

Gas-actuated thermometer with switch contacts Model 73, stainless steel version

WIKA data sheet TV 27.01



for further approvals
see page 12

Applications

- Control and regulation of industrial processes
- Monitoring of plants and switching of electric circuits
- Universally suitable for machine building, plant, vessel, apparatus construction and food industry
- Temperature measurement without any contact to the medium
- Mounting in instrument boards, control cabinets, control panels

Special features

- Instruments meet the highest standards of measurement technology
- Case and stem from stainless steel
- For external mounting on pipes and tanks
- Gauges with inductive contact for use in hazardous areas with ATEX approval
- Gauges with electronic contact for PLC applications

Description

Wherever the process temperature must be shown in situ or in hard-to-reach locations, and where, at the same time, an electrical circuit also needs to be switched, the gas-actuated thermometers with switch contacts are ideally suited.

Due to the wide variety of possible designs, the model 73 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 any contact with the medium), temperature measurements are possible even when the pipe diameter is extremely small. When mounting this thermometer version, it must be ensured that the contact bulb is in contact with the measuring point over its complete length.

Switch contacts (electrical alarm contacts) make or break an electric control circuit dependent upon the position of the instrument pointer.



Fig. top: with capillary
Fig. bottom: back mount (BM)

The switch contacts are adjustable over the full measuring range. The instrument pointer (actual value pointer) moves freely across the entire scale range, independent of the setting. The set pointer can be adjusted via the window using a removable adjustment key (mounted on the terminal box).

Switch contacts consisting of several contacts can also be set to a single set point. Contact actuation is made when the actual value pointer travels beyond or below the desired set point.

For switch contacts, sliding and magnetic snap-action contacts, inductive contacts - for requirements to ATEX - or electronic contacts for PLC switching are available.

For further information on the different switch contacts please see data sheet AC 08.01.

Standard version

Measuring principle

Gas-pressure inert gas filling, physiologically safe

Nominal size in mm

100, 160, 144 x 144

Connection design

S Standard (male thread connection) ¹⁾

- 1 Plain stem (without thread)
- 2 Male nut
- 3 Union nut
- 4 Compression fitting (sliding on stem)
- 5 Union nut with fitting
- 6 Compression fitting (can be adjusted on either capillary or spiral protection hose)
- 7 Compression fitting at the case

1) Not for gauges with capillary or edgewise panel design

Models

- Back mount (axial)
- Lower mount (radial)
- Back mount, adjustable stem and dial
- Instruments with capillaries
- Instruments in edgewise panel design

Accuracy class

Class 1 per DIN 16196
at 23 °C ±10 °C ambient temperature

Working range

Normal (1 year): Measuring range (DIN 16196)
Short time (24 h max.): Scale range (DIN 16196)

Rated operating ranges and conditions

DIN 16196 (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°

Edgewise panel case and panel frame

Steel, galvanised

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
Length to user specifications

Dial

Aluminium white, black lettering

Window

Laminated safety glass
(at edgewise panel design: shatterproof plastic)

Pointer

Aluminium, black, adjustable pointer

Electrical connection

Terminal box

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 pressure rating at the stem

max. 25 bar, static

Ingress protection

IP 65 per EN/IEC 60529

Exception with edgewise panel design: IP 65 at the front
IP 40 at the back

Mounting types for instruments with capillary

- Surface mounting flange, stainless steel
- Surface mounting bracket, aluminium die cast
- Panel mounting flange, stainless steel

Switch contacts

Sliding contact model 811

- Simple construction
- No control unit and no extra power supply required
- Direct switching up to max. 230 V, 18 VA / 10 W

Magnetic snap-action contact model 821

- Simple construction
- No control unit and no extra power supply required
- Direct switching up to max. 230 V, 50 VA / 30 W
- Up to 4 switch contacts per measuring instrument

Inductive contact model 831

- Long service life due to non-contact sensor
- Additional control unit required
- With corresponding control unit suitable for use in zone 1 / zone 21 (2 GD) hazardous areas
- Low effect on the indication accuracy
- Fail-safe switching at high switching rates
- Insensitive to corrosion
- Also in safety version (SN, S1N contact)
- Up to 3 switch contacts per measuring instrument

Electronic contact model 830 E

- For direct triggering of a programmable logic controller (PLC)
- No additional control unit required
- Long service life due to non-contact sensor
- Low effect on the indication accuracy
- Fail-safe switching at high switching rates
- Insensitive to corrosion
- Up to 3 switch contacts per measuring instrument

Switching function

The switching function of the switch is indicated by function index 1, 2 or 3.

Model 8xx.1: Contact makes (clockwise pointer motion)

Model 8xx.2: Contact breaks (clockwise pointer motion)

Model 8xx.3: Change over; one contact breaks and one contact makes simultaneously when pointer reaches set point

Please indicate switch points!

Unless otherwise specified, the instrument will be delivered with the adjustable switching points factory-set as follows:

- Single contact Start of measuring range
- Double contact Start and end of the measuring range
- Triple contact Start, middle and end of the measuring range

Note

For magnetic snap-action contacts, it does not make sense to test the display, around the set limit values, in the range $\pm 5\%$ of the measuring span, because the magnet has an influence on the indication accuracy.

