



Environment responsive type

Indicating Thermometers

OUTLINE

Indicating thermometers can be classified into liquid filled type, which use the expansion and contraction of the liquid sealed in the thermometer caused by temperature changes of the liquid, and gas filled type, which uses changes in the pressure of the insert gas sealed in the thermometer caused by temperature changes of the gas. These thermometers are perfect for local indication of temperature because a power source is unnecessary, they are easy to see, and do not require any experience to read.

FEATURES

- Since the sealed-in medium is a non-polluting organic liquid or an inert gas, the thermometer is environmentally friendly.
- A large variety of types matched to a wide range of environments and applications is available.

* When selecting a thermometer, select one which is normally used within a temperature range of 30% to 60% of full span. Check to confirm that the material of the wetted parts is appropriate for the gas or liquid to be measured.

SPECIFICATIONS 1

Manufacturing temperature range:
- 200 °C ~ 600 °C

Size:
75DIA., 100DIA., 150DIA.

Mounting:

Remote surface
mounting



Remote panel
mounting



Direct type



Bulb · Connection mounting:
304 st.st.

Lead parts material:

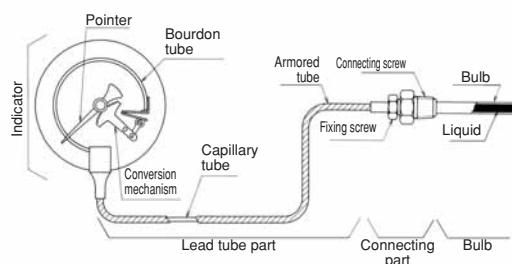
Capillary 304 st.st. or 316 st.st.
Armored tube 430st.st.

Ambient temperature compensation:

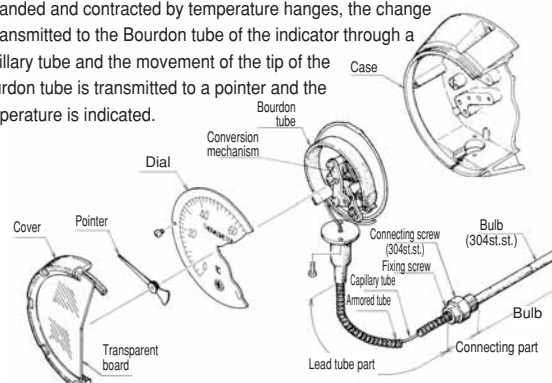
The liquid charged in the indicator and capillary tube of the pressure type thermometer expands and contracts according to the ambient temperature, causing an indication error. The following two methods of compensating for this are available:

- Bimetal compensation
- Lead compensation

Principles and Construction

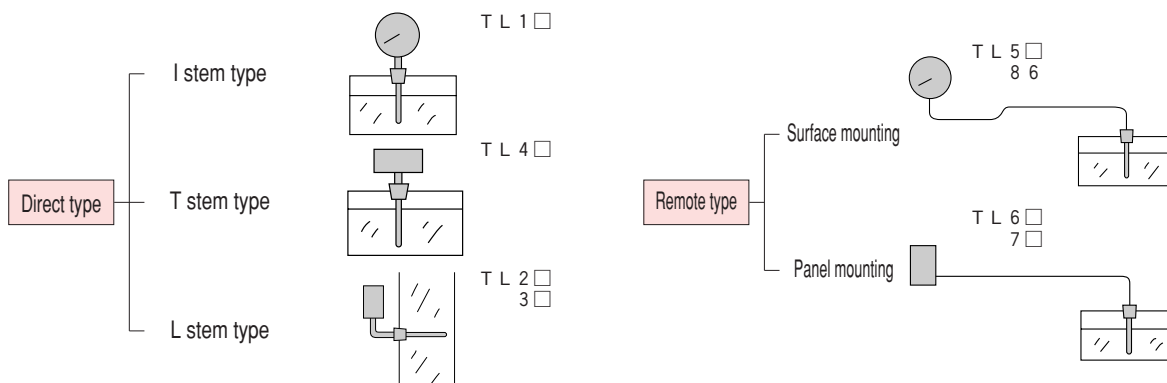


Indicating thermometers consist of a bulb and an indicator and a capillary tube which interconnects them. There is a connecting part which connects the bulb between them. A liquid is charged in this system. When the liquid in the bulb is expanded and contracted by temperature changes, the change is transmitted to the Bourdon tube of the indicator through a capillary tube and the movement of the tip of the Bourdon tube is transmitted to a pointer and the temperature is indicated.



SELECTION OF THE SPECIFICATIONS OF THERMOMETERS 1

1. Type and mounting



	Advantages	Disadvantages
Direct type	- Since the indicator and bulb are directly connected, the thermometer can be connected using only a connecting screw. - The indicator of the free angle type of the L stem type can be moved to the position at which the indicator can be easily read.	- Since the indicator and bulb are directly connected, the thermometer is easily affected by the measured liquid. - The indicator of the slide type of the L stem type can be turned around by loosening the fixing screws, because the thermometer is installed with gaskets. (Basically not manufactured because there is a problem.)

	Advantages	Disadvantages
Remote type	Temperature can be read at a place different than that of the measured liquid.	A panel, stanchion, etc. which fixes the indicator is necessary.

2. Compensation system by installation site

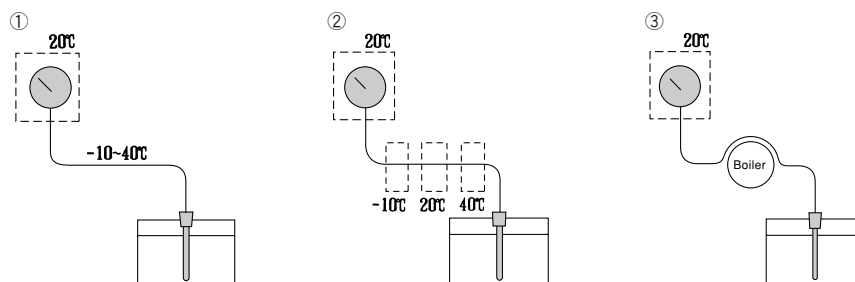
When the ambient temperature of a temperature gauges changes, the liquid sealed in the indicator and capillary tube of sealed type thermometer expands or contracts and causes an indication error. To compensate for this error, the following compensation systems are available:

(1) Bimetal compensation

- When the temperature is changed at the indicator and capillary tubes (however, at the same temperature)

(2) Lead compensation

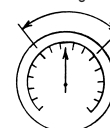
- When the temperature is changed at the whole indicator and capillary tubes
 - When the temperature change around the indicator is small and the temperature change around the capillary tubes is large and vice versa
 - When the capillary tubes are used under various ambient temperatures
 - When a part of the capillary tubes is heated



3. Temperature range (Scale range)

- Select the scale range so that the instrument is normally used between 30% and 60% of full span.
- The instrument itself is active even though the thermometer is not used, including temperature measurement from the time of manufacture.
- When the temperature exceeds the temperature range, it may cause the temperature gauge to break. For example, if the gauges will cross the equator or pass through cold regions during shipment, or will be stored in a cold region, careful attention is required.

Normal usage range

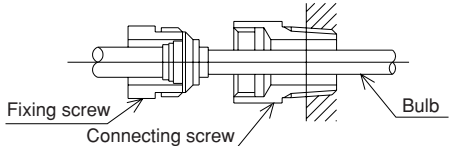


SELECTION OF THE SPECIFICATIONS OF THERMOMETERS 2

4. Bulb type

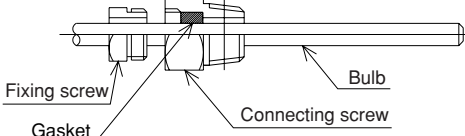
Union type

- Standard spec.

 Fixing screw Connecting screw Bulb	By tightening the fixing screw, the bulb is fixed to the connecting screws so that its position does not change.	Maximum allowable working pressure of union type is Less than 200g → 2MPa Over 200g → 1MPa (If the pressure is higher than the above, a thermowell should be provided.)
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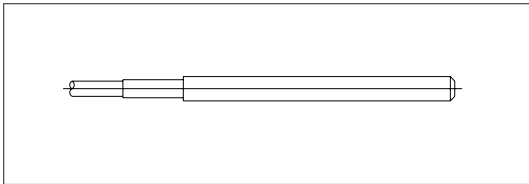
Slide type

- When the bulb position must be adjusted due to changing of the position of the fluid to be measured in a tank or other vessel
- When thermowell is provided or the bulb must be inserted all the way to the bottom

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

- When a long bulb is inserted into the thermowell, it does not have to be fixed.
- Only remote type is manufactured.

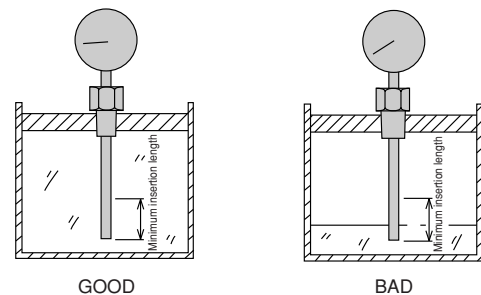


5. Bulb minimum insertion length

- The minimum bulb insertion length is decided according to the type, temperature range and bulb diameter.
- Decide the bulb length within the range between the minimum insertion length and the maximum insertion length.
- Make sure that the bulb is inserted into the liquid under measurement up to the screws, flange, or other connecting parts.

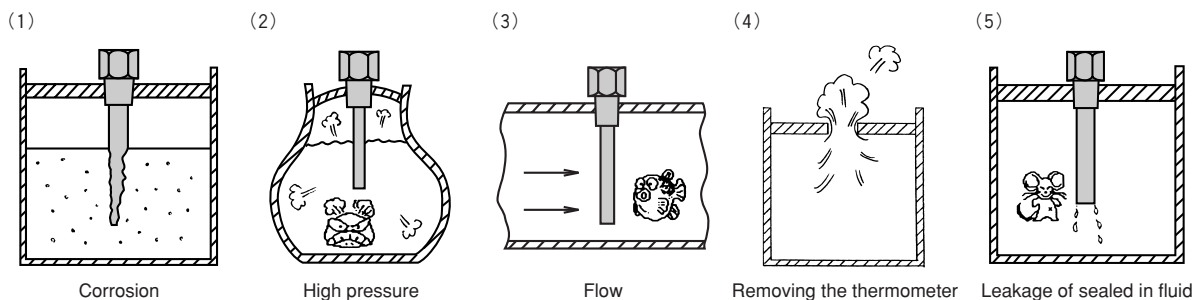
Note

If the bulb is not inserted into the liquid under measurement up to the screws or flange, an indication error may occur.



6. Thermowell necessary conditions

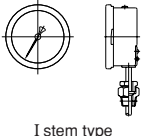
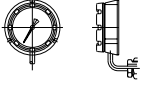
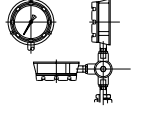
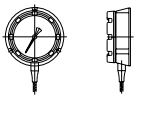
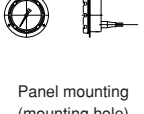
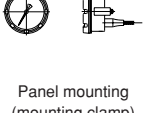
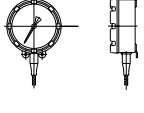
- (1) For corrosive fluids, a thermowell made of a suitable material is necessary.
- (2) For high pressure, a thermowell suited to the operating pressure must be used.
- (3) When the fluid flows, a thermowell suitable for the flow speed must be used.
- (4) When the fluid leaks when the thermometer is removed, a thermowell is convenient for maintenance.
- (5) When the liquid in the thermometer leaks from the bulb and is harmful, a thermowell must be used.



