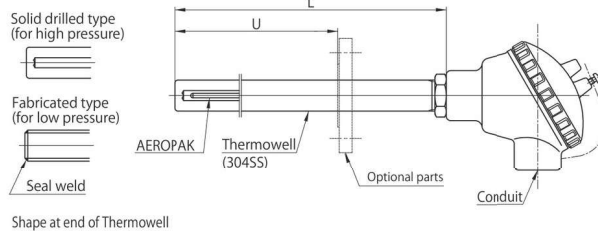


Model code T96S

T96S- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ / ⑩ ⑪

①	Structure	1 2 3	1/2B support pipe φ 15 support pipe φ 12 support pipe
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	Sheath outer diameter (Unit: mm)	D E F G	φ 3.2 φ 4.8 φ 6.4 φ 8.0
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 K	316SS 310S SS NCF600eq. (Inconel 600) HOSKINS2300
⑨	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)
⑩	Optional parts		See "Standard Parts" section
⑪	Immersion length (Unit: mm)	- L	(- L 1)

Thermocouple with Thermowell



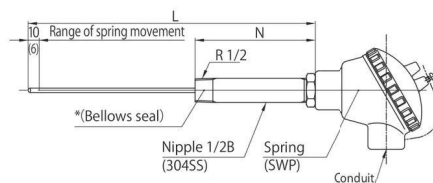
Model code T96W

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			
		-12			
		-15			
		-22			
⑪	Thermowell material	A	304SS		
		C	316SS		
		P	SANDVIK P4		
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



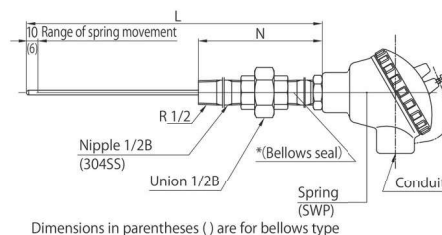
Dimensions in parentheses () are for bellows type

Model code T400N

T400N- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ / ⑩ ⑪

①	Structure	1 2 3 4	N=100 N=150 N=100 *Bellows seal N=150 *Bellows seal
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	Sheath outer diameter (Unit: mm)	D E F G	φ 3.2 φ 4.8 φ 6.4 φ 8.0
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 K	316SS 310S SS NCF600eq. (Inconel 600) HOSKINS2300
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		N/A

Spring Loaded Thermocouple with Head/Nipple/Union

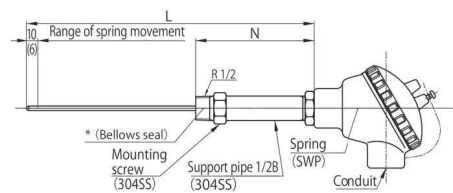


Model code **T400U**

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	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		N/A

Spring Loaded Thermocouple with Head/Support Pipe



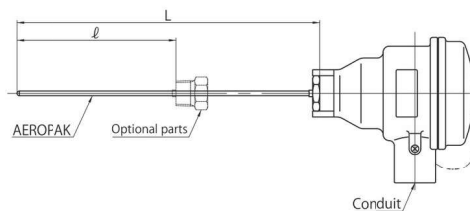
Dimensions in parentheses () are for bellows type

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 φ8.0)		
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.)

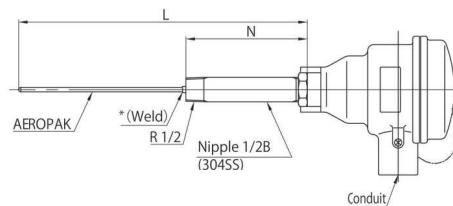
Model Codes and Sheath Outer Diameters

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 φ8.0)		
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			

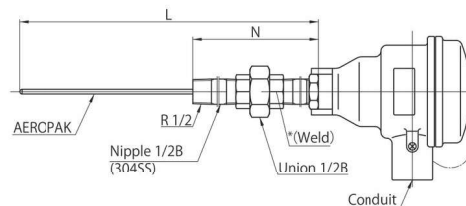
Notes

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 5.4	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 φ8.0)			
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			

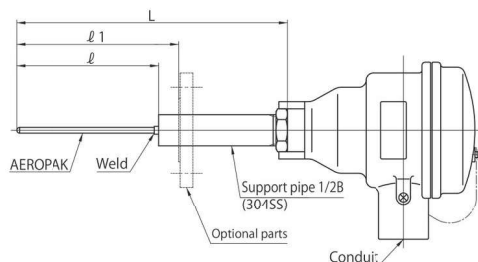
Notes

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 5.4	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	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)	B	φ 1.6	F	φ 6.4
		D	φ 3.2	G	φ 8.0
		E	φ 4.8		
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 φ8.0)		
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 (Unit: mm)	- ∅	(- ∅ 1)		

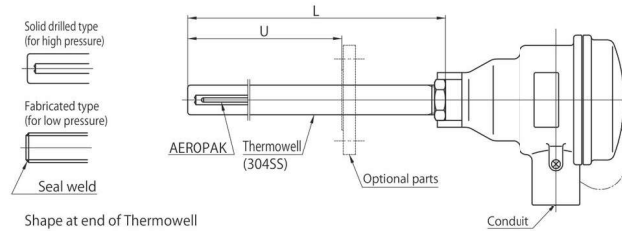
Notes

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 5.4	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 φ8.0)	
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	See the table below					
		-15						
		-22						
⑪	Thermowell material	A	304SS					
		C	316SS					
		P	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.)