For further information see data sheet AC 08.01, "Electrical switch contacts"

Options

- Scale range °F, °C/°F (dual scale)
- Case with liquid damping
- Case with food-compatible liquid damping
- Case from 1.4571
- Armoured coating for capillary: \varnothing 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)
- Version per ATEX Ex II 2 GD c TX
- Ambient temperature: -40 ... +60 °C (for SN contact)

Scale ranges, measuring ranges ¹⁾, error limits (DIN 16196) 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	3.0
-60 ... +40	-50 ... +30	1	1.5
-40 ... +60	-30 ... +50	1	1.5
-30 ... +50	-20 ... +40	1	1.5
-20 ... +60	-10 ... +50	1	1.5
-20 ... +80	-10 ... +70	1	1.5
0 ... 60	10 ... 50	1	1.5
0 ... 80	10 ... 70	1	1.5
0 ... 100	10 ... 90	1	1.5
0 ... 120	10 ... 110	2	3.0
0 ... 160	20 ... 140	2	3.0
0 ... 200	20 ... 180	2	3.0
0 ... 250	30 ... 220	5	3.75
0 ... 300	30 ... 270	5	7.5
0 ... 400	50 ... 350	5	7.5
0 ... 500	50 ... 450	5	7.5
0 ... 600	100 ... 500	10	15.0
0 ... 700	100 ... 600	10	15.0

¹⁾ The measuring range is indicated on the dial by two triangular marks. Only within this range is the stated error limit valid per DIN 16196.

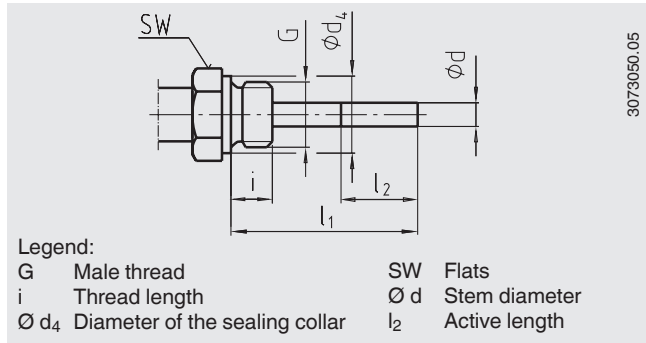
Connection design

Design standard (male thread connection) ¹⁾

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

Nominal size	Process connection		Dimensions in mm		
	G	i	SW	$\varnothing d_4$	$\varnothing d$
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 for gauges with capillary or edgewise panel design

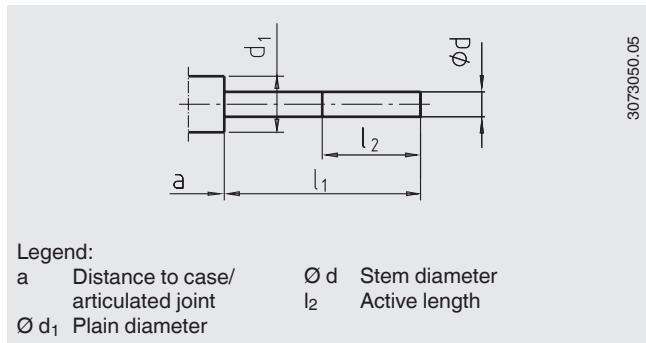


Design 1, plain stem (without thread)

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

Nominal size	Dimensions in mm			
	d_1 ²⁾	$\varnothing d$	a for axial	a for adjustable stem and dial
100, 160, 144 x 144	18	8	15	25

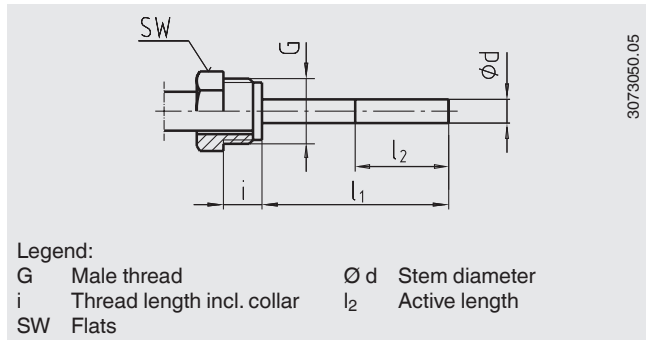
2) Not applicable to version with capillary



Design 2, male nut

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

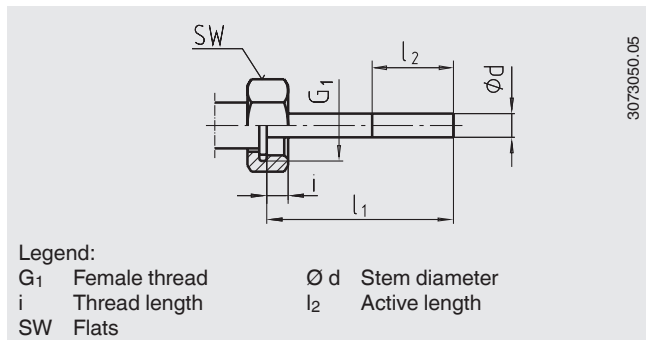
Nominal size	Process connection		Dimensions in mm	
	G	i	SW	$\varnothing d$
100, 160, 144 x 144	G 1/2 B	20	27	8
	M20 x 1.5	15	22	8



Design 3, union nut

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

Nominal size	Process connection		Dimensions in mm	
	G	i	SW	$\varnothing d$
100, 160, 144 x 144	G 1/2 B	8.5	27	8
	G 3/4 B	10.5	32	8
	M24 x 1.5	13.5	32	8

