

Gas-actuated thermometer

Stainless steel version

Model 73

WIKA data sheet TM 73.01



for further approvals
see page 15

Applications

- General process instrumentation in the chemical and petrochemical industries, oil and gas industries, energy and water/wastewater industries
- Universally suitable for machine building, plant, tank, apparatus construction and food industry
- Temperature measurement without any contact to the medium
- Mounting in instrument boards, control cabinets, control panels

Special features

- Scale ranges from -200 ... +700 °C
- Fast response behaviour
- Case and stem from stainless steel
- Various connection and case mounting designs

Description

The model 73 gas-actuated thermometer has been developed and is manufactured in accordance with the EN 13190 standard. The high-quality thermometer has been designed especially for the requirements of the process industry. Especially in the chemical and petrochemical, oil and gas, and power engineering industries, the thermometer completely manufactured from stainless steel is used successfully.

The stem, the process connection and the case of the instrument are made from stainless steel. To allow optimum fitting to the process, individual insertion lengths and process connections are available. The thermometers have a high ingress protection of IP65 and can be used in outdoor applications even at negative temperatures. With liquid damping operation under high vibration conditions is possible. Due to the wide variety of possible designs, the model 73 gas-actuated thermometers can be perfectly adapted to any process connection or location.



Fig. left: lower mount (radial), model R73.100

Fig. centre: with capillary and instrument mounting bracket, model F73.100

Fig. right: adjustable stem and dial version, model S73.100

With the adjustable stem and dial version, the case can be adjusted precisely to the desired viewing angle. With the contact bulb version, temperature measurements are possible without any contact with the medium, even when the pipe diameter is extremely small. The contact bulb is intended for external mounting on pipes and 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.

Standard version

Measuring principle

Gas-pressure inert gas filling, physiologically safe

Nominal size in mm

100, 160

Connection designs

S Standard (threaded connection) ¹⁾

- 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 ¹⁾

1) Not for version with capillary

Model overview

Model	NS	Version
A73.100	100	Back mount (axial)
A73.160	160	
R73.100	100	Lower mount (radial)
R73.160	160	
S73.100	100	Back mount, adjustable stem and dial
S73.160	160	
F73.100	100	Version with capillary
F73.160	160	

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, ring

Stainless steel 1.4301

Stem, process connection

Stainless steel 316SS

Adjustable stem and dial version

Stainless steel

swivelling 90°

rotatable 360°

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 customer specification

Smallest possible bending radius:

- Capillary without spiral protective sleeve: 6 mm
- Capillary with spiral protective sleeve: 20 mm
- Capillary with spiral protective sleeve and PVC coated: 30 mm

Dial

Aluminium white, black lettering

Window

Laminated safety glass

Pointer

Aluminium, black, micro adjustment

Temperature limits for storage and transport

-50 ... +70 °C without liquid damping

-40 ... +70 °C with liquid damping

Permissible ambient temperature

-40 ... +60 °C without/with liquid damping

Permissible operating pressure at the stem

max. 25 bar, static

Ingress protection

IP65 per IEC/EN 60529

Mounting types for F73.xxx

- Surface mounting flange, stainless steel
- Instrument mounting bracket, aluminium die-casting
- Panel mounting flange, stainless steel
- Triangular bezel with clamp, stainless steel

Options

- Scale range °F, °C/°F (dual scale)
- Case with liquid damping
- Case with food-compatible 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)
- Ingress protection IP66
- Thermometer with switch contacts (data sheet TV 27.01)
- Special measuring ranges or dial printing to customer specifications (on request)
- Version per ATEX
- Ambient temperature: -50 ... +60 °C
- Movement entirely from stainless steel

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 ±°C
-200 ... +50	-170 ... +20	5	5
-200 ... +100	-170 ... +70	5	5
-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

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.

Minimum insertion lengths

Models A73 (back mount) and R73 (lower mount)

Design	1			2 and 3			S, 4 and 5		
Stem diameter	6	8	>10	6	8	>10	6	8	>10
Scale range in °C									
-200 ... +50	60			60			60		
-200 ... +100	60			60			60		
-80 ... +60	60			60			60		
-60 ... +40	75	60		75	60		70	60	
-40 ... +60	85	60		70	60		80	60	
-30 ... +50	85	60		65	60		75	60	
-20 ... +60	90	60		70	60		80	60	
-20 ... +80	90	60		65	60		80	60	
0 ... 60	150	90	70	150	70	60	140	80	60
0 ... 80	100	70	60	80	60		90	60	
0 ... 100	90	65	60	70	60		85	60	
0 ... 120	75	60		60			70	60	
0 ... 160	65	60		60			60		
0 ... 200	70	60		60			60		
0 ... 250	60			60			60		

Model S73 (back mount, adjustable stem and dial)

