

TF14-54-64-74 & 56-66-76 Series Thermometer with Electric Contact



OUTLINE

This thermometer with an electric contact is an indicating thermometer in which an electric contact is installed. The contact can be set at any positions. A pressure type thermometer, in which liquid is charged and its expansion and contraction due to temperature change is applied, is used as a temperature element. This thermometer is classified into the non-mercury organic liquid filled type and mercury filled type. Additionally, this catalog is formed by classifying this thermometer into the type with a microswitch and the type with a contact point according to the type of applied contact, and into the drip-proof type according to the construction of a case.

* 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 • $-70^{\circ}\text{C} \sim 600^{\circ}\text{C}$

Electric contact type :

With micro switch
With contact switch

Construction :

Indoor use (With contact switch)
Drip-proof type (With micro switch)
Water-proof (Application for transformer)

Dial Size :

100 DIA., 150 DIA.
※75 DIA. of thermometers with contact switch is available.
Contact NKS for details.

Mounting :

Remote surface mounting



Remote panel mounting
(Mounting hole • Mounting clamp)



Bulb • Connection material :

304st.st.

Bulb material :

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

Connection :

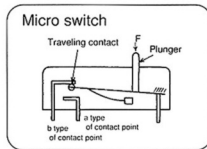
$R \frac{1}{2}$ (PT), $R \frac{3}{4}$ (PT), $\frac{1}{2}$ NPT, $G \frac{1}{2}$ B (PF),
 $G \frac{3}{4}$ B (PF)
JIS10K20ARF, JIS10K25ARF,
ANSI1B150RF, ANSI1B300RF
※For other connections, please contact us.

Accuracy :

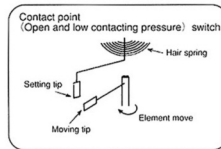
Indicator accuracy Within $\pm 2\%$ F.S.
Reproducibility Within 2 % F.S.

SELECTION GUIDE OF THERMOMETERS WITH ELECTRIC CONTACT¹

1. Features of switch



Micro switch is able to take electricity rating greatly, and is available for various control other than dispatch of warning with safety from vibration.



The contact point is mainly applied to warning including a buzzer and a flashing lamp. However, it can be applied to switching large capacity electricity on and off through a relay. A contacting tip is made of high melting point alloy of platinum and osmium.

A contact point should be applied under the normal open mode.

Mounting	Mercury filled type	Liquid filled type	Mercury filled type	Liquid filled type
Type	Micro switch		Contact switch	
Characteristic	Micro switch		Contact switch	
Rating	Resistance load	Inductive load *	Resistance load	
	125V AC 5A	125V AC 4A	100V AC 0.5A	
	250V AC 5A	250V AC 4A	200V AC 0.25A	
	30V DC 5A	30V DC 4A	100V DC 0.05A	
	125V DC 0.4A	125V DC 0.4A	200V DC 0.025A	
	* AC : Power factor more than DC : Time-contact 7ms or less.			
Withstand voltage	1500V AC 1 minute		1000 V AC 1 minute	

The insulation resistance (with microcontact) should be 100MΩ or larger by a 500V DC megger.

※ The minimum load of the microcontact is 800mW and that of the contact point 1W. In the case of the microcontact, minute load application can be specified.

2. Compensation system by installation place

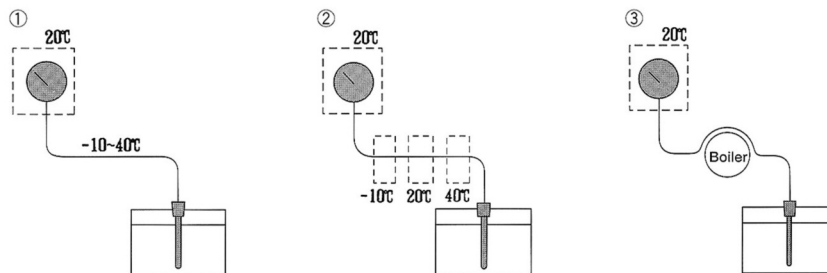
When the ambient temperature around temperature gauge changes, the filled liquid in the indicator and capillary tube also changes to expand or shrink and this cause the indication error. To compensate this error, following compensations are provided.