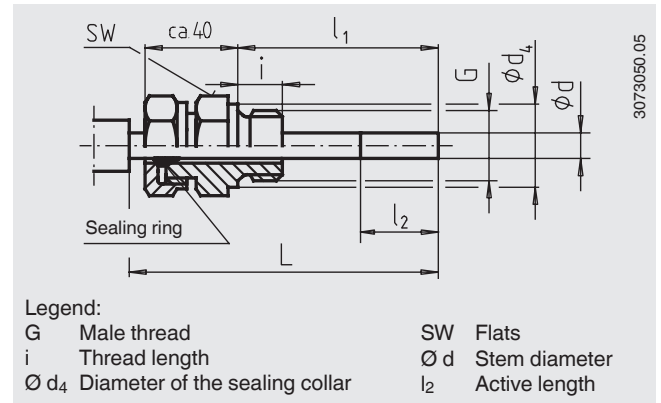


Design 4, compression fitting (sliding on stem)

Insertion length l_1 = variable

Length $L = l_1 + 40$ mm

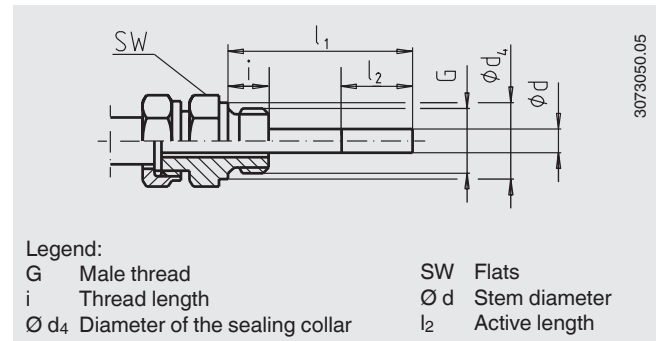
Nominal size	Process connection		Dimensions in mm		
	G	i	SW	$\varnothing d_4$	$\varnothing d$
100, 160, 144 x 144	G 1/2 B	14	27	26	8
	G 3/4 B	16	32	32	8
	M18 x 1.5	12	24	23	8
	1/2 NPT	19	22	-	8
	3/4 NPT	20	30	-	8



Design 5, union nut with fitting

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

Nominal size	Process connection		Dimensions in mm		
	G	i	SW	$\varnothing d_4$	$\varnothing d$
100, 160, 144 x 144	G 1/2 B	14	27	26	8
	G 3/4 B	16	32	32	8
	M18 x 1.5	12	24	23	8
	1/2 NPT	19	22	-	8
	3/4 NPT	20	30	-	8



Option: Connection with union nut M24 x 1.5 with fitting
M18 x 1.5

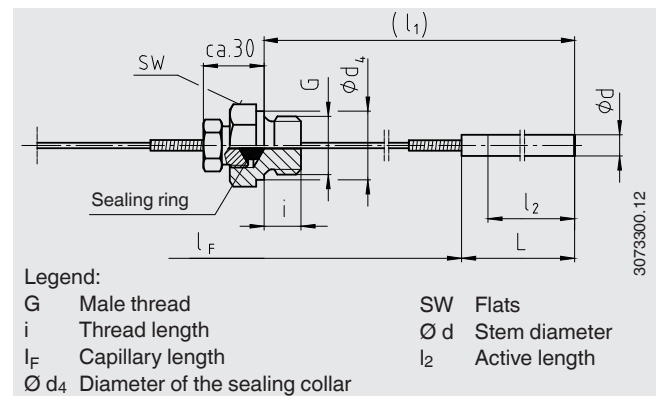
Nominal size	Process connection	Dimensions in mm			
NS	G	i	SW	$\varnothing d_4$	$\varnothing d$
100, 160	M18 x 1.5	12	32	23	8

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

Insertion length l_1 = variable

Active length L : standard 200 mm at $\varnothing d = 6$ mm
standard 170 mm at $\varnothing d = 8$ mm
standard 100 mm at $\varnothing d \geq 10$ mm

Nominal size	Process connection		Dimensions in mm		
	G	i	SW	$\varnothing d_4$	$\varnothing d$
100, 160, 144 x 144	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

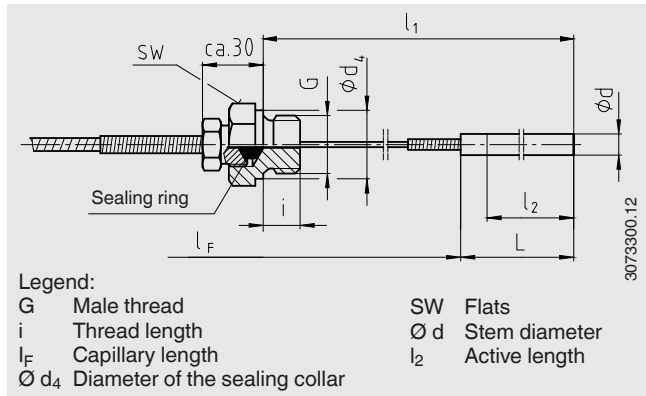


Design 6.2, compression fitting sliding on capillary with spiral protection hose (compression fitting is leak-proof)

Insertion length l_1 : ≥ 300 mm at $\varnothing d = 6$ or 8 mm
 ≥ 200 mm at $\varnothing d = \geq 10$ mm

