

Gas-actuated thermometer with electrical output signal Stainless steel version Models TGT73.100 and TGT73.160

WIKA data sheet TV 17.10



for further approvals
see page 15

intelliTHERM®

Applications

- Chemical, petrochemical industry
- Oil and gas industry
- Power engineering, renewable energy
- Machine building, plant and vessel construction

Special features

- Cost-effective “2 in 1” temperature measurement
- Compact design
- Application ranges from -200 ... +700 °C
- “Plug-and-play”, thus no transmitter configuration necessary



Fig. left: Lower mount (radial)
Fig. right: Back mount (axial)

Description

At any point where the process temperature must be displayed locally and there is a requirement to simultaneously transmit the signal to a central controller or remote control room, the model TGT73 intelliTHERM® can be used.

Through the combination of a mechanical measuring system and electronic signal processing, the process temperature can be read securely, even if the voltage supply is lost.

Due to the wide variety of possible designs, the model TGT73 gas-actuated thermometers can be perfectly adapted to any process connection or location. The adjustable stem and dial version can be adjusted to any angle to allow easy reading. With the contact bulb version (without direct contact with the medium), the temperature can be measured and controlled even when the pipe diameter is extremely small.

The WIKA electronic transmitter, integrated into the high-quality mechanical temperature measuring instrument, combines the advantages of electrical signal transmission with the advantages of a local mechanical display.

The measuring span (electrical output signal) is adjusted automatically along with the mechanical display, i.e. the scale over the full scale range corresponds to 4 ... 20 mA.

Standard version

Measuring principle

Inert gas expansion system

Nominal size in mm

100, 160

Connection designs

- S Standard (male threaded connection)
 - 1 Plain stem (without thread)
 - 2 Male nut
 - 3 Union nut
 - 4 Compression fitting (sliding on stem)
 - 5 Union nut and loose threaded connection
 - 6 Compression fitting (can be adjusted on either capillary or spiral protective sleeve)
 - 7 Compression fitting at the case

Instrument version

- Back mount (axial)
- Lower mount (radial)
- Back mount (adjustable stem and dial)
- Instruments with capillaries

Accuracy class

Class 1 per EN 13190
at 23 °C ±10 °C ambient temperature

Working range

Normal (1 year): Measuring range (EN 13190)
Short time (24 h max.): Scale range (EN 13190)

Rated operating ranges and conditions

EN 13190

Case, bezel ring, process connection

Stainless steel 1.4301

Stem

Stainless steel 1.4571

Adjustable stem and dial

Stainless steel
Swivelling 90°
Rotatable 360°

Contact bulb

120 x 22 x 12 mm, stainless steel 1.4571

Capillary

Ø 2 mm, stainless steel 1.4571, bending radius no less than 6 mm

Standard capillary: max. 60 m
Capillary with spiral protective sleeve: max. 40 m
Capillary with PVC coating: max. 20 m
Length to customer specification

Dial

Aluminium white, black lettering

Window

Laminated safety glass

Pointer

Aluminium, black, adjustable pointer

Electrical connection

Angular connector

Temperature limits for storage and transport

-50 ... +70 °C without liquid damping
-40 ... +70 °C with liquid damping

Permissible ambient temperature

-20 ... +60 °C without/with liquid damping

Permissible operating pressure at the stem

max. 25 bar, static

Ingress protection

IP 65 to EN/IEC 60529
Reverse polarity protection

Mounting types for instruments with capillary

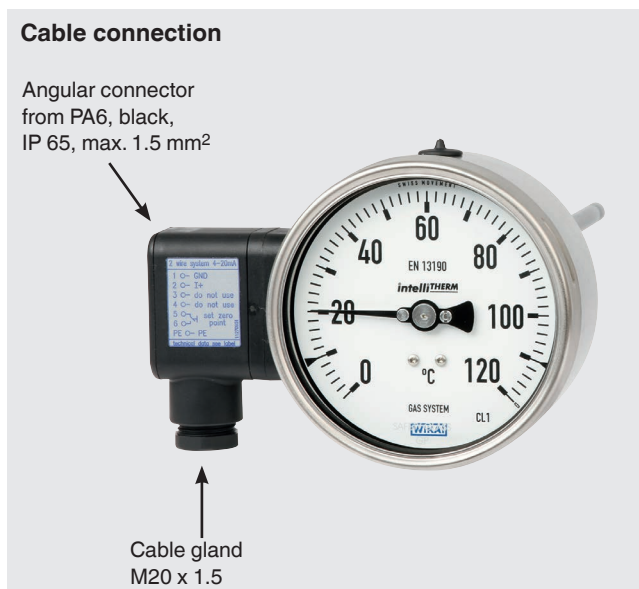
- Surface mounting flange, stainless steel
- Instrument mounting bracket, aluminium die-casting
- Panel mounting flange, stainless steel

Options

- Scale range °F, °C/°F (dual scale)
- Case with liquid damping
- Armoured coating for capillary: Ø 7 mm spiral protective sleeve, flexible or PVC coated
- Stem diameter 6, 10, 12 mm (others on request)
- Special measuring ranges or dial printing to customer specifications (on request)