(1) Bimetal compensation

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

(2) Lead compensation

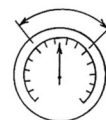
- When the ambient temperature around indicator and lead parts changes independently.
 - ① When the temperature change around indicator is small and big for lead parts or it's opposite case.
 - ② When the lead parts is under various ambient temperature condition.
 - ③ When a part of lead parts is heated.



3. 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.

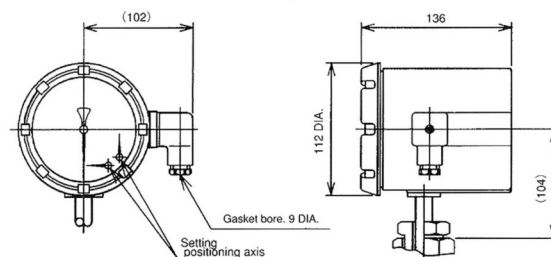
Normal using range.



THERMOMETERS WITH MICRO SWITCH / DRIP-PROOF · DIRECT TYPE

T F 14 Liquid filled dial thermometer

■ Dimension



I stem type

■ Specification

Manufacturing range	-70~150℃					
Case	Construction : Drip-proof • equivalent to IP33, Material : AC7A , Finishing : Black					
Wetted parts material	Bulb : 304st.st., Connection • Flange : 304st.st.					
Use switch	JIS C 4505 Industrial switch	Accuracy	Indication	Within ±2% F.S..(No load to contactor)	Electric rating	
Number of contacts	One contact • Two contact		Reproducibility	Within 2% F.S.	Resistance load	Inductive load *
Setting	Internal abjustment		Setting	Within ±3% F.S.	125V AC5A	125V AC4A
Compensation	Lead compensation				250V AC5A	250V AC4A
Dead band	Within 6% F.S.				30V DC5A	30V DC4A
Ambient temperature error	Within ±2% F.S./15deg				125V DC0.4A	125V DC0.4A
					* AC : Power factor more than 0.4 DC : Time-contact 7ms or less	
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, 0ANS11B150RF, ANS11B300RF					
Connection	Without thermowell	Union type, Slide type			Slide type is not available with 8 Dia. and 16 Dia. bulb.	
	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

Value in parenthesis is the case with thermowell.

Range ℃	Minimum graduation ℃	standard Bulb Dia.×Length $\frac{d}{(d1)} \times \frac{L}{(L)}$	Bulb length (L) mm					Max.
			Minimum insertion length					
			d=8 DIA. (d ₁ =12 DIA.)	d=10 DIA. (d ₁ =15 DIA.)	d=12 DIA.	d=13 DIA. (d ₁ =19 DIA.)	d=16 DIA. (d ₁ =23 DIA.)	
- 70 ~ 50	2	$\frac{10}{(15)} \times \frac{150}{(200)}$	160 (185)	130 (155)	100	90 (115)	75 (100)	500
- 70 ~ 100	5	$\times \frac{150}{(150)}$	125 (150)	105 (130)	85	75 (100)	65 (90)	
- 50 ~ 50	2	$\times \frac{150}{(200)}$	180 (205)	145 (170)	110	100 (125)	80 (105)	
- 30 ~ 50	2	$\times \frac{200}{(200)}$	215 (240)	170 (195)	130	115 (140)	95 (120)	
- 20 ~ 100	2	$\times \frac{150}{(200)}$	160 (185)	130 (155)	100	90 (115)	75 (100)	
- 10 ~ 100	2	$\times \frac{150}{(200)}$	170 (195)	135 (160)	105	95 (120)	80 (105)	
- 10 ~ 50	1	$\times \frac{300}{(300)}$	265 (290)	210 (235)	155	135 (160)	105 (130)	
0 ~ 50	1	$\times \frac{300}{(300)}$	355 (380)	270 (295)	195	170 (195)	135 (160)	
~ 60	1	$\times \frac{300}{(300)}$	315 (340)	245 (270)	180	155 (180)	120 (145)	
~ 80	2	$\times \frac{200}{(300)}$	245 (270)	195 (220)	145	125 (150)	100 (125)	
~ 100	2	$\times \frac{200}{(200)}$	205 (230)	165 (190)	125	110 (135)	90 (115)	
~ 120	2	$\times \frac{150}{(200)}$	180 (205)	145 (170)	110	100 (125)	80 (105)	
~ 150	2	$\times \frac{150}{(150)}$	155 (180)	125 (150)	100	90 (115)	75 (100)	