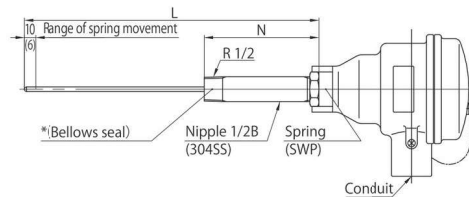
Model Codes and Sheath Outer Diameters

Model code	φ 1.6	φ 3.2	φ 4.8	φ 5.4	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



Dimensions in parentheses () are for bellows type

Model code T407N

T407N- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ / ⑩ ⑪

①	Structure	1 2	N=100 N=150	3 4	N=100 *Bellows seal N=150 *Bellows seal
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)	D E	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 φ8.0)		
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		See "Standard Parts" section		
⑪	Immersion length		N/A		

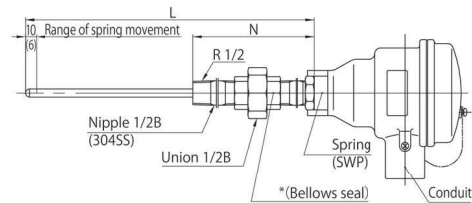
Notes

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 5.4	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 φ8.0)		
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		

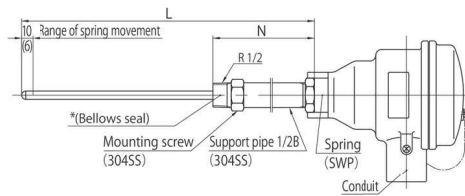
Notes

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 φ8.0)		
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		

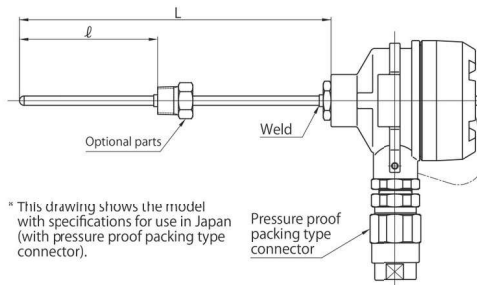
Notes

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 (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)	- φ			

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 d IIP66 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.

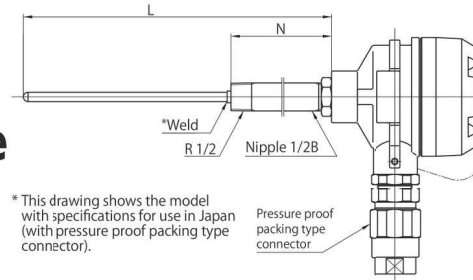
*2: Cannot be used as product with type approval in Japan (TIIS).

*3: The standard coating color is blue.

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

T99N¹- 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

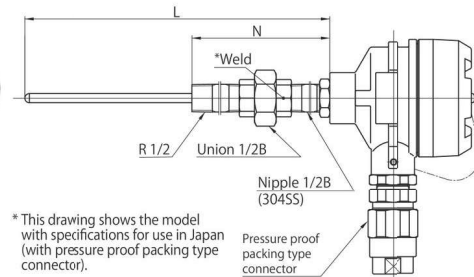
- Conforms to EAC TR CU customs union regulations for Russia, Kazakhstan, and Belarus
Explosion proof class: 1 Ex de II C T5/T6 Gb X Ex tb III C T95°C/80°C Db X
- Conforms to India safety standards
Explosion proof class: Ex de II C T6 Ta
- Excellent protection class: IP66 (for Japan, international, Europe, 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	OFP
International/ATEX (Baseefa) certified product	OFP
FM certified product	T99
NEPSI certified product	OFP
TR CU certified product	OFP
KOSHA certified product	OFP
PESO certified product	OFP
OSHA certified product	OFP
INMETRO certified product	OFP

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

Model code T99U



T99U¹- 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 d 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: 1 Ex 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).

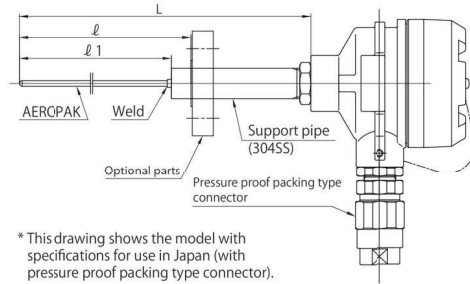
*3: The standard coating color is blue.

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



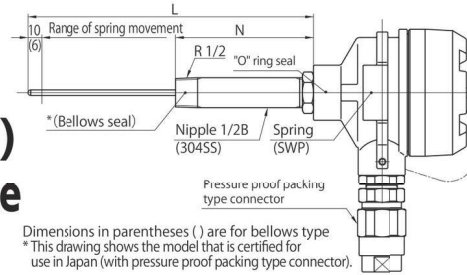
Explosion-Proof (Hydrogen Protection) Thermocouple with Support Pipe

Model code T99S



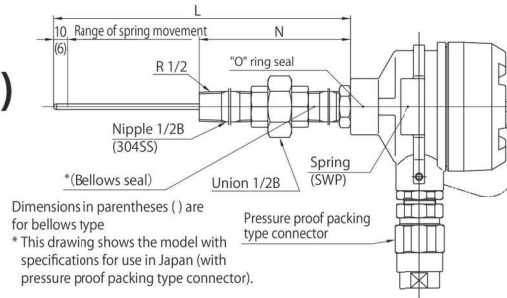
Spring Loaded Explosion-Proof (Hydrogen Protection) Thermocouple with Nipple

Model code T409N



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

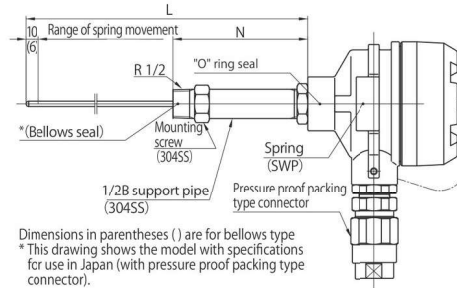
- New technical standards that conform to IEC standard (TIIS)
Explosion proof class: Ex d II C T6 (for Japan/TIIS)
Explosion proof class: Ex db eb II C T6 or T5 Gb
Ex tb III C T85°C or T100°C Db (for Japan/CML)
- Suitable for use in environments with gas vapor, dust, etc. in conformance with IECEx and 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: 1 Ex 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	OPF
International/ATEX (Baseefa) certified product	OPF
FM certified product	T409
NEPSI certified product	OPF
TR CU certified product	OPF
KOSHA certified product	OPF
PESO certified product	OPF
OSHA certified product	OPF
INMETRO certified product	OPF