Active length L: standard 200 mm at $\varnothing d = 6$ mm
 standard 170 mm at $\varnothing d = 8$ mm
 standard 100 mm at $\varnothing d = \geq 10$ mm

Nominal size	Process connection		Dimensions in mm		
NS	G	i	SW	$\varnothing d_4$	$\varnothing d$
100, 160, 144 x 144	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

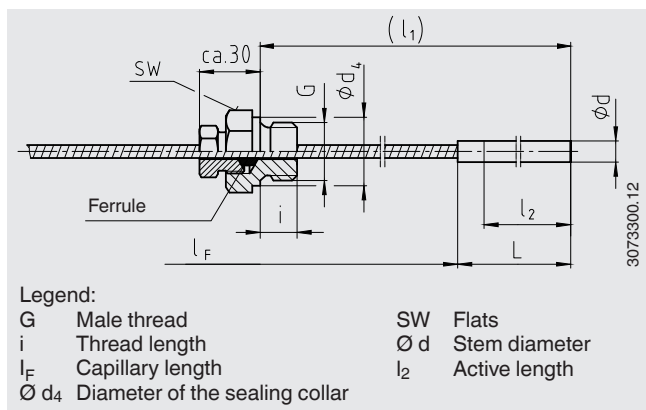


Design 6.3, compression fitting sliding on spiral protection hose (compression fitting is not leak-proof)

Insertion length l_1 = variable

Active length L: standard 200 mm at $\varnothing d = 6$ mm
 standard 170 mm at $\varnothing d = 8$ mm
 standard 100 mm at $\varnothing d = \geq 10$ mm

Nominal size	Process connection		Dimensions in mm		
NS	G	i	SW	$\varnothing d_4$	$\varnothing d$
100, 160, 144 x 144	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



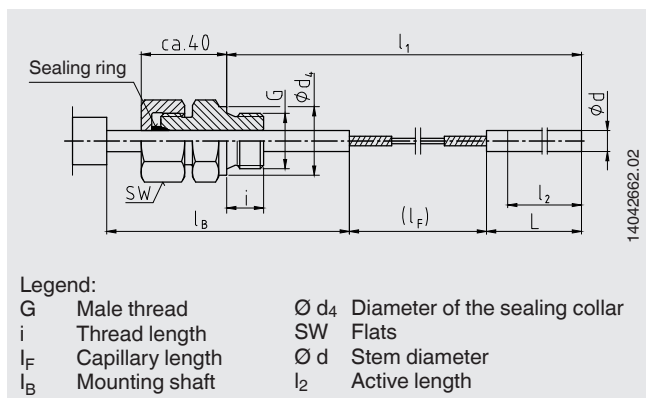
Design 7, compression fitting at the case

Insertion length l_1 : ≥ 400 mm

Active length L: standard 200 mm at $\varnothing d = 6$ mm
 standard 170 mm at $\varnothing d = 8$ mm
 standard 100 mm at $\varnothing d = \geq 10$ mm

l_B = standard 100 mm (others on request)

Nominal size	Process connection		Dimensions in mm		
NS	G	i	SW	$\varnothing d_4$	$\varnothing d$
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



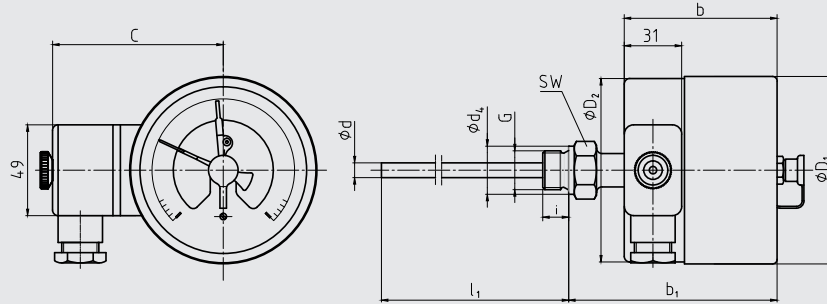
Note for designs 6.1, 6.2, 6.3 and 7:

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

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

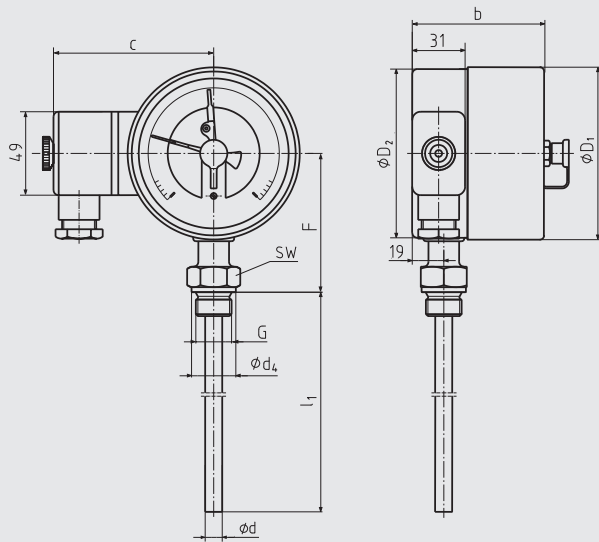
Dimensions in mm

Back mount (BM)