- Note ● 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.

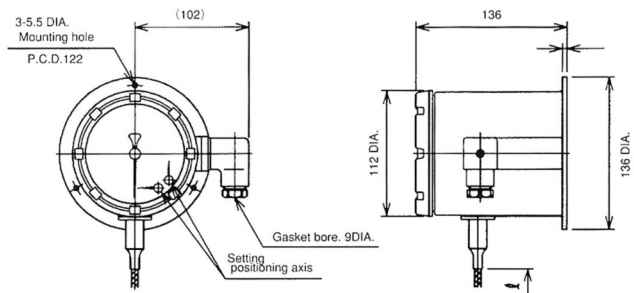
THERMOMETERS WITH MICRO SWITCH / DRIP-PROOF · REMOTE TYPE 1

Liquid filled dial thermometer

TF 54 · 100 DIA. · Surface mounting



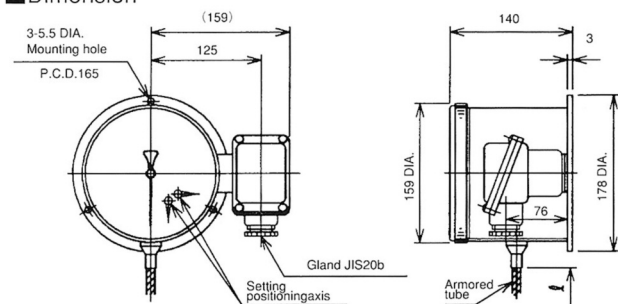
Dimension



TF 56 · 150 DIA. · Surface mounting



Dimension

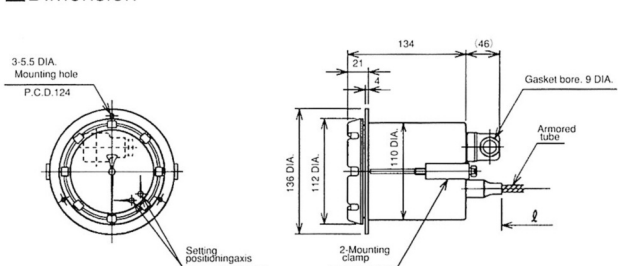


TF 64 · 74 · 100 DIA. · Panel mounting

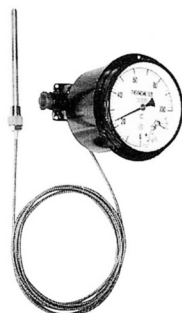


Model	Mounting
TF64	Mounting hole
TF74	Mounting clamp

Dimension

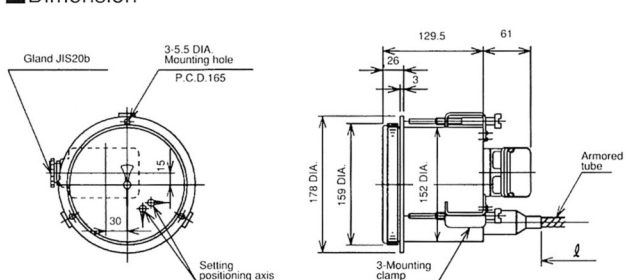


TF 66 · 76 · 150 DIA. · Panel mounting



Model	Mounting
TF66	Mounting hole
TF76	Mounting clamp

Dimension



THERMOMETERS WITH MICRO SWITCH/DRIP-PROOF · REMOTE TYPE 2

T F 54 · 56 · 64 · 74 · 66 · 76 Liquid filled type

■ Specification

Manufacturing range	－70～300℃					
Case	Construction : Drip-proof ・ equivalent to IP43, Material : TF54 ・ 64 ・ 74 : AC7A, TF56 ・ 66 ・ 76 : ADC12, Finishing : Black					
Wetted parts material	Bulb : 304st.st., Connection ・ Flange : 304st.st.					
Use switch	JIS C 4505 Industrial switch	Accuracy	Indication	Within ±2% F.S.	Electric rating	
Number of contacts	One contact ・ Two contact		Reproducibility	Within 2% F.S.	Resistance load	Inductive load
Setting	Internal adjustment		Setting	Within ±3% F.S.	125V AC5A	125V AC4A
Lead length	1・2・3・4・5・8・10・15・20 (m)	Dread band	Within 4% F.S.	250V AC5A	250V AC4A	
	Standard 3m Max. 20m			30V DC5A	30V DC4A	
Compensation	Lead compensation	Ambient temperature error	Within ±2%F.S./15deg	125V DC0.4A	125V DC0.4A	
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) 1/2 is not available with 16 Dia. bulb and 19 Dia., 23 Dia. thermowell.			* AC : Power factor more than 0.4 DC : Time-contact 7ms or less		
