Head mounting type temperature transmitter (RTD only)
Model : R912 (with T990)

Spec. sheet no. RD09-02

Service intended
These transmitters are recommended be used in the situation where the application of RTD signals to carry to a long distance or to guard against the heavy electrical field noise. The transmitters convert RTD inputs to an analog signal for a direct interface with indicators, recorders, controllers, PLC, DCS systems, and these can be used for a wide range of applications in process control, automatic machinery and hydraulic or pneumatic system design.

Advantages
- Two wire 4 - 20 mA current output signal
- RTD input
- Measuring range from -50~400 ºC
- Fixed range
- Excellent accuracy and long term stability
- Low - cost
- Miniature design

Model : T990

Specification

Electrical specification
Excitation voltage : 18~30 V
Load resistance : Max. 500 Ω at 24 V
Influence of excitation : 0.01 % FSO/V
Burnout : Upscale (Approx. 23 mA DC) or
Down scale (Approx. 4 mA DC)
Reverse polarity : Protected
Shock resistance : No change in performance after
10Gs for 11ms
Vibration : 5g (10~2,000 Hz)
Response time (10~90 %) : ±0.5 seconds
Adjustment range : ±15 % of full scale / Zero and span

Performance specification
Accuracy : ±0.2 % of full scale
Non - linearity : Better than 0.10 % of full scale
Repeatability : Better than 0.05 % of full scale
Long term stability : Better than 0.05 % of full scale per month
Ambient temperature limits : -40~65 ºC
Ambient humidity limits : 5~95 % R.H

Input
Measuring element : Pt 100 Ω at 0 ℃

Output
Current output
Electrical connection type : 2-wire technique
Full scale output signal : 20 mA ± 0.2 %
Zero measured output : 4 mA ± 0.03 %
Other output signals available on request

Certificates
KCS Ex d IIC T6
KCS Ex tD A21 T85ºC

Main order — Ordering information

1. Base model

R912	Temperature transmitter (RTD only)

2. Head and tip shape type

F	Explosion proof and ungrounded
G	Explosion proof and spring - loaded
P	Explosion proof (Double conduit) and ungrounded
S	Explosion proof (Double conduit) and spring - loaded

3. Element

Q	Pt 100 Ω(B)
9	Pt 100 Ω(A)

4. Sheath or tube material

0	304SS
1	316SS
7	316L SS
9	Other

5. Sheath or tube outer diameter (mm)

Sheath type		Tube type	
D9	3.2	**E8**	4.8
E9	4.8	**F8**	6.4
F9	6.4	**G8**	8.0
G9	8.0	**J0**	10.0
N9	6.0		

6. Conduit connection

3	½" NPT
6	¾" NPT
7	None
8	M20 x 1.5P
9	Other

7. Mounting type

X	Refer to mounting table (11th character)

8. Connection type

XX	Refer to Connection table (12th and 13th character)

9. Insert length

X	Refer to insert length table (14th character)

10. Option

0	None
1	Accessories
4	Epoxy coated ALDC head
6	Head material : 316SS
7	Accessories and epoxy coated ALDC head
9	Accessories and head material : 316SS
A	Ex tD Certi.
B	Accessories and Ex tD Certi.
C	Epoxy coated and Ex tD Certi.
D	Head material : 316SS and Ex tD Certi.
E	Accessories, Epoxy coated and Ex tD Certi.
F	Accessories and Head material : 316SS and Ex tD Certi.

Sample ordering code

1	2	3	4	5	6	7	8	9	10
R912	**F**	**Q**	**7**	**F9**	**3**	**X**	**XX**	**X**	**4**

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1. Base model

T990	Temperature transmitter

2. Input type

RJ	Pt 100 Ω

3. Measuring range (℃)

05	0 ~ 50
10	0 ~ 100
15	0 ~ 150
20	0 ~ 200
25	0 ~ 250
30	0 ~ 300
40	0 ~ 400
50	0 ~ 500
51	50 ~ 150
55	50 ~ 150
12	100 ~ 200
13	100 ~ 300
N0	-50 ~ 50
N1	-50 ~ 100
N5	-50 ~ 150
N2	-50 ~ 200
ZZ	Special