Cable connection

Angular connector
from PA6, black,
IP 65, max. 1.5 mm²

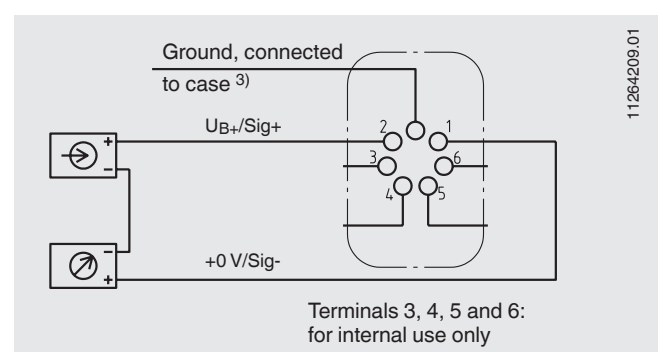


Electrical data	intelliTHERM® models TGT73.100 and TGT73.160		
Power supply U_B ■ 4 ... 20 mA ■ 0 ... 10 V	DC $12 \leq U_B \leq 30$ V DC $15 \leq U_B \leq 30$ V		
Influence of power supply	≤ 0.1 % of full scale value/10 V		
Permissible residual ripple	≤ 10 % ss		
Output signal, version I	4 ... 20 mA, 2-wire, passive, per NAMUR NE43		
Permissible max. load R_A	$R_A \leq (U_B - 12 \text{ V})/0.02 \text{ A}$ with R_A in Ω and U_B in V, however max. 600 Ω		
Effect of load	≤ 0.1 % of full scale value		
Output signal, version II	0 ... 10 V, 3-wire		
Impedance at voltage output	0.5 Ω		
Load capacity at voltage output	2 ... 100 k Ω		
Sampling rate sensor	600 ms		
Linear error	≤ 1.0 % of span (terminal method)		
Output signal accuracy	0.2 % of full scale value (only electronics)		
Resolution	0.15 % of full scale value (10 bit resolution at 360°)		
Refresh rate (measuring rate)	$> 1/s$		
Input signal, angle of rotation	0 ... 270 \nless °		
Long-term stability of electronics	< 0.3 % of full scale value/a		
Temperature error of electronics	< 0.3 % of full scale value/10 K (in overall temperature range)		
Warm-up time	≤ 5 min		
Electrical connection	Via angular connector, 180° rotatable, max. 1.5 mm ² , cable protection, M20 x 1.5 cable gland, cable outer diameter 7 ... 13 mm, incl. strain relief		
Designation of connection terminals dependent on the output signal version	Terminal Type	Variant I	Variant II
	1	4 ... 20 mA	0 ... 10 V
	2	GND	GND
	3	I_+	U_{B+}
	4	reserved	U_{out}
	5	reserved	reserved
	6	reserved	reserved

Scale ranges, measuring ranges ¹⁾, error limits (EN 13190) Scale graduation per WIKA standard

Scale range in °C	Measuring range in °C	Scale spacing in °C	Error limit \pm °C
-80 ... +60	-60 ... +40	2	2
-60 ... +40	-50 ... +30	1	1
-40 ... +60	-30 ... +50	1	1
-30 ... +50	-20 ... +40	1	1
-20 ... +60	-10 ... +50	1	1
-20 ... +80	-10 ... +70	1	1
0 ... 60	10 ... 50	1	1
0 ... 80	10 ... 70	1	1
0 ... 100	10 ... 90	1	1
0 ... 120	10 ... 110	2	2
0 ... 160	20 ... 140	2	2
0 ... 200	20 ... 180	2	2
0 ... 250	30 ... 220	5	2.5
0 ... 300	30 ... 270	5	5
0 ... 400	50 ... 350	5	5
0 ... 500	50 ... 450	5	5
0 ... 600	100 ... 500	10	10
0 ... 700	100 ... 600	10	10

Designation of connection terminals ²⁾



1) The measuring range is indicated on the dial by two triangular marks.

Only within this range is the stated error limit valid per EN 13190.

2) For 3-wire connection (see operating instructions)

3) This connection must not be used for equipotential bonding. The instrument must be incorporated in the equipotential bonding via the process connection.

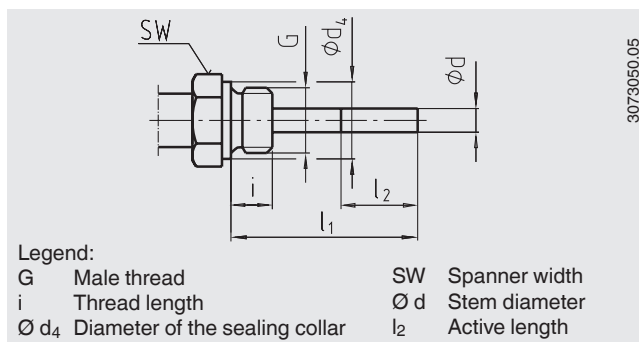
Connection designs

Standard design (male thread connection) ¹⁾

Standard insertion length $l_1 = 63, 100, 160, 200, 250$ mm

Nominal size	Process connection	Dimensions in mm			
NS	G	i	SW	d_4	$\varnothing d$
100, 160	G 1/2 B	14	27	26	8
	G 3/4 B	16	32	32	8
	1/2 NPT	19	22	-	8
	3/4 NPT	20	30	-	8

1) Not applicable to version with capillary



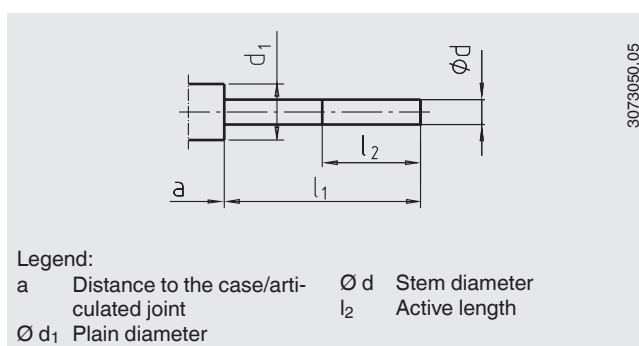
Design 1, plain stem (without thread)

Standard insertion length $l_1 = 100, 140, 200, 240, 290$ mm

Basis for design 4, compression fitting

Nominal size	Dimensions in mm			
NS	d_1 ¹⁾	$\varnothing d$	a for axial	a for adjustable stem and dial
100, 160	18	8	15	25

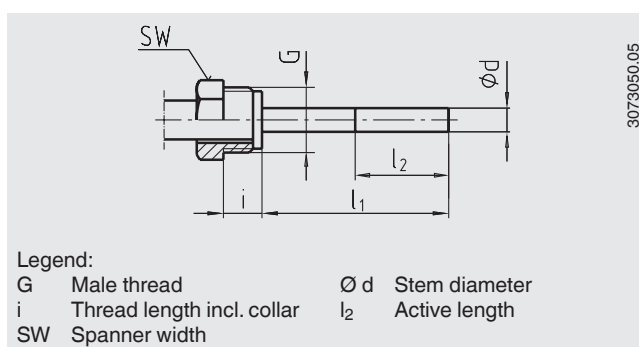
1) Not applicable to version with capillary



Design 2, male nut

Standard insertion length $l_1 = 80, 140, 180, 230$ mm

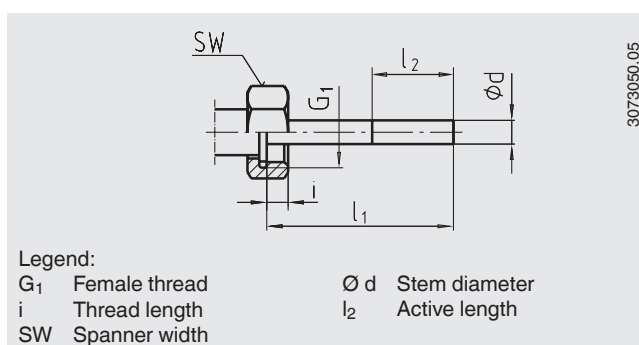
Nominal size	Process connection	Dimensions in mm		
NS	G	i	SW	$\varnothing d$
100, 160	G 1/2 B	20	27	8
	M20 x 1.5	15	22	8



Design 3, union nut

Standard insertion length $l_1 = 89, 126, 186, 226, 276$ mm

Nominal size	Process connection	Dimensions in mm		
NS	G	i	SW	$\varnothing d$
100, 160	G 1/2 B	8.5	27	8
	G 3/4 B	10.5	32	8
	M24 x 1.5	13.5	32	8