Design	1			2 and 3			S, 4 and 5		
Stem diameter	6	8	>10	6	8	>10	6	8	>10
Scale range in °C									
-200 ... +50	60			60			60		
-200 ... +100	60			60			60		
-80 ... +60	60			60			60		
-60 ... +40	60			60			70	60	
-40 ... +60	70	60		70	60		80	60	
-30 ... +50	70	60		70	60		75	60	
-20 ... +60	75	60		75	60		80	60	
-20 ... +80	70	60		70	60		80	60	
0 ... 60	130	80	60	130	80	60	130	80	70
0 ... 80	85	60		85	60		90	60	
0 ... 100	80	60		80	60		85	60	
0 ... 120	60			60			65	60	
0 ... 160	60			60			60		
0 ... 200	60			60			60		
0 ... 250	60			60			60		

Model F73 (version with capillary)

Capillary in m	1 ... 5			1 ... 10			1 ... 15		
Stem diameter	6	8	>10	6	8	>10	6	8	>10
Scale range in °C									
-200 ... +50	60			60			60		
-200 ... +100	60			60			60		
-80 ... +60	60			60			60		
-60 ... +40	75	60		90	60		100	65	60
-40 ... +60	85	60		85	60		105	70	60
-30 ... +50	90	60		100	60		110	70	60
-20 ... +60	95	60		105	60		120	75	60
-20 ... +80	90	60		105	60		120	75	60
0 ... 60	145	90	65	165	100	70	185	110	75
0 ... 80	105	70	60	120	75	60	135	85	60
0 ... 100	100	65	60	120	75	60	125	80	60
0 ... 120	80	60		90	60		105	60	
0 ... 160	65	60		75	60		85	60	
0 ... 200	80	60		95	65	60	115	65	60
0 ... 250	70	60		85	60		100	65	60
0 ... 300	60			60			65	60	
0 ... 400	60			65	60		75	60	
0 ... 500	75	60		105	70	60	130	80	60
0 ... 600	60			60			60		
0 ... 700	65	60		65	60		110	60	

The technical feasibility of minimum insertion lengths in conjunction with capillary > 15 m should be tested beforehand.

Temperature range > 300 °C (models A73, R73, S73)

Design	S	1	2	3	4 and 5
Scale range in °C					
0 ... 300, 0 ... 400	75	90	60	80	60
0 ... 500, 0 ... 600, 0 ... 700	115	130	100	120	95

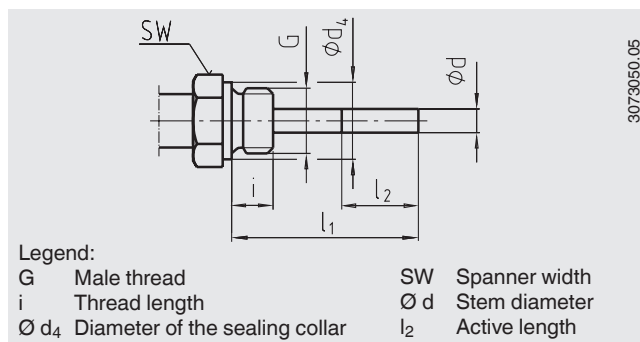
Connection designs

Standard design (male threaded connection) ¹⁾

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

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

1) Not for version with capillary (F73.xxx)

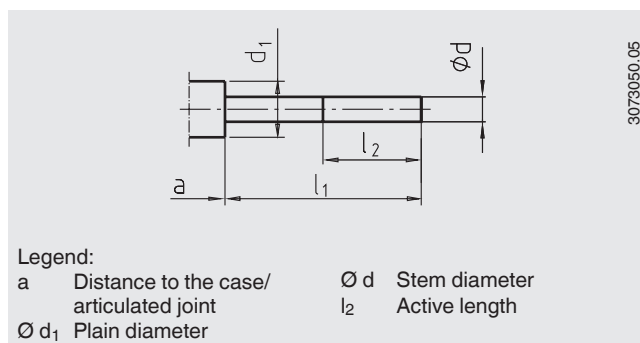


Design 1, plain stem (without thread)

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

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

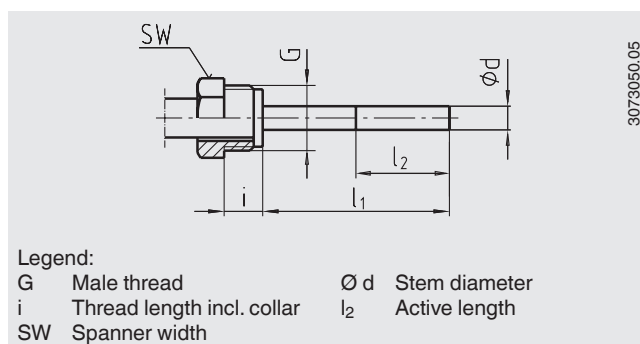
2) Not applicable to version with capillary