4. Burn-out

U	Up scale
D	Down scale

Sample ordering code

1	2	3	4
T990	**RJ**	**05**	**U**

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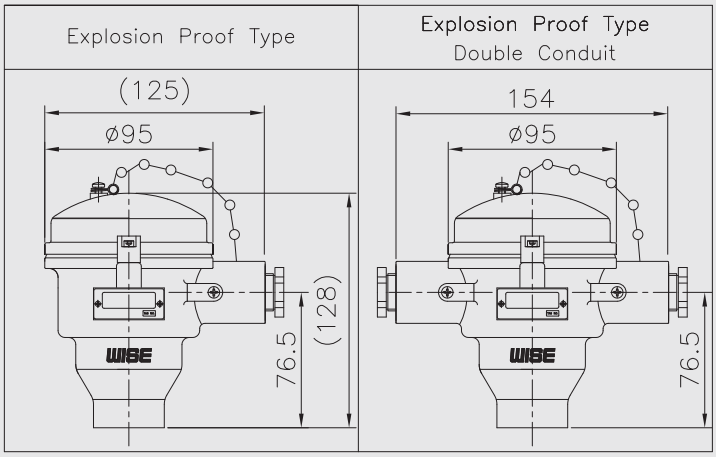
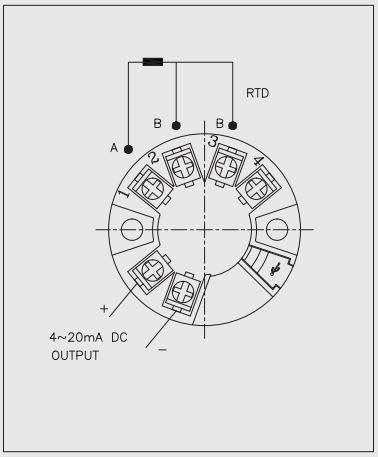
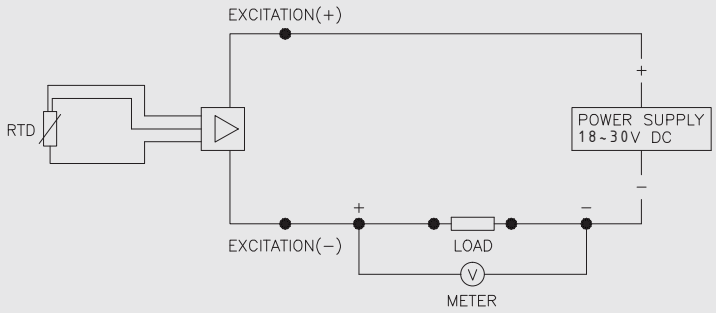
R912 : Type of mounting