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: 1 Ex 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	OPF
International/ATEX (Baseefa) certified product	OPF
FM certified product	T409
NEPSI certified product	OPF
TR CU certified product	OPF
KOSHA certified product	OPF
PESO certified product	OPF
OSHA certified product	OPF
INMETRO certified product	OPF

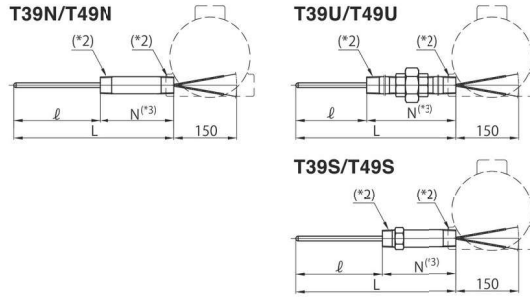


A-48



Series / Explosion/Flame Proof Nipple Type Temperature Sensor

Model code



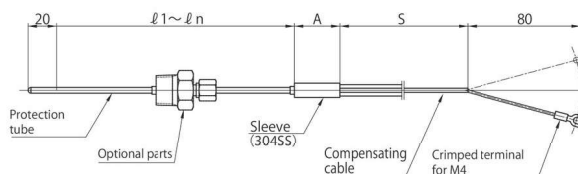
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

①	Basic model ^(*)	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)	-FM -KS	FM certified KOSHA certified
③	Nipple length ^(*)	-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,FN 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-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 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

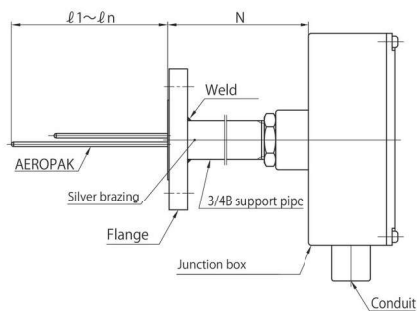
①	Length	ℓ 1 to ℓ n	Measuring junction position			
②	Number	2	Single			
③	Protection tube outer diameter	E F G	φ 4.8 φ 6.4 φ 8.0			
④	Sleeve outer diameter	10 12 15 18	φ 10 φ 12 φ 15 φ 18			
⑤	Type	N K E	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al Ni-Cr/Cu-Ni	J T	Fe/Cu-Ni Cu/Cu-Ni	
⑥	Measuring junction	8 9	G (#8) Grounded U (#9) Ungrounded			
⑦	Protection tube 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	Compensating cable length (Unit: mm)	S				
⑩	Type	EXD-M EXE-M	Compensating cable for general use 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.E	2 to 6	φ 1.0 φ 1.6
	φ 6.4	2 to 12	
	φ 8.C	2 to 15	

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	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

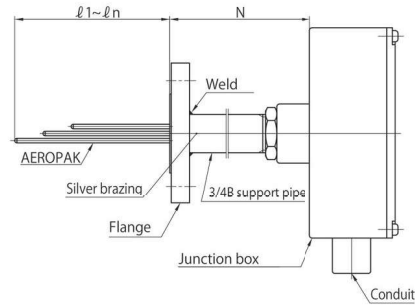
①	Number of terminals	4 to 6	Number of terminals (support pipe)		
②	Terminal box	T Y	Vertical type JB6 Horizontal type JB6		
③	Sheath length		ℓ 1 to ℓ 3		
④	Sheath outer diameter	B D E F	φ 1.6 φ 3.2 φ 4.8 φ 6.4		
⑤	Number of element wires	2 4	Single Double		
⑥	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al 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 l1 to ln
Specification method
Example: 3-point model
l1=3000
l2=2000
l3=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

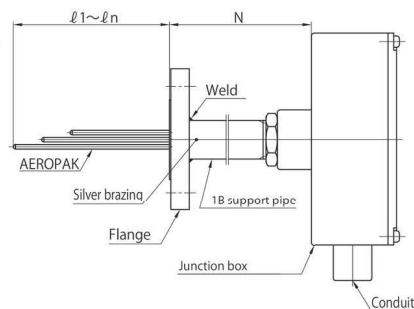
①	Number of terminals	8 to 12	Number of terminals (support pipe)		
②	Terminal box	T Y	Vertical type JB12 Horizontal type JB12		
③	Sheath length		ℓ1 to ℓ6		
④	Sheath outer diameter	B D E F	φ 1.6 φ 3.2 φ 4.8 φ 6.4		
⑤	Number of element wires	2 4	Single Double		
⑥	Type	N K E J T	Ni-Cr-Si/Ni-Si Ni-Cr/Ni-Al 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 l1 to ln
Specification method
Example: 5-point model
l1=5000
l2=4000
l3=3000
l4=2000
l5=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		ℓ 1 to ℓ 12			
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	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD. ASTM SP.	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			

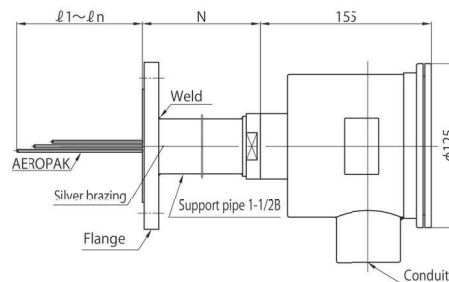
Notes

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 ℓ1 to ℓn
Specification method
Example: 9-point model
ℓ1=5000
ℓ2=4000
.
ℓ8=2000
ℓ9=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		ø 1 to ø 6 (2 to 6 pairs)		
④	Sheath outer diameter	B D F	ø 1.6 ø 3.2 ø 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	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD. ASTM SP.	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 ø 1 to ø n
Specification method
Example: 5-point model
ø 1=5000
ø 2=4000
ø 3=3000
ø 4=2000
ø 5=1000