Design 2, male nut

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

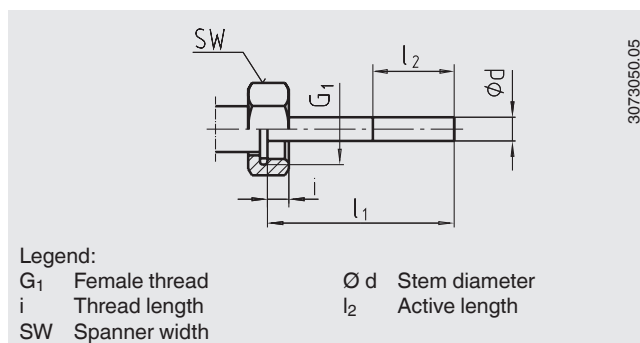
Nominal size	Process connection	Dimensions in mm		
NS	G	i	SW	$\varnothing d$
100, 160	G ½ B	20	27	8
	M20 x 1.5	15	22	8



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 ½ B	8.5	27	8
	G ¾ B	10.5	32	8
	M24 x 1.5	13.5	32	8

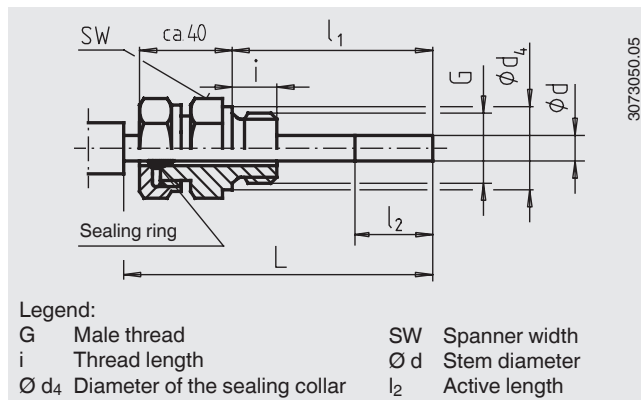


Design 4, compression fitting (sliding on stem)

Insertion length l_1 = variable

Length $L = l_1 + 40$ mm

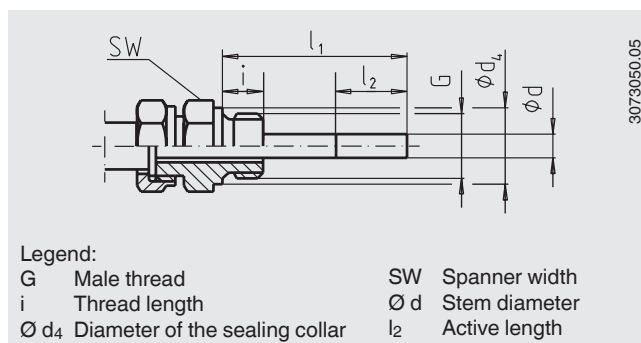
Nominal size	Process connection		Dimensions in mm		
NS	G	i	SW	$\varnothing d_4$	$\varnothing d$
100, 160	G ½ B	14	27	26	8
	G ¾ B	16	32	32	8
	M18 x 1.5	12	24	23	8
	½ NPT	19	22	-	8
	¾ NPT	20	30	-	8



Design 5, union nut and loose threaded connection

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

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

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

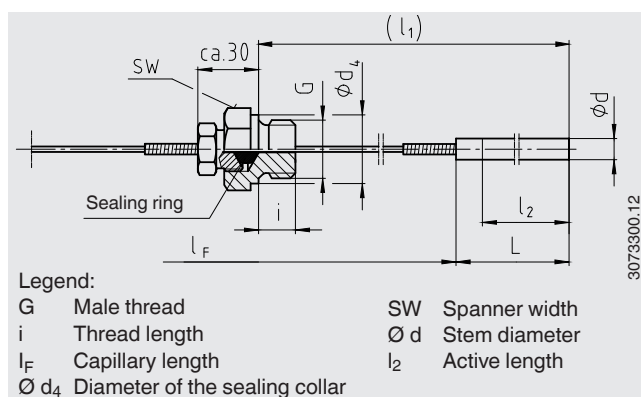
Insertion length l_1 = variable

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

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

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

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



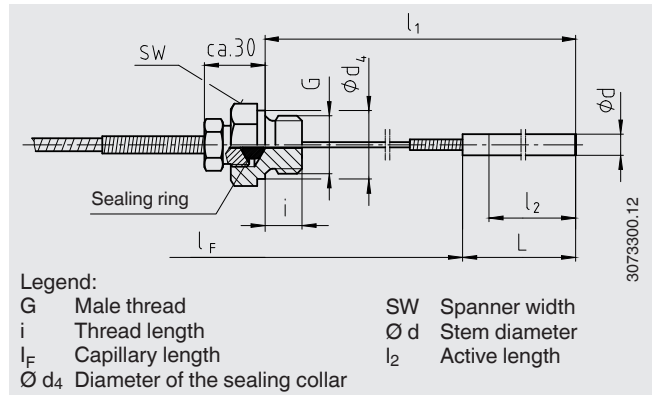
For stem diameter 6 mm no bend protection spring will be fitted at the probe.