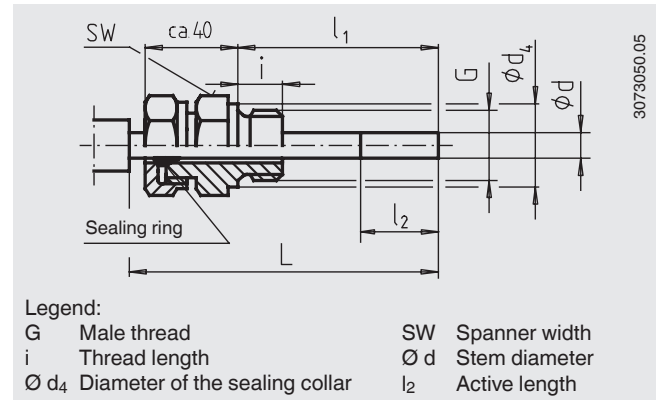


Design 4, compression fitting (sliding on stem)

Insertion length l_1 = variable

Length $L = l_1 + 40$ mm

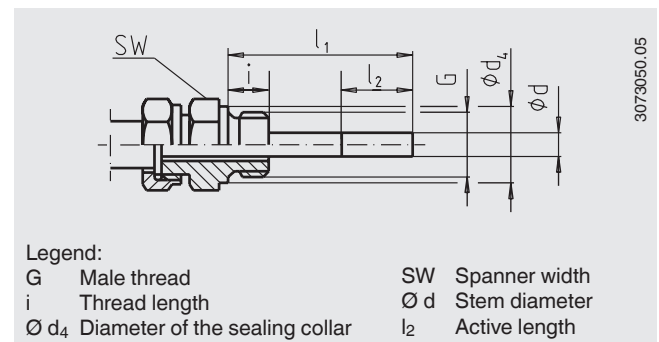
Nominal size	Process connection	Dimensions in mm			
NS	G	i	SW	d ₄	Ø d
100, 160	G ½ B	14	27	26	8
	G ¾ B	16	32	32	8
	M18 x 1.5	12	24	23	8
	½ NPT	19	22	-	8
	¾ NPT	20	30	-	8



Design 5, union nut and loose threaded connection

Standard insertion length $l_1 = 63, 100, 160, 200, 250$ mm

Nominal size	Process connection	Dimensions in mm			
NS	G	i	SW	d ₄	Ø d
100, 160	G ½ B	14	27	26	8
	G ¾ B	16	32	32	8
	M18 x 1.5	12	24	23	8
	½ NPT	19	22	-	8
	¾ NPT	20	30	-	8



Option: Connection with union nut M24 x 1.5 and loose threaded connection M18 x 1.5

Nominal size	Process connection	Dimensions in mm			
NS	G	i	SW	d ₄	Ø d
100, 160	M18 x 1.5	12	32	23	8

Design 6.1, compression fitting sliding on capillary (compression fitting is leak-proof)

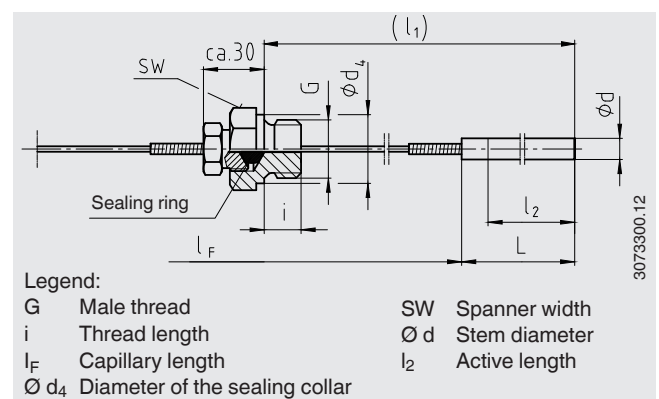
Insertion length l_1 = variable

Sensor length L: Standard 200 mm with Ø d = 6 mm

Standard 170 mm with Ø d = 8 mm

Standard 100 mm with Ø d ≥ 10 mm

Nominal size	Process connection	Dimensions in mm			
NS	G	i	SW	d ₄	Ø d
100, 160	G ½ B	14	27	26	8
	G ¾ B	16	32	32	8
	½ NPT	19	22	-	8
	¾ NPT	20	30	-	8



Design 6.2, compression fitting sliding on capillary with spiral protective sleeve (compression fitting is leak-proof)

Insertion length l_1 : ≥ 300 mm with $\varnothing d = 6$ or 8 mm

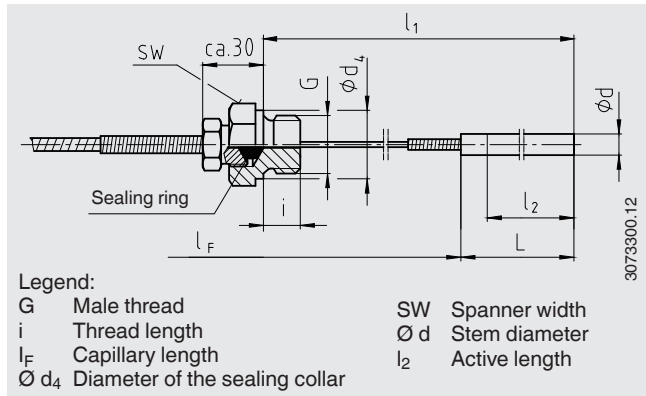
≥ 200 mm with $\varnothing d \geq 10$ mm

Sensor length L: Standard 200 mm with $\varnothing d = 6$ mm

Standard 170 mm with $\varnothing d = 8$ mm

Standard 100 mm with $\varnothing d \geq 10$ mm

Nominal size	Process connection	Dimensions in mm			
NS	G	i	SW	d_4	$\varnothing d$
100, 160	G 1/2 B	14	27	26	8
	G 3/4 B	16	32	32	8
	1/2 NPT	19	22	-	8
	3/4 NPT	20	30	-	8



Design 6.3, compression fitting sliding on spiral protective sleeve (compression fitting is not leak-proof)