Flange	JIS10K20ARF, JIS10K25ARF, ANS11B150RF, ANS11B300RF					
Connection	Without thermowell	Union type, Slide type			Slide type is not available with 16 Dia. bulb.	
	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)				

※ For other connections, please contact us.

■ Range · Bulb DIA. · Bulb length

Value in parenthesis is the case with thermowell.

Range ℃	Minimum graduation ℃	Standard Bulb Dia.×Length $\frac{d}{(d_1)} \times \frac{L}{(L)}$	Bulb length (L) mm					Max.
			Minimum insertion length					
			d=8 DIA. (d ₁ =12 DIA.)	d=DIA.10 (d ₁ =150 DIA.)	d=12 DIA.	d=13 DIA. (d ₁ =19 DIA.)	d=16 DIA. (d ₁ =23 DIA.)	
-70 ~ 50	2	$\frac{10}{(15)} \times \frac{150}{(200)}$	160 (185)	130 (155)	100	90 (115)	75 (100)	500
-70 ~ 100	5	$\frac{150}{(150)}$	125 (150)	105 (130)	85	75 (100)	65 (90)	
-50 ~ 50	2	$\frac{150}{(200)}$	180 (205)	145 (170)	110	100 (125)	80 (105)	
-30 ~ 50	2	$\frac{200}{(200)}$	215 (240)	170 (195)	130	115 (140)	95 (120)	
-20 ~ 100	2	$\frac{150}{(200)}$	160 (185)	130 (155)	100	90 (115)	75 (100)	
-10 ~ 100	2	$\frac{150}{(200)}$	170 (195)	135 (160)	105	95 (120)	80 (105)	
-10 ~ 50	1	$\frac{300}{(300)}$	265 (290)	210 (235)	155	135 (160)	105 (130)	
0 ~ 50	1	$\frac{300}{(300)}$	355 (380)	270 (295)	195	170 (195)	135 (160)	
~ 60	1	$\frac{300}{(300)}$	315 (340)	245 (270)	180	155 (180)	120 (145)	
~ 80	2	$\frac{200}{(300)}$	245 (270)	195 (220)	145	125 (150)	100 (125)	
~ 100	2	$\frac{200}{(200)}$	205 (230)	165 (190)	125	110 (135)	90 (115)	
~ 120	2	$\frac{150}{(200)}$	180 (205)	145 (170)	110	100 (125)	80 (105)	
~ 150	2	$\frac{150}{(150)}$	155 (180)	125 (150)	100	90 (115)	75 (100)	
~ 200	5	$\frac{100}{(150)}$	110 (135)	95 (120)	75	70 (95)	60 (85)	
~ 250	5	$\frac{100}{(150)}$	100 (125)	85 (110)	70	65 (90)	60 (85)	
~ 300	5	$\frac{100}{(150)}$	90 (115)	80 (105)	65	60 (85)	55 (80)	