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

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

Sensor length L: Standard 200 mm for $\varnothing d = 6$ mm
Standard 170 mm for $\varnothing d = 8$ mm
Standard 100 mm for $\varnothing d \geq 10$ mm

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



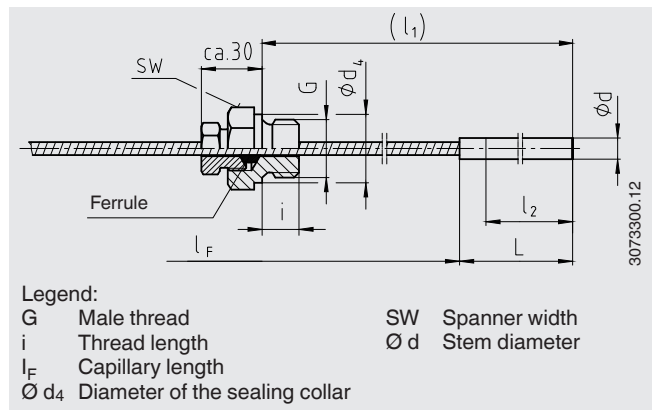
For stem diameter 6 mm no bend protection spring will be fitted at the probe.

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 for $\varnothing d = 6$ mm
Standard 170 mm for $\varnothing d = 8$ mm
Standard 100 mm for $\varnothing d \geq 10$ mm

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



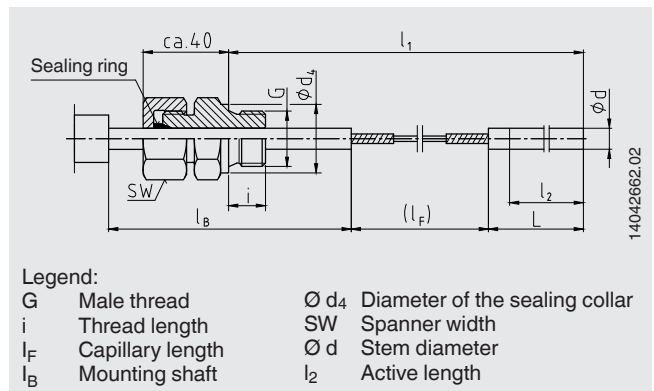
Design 7, compression fitting at the case

Insertion length l_1 : ≥ 400 mm

Sensor length L: Standard 200 mm for $\varnothing d = 6$ mm
Standard 170 mm for $\varnothing d = 8$ mm
Standard 100 mm for $\varnothing d \geq 10$ 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



For stem diameter 6 mm no bend protection spring will be fitted at the probe.

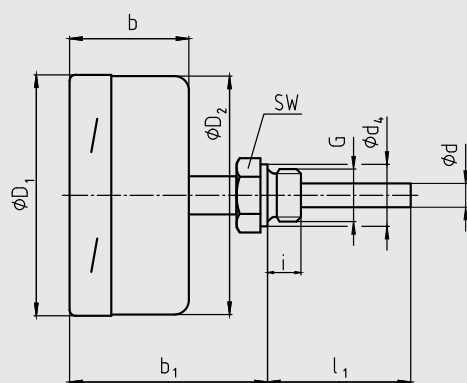
Note for designs 6.1, 6.2, 6.3 and 7:

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.