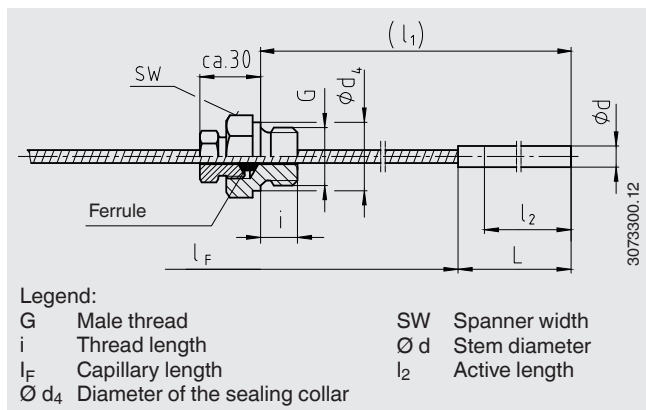
Insertion length l_1 = variable

Sensor length L: Standard 200 mm with $\varnothing d = 6$ mm

Standard 170 mm with $\varnothing d = 8$ mm

Standard 100 mm with $\varnothing d \geq 10$ mm

Nominal size	Process connection	Dimensions in mm			
NS	G	i	SW	d_4	$\varnothing d$
100, 160	G 1/2 B	14	27	26	8
	G 3/4 B	16	32	32	8
	1/2 NPT	19	22	-	8
	3/4 NPT	20	30	-	8



Design 7, compression fitting at the case

Insertion length l_1 : ≥ 400 mm

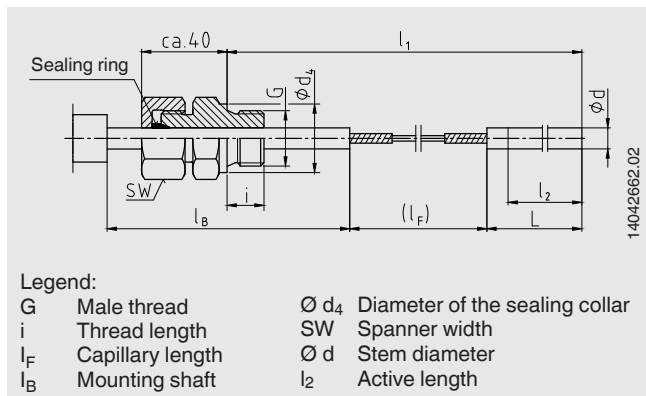
Sensor length L: Standard 200 mm with $\varnothing d = 6$ mm

Standard 170 mm with $\varnothing d = 8$ mm

Standard 100 mm with $\varnothing d \geq 10$ mm

l_B = standard 100 mm (others on request)

Nominal size	Process connection	Dimensions in mm			
NS	G	i	SW	d_4	$\varnothing d$
100, 160	G 1/2 B	14	27	26	8
	G 3/4 B	16	32	32	8
	1/2 NPT	19	22	-	8
	3/4 NPT	20	30	-	8



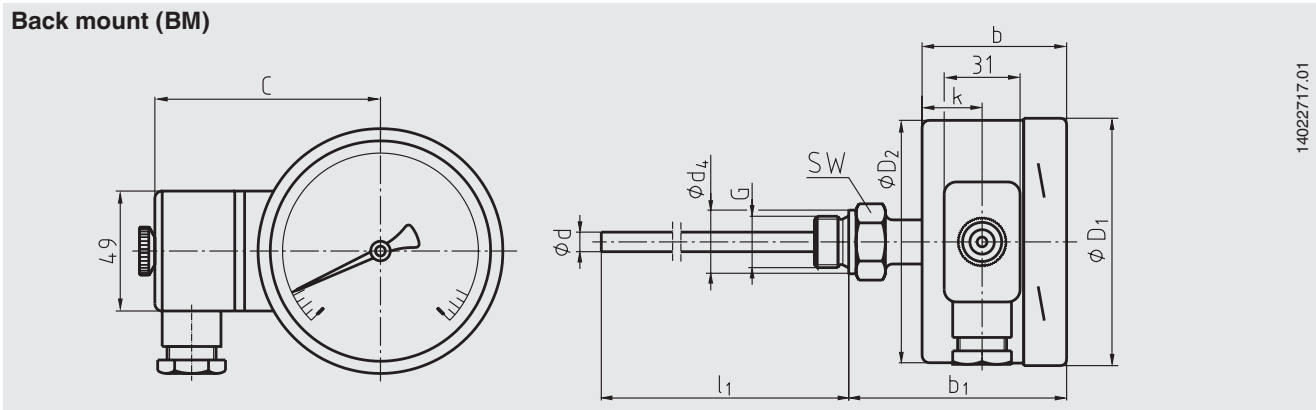
Note for designs 6.1, 6.2, 6.3 and 7:

With some combinations, the active length l_2 can correspond to the sensor length L.

If an additional compression fitting is desired, the sensor length L increases by at least 60 mm.

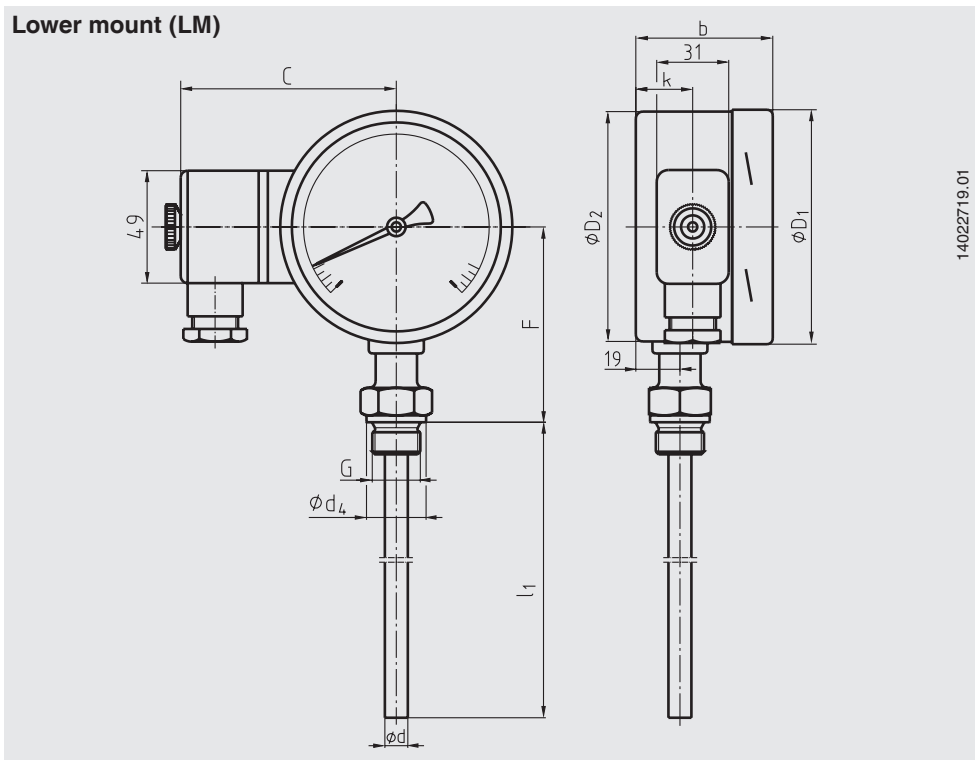
Dimensions in mm

Back mount (BM)