Indicating Thermometers

LIQUID · GAS FILLED TYPE INDICATING THERMOMETERS 1

1. Drip-proof thermometers

Mounting	Sensing method	Manufacturing range	Max. lead length		Dial size (mm)	Model
			Bimetal compensation	Lead compensation		
Direct type	 I stem type	Liquid filled type	—	—	75	T L 13
		Gas filled type	—	—	100	T L 14
		— 70 °C ~ 600 °C	—	—	150	T L 16
	 L stem type	Liquid filled type	—	—	75	T L 23
		Gas filled type	—	—	100	T L 24
	 Free angle type	Liquid filled type	—	—	75	T L 33
		— 70 °C ~ 200 °C	—	—	100	T L 34
	 T stem type	Liquid filled type	—	—	75	T L 43
		— 70 °C ~ 150 °C	—	—	100	T L 44
Remote type	 Surface mounting	Liquid filled type	* 5 m	—	75	T L 53
		Gas filled type		20 m	100	T L 54
		— 200 °C ~ 600 °C			150	T L 56
	 Panel mounting (mounting hole)	Liquid filled type	* 5 m	—	75	T L 63
		Gas filled type		20 m	100	T L 64
		— 200 °C ~ 600 °C			150	T L 66
	 Panel mounting (mounting clamp)	Liquid filled type	* 5 m	—	75	T L 73
		Gas filled type		20 m	100	T L 74
		— 200 °C ~ 600 °C			150	T L 76
	 Surface mounting	Liquid filled type	* 5 m	20 m	150	T L 86
		Gas filled type				

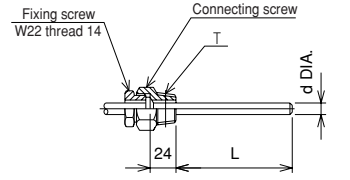
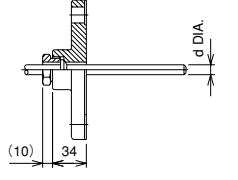
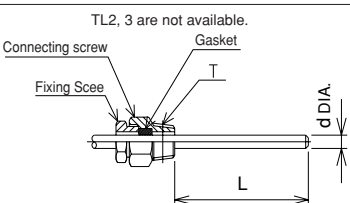
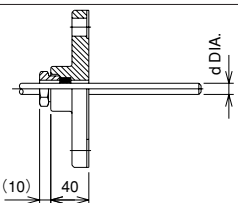
* For the -200 to 50°C and -100 to 100°C ranges, the maximum lead length can be increased up to 30m, depending on the size of the bulb. (75DIA. not available)

For 0 to 400°C and wider ranges, it can be increased up to 10m.

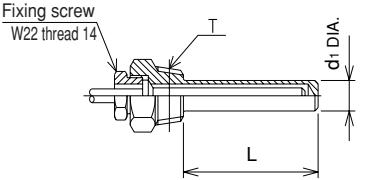
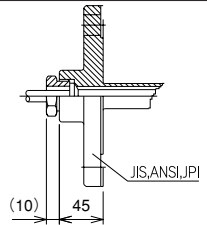
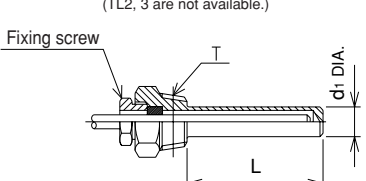
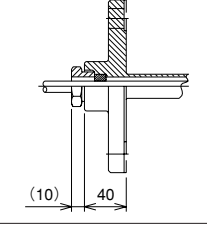
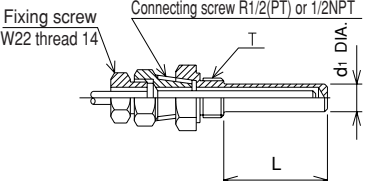
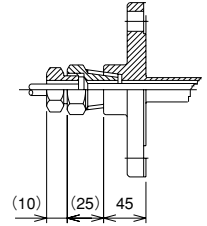
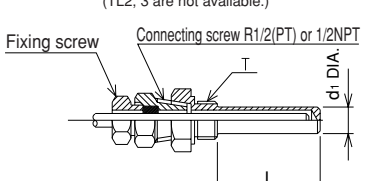
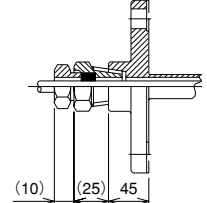
Indicating Thermometers

CONNECTION · BULB SPECIFICATIONS 1

1. Without thermowell

	Connection		Bulb outer dia.	Note
	Screw type	Flange type		
Union type	 Fixing screw W22 thread 14 Connecting screw 24 L d DIA. Max. operating pressure: 2MPa for less than 200°C 1MPa for 200°C or over	 (10) 34 d DIA.	8	• Direct type and slide type not available.
			10	_____
Slide type	 TL2, 3 are not available. Connecting screw Gasket Fixing Screw L d DIA. Max. operating pressure 0.3MPa	 (10) 40 d DIA.	12	_____
			13	_____
			16	• T=1/2 not available • Slide type not available

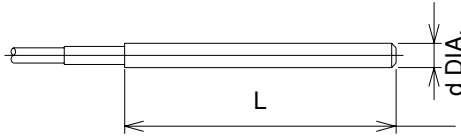
2. With thermowell

	Connection		Thermowell outer dia.	Bulb outer dia.	Note
	Screw type	Flange type			
Standard type	Union type  Fixing screw W22 thread 14 L d1 DIA. d DIA.	 (10) 45 JIS,ANSI,JPI	12	8	_____
	Slide type  (TL2, 3 are not available.) Fixing screw L d1 DIA. d DIA.	 (10) 40 d DIA.	15	10	_____
Double socket type	Union type  Fixing screw W22 thread 14 Connecting screw R1/2(PT) or 1/2NPT L d1 DIA. d DIA.	 (10) (25) 45 d DIA.	19	13	• T=1/2 not available
	Slide type  (TL2, 3 are not available.) Fixing screw Connecting screw R1/2(PT) or 1/2NPT L d1 DIA. d DIA.	 (10) (25) 45 d DIA.	23	16	• T=1/2 not available • Welding type well not available
			19 Taper 23	13	• T=1/2 not available • Welding type well not available

CONNECTION · BULB SPECIFICATIONS 2

	Connecting screw	Flange rating	Note
Standard connection	R 1/2 (PT), 1/2 NPT G 1/2 B (PF) R 3/4 (PT), G 3/4 B (PF) (Fixing screw only = W22 thread 14)	JIS 10 K 20 A R F JIS 10 K 25 A R F ANSI 1 B 150 R F ANSI 1 B 300 R F	Other screws and flanges in addition to those shown at the left are available. Contact NKS for details.

3. Plain type

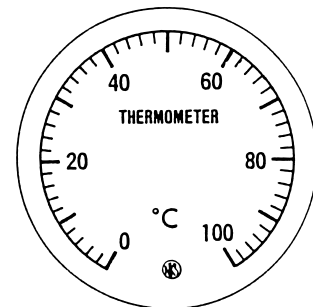
	Bulb	Note
Plain type	 d DIA. = 8DIA., 10DIA., 12DIA., 13DIA., 16DIA.	Remote type only. Direct type not available.

Scale shape

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

Range	Scale division and number entry position	75 DIA.	100 DIA.	150 DIA.
0~ 50		○	○	○
0~100		○	○	○
0~500		○	○	○
0~ 60		○	—	—
0~120		○	○	○
0~ 80		○	○	○
0~400		○	○	○
0~150		○	—	—
0~200		○	○	○
0~250		○	○	○
0~300		○	—	—
0~600		○	—	—
-10~ 50		○	○	○
-20~100		○	○	○
-10~100		○	○	○
-30~ 50		○	○	○
-30~120		○	—	—
-50~ 50		○	○	○
-70~ 50		○	○	○
-70~100		○	○	○
-100~100		—	○	○
-200~ 50		—	○	○

[Example]



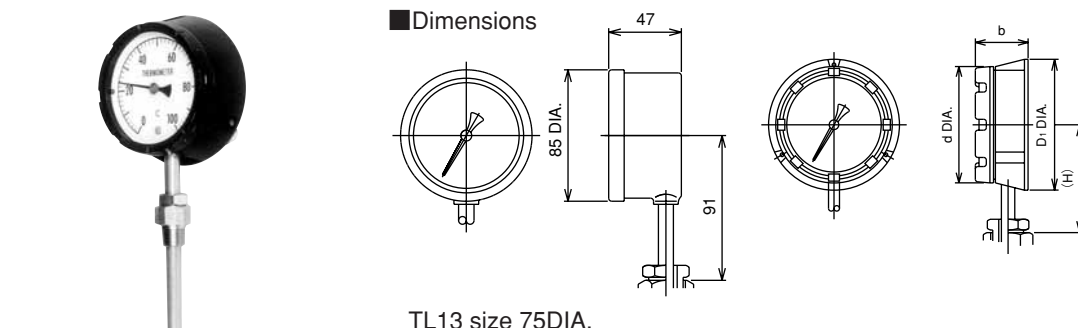
Ground: White

Entry: Black, red for minus graduation lines and figures.

Indicating Thermometers

DRIP-PROOF · DIRECT TYPE THERMOMETER 1

TL13 · 14 · 16 Liquid filled dial thermometer · Gas filled dial thermometer



I stem type

Model	Dial size	Dimensions			
		D	D ₁	b	H
T L 14	100	112	128	51	97
T L 16	150	165	178	59	125

■ Specifications

Manufacturing range	TL14・16: -70~600℃, TL13: -70~150℃, 0~400→600℃			
Case	TL14, 16 Construction: Drip-proof・equivalent to IP33, Material: ADC12, Finish: Black TL13 Construction: Drip-proof・equivalent to IP43, Material: AC7A, Finish: Black			
Wetted parts material	Bulb: 304st.st., Connection・Flange: 304st.st.			
Accuracy	Indication error: within ±2% F.S. at room temperature (20℃), effect of ambient temperature: within ±2% F.S./15℃, Within ±1% F.S.(TL14・16) at room temperature (20℃)			
Compensation	Bimetal compensation, lead compensation (However, applicable to TL14 and TL16 300℃ or less. 0~200℃, 0~250℃, and 0~300℃: Lead compensation only.)			
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	J IS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF			
Connection	Without thermowell	Union type, slide type		Slide type is not available with 8 Dia., 16 Dia. bulb. When the maximum temperature of temperature range exceeds 400℃, slide type is not available.
	With thermowell	Double socket union type: R 1/2, 1/2 NPT(Connection)		
		Double socket slide type: R 1/2, 1/2 NPT(Connection)		

■ Range · Bulb DIA. · Bulb length

Range ℃	Minimum graduation ℃	Bulb minimum insertion length mm										Bulb maximum length mm
		Bimetal compensation					Lead compensation (Not available for TL13)					
		d=8DIA.	d=10DIA.	d=12DIA.	d=13DIA.	d=18DIA.	d=8DIA.	d=10DIA.	d=12DIA.	d=13DIA.	d=10DIA.	
−70 ~ 50	2	50	45	40	40	50	160	110	90	75	65	500
−70 ~ 100	5	40	40	40	40	40	125	90	75	65	60	
−50 ~ 50	2	55	45	40	40	55	180	120	95	85	70	
−30 ~ 50	2	65	55	45	40	40	215	140	110	95	80	
−20 ~ 100	2	50	45	40	40	50	160	110	90	75	65	
−10 ~ 50	1	70	60	50	45	40	265	170	130	110	90	
0 ~ 50	1	70	60	50	45	40	305	190	145	125	100	
~ 60	1	65	55	45	40	40	265	170	130	110	90	
~ 80	2	65	55	45	40	40	245	155	120	105	85	
~ 100	2	55	45	40	40	55	205	135	105	90	75	
~ 120	2	50	45	40	40	50	180	120	95	85	70	
~ 150	2	40	40	40	40	40	155	105	85	75	65	
~ 200	5	—	—	—	—	—	110	80	70	60	55	
~ 250	5	—	—	—	—	—	100	75	65	60	55	
~ 300	5	—	—	—	—	—	90	70	60	55	50	
~ 400	10	230	170	120	100	80	—	—	—	—	—	
~ 500	10	230	170	120	100	80	—	—	—	—	—	
~ 600	10	230	170	120	100	80	—	—	—	—	—	

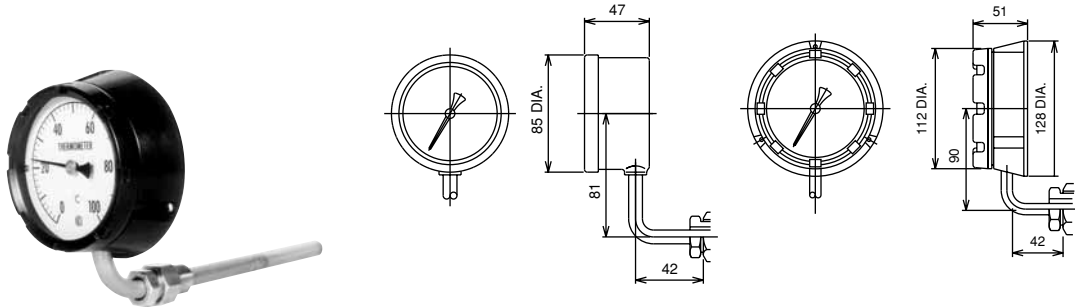
Note

- The above minimum insertion length is the length without thermowell. With thermowell, 25mm is added to the above length.
- The above lengths are the minimum necessary of the bulb to be inserted into the fluid to be measured.
- Bulb length should be over the above length and specified in 5mm steps.