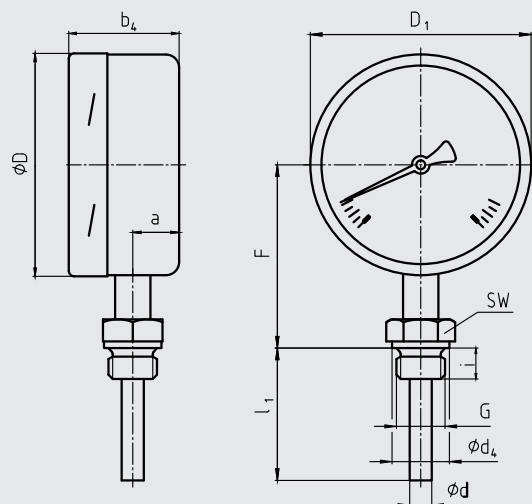
Dimensions in mm

Model A73, back mount



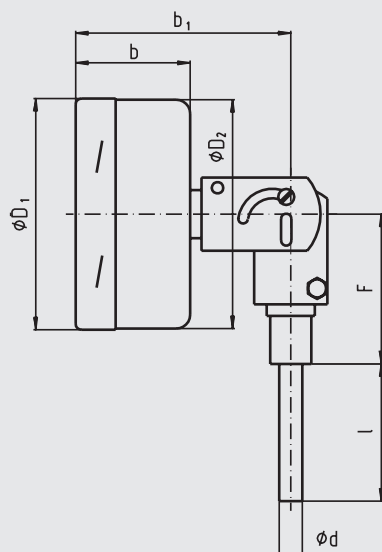
3073068.01

Model R73, lower mount



3073076.01

Model S73, back mount, adjustable stem and dial



3073254.01

Table of dimensions for models A73 and R73

Nominal size	Dimensions in mm										Weight in kg
NS	b	b ₁ ¹⁾	d	d ₄	D ₁	D ₂	F ¹⁾	i	G	SW	
100	50	83	8 ²⁾	26	101	99	83	14	G ½ B	27	1.1
160	50	83	8 ²⁾	26	161	159	113	14	G ½ B	27	1.4

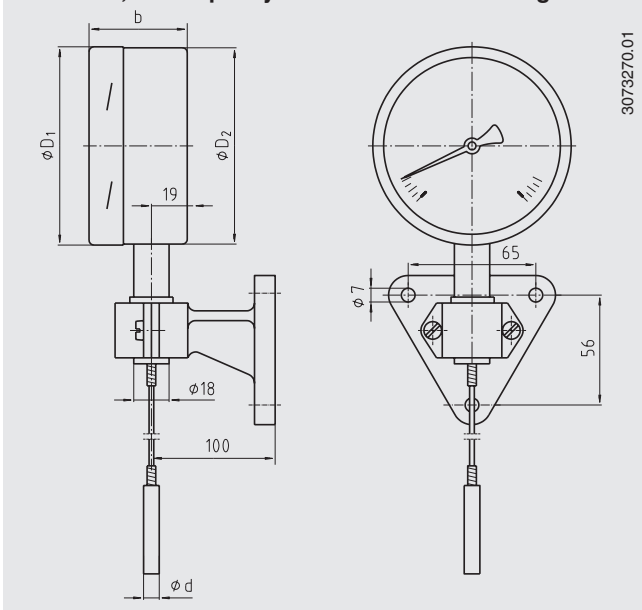
Table of dimensions for model S73

Nominal size	Dimensions in mm						Weight in kg
NS	b	b ₁	d	D ₁	D ₂	F	
100	50	93	8 ²⁾	101	99	68	1.3
160	50	93	8 ²⁾	161	159	68	1.6

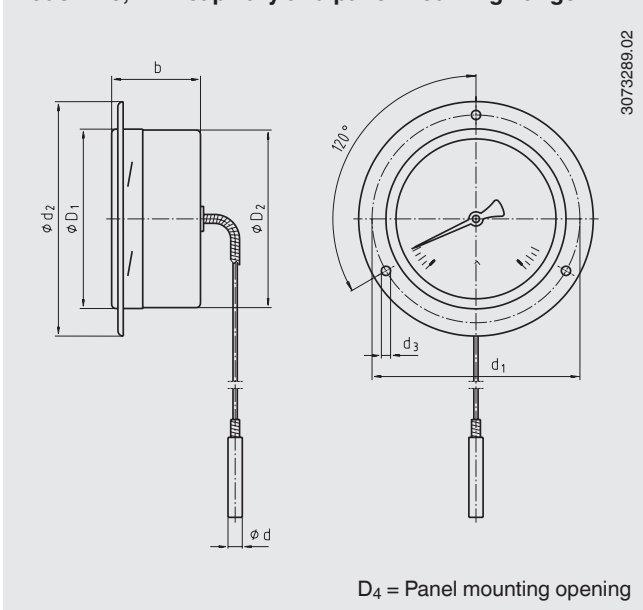
1) With scale ranges $\geq 0 \dots 300^\circ\text{C}$, $-200 \dots +50^\circ\text{C}$ or $-200 \dots +100^\circ\text{C}$ the dimensions increase by 40 mm

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

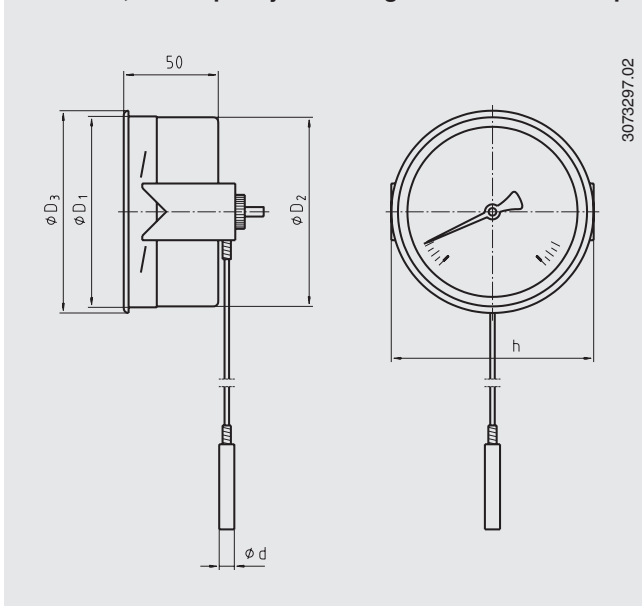
Model F73, with capillary and instrument mounting bracket