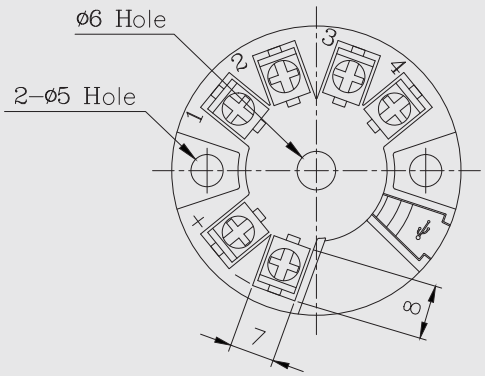
Head

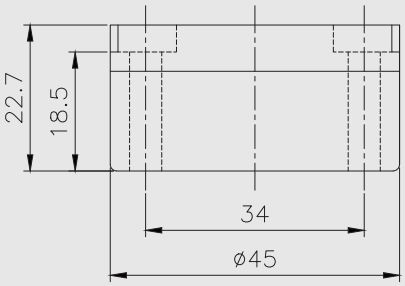


Electrical connection



System connection for 2 - wire transmitter





Mounting, connection type and insert length table - 11th thru 14th characters

11th character		12th character		13th character		14th character	
Code	Mounting	Code	Connection size and connector material	Code	Connection type	Code	Insert length (mm)
A	None	A	None	A	None	A	100
	Fixed thread lag length	B	⅛" and 304SS	B	PT	B	200
B	80 mm	C	¼" and 304SS	C	NPT	C	300
C	100 mm	D	⅜" and 304SS	D	PF	D	400
D	150 mm	E	½" and 304SS	E	NPS	E	500
E	200 mm	F	¾" and 304SS	F	UNF	F	600
F	Other	G	1" and 304SS	G	BSPT	G	700
	Fixed flange lag length	H	1¼" and 304SS	H	BSPF	H	800
G	80 mm	J	1½" and 304SS	J	MM	J	900
H	100 mm	K	2" and 304SS	K	B16.5 Class 150 RF	K	1,000
J	150 mm	L	3" and 304SS	L	B16.5 Class 150 FF	L	1,500
K	200 mm	M	7/16" and 304SS	M	B16.5 Class 300 RF	M	2,000
L	Other	N	⅛" and 316SS	N	B16.5 Class 300 FF	N	2,500
M	Movable thread	P	¼" and 316SS	O	Sanitary	P	3,000
N	Movable flange	Q	⅜" and 316SS	P	B16.5 Class 600 RF	Q	3,500
P	Compression fitting	R	½" and 316SS	Q	B16.5 Class 600 FF	R	4,000
	Union and nipple length	S	¾" and 316SS	R	JIS 5K RF	S	4,500
Q	100 mm length	T	1" and 316SS	S	JIS 5K FF	T	5,000
R	150 mm length	U	1¼" and 316SS	T	JIS 10K RF	U	6,000
S	Other	V	1½" and 316SS	U	JIS 10K FF	V	7,000
	Nipple length	W	2" and 316SS	V	JIS 20K RF	W	8,000
T	50 mm	X	3" and 316SS	W	JIS 20K FF	X	9,000
U	100 mm	Y	7/16" and 316SS	X	B16.5 Class 1,500 RTJ	Y	10,000
V	150 mm	Z	Other	Y	B16.5 Class 2,500 RTJ	Z	Other
W	Other			Z	Other		
X	Fixed thread						
Z	Other						

- Note for 14th character, please choose a code of next higher length if applicable length is not. Actual length shall be specified.
- Note for *Y code (Oil sealing type), only available with spring-loaded head type.

Other option codes

This catalog provides additional optional information beyond the main ordering information for the basic models of thermocouple and RTD.

1. Select option code for Head type Conduit adapter

When using the Conduit adapter, the code selection for the material is as follows.

Base Model	Code	Code Name	Remark
R110, R120, R200, R210, R220, R300, R600, R700, R911, R912, R920, R940, R950, R960, R970	M6	General (Weather-proof) Brass + Ni Plating	The size of the conduit connection is selected in the main order of the base model.
	M7	Ex-proof Brass + Ni Plating	
	M8	General (Weather-proof) 304SS	
	MA	General (Weather-proof) 316SS	
	MB	Ex-proof 316SS	
	AD	Other (Contact the head office)	

Note.
1. See the <Table: Head information> below for the types of cable conduit that may be connected.
2. For sizes other than the conduit of the head itself, an adapter must be used.
3. Certified explosion proof cable glands must be used when installing in hazardous areas.
4. For other inquiries, please contact the head office.

<Table: Head information>

Head Type	Head Material	Head thread (Cable entry size)	Conduit Adapter	
			Size	Material
Ex-proof (Single Conduit)	ALDC	PF½"(F), PF¾"(F), NPT½"(F), NPT¾"(F)	NPT½"(F), NPT¾"(F) M20X1.5P(F) PT (Unavailable)	Brass + Ni Plating 316SS
	316SS	PF½"(F)		
Ex-proof (Double Conduit)	AC4C	PF½"(F)		
General (Weather-Proof)	ALDC	PF½"(F), PF¾"(F)		
	316SS 304SS	PF¾"(F)	PT½"(F), PT¾"(F) NPT½"(F), NPT¾"(F) M20X1.5P(F)	Brass + Ni Plating (Only PT½"(F), PT¾"(F)) 316SS, 304SS
Compact (Small)	ALDC	PF½"(F)		

2. Lead wire type

If the WISE standard Lead wire type is not applied, the option code below can be selected.

Base Model	Code	Code Name	Remark
R200, R300, R600, R950	E1	Only Extended lead wire	1) "E1": Lead wire disconnection 2) "E2": Use only armored tube type code for R330. 3) "E4", "E9": Only to Extension lead type 4) 316SS armored tube type (Contact the head office)
	E2	304SS armored tube type	
	E3	Shrinkable tube with 304SS armored tube type	
	E4	Outer shield	
	E8	PVC Coating with 304SS aemored tube type	
	E9	Shrinkable tube type	
	EA	316SS armored tube type	
	EB	Shrinkable tube with 316SS armored tube type	
	EC	PVC Coating with 316SS aemored tube type	

3. Insulation material for lead wire

If the WISE standard Insulation material for Lead wire is not applied, the option code below can be selected.

Base Model	Code	Code Name	Remark
R200, R300, R600, R950	FB	Silicon	Other materials are selected after consulting the head office
	MC	PVC	
	MD	Teflon	
	ME	Non-asbestos	
	MG	Teflon (Grey)	
	AD	Other	

Note.

