Resistance thermometer with digital display
Model TR75, battery operation

DiwiTherm®

Applications

- Machine building, plant and vessel construction
- Chemical industry
- Food and beverage industry
- Automotive engineering
- Sanitary, heating and air-conditioning technology

Special features

- LC display
- Versions with sensors for insertion, mounting into a thermowell or with contact bulb for mounting on a pipe surface
- For all standard thermowell designs
- Measuring range -40 ... +450 °C (-40 ... +842 °F)
- With automatic measuring range changeover (autorange)

Resistance thermometer, battery operation, model TR75

Description

The DiwiTherm® is the ideal combination of a digital display and a resistance thermometer. This compact temperature measuring instrument can be used in a wide range of applications and works without an external power supply.

A wide variety of possibilities for the combination of insertion length, neck length, connection to thermowell etc. are available for the thermometers, suitable for any thermowell dimension and the widest range of applications.

Operation without thermowell is only recommended in certain applications.

Optionally, the DiwiTherm® can be manufactured with a process connection for measuring the temperature on a pipe surface.

Specifications

Resistance thermometer with digital display, model TR75	
Measuring ranges	-40.0 ... +199.9 °C / +200 ... +450 °C with automatic measuring range changeover (autorange)
Display ■ Principle ■ Resolution ■ Accuracy	 3 ½- digit LCD, 7-segment display, 21 mm high 0.1 K up to 199.9 °C; 1 K from 200 °C 0.5 % of the respective full-range value ±1 digit
Sensor	Pt1000
Instrument variants	
■ DiwiTherm® with sensor for insertion	Sensor with connection cable Max. working temperature 200 °C Case for panel mounting, with panel mounting flange
■ DiwiTherm® for mounting in a thermowell	Spring-loaded sensor Screwed plug to thermowell Case with neck tube Option: Adjustable stem and dial (rotatable through 360° and tiltable through 90°)
■ DiwiTherm® for mounting on a pipe surface	Contact bulb for fixing with tightening strap Max. working temperature 200 °C Case with neck tube Option: Adjustable stem and dial (rotatable through 360° and tiltable through 90°) Case for panel mounting, with connection cable and panel mounting flange
Power supply U_B	DC 3.6 V from 3.6 V lithium battery, AA size (Mignon), included in delivery [1]
Operating time	min. 10 years
Special features	If the battery drops below 2.7 V, the display switches into “LO” mode

Case	
Nominal size	100
Material	Stainless steel
Bezel ring	Bayonet ring
Bezel ring	Instrument glass
Ingress protection	IP65 per IEC/EN 60529
Weight in kg	approx. 1 kg (actual weight depends on design and possibly mounted thermowell)

Ambient conditions	
Ambient and storage temperature	-20 ... +60 °C
Vibration resistance (at sensor)	10 ... 500 Hz, 5 g, IEC/EN 60068-2-6
Shock resistance (at sensor)	IEC/EN 60068-2-7

1) Not replaceable by the customer.

Approvals

Logo	Description	Country
CE	**EU declaration of conformity** ■ EMC directive EN 61326 emission (group 1, class B) and interference immunity (industrial application)	European Union
EAC	**EAC (option)** ■ Import certificate ■ Electromagnetic compatibility	Eurasian Economic Community
	KazInMetr (option) Metrology, measurement technology	Kazakhstan
-	**MTSCHS (option)** Permission for commissioning	Kazakhstan
	BelGIM (option) Metrology, measurement technology	Belarus
	Uzstandard (option) Metrology, measurement technology	Uzbekistan

Certificates (option)

Certification type	Measuring accuracy	Material certificate
2.2 test report	x	x
3.1 inspection certificate	x	-
DKD/DAkkS calibration certificate	x	-

The different certifications can be combined with each other.

Approvals and certificates, see website

DiwiTherm® with sensor for insertion

Sensor
Material: stainless steel
Diameter: 2 mm, 3 mm, 6 mm or 8 mm
Length: selectable
Regardless of the design, the first 60 mm of the sensor tip must not be bent.

For temperature measurement in a solid body, the diameter of the bore into which the sensor should be inserted, should be no more than 1 mm larger than the sensor diameter.

