

Indicating Thermometers

OUTLINE

An indicating thermometer can be roughly classified into the liquid filled type, in which a principle that charged liquid expands and contracts according to temperature change is applied, and the gas filled type, in which a principle that charged inert gas pressure changes according to temperature change is applied. Additionally, in the liquid filled type, two types, the mercury filled type and the liquid filled type, exist.

This catalog is formed by classifying these thermometers into a thermometer with mercury and that without mercury.

FEATURES

- These thermometers are classified into the liquid filled type and the mercury filled type according to a temperature sensing method, and into the remote type and the direct type according to a function.
- The wide variation complying with extensive environments and applications is provided.
- * When selecting a thermometer, select a thermometer which is normally applied to a temperature range of 30% to 60% of full span. Check to confirm that the material of the wetted parts is appropriate to measuring gas or liquid.



SPECIFICATION

Manufacturing temperature range:

Liquid filled type • -200℃ ~ 600℃

Mercury filled type • -50℃ ~ 650℃

Size:

100DIA., 150DIA. (75DIA. is available)

Mounting:

Remote surface mounting



Remote panel mounting



Direct type



Bulb • Connection material:

304 st.st.

Lead parts material:

Capillary 304 st.st. or 316 st.st.

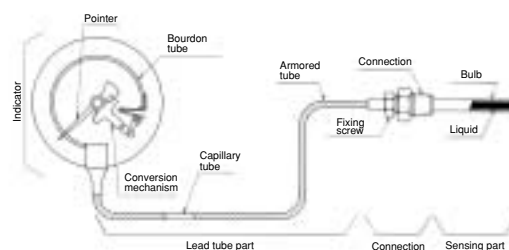
Armored tube 430 st.st. or 430 st.st.+PVC

Ambient temperature compensation:

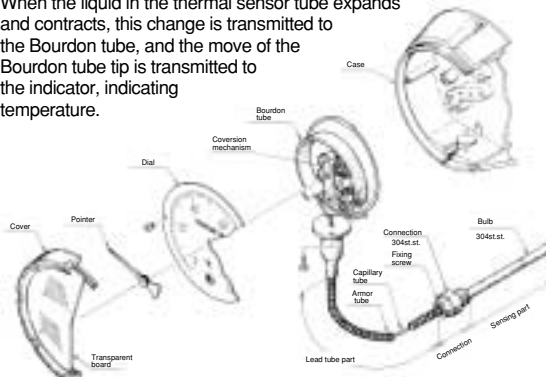
The charged liquid in the indication portion and duct portion of the pressure type thermometer expands and contracts according to the ambient temperature, causing an indication error. Two methods to compensate this error exist:

- Bimetal compensation
- Lead compensation

Principles • Construction:

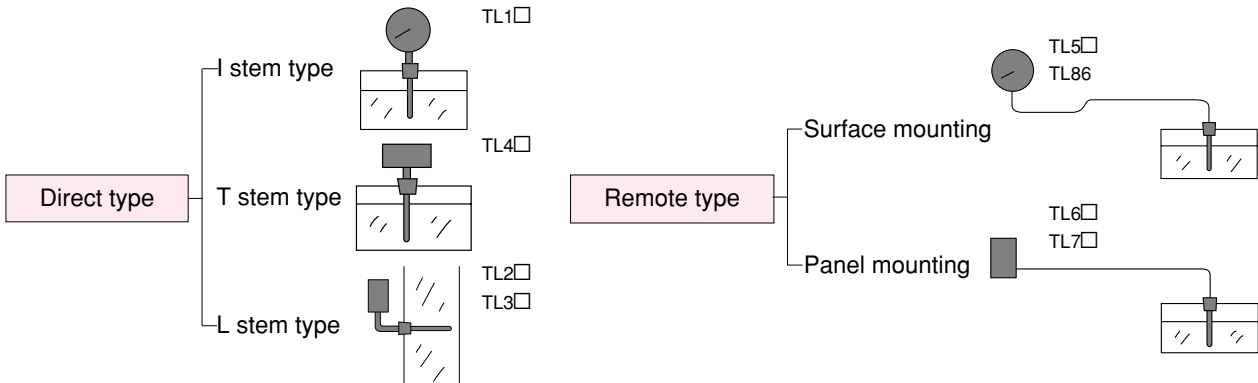


The pressure type thermometer is composed of a thermal sensing parts, an indicator and a lead tube part which connects these two portions. Between these portions, a connecting portion, which connects the thermal sensor tube, exists. The liquid is charged in this system. When the liquid in the thermal sensor tube expands and contracts, this change is transmitted to the Bourdon tube, and the move of the Bourdon tube tip is transmitted to the indicator, indicating temperature.



SELECT THE SPECIFICATION OF THERMOMETERS 1

1. Type and mounting



	Advantages	Disadvantages
Direct type	<ul style="list-style-type: none"> As the indicator and the bulb are directly connected, installation can be performed only by the connecting screw. The indicator of the free angle type of the L stem type can be moved to the position the indicator can be easily read. 	<ul style="list-style-type: none"> As the indicator and the bulb are directly connected, this thermometer is easily affected by measuring liquid. (In the case of the liquid filled type, manufacturing temperature range is up to 150°C.) The indicator of the slide model of the L stem type can be turned around, if the fixing screws are loose, because the thermometer is installed with packings.

	Advantages	Disadvantages
Remote type	<ul style="list-style-type: none"> Temperature can be read at the different place from measuring liquid. 	<ul style="list-style-type: none"> In the case of the mercury filled type, the position (height difference between the indicator and the bulb) can cause an error.

2. Compensation system by installation place

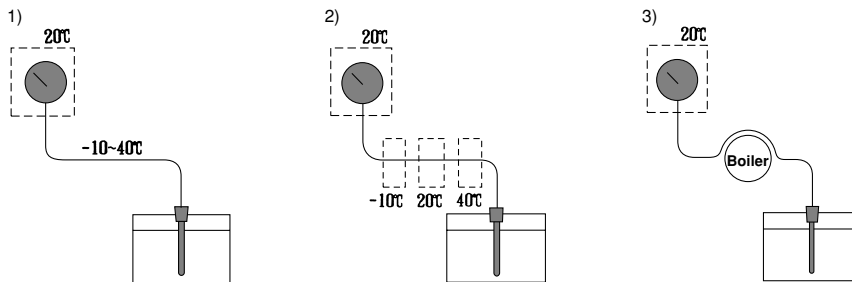
When the ambient temperature around temperature gauge changes, the filled liquid in the indicator and capillary tube also changes to expand or shrink and this causes the indication error. To compensate this error, following compensations are provided.

(1) Bimetal compensation

- When the ambient temperature around indicator and lead parts changes at a same time.

(2) Lead compensation

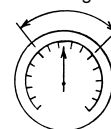
- When the ambient temperature around indicator and lead parts changes independently.
 - When the temperature change around indicator is small and big for lead parts or it's opposite case.
 - When the lead parts is under various ambient temperature condition.
 - When a part of lead parts is heated.



4. Temperature range (Scale range)

- Scale range should be selected to use normally between 30 to 60% of full span.
- When the temperature exceeds the temperature range, it may cause to break the temperature gauge. For example, if there will be a case that the gauges pass the right on the equator or cold district during transportation, or store them at cold district, it needs careful attention.

Normal using range.



SELECT THE SPECIFICATION OF THERMOMETERS2

4. Bulb type

Union type

- Standard spec.

	<p>By tightening the fixing screw, it fixed to the connecting thread so that position of bulb does not change.</p>	<p>Maximum allowable working pressure of union type is Less than 200°C → 2MPa Over 200°C → 1MPa (If the pressure is higher than above, thermowell should be provided.)</p>
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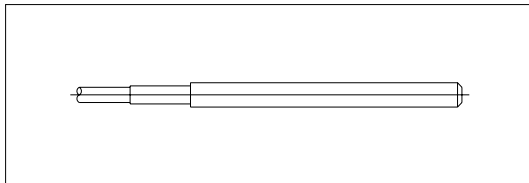
Slide type

- At the time when it needs to adjust the bulb position by the changing the position of fluid to be measured in a tank or other vessel.
- At the time when it needs to insert the bulb up to the bottom of thermowell.

	<p>By tightening the gasket with fixing screw, bulb can be fixed at any position.</p>	<p>Maximum allowable working pressure of slide type is 0.3MPa (If the pressure is higher than above, thermowell should be provided.)</p>
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Plain type

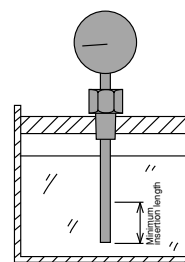
- At the time when the long bulb is inserted to thermowell and no need to fix it.



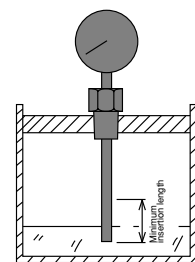
5. Bulb minimum insertion length

According to type, temperature range and bulb diameter, minimum insertion length is decided.

When placing order or decide the specifications, select a suitable length which is longer than the minimum insertion length to keep the performance.