Note ● 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.

GRADUATIONS

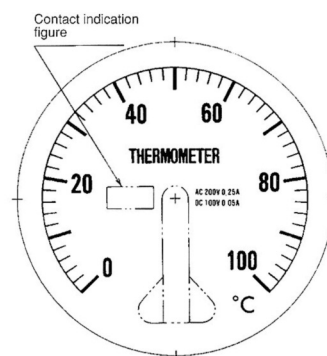
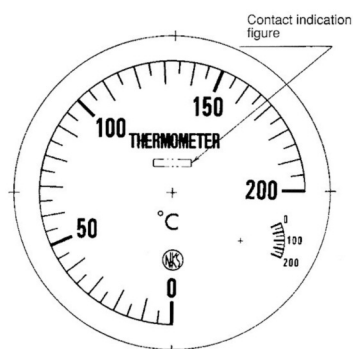
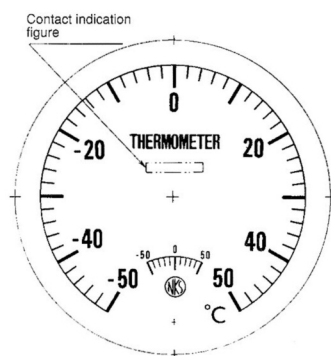
Refer to the manufacturing specifications of respective models regarding the graduations of respective models.

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

TE 5 · 6 · 7 (100 DIA.)
(With micro switch)

TE 5 · 6 · 7 (150 DIA.)
TF 5 · 6 · 7 (150 DIA.)
(With micro switch)

TJ 5 · 6 · 7 (100 DIA., 150 DIA.)
TK 5 · 6 · 7 (100 DIA., 150 DIA.)
(With contact switch)
TD10 · TD11



Contact point type	Mark	Contact indication figure
Upper limit type	H	<input type="checkbox"/> OFF <input type="checkbox"/> ON
Lower limit type	L	<input type="checkbox"/> ON <input type="checkbox"/> OFF
Upper & Lower limit type	HL	<input type="checkbox"/> ON <input type="checkbox"/> OFF <input type="checkbox"/> OFF <input type="checkbox"/> ON

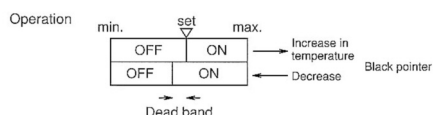
Ground : white
Entry : Black color, red for graduation line and figure of minus parts.

TYPE OF CONTACT AND WIRING SYSTEM

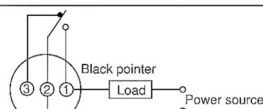
With micro switch

1. Upper limit type with one contact • H (Connecting ①—②)

When the temperature rises to a set value, contact points work to turn a circuit ON.



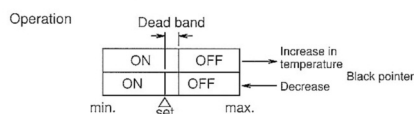
Wiring



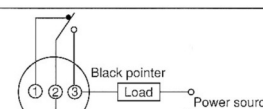
Wiring ② and ③ reverses ON and OFF at the set point.
Note: If this type is applied as the lower limit type, setting should be corrected by the dead band.