- **Tubular design (sensor length A < 400 mm, sensor diameter ≥ 6 mm)**

The tubular design features a rigid construction to the metal sensor tip; therefore tubular designs must not be bent. Internally, the measuring resistor is connected directly to an insulated lead, therefore tubular-design cable resistance thermometers can only be used up to the temperatures specified for the lead (see working temperatures).

- **Sheathed design (sensor length A > 400 mm, sensor diameter < 6 mm, measuring range > 200 °C)**

In sheathed resistance thermometers the flexible part of the sensor is a mineral-insulated cable (sheathed cable).
It consists of a stainless steel outer sheath, which contains the insulated internal leads, embedded within a high-density ceramic compound.

The measuring resistor is connected directly to the internal leads of the sheathed cable and is, therefore, also suitable for use at higher temperatures.
Due to their flexibility and the small possible diameters, sheathed resistance thermometers can also be used in locations that are not easily accessible, since, with the exception of the sensor tip and the transition sleeve of the connection cable, the sheath can be bent to a radius of three times the diameter of the cable.

Please note:
The flexibility of the sheathed resistance thermometer must be considered, especially when the flow rates are relatively high.

Transition
The junction between the metal part of the sensor and the connecting cable should not be immersed within the process and must not be bent. Compression fittings should not be attached to the transition sleeve.

The dimension T describes the length of the transition sleeve.

Criterion	Dimension T [1] in mm	Ø transition sleeve in mm
Sensor Ø = transition sleeve Ø	n/a	Identical to sensor
Ø 6 mm with crimped transition sleeve	45	7
Ø 6 mm with crimped transition sleeve [2]	45	8
Ø 8 mm with crimped transition sleeve	45	10

1) The transition sleeve is generally 60 mm long for 2 x 4-wire sensor connection method.
2) With a large number of wires (e.g. 2 x 3-wire and shielding)

The sensor diameter should be approx. 1 mm smaller than the bore diameter of the thermowell or the blind bore, respectively.

Gaps of more than 0.5 mm between thermowell and the sensor will have a negative effect on the heat transfer, and they will result in unfavourable response behaviour of the thermometer.

Sensor lengths

Sensor Ø in mm	Standard sensor lengths A in mm		
6	50	100	150
8	-	100	150

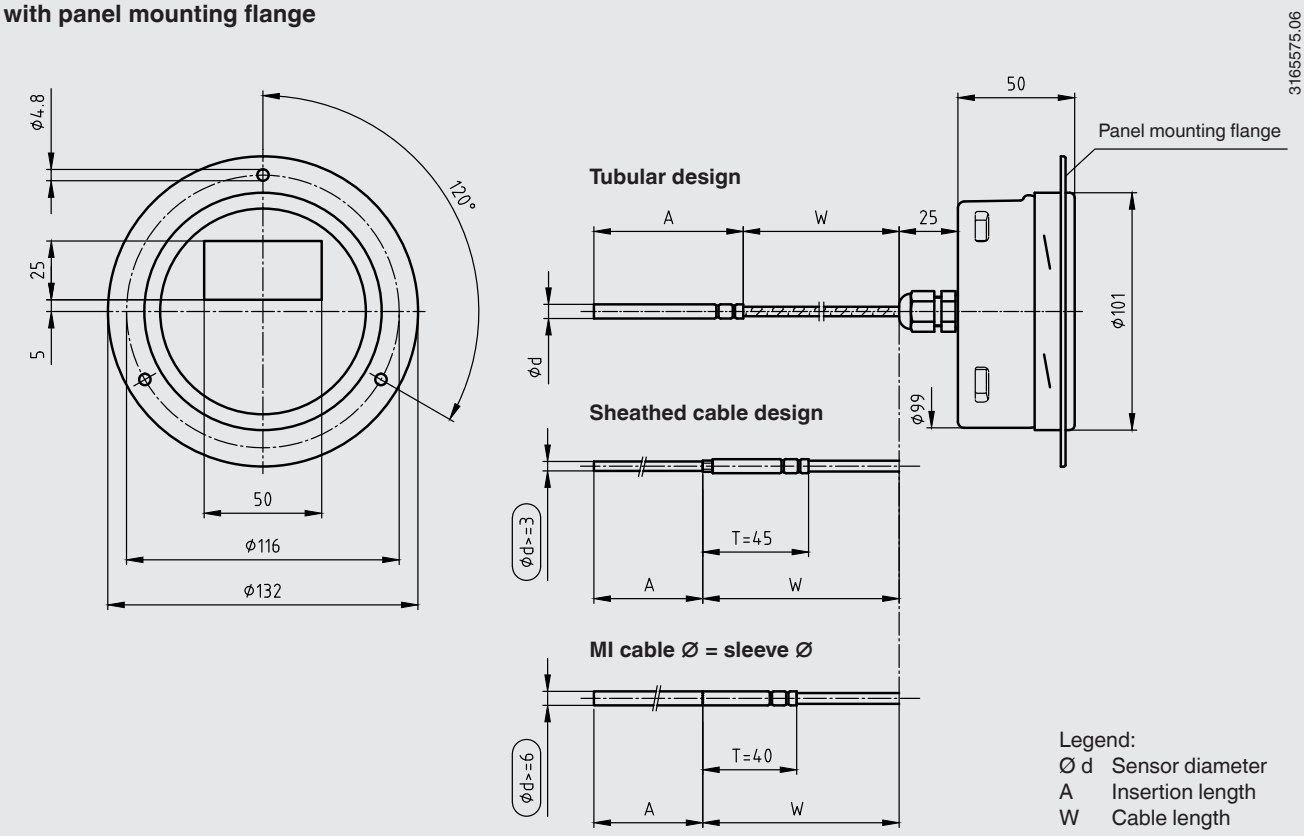
Special lengths are possible.