A good example

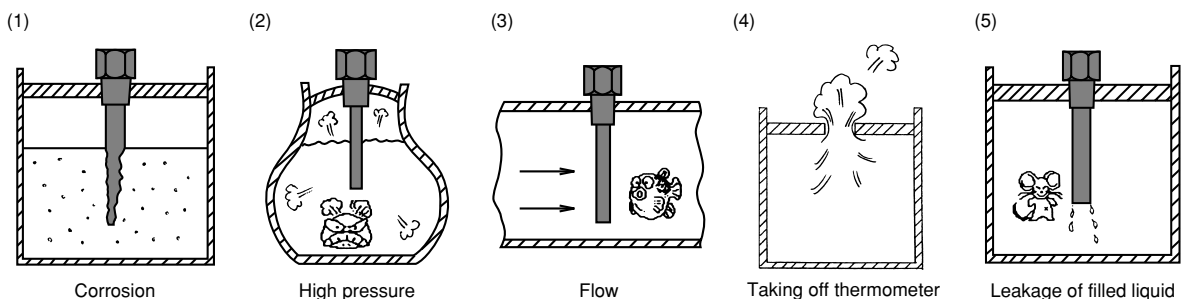


A bad example

6. Thermowell

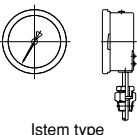
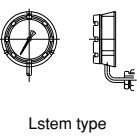
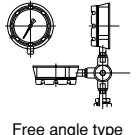
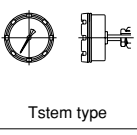
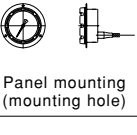
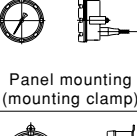
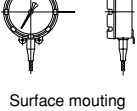
In the case of following conditions, thermowell should be provided to protect bulb.

- (1) In case of corrosion fluid, thermowell with suitable material is necessary.
- (2) In case of high pressure, necessary to use thermowell suitable for operating pressure.
- (3) In case of fluid with flow, necessary to use thermowell suitable for flow and viscosity.
- (4) In case of fluid leaking out when taking off the thermometer, necessary to use thermowell.
- (5) In case of filled liquid in thermometer is leak out from bulb and it is harmful, necessary to use thermowell.



LIQUID FILLED, PRESSURE TYPE INDICATING THERMOMETERS1

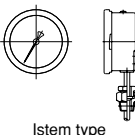
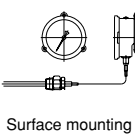
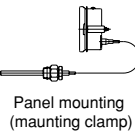
1. Drip-proof thermometers

	Mounting	Sensing method	Manufacturing range	Max lead length		Dial size (mm)	Model
				Bimetal compensation	Lead compensation		
Direct type	 Lstem type	Liquid filled type	-70°C ~ 150°C	—	—	100	TL14
						150	TL16
		Mercury filled type	-50°C ~ 650°C	—	—	100	TM14
						150	TM16
	 Lstem type	Liquid filled type	-70°C ~ 150°C	—	—	100	TL24
		Mercury filled type	-50°C ~ 650°C	—	—	100	TM24
	 Free angle type	Liquid filled type	-70°C ~ 150°C	—	—	100	TL34
		Mercury filled type	-50°C ~ 200°C	—	—	100	TM34
	 Tstem type	Liquid filled type	-70°C ~ 150°C	—	—	100	TL44
		Mercury filled type	-50°C ~ 650°C	—	—	100	TM44
Remote type	 Surface mounting	Liquid filled type	-200°C ~ 600°C	5m	20m	100	TL54
						150	TL56
		Mercury filled type	-50°C ~ 650°C	20m	—	100	TM54
					50m	150	TM56
	 Panel mounting (mounting hole)	Liquid filled type	-200°C ~ 600°C	5m	20m	100	TL64
						150	TL66
		Mercury filled type	-50°C ~ 650°C	20m	—	100	TM64
					50m	150	TM66
	 Panel mounting (mounting clamp)	Liquid filled type	-200°C ~ 600°C	5m	20m	100	TL74
						150	TL76
		Mercury filled type	-50°C ~ 650°C	20m	—	100	TM74
					50m	150	TM76
 Surface mounting	Liquid filled type	-200°C ~ 600°C	5m	20m	150	TL86	
	Mercury filled type	-50°C ~ 650°C	20m	50m	150	TM86	

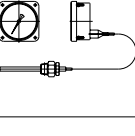
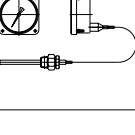

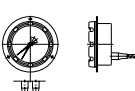
* In case of -200 to 50 degrees, range of -100 to 100 degrees, it can extend it to 30 m by size of bulb (in case of range more than 10-400 degrees 10 m).

LIQUID FILLED, PRESSURE TYPE INDICATING THERMOMETERS2

2Stainless steel thermometers and Glycerin bath type thermometers

Mounting		Sensing method	Manufacturing range	Dial size (mm)	Model	
					Stainless steel case	Glycerin bath type
Direct type  Istem type	Liquid filled type	-70°C ~ 150°C	100	RL14	RV14	
			150	RL16	—	
	Mercury filled type	-50°C ~ 650°C (RW14is300°Cmax.)	100	RM14	RW14	
			150	RM16	—	
Remote type  Surface mounting	Liquid filled type	-200°C ~ 500°C	100	RL54	RV54	
			150	RL56	—	
	Mercury filled type	-50°C ~ 650°C	100	RM54	RW54	
			150	RM56	—	
	Panel mounting (mounting clamp) 	Liquid filled type	-200°C ~ 500°C	100	RL74	RV74
				150	RL76	—
		Mercury filled type	-50°C ~ 650°C	100	RM74	RW74
				150	RM76	—

3Special indicating thermometers

Model	Mounting	Sensing method	Manufacturing range	Dial size (mm)	Model	Fitting
Square type thermometer	Panel mounting 	Liquid filled type	-200°C ~ 600°C	□110	TL90	Bolt
					TL91	Clamp
		Mercury filled type	-50°C ~ 650°C	□110	TM90	Bolt
					TM91	Clamp
	Panel mounting 	Liquid filled type	-200°C ~ 600°C	□168	TL92	Bolt
					TL93	Clamp
Mercury filled type	-50°C ~ 650°C	□168	TM92	Bolt		
			TM93	Clamp		
Duplex dial thermometer	Surface mounting BN,EN type 	Liquid filled type	-70°C ~ 300°C	150	TL80	BN type hole
					TL81	EN type hole
	Mercury filled type	-50°C ~ 650°C	150	TM80	BN type hole	
				TM81	EN type hole	
Panel mounting D1N,D2N type 	Liquid filled type	-70°C ~ 300°C	150	TL83	mounting hole	
				Mercury filled type	-50°C ~ 650°C	150

CONNECTION • BULB SPECIFICATION1

1. Without thermowell

		Connection		Bulb out dia d DIA.	Note
		Screw type	Flange type		
Union type	Slide type	<p>Max. operating pressure: 2MPa (20kgf/cm²) for less than 200°C 1MPa (10kgf/cm²) for 200°C or over</p>		8 DIA.	· Not available to direct type and slide type.
		<p>(TL 2 - 3 and TM2 - 3 are not available.)</p>		10 DIA.	_____
Slide type	Union type	<p>(TL 2 - 3 and TM2 - 3 are not available.)</p>		12 DIA.	_____
		<p>Max. operating pressure 0.3MPa (3kgf/cm²)</p>		13 DIA.	_____
				16 DIA.	· T=1/2 is not available. · Slide type is not available.

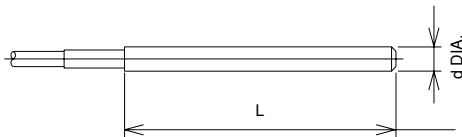
2. With thermowell

		Connection		Thermo-well out dia d DIA.	Bulb out dia d DIA.	Note
		Screw type	Flange type			
Standard type	Union type		<p>JIS,ANSI,JPI</p>	12 DIA.	8 DIA.	_____
		<p>(TL 2 - 3 and TM2 - 3 are not available.)</p>		15 DIA.	10 DIA.	_____
Double socket type	Slide type			19 DIA.	13 DIA.	· T=1/2 is not available.
		<p>(TL 2 - 3 and TM2 - 3 are not available.)</p>		23 DIA.	13 DIA.	· T=1/2 is not available. · Welding type well is not available.
		<p>(TL 2 - 3 and TM2 - 3 are not available.)</p>		Taper 19 / 23	13 DIA.	· T=1/2 is not available. · Welding type well is not available.

CONNECTION • BULB SPECIFICATION2

	Connecting screw	Flange rating	Note
Standard Connection	R ¹ / ₂ (PT), ¹ / ₂ NPT G ¹ / ₂ B (PF) R ³ / ₄ (PT), D ³ / ₄ B (PF) (Fixing screw only=W22thread14)	JIS10K20ARF JIS10K25ARF ANSI1B150RF ANSI1B300RF	Other connections except shown left are available. Contact NKS for details.

3. Plain type

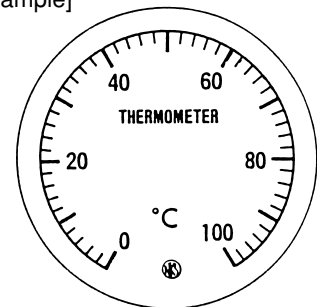
	Bulb	Note
Plain type	 <p>d DIA.=8 DIA., 10 DIA., 12 DIA., 13DIA., 16 DIA.</p>	Remote type only. Not available to direct type.

Scale shape

Refer to the manufacturing specifications of respective models regarding the graduations of respective models.

range (°C)	Scale division and number entry position
0 ~ 50	0 10 20 30 40 50
0 ~ 100	0 20 40 60 80 100
0 ~ 250	0 50 100 150 200 250
0 ~ 500	0 100 200 300 400 500
0 ~ 60	0 10 20 30 40 50 60
0 ~ 120	0 20 40 60 80 100 120
0 ~ 600	0 100 200 300 400 500 600
0 ~ 80	0 20 40 60 80
0 ~ 200	0 50 100 150 200
0 ~ 400	0 100 200 300 400
0 ~ 150	0 30 60 90 120 150
0 ~ 300	0 50 100 150 200 250 300
0 ~ 650	0 100 200 300 400 500 600 650
-10 ~ 50	-10 0 10 20 30 40 50
-20 ~ 100	-20 0 20 40 60 80 100
-10 ~ 100	-10 0 20 40 60 80 100
-30 ~ 50	-30 -20 -10 0 10 20 30 40 50
-30 ~ 120	-30 0 30 60 90 120
-50 ~ 50	-50 -40 -20 0 20 40 50
-70 ~ 50	-70 -60 -40 -20 0 20 40 50
-70 ~ 100	-70 -50 0 50 100
-100 ~ 100	-100 -50 0 50 100
-200 ~ 50	-200 -150 -100 -50 50

[Example]



Ground: white

Entry: Black color, red for graduation line and figure of minus parts.