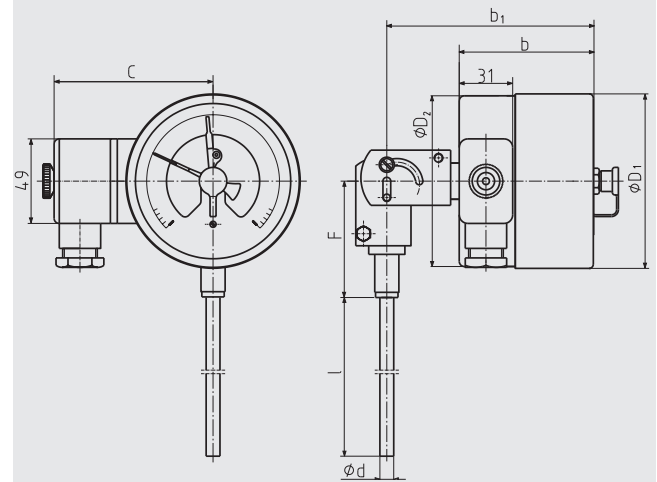
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Lower mount (LM)



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Back mount (BM) Adjustable stem and dial



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Back mount (BM), lower mount (LM)

Nominal size	Dimensions in mm											Weight in kg
	Switch contact model 811, 821 or 831											
	1- or 2-way		3-way		d	d ₄	D ₁	D ₂	F ¹⁾	G	SW	
b	b ₁ ¹⁾	b	b ₁ ¹⁾									
NS	b	b ₁ ¹⁾	b	b ₁ ¹⁾	d	d ₄	D ₁	D ₂	F ¹⁾	G	SW	1.3
100	88	121	-	-	8 ²⁾	26	101	99	83	G ½ B	27	
160	88	121	96	129	8 ²⁾	26	161	159	113	G ½ B	27	

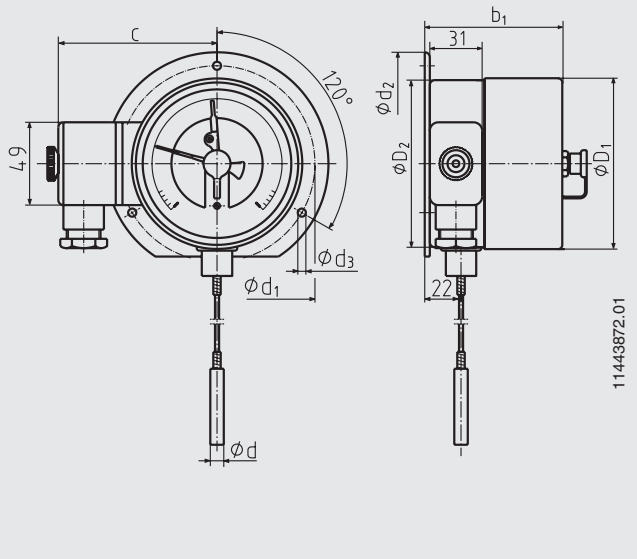
Back mount (BM), adjustable stem and dial

Nominal size	Dimensions in mm								Weight in kg
	Switch contact model 811, 821 or 831								
	1- or 2-way		3-way		d	D ₁	D ₂	F	
b	b ₁	b	b ₁						
NS	b	b ₁	b	b ₁	d	D ₁	D ₂	F	1.5
100	88	131	-	-	8 ²⁾	101	99	68	
160	88	131	97	140	8 ²⁾	161	159	68	

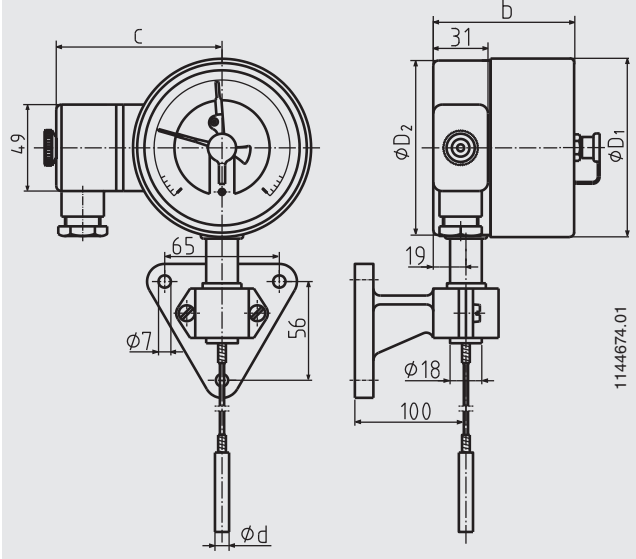
1) With scale ranges ≥ 0 ... 300 °C the dimensions increase by 40 mm
 2) Option: Stem diameter 6, 10, 12 mm