Model F73, with capillary and panel mounting flange



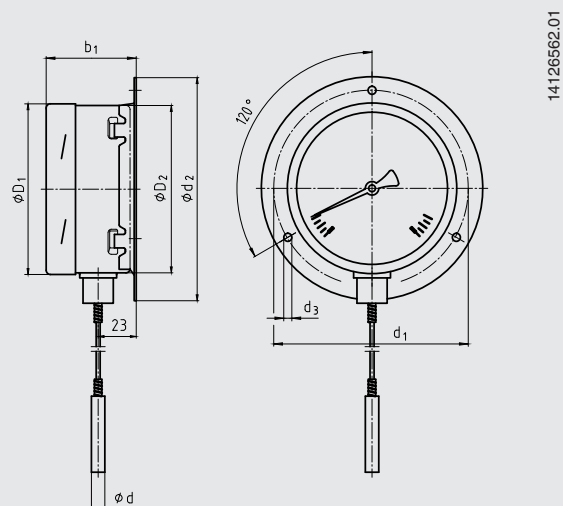
Model F73, with capillary and triangular bezel with clamp



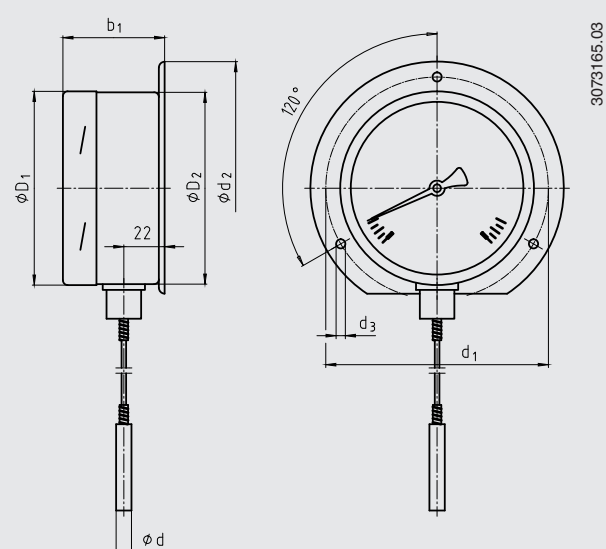
Nominal size	Dimensions in mm										Weight in kg
NS	b	d	d ₁	d ₂	d ₃	D ₁	D ₂	D ₃	D ₄	h	
100	50	8 ²⁾	116	132	4.8	101	99	107	104	110	1.4
160	50	8 ²⁾	178	196	4.8	161	159	166	164	173	1.8

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

Model F73.100, with capillary and surface mounting flange



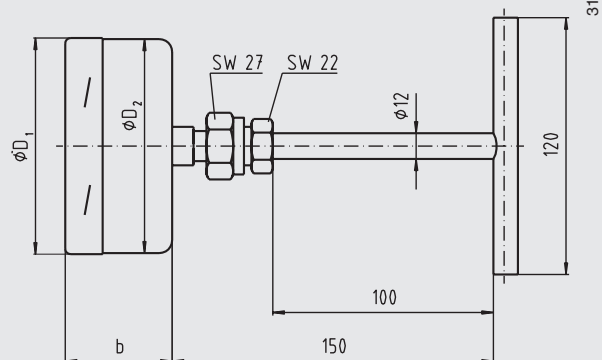
Model F73.160, with capillary and surface mounting flange



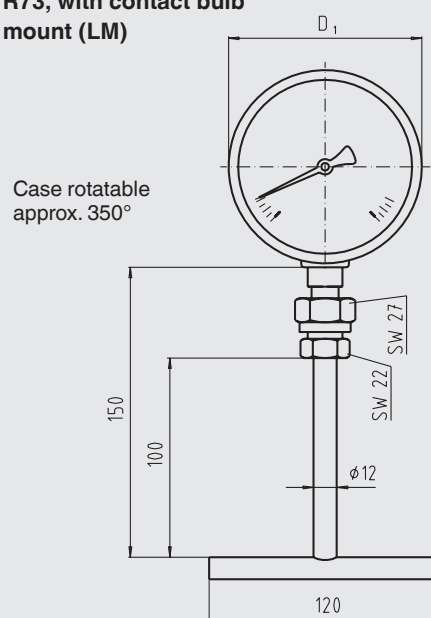
Nominal size	Dimensions in mm							Weight in kg
NS	b_1	d	d_1	d_2	d_3	D_1	D_2	
100	54	8	117	132	4.8	101	99	1.4
160	53	8 ²⁾	178	196	4.8	161	159	1.8