Nominal size	Dimensions in mm										Weight in kg
NS	b ¹⁾	b ₁ ¹⁾	C	Ø d	Ø d ₄	Ø D ₁	Ø D ₂	G	k	SW	
100	60/68	92/100	94	8 ²⁾	26	101	99	G ½ B	25	27	1.3
160	66/70	99/103	122	8 ²⁾	26	161	159	G ½ B	32	27	1.5

Lower mount (LM)



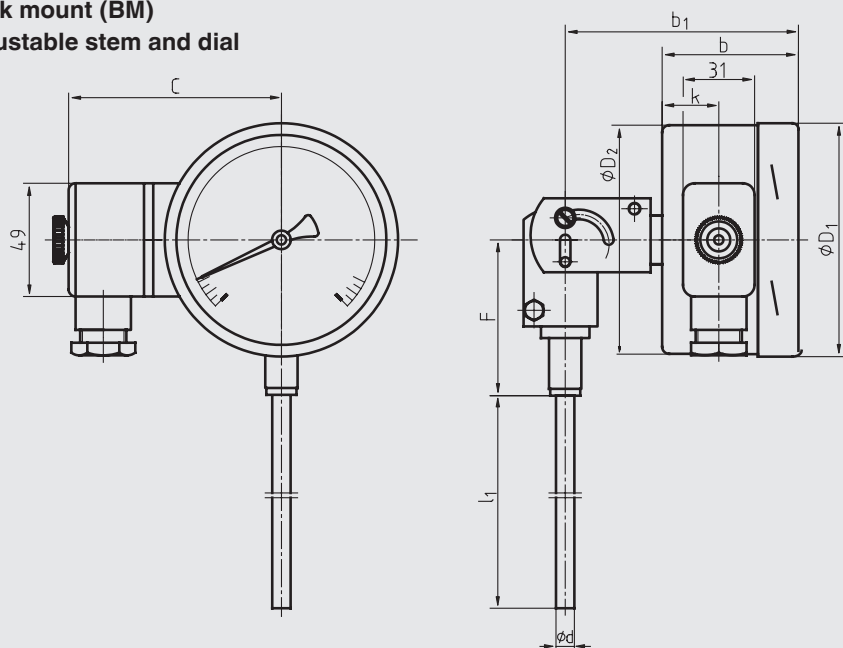
Nominal size	Dimensions in mm										Weight in kg
NS	b ¹⁾	b ₁ ¹⁾	C	Ø d	Ø d ₄	Ø D ₁	Ø D ₂	F ³⁾	G	k	
100	60/68	92/100	94	8 ²⁾	26	101	99	85	G ½ B	25	1.3
160	66/70	99/103	122	8 ²⁾	26	161	159	114	G ½ B	32	1.5

1) Dependent on required measuring system

2) Option: Stem diameter 6, 10, 12 mm

3) With scale ranges ≥ 0 ... 300 °C the dimensions increase by 40 mm

Back mount (BM) Adjustable stem and dial



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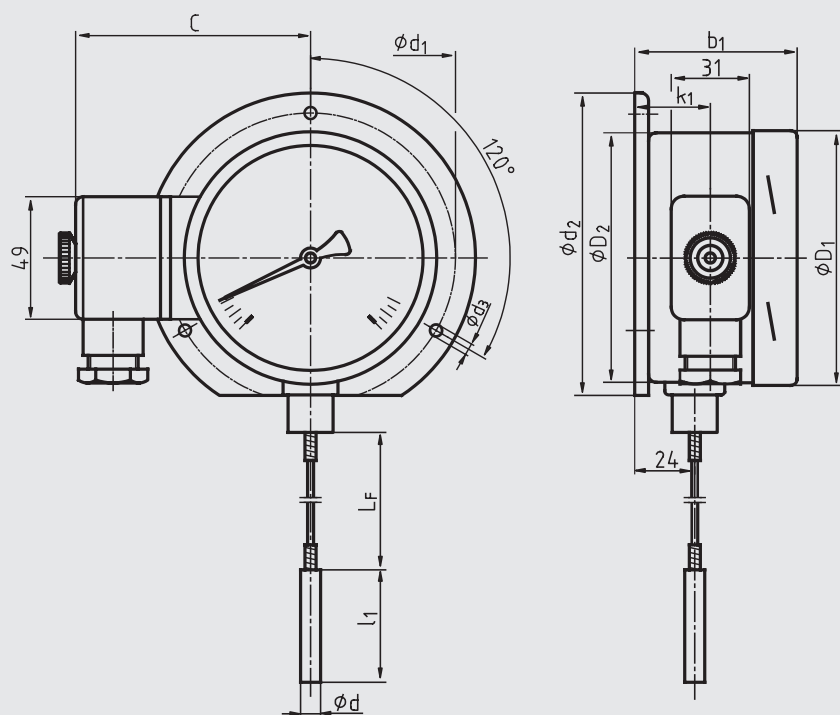
Nominal size	Dimensions in mm							
NS	b ¹⁾	b ₁ ¹⁾	C	d	D ₁	D ₂	F	k
100	60/68	104/112	94	8 ²⁾	101	99	68	25
160	66/70	110/114	122	8 ²⁾	161	159	68	32

1) Dependent on required measuring system

2) Option: Stem diameter 6, 10, 12 mm

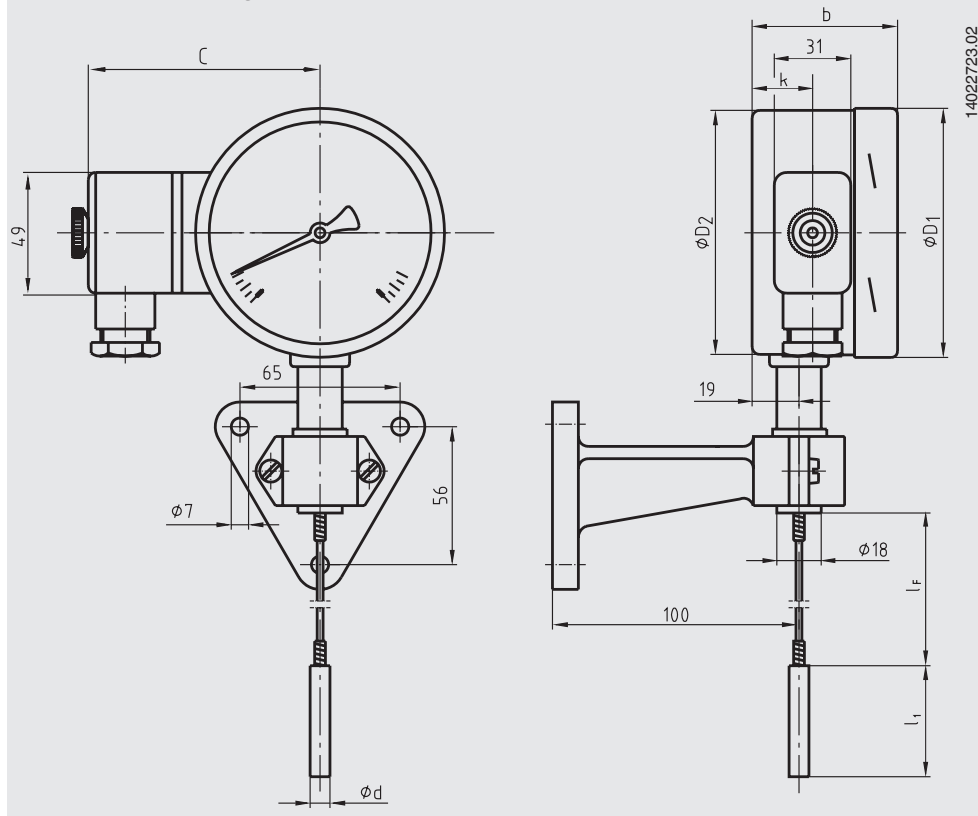
Dimensions in mm for instruments with capillary