Extension & compensation wire (WISE Standard)
Composed of a combination of 2-item. Lead wire type and 3-item. Insulation material for lead wire.

1. Thermocouple
1.1) E4ME: Outer shield (tinned copper) + Non asbestos (200°C) (STD) - Omit code selection
1.2) MD (Teflon), MC (PVC): Single only (Excluding shield). In the case of Double, it is produced with 2 single wires.
1.3) E4MD: Outer shield (tinned copper) + Teflon (Contact the head office)
1.4) ME: Element B, R, S type - Non asbestos only (Excluding shield) - Omit code selection

2. RTD
2.1) E4MD: Outer shield (tinned copper) + Teflon (100~120°C) (STD) - Omit code selection
2.2) E4ME: Outer shield (tinned copper) + Non asbestos
2.3) MD (Teflon), MC (PVC): Single only (excluding shield). In the case of Double, it is produced with 2 single wires.

For other inquiries, please contact the head office.

4. Lead wire color

Base Model	Code	Code Name	Remark
R110, R120, R200, R210, R220, R300, R600, R700, R911, R912, R920, R940, R950, R960, R970	A0	ANSI Code	Thermocouple ANSI (ISA MC96.1) Code
	E0	EN (IEC) Code	Thermocouple EN (IEC 60584-3) Code RTD EN (IEC 60751) and JIS C 1605-2013 Code
	K0	KS Code	Thermocouple JIS C 1610 (KS C 1609) Code RTD JIS (Old), KS C 1603 Code
	Z0	Other	For other materials, contact the head office.

Note.
1. Add code when requesting lead wire standard designation. (Use WISE STD when option code is not selected)
   WISE standard Thermocouple JIS C 1610 (KS C 1609) "K0", RTD EN (IEC 60751) "E0" Omit code selection.
2. If you are using a version prior to JIS C 1604-2013, select option code "K0".
   If the "K0" option code is not selected, WISE standard EN (IEC 60751) colors are used.
3. RTD lead wire material (Teflon + Outer Teflon) is only available with KS C 1603 "K0" option code.
4. If the lead wire material is PVC, the standard size connot be applied to the lead wire color.
   Available in PVC manufacturer specified colors only.
5. For other inquiries, please contact the head office.

<International color code table>

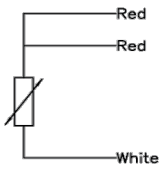
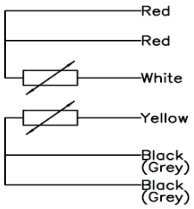
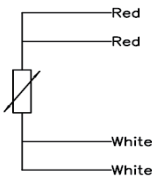
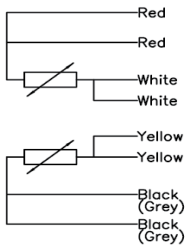
(Differential colors may be used according to customer requirements.)

■ **Thermocouple (TC)**

Type	EN (IEC 60584-3)		ANSI (ISA MC96.1)		JIS C 1610 (KS C 1609)	
	(+)	(-)	(+)	(-)	(+)	(-)
T	Brown	White	Blue	Red	Red	White
E	Violet (Purple)	White	Purple	Red	Red	White
J	Black	White	White	Red	Red	White
K	Green	White	Yellow	Red	Red	White
N	Pink	White	Orange	Red	Red	White
B	Grey	White	Grey	Red	Red	White
R	Orange	White	Black	Red	Red	White
S	Orange	White	Black	Red	Red	White

■ **Resistance thermometer detector (RTD)**

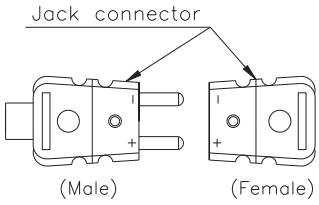
IEC/EN 60751 standard applied (See applicable colors for the KS C 1603 standard)

			
Single (3-Wire)	**Double (6-Wire)**	**Single (4-Wire)**	**Double (8-Wire)**

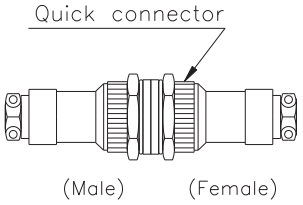
5. Lead Wire Terminal

Base Model	Code	Code Name	Remark
R200, R300, R600, R950	E5	Jack Connector (2P)	Shape reference for each type
	E6	Quick Connector	
	E7	Small Jack Connector (2P)	
R110, R120, R200, R210, R220, R230, R600, R700, R911, R912, R920, R940, R950, R960, R970	Y0	Except Terminal Lug	WISE Standard (The specifications produced without selecting other option codes are as follows.) Head type: Except Terminal Lug (STD) Non Head type: "Y" type Terminal Lug (STD)
	Y1	"O" type Terminal Lug	
	Y2	"I" type Terminal Lug	
	Y3	"Y" type Terminal Lug	

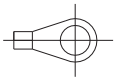
Note.
1. The shape of each type is as follows.