DRIP-PROOF • DIRECT THERMOMETER1

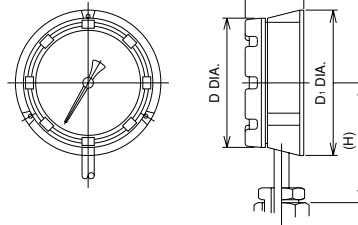
TL14 • 16 Liquid filled dial thermometer

TM14 • 16 Mercury filled dial thermometer



Stem type

Dimension



Model	Dial size	Dimension			
		D	D ₁	b	H
TL14 TM14	100	112	128	51	97
TL16 TM16	150	165	178	59	125

* 75 DIA. is also manufacturing.

Specification

Manufacturing range	TL14 • 16: -70 ~ 150°C, TM14 • 16: -50 ~ 650°C		
Case	Construction: Drip-proof • equivalent to IP33, Material: ADC12, Finishing: Black color		
Wetted parts material	Bulb: 304st.st., Connection • Flange: 304st.st.		
Accuracy	Indication error: Within ±2% of full scale or smaller near room temperature (20°C), effect of ambient temperature: Within ±2%/15 deg or smaller near room temperature (20°C)		
Compensation	Bimetal compensation, Lead compensation (But not available to TM14.)		
Connection	R ¹ / ₂ (PT), R ³ / ₄ (PT), ¹ / ₂ NPT, G ¹ / ₂ B (PF), G ³ / ₄ B (PF) 1/2 is not available with 16 Dia. bulb and 19 Dia., 23 Dia. thermowell.		
Flange	JIS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF		
Connection	Without thermowell	Union type, Slide type	
	With thermowell	Double socket union type: R ¹ / ₂ NPT (Connection)	Slide type is not available with 8 Dia. and 16 Dia. bulb.
		Double socket slide type: R ¹ / ₂ NPT (Connection)	

Range • Bulb DIA. • Bulb length

Range °C		Minimum graduation °C	Bulb minimum insertion length (mm)										Max. length (mm)	
TM14 • 16 Liquid Filled	TM14 • 16 Mercury filled		d=8 DIA.		d=10DIA.		d=12DIA.		d=13 DIA.		d=16 DIA.		TL	TM
			TL	TM	TL	TM	TL	TM	TL	TM	TL	TM		
-70 ~ 50	—	2	50	—	45	—	40	—	40	—	50	—		
-70 ~ 100	—	5	40	—	40	—	40	—	40	—	40	—		
-50 ~ 50	-50 ~ 50	2	55	170	45	130	40	95	40	85	55	65		
-30 ~ 50	-30 ~ 50	2	65	210	55	160	45	115	40	100	40	75		
—	-30 ~ 120	2	—	120	—	95	—	70	—	60	—	50		
-20 ~ 100	-20 ~ 100	2	50	145	45	110	40	80	40	70	50	55		
-10 ~ 50	-10 ~ 50	1	70	290	60	220	50	155	45	130	40	100		
0 ~ 50	0 ~ 50	1	95	360	75	270	60	190	50	160	45	120		
~ 60	~ 60	1	70	290	60	220	50	155	45	130	40	100		
~ 80	~ 80	2	65	210	55	160	45	115	40	100	40	75		
~ 100	~ 100	2	55	170	45	130	40	95	40	85	55	65		
~ 120	~ 120	2	50	145	45	110	40	80	40	70	50	55		
~ 150	~ 150	2	40	120	40	95	40	70	40	60	40	50		
—	~ 200	5	—	90	—	75	—	70	—	70	—	70		
—	~ 250	5	—	75	—	70	—	70	—	70	—	70		
—	~ 300	5	—	70	—	70	—	70	—	70	—	70		
—	~ 400	10	—	100	—	100	—	100	—	100	—	100		
—	~ 500	10	—	100	—	100	—	100	—	100	—	100		
—	~ 600	10	—	100	—	100	—	100	—	100	—	100		
—	~ 650	20	—	100	—	100	—	100	—	100	—	100		

- Above minimum insertion length is the one for without thermowell. In case of with thermowell, 25mm to be increased to the above length.
- Above length is the minimum necessary length of bulb to be inserted into the fluid to be measured.
- Bulb length should be over the above length and specify 5mm steps.
- In case of plain type of bulb, minimum length to be added 40mm to the above length.

DRIP-PROOF • DIRECT TYPE THERMOMETER2

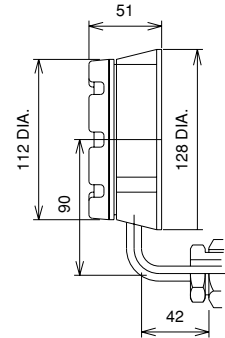
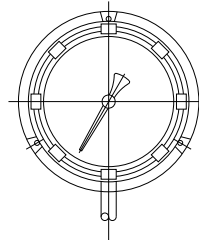
TL24 Liquid filled dial thermometer

• **TM24** Mercury filled dial thermometer

■ Dimension



Lstem type



Model	Dial size
TL24	100
TM24	

*75 DIA. is also manufacturing.

■ Specification

Manufacturing range	TL24: -70 ~ 150°C, TM24: -50 ~ 650°C	
Case	Construction: Drip-proof • equivalent to IP33, Material: ADC12, Finishing: Black color	
Wetted parts material	Bulb: 304st.st., Connection • Flange: 304st.st.	
Accuracy	Indication error: Within ±2% of full scale or smaller near room temperature (20°C), effect of ambient temperature: Within ±2%/15 deg or smaller near room temperature (20°C)	
Compensation	Bimetal compensation, Lead compensation (But not available to TM24.)	
Connection	R ¹ / ₂ (PT), R ³ / ₄ (PT), ¹ / ₂ NPT, G ¹ / ₂ B (PF), G ³ / ₄ B (PF) 1/2 is not available with 16 Dia. bulb and 19 Dia., 23 Dia. thermowell.	
Flange	JIS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF	
Connection	Without thermowell	Union type
	With thermowell	Double socket slide type: R ¹ / ₂ , ¹ / ₂ NPT
Slide type is not available with this model.		

■ Range • Bulb DIA. • Bulb length

Range °C		Minimum graduation °C	Bulb minimum insertion length (mm)										Max. length (mm)	
TL24 Liquid Filled	TM24 Mercury filled		d=8DIA.		d=10 DIA.		d=12 DIA.		d=14 DIA.		d=16 DIA.		TL	TM
-70 ~ 50	—	2	50	—	45	—	40	—	40	—	50	—	500	d = 8 DIA. 16 DIA. 1000 • d = 10 DIA. 12 DIA. 13 DIA. 3000
-70 ~ 100	—	5	40	—	40	—	40	—	40	—	40	—		
-50 ~ 50	-50 ~ 50	2	55	170	45	130	40	95	40	85	55	65		
-30 ~ 50	-30 ~ 50	2	65	210	55	160	45	115	40	100	40	75		
—	-30 ~ 120	2	—	120	—	95	—	70	—	60	—	50		
-20 ~ 100	-20 ~ 100	2	50	145	45	110	40	80	40	70	50	55		
-10 ~ 50	-10 ~ 50	1	70	290	60	220	50	155	45	130	40	100		
0 ~ 50	0 ~ 50	1	95	360	75	270	60	190	50	160	45	120		
~ 60	~ 60	1	70	290	60	220	50	155	45	130	40	100		
~ 80	~ 80	2	65	210	55	160	45	115	40	100	40	75		
~ 100	~ 100	2	55	170	45	130	40	95	40	85	55	65		
~ 120	~ 120	2	50	145	45	110	40	80	40	70	50	55		
~ 150	~ 150	2	40	120	40	95	40	70	40	60	40	50		
—	~ 200	5	—	90	—	75	—	70	—	70	—	70		
—	~ 250	5	—	75	—	70	—	70	—	70	—	70		
—	~ 300	5	—	70	—	70	—	70	—	70	—	70		
—	~ 400	10	—	100	—	100	—	100	—	100	—	100		
—	~ 500	10	—	100	—	100	—	100	—	100	—	100		
—	~ 600	10	—	100	—	100	—	100	—	100	—	100		
—	~ 650	20	—	100	—	100	—	100	—	100	—	100		

- Above minimum insertion length is the one for without thermowell. In case of with thermowell, 25mm to be increased to the above length.
- Above length is the minimum necessary length of bulb to be inserted into the fluid to be measured.
- Bulb length should be over the above length and specify 5mm steps.
- In case of plain type of bulb, minimum length to be added 40mm to the above length.

DRIP-PROOF • DIRECT TYPE THERMOMETER3

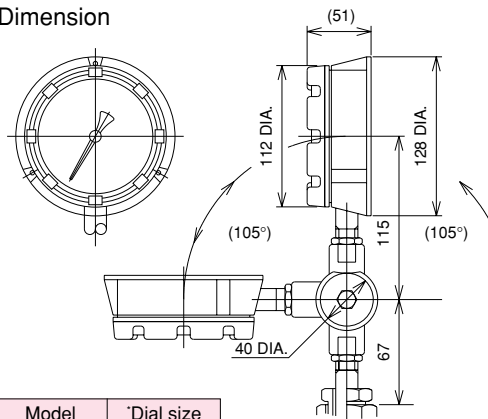
TL34 Liquid filled dial thermometer

• **TM34** Mercury filled dial thermometer

■ Dimension



Free angle type



Model	Dial size
TL34	100
TM34	

+75 DIA. is also manufacturing.