Surface mounting flange

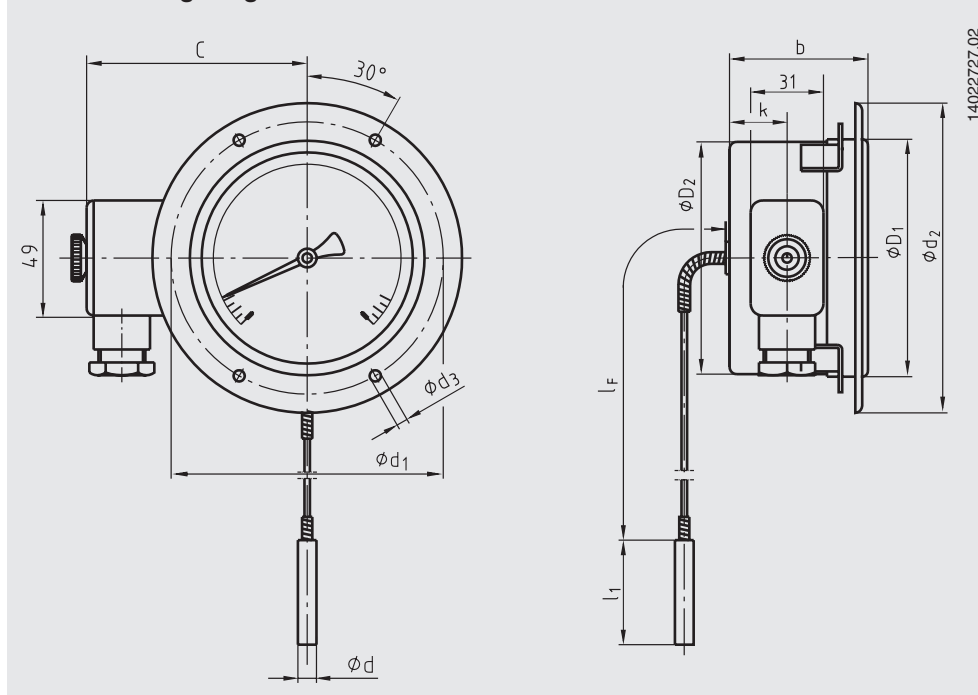


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Instrument mounting bracket



Panel mounting flange



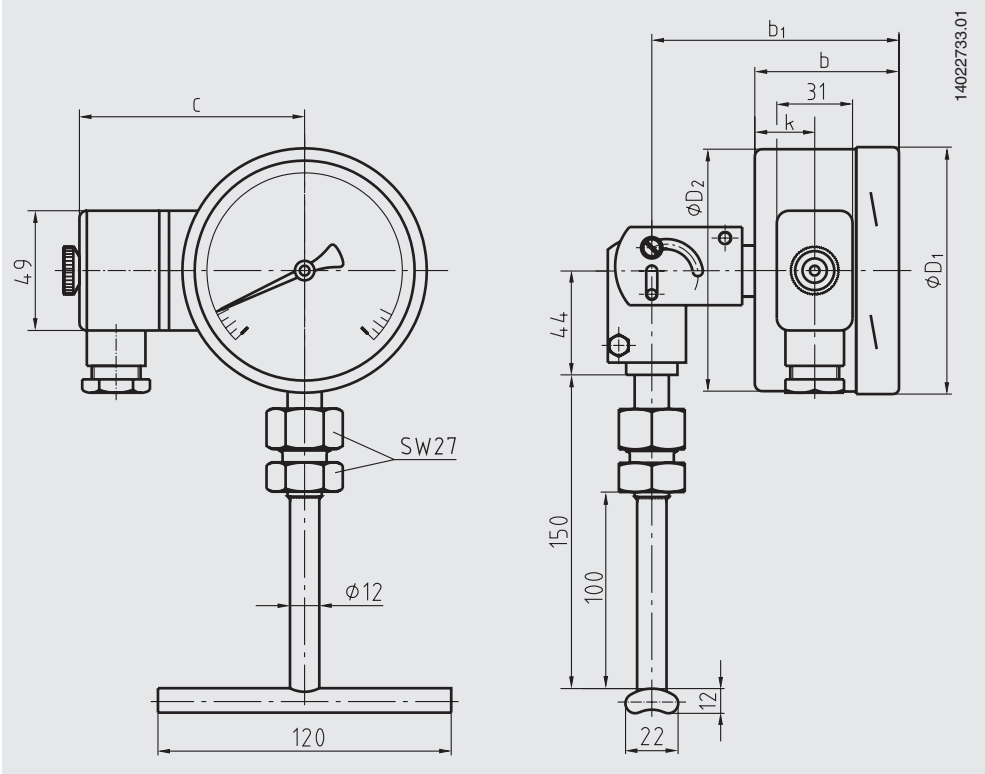
Nominal size	Dimensions in mm										
NS	b ¹⁾	b ₁ ¹⁾	C	d	d ₁	d ₂	d ₃	D ₁	D ₂	k	k ₁
100	60/68	65/73	94	8 ²⁾	116	132	4.8	101	99	25	30
160	66/70	72/76	122	8 ²⁾	178	196	5.8	161	159	32	37

1) Dependent on required measuring system

2) Option: Stem diameter 6, 10, 12 mm

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Back mount, adjustable stem and dial