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

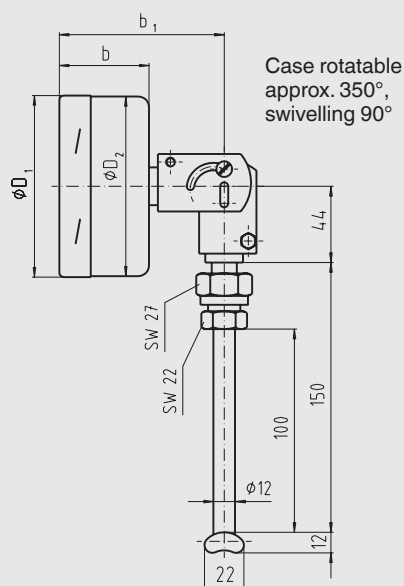
Model A73, with contact bulb
Back mount (BM)



Model R73, with contact bulb
Lower mount (LM)

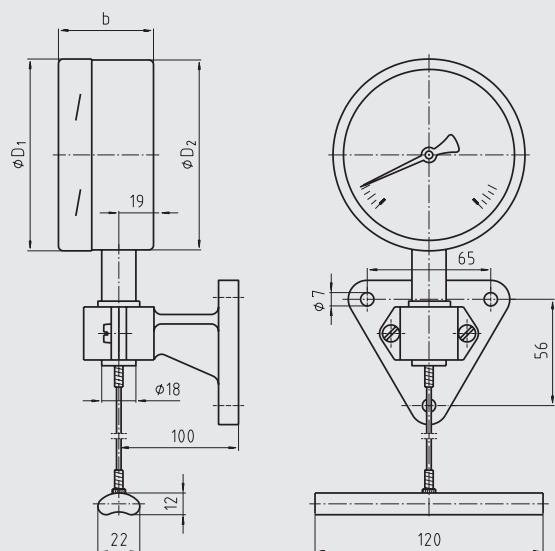


Model S73, with contact bulb
Back mount, adjustable stem and dial



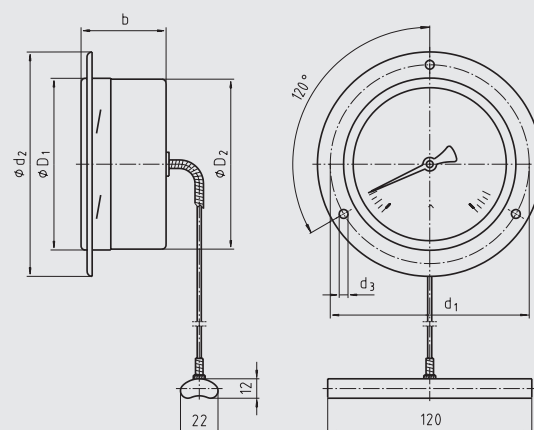
Model	Nominal size	Dimensions in mm				Weight in kg
	NS	b	b ₁	D ₁	D ₂	
A73.100	100	50	-	101	99	0.8
A73.160	160	50	-	161	159	0.9
R73.100	100	50	-	101	99	0.8
R73.160	160	50	-	161	159	0.9
S73.100	100	50	93	101	99	0.9
S73.160	160	50	93	161	159	1.0

Model F73, with contact bulb
Capillary and instrument mounting bracket



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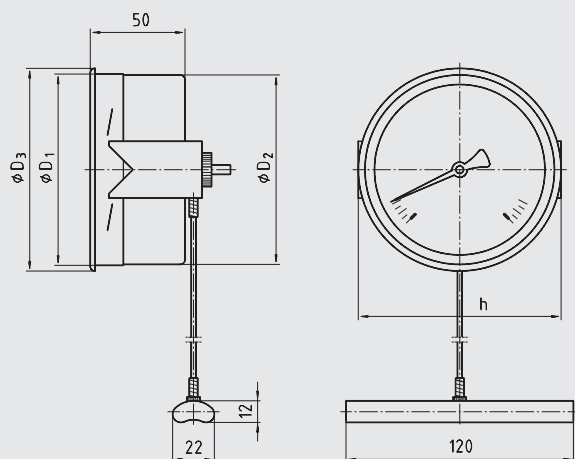
Model F73, with contact bulb
Capillary and panel mounting flange