Dimensions in mm for instruments with capillary

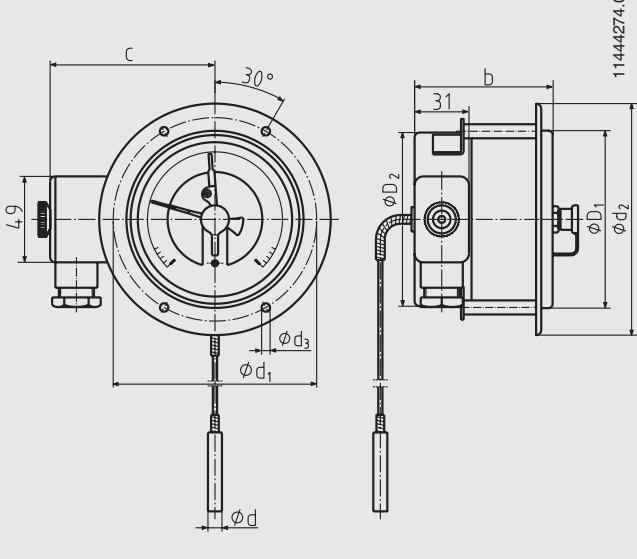
Surface mounting flange



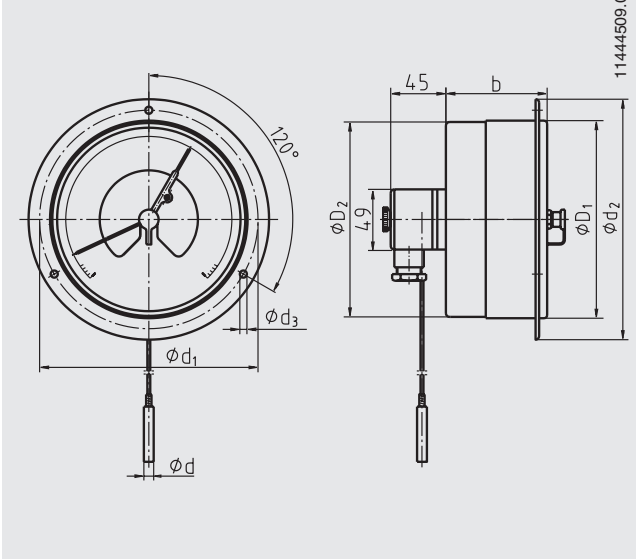
Instrument mounting bracket



Instruments NS 100 with panel mounting flange



Instruments NS 160 with panel mounting flange

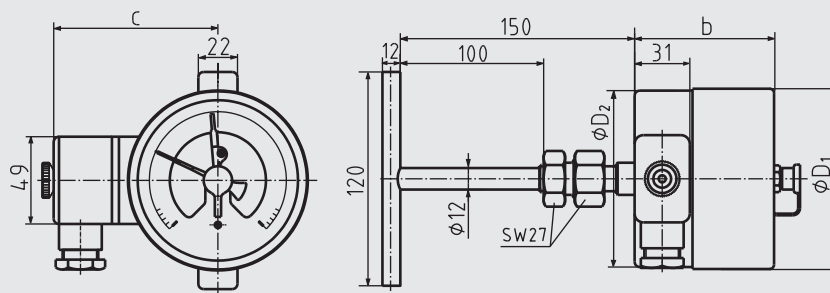


Nominal size	Dimensions in mm												Weight in kg
	Switch contact models 811, 821 or 831												
	1- or 2-way		3-way		d	d ₁	d ₂	d ₃	D ₁	D ₂	D ₃	h	
NS	b	b ₁	b	b ₁	d	d ₁	d ₂	d ₃	D ₁	D ₂	D ₃	h	
100	88	91	-	-	8 ²⁾	116	132	4.8	101	99	107	107	1.6
160	88	91	97	100	8 ²⁾	178	196	5.8	161	159	166	172	2.0

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

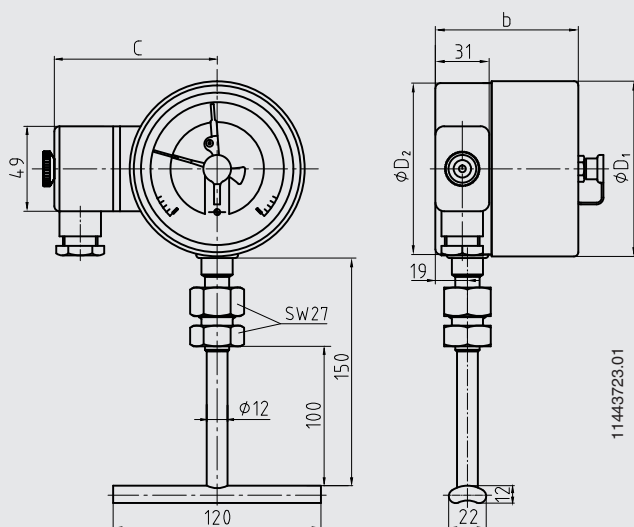
Dimensions in mm for instruments with contact bulb

Back mount (BM)



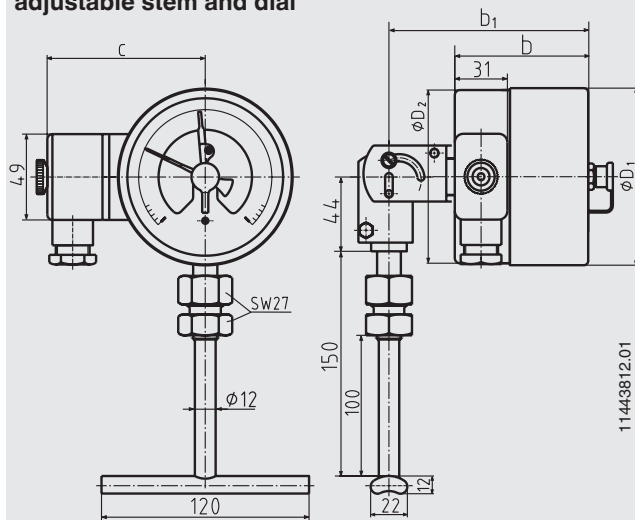
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Lower mount (LM)