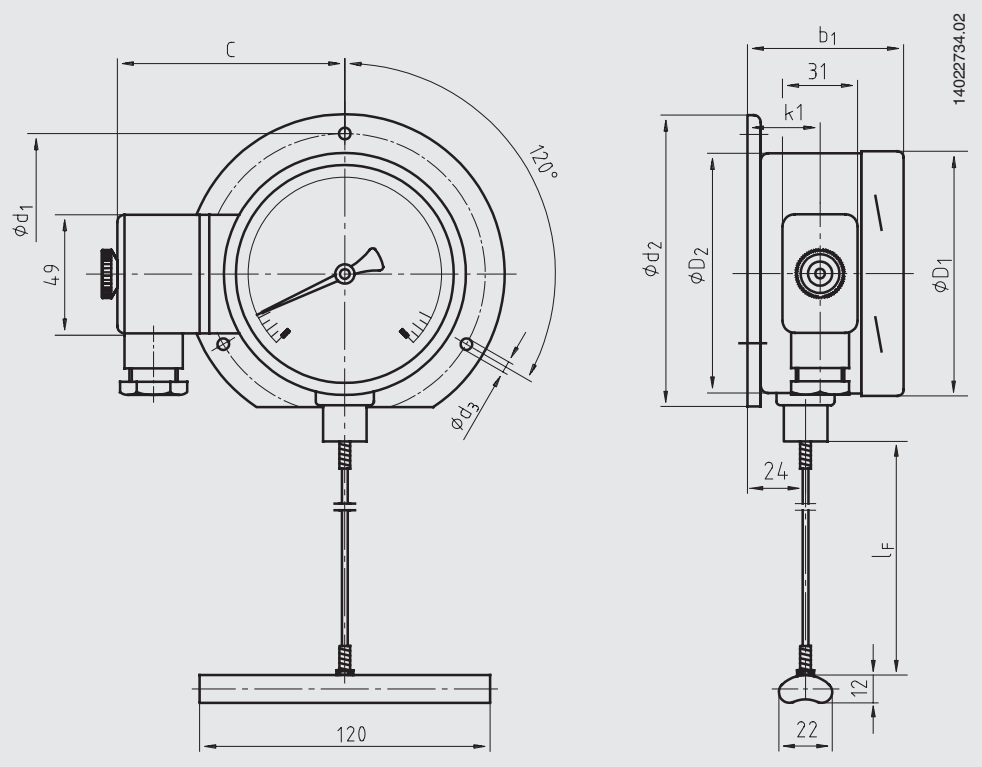


Connection location	Nominal size	Dimensions in mm					
	NS	b ¹⁾	b ₁ ¹⁾	C	D ₁	D ₂	k
Back mount	100	60/68	104/112	94	101	99	25
	160	66/70	110/114	122	161	159	32
Lower mount	100	60/68	104/112	94	101	99	25
	160	66/70	110/114	122	161	159	32
Adjustable stem and dial	100	60/68	104/112	94	101	99	25
	160	66/70	110/114	122	161	159	32

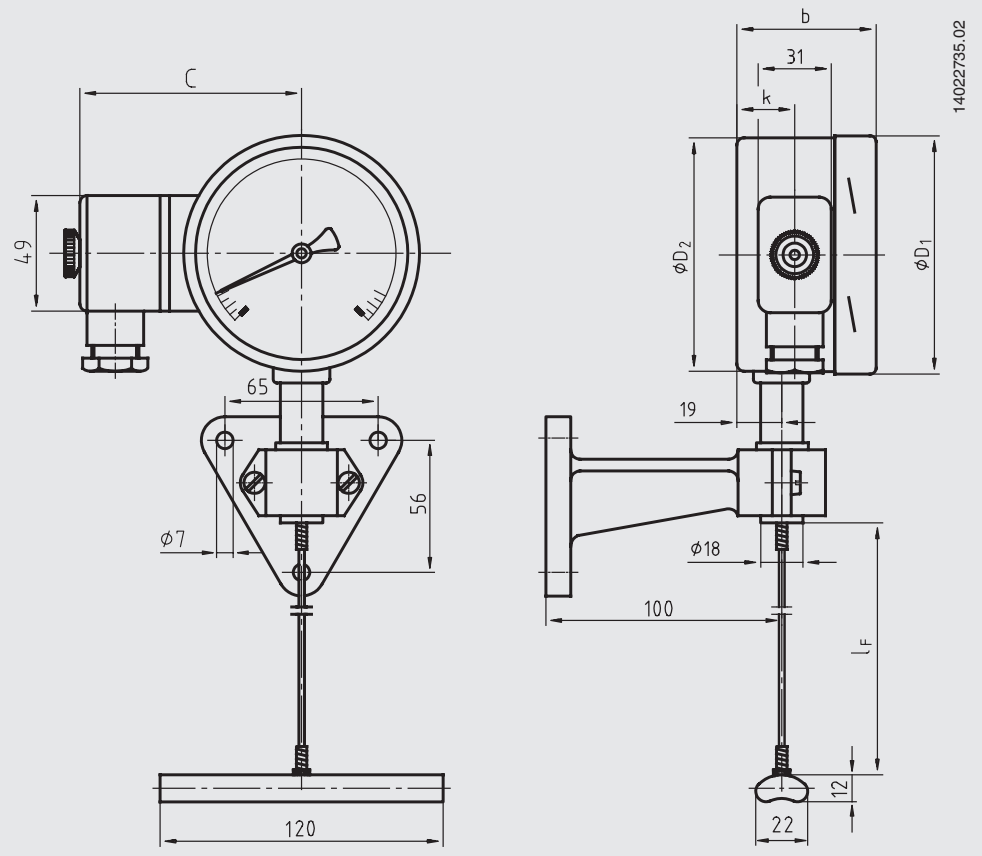
1) Dependent on required measuring system