Please indicate
each position

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



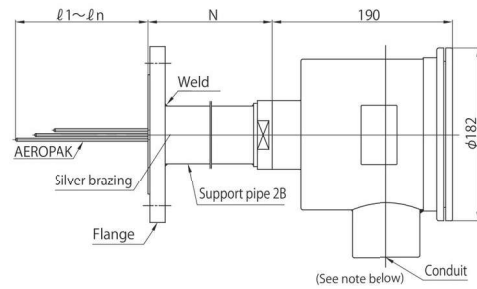
OKAZAKI
MANUFACTURING COMPANY

A-54



Explosion-Proof Multipoint Thermocouple

d2G4 (Note 1)



Model code **T97M(24)**

T97M(24) - ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ / ⑪

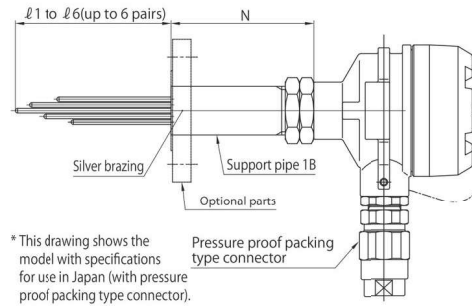
①	Number of terminals	4 to 24	4 to 24 terminals
②	Terminal box	GM24 25-n 40-n 50-n	Stainless steel (ST/ST) G1 1 to 4 places G1-1/2 1 to 4 places G2 1 to 4 places
③	Sheath length		l1 to l12 (2 to 12 pairs) l1 to l6 (φ 4.8 double)
④	Sheath outer diameter	B D E F	φ 1.6 φ 3.2 φ 4.8 φ 6.4
⑤	Number of element 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	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD. ASTM SP.
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 l1 to ln
Specification method
Example: 9-point model
l1=5000
l2=4000
.
l8=2000
l9=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 GEDS	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
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
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.
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



A-56



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 50584-1		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	PL-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	3950		
		15	11			
		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	3950		
		15	11			
		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	3950		
		15	11			
		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			
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 (φmm)	Non-metal protection tube (φmm)
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 150 mm<	±2.0 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

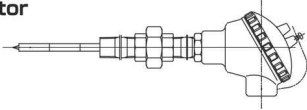
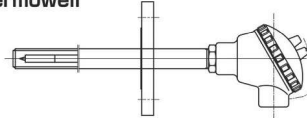
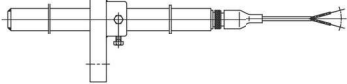
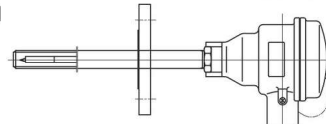
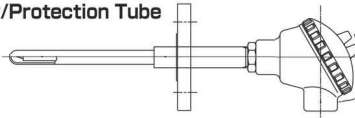
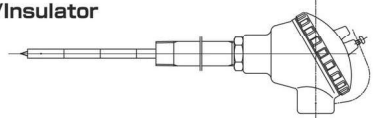
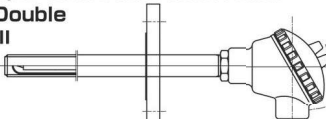
T thermocouple	100°C	Boiling point of water
B, R, S, N, K, E, J thermocouple	300°C	Niter bath

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 

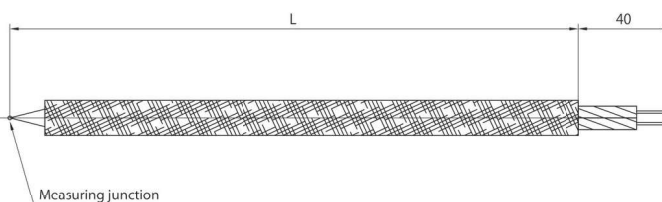


OKAZAKI
MANUFACTURING COMPANY

B-8



Braided Glass Yarn Insulated Thermocouple



Model code EXE

EXE- ① ② ③ ④ ⑤

①	Length (Unit: mm)	L				
②	Element outer diameter	T	φ 0.32			
		H	φ 0.65			
③	Number of element wires	2	Single			
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	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)	

Braided Glass Yarn Insulated Thermocouple Standard Specifications

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

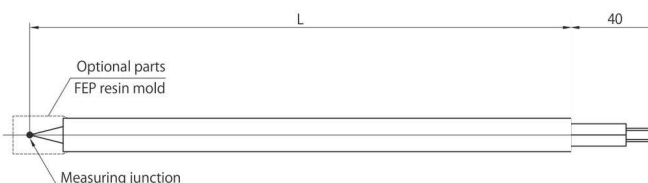
Color Type		*JIS C 1610 (IEC60584-3)			
		Color code for overall jacket		Color code for polarity	
		JIS-2012	JIS-1995 (Category 2)	JIS-2012	JIS-1995 (Category 2)
EXE	N	Pink	-	+ side: Same as overall jacket color - side: White	+ side: Red - side: White
	K	Green	Blue		
	E	Purple	Purple		
	J	Black	Yellow		
	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 H	φ0.32 φ0.65		
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	Class	01 02 03 04 05	1 (Former JIS class 0.4) 2 (Former JIS class 0.75) 3 (Former JIS class 1.5) ASTM STD. ASTM SP.	06 07 08	1 (IEC) 2 (IEC) 3 (IEC)
⑥	Optional parts	M	Mold		