■ Specification

Manufacturing range	TL34 : -70 ~ 150°C, TM34: -50 ~ 200°C	
Case	Construction: Drip-proof • equivalent to IP33, Material: ADC12, Finishing: Black color	
Wetted parts material	Bulb: 304st.st., Connection • Flange: 304st.st.	
Accuracy	Indication error: Within ±2% of full scale or smaller near room temperature (20°C), effect of ambient temperature: Within ±2%/15 deg or smaller near room temperature (20°C)	
Compensation	Bimetal compensation, Lead compensation (But not available to TM34.)	
Connection	R ¹ / ₂ (PT), R ³ / ₄ (PT), ¹ / ₂ NPT, G ¹ / ₂ B (PF), G ³ / ₄ B (PF) 1/2 is not available with 16 Dia. bulb and 19 Dia., 23 Dia. thermowell.	
Flange	JS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF	
Connection	Without thermowell	Union type
	With thermowell	Double socket slide type: R ¹ / ₂ ¹ / ₂ NPT
Slide type is not available with this model.		

■ Range • Bulb DIA. • Bulb length

Range °C		Minimum graduation °C	Bulb minimum insertion length (mm)										Max. length (mm)	
TL34 Liquid filled	TM34 Mercury filled		d=8DIA.		d=10 DIA.		d=12 DIA.		d=3 DIA.		d=16 DIA.		TL	TM
			TL	TM	TL	TM	TL	TM	TL	TM	TL	TM		
-70 ~ 50	—	2	50	—	45	—	40	—	40	—	50	—	500	d = 8 DIA. 16 DIA. 1000 • d = 10 DIA. 12 DIA. 13 DIA. 3000
-70 ~ 100	—	5	40	—	40	—	40	—	40	—	40	—		
-50 ~ 50	-50 ~ 50	2	55	170	45	130	40	95	40	85	55	65		
-30 ~ 50	-30 ~ 50	2	65	210	55	160	45	115	40	100	40	75		
—	-30 ~ 120	2	—	120	—	95	—	70	—	60	—	50		
-20 ~ 100	-20 ~ 100	2	50	145	45	110	40	80	40	70	50	55		
-10 ~ 50	-10 ~ 50	1	70	290	60	220	50	155	45	130	40	100		
0 ~ 50	0 ~ 50	1	95	360	75	270	60	190	50	160	45	120		
~ 60	~ 60	1	70	290	60	220	50	155	45	130	40	100		
~ 80	~ 80	2	65	210	55	160	45	115	40	100	40	75		
~ 100	~ 100	2	55	170	45	130	40	95	40	85	55	65		
~ 120	~ 120	2	50	145	45	110	40	80	40	70	50	55		
~ 150	~ 150	2	40	120	40	95	40	70	40	60	40	50		
—	~ 200	5	—	90	—	75	—	55	—	50	—	40		

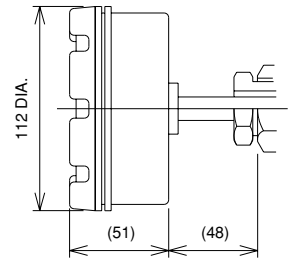
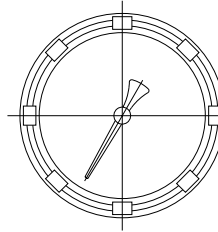
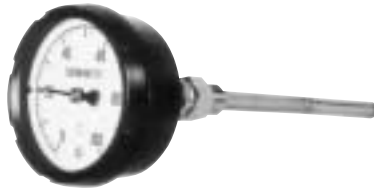
- Above minimum insertion length is the one for without thermowell. In case of with thermowell, 25mm to be increased to the above length.
- Above length is the minimum necessary length of bulb to be inserted into the fluid to be measured.
- Bulb length should be over the above length and specify 5mm steps.
- In case of plain type of bulb, minimum length to be added 40mm to the above length.

DRIP-PROOF • DIRECT TYPE THERMOMETER4

TL44 Liquid filled dial thermometer

• **TM44** Mercury filled dial thermometer

■ Dimension



Model	Dial size
TL44	100
TM44	

• 75 DIA. is also manufacturing.

Tstem type

■ Specification

Manufacturing range	TL44 : -70 ~ 150°C, TM44: -50 ~ 650°C		
Case	Construction: Drip-proof • equivalent to IP33, Material: ADC12, Finishing: Black color		
Wetted parts material	Bulb: 304st.st., Connection • Flange: 304st.st.		
Accuracy	Indication error: Within ±2% of full scale or smaller near room temperature (20°C), effect of ambient temperature: Within ±2%/15 deg or smaller near room temperature (20°C)		
Compensation	Bimetal compensation, Lead compensation (But not available to TM44.)		
Connection	R ¹ / ₂ (PT), R ³ / ₄ (PT), ¹ / ₂ NPT, G ¹ / ₂ B (PF), G ³ / ₄ B (PF) 1/2 is not available with 16 Dia. bulb and 19 Dia., 23 Dia. thermowell.		
Flange	JIS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF		
Connection	Without thermowell	Union type, Slide type	
	With thermowell	Double socket union type: R ¹ / ₂ NPT (Connection)	Slide type is not available with 8 Dia. and 16 Dia. bulb.
		Double socket slide type: R ¹ / ₂ NPT (Connection)	

■ Range • Bulb DIA. • Bulb length

Range °C		Minimum graduation °C	Bulb minimum insertion length (mm)										Max. length (mm)	
TL44 Liquid Filled	TM44 Mercury Filled		d=8 DIA.		d=10 DIA.		d=12 DIA.		d=13 DIA.		d=16DIA.		TL	TM
-70 ~ 50	—	2	50	—	45	—	40	—	40	—	50	—	500	d = 8 DIA. 16 DIA. 1000 • d = 10 DIA. 12 DIA. 13 DIA. 3000
-70 ~ 100	—	5	40	—	40	—	40	—	40	—	40	—		
-50 ~ 50	-50 ~ 50	2	55	170	45	130	40	95	40	85	55	65		
-30 ~ 50	-30 ~ 50	2	65	210	55	160	45	115	40	100	40	75		
—	-30 ~ 120	2	—	120	—	95	—	70	—	60	—	50		
-20 ~ 100	-20 ~ 100	2	50	145	45	110	40	80	40	70	50	55		
-10 ~ 50	-10 ~ 50	1	70	290	60	220	50	155	45	130	40	100		
0 ~ 50	0 ~ 50	1	95	360	75	270	60	190	50	160	45	120		
~ 60	~ 60	1	70	290	60	220	50	155	45	130	40	100		
~ 80	~ 80	2	65	210	55	160	45	115	40	100	40	75		
~ 100	~ 100	2	55	170	45	130	40	95	40	85	55	65		
~ 120	~ 120	2	50	145	45	110	40	80	40	70	50	55		
~ 150	~ 150	2	40	120	40	95	40	70	40	60	40	50		
—	~ 200	5	—	90	—	75	—	70	—	70	—	70		
—	~ 250	5	—	75	—	70	—	70	—	70	—	70		
—	~ 300	5	—	70	—	70	—	70	—	70	—	70		
—	~ 400	10	—	100	—	100	—	100	—	100	—	100		
—	~ 500	10	—	100	—	100	—	100	—	100	—	100		
—	~ 600	10	—	100	—	100	—	100	—	100	—	100		
—	~ 650	20	—	100	—	100	—	100	—	100	—	100		

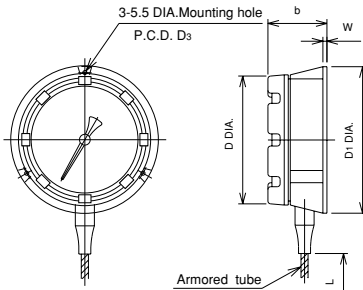
- Above minimum insertion length is the one for without thermowell. In case of with thermowell, 25mm to be increased to the above length.
- Above length is the minimum necessary length of bulb to be inserted into the fluid to be measured.
- Bulb length should be over the above length and specify 5mm steps.
- In case of plain type of bulb, minimum length to be added 40mm to the above length.

DRIP-PROOF • REMOTE TYPE THERMOMETER1

TL54 • 56 Liquid filled dial thermometer

• TM54 • 56 Mercury filled dial thermometer

■ Dimension



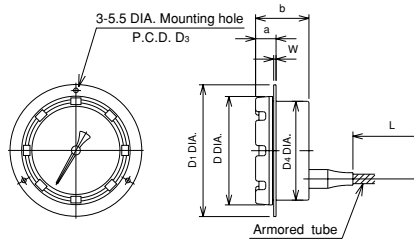
Model	Dial size	Dimensions				
		D	D ₁	D ₃	b	W
TL54 TM54	100	112	128	115	51	3
TL56 TM56	150	165	178	165	59	4

*75 DIA. is also manufacturing.