Process connection
A compression fitting enables simple, on-site adjustment to the required insertion length.

Compression fitting
Material: stainless steel
G ¼ B male thread (not with Ø 8 mm sensors) or G ½ B
Delivery also possible without process connection.

Cable
Silicone, shielded, application range -40 ... +200 °C with EMC cable gland
Cable length to customer specification.

DiwiTherm® battery operation, model TR75 with sensor for insertion, rear cable outlet, with panel mounting flange



DiwiTherm® for mounting in a thermowell

Sensor
Material: stainless steel
The sensor is made from vibration-resistant, sheathed cable (MI cable).

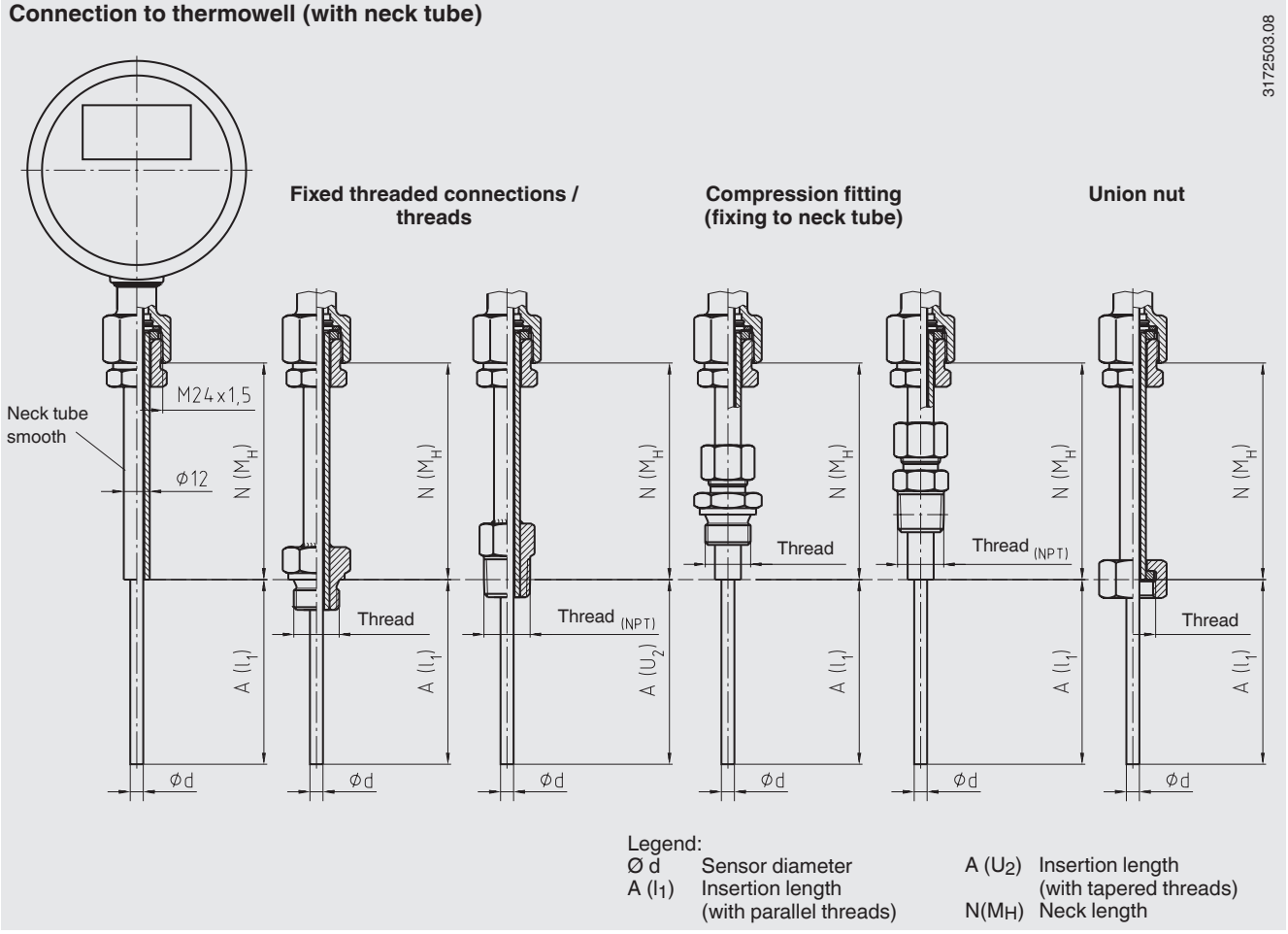
The sensor diameter should be approx. 1 mm smaller than the bore diameter of the thermowell.
Gaps of more than 0.5 mm between thermowell and the sensor will have a negative effect on the heat transfer, and they will result in unfavourable response behaviour of the thermometer.

When fitting the measuring insert into a thermowell, it is very important to determine the correct insertion length (= thermowell length for bottom thicknesses of ≤ 5.5 mm). In order to ensure that the sensor is firmly pressed down onto the bottom of the thermowell, the sensor must be spring-loaded (spring travel: max 10 mm).

Process connection (standard process connection)
Material: stainless steel
Screwed plug: G ½ B
M14 x 1.5
M18 x 1.5
½ NPT
Union nut: G ½ B
Male nut: G ½ B