2. Lower limit type with one contact • L (Connecting ②—③)

When the temperature decreases to a set value, contact points work to turn a circuit ON.



Wiring



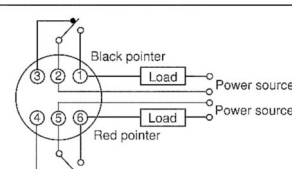
Wiring ① and ② reverses ON and OFF at the set point.
Note: If this type is applied as the upper limit type, setting should be corrected by the dead band.

3. Upper & lower limit type with two contact • HL

(①—②Connecting, ⑤—⑥Connecting)

This is the combination of the upper limit type and the lower limit type and each works independently.
Refer to the previous 1 and 2 for the functioning figure.

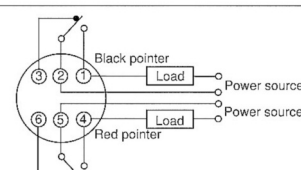
Wiring



4. Upper limit type with two contact • 2H (Connecting ①—②, Connecting ④—⑤)

This is the combination of two upper limit types and each works independently.
Refer to the previous 1 for the functioning figure.

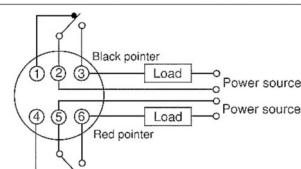
Wiring



5. Lower limit type with two contact • 2L (Connecting ②—③, Connecting ⑤—⑥)

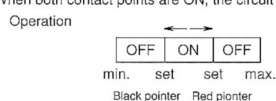
This is the combination of two lower limit types and each works independently.
Refer to the previous 2 for the functioning figure.

Wiring

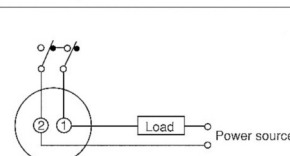


6. Center parts setting type with two contact • HLR

This is the series combination of the upper limit type and lower limit type.
When both contact points are ON, the circuit turns ON.



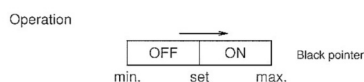
Wiring



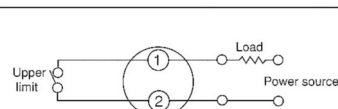
With contact switch

1. Upper limit type with one contact • H

When the temperature rises to a set value, contact points work to turn a circuit ON.

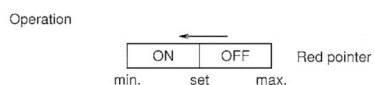


Wiring

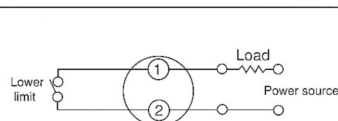


2. Lower limit type with one contact • L

When the temperature decreases to a set value, contact points work to turn a circuit ON.

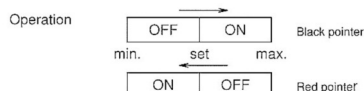


Wiring

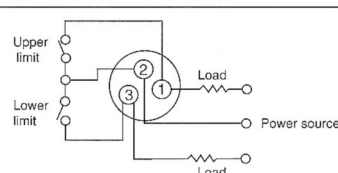


3. Upper & lower limit type with two contact • HL

This is the combination of the upper limit type and the lower limit type.
Because of the common pole, each circuit doesn't work independently.



Wiring



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.)

- TF With micro switch • Liquid filled dial thermometer
- TK With contact switch • Liquid filled dial thermometer

Mounting

1	Direct / I stem type (100 DIA.)
5	Remote / Surface mounting
6	Remote / Panel (Mounting hole)
7	Remote / Panel (Mounting clamp)

I stem type 150 Dia. and others direct type is available. Contact NKS for details.

Mounting • Size

4	100
6	150

75 Dia. is available with electric contact. Contact NKS for details.

2 Connecting form

0	Union type
1	Slide type
4	Plain type

Bulb dend type is available.