DRIP-PROOF · DIRECT TYPE THERMOMETER 2

TL23 · 24 Liquid filled dial thermometer · Gas filled dial thermometer

■ Dimensions



L stem type

TL23 size 75DIA.

TL24 size 100DIA.

■ Specifications

Manufacturing range	T L 2 3 : - 7 0 ~ 1 5 0 ° C , 0 ~ 4 0 0 → 6 0 0 ° C T L 2 4 : - 7 0 ~ 6 0 0 ° C	
Case	TL24 Construction: Drip-proof · equivalent to IP33, Material: ADC12, Finish: Black TL23 Construction: Drip-proof · equivalent to IP43, Material: AC7A, Finish: Black	
Wetted parts material	Bulb: 304st.st., Connection · Flange: 304st.st.	
Accuracy	Indication error: within $\pm 2\%$ F.S. at room temperature (20°C), effect of ambient temperature: within $\pm 2\%$ F.S./ 15°C, Within $\pm 1\%$ F.S.(TL24) at room temperature (20°C)	
Compensation	Bimetal compensation, lead compensation (However, applicable to TL24 300°C or less. 0~200°C, 0 ~250°C, and 0~300°C : Lead compensation only.)	
Connection	R $\frac{1}{2}$ (PT), R $\frac{3}{4}$ (PT), $\frac{1}{2}$ NPT, G $\frac{1}{2}$ B (PF), G $\frac{3}{4}$ B (PF) $\frac{1}{2}$ 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 union type: R $\frac{1}{2}$, $\frac{1}{2}$ NPT
Slide type is not available.		

■ Range · Bulb DIA. · Bulb length

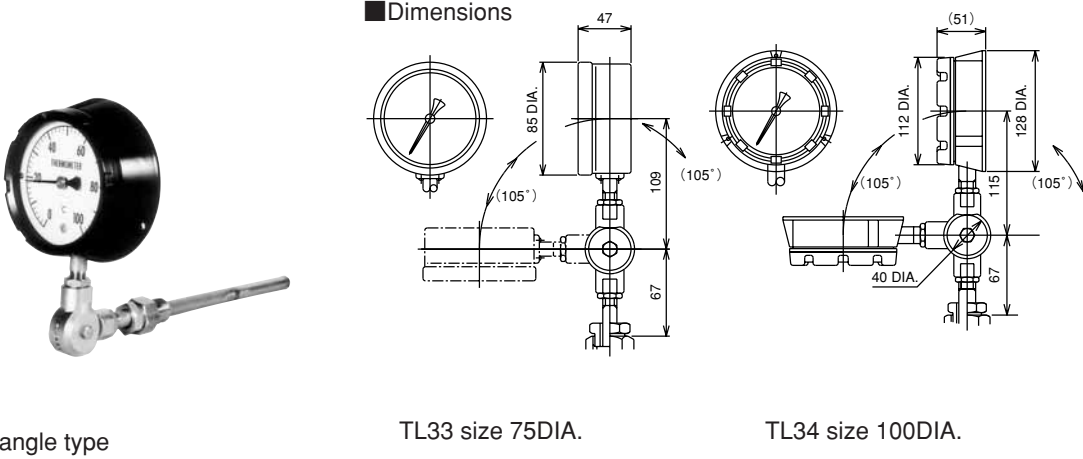
Range ℃	Minimum graduation ℃	Bulb minimum insertion length mm										Bulb maximum length mm
		Bimetal compensation					Lead compensation (Not available for TL23)					
		d=8DIA.	d=10DIA.	d=12DIA.	d=13DIA.	d=16DIA.	d=8DIA.	d=10DIA.	d=12DIA.	d=13DIA.	d=16DIA.	
-70 ~ 50	2	50	45	40	40	50	160	110	90	75	65	500
-70 ~ 100	5	40	40	40	40	40	125	90	75	65	60	
-50 ~ 50	2	55	45	40	40	55	180	120	95	85	70	
-30 ~ 50	2	65	55	45	40	40	215	140	110	95	80	
-20 ~ 100	2	50	45	40	40	50	160	110	90	75	65	
-10 ~ 50	1	70	60	50	45	40	265	170	130	110	90	
0 ~ 50	1	70	60	50	45	40	305	190	145	125	100	
~ 60	1	65	55	45	40	40	265	170	130	110	90	
~ 80	2	65	55	45	40	40	245	155	120	105	85	
~ 100	2	55	45	40	40	55	205	135	105	90	75	
~ 120	2	50	45	40	40	50	180	120	95	85	70	
~ 150	2	40	40	40	40	40	155	105	85	75	65	
~ 200	5	—	—	—	—	—	110	80	70	60	55	
~ 250	5	—	—	—	—	—	100	75	65	60	55	
~ 300	5	—	—	—	—	—	90	70	60	55	50	
~ 400	10	230	170	120	100	80	—	—	—	—	—	
~ 500	10	230	170	120	100	80	—	—	—	—	—	
~ 600	10	230	170	120	100	80	—	—	—	—	—	

Note

- The above minimum insertion length is the length without thermowell. With thermowell, 25mm is added to the above length.
- The above lengths are the minimum necessary of the bulb to be inserted into the fluid to be measured.
- Bulb length should be over the above length and specified in 5mm steps.

DRIP-PROOF · DIRECT TYPE THERMOMETER 3

TL33 · 34 Liquid filled dial thermometer · Gas filled dial thermometer



■ Specifications

Manufacturing range	T L 33 : - 70 ~ 150 °C, T L 34 : - 70 ~ 200 °C		
Case	Construction: Drip-proof · equivalent to IP33, Material: ADC12 (TL34), AC7A (TL33) Finish: Black		
Wetted parts material	Bulb: 304st.st., Connection · Flange: 304st.st.		
Accuracy	Indication error: within ±2% F.S. at room temperature (20°C), effect of ambient temperature: within ±2% F.S./ 15°C at room temperature (20°C)		
Compensation	Bimetal compensation, lead compensation (However, applicable to TL34 0~200°C)		
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 is not available.
	With thermowell	Double socket union type: R 1/2, 1/2 NPT	

■ Range · Bulb DIA. · Bulb length

Range ℃	Minimum graduation ℃	Bulb minimum insertion length mm										Bulb maximum length mm
		Bimetal compensation					Lead compensation (Not available for TL33)					
		d=8DIA.	d=10DIA.	d=12DIA.	d=13DIA.	d=16DIA.	d=8DIA.	d=10DIA.	d=12DIA.	d=13DIA.	d=16DIA.	
-70 ~ 50	2	50	45	40	40	50	160	110	90	75	65	500
-70 ~ 100	5	40	40	40	40	40	125	90	75	65	60	
-50 ~ 50	2	55	45	40	40	55	180	120	95	85	70	
-30 ~ 50	2	65	55	45	40	40	215	140	110	95	80	
-20 ~ 100	2	50	45	40	40	50	160	110	90	75	65	
-10 ~ 50	1	70	60	50	45	40	265	170	130	110	90	
0 ~ 50	1	70	60	50	45	40	305	190	145	125	100	
~ 60	1	65	55	45	40	40	265	170	130	110	90	
~ 80	2	65	55	45	40	40	245	155	120	105	85	
~ 100	2	55	45	40	40	55	205	135	105	90	75	
~ 120	2	50	45	40	40	50	180	120	95	85	70	
~ 150	2	40	40	40	40	40	155	105	85	75	65	
~ 200	5	—	—	—	—	—	110	80	70	60	55	

Note

- The above minimum insertion length is the length without thermowell. With thermowell, 25mm is added to the above length.
- The above lengths are the minimum necessary of the bulb to be inserted into the fluid to be measured.
- Bulb length should be over the above length and specified in 5mm steps.

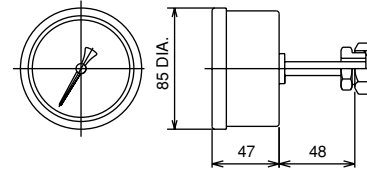
DRIP-PROOF · DIRECT TYPE THERMOMETER 4

TL43 · 44 Liquid filled dial thermometer · Gas filled dial thermometer

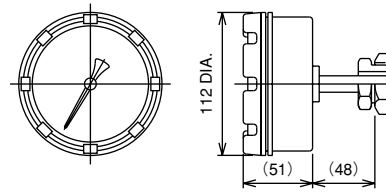


T stem type

■ Dimensions



TL43
size 75DIA.



TL44
size 100DIA.

■ Specifications

Manufacturing range	T L 43 · T L 44 : - 70 ~ 150 °C	
Case	Construction: Drip-proof · equivalent to IP43, Material: ADC12 (TL44), AC7A (TL43), Finish: Black	
Wetted parts material	Bulb: 304st.st., Connection · Flange: 304st.st.	
Accuracy	Indication error: within $\pm 2\%$ F.S. at room temperature (20°C), effect of ambient temperature: within $\pm 2\%$ F.S./ 15°C at room temperature (20°C)	
Compensation	Bimetal compensation	
Connection	R $\frac{1}{2}$ (PT), R $\frac{3}{4}$ (PT), $\frac{1}{2}$ NPT, G $\frac{1}{2}$ B (PF), G $\frac{3}{4}$ B (PF) $\frac{1}{2}$ 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 $\frac{1}{2}$, $\frac{1}{2}$ NPT(Connection) Double socket slide type: R $\frac{1}{2}$, $\frac{1}{2}$ NPT(Connection)
Slide type is not available with 8Dia., 16Dia. bulb. When the maximum temperature of temperature range exceeds 400°C, slide type is not available.		

■ Range · Bulb DIA. · Bulb length

Range ℃	Minimum graduation ℃	Bulb minimum insertion length mm					Bulb maximum length mm
		Bimetal compensation					
		d=8DIA.	d=10DIA.	d=12DIA.	d=13DIA.	d=16DIA.	
−70 ∼ 50	2	50	45	40	40	50	500
−70 ∼ 100	5	40	40	40	40	40	
−50 ∼ 50	2	55	45	40	40	55	
−30 ∼ 50	2	65	55	45	40	40	
−20 ∼ 100	2	50	45	40	40	50	
−10 ∼ 50	1	70	60	50	45	40	
0 ∼ 50	1	70	60	50	45	40	
∼ 60	1	65	55	45	40	40	
∼ 80	2	65	55	45	40	40	
∼ 100	2	55	45	40	40	55	
∼ 120	2	50	45	40	40	50	
∼ 150	2	40	40	40	40	40	

Note

- The above minimum insertion length is the length without thermowell. With thermowell, 25mm is added to the above length.
- The above lengths are the minimum necessary of the bulb to be inserted into the fluid to be measured.
- Bulb length should be over the above length and specified in 5mm steps.