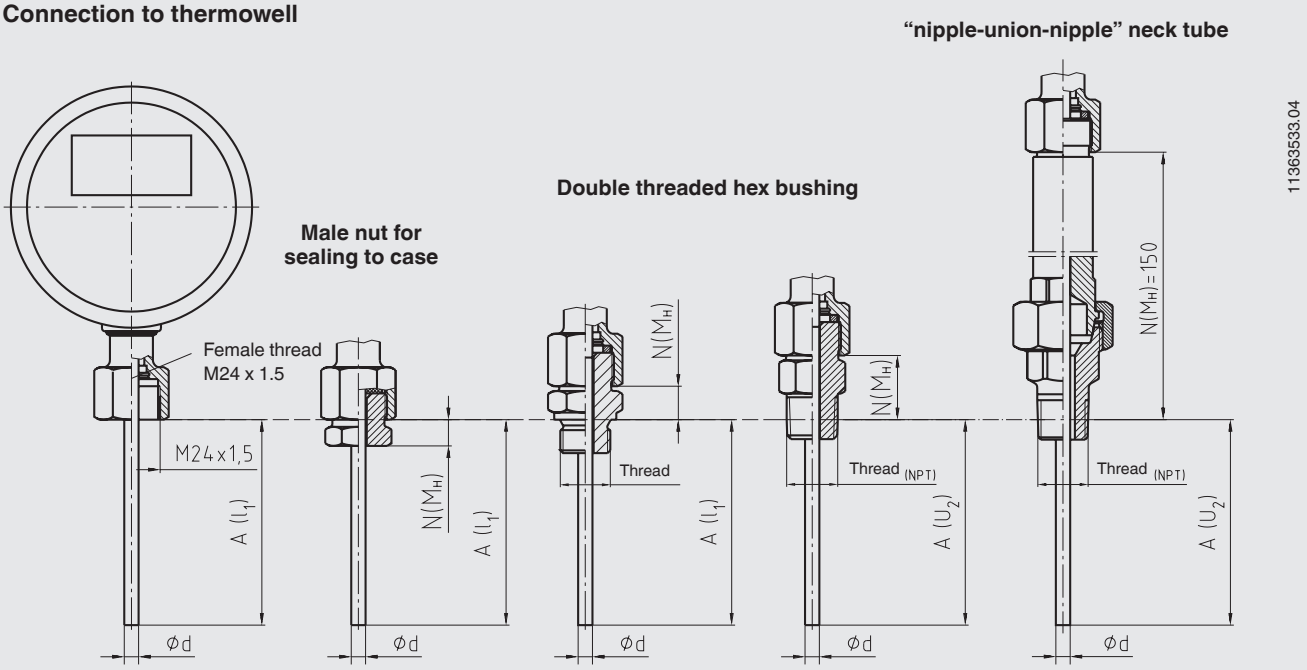
Neck tube
Material: stainless steel
Neck tube diameter: 12 mm
Standard neck length: 150 mm
others on request
(minimum neck length: 30 mm)

Connection to thermowell (with neck tube)



Legend:
Ø d Sensor diameter
A (l_1) Insertion length (with parallel threads)
A (U_2) Insertion length (with tapered threads)
N(M_H) Neck length

