



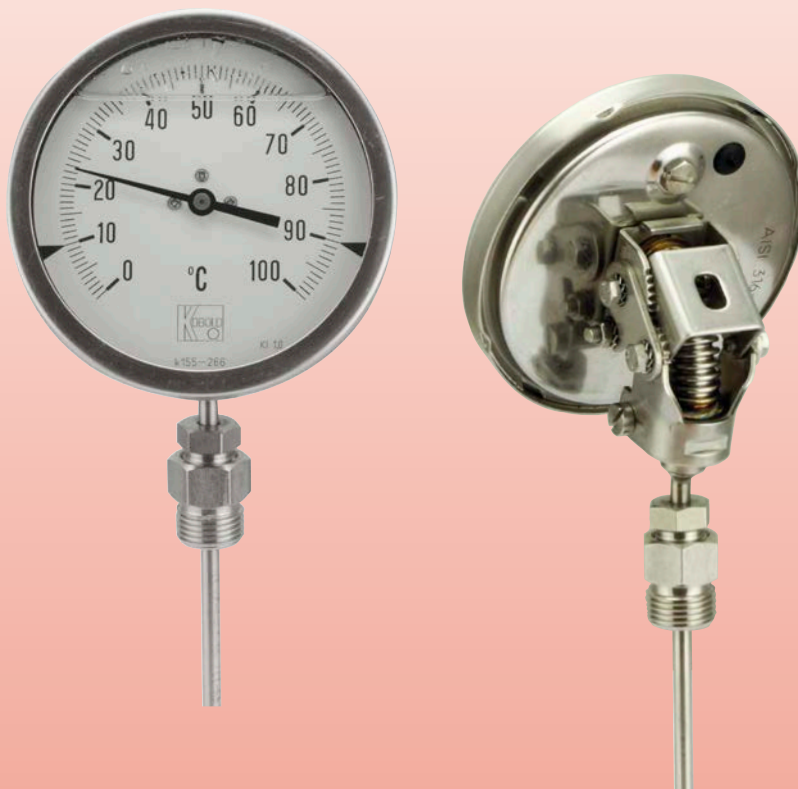
## Bi-metal Thermometers

all stainless steel construction

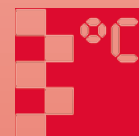


measuring  
•  
monitoring  
•  
analysing

TBE



- Fast response times
- Large selection of standard versions
- Special versions at customer request
- Nominal sizes: 100, 125 and 150 mm
- Temperatures: -50... +50 °C to 0 ... 600 °C



T2

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### Description

These instruments are designed for use in food, beverage, pharmaceutical, chemical, petrochemical processing industries. They are built to resist the most severe operating conditions created by the ambient environment and the process medium. An Argon arc welded case/bulb strengthens the whole construction. A leak tight fit is ensured if the instrument is filled with a dampening fluid to prevent damage due to vibration.

The bi-metal thermometers are built from a stainless steel tube inside of which a bi-metal helicoidal spiral is placed. This spiral is welded to the tip of the tube and on the other side to a transmission shaft directly connected to the pointer. The temperature vibrations generate a deformation of the bi-metal which is transmitted to the pointer through a shaft rotation.

### Thermowells

Must be used on all applications where thermometer bulb is subjected to pressure, corrosive fluid or flow rate. Thermowells will make thermometer disassemble for calibration or replacement easier as the process will not be disturbed.

#### Thermowells available:

- Thermowells with thread connection either built up type or machined from bar stock
- Thermowells with flange either built up type or machined from a bar stock

Type, material and constructive characteristics on datasheet TWL.

### Technical Details

Indication ranges:	-50 ... +600 °C (-80 ... 1000 °F)
Measuring ranges:	the °C measuring range has been marked by two ▼ stamped on the dial. They represent the temperature span recommended for the use of instruments as per DIN 16203
Accuracy:	Class 1.0 as per EN 13190
Ambient temperature:	-25 ... +65 °C
Overtemperature limit:	30% of full scale range for temperature ≤ 400 °C; max. 500 °C
Special overtemperature (option F02):	100% of full scale range for temperature ≤ 150 °C; 50% of full scale range for temperature 150 °C ... 300 °C; max. 500 °C
Max working pressure:	15 bar (without thermowell)
Protection degree:	IP55 as per IEC 529
Process connection:	AISI 316 stainless steel
Bulb:	Ø 6.0 - 6.4 - 8.0 - 9.6 mm AISI 316 stainless steel
Measuring element:	bi-metal spiral shaped
Welding:	AISI 304 stainless steel TIG
Case:	AISI 304 stainless steel
Ring:	AISI 304 stainless steel bayonet lock
Window:	tempered glass
Dial:	aluminium white with black markings
Pointer:	aluminium, black
Zero-Adjustment:	external zero-adjustment screw