TL64 • 66 Liquid filled dial thermometer

• TM64 • 66 Mercury filled dial thermometer

■ Dimension



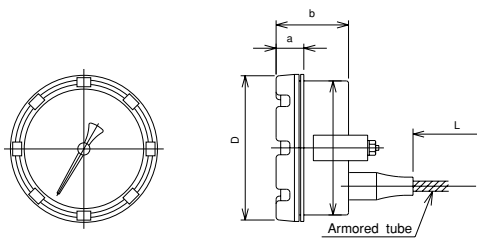
Model	Dial size	Dimensions						
		D	D ₁	D ₃	D ₄	a	b	W
TL64 TM64	100	112	136	122	102	19	51	2.5
TL66 TM66	150	165	192	178	158	22	59	4

*75 DIA. is also manufacturing.

TL74 • 76 Liquid filled dial thermometer

• TM74 • 76 Mercury filled dial thermometer

■ Dimension



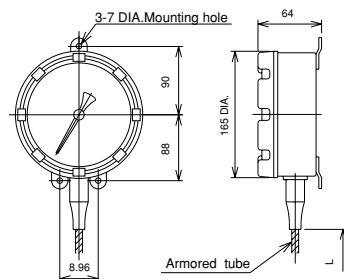
Model	Dial size	Dimensions			
		D	D ₄	a	b
TL74 TM74	100	112	102	19	51
TL76 TM76	150	165	158	22	59

*75 DIA. is also manufacturing.

TL86 Liquid filled dial thermometer

• TM86 Mercury filled dial thermometer

■ Dimension



Model	Dial size
TL86	150
TM86	

DRIP-PROOF • REMOTE TYPE THERMOMETER2

TL54 • 56, 64 • 66, 74 • 76, 86 • TM54 • 56, 64 • 66, 74 • 76, 86

■ Specification

Manufacturing range	TL: -200 ~ 600°C, TM: -50 ~ 650°C		
Case	Construction: Drip-proof • TL54•56, TM54 • 56: IP33Others: equivalent toIP43, Material: ADC12, Finishing: Black color		
Wetted parts material	Bulb: 304st.st., Connection • Flange: 304st.st. Lead part: Capillary304st.st. or316st.st., Armored tube 430st.st. or430st.st. +PVC		
Accuracy	Indication error: Within ±2% of full scale or smaller near room temperature (20°C), effect of ambient temperature: Within ±2%/15 deg or smaller near room temperature (20°C)		
Compensation	Bimetal compensation, Lead compensation(Not available with 100mm Dia. of mercury filled.)		
Connection	R ¹ / ₂ (PT), R ³ / ₄ (PT), ¹ / ₂ NPT, G ¹ / ₂ B (PF), G ³ / ₄ B (PF)1/2 is not available with 16 Dia. bulb and 19 Dia., 23 Dia. thermowell.		
Flange	JIS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF		
Connection	Without thermowell	Union type, Slide type	16mm Dia. bulb with slide type is not available.
	With thermowell	Double socket union type: R ¹ / ₂ NPT (Connection)	
		Double socket slide type: R ¹ / ₂ NPT (Connection)	

■ Range • Bulb DIA. • Bulb length (Model TL, 100mm DIA. and lead compensation type is shown below table.)

Range °C		Minimum graduation °C	Bulb minimum insertion length (mm)										Max. length (mm)	
TL Liquid filled	TM Mercury filled		d=8 DIA.		d=10 DIA.		d=12 DIA.		d=13 DIA.		d=16 DIA.		TL	TM
-200 ~ 50	—	5	—	—	—	—	—	—	*	—	*	—	500	d = 8 DIA. 16 DIA. 1000 • d = 10 DIA. 12 DIA. 13 DIA. 3000
-100 ~ 100	—	5	—	—	—	—	—	—	*	—	*	—		
-70 ~ 50	—	2	50	—	45	—	40	—	40	—	50	—		
-70 ~ 100	—	5	40	—	40	—	40	—	40	—	40	—		
-50 ~ 50	-50 ~ 50	2	55	170	45	130	40	95	40	85	55	65		
-30 ~ 50	-30 ~ 50	2	65	210	55	160	45	115	40	100	40	75		
—	-30 ~ 120	2	—	120	—	95	—	70	—	60	—	50		
-20 ~ 100	-20 ~ 100	2	50	145	45	110	40	80	40	70	50	55		
-10 ~ 50	-10 ~ 50	1	70	290	60	220	50	155	45	130	40	100		
0 ~ 50	0 ~ 50	1	95	360	75	270	60	190	50	160	45	120		
~ 60	~ 60	1	70	290	60	220	50	155	45	130	40	100		
~ 80	~ 80	2	65	210	55	160	45	115	40	100	40	75		
~ 100	~ 100	2	55	170	45	130	40	95	40	85	55	65		
~ 120	~ 120	2	50	145	45	110	40	80	40	70	50	55		
~ 150	~ 150	2	40	120	40	95	40	70	40	60	40	50		
~ 200	~ 200	5	40	90	40	75	40	55	40	50	40	40		
~ 250	~ 250	5	40	75	40	60	40	50	40	45	40	40		
~ 300	~ 300	5	40	70	40	60	40	45	40	40	40	40		
~ 400	~ 400	10	230	60	170	50	120	40	100	40	80	40		
~ 500	~ 500	10	230	50	170	40	120	40	100	40	80	40		
~ 600	~ 600	10	230	45	170	40	120	40	100	40	80	40		
—	~ 650	20	—	45	—	40	—	40	—	40	—	40		

*The minimum insertion length of the indicating thermometers with the temperature ranges of -200°C to 50°C and -100°C to 100°C are different according to the length of the lead. Refer to the right table.

Range °C	Lead length m	Bulb minimum insertion length (mm)	
		d=13 DIA. (d=19 DIA.)	d=16 DIA. (d=23 DIA.)
-200 ~ 50	2 ~ 5	225 (250)	170 (195)
	6 ~ 15	300 (325)	220 (245)
-100 ~ 100	16 ~ 25	370 (395)	270 (295)
	26 ~ 30	— (—)	300 (325)

■ Liquid filled dial thermometer 100 DIA. (TL54 • 64 • 74) Lead compensation • Range • Bulb length

Range °C	Minimum graduation °C	Bulb minimum insertion length (mm)					Max. length mm
		8 DIA	10 DIA	12 DIA	13 DIA	16 DIA	
-70 ~ 50	2	160	130	100	90	75	500
-70 ~ 100	5	125	105	85	75	65	
-50 ~ 50	2	180	145	110	100	80	
-30 ~ 50	2	215	170	130	115	95	
-20 ~ 100	2	160	130	100	90	75	
-10 ~ 100	2	170	135	105	95	80	
-10 ~ 50	1	265	210	155	135	105	
0 ~ 50	1	355	270	195	170	135	
~ 60	1	315	245	180	155	120	
~ 80	2	245	195	145	125	100	
~ 100	2	205	165	125	110	90	
~ 120	2	180	145	110	100	80	
~ 150	2	155	125	100	90	75	
~ 200	5	110	95	75	70	60	
~ 250	5	100	85	70	65	60	
~ 300	5	90	80	65	60	55	

• Max. lead length (m)

Type	Revision	Bimetal compensation	Lead compensation
Liquid filled dial thermometer	Less than 300°C	5	20
	More than 400°C	10	—
	Less than -100°C	30	—
Mercury filled dial thermometer		20	50

- Above minimum insertion length is the one for without thermowell. In case of with thermowell, 25mm to be increased to the above length.
- Above length is the minimum necessary length of bulb to be inserted into the fluid to be measured.
- Bulb length should be over the above length and specify 5mm steps.
- In case of plain type of bulb, minimum length to be added 40mm to the above length.

STAINLESS STEEL CASE THERMOMETER

RL1 • 5 • 7 Liquid filled dial thermometer

• RM1 • 5 • 7 Mercury filled dial thermometer



RL5
RM5

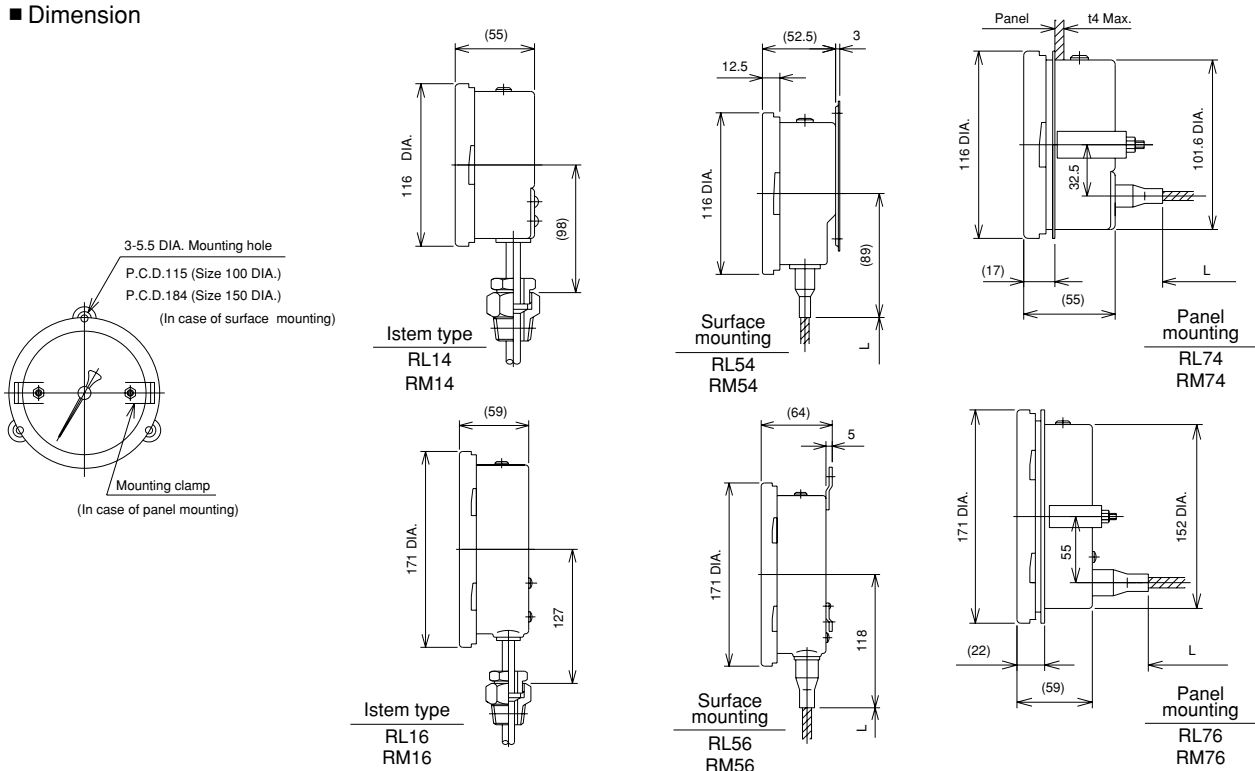
Type Manufacturing range	Mounting	Model	Dial size
Liquid filled type -200 ~ 600°C (RL1 -70 ~ 150°C)	Istem RL1	RL14	100
		RL16	150
	Surface RL5	RL54	100
		RL56	150
	Panel RL7	RL74	100
		RL76	150
Mercury filled type -50 ~ 650°C	Istem RM1	RM14	100
		RM16	150
	Surface RM5	RM54	100
		RM56	150
	Panel RM7	RM74	100
		RM76	150