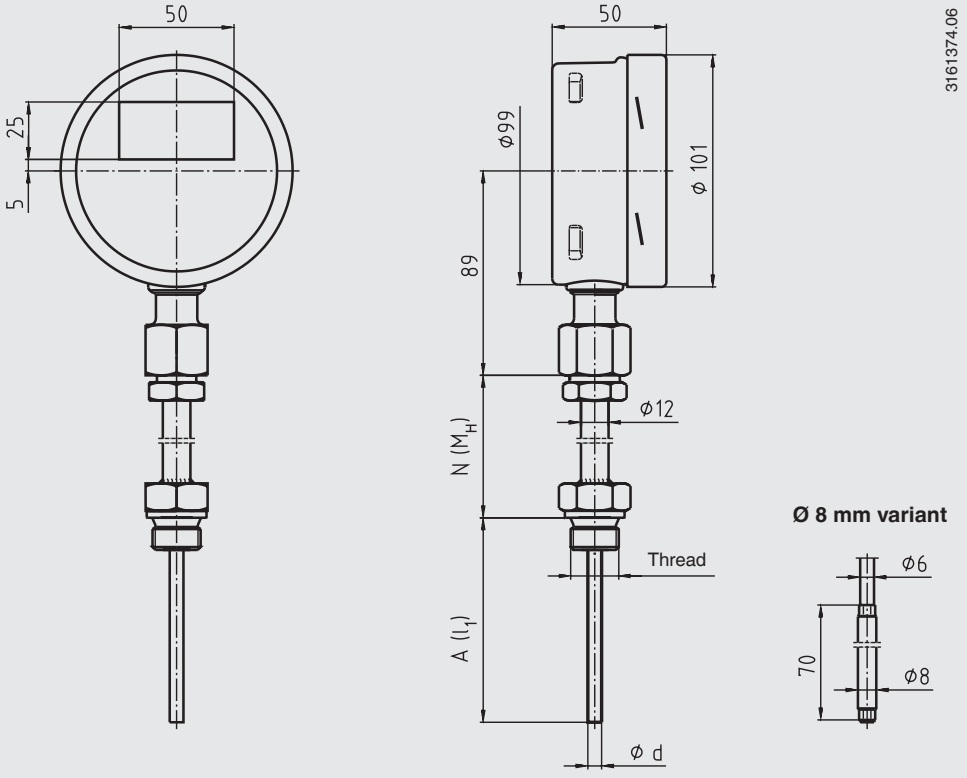
Connection to thermowell



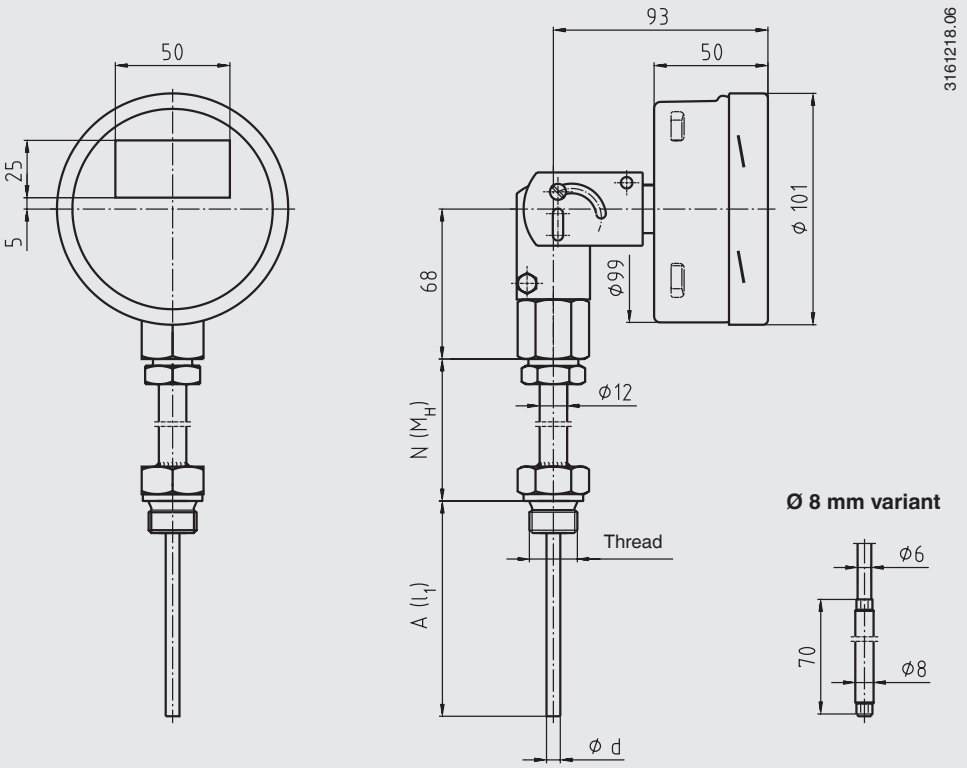
Legend:

Ø d	Sensor diameter	A (U_2)	Insertion length (with tapered threads)
A (l_1)	Insertion length (with parallel threads)	N(M_H)	Neck length

DiwiTherm® model TR75 for mounting in a thermowell, with neck tube
Connection from case to neck tube: fixed, lower mount



DiwiTherm® model TR75 for mounting in a thermowell, with neck tube
Connection from case to neck tube: adjustable stem and dial, centre back mount