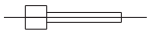
"E5", "E7" (Jack Connector)



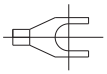
"E6" (Quick Connector)



"Y1" ("O" type Terminal Lug)



"Y2" ("I" type Terminal Lug)



"Y3" ("Y" type Terminal Lug)

6. Element type option (for RTD Element type)

Base Model	Code	Code Name	Remark
R220, R300, R600, R911, R912, R920, R940, R950	S0	Silicon Molding	Option applied to models except model R200 (Sheath outer diameter: 6, 6.4, 8 mm)
	Z1	Element (Other)	Cryogenic sensor

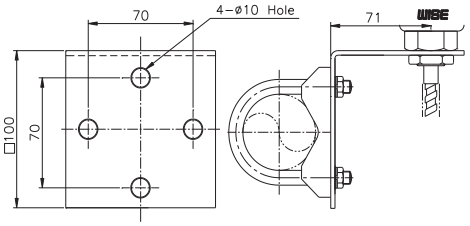
7. Terminal for Thermocouple (Head type)

Base Model	Code	Code Name	Remark
R110, R120, R300, R600, R700, R920, R940, R950, R960, R970	TK	"K" type only	If the terminal block terminal material is the same material request as the thermocouple (TC) inner conductor
	TE	"E" type only	

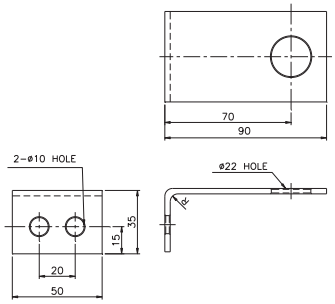
8. Mounting Bracket

Base Model	Code	Code Name	Remark
R120, R200, R220, R300, R600, R911, R912, R920, R940, R950	R1	2" Mounting bracket (304SS)	For dimensions and shapes other than the mounting bracket, select other "R0" and contact the head office.
	R2	2" Mounting bracket (316L SS)	
	R6	Wall Mounting bracket STD (304SS)	
	R7	Wall Mounting bracket STD (316L SS)	
	RA	Wall Mounting bracket open type (304SS)	
	RB	Wall Mounting bracket open type (316L SS)	
	RC	Wall Mounting bracket vertical (304SS)	
	RD	Wall Mounting bracket vertical (316L SS)	
	R0	Other	

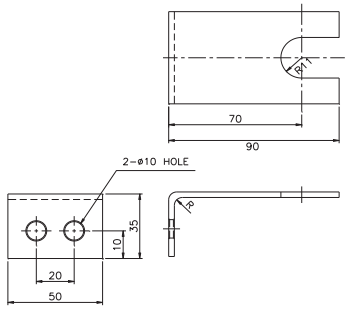
Note.
Mounting Bracket shape reference.



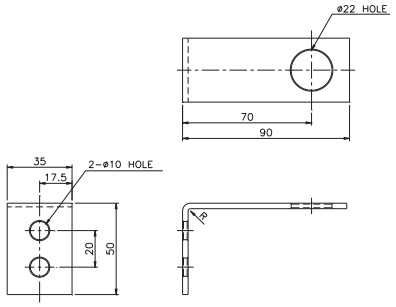
"R1", "R2" (2" Mounting Bracket)



"R6", "R7" (Wall Mounting Bracket)



"RA", "RB" (Wall Mounting Bracket Open type)



"RC", "RD" (Wall Mounting Bracket Vertical)

9. Element post-processing

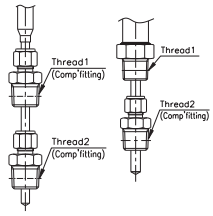
Base Model	Code	Code Name	Remark
R110, R120, R200, R210, R220, R300, R600, R911, R912, R920, R940, R950, R960	P4	Buffing (#300)	
	P6	Electrical Polishing	
	PA	Teflon Coating	
	PB	Teflon Lining	