Model	Dial size
T L 86	150

DRIP-PROOF · REMOTE TYPE THERMOMETER 2

TL 53 · 54 · 56, 63 · 64 · 66, 73 · 74 · 76, 86

Specifications

Manufacturing range	T L 53 ・ 63 ・ 73 : -70 ~ 600℃, T L 54 ・ 56 ・ 64 ・ 66 ・ 74 ・ 76 ・ 86 : -200 ~ 600℃		
Case	Construction: Drip-proof ・ TL54, 56: IP33, others: equivalent to IP43, Material: ADC12 (AC7A for TL63, 73), Finish: Black		
Wetted parts material	Bulb: 304st.st., Connection ・ Flange: 304st.st.		
Accuracy	Indication error: within ±2% F.S. at room temperature (20℃), effect of ambient temperature: within ±2% F.S./15℃ at room temperature (20℃), Within ±1% F.S.(TL54 ・ 56 ・ 64 ・ 66 ・ 74 ・ 76)		
Compensation	Bimetal compensation ・ lead compensation (75DIA. is not available. Available in the -70 to 300℃ range.)		
Connection	R ½ (PT), R ¾ (PT), ½ NPT, G ½ B (PF), G ¾ B (PF) ½ 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, plain type	Slide type is not available with 16 Dia. bulb. When the maximum temperature of temperature range exceeds 400℃, slide type is not available.
	With thermowell	Double socket union type: R ½, ½ NPT(Connection)	
		Double socket slide type: R ½, ½ NPT(Connection)	

Range · Bulb DIA. · Bulb length · lead length

Range ℃	Minimum graduation ℃	Bulb minimum insertion length mm												Bulb maximum length mm
		Bimetal compensation						100DIA. lead compensation						
		d=8DIA.	d=10DIA.	d=12DIA.	d=13DIA.	d=16DIA.	Lead length	d=8DIA.	d=10DIA.	d=12DIA.	d=13DIA.	d=16DIA.	Lead length	
−200~ 50	5	—	—	—	225	170	2~ 5m	—	—	—	—	—	—	500
−200~ 50	5	—	—	—	300	220	6~15m	—	—	—	—	—	—	
−200~ 50	5	—	—	—	370	270	16~25m	—	—	—	—	—	—	
−200~ 50	5	—	—	—	—	300	26~30m	—	—	—	—	—	—	
−100~100	5	—	—	—	225	170	2~ 5m	—	—	—	—	—	—	
−100~100	5	—	—	—	300	220	6~15m	—	—	—	—	—	—	
−100~100	5	—	—	—	370	270	16~25m	—	—	—	—	—	—	
−100~100	5	—	—	—	—	300	26~30m	—	—	—	—	—	—	
−70~ 50	2	50	45	40	40	50	~ 5m	160	110	90	75	65	~20m	
−70~ 100	5	40	40	40	40	40	~ 5m	125	90	75	65	60	~20m	
−50~ 50	2	55	45	40	40	55	~ 5m	180	120	95	85	70	~20m	
−30~ 50	2	65	55	45	40	40	~ 5m	215	140	110	95	80	~20m	
−20~ 100	2	50	45	40	40	50	~ 5m	160	110	90	75	65	~20m	
−10~ 50	1	70	60	50	45	40	~ 5m	265	170	130	110	90	~20m	
0~ 50	1	70	60	50	45	40	~ 5m	305	190	145	125	100	~20m	
~ 60	1	65	55	45	40	40	~ 5m	265	170	130	110	90	~20m	
~ 80	2	65	55	45	40	40	~ 5m	245	155	120	105	85	~20m	
~ 100	2	55	45	40	40	55	~ 5m	205	135	105	90	75	~20m	
~ 120	2	50	45	40	40	50	~ 5m	180	120	95	85	70	~20m	
~ 150	2	40	40	40	40	40	~ 5m	155	105	85	75	65	~20m	
~ 200	5	40	40	40	40	40	~ 5m	110	80	70	60	55	~20m	
~ 250	5	40	40	40	40	40	~ 5m	100	75	65	60	55	~20m	
~ 300	5	40	40	40	40	40	~ 5m	90	70	60	55	50	~20m	
~ 400	10	230	170	120	100	80	~10m	—	—	—	—	—	—	d=8 DIA., d=16 DIA.: 1000, d=10 DIA., d=12 DIA., d=13 DIA.: 3000
~ 500	10	230	170	120	100	80	~10m	—	—	—	—	—	—	
~ 600	10	230	170	120	100	80	~10m	—	—	—	—	—	—	

Note

- The above minimum insertion length is the length without thermowell. With thermowell, 25mm is added to the above length.
- The above lengths are the minimum necessary of the bulb to be inserted into the fluid to be measured.
- Bulb length should be over the above length and specified in 5mm steps.
- The minimum length of the plain type bulb is the minimum length of the above table plus 40mm.
- 75DIA. are not available in the portion.

150DIA. (TL56 · 66 · 76 · 86) lead compensation · range · bulb length

Range °C	Minimum graduation °C	Bulb minimum insertion length mm					
		150DIA. lead compensation					
		d=8DIA.	d=10DIA.	d=12DIA.	d=13DIA.	d=16DIA.	
-70 ~ 50	2	50	45	40	40	50	Lead length Up to 20m
-70 ~ 100	5	40	40	40	40	40	
-50 ~ 50	2	55	45	40	40	55	
-30 ~ 50	2	65	55	45	40	40	
-20 ~ 100	2	50	45	40	40	50	
-10 ~ 50	1	70	60	50	45	40	
0 ~ 50	1	70	60	50	45	40	Bulb maxi- mum length Up to 500mm
~ 60	1	65	55	45	40	40	
~ 80	2	65	55	45	40	40	
~ 100	2	55	45	40	40	55	
~ 120	2	50	45	40	40	50	
~ 150	2	40	40	40	40	40	
~ 200	5	40	40	40	40	40	
~ 250	5	40	40	40	40	40	
~ 300	5	40	40	40	40	40	

Indicating Thermometers

Model number configuration

For ordering, please specify the model number, each specs and the range.

T L		—			—			—			×			×					
Indicating thermometer		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮			
Model		Selective spec.										Additional spec. (option)							
Type	Available or not, depending on size.																		
	1	Direct type/I stem type										8DIA., 16DIA. slide type bulb not available			75DIA.	100DIA.	150DIA.		
	2	Direct type/L stem type										Slide type not available			○	○	×		
	3	Direct type/Free angle type										Slide type not available			○	○	×		
	4	Direct type/T stem type										8DIA., 16DIA. slide type bulb not available			○	○	×		
	5	Remote type/surface mounting type													○	○	○		
	6	Remote type/panel mounting type (Hole mounting)													○	○	○		
	7	Remote type/panel mounting type (Clamp mounting)													○	○	○		
8	Remote type/surface mounting type (EN type)													×	×	○			
Size	3	75DIA. Lead compensation not available.																	
	4	100DIA.																	
	6	150DIA.																	
① Thermowell inside screws For with thermowell, please specify the thermowell type on a separate page.	0	Without thermowell																	
	With thermowell	Welded type										Drilled type			Welded type				
												Straight		Taper		Flange			
		1	Inside screws: Standard (W22 thread 14) and for slide type										SW11 (SW10)	SW41 (SW40)	SW71 (SW70)	SW81			
		2	Inside screws: Rc1/2 double socket										SW12	SW42	SW72	SW82			
		3	Inside screws: 1/2NPT double socket										SW13	SW43	SW73	—			
4	Inside screws: G1/2 double socket										SW14	SW44	SW74	—					
5	Inside screws: Rc3/4 double socket										SW15	SW45	SW75	—					
② Connecting part	0	Union type																	
	1	Slide type (Not available for 16DIA. bulb, L stem type, I and T stem with 8DIA. bulb, and when the maximum temperature of temperature range exceeds 400°C.)																	
	4	Plain type (Remote type)																	
③ Connecting screws	0	R1/2										H	JIS10K50ARF						
	1	R3/4										J	JIS20K20ARF						
	2	1/2NPT										K	JIS20K25ARF						
	3	G1/2B										L	JIS10K15ARF						
	4	G3/4B										M	JIS10K20ARF						
	5	JIS10K20ARF										N	JIS10K25ARF						
	6	JIS10K25ARF										P	ANSI3/4B150RF						
	7	ANSI1B150RF										Q	ANSI3/4B300RF						
	8	ANSI1B300RF										R	ANSI1B600RF						
	A	Fixing screws (W22 thread 14) union type only										S	ANSI 1 1/2B150RF						
	B	R3/8										T	ANSI 1 1/2B300RF						
	C	R1										U	ANSI 1 1/2B600RF						
	D	3/4NPT										W	JPI 1B150RF						
	E	1NPT										X	JPI 1B300RF						
	F	JIS10K15ARF										Y	JPI 1B600RF						
	G	JIS10K40ARF										Z	Plain type						
	④ Range °C (When ordering, please specify the range and units separately.)	1	0~50, 60, 80, 100, 120, 150																
2		0~200, 250, 300 (T stem type and free angle type of 250°C, 300°C not available)																	
3		0~400, 500 (T stem type and free angle type not available)																	
4		0~600 (T stem type and free angle type not available)																	
5		-10~50, -30~50, -50~50																	
6		-70~50, -70~100, -20~100																	
8		-100~100 Remote type only 75DIA. not available (Gas filled)																	
9		-200~50 Remote type only 75DIA. not available (Gas filled)																	
⑤ Bulb material		1	304st.st.																
	2	316st.st.																	
	X	With thermowell																	
⑥ Bulb DIA.	1	d = 8DIA. Direct type and slide type not available																	
	2	d = 10DIA. L stem type, free angle for slide type not available																	
	3	d = 12DIA. L stem type, free angle for slide type not available																	
	4	d = 13DIA. L stem type, free angle for slide type not available																	
	5	d = 16DIA. Slide type not available																	
	X	With thermowell																	
⑦ Bulb length	A	Minimum dimension ~ 500mm																	
	B	501 ~ 600mm																	
	C	601 ~ 700mm																	
	D	701 ~ 800mm																	
	E	801 ~ 900mm																	
	F	901 ~ 1000mm																	
	X	With thermowell																	
⑧ Compensation	1	Bimetal compensation																	
	2	Lead compensation 100DIA. T stem type not available																	
		Lead compensation 150DIA. T stem type and free angle type not available																	
⑨ Lead type	0	Direct type																	
	2	Armored tube B (430st.st.) (Standard)																	
	B	Armored tube B (304st.st.)																	
	E	Armored tube B (316st.st.)																	
⑩ Lead length	Bimetal		Lead																
	0	0	Direct type																
	A	a	Up to 3m																
	B	b	Up to 4m																
	C	c	Up to 5m																
	D	d	Up to 6m																
	E	e	Up to 7m																
	F	f	Up to 8m																
	G	g	Up to 9m																
	H	h	Up to 10m																
9	9	Other specifications (/m)																	
⑬ Kind of thermowell	1	Welded type																	
	4	Drilled type straight																	
	7	Drilled type taper																	
	8	Welded flange																	
⑭ Thermowell inside screws	0	For slide type General products: Not available																	
	1	W22 thread 14																	
	2	Rc1/2																	
	3	1/2NPT General products: Not available																	
	4	G1/2 General products: Not available																	
	5	Rc3/4 General products: Not available																	
	6	3/4NPT General products: Not available																	
7	G3/4 General products: Not available																		
⑮ Documents	0	Nil																	
	1	Required (Please specify the desired documents separately.) Submission drawings, instruction manual, inspection procedure, mill sheet, test report (1 pc 1 copy), traceability certificate, inspection certificate, strength calculation, attended inspection																	

[Manufacturing range]

- Direct type bimetal compensation 200 to 300°C not available.
- Lead compensation 400 to 600°C not available.
- Thermowell inside screws: For slide type, not available for 16DIA. bulb, L stem type, I and T stem with 8DIA. bulb, and when the maximum temperature of temperature range exceeds 400°C.

*When ordering, please specify the bulb length and lead length.

*The thermowell model composition is SW ⑬ ⑭.

*For with thermowell, please refer to P ⑭ ~ thermowell manufacturing specifications and specify the SW model also.

*Specify "X" if there is no specification item.