### Special version

Measuring range:	°C, °F, and double range °C/°F
Protection degree:	IP65 (option E65)
Case and ring:	AISI 316 stainless steel (option C40)
Dampening liquid filling:	glycerine 98% and silicone oil (options R10-R11; see table on page 5 for limit operating conditions)

## Scale Ranges

### Single scales °C and bulb length S

Code	°C	Ø 6 - 6.4 [mm]	Ø 8 [mm]	Ø 9.6 [mm]
C55	-50...+50	100...700	82...900 <sup>1)</sup>	82...900 <sup>1)</sup>
C35	-30...+50	114...700	88...900 <sup>1)</sup>	88...900 <sup>1)</sup>
C14	-20...+120	83...700	67...900 <sup>1)</sup>	67...900 <sup>1)</sup>
C24	-20...+40	137...700	107...900 <sup>1)</sup>	107...900 <sup>1)</sup>
C28	-20...+80	100...700	82...900 <sup>1)</sup>	82...900 <sup>1)</sup>
C06	0...+60	137...700	107...900 <sup>1)</sup>	107...900 <sup>1)</sup>
C08	0...+80	114...700	88...900 <sup>1)</sup>	88...900 <sup>1)</sup>
C10	0...+100	100...700	82...900 <sup>1)</sup>	82...900 <sup>1)</sup>
C12	0...+120	88...700	72...900 <sup>1)</sup>	72...900 <sup>1)</sup>
C16	0...+160	116...700	91...900 <sup>1)</sup>	91...900 <sup>1)</sup>
C20	0...+200	98...700	79...900 <sup>1)</sup>	79...900 <sup>1)</sup>
C25	0...+250	84...700	70...900 <sup>1)</sup>	70...900 <sup>1)</sup>
C30	0...+300	100...700	88...900 <sup>1)</sup>	88...900 <sup>1)</sup>
C40	0...+400	150...700	150...900	150...900
C50	0...+500	150...700	150...900	150...900
C60	0...+600 <sup>2)</sup>	150...700	150...900	150...900

### Single scales °F and bulb length S

Code	°F	Ø 6 - 6.4 [mm]	Ø 8 [mm]	Ø 9.6 [mm]
F11	-80...+120	94...500	76...900 <sup>1)</sup>	76...900 <sup>1)</sup>
F55	-20...+120	114...500	88...900 <sup>1)</sup>	88...900 <sup>1)</sup>
F12	0...+200	94...500	76...900 <sup>1)</sup>	76...900 <sup>1)</sup>
F14	0...+250	83...500	67...900 <sup>1)</sup>	67...900 <sup>1)</sup>
F21	+50...+400	108...500	89...900 <sup>1)</sup>	89...900 <sup>1)</sup>
F30	+50...+550	112...500	100...900 <sup>1)</sup>	100...900 <sup>1)</sup>
F27	+200...+700	150...500	150...900	150...900
F40	+100...+800	150...500	150...900	150...900
F44	+200...+1000 <sup>2)</sup>	150...500	150...900	150...900

### Dual scales °C/°F and bulb length S

Code	Primary °C (int.)	Secondary °F (ext.)	Ø 6 - 6.4 [mm]	Ø 8 [mm]	Ø 9.6 [mm]
D55	-50...+50	-58...+122	100...500	82...900 <sup>1)</sup>	82...900 <sup>1)</sup>
D35	-30...+50	-22...+122	114...500	88...900 <sup>1)</sup>	88...900 <sup>1)</sup>
D22	-20...+120	-4...+248	82...500	67...900 <sup>1)</sup>	67...900 <sup>1)</sup>
D06	0...+60	+32...+140	137...500	107...900 <sup>1)</sup>	107...900 <sup>1)</sup>
D10	0...+100	+32...+212	100...500	82...900 <sup>1)</sup>	82...900 <sup>1)</sup>
D12	0...+120	+32...+248	88...500	72...900 <sup>1)</sup>	72...900 <sup>1)</sup>
D16	0...+160	+32...+320	116...500	91...900 <sup>1)</sup>	91...900 <sup>1)</sup>
D20	0...+200	+32...+392	98...500	79...900 <sup>1)</sup>	79...900 <sup>1)</sup>
D30	0...+300	+32...+572	150...500	88...900 <sup>1)</sup>	88...900 <sup>1)</sup>
D40	0...+400	+32...+752	150...500	150...900	150...900
D50	0...+500	+32...+932	150...500	150...900	150...900
D60	0...+600 <sup>2)</sup>	+32...+1112 <sup>2)</sup>	150...500	150...900	150...900