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Back mount, adjustable stem and dial

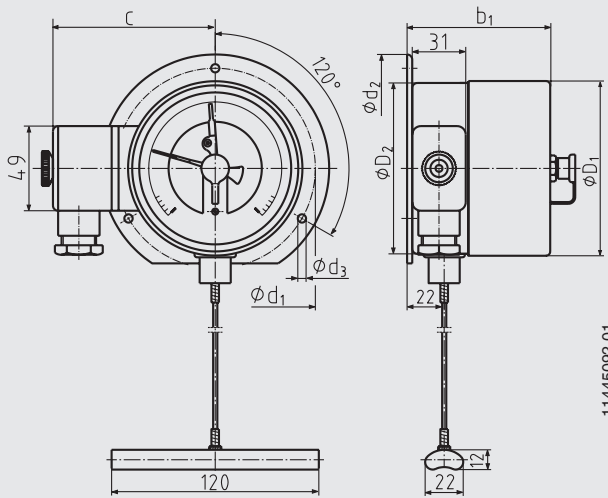


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Connection location	Nominal size	Dimensions in mm						Weight in kg
		Switch contact models 811, 821 or 831				D ₁	D ₂	
		1- or 2-way		3-way				
NG	b	b ₁	b	b ₁	D ₁	D ₂		
Back mount (BM)	100	88	-	-	-	101	99	1.0
	160	88	-	97	-	161	159	1.1
Lower mount	100	88	-	-	-	101	99	1.0
	160	88	-	97	-	161	159	1.1
Adjustable stem and dial	100	88	131	-	-	101	99	1.1
	160	88	131	97	140	161	159	1.2

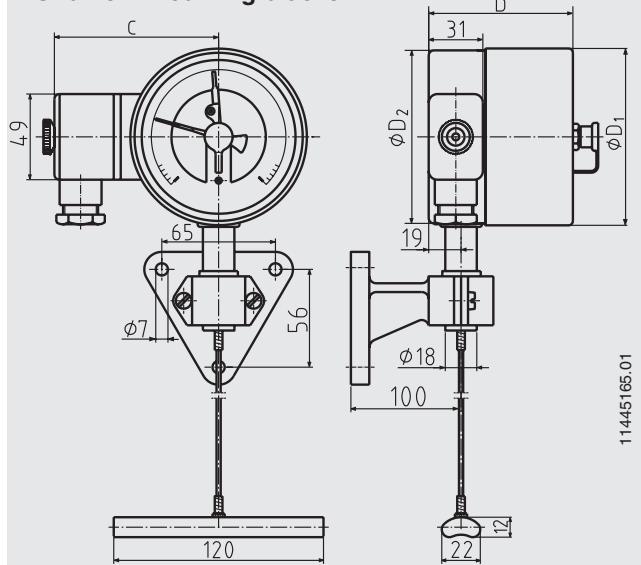
Dimensions in mm for instruments with contact bulb and capillary

Surface mounting flange



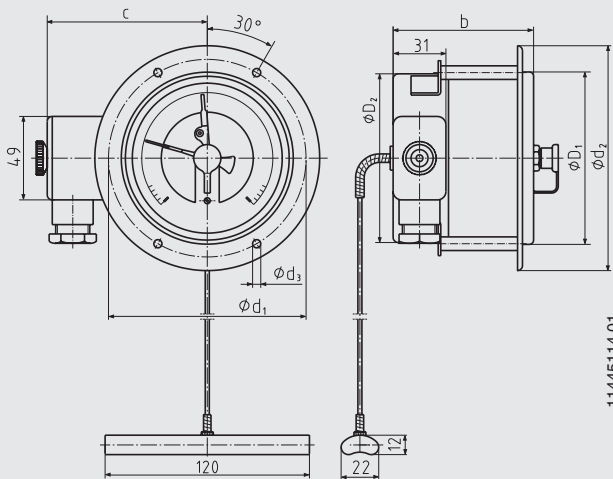
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Instrument mounting bracket



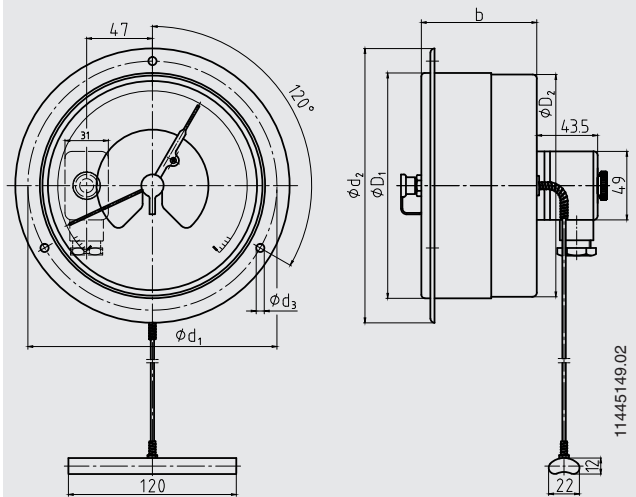
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Instruments NS 100 with panel mounting flange