10. Mounting type Option

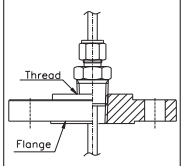
Base Model	Code	Code Name	Remark
R110, R120, R200, R210, R200, R300, R600, R700, R911, R912, R920, R940, R950, R960, R970	AM	AVL Maker	1) AVL Maker: Corresponds to the use of flange or compression fitting by designated manufacturers. 2) "CF", "FT" codes are additional mounting options to the basic mounting type options. 3) "KE", "PD" applies to models R940, R950 series. 4) See other mounting type shapes.
	CF	With Compression Fitting	
	FT	With Flange (Thread type)	
	FW	With Flange (Welding type)	
	KE	With Knife Edge (Only Thermocouple)	
	MF	Movable (Ferrule type)	
	MS	Movable (Stopper type)	
	PD	With Pad	
	SF	With S-Fin	
	ST	With Shroud tube	
	T0	With Guide tube	
	T1	Above Guide tube	
	T2	Below Guide tube	
	T3	Outer protection tube	
	ZZ	Mounting type (Other)	

Note.
Please select an option other than the mounting type option ordering information in the main order.
Of there is no mointing type option to select in the other option code, select mounting type (other) code "ZZ" and contact the head office.

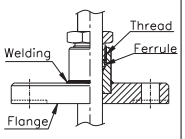
< Other mounting type shape reference >



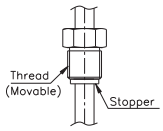
"CF"
With Compression Fitting



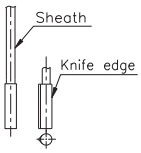
"FT"
With Flange (Thread type)



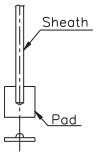
"MF"
Movable (Ferrule type)



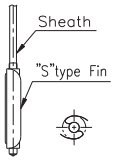
"MS"
Movable (Stopper type)



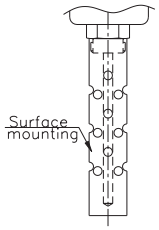
"KE"
With Knife Edge



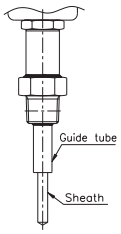
"PD"
With Pad



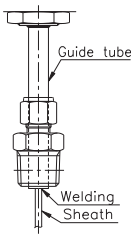
"SF"
With S-Fin



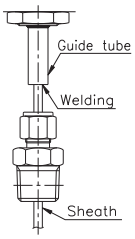
"ST"
With Shroud tube



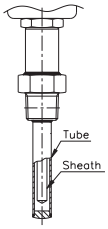
"T0"
With Guide tube



"T1"
Above Guide tube



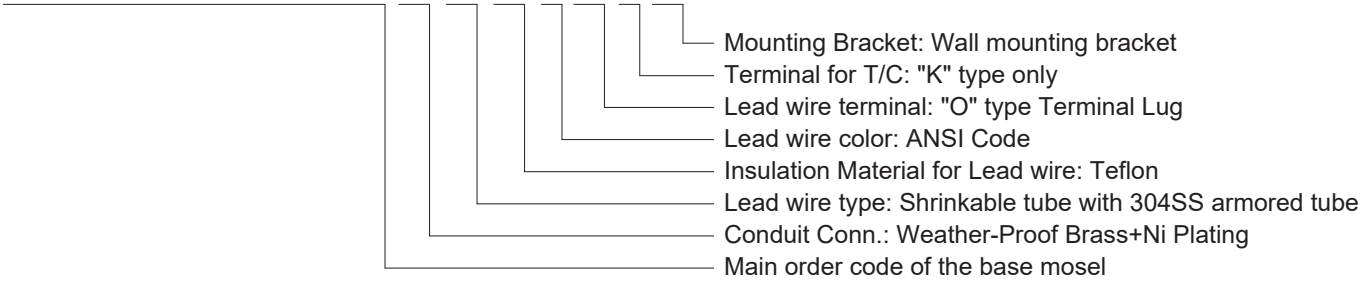
"T2"
Below Guide tube



"T3"
Outer Protection tube

< Example >

R321 X X X XX X X X X X X_**M8 E3 MD A Y1 K R6**



* The above example is a thermocouple specification, and if other option codes are not selected, the code digits are not displayed.

* The above other option codes do not apply to all models, so please inquire at the head office before selecting.

* For order specifications or other inquiries other than the above other option codes, please contact the head ofiice.