FEP Insulated Thermocouple Standard Specifications

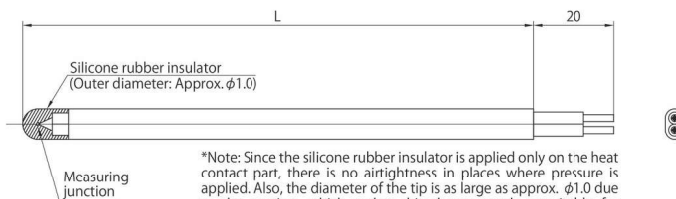
Specifications				
Element wire diameter	A	B	Temp. limit in operation	
φ0.65	Approx. 2.8	Approx. 1.7	-200 to 200°C (-200 to 150°C) *Mold type	
φ0.32	Approx. 1.7	Approx. 1.0	-200 to 200°C (-200 to 150°C) *Mold type	

Color		*JIS C 1610 (IEC60584-3)			
Type		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



Model code T801-1

T801-1- ① ②

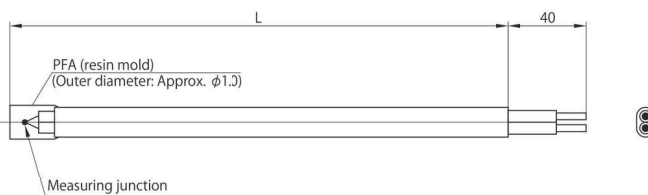
①	Length (Unit: mm)	L	
②	Element	K T	Ni-Cr/Ni-Al Cu/Cu-Ni

Specifications

Element	Element wire outer diameter	Insulation coating	Coating outer diameter	Measuring junction	Maximum operating temp.
K & T Class 2	φ 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

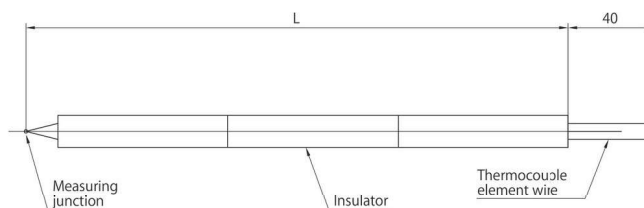
①	Length (Unit: mm)	L	
②	Element	K	Ni-Cr/Ni-Al

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

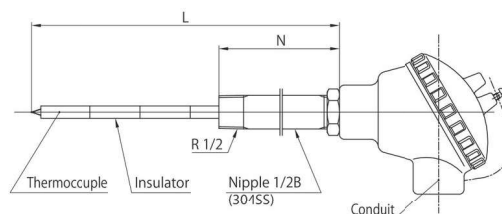
①	Length (Unit: mm)	L				
②	Element outer diameter	T	φ 0.5			
		H	φ 0.65			
		A	φ 1.0			
		B	φ 1.6			
		C	φ 2.3			
		D	φ 3.2			
③	Number of element wires	2	Single			
		4	Double			
④	Type	B	PL-Rh30/Pt-Rh6	K	Ni-Cr/Ni-Al	
		R	Pt-Rh13/Pt	E	Ni-Cr/Cu-Ni	
		S	Pt-Rh10/Pt	J	Fe/Cu-Ni	
		N	Ni-Cr-Si/Ni-Si	T	Cu/Cu-Ni	
⑤	Class	01	1 (Former JIS class 0.4)	05	ASTM SP.	
		02	2 (Former JIS class 0.75)	06	1 (IEC)	
		(B, R, and S are former JIS class 0.25)		07	2 (IEC)	
		03	3 (Former JIS class 1.5)	08	3 (IEC)	
		(B is former JIS class 0.5)				
		04	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

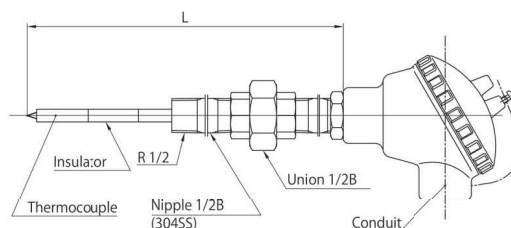


Model code TCN

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

①	Structure	1 2	N=100 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	φ 0.65 φ 1.0 φ 1.6 φ 2.3 φ 3.2
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

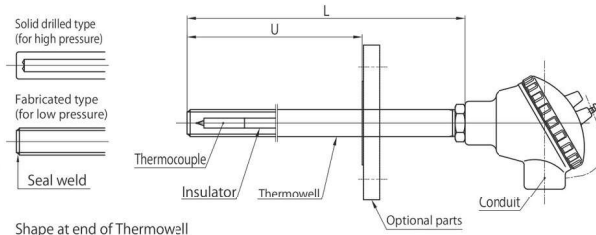


Model code TCU

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	ϕ 0.65 ϕ 1.0 ϕ 1.6 ϕ 2.3 ϕ 3.2
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	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			

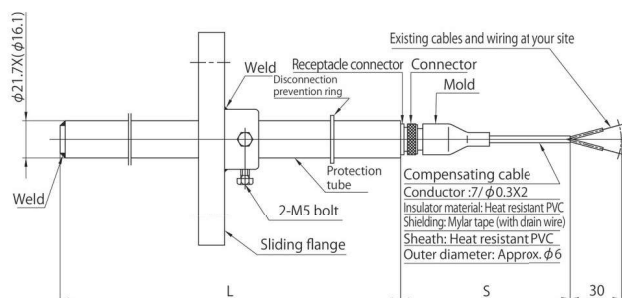
Protection tube dimensions

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

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

GS One Touch Sensor

Model code TCW-GS

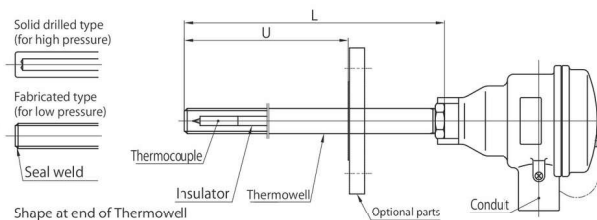


TCW-GS- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧
⑨ ⑩ / ⑪ ⑫ ⑬ / ⑭ / ⑮