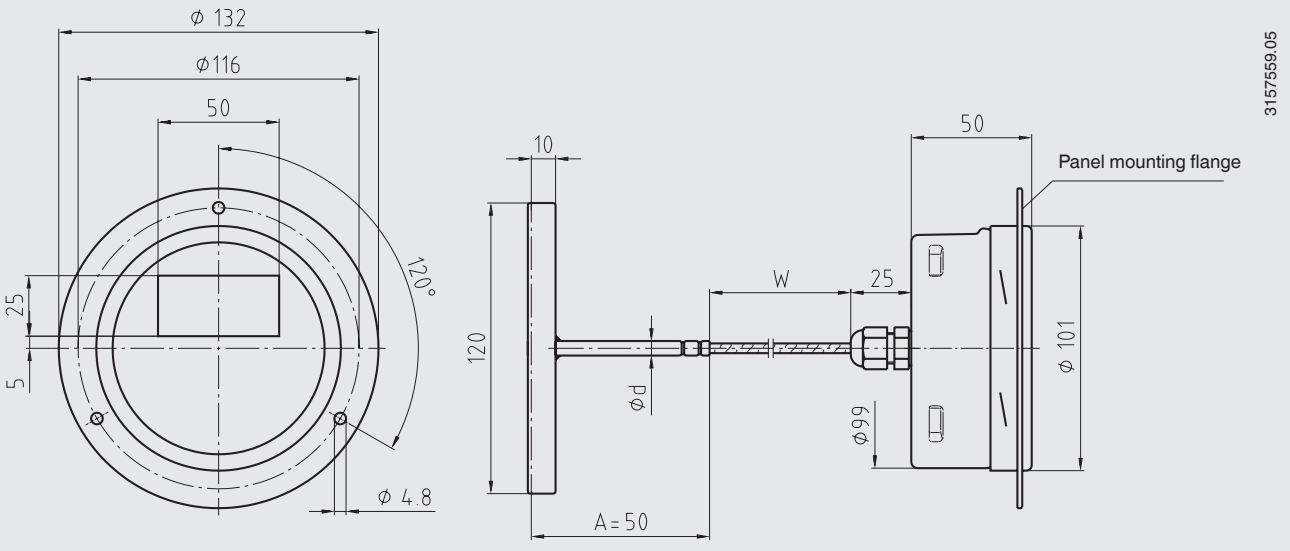


DiwiTherm® for mounting on a pipe surface

Contact bulb
Material: stainless steel
Mounting tube: 120 mm
Fixing with a tightening strap (not included in delivery)

Cable
Silicone, shielded, application range -40 ... +200 °C
Cable length to customer specification
The specified accuracy can only be guaranteed up to a maximum cable length of 15 m. With longer cable lengths, the accuracy can deviate sharply.

DiwiTherm® model TR75 for mounting on a pipe surface, rear cable outlet, with panel mounting flange