STAINLESS STEEL CASE THERMOMETER

RL1 · 5 · 7 Liquid filled dial thermometer · Gas filled dial thermometer



RL 5

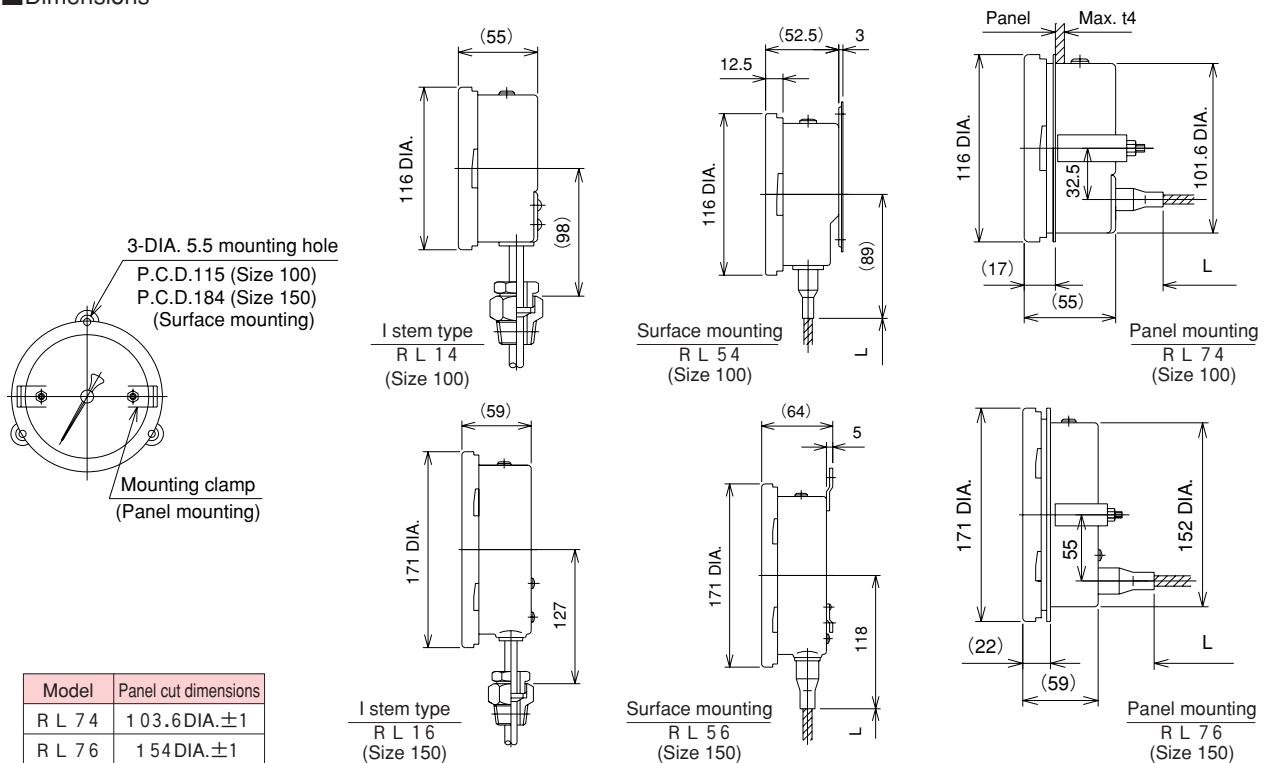
Type Manufacturing range	Mounting	Model	Dial size
(RL 5 · 7) (-200 ~ 600 °C)	I stem type RL 1	RL 14	100
		RL 16	150
(RL 1) (-70 ~ 150 °C)	Surface mounting type RL 5	RL 54	100
		RL 56	150
	Panel mounting type RL 7	RL 74	100
		RL 76	150

Specifications

Manufacturing range	RL 14 · 16 : -70 ~ 150 °C, RL 54 · 56 · 74 · 76 : -200 ~ 600 °C		
Case	Construction: Spray-proof · equivalent to IP65, Material: 304st.st., Finish: Plain		
Wetted parts material	Bulb: 304st.st., Connection · Flange: 304st.st.		
Accuracy	Indication error: within ±2% F.S. at room temperature (20°C), effect of ambient temperature: within ±2% F.S./15°C at room temperature (20°C), Within ±1% F.S.(RL14 · 54)		
Compensation	Bimetal compensation · lead compensation (For lead compensation, only RL54, 56, 74, 76 are available.)		
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. When the maximum temperature of temperature range exceeds 400°C, slide type is not available.
	With thermowell	Double socket union type: R 1/2, 1/2 NPT(Connection)	
		Double socket slide type: R 1/2, 1/2 NPT(Connection)	

For the temperature range, bulb length, lead length and other specifications, refer to the drip-proof type, direct type (remote type) thermometers.

Dimensions



Indicating Thermometers

Model number configuration

For ordering, please specify the model number, each specs and the range.

R	L										X	X									
Stainless steel case thermometer				①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮			
Model				Selective spec.										Additional spec. (option)							
Type	1	4	100DIA. Spray-proof stem type																		
	5	4	100DIA. Spray-proof surface mounting type																		
	7	4	100DIA. Spray-proof panel mounting type																		
	1	6	150DIA. Spray-proof stem type																		
	5	6	150DIA. Spray-proof surface mounting type																		
	7	6	150DIA. Spray-proof panel mounting type																		
① Thermowell inside screws			0	Without thermowell																	
For with thermowell, please specify the thermowell type on a separate page.				With thermowell										Welded type		Drilled type		Welded type			
			1	Inside screws: Standard (W22 thread 14) and for slide type										SW11 (SW10)		SW41 (SW40)		SW71 (SW70)		SW81	
			2	Inside screws: Rc1/2 double socket										SW12		SW42		SW72		SW82	
			3	Inside screws: 1/2NPT double socket										SW13		SW43		SW73		—	
			4	Inside screws: G1/2 double socket										SW14		SW44		SW74		—	
			5	Inside screws: Rc3/4 double socket										SW15		SW45		SW75		—	
② Connecting part			0	Union type																	
			1	Slide type (Not available for 16DIA. bulb, 8 DIA. R14 and 16 and when the maximum temperature of temperature range exceeds 400°C.)																	
			2	Union / warp type (DIA. 8 bulb not available)																	
			3	Slide / warp type (DIA. 8 bulb not available)																	
			4	Plain type (Remote type)																	
③ Connecting screws			0	R1/2										H	JIS10K50ARF						
			1	R3/4										J	JIS20K20ARF						
			2	1/2NPT										K	JIS20K25ARF						
			3	G1/2B										L	JIS10K15AFF						
			4	G3/4B										M	JIS10K20AFF						
			5	JIS10K20ARF										N	JIS10K25AFF						
			6	JIS10K25ARF										P	ANSI3/4B15ORF						
			7	ANSI1B15ORF										Q	ANSI3/4B30ORF						
			8	ANSI1B30ORF										R	ANSI1B60ORF						
			A	Fixing screws (W22 thread 14) union type only										S	ANSI 1 1/2B15ORF						
			B	R3/8										T	ANSI 1 1/2B30ORF						
			C	R1										U	ANSI 1 1/2B60ORF						
			D	3/4NPT										W	JPI 1B15ORF						
			E	1NPT										X	JPI 1B30ORF						
			F	JIS10K15ARF										Y	JPI 1B60ORF						
			G	JIS10K40ARF										Z	Plain type						
④ Range °C			1	0~50, 60, 80, 100, 120, 150																	
			2	0~200, 250, 300										RL14, RL16 not available							
			3	0~400, 500										RL14, RL16 not available							
(When ordering, please specify the range and units separately.)			4	0~600										RL14, RL16 not available							
			5	-10~50, -30~50, -50~50																	
			6	-70~50, -70~100, -20~100																	
			8	-100~100										(Gas filled) RL14, RL16 not available							
			9	-200~50										(Gas filled) RL14, RL16 not available							
⑤ Bulb material			1	304st.st.																	
			2	316st.st.																	
			X	With thermowell																	
⑥ Bulb DIA.			1	d = 8DIA. Slide type RL14, 16 not available																	
			2	d = 10DIA.																	
			3	d = 12DIA.																	
			4	d = 13DIA.																	
			5	d = 16DIA. Slide type not available																	
			X	With thermowell																	
⑦ Bulb length			A	Minimum dimension ~ 500mm																	
			B	501 ~ 600mm																	
			C	601 ~ 700mm																	
			D	701 ~ 800mm																	
			E	801 ~ 900mm																	
			F	901 ~ 1000mm																	
			X	With thermowell																	
⑧ Compensation			1	Bimetal compensation																	
			2	Lead compensation Remote type 100DIA. Lead compensation Remote type 150DIA.																	
⑨ Lead type			0	Direct type																	
			2	Armored tube B (430st.st.) (Standard)																	
			B	Armored tube B (304st.st.)																	
			E	Armored tube B (316st.st.)																	
⑩ Lead length			Bimetal	Lead																	
			0	0		Direct type															
			A	a		Up to 3m															
			B	b		Up to 4m															
			C	c		Up to 5m															
			D	d		Up to 6m															
			E	e		Up to 7m															
			F	f		Up to 8m															
			G	g																	

ULTRA VIBRATION-PROOF GLYCERIN BATH TYPE THERMOMETER

RV1 · 5 · 7 Liquid filled dial thermometer · Gas filled dial thermometer



Type	Mounting	Model	Dial size
Manufacturing range			
(R V 5 · 7) - 200 ~ 600 °C	I stem type R V 1	R V 1 4	100
(R V 1) - 70 ~ 150 °C	Surface mounting type R V 5	R V 5 4	
	Panel mounting type R V 7	R V 7 4	

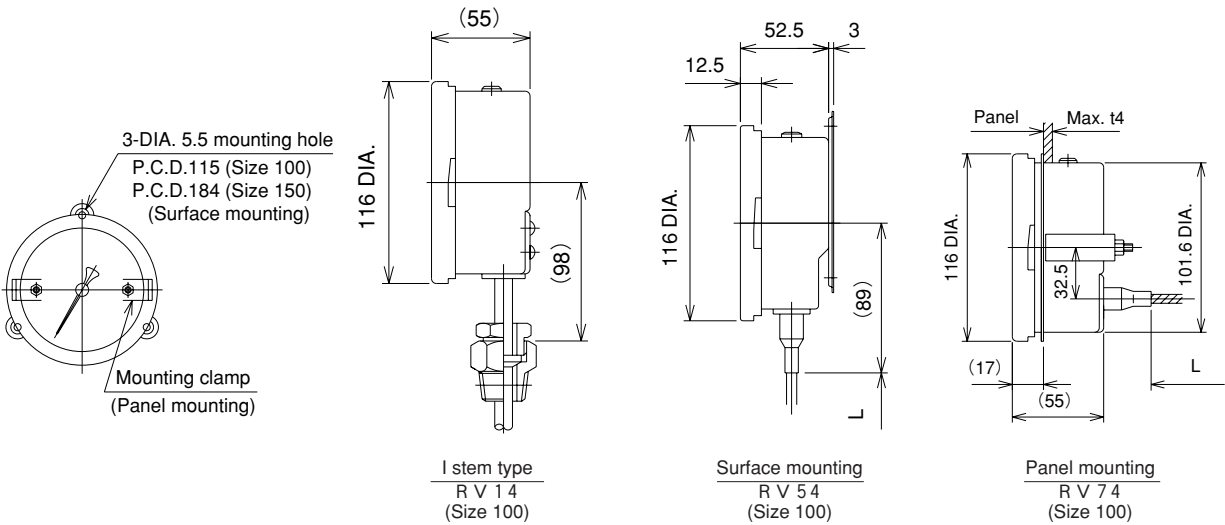
The mechanism inside the case is totally immersed in a glycerin bath. Violent vibration and vibration amplitude are suppressed, wear is reduced, and durability is increased by the back pressure generated according to the viscosity resistance of the glycerin. The case is made of "304st.st", ambient atmosphere resistance is excellent, and a glycerin-water solution is used as the charged liquid.

Specifications

Manufacturing range	R V 1 4 : - 70 ~ 150 °C, R V 5 4 · 7 4 : - 200 ~ 600 °C		
Case	Construction: Spray-proof · equivalent to IP65, Material: 304st.st., Finish: Plain		
Wetted parts material	Bulb: 304st.st., Connection · Flange: 304st.st.		
Accuracy	Indication error: within ±2%F.S. at room temperature (20°C), effect of ambient temperature: within ±2% F.S./ 15°C at 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	J IS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF		
Connection	Without thermowell	Union type, slide type	For I stem type, slide type is not available. Slide type is not available with 16 Dia. bulb. When the maximum temperature of temperature range exceeds 400°C, slide type is not available.
	With thermowell	Double socket union type: R 1/2, 1/2 NPT(Connection)	
		Double socket slide type: R 1/2, 1/2 NPT(Connection)	

For the temperature range, bulb length, lead length and other specifications, refer to the drip-proof type, direct type (remote type) thermometers.