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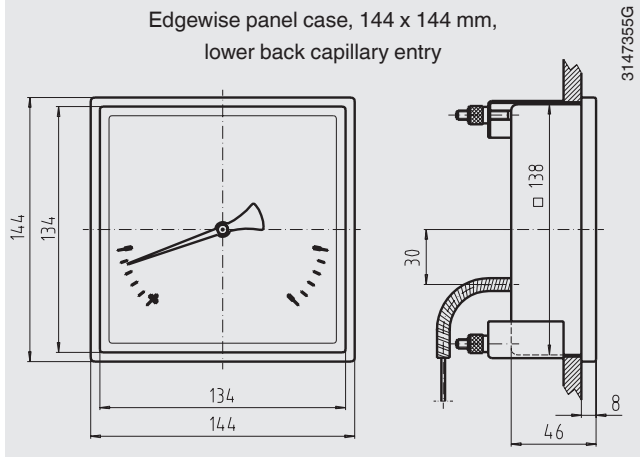
Instruments NS 160 with panel mounting flange



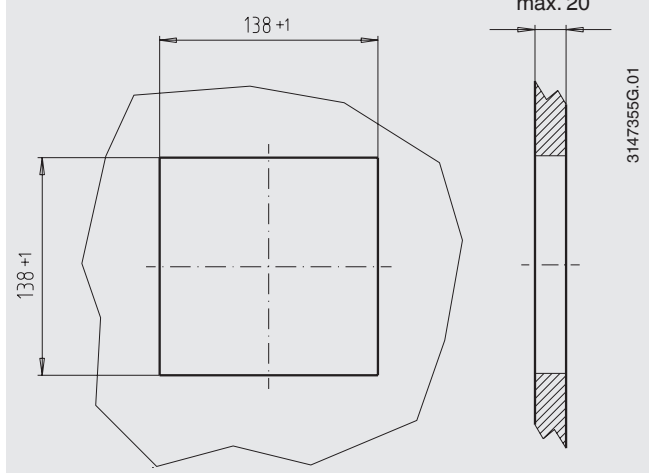
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Nominal size	Dimensions in mm											Weight in kg
	Switch contact models 811, 821 or 831											
	1- or 2-way		3-way		d ₁	d ₂	d ₃	D ₁	D ₂	D ₃	h	
NS	b	b ₁	b	b ₁	d ₁	d ₂	d ₃	D ₁	D ₂	D ₃	h	
100	88	91	-	-	116	132	4.8	101	99	107	107	1.6
160	88	91	97	100	178	196	5.8	161	159	166	172	2.0

Edgewise panel design with optional switch contact



Panel cutout in mm



Mounting instructions for contact bulb

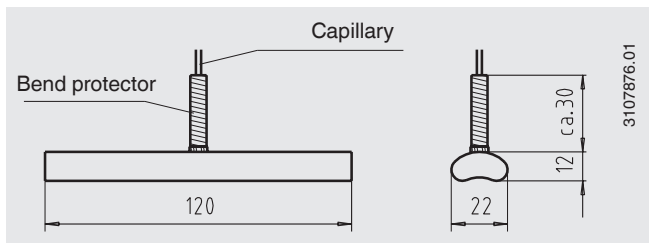
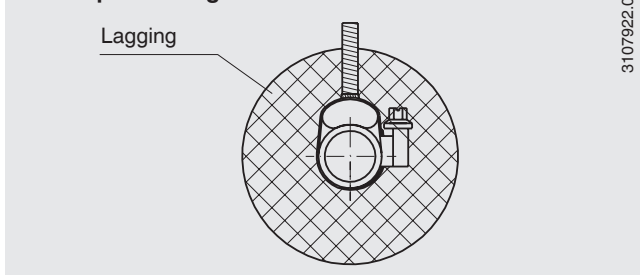
General

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 ambient 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. The skin mounted 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 to be expected, a heat conducting paste can be used to optimise the heat transmission between skin mounted contact bulb and pipe. Lagging must be applied where the skin mounted contact bulb has been mounted, in order to avoid error due to heat loss. This lagging must have sufficient temperature resistance and is not provided with the instrument.

Tube clip mounting

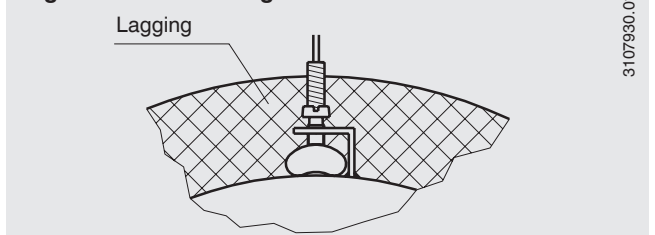


■ Mounting on tanks

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 should be fastened to the tank by means of an angle bracket with clamping screws, or any similar method. The skin mounted 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 skin mounted contact bulb and tank if temperatures under 200 °C are to be expected. Lagging must be applied where the skin mounted contact bulb has been mounted, in order to avoid error due to heat loss. This lagging must have sufficient temperature resistance and is not provided with the instrument.

Angle bracket mounting



Thermowell

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

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.

CE conformity

ATEX directive (option)

94/9/EG, II 2 GD c TX

Approvals (options)

- **EAC**, import certificate, ignition protection type "c" - constructive safety, customs union Russia/Belarus/Kazakhstan
- **GOST**, metrology, measurement technology, Russia
- **CRN**, safety (e.g. electr. safety, overpressure, ...), Canada

Certificates (options)

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

Approvals and certificates, see website

Ordering information

Model / Nominal size / Type of contact and switching function / Scale range / Design of connection / Process connection / Length l_1 / Capillary length l_F / Options

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