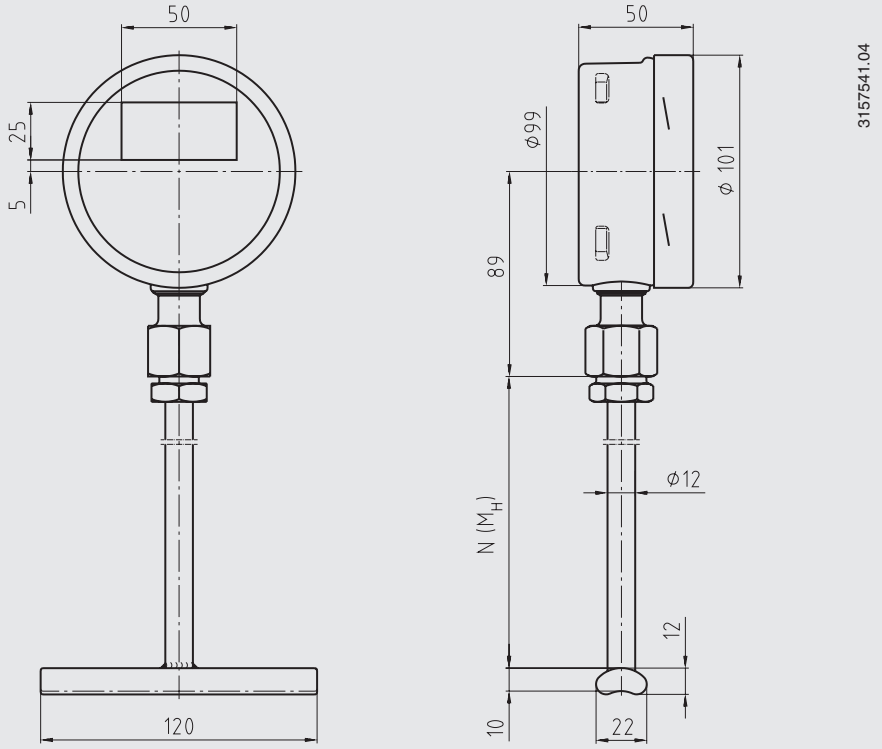


Neck tube

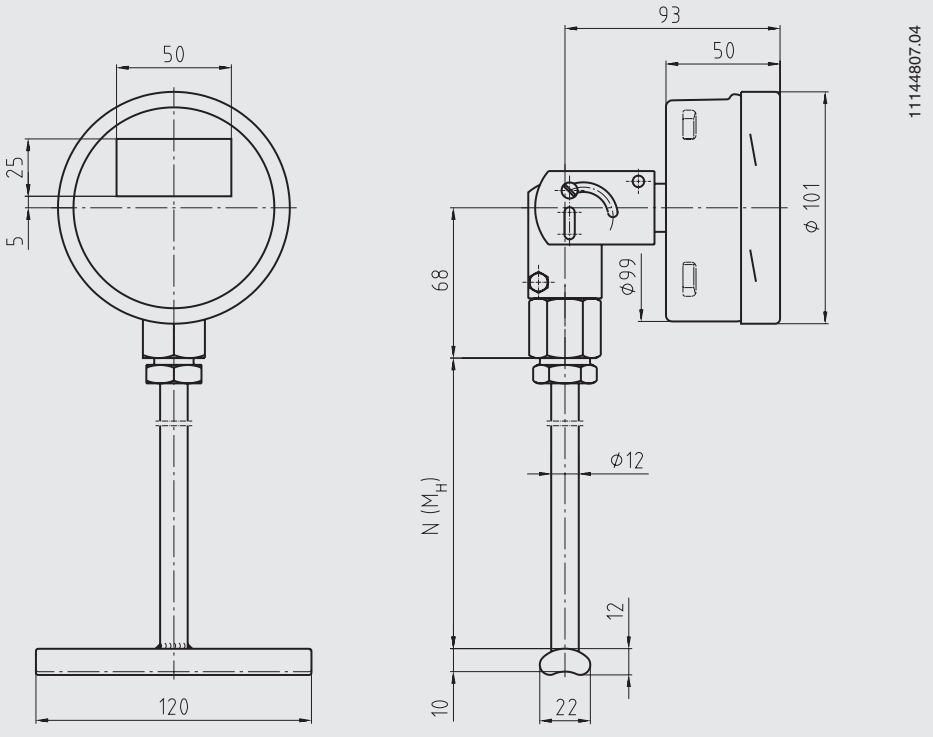
Material: stainless steel
Neck tube diameter: 12 mm
Application range: -40 ... +200 °C

Standard neck length: 150 mm
others on request (minimum neck length: 100 mm)

DiwiTherm® model TR75 for mounting on a pipe surface, with neck tube
Connection from case to neck tube: fixed, lower mount



DiwiTherm® model TR75 for mounting on a pipe surface, with neck tube
Connection from case to neck tube: adjustable stem and dial, centre back mount



Mounting instructions for contact bulb

General information

The contact bulb has been designed for surface mounting on pipes or tanks. The basic requirements to ensure a perfect measurement result is to retain good thermal contact between the sensor and the outside wall of the vessel or pipe as well as a heat loss as low as possible from the sensor and the measuring point to the environment.

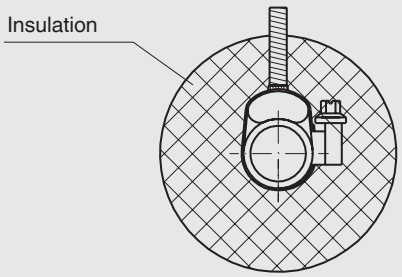
The sensor should have direct, metallic contact with the measuring point and sit firmly on the surface of the measuring point.

A heat conductive paste can be used to optimise the heat transmission between contact bulb and vessel, 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.

■ 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.

Pipe clamp mounting



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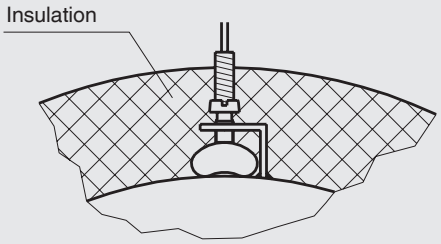
■ Mounting on tanks

The geometry of the contact bulb has been designed for vessels with an external diameter up to 160 mm. If the mounting point of the skin mounting contact bulb on the tank has an external radius greater than 160 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.

Angle bracket mounting



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Ordering information

Model / Instrument design / Process connection / Neck length N(MH) / Connection cable, sheathed cable / Sensor diameter Ø d / Insertion length A / Certificates / Options

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