3107965.01

D₄ = Panel mounting opening

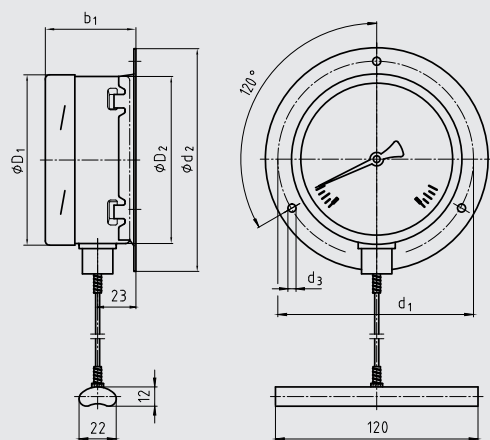
Model F73, with contact bulb
Capillary and triangular bezel with clamp



3107973.01

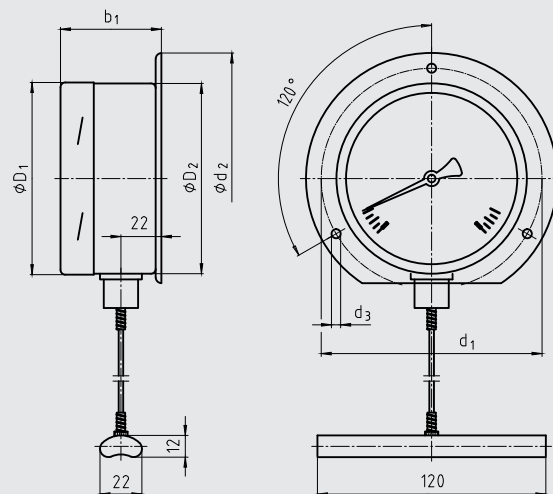
Nominal size	Dimensions in mm									Weight in kg
NS	b	d ₁	d ₂	d ₃	D ₁	D ₂	D ₃	D ₄	h	
100	50	116	132	4.8	101	99	107	104	110	1.4
160	50	178	196	5.8	161	159	166	164	173	1.8

Model F73.100, with contact bulb
Capillary and surface mounting flange



14126563.01

Model F73.160, with contact bulb
Capillary and surface mounting flange



3107949.02

Nominal size	Dimensions in mm						Weight in kg
NS	b_1	d_1	d_2	d_3	D_1	D_2	
100	54	117	132	4.8	101	99	1.4
160	53	178	196	5.8	161	159	1.8

Mounting instructions for contact bulb

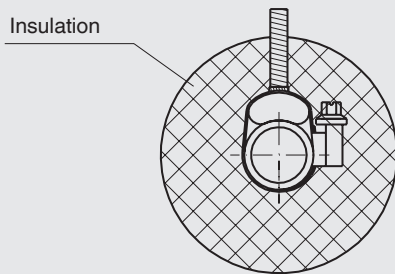
General information

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.

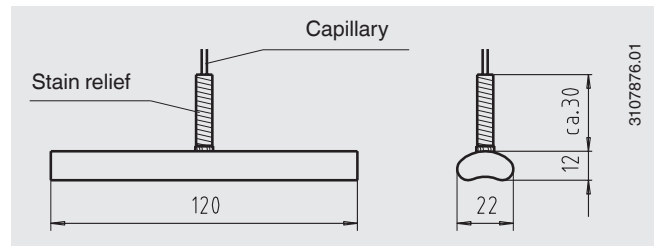
■ Mounting on pipes

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.

Pipe clamp mounting



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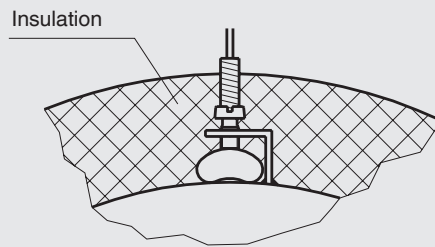


■ Mounting on tanks

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.

Angle bracket mounting



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Thermowell

In principle, the operation of a mechanical thermometer without a thermowell is possible 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
	EU declaration of conformity ATEX directive (option) Hazardous areas Zone 1 gas II 2G Ex h IIC T6 ... T1 Gb X Zone 21 dust II 2D Ex h IIIC T85 ... T450 °C Db X	European Union
	EAC (option) ■ Import certificate ■ EMC directive ■ Hazardous areas Zone 1 gas [II Gb c T* X] Zone 21 dust [III Db c T* X IP66]	Eurasian Economic Community
	GOST (option) Metrology, measurement technology	Russia
	KazInMetr (option) Metrology, measurement technology	Kazakhstan
-	MTSCHS (option) Permission for commissioning	Kazakhstan
	BelGIM (option) Metrology, measurement technology	Belarus
	Uzstandard (option) Metrology, measurement technology	Uzbekistan
-	CRN (option) Safety (e.g. electr. safety, overpressure, ...)	Canada

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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We reserve the right to make modifications to the specifications and materials.



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