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	J05 J10 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

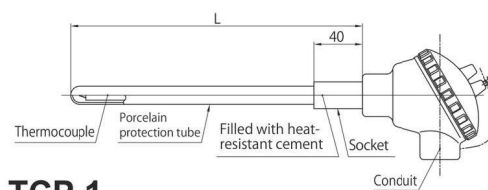
TCG- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ / ⑪ ⑫

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	

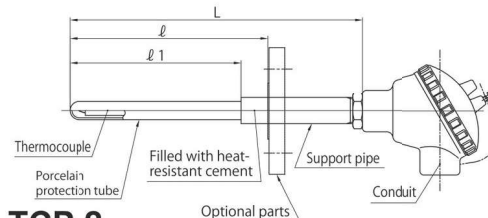
Protection tube dimensions

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



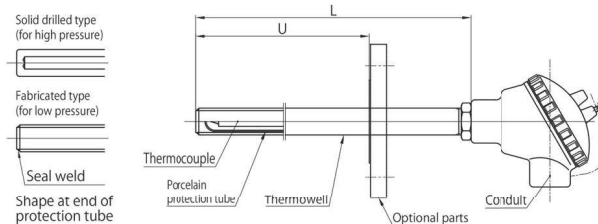
TCP-2

Model code TCP

TCP- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ / ⑪ ⑫

①	Structure	1 2	Socket type Support fabricated 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	φ0.5	N/A		
⑤	Number of element wires	2 4	Single Double		
⑥	Type	B R S	Pt-Rh30/Pt-Rh6 Pt-Rh13/Pt Pt-Rh10/Pt		
⑦	Measuring junction	5 9	(#5) Ungrounded/Separated U (#9) Ungrounded		
⑧	Class	02 03 04 05	2 (Former JIS class 0.25) 3 (Former JIS class 0.5) ASTM STD. ASTM SP.	06 07 08	1 (IEC) 2 (IEC) 3 (IEC)
⑨	Protection tube dimensions	-10 -13	φ10 φ13	-15 -17	φ15 φ17
⑩	Protection tube material	P0 P1	PT0 (equivalent to JIS R1401) 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

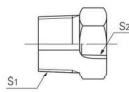
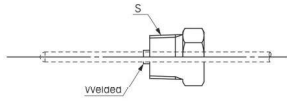
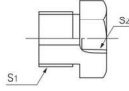
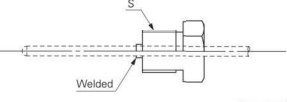
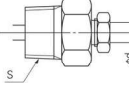
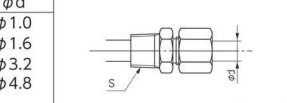
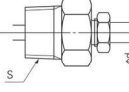
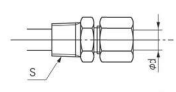
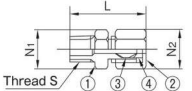
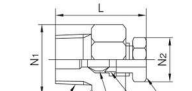


Model code TCR

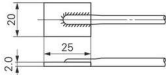
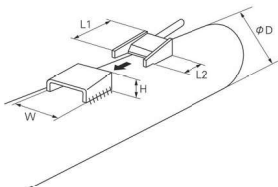
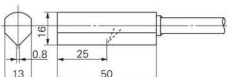
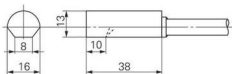
TCR- ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ / ⑪ ⑫

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

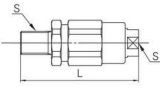
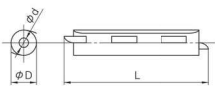
Standard Parts

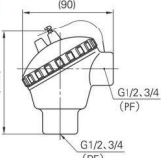
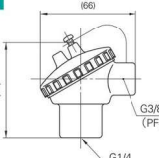
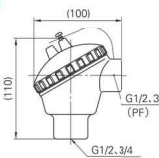
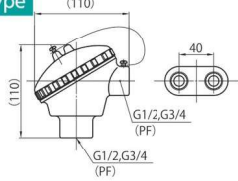
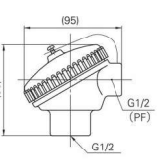
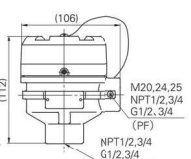
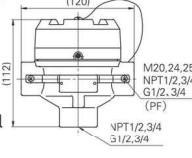
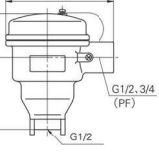
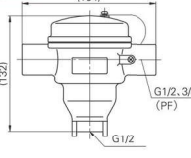
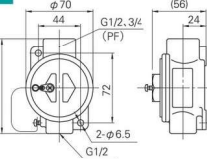
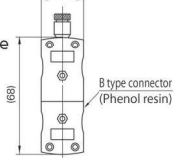
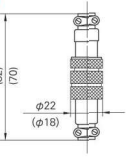
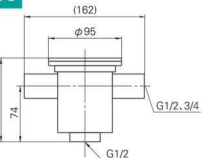
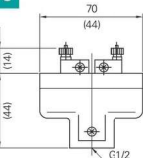
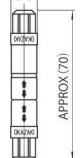
Double threaded adapter				Single threaded adapter				
	S ₁	S ₂	 (304SS)		S	 (304SS)		
AD-2T1T	R1/4	R1/8		AS-1T	R1/8			
AD-3T1T	R3/8	R1/8		AS-2T	R1/4			
AD-4T1T	R1/2	R1/8		AS-3T	R3/8			
AD-6T1T	R3/4	R1/8		AS-4T	R1/2			
AD-4T2T	R1/2	R1/4	 (304SS)	AS-6T	R3/4	 (304SS)		
AD-2F1T	G1/4	R1/8		AS-1F	G1/8			
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	 (304SS)	AS-6F	G3/4	 (304SS)		
AD-6F2T	G3/4	R1/4						
Compression fitting								
	S	φd	 (304SS)		S	φd	 (304SS)	
CF2T64	R1/4	φ6.4		CF1T10	R1/8	φ1.0		
CF2T80	R1/4	φ8.0		CF1T16	R1/8	φ1.6		
CF4T64	R1/2	φ6.4		CF1T32	R1/8	φ3.2		
CF4T80	R1/2	φ8.0		CF1T48	R1/8	φ4.8		
Structure		Code	Specifications				Sheath outer diameter applied	
			S	N1	N2	L	Material	
 Thread S		/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
 Thread S		/CF2T64	R1/4	17×19.6	14×16.2	40		φ6.4
		/CF2T80				42		φ8.0
		/CF4T64	R1/2	24×27.7	14×16.2	36		φ6.4
		/CF4T80				37		φ8.0