1 Thermowell • Inner connection

0	Without thermowell
1	With thermowell : W22 thread14 (Standard)
2	With thermowell : R $\frac{1}{2}$ Double socket
3	With thermowell : $\frac{1}{2}$ NPT Double socket
4	With thermowell : G $\frac{1}{2}$ B Double socket
5	With thermowell : R $\frac{3}{4}$ Double socket

Please refer to other page for thermowell. (SW□□)

3 Connection

0	R $\frac{1}{2}$
1	R $\frac{3}{4}$
2	$\frac{1}{2}$ NPT
3	G $\frac{1}{2}$ B
4	G $\frac{3}{4}$ B
5	JIS10K20ARF
6	JIS10K25ARF
7	ANSI1B150RF
8	ANSI1B300RF
A	Fixing screw (W22 thread 14) union type only
Z	Plain type

15 Document

0	Nil
1	Please specify your requirement. Drawing one sheet, Instruction manual, Inspection procedure, Mill sheet, Test report.

14 Other additional spec.

0	Nil
1	Please specify your requirement. Case Finishing, Dual scale with(°F) Connection 316 st. st. option. Accuracy within $\pm 1.0\%$ f.s. option.

12 Outlet for electric wire

0	DIN 9 DIA.
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With contact switch.

12 Outlet for electric wire coduit type

3	PF $\frac{3}{4}$ Female (Standard)
2	PF $\frac{1}{2}$ Female
A	Rc $\frac{1}{2}$
B	$\frac{1}{2}$ NPT Female

With micro switch.

T

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type No.

4 Range (°C)

1	0~50, 60, 80, 100, 120, 150
2	0~200, 250, 300 (Liquid filled type TF14 is not available)
3	0~400, 500 (Liquid filled type is not available)
4	0~600, 650 (Liquid filled type is not available)
5	-10~50, -30~50, -50~50, -10~100
6	-70~50, -70~100 (Mercury filled type is not available)
7	-30~120, -20~100

Please specify range & unit.

5 Bulb Dia.

1	d=8 Dia.
2	d=10 Dia.
3	d=12 Dia.
4	d=13 Dia.
5	d=16 Dia.

6 Bulb length

1	From min. insertion length to ~500mm Liquid filled type Max. 500mm
2	505 mm~ 1000 (8 DIA., 16 DIA.) 3000 (Others)

Please specify bulb length.

7 Lead kind

0	Nil (Direct type)
1	Capillary : 304st.st., Armored tube : 430st.st.
2	Capillary : 316st.st., Armored tube : 430st.st.
3	Capillary : 304st.st., Armored tube : 430st.st.+PVC (Max. 100°C)
4	Capillary : 316st.st., Armored tube : 430st.st.+PVC (Max. 100°C)

12 Outlet for electric wire

0	DIN 9 DIA.
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With contact switch.

12 Outlet for electric wire coduit type

3	PF $\frac{3}{4}$ Female (Standard)
2	PF $\frac{1}{2}$ Female
A	Rc $\frac{1}{2}$
B	$\frac{1}{2}$ NPT Female

With micro switch.

Additional Spec. (Option)

13 Treatment

0	Nil
1	Use no oil
2	Use no water
3	Use no oil • water

10 Contact point type

1	H : Upper limit type with one contact
2	L : Lower limit type with one contact
3	HL : Upper & lower limit type with two contact
4	2H : Upper type with two contact (Contact type is not available.)
5	2L : Lower limit type with two contact (Contact type is not available.)

9 Compensation

1	Bimetal compensation (Micro liquid filled type is not available.)
2	Lead compensation (Micro mercury filled type is not available. Contact 100 DIA. is not available. Contact more than 350deg. impossibility.)

9 Lead length

0	Nil (Direct type)
1	Less than 3m
2	Over 3m

Please specify lead length.

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