Dimensions



Model	Panel cut dimensions
R V 7 4	103.6 DIA.±1

Indicating Thermometers

Model number configuration

For ordering, please specify the model number, each specs and the range.

R V		—			—										×		×				
		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮					
Ultra vibration-proof glycerin bath type thermometer																					
Model		Selective spec.										Additional spec. (option)									
Type	1	4	100DIA. Spray-proof stem type																		
	5	4	100DIA. Spray-proof surface mounting type																		
	7	4	100DIA. Spray-proof panel mounting type																		
① Thermowell inside screws For with thermowell, please specify the thermowell type on a separate page.		0	Without thermowell										Welded type		Drilled type		Welded type				
			With thermowell												Straight		Taper		Flange		
		1	Inside screws: Standard (W22 thread 14) and for slide type										SW11 (SW10)		SW41 (SW40)		SW71 (SW70)		SW81		
		2	Inside screws: Rc1/2 double socket										SW12		SW42		SW72		SW82		
		3	Inside screws: 1/2NPT double socket										SW13		SW43		SW73		—		
		4	Inside screws: G1/2 double socket										SW14		SW44		SW74		—		
② Connecting part		0	Union type																		
		1	Slide type (Not available for 16DIA. bulb, RV14, and when the maximum temperature of temperature range exceeds 400°C.)																		
		2	Union / warp type (DIA. 8 bulb not available)																		
		3	Slide / warp type (DIA. 8 bulb not available, RV14 not available)																		
		4	Plain type																		
		③ Connecting screws		0	R1/2										H		JIS10K50ARF				
1	R3/4										J		JIS20K20ARF								
2	1/2NPT										K		JIS20K25ARF								
3	G1/2B										L		JIS10K15AFF								
4	G3/4B										M		JIS10K20AFF								
5	JIS10K20ARF										N		JIS10K25AFF								
6	JIS10K25ARF										P		ANSI3/4B150RF								
7	ANSI1B150RF										Q		ANSI3/4B300RF								
8	ANSI1B300RF										R		ANSI1B600RF								
A	Fixing screws (W22 thread 14) union type only										S		ANSI 1 1/2B150RF								
B	R3/8										T		ANSI 1 1/2B300RF								
C	R1										U		ANSI 1 1/2B600RF								
D	3/4NPT										W		JPI 1B150RF								
E	1NPT										X		JPI 1B300RF								
④ Range °C (When ordering, please specify the range and units separately.)		1	0~50, 60, 80, 100, 120, 150																		
		2	0~200, 250, 300												RL14 not available						
		3	0~400, 500												RL14 not available						
		4	0~600												RL14 not available						
		5	-10~50, -30~50, -50~50																		
		6	-70~50, -70~100, -20~100																		
		8	-100~100												RL14 not available						
		9	-200~50												RL14 not available						
		⑤ Bulb material		1	304st.st.																
				2	316st.st.																
				X	With thermowell																
				⑥ Bulb DIA.		1	d = 8DIA. Slide type RV14 not available														
						2	d = 10DIA. Slide type RV14 not available														
						3	d = 12DIA. Slide type RV14 not available														
4	d = 13DIA. Slide type RV14 not available																				
⑦ Bulb length		5	d = 16DIA. Slide type not available																		
		X	With thermowell																		
		A	Minimum dimension ~ 500mm																		
		B	501~ 600mm																		
		C	601~ 700mm																		
		D	701~ 800mm																		
⑧ Compensation		1	Bimetal compensation																		
		2	Lead compensation (RV14 not available)																		
		⑨ Lead type		0	Direct type																
				2	Armored tube B (430st.st.) (Standard)																
				B	Armored tube B (304st.st.)																
				E	Armored tube B (316st.st.)																
⑩ Lead length		Bimetal		Lead		0		0		Direct type											
		A		a		Up to 3m															
		B		b		Up to 4m															
		C		c		Up to 5m															
		D		d		Up to 6m															
		E		e		Up to 7m															
		F		f		Up to 8m															
		G		g		Up to 9m															
		H		h		Up to 10m															
		9		9		Other specifications (/m)															
⑬ Kind of thermowell		1	Welded type																		
		4	Drilled type straight																		
		7	Drilled type taper																		
		8	Welded flange																		
⑭ Thermowell inside screws		0	For slide type General products: Not available																		
		1	W22 thread 14																		
		2	Rc1/2																		
		3	1/2NPT General products: Not available																		
		4	G1/2 General products: Not available																		
		5	Rc3/4 General products: Not available																		
		6	3/4NPT General products: Not available																		
⑮ Documents		0	Nil																		
		1	Required (Please specify the desired documents separately.) Submission drawings, instruction manual, inspection procedure, mill sheet, test report (1 pc 1 copy), traceability certificate, inspection certificate, strength calculation, attended inspection																		

[Manufacturing range]

- RV14 200 to 600°C not available.
- For thermowell slide type, not available for RV14, 16DIA. bulb, and when the maximum temperature of temperature range exceeds 400°C.
- RV14 and 400 to 600°C lead compensation are not available.

*When ordering, please specify the bulb length and lead length.

*The thermowell model composition is SW 13 14.

*For with thermowell, please refer to P 14 ~ thermowell manufacturing specifications and specify the SW model also.

*Specify "X" if there is no specification item.

SQUARE THERMOMETER (REMOTE TYPE)

TL90 · 91 · 92 · 93 Liquid filled dial thermometer · Gas filled dial thermometer



Square Thermometer

Type	Mounting	Model	Dial size
Liquid filled type	T L 90	□ 110	Mounting bolt
	T L 91		Mounting clamp
Gas filled type	T L 92	□ 168	Mounting bolt
	T L 93		Mounting clamp

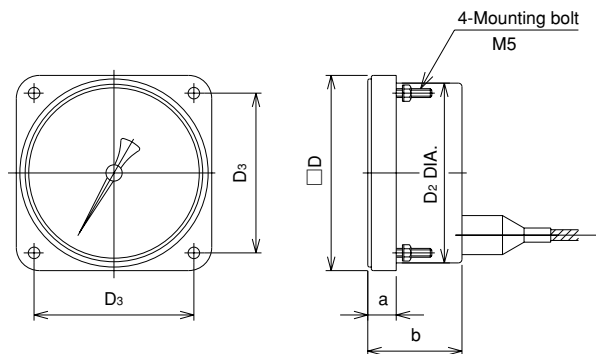
Specifications

Manufacturing range	TL90 · 91 · 92 · 93 : -200 ~ 600 °C		
Case	Construction: Drip-proof · equivalent to IP33, Material: ZDC2 for TL90 · 91, AC7A for TL92 · 93 Finish: Black		
Wetted parts material	Bulb: 304st.st., Connection · Flange: 304st.st.		
Accuracy	Indication error: within $\pm 2\%$ F.S. at room temperature (20°C), effect of ambient temperature: within $\pm 2\%$ F.S./ 15°C at room temperature (20°C)		
Compensation	Bimetal compensation, lead compensation (□ 168 only)		
Max. lead length	TL: 5m (Bimetal compensation), 20m (lead compensation)		
Connection	R $\frac{1}{2}$ (PT), R $\frac{3}{4}$ (PT), $\frac{1}{2}$ NPT, G $\frac{1}{2}$ B (PF), G $\frac{3}{4}$ B (PF) $\frac{1}{2}$ 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. When the maximum temperature of temperature range exceeds 400°C, slide type is not available.
	With thermowell	Double socket union type: R $\frac{1}{2}$, $\frac{1}{2}$ NPT(Connection) Double socket slide type: R $\frac{1}{2}$, $\frac{1}{2}$ NPT(Connection)	

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

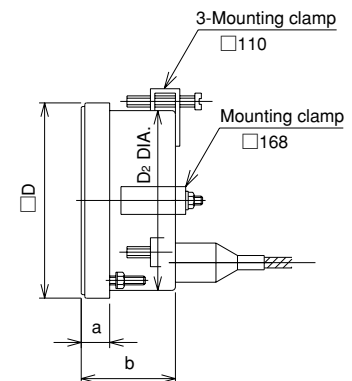
Dimensions

Mounting bolt



T L 90 (Size □ 110)
T L 92 (Size □ 168)

Mounting clamp



T L 91 (Size □ 110)
T L 93 (Size □ 168)

Model	Size	Dimensions					Panel cut dimension
		D	D ₂	D ₃	a	b	
T L 90 · 91	□ 110	110	102	90	16	53	104DIA. ± 1
T L 92 · 93	□ 168	168	152	145	17	60	154DIA. ± 1

Indicating Thermometers

Model number configuration

For ordering, please specify the model number, each specs and the range.

T L 9			—			—			—			× ×			—		
Square thermometer			① ② ③			④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩			⑪ ⑫ ⑬ ⑭ ⑮								
Model			Selective spec.									Additional spec. (option)					
Type	0	□110・Mounting bolt															
Size	1	□110・Mounting clamp															
	2	□168・Mounting bolt															
	3	□168・Mounting clamp															
① Thermowell inside screws For with thermowell, please specify the thermowell type on a separate page.		0	Without thermowell														
			With thermowell														
		1	Inside screws: Standard (W22 thread 14) and for slide type														
		2	Inside screws: Rc1/2 double socket														
		3	Inside screws: 1/2NPT double socket														
		4	Inside screws: G1/2 double socket														
		5	Inside screws: Rc3/4 double socket														
② Connecting part		0	Union type														
		1	Slide type (Not available for 16DIA. bulb, and when the maximum temperature of temperature range exceeds 400℃.)														
		4	Plain type (Remote type only)														
③ Connecting screws		0	R1/2	H	JIS10K50ARF												
		1	R3/4	J	JIS20K20ARF												
		2	1/2NPT	K	JIS20K25ARF												
		3	G1/2B	L	JIS10K15AFF												
		4	G3/4B	M	JIS10K20AFF												
		5	JIS10K20ARF	N	JIS10K25AFF												
		6	JIS10K25ARF	P	ANSI3/4B150RF												
		7	ANSI1B150RF	Q	ANSI3/4B300RF												
		8	ANSI1B300RF	R	ANSI1B600RF												
		A	Fixing screws (W22 thread 14) union type only		S	ANSI 1 1/2B150RF											
		B	R3/8	T	ANSI 1 1/2B300RF												
		C	R1	U	ANSI 1 1/2B600RF												
		D	3/4NPT	W	JPI 1B150RF												
		E	1NPT	X	JPI 1B300RF												
		F	JIS10K15ARF	Y	JPI 1B600RF												
		G	JIS10K40ARF	Z	Plain type												
④ Range ℃ (When ordering, please specify the range and units separately.)		1	0~50, 60, 80, 100, 120, 150														
		2	0~200, 250, 300														
		3	0~400, 500														
		4	0~600														
		5	-10~50, -30~50, -50~50														
		6	-70~50, -70~100, -20~100														
		8	-100~100														
		9	-200~50														
⑤ Bulb material		1	304st.st.														
		2	316st.st.														
		X	With thermowell														
⑥ Bulb DIA.		1	d = 8DIA.														
		2	d = 10DIA.														
		3	d = 12DIA.														
		4	d = 13DIA.														
		5	d = 16DIA.														
		X	With thermowell														
⑦ Bulb length		A	Minimum dimension ~ 500mm														
		B	501 ~ 600mm														
		C	601 ~ 700mm														
		D	701 ~ 800mm														
		E	801 ~ 900mm														
		F	901 ~ 1000mm														
		X	With thermowell														
⑧ Compensation		1	Bimetal compensation														
		2	Lead compensation (□168 only)														
⑨ Lead type		2	Armored tube B (430st.st.) (Standard)														
		B	Armored tube B (304st.st.)														
		E	Armored tube B (316st.st.)														
⑩ Lead length		Bimetal		Lead													
		A	a	Up to 3m													
		B	b	Up to 4m													
		C	c	Up to 5m													
		D	d	Up to 6m													
		E	e	Up to 7m													
		F	f	Up to 8m													
		G	g	Up to 9m													
		H	h	Up to 10m													
		9	9	Other specifications (/m)													
⑬ Kind of thermowell		0	Nil														
		1	Welded type														
		4	Drilled type straight														
		7	Drilled type taper														
		8	Welded flange														
⑭ Thermowell inside screws		0	For slide type General products: Not available														
		1	W22 thread 14														
		2	Rc1/2														
		3	1/2NPT General products: Not available														
		4	G1/2 General products: Not available														
		5	Rc3/4 General products: Not available														
		6	3/4NPT General products: Not available														
		7	G3/4 General products: Not available														
⑮ Documents		0	Nil														
		1	Required (Please specify the desired documents separately.) Submission drawings, instruction manual, inspection procedure, mill sheet, test report (1 pc 1 copy), traceability certificate, inspection certificate, strength calculation, attended inspection														

*When ordering, please specify the bulb length and lead length.