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

Surface pads																		
AEROPAD (304SS) AEROPAD PD-A ϕ 3.2, ϕ 4.8		RESIOPAD (304SS) RESIOPAD PD-R ϕ 3.2, ϕ 4.8, ϕ 6.4																
Strap (304SS) Strap ST-D ϕ 3.2 ST-E ϕ 4.8		U Pad (304SS) U Pad PD-UD ϕ 3.2 ϕ D: ϕ 38 to ϕ 120 PD-UE ϕ 4.8 ϕ D: ϕ 80 to ϕ 200 (Unwelded type)																
Knife Edge Pad Knife Edge Pad (Hastelloy-X) PD-N ϕ 8.0																		
Fan Tip Pad Fan Tip Pad (Hastelloy-X) PD-F ϕ 8.0																		
			<table><tr><td></td><td>L1</td><td>L2</td><td>W</td><td>H</td></tr><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></table>		L1	L2	W	H	PD-UD	46	25	21	13.5	PD-UE	47	32	26	16
	L1	L2	W	H														
PD-UD	46	25	21	13.5														
PD-UE	47	32	26	16														

Y-1

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 GL-20S-BC (BC Plated) GL-20S-SUS (304SS) S: PF3/4 or G3/4 L=110	 (for d2G4)	<table border="1"> <thead> <tr> <th></th><th>ϕd</th><th>ϕD</th><th>L</th></tr> </thead> <tbody> <tr> <td>FN-1</td><td>$\phi 4.8$</td><td>$\phi 11$</td><td>65</td></tr> <tr> <td>FN-2</td><td>$\phi 6.4$</td><td>$\phi 11$</td><td>65</td></tr> <tr> <td>FN-3</td><td>$\phi 4.8$</td><td>$\phi 9$</td><td>65</td></tr> <tr> <td>FN-4</td><td>$\phi 8.0$</td><td>$\phi 16$</td><td>100</td></tr> </tbody> </table>		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	FN-4	$\phi 8.0$	$\phi 16$	100	 (304SS)
	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																				
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 120g (40g) 	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	JIS 5K	P15	JPI 150LB
		J10	JIS 10K	P30	JPI 300LB
		J20	JIS 20K	P60	JPI 600LB
		A15	ASME 150LB	F-Z	Other flange (Z=□, □)
		A30	ASME 300LB		
		A60	ASME 600LB		
②	Flange face	FF	Flat face	RJ	Ring joint
		RF	Raised face	Z	Other seating surface (Z=□, □)
③	Flange size	15	15A or 1/2B	40	40A or 1-1/2B
		20	20A or 3/4B	50	50A or 2B
		25	25A or 1B	Z	Other size (Z=□, □)
④	Flange material	A	304SS	D	310S SS
		C	316SS	Z	Other material (Z=□, □)
⑤	Immersion length (Unit: mm)	- l			

Reference Thermoelectromotive Force Table

B Thermocouple											μV	ITS-90
°C	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	1048	1095	1143	1192	1242	
500	1242	1293	1344	1397	1451	1505	1561	1617	1675	1733	1792	
600	1792	1852	1913	1975	2037	2101	2165	2230	2296	2363	2431	
700	2431	2499	2569	2639	2710	2782	2854	2928	3002	3078	3154	
800	3154	3230	3308	3386	3466	3546	3626	3708	3790	3873	3957	
900	3957	4041	4127	4213	4299	4387	4475	4564	4653	4743	4834	
1000	4834	4926	5018	5111	5205	5299	5394	5489	5585	5682	5780	
1100	5780	5878	5976	6075	6175	6276	6377	6478	6580	6683	6786	
1200	6786	6890	6995	7100	7205	7311	7417	7524	7632	7740	7848	
1300	7848	7957	8066	8176	8286	8397	8508	8620	8731	8844	8956	
1400	8956	9069	9182	9296	9410	9524	9639	9753	9868	9984	10099	
1500	10099	10215	10331	10447	10563	10679	10796	10913	11029	11146	11263	
1600	11263	11380	11497	11614	11731	11848	11965	12082	12199	12316	12433	
1700	12433	12549	12666	12782	12898	13014	13130	13246	13361	13476	13591	
1800	13591	13706	13820									