Dimensions in mm for instruments with contact bulb and capillary

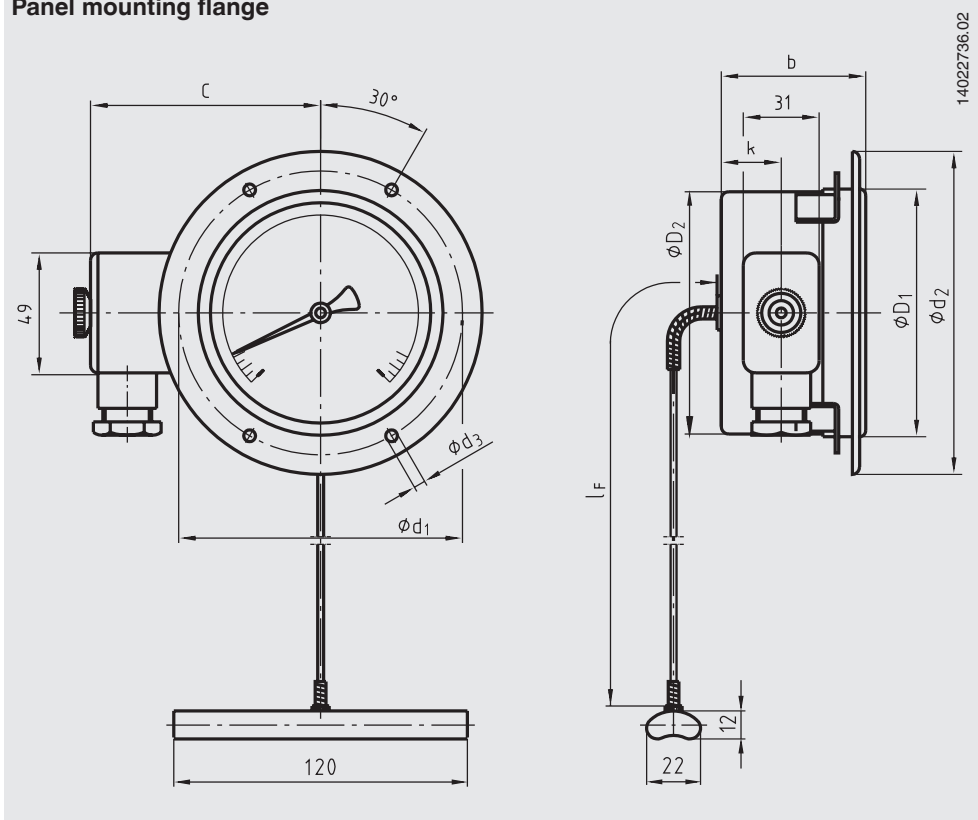
Surface mounting flange



Instrument mounting bracket



Panel mounting flange



Nominal size	Dimensions in mm												Weight in kg
NS	b ¹⁾	b ₁ ¹⁾	C	d ₁	d ₂	d ₃	D ₁	D ₂	D ₃	h	k	k ₁	
100	60/68	65/73	94	116	132	4.8	101	99	107	107	25	30	1.6
160	66/70	72/76	122	178	196	5.8	161	159	166	172	32	37	2.0

1) Dependent on required measuring system

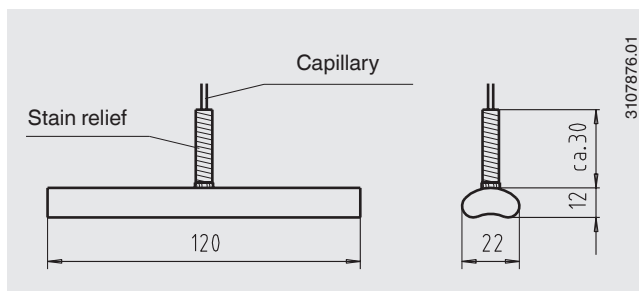
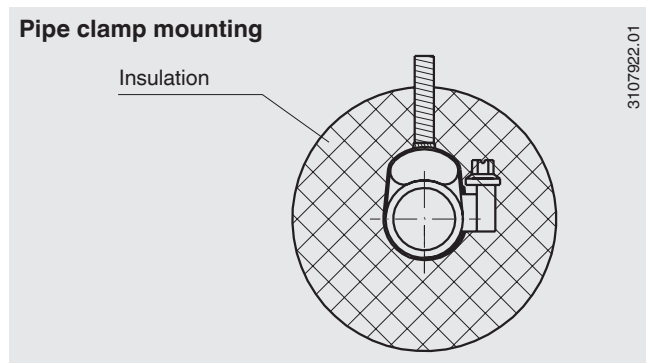
Mounting instructions for contact bulb

General information

The contact bulb has been designed for mounting on pipes or tanks. When mounting this thermometer version, it must be ensured that the contact bulb is in contact with the measuring point over its complete length. The basic requirements to ensure a perfect measurement result is to retain good thermal contact between the skin mounted contact bulb and the outside wall of the pipe or tank with minimal heat loss to the environment from the skin mounted contact bulb and measuring point.

■ Mounting on pipes

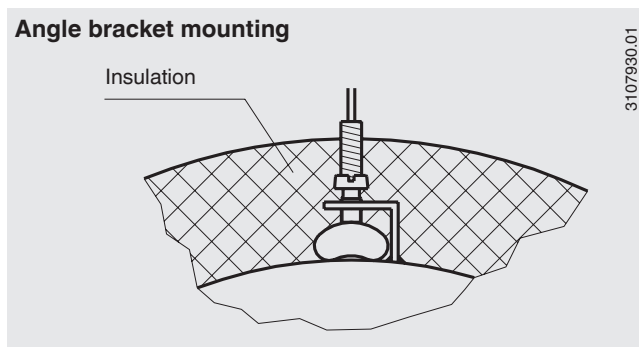
The geometry of the contact bulb has been designed for pipes with external diameters between 20 and 160 mm. For fixing the contact bulb to the pipe, pipe clamps are sufficient. The contact bulb should have direct metallic contact with the measuring point and have firm contact with the surface of the pipe. Where temperatures under 200 °C are expected, a heat conductive paste can be used to optimise the heat transmission between contact bulb and pipe. Insulation must be applied at the mounting point to avoid error due to heat loss. This insulation must have sufficient temperature resistance and is not included in the scope of delivery.



■ Mounting on tanks

The geometry of the contact bulb has been designed for tanks with an external radius up to 80 mm. If the mounting point of the skin mounting contact bulb on the tank has an external radius greater than 80 mm, we recommend the use of an intermediate piece designed for the respective tank diameter, made of a material with good thermal conductivity. The contact bulb can be fastened to the tank by means of an angle bracket with clamping screws, or any similar method. The contact bulb should have direct metallic contact with the measuring point and have firm contact with the surface of the tank.

A heat conductive paste can be used to optimise the heat transmission between contact bulb and tank, if temperatures under 200 °C are expected. Insulation must be applied at the mounting point to avoid error due to heat loss. This insulation must have sufficient temperature resistance and is not included in the scope of delivery.







Thermowell

In principle, the operation of a mechanical thermometer is possible without a thermowell with low process-side loading (low pressure, low viscosity and low flow velocities).

However, in order to enable exchanging the thermometer during operation (e.g. instrument replacement or calibration) and to ensure a better protection of the instrument and also the plant and the environment, it is advisable to use a thermowell from the extensive WIKA thermowell portfolio.

For further information on the calculation of the thermowell, see Technical information IN 00.15.

Approvals

Logo	Description	Country
	CE conformity EMC directive 2004/108/EG EN 61326 emission (group 1, class B) and interference immunity (industrial application)	European Community
	EAC (option) ■ Import certificate ■ Electromagnetic compatibility	Eurasian Economic Community
	GOST (option) Metrology, measurement technology	Russia
-	MTSCHS (option) Permission for commissioning	Kazakhstan
	BelGIM (option) Metrology, measurement technology	Belarus

Certificates (option)

- 2.2 test report
- 3.1 inspection certificate
- DKD/DAkkS calibration certificate

Approvals and certificates, see website

Ordering information

Model / Nominal size / Scale range / Connection design / Process connection / Length l_1 / Capillary length l_F / Options

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