*The thermowell model composition is SW ⑬ ⑭.

*For with thermowell, please refer to P ⑭ ~ thermowell manufacturing specifications and specify the SW model also.

*Specify "X" if there is no specification item.

DUPLEX THERMOMETER (REMOTE TYPE)

TL80 · 81 · 83 Liquid filled dial thermometer



BN type

Type	Model	Dial size	Mounting
Liquid filled type	T L 8 0	1 5 0	Surface mounting (BN type)
	T L 8 1		Surface mounting (EN type)
	T L 8 3		Panel mounting type

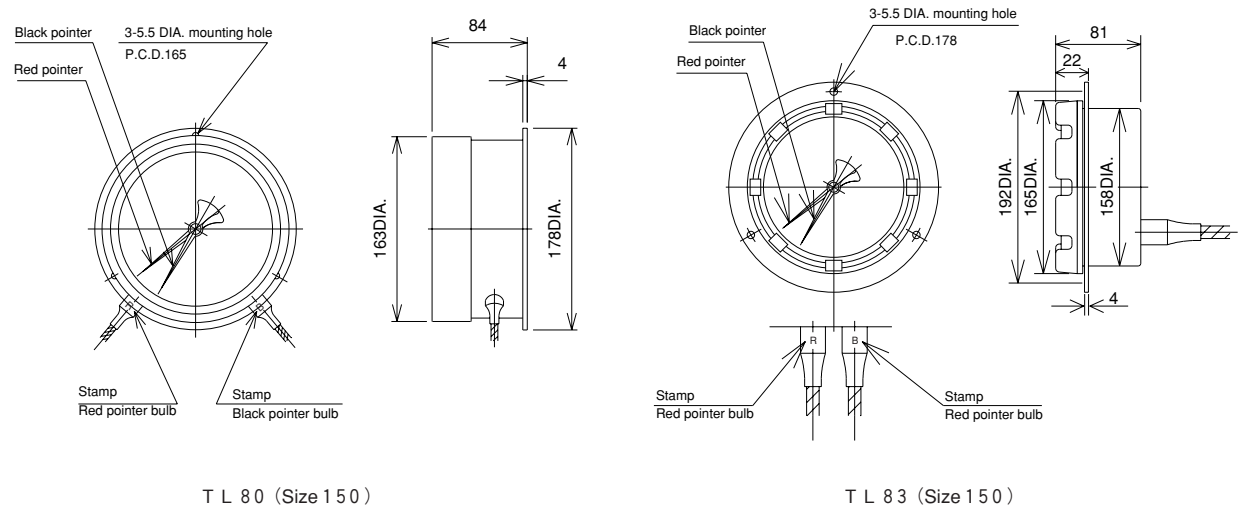
Duplex thermometers are thermometers which indicate the temperature of two points on the same scale. This is effective when you want to compare the temperature of two points and when there is not enough space to mount two thermometers.

Specifications

Manufacturing range	TL80 · 81 · 83 : - 70 ~ 300 °C		
Case	Construction: Drip-proof · equivalent to IP33, Material: ADC12, AC7A for TL83 Finish: Black		
Wetted parts material	Bulb: 304st.st., Connection o Flange: 304st.st.		
Accuracy	Indication error: within ±2% F.S. at room temperature (20°C), effect of ambient temperature: within ±2% F.S./ 15°C at room temperature (20°C)		
Compensation	Bimetal compensation		
Max. lead length	TL80 · 81 · 83 : 5 m		
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)	Slide type is not available with 16 Dia. bulb. When the maximum temperature of temperature range exceeds 400°C, slide type is not available.
		Double socket slide type: R 1/2, 1/2 NPT(Connection)	

The temperature range, bulb length, and other specifications are the same as those of the drip-proof remote type thermometers.

Dimensions



Model	Panel cut dimension
T L 8 3	160DIA. ±1

Indicating Thermometers

Model number configuration

For ordering, please specify the model number, each specs and the range.

T L 8									1			X			X											
Duplex thermometer			①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮									
Model			Selective spec.										Additional spec. (option)													
Type Size			0	Surface mounting (BN type) 150DIA.																						
			1	Surface mounting (EN type) 150DIA.																						
			3	Panel mounting 150DIA.																						
① Thermowell inside screws For with thermowell, please specify the thermowell type on a separate page.			0	Without thermowell																						
			With thermowell							Welded type		Drilled type		Welded type												
												Straight		Taper		Flange										
			1	Inside screws: Standard (W22 thread 14) and for slide type							SW11 (SW10)		SW41 (SW40)		SW71 (SW70)		SW81									
			2	Inside screws: Rc1/2 double socket							SW12		SW42		SW72		SW82									
			3	Inside screws: 1/2NPT double socket							SW13		SW43		SW73		—									
② Connecting part			4	Inside screws: G1/2 double socket							SW14		SW44		SW74		—									
			5	Inside screws: Rc3/4 double socket							SW15		SW45		SW75		—									
③ Connecting screws			0	Union type																						
			1	Slide type (Not available for 16DIA. bulb, and when the maximum temperature of temperature range exceeds 400℃.)																						
			4	Plain type (Remote type only)																						
			0	R1/2							H	JIS10K50ARF														
			1	R3/4							J	JIS20K20ARF														
			2	1/2NPT							K	JIS20K25ARF														
			3	G1/2B							L	JIS10K15AFF														
			4	G3/4B							M	JIS10K20AFF														
			5	JIS10K20ARF							N	JIS10K25AFF														
			6	JIS10K25ARF							P	ANSI3/4B150RF														
			7	ANSI1B150RF							Q	ANSI3/4B300RF														
			8	ANSI1B300RF							R	ANSI1B600RF														
			A	Fixing screws (W22 thread 14) union type only							S	ANSI 1 1/2B150RF														
			B	R3/8							T	ANSI 1 1/2B300RF														
			C	R1							U	ANSI 1 1/2B600RF														
			D	3/4NPT							W	JPI 1B150RF														
			E	1NPT							X	JPI 1B300RF														
F	JIS10K15ARF							Y	JPI 1B600RF																	
G	JIS10K40ARF							Z	Plain type																	
④ Range ℃ (When ordering, please specify the range and units separately.)			1	0~50, 60, 80, 100, 120, 150																						
			2	0~200, 250, 300																						
			5	-10~50, -30~50, -50~50																						
			6	-70~50, -70~100, -20~100																						
⑤ Bulb material			1	304st.st.																						
			2	316st.st.																						
			X	With thermowell																						
⑥ Bulb DIA.			1	d = 8DIA.																						
			2	d = 10DIA.																						
			3	d = 12DIA.																						
			4	d = 13DIA.																						
			5	d = 16DIA.																						
			X	With thermowell																						
⑦ Bulb length			A	Minimum dimension ~ 500mm																						
			X	With thermowell																						
⑧ Compensation			1	Bimetal compensation																						
⑨ Lead type			2	Armored tube B (430st.st.) (Standard)																						
			B	Armored tube B (304st.st.)																						
			E	Armored tube B (316st.st.)																						
⑩ Lead length			A	Up to 3m																						
			B	Up to 4m																						
			C	Up to 5m																						
			9	Other specifications (/m)																						
⑬ Kind of thermowell			0	Nil																						
			1	Welded type																						
			4	Drilled type straight																						
			7	Drilled type taper																						
			8	Welded flange																						
⑭ Thermowell inside screws			0	For slide type General products: Not available																						
			1	W22 thread 14																						
			2	Rc1/2																						
			3	1/2NPT General products: Not available																						
			4	G1/2 General products: Not available																						
			5	Rc3/4 General products: Not available																						
			6	3/4NPT General products: Not available																						
7	G3/4 General products: Not available																									
⑮ Documents			0	Nil																						
			1	Required (Please specify the desired documents separately.) Submission drawings, instruction manual, inspection procedure, mill sheet, test report (1 pc 1 copy), traceability certificate, inspection certificate, strength calculation, attended inspection																						

*When ordering, please specify the bulb length and lead length.

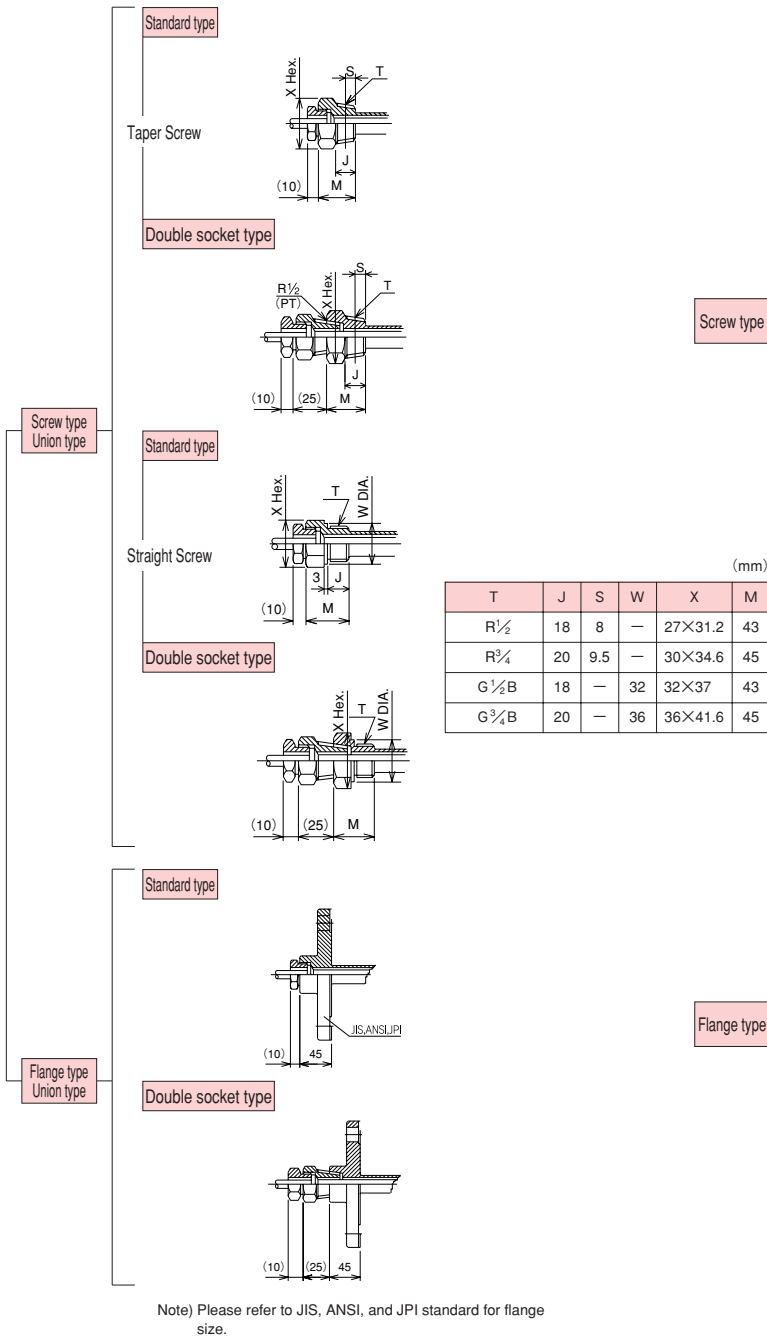
*The thermowell model composition is SW 13 14.