R Thermocouple											μV	ITS-90
°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100	
0	0	-51	-100	-145	-188	-226						
°C	0	10	20	30	40	50	60	70	80	90	100	
0	0	54	111	171	232	296	363	431	501	573	647	
100	647	723	800	879	959	1041	1124	1208	1294	1381	1469	
200	1469	1558	1648	1739	1831	1923	2017	2112	2207	2304	2401	
300	2401	2498	2597	2696	2796	2896	2997	3099	3201	3304	3408	
400	3408	3512	3616	3721	3827	3933	4040	4147	4255	4363	4471	
500	4471	4580	4690	4800	4910	5021	5133	5245	5357	5470	5583	
600	5583	5697	5812	5926	6041	6157	6273	6390	6507	6625	6743	
700	6743	6861	6980	7100	7220	7340	7461	7583	7705	7827	7950	
800	7950	8073	8197	8321	8446	8571	8697	8823	8950	9077	9205	
900	9205	9333	9461	9590	9720	9850	9980	10111	10242	10374	10506	
1000	10506	10638	10771	10905	11039	11173	11307	11442	11578	11714	11850	
1100	11850	11986	12123	12260	12397	12535	12673	12812	12950	13089	13228	
1200	13228	13367	13507	13646	13786	13926	14066	14207	14347	14488	14629	
1300	14629	14770	14911	15052	15193	15334	15475	15616	15758	15899	16040	
1400	16040	16181	16323	16464	16605	16746	16887	17028	17169	17310	17451	
1500	17451	17591	17732	17872	18012	18152	18292	18431	18571	18710	18849	
1600	18849	18988	19126	19264	19402	19540	19677	19814	19951	20087	20222	
1700	20222	20356	20488	20620	20749	20877	21003					

S Thermocouple											μV	ITS-90
°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100	
0	0	-53	-103	-150	-194	-236						
°C	0	10	20	30	40	50	60	70	80	90	100	
0	0	55	113	173	235	299	365	433	502	573	646	
100	646	720	795	872	950	1029	1110	1191	1273	1357	1441	
200	1441	1526	1612	1698	1786	1874	1962	2052	2141	2232	2323	
300	2323	2415	2507	2599	2692	2786	2880	2974	3069	3164	3259	
400	3259	3355	3451	3548	3645	3742	3840	3938	4036	4134	4233	
500	4233	4332	4432	4532	4632	4732	4833	4934	5035	5137	5239	
600	5239	5341	5443	5546	5649	5753	5857	5961	6065	6170	6275	
700	6275	6381	6486	6593	6699	6806	6913	7020	7128	7236	7345	
800	7345	7454	7563	7673	7783	7893	8003	8114	8226	8337	8449	
900	8449	8562	8674	8787	8900	9014	9128	9242	9357	9472	9587	
1000	9587	9703	9819	9935	10051	10168	10285	10403	10520	10638	10757	
1100	10757	10875	10994	11113	11232	11351	11471	11590	11710	11830	11951	
1200	11951	12071	12191	12312	12433	12554	12675	12796	12917	13038	13159	
1300	13159	13280	13402	13523	13644	13766	13887	14009	14130	14251	14373	
1400	14373	14494	14615	14736	14857	14978	15099	15220	15341	15461	15582	
1500	15582	15702	15822	15942	16062	16182	16301	16420	16539	16658	16777	
1600	16777	16895	17013	17131	17249	17366	17483	17600	17717	17832	17947	
1700	17947	18061	18174	18285	18395	18503	18609					



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

K Thermocouple										
°C	0	-10	-20	-30	-40	-50	-60	-70	-80	ITS-90
-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	-5 891
0	0	-392	-778	-1 156	-1 527	-1 889	-2 243	-2 587	-2 920	-3 243
100	4 096	4 509	4 920	5 328	5 735	6 138	6 540	6 941	7 340	7 739
200	8 138	8 539	8 940	9 343	9 747	10 153	10 561	10 971	11 382	11 795
300	12 209	12 624	13 040	13 457	13 874	14 293	14 713	15 133	15 554	15 975
400	16 397	16 820	17 243	17 667	18 091	18 516	18 941	19 366	19 792	20 218
500	20 644	21 071	21 497	21 924	22 350	22 776	23 203	23 629	24 055	24 480
600	24 905	25 330	25 755	26 179	26 602	27 025	27 447	27 869	28 289	28 710
700	29 129	29 548	29 965	30 382	30 798	31 213	31 628	32 041	32 453	32 865
800	33 275	33 685	34 093	34 501	34 908	35 313	35 718	36 121	36 524	36 925
900	37 326	37 725	38 124	38 522	38 918	39 314	39 708	40 101	40 494	40 885
1000	41 276	41 665	42 053	42 440	42 826	43 211	43 595	43 978	44 359	44 740
1100	45 119	45 497	45 873	46 249	46 623	46 995	47 367	47 737	48 105	48 473
1200	48 838	49 202	49 565	49 926	50 286	50 644	51 000	51 355	51 708	52 060
1300	52 410	52 759	53 106	53 451	53 795	54 138	54 479	54 819		55 160

E Thermocouple										
°C	0	-10	-20	-30	-40	-50	-60	-70	-80	ITS-90
-200	-8 875	-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
0	0	-582	-1 152	-1 709	-2 255	-2 787	-3 306	-3 811	-4 302	-4 777
100	6 319	6 998	7 685	8 379	9 081	9 789	10 503	11 224	11 951	12 684
200	13 421	14 164	14 912	15 664	16 420	17 181	17 945	18 713	19 484	20 259
300	21 036	21 817	22 600	23 386	24 174	24 964	25 757	26 552	27 348	28 146
400	28 946	29 747	30 550	31 354	32 159	32 965	33 772	34 579	35 387	36 196
500	37 005	37 815	38 624	39 434	40 243	41 053	41 862	42 671	43 479	44 286
600	45 093	45 900	46 705	47 509	48 313	49 116	49 917	50 718	51 517	52 315
700	53 112	53 908	54 703	55 497	56 289	57 080	57 870	58 659	59 446	60 232
800	61 017	61 801	62 583	63 364	64 144	64 922	65 698	66 473	67 246	68 017
900	68 787	69 554	70 319	71 082	71 844	72 603	73 360	74 115	74 869	75 621
1000	76 373									77 125

Thermocouple Reference Thermoelectromotive Force Table

J Thermocouple											μV	ITS-90
$^{\circ}C$	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100	
-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	
$^{\circ}C$	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											

T Thermocouple											μV	ITS-90
$^{\circ}C$	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100	
-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	
$^{\circ}C$	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)



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Z-3



This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no text or other markings on the paper.





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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