■ Specification

Manufacturing range	RL14 • 16 (Direct type): -70 ~ 150°C, RL54 • 56 • 74 • 76: -200 ~ 600°C RM14 • 16 • 54 • 56 • 74 • 76: -50 ~ 650°C		
Case	Construction: Drip-proof • equivalent to IP65, Material: 304st.st., Finishing: Plain		
Wetted parts material	Bulb: 304st.st., Connection • Flange: 304st.st.		
Accuracy	Indication error: Within ±2% of full scale or smaller near room temperature (20°C), effect of ambient temperature: Within ±2%/15 deg or smaller near room temperature (20°C)		
Compensation	Bimetal compensation • Lead compensation (Lead Compensation is only RL54 • 56 • 74 • 76, RM56 • 76)		
Connection	R ¹ / ₂ (PT), R ³ / ₄ (PT), ¹ / ₂ NPT, G ¹ / ₂ B (PF), G ³ / ₄ B (PF) 1/2 is not available with 16 Dia. bulb and 19 Dia., 23 Dia. thermowell.		
Flange	JIS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF		
Connection	Without thermowell	Union type, Slide type	Slide type with 8mm Dia. Direct type (RL1□, RM1□) is not available. Slide type with 16mm Dia. is not available.
	With thermowell	Double socket union type: R ¹ / ₂ NPT (Connection) Double socket slide type: R ¹ / ₂ NPT (Connection)	

The specifications of the temperature range, the length of the bulb, the length of the lead, etc. are the same as those of the drip-proof type, direct type and remote type thermometer.

■ Dimension



ULTRA VIBRATION - PROOF GLYCERIN BATH TYPE THERMOMETER

RV1 • 5 • 7 Liquid filled dial thermometer

• RW1 • 5 • 7 Mercury filled dial thermometer



RV74
RW74

The case interior mechanism is totally immersed in glycerin. Violent vibration and vibration amplitude are subdued, wear is decreased and durability is increased by back pressure stemmed from the viscosity resistance of glycerin. The case is made of "304st.st", atmospheric resistance is excellent and glycerinwater solution is charged.

Type Manufacturing range	Mounting	Model	Dial size
Liquid filled type -200 ~ 600°C (RV1 -70 ~ 150°C)	Istem RV1	RV14	100
	Surface RV5	RV54	
	Panel RV7	RV74	
Mercury filled type -50 ~ 650°C (RW1 -50 ~ 300°C)	Istem RW1	RW14	100
	Surface RW5	RW54	
	Panel RW7	RW74	

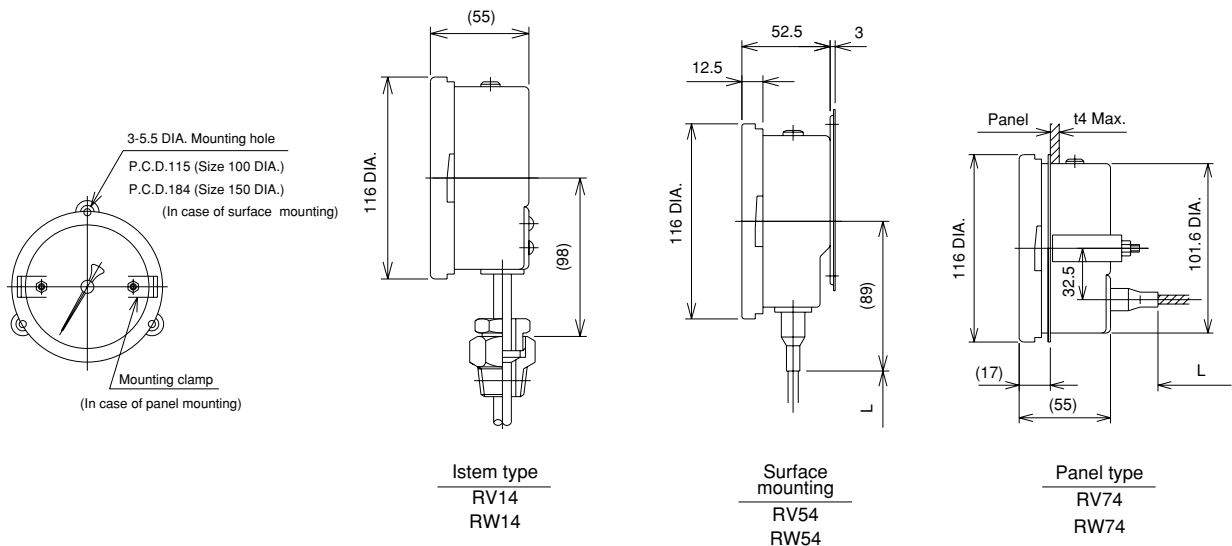
■ Specification

Manufacturing range	RV14: -70 ~ 150°C, RV54 • 74: -200 ~ 600°C RW14: -50 ~ 300°C, RW54 • 74: -50 ~ 650°C	
Case	Construction: Drip-proof • equivalent to IP65, Material: 304st.st., Finishing: Plain	
Wetted parts material	Bulb: 304st.st., Connection • Flange : 304st.st.	
Accuracy	Indication error: Within ±2% of full scale or smaller near room temperature (20°C), effect of ambient temperature: Within ±2%/15 deg or smaller near room temperature (20°C)	
Compensation	Bimetal compensation	
Connection	R ¹ / ₂ (PT), R ³ / ₄ (PT), ¹ / ₂ NPT, G ¹ / ₂ B (PF), G ³ / ₄ B (PF) 1/2 is not available with 16 Dia. bulb and 19 Dia., 23 Dia. thermowell.	
Flange	JIS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF	
Connection	Without thermowell	Union type, Slide type*
	With thermowell	Double socket union type: R ¹ / ₂ , ¹ / ₂ NPT (Connection)
		Double socket slide type: R ¹ / ₂ , ¹ / ₂ NPT (Connection)
		Slide type with 8mm Dia. Direct type (RV14, RW14) is not available. Slide type with 16mm Dia. is not available.

The specifications of the temperature range, the bulb, the length of the lead, etc. are the same as those of the drip-proof type, direct type and remote type thermometer.

* Not available to Slide type I stem type.

■ Dimension



SQUARE THERMOMETER (REMOTE TYPE)

TL90 • 91 • 92 • 93

Liquid filled dial thermometer

• TM90 • 91 • 92 • 93

Mercury filled dial thermometer



Square Thermometer

Type	Model	Dial size	Mounting
Liquid filled type	TL90	□110	Mounting Bolt
	TL91		Mounting Clamp
	TL92	□168	Mounting Bolt
	TL93		Mounting Clamp
Mercury filled type	TM90	□110	Mounting Bolt
	TM91		Mounting Clamp
	TM92	□168	Mounting Bolt
	TM93		Mounting Clamp

■ Specification

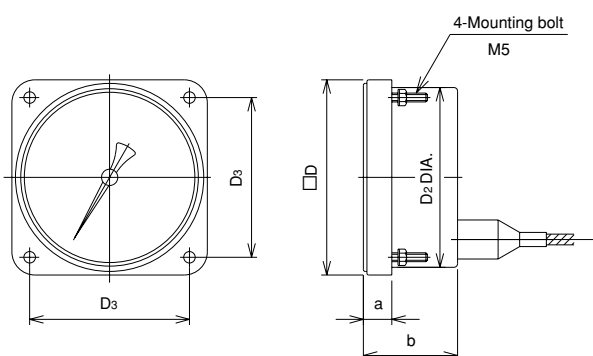
Manufacturing range	TL90 • 91 • 92 • 93: -200 ~ 600°C, TM90 • 91 • 92 • 93: -50 ~ 650°C		
Case	Construction: Drip-proof • equivalent to IP33, Material: ADC12, Finishing: Black color		
Wetted parts material	Bulb: 304st.st., Connection • Flange: 304st.st.		
Accuracy	Indication error: Within ±2% of full scale or smaller near room temperature (20°C), effect of ambient temperature: Within ±2%/15 deg or smaller near room temperature (20°C)		
Compensation	Bimetal compensation, Lead compensation (Only □168)		
Maximum lead Length	TL: 5m (Bimetal compensation) , 20m (Lead compensation) TM: 20m (Bimetal compensation) , 50m (Lead compensation)		
Connection	R ¹ / ₂ (PT) , R ³ / ₄ (PT) , ¹ / ₂ NPT, G ¹ / ₂ B (PF) , G ³ / ₄ B (PF) 1/2 is not available with 16 Dia. bulb and 19 Dia., 23 Dia. thermowell.		
Flange	JIS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF		
Connection	Without thermowell	Union type, Slide type	Slide type is not available with 16 Dia. bulb.
	With thermowell	Double socket Union type: R ¹ / ₂ NPT (Connection)	
		Double socket Slide type: R ¹ / ₂ NPT (Connection)	

The specifications of the temperature range, the bulb, the length of the lead, etc. are the same as those of the drip-proof type, direct type and remote type thermometer.