*For with thermowell, please refer to P 14 ~thermowell manufacturing specifications and specify the SW model also.

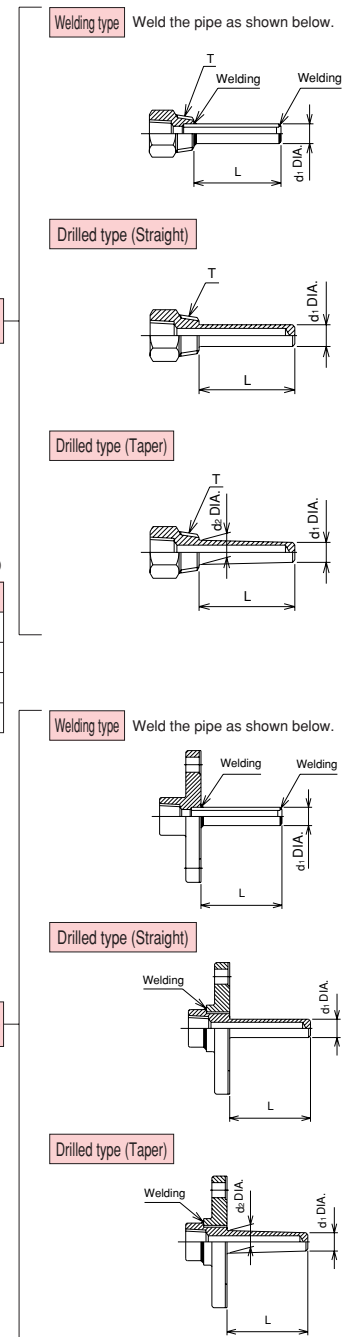
*Specify "X" if there is no specification item.

THERMOWELL SPECIFICATIONS

■ Connection parts and dimensions



■ Thermowell type and size



■ Relation of thermowell and bulb

Thermowell	Outer dia. (d DIA.)	12		15		19		19/23	23
	Type	Drilled type	Welding type	Drilled type	Welding type	Drilled type	Welding type	Drilled type	
	Inner DIA. (d _i DIA.)	8.5	8.5	10.5	11	13.5	13.5	13.5	16.5
Bulb	d DIA.	8	8	10	10	13	13	13	16

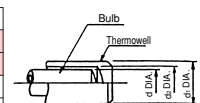
■ Thermowell material

Thermowell 304st.st, 316st.st, 316L st.st, titanium, Hastelloy-B[®], and Monel-metal[®] are available.
 Rubber, Kel-F, Teflon[®], Lead, or Glass coating is available.
 Coated thermowell is available with flange type only.

■ Thermowell DIA. and type (screw, flange)

Outer dia. (d DIA.)	Type	Thermowell		Flange
		Screw (T)		
12 DIA.	Drilled type	○	○	○
	Welding type	○	○	○
15 DIA.	Drilled type	○	○	○
	Welding type	○	○	○
19 DIA.	Drilled type	—	○	○
	Welding type	—	○	○
23 DIA.	Drilled type	—	○	○
	Drilled type	—	○	○

Inside screws (Connecting screws with thermometer): W22 thread 14 or Rc $\frac{1}{2}$



Indicating Thermometers

Model number configuration

For ordering, please specify the model number, each specs and the range.

S

W

1

—

—

Welding type thermowell

Model

0

Welding type straight

For slide type

W16-18 (8DIA.), W20-16 (10DIA.), W22-14 (13DIA.)

Model

1

Welding type straight

Inside screws

W22 thread 14

Model

2

Welding type straight

Rc1/2

Model

3

Welding type straight

1/2NPT

Model

4

Welding type straight

G1/2

Model

5

Welding type straight

Rc3/4

Model

6

Welding type straight

3/4NPT

Model

7

Welding type straight

G3/4

①②

Connecting part

00

R1/2

07

ANSI 1B150RF

0N

JIS10K25AFF

01

R3/4

08

ANSI 1B300RF

0P

ANSI 3/4 150RF

02

1/2NPT

0F

JIS10K15ARF

0Q

ANSI 3/4 300RF

03

G1/2B

0G

JIS10K40ARF

0S

ANSI 1 1/2 150RF

04

G3/4B

0H

JIS10K50ARF

0T

ANSI 1 1/2 300RF

0C

R1

0J

JIS20K20ARF

0W

JPI 1 150RF

0D

3/4NPT

0K

JIS20K25ARF

0X

JPI 1 300RF

05

JIS10K20ARF

0L

JIS10K15AFF

TF,GF,MF,FMF,RJ (specified)

06

JIS10K25ARF

0M

JIS10K20AFF

③

Material

1

304st.st.

2

316st.st.

④

Outer dia.

1

Outer dia. 12DIA.

2

Outer dia. 15DIA.

3

Outer dia. 19DIA.

⑤

L dimension (mm)

304st.st.

316st.st.

0

A

~ 100

1

B

101 ~ 200

2

C

201 ~ 300

3

D

301 ~ 400

4

E

401 ~ 500

5

F

501 ~ 600

6

G

601 ~ 700

7

H

701 ~ 800

8

J

801 ~ 900

9

K

901 ~ 1000

1001 ~ (/100mm)

⑮

Documents

0

Nil

1

Required
(Please specify the desired documents separately.)
Submission drawings, instruction manual,
inspection procedure, mill sheet, test report (1 pc
1 copy), strength calculation, attended inspection

1001 ~ (/100mm)

*Specify "X" if there is no specification item.

Model number configuration

For ordering, please specify the model number, each specs and the range.

S	W																		
Drilled type thermowell				①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	
Model				Selective spec.								Additional spec. (option)							
Model	4	0	Drilled type straight	For slide type	W16-18 (8DIA.), W20-16 (10DIA.), W22-14 (13DIA.)														
	4	1	Drilled type straight	Inside screws	W22 thread 14														
	4	2	Drilled type straight		Rc1/2														
	4	3	Drilled type straight		1/2NPT														
	4	4	Drilled type straight		G1/2														
	4	5	Drilled type straight		Rc3/4														
	4	6	Drilled type straight		3/4NPT														
	4	7	Drilled type straight		G3/4														
	7	0	Drilled type taper	For slide type	W16-18 (8DIA.), W20-16 (10DIA.), W22-14 (13DIA.)														
	7	1	Drilled type taper	Inside screws	W22 thread 14														
	7	2	Drilled type taper		Rc1/2														
	7	3	Drilled type taper		1/2NPT														
	7	4	Drilled type taper		G1/2														
	7	5	Drilled type taper		Rc3/4														
	7	6	Drilled type taper		3/4NPT														
	7	7	Drilled type taper		G3/4														
①② Connecting part		00	R1/2	06	JIS10K25ARF	0M	JIS10K20AFF												
		01	R3/4	07	ANSI 1B150RF	0N	JIS10K25AFF												
		02	1/2NPT	08	ANSI 1B300RF	0P	ANSI 3/4 150RF												
		03	G1/2B	0F	JIS10K15ARF	0Q	ANSI 3/4 300RF												
		04	G3/4B	0G	JIS10K40ARF	0S	ANSI 1 1/2 150RF												
		0B	R3/8	0H	JIS10K50ARF	0T	ANSI 1 1/2 300RF												
		0C	R1	0J	JIS20K20ARF	0W	JPI 1 150RF												
		0D	3/4NPT	0K	JIS20K25ARF	0X	JPI 1 300RF												
		05	JIS10K20ARF	0L	JIS10K15AFF		TF,GF,MF,FMF,RJ (specified)												
③ Material*		1	304st.st.																
		2	316st.st.																
		5	316Lst.st.																
④ Outer dia.		1	Outer dia. 12DIA.																
		2	Outer dia. 15DIA.																
		3	Outer dia. 19DIA.																
		4	Outer dia. 23DIA.																
		5	Outer dia. 19, 23DIA.																
			Specified outer dia.																
⑤ L dimension (mm)		304st.st.	316st.st.	316Lst.st.															
		0	A	a	~ 100														
		1	B	b	101~ 200														
		2	C	c	201~ 300														
		3	D	d	301~ 400														
		4	E	e	401~ 500														
		5	F	f	501~ 600														
		6	G	g	601~ 700														
⑮ Documents		0	Nil																
		1	Required (Please specify the desired documents separately.) Submission drawings, instruction manual, inspection procedure, mill sheet, test report (1 pc 1 copy), strength calculation, attended inspection																

*For drilled type, titanium, Hastelloy® and other special materials are also available. Please specify the material.

【Manufacturing range】

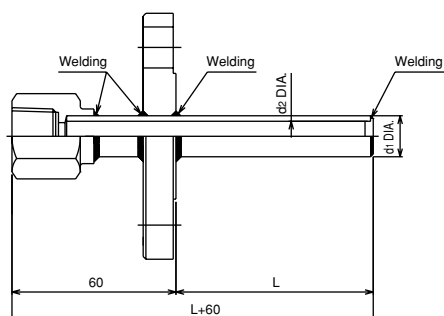
Manufacturing range of connecting screws and well
 3/8 : Well outer diameter 12DIA. drilling only
 1/2 : Well outer diameter 12, 15DIA.
 3/4, 1: Well outer diameter 12, 15, 19DIA., 19/23DIA.

*Specify "X" if there is no specification item.

THERMOWELL FLANGE TYPE SPECIFICATIONS

■ Type and size

Pipe and flange are welded as shown below.

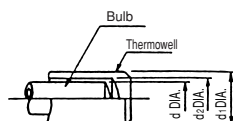


■ Relation of thermowell and bulb

Thermowell	Outer dia. (d1 DIA.)	12	15	19
	Type	Welding type		
Bulb	Inner dia. (d2 DIA.)	8.5	11	13.5
	d DIA.	8	10	13

■ Thermowell material

Thermowell material 304st.st.



■ Thermowell DIA. and flange

Thermowell		
Outer dia. (d1)	Type	Flange JIS, ANSI, JPI
12 DIA.	Welding type	○
15 DIA.		○
19 DIA.		○

Inside screws (Connecting screws with thermometer) : W22 thread 14 · Rc 1/2

Model number configuration

For ordering, please specify the model number, each specs and the range.

S	W	8	—	①	②	1	—	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮
----------	----------	----------	---	---	---	----------	---	---	---	---	---	---	---	---	---	---	---	---	---

Welding type thermowell
(Flange type)

Model		Selective spec.				Additional spec. (option)			
Model	1	Welding type straight		Inside screws		W22 thread 14			
	2	Welding type straight		Rc1／2					
①② Connecting part	05	JIS10K20ARF				0L	JIS10K15AFF		
	06	JIS10K25ARF				0M	JIS10K20AFF		
	07	ANSI 1B150RF				0N	JIS10K25AFF		
	08	ANSI 1B300RF				0P	ANSI 3/4 150RF		
	0F	JIS10K15ARF				0Q	ANSI 3/4 300RF		
	0G	JIS10K40ARF				0S	ANSI 1 1/2 150RF		
	0H	JIS10K50ARF				0T	ANSI 1 1/2 300RF		
	0J	JIS20K20ARF				0W	JPI 1 150RF		
	0K	JIS20K25ARF				0X	JPI 1 300RF		
③ Material		1	304st.st.						
④ Outer dia.		1	Outer dia. 12DIA.						
		2	Outer dia. 15DIA.						
		3	Outer dia. 19DIA.						
⑤ L dimension (mm)		0	～ 100						
		1	101～ 200						
		2	201～ 300						
		3	301～ 400						
		4	401～ 500						
		5	501～ 600						
		6	601～ 700						
		7	701～ 800						
		8	801～ 900						
		9	901～1000						
			1001～ (／100mm)						
⑮ Documents					0	Nil			
					1	Required (Please specify the desired documents separately.) Submission drawings, instruction manual, inspection procedure, mill sheet, test report (1 pc 1 copy), strength calculation, attended inspection			

*Specify "X" if there is no specification item.

*Specify "X" if there is no specification item.