<sup>1)</sup> Special minimum bulb length S is available on request, against add-on price, only for sliding and swivel nuts (Code 7 and 9)

<sup>2)</sup> Max. working temperature 500 °C (932 °F)



Order Details (Example: TBE-1 1 C16 3 A 7 R10)

Model	Connection orientation	Nominal diameter	Indication range	Connection type	Process connection**	Bulb diameter	Options
TBE-	1 = back connection 2 = every-angle connection 3 = lower connection	1 = 100 mm 2 = 125 mm 3 = 150 mm	C55: -50...+50 °C	3 = fixed male  5 = male swivel nut  9 = sliding male and swivel nut  8 = female swivel nut  7 = sliding female and swivel nut	A = 1/2" NPT B = 3/4" NPT 1 = 1/2" BSP 2 = 3/4" BSP	6 = 6 mm 7 = 6.4 mm 8 = 8 mm 9 = 9.6 mm	000 = none  Other options = see options table
			C35: -30...+50 °C				
			C14: -20...+120 °C				
			C24: -20...+40 °C				
			C28: -20...+80 °C				
			C06: 0...+60 °C				
			C08: 0...+80 °C				
			C10: 0...+100 °C				
			C12: 0...+120 °C				
			C16: 0...+160 °C				
			C20: 0...+200 °C				
			C25: 0...+250 °C				
			C30: 0...+300 °C				
			C40: 0...+400 °C				
			C50: 0...+500 °C				
			C60: 0...+600 °C*				
			F11: -80...+120 °F				
			F55: -20...+120 °F				
			F12: 0...+200 °F				
			F14: 0...+250 °F				
			F21: +50...+400 °F				
			F30: +50...+550 °F				
			F27: +200...+700 °F				
			F40: +100...+800 °F				
			FHF: +200...+1000 °F*				
			D55: -50...+50 °C/-58...+122 °F				
			D35: -30...+50 °C/-22...+122 °F				
			D22: -20...+120 °C/-4...+248 °F				
			D06: 0...+60 °C/+32...+140 °F				
			D10: 0...+100 °C/+32...+212 °F				
D12: 0...+120 °C/+32...+248 °F							
D16: 0...+160 °C/+32...+320 °F							
D20: 0...+200 °C/+32...+392 °F							
D30: 0...+300 °C/+32...+572 °F							
D40: 0...+400 °C/+32...+752 °F							
D50: 0...+500 °C/+32...+932 °F							
D60: 0...+600 °C/+32...+1112 °F*							

\* Max. working temperature 500 °C (932 °F)

\*\* Not all connection sizes are possible with all connection types. See page 6 for possible combinations

**Note:** Specify bulb length in clear text while ordering

**Important!** Minimum order quantity per order (PO): 5 pieces

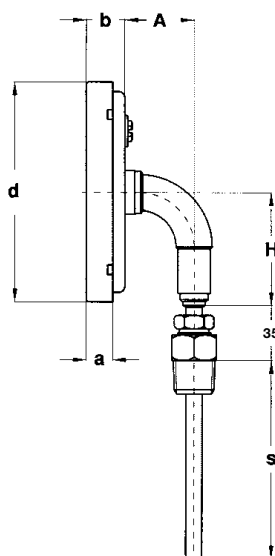
**Options**

Description	Code	DS100	DS125	DS150
Case and ring AISI 316 stainless steel	C40	yes	yes	yes
Protection degree IP65 (without filling)	E65	yes	yes	yes
Special overtemperature*	F02	yes	yes	yes
Serial number on label	ST2	yes	yes	yes
Suitable for glycerine filling IP67	P00	yes	yes	yes
Suitable for silicone IP67	P01	yes	yes	yes
Glycerine filling (max. +160°C), IP67	R10	yes	yes	yes
Silicone filling (max. +250°C), IP67	R11	yes	yes	yes
Calibration report	C01	yes	yes	yes
Tropicalisation	T01	yes	yes	yes
AISI316 stainless steel label for initialing	T25	yes	yes	yes
Plexiglas window (for ranges from 0°C ... +100°C)	T31	yes	yes	yes
Safety double stratified glass	T32	yes	yes	yes

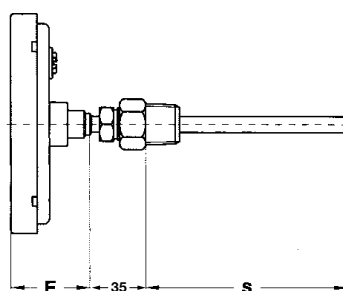
\*100% of full range for temperature ≤150°C  
 50% of full range for temperature 150...300°C  
 max. 500°C