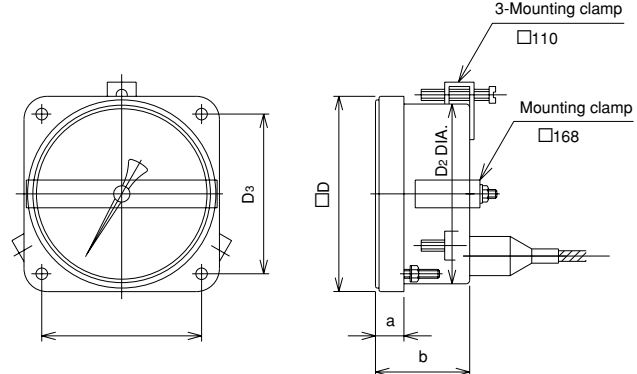
■ Dimension

Mounting Bolt

Mounting Clamp



TL90 • 92
TM90 • 92



TL91 • 93
TM91 • 93

Size	Dimension				
	D	D ₂	D ₃	a	d
□110	110	102	90	16	53
□168	168	152	145	17	60

DUPLEX THERMOMETER (REMOTE TYPE)

TL80 • 81 • 83 Liquid filled dial thermometer

• TM80 • 81 • 83 Mercury filled dial thermometer



BN Type

Type	Model	Size	Mounting
Liquid filled type	TL80	150DIA.	Surface mounting (BN type)
	TL81		Surface mounting (EN type)
	TL83		Panel type
Mercury filled type	TM80		Surface mounting (BN type)
	TM81		Surface mounting (EN type)
	TM83		Panel type

This thermometer indicates the temperature of two places and is suitable to compare the different place or there is no space to install the 2pcs. of thermometers.

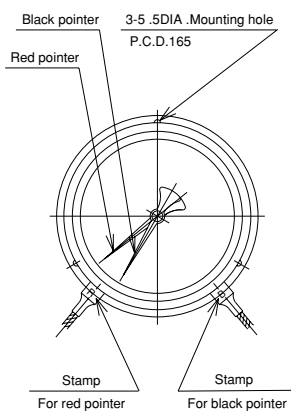
■ Specification

Manufacturing range	TL80 • 81 • 83: -70 ~ 300°C, TM80 • 81 • 83: -50 ~ 650°C		
Case	Construction: Drip-proof • equivalent to IP33, Material: ADC12, Finishing: Black color		
Wetted parts material	Bulb: 304st.st., Connection • Flange: 304st.st.		
Accuracy	Indication error: Within ±2% of full scale or smaller near room temperature (20°C), effect of ambient temperature: Within ±2%/15 deg or smaller near room temperature (20°C)		
Compensation	Bimetal compensation Max. lead length TL: 2.5m, TM: 20m		
Connection	R ¹ / ₂ (PT), R ³ / ₄ (PT), ¹ / ₂ NPT, G ¹ / ₂ B (PF), G ³ / ₄ B (PF) 1/2 is not available with 16 Dia. bulb and 19 Dia., 23 Dia. thermowell.		
Flange	JIS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF		
Connection	Without thermowell	Slide type is not available with 16 Dia. bulb.	
	With thermowell		Union type, Slide type
			Double socket Union type: R ¹ / ₂ , ¹ / ₂ NPT (Connection)
	Double socket Slide type: R ¹ / ₂ , ¹ / ₂ NPT (Connection)		

The specifications of the temperature range, the bulb, the length of the lead, etc. are the same as those of the drip-proof type, direct type and remote type thermometer.

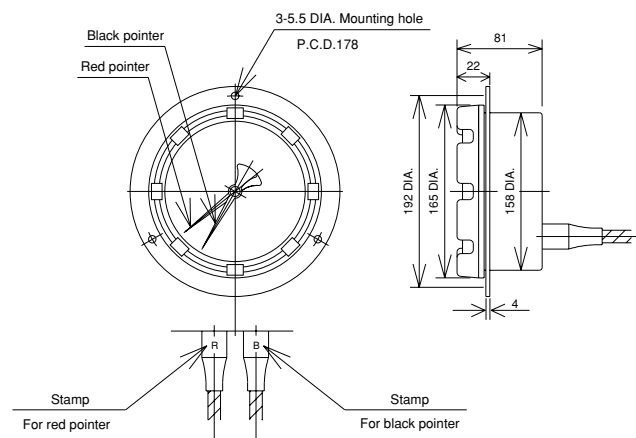
■ Dimension

Surface type [BN type]



TL80 • TM80

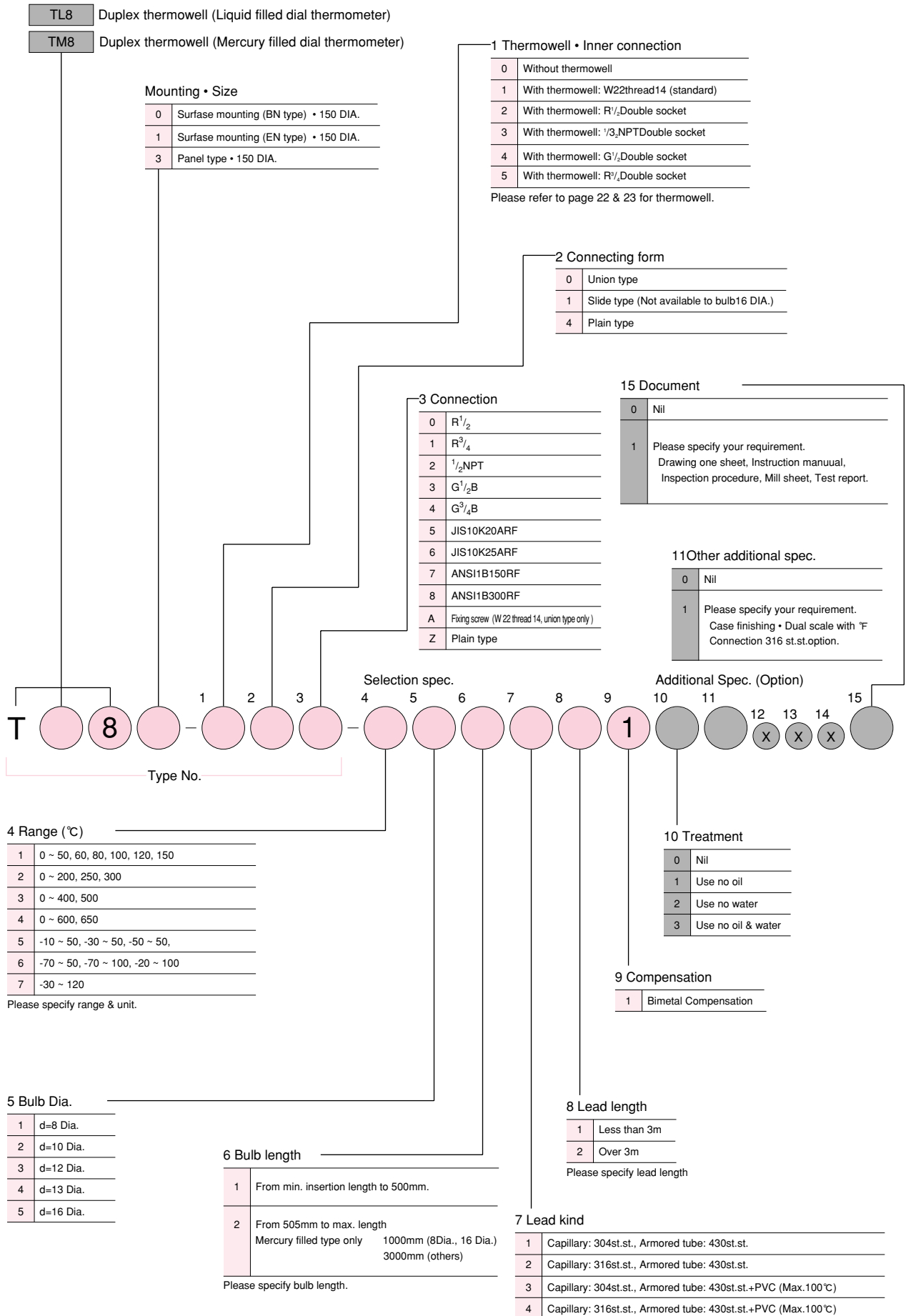
Panel type [Mounting hole]



TL83 • TM83

Type No. Constitution Please specify Type No., each specification and temperature range when ordering.