**Dimensions [mm]**

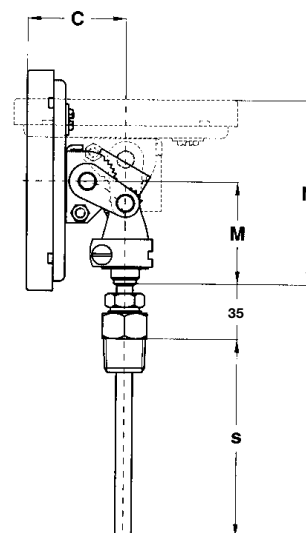
Connection orientation\* (Code 3)



Connection orientation\* (Code 1)



Connection orientation\* (Code 2)

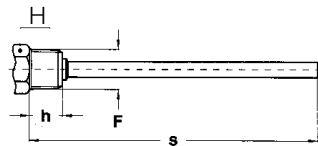


\* Connection orientations are shown as an example with connection type code 9.

DS	A	a	b	C	d	E	H	M	N	S
100	34.5	13	19	49	110.6	39	57	51.5	92.5	see page 3
125	34.5	14.5	19.5	49.5	130	39.5	65	51.5	93	see page 3
150	34.5	15	20	50	161	40	82	51.5	93.5	see page 3

**Dimensions [mm]**  
Process connection

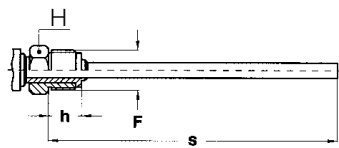
**Fixed male**  
(Code 3)



F	Code	H	h
1/2" NPT	A	22*	17
1/2" BSP	1	22*	14

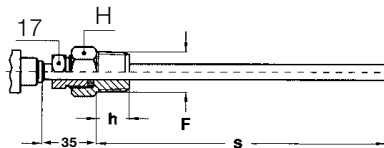
\* Ø 24 for every-angle connection (code 2)

**Male swivel nut**  
(Code 5)



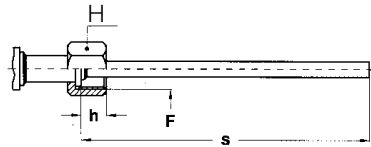
F	Code	H	h
1/2" BSP	1	22	17
3/4" BSP	2	27	17

**Sliding male and swivel nut**  
(Code 9)



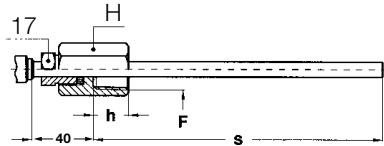
F	Code	H	h
1/2" BSP	1	22	14
1/2" NPT	A	22	17
3/4" BSP	2	27	16
3/4" NPT	B	27	17

**Female swivel nut**  
(Code 8)

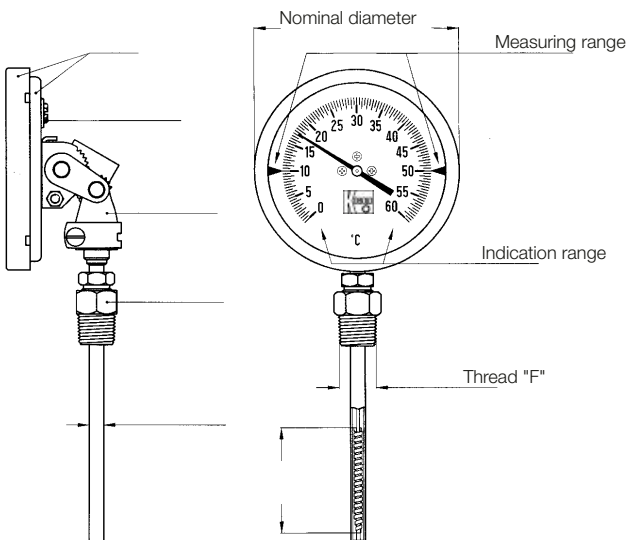


F	Code	H	h
1/2" BSP	1	24	13
3/4" BSP	2	30	13

**Sliding female and swivel nut**  
(Code 7)



F	Code	H	h
1/2" NPT	A	24	18
3/4" NPT	B	32	18



Filling liquids	Ambient temperature	Working temperature
Glycerine 98%	+15...+65 °C (+60...+150 °F)	+15...+160 °C (-60...+320 °F)
Silicone oil	-45...+65 °C (-50...+150 °F)	-40...+250 °C (-40...+480 °F)

Glycerine and silicone oil must not be used with strongly oxidant agents such as oxygen, chlorine, nitric acid and hydrogen peroxide. It could be dangerous because of spontaneous chemical reactions, inflammability or explosion.