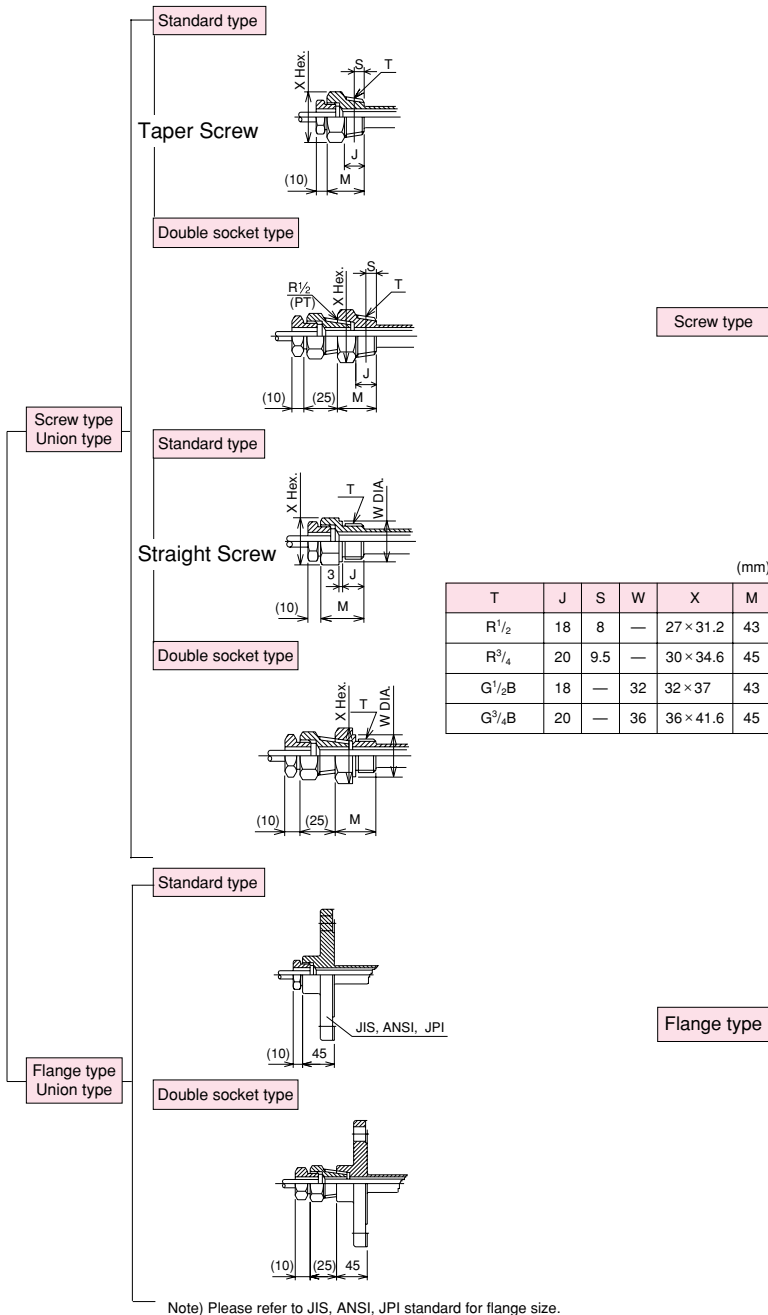
(Note: For this Model, there is no applicable item for the figures X, but please specify X when ordering.)



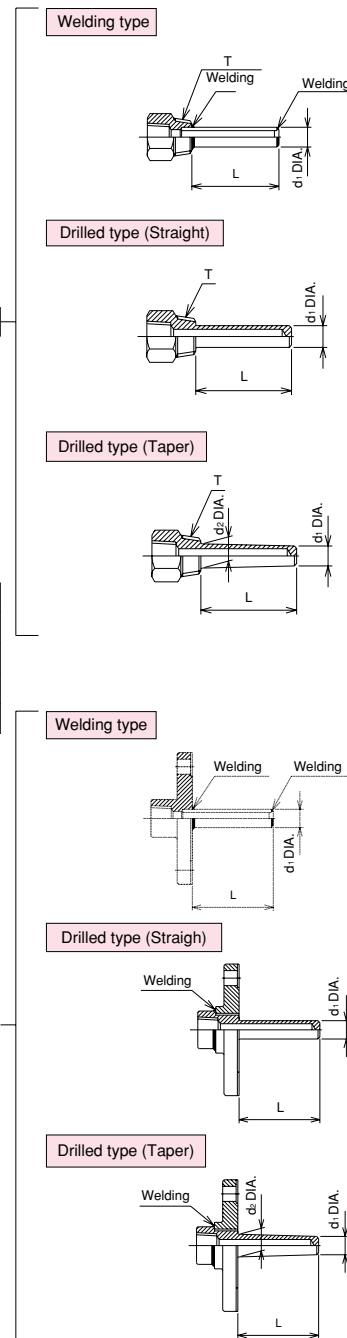
* When placing an order, check to confirm the specifications including a model, range, bulb, a lead parts, etc. and then select a model number.

THERMOWELL SPECIFICATION

■ Connection parts and dimension



■ Thermowell mounting, Size



■ Relation of Thermowell and bulb.

Thermo-well	Out dia (ø DIA.)	12		15		19		23, 19/23 (Taper)
		Drilled type	Welding type	Drilled type	Welding type	Drilled type	Welding type	Welding type
Bulb	d DIA.	8	8	10	10	13	13	13

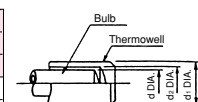
■ Thermowell material 1

304 st.st., 316 st.st., 316 L st.st., Titanium, Hastelloy-B, and Monel-metal are available. Coating is available with followings. Rubber, Kel-F, Teflon, Lead or Glass Thermowell with coating is flange type only.

■ Relation of Thermowell DIA. and connection

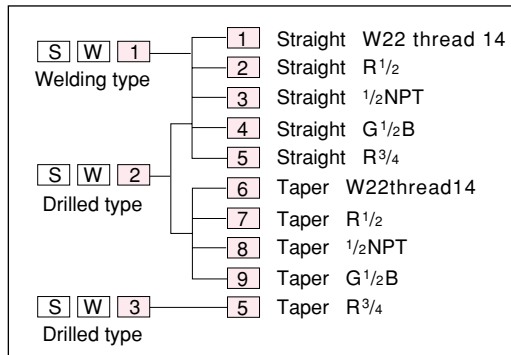
Out dia (d.)	Mounting	Thermowell		
		Screw (T)		Flange
		1/2	3/4	
12 DIA.	Drilled type	○	○	JIS, ANSI, JPI
	Welding type	○	○	○
15 DIA.	Drilled type	○	○	○
	Welding type	○	○	○
19 DIA.	Drilled type	—	○	○
	Welding type	—	○	○
23 DIA.	Drilled type	—	○	○
	19 DIA./23DIA. (Taper)	—	○	○

Standard Inner connection (connection with thermometer jis W22 thread 14 or Rc1/2



Type No. Constitution Please specify Type No., each specification and temperature range when ordering.

(Note: For this Model, there is no applicable item for the figures X, but please specify X when ordering.)



1 • 2 Connection

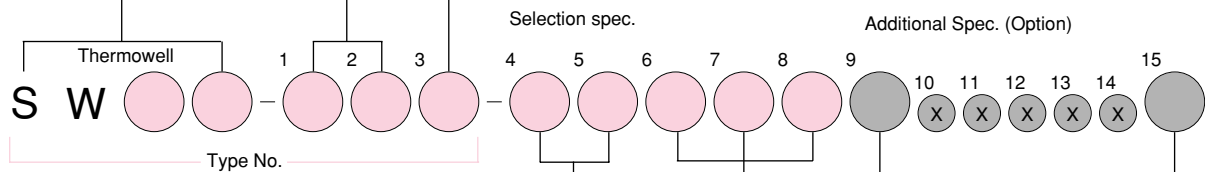
00	Screw TypeR ^{1/2}
01	Screw TypeR ^{3/4}
02	Screw Type1/2NPT
03	Screw TypeG ^{1/2} B
04	Screw TypeG ^{3/4} B
05	Flange typeJIS10K20ARF
06	Flange typeJIS10K25ARF
07	Flange typeANSI1B150RF
08	Flange typeANSI1B300RF
0F	Flange typeJIS10K15ARF
0G	Flange typeJIS10K40ARF
0H	Flange typeJIS10K50ARF
0W	Flange typeJPI1B150RF
0X	Flange typeJPI1B300RF

Other screw • flange (TF,GF,MF,FMF,R) is available, contact NKS for details.

3 Material

1	304 st.st.
2	316 st.st.
5	316 L st.st. Drilled type only.

In case of Drilled type, special material titanium, hastelloy is available, contact NKS for details.



4 • 5 Out dia

12	Out dia 12 DIA.
15	Out dia 15 DIA.
19	Out dia 19 DIA.
23	Out dia 23 DIA.
AA	Out dia 19/23 DIA. Flange type with Drilled type only.

6 • 7 • 8 L Size

Welding type (mm)		Drilled type (mm)	
001	~ 100	001	~ 100
101	101 ~ 200	101	101 ~ 150
201	201 ~ 300	151	151 ~ 200
301	301 ~ 400	201	201 ~ 250
401	401 ~ 500	251	251 ~ 300
501	501 ~ 600	301	301 ~ 350
601	601 ~ 700	351	351 ~ 400
701	701 ~ 800	401	401 ~ 450
801	801 ~ 900	451	451 ~ 500
901	901 ~ 1000	501	501 ~ 550
999	1001 ~	551	551 ~ 600
		601	601 ~ 650
		651	651 ~ 700
		701	701 ~ 750
		751	751 ~ 800
		801	801 ~ 850
		851	851 ~ 900
		901	901 ~ 950
		951	951 ~ 1000
		999	1001 ~

9 Other additional spec.

0	Nil
1	Please specify your requirement. Bore option (Drilled type only) with plug chain.

15 Document

0	Nil
1	Please specify your requirement. Drawing one sheet, Mill sheet.

• Please specify L size.
• When required over 1000mm, please specify with 100mm steps.