

# Resistance thermometer with digital display

## Battery operation

### Model TR75

WIKA data sheet TE 60.75



for further approvals  
see page 11

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 probes 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)

#### 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.



Resistance thermometer, battery operation, model TR75

## Specifications

Resistance thermometer with digital display, model TR75	
<b>Measuring ranges</b>	<ul style="list-style-type: none"> <li>■ -40.0 ... +199.9 °C</li> <li>■ +200 ... +450 °C</li> </ul> with automatic measuring range changeover (autorange)
<b>Display</b>	
Principle	3 ½- digit LCD 7-segment display 21 mm high
Resolution	0.1 K up to 199.9 °C 1 K from 200 °C
Accuracy	0.5 % of the respective full-range value ±1 digit
<b>Sensor</b>	Pt1000
<b>Instrument variants</b>	
DiwiTherm® with probe for insertion	Probe with connection cable Max. working temperature 200 °C Case for panel mounting, with panel mounting flange
DiwiTherm® for mounting in a thermowell	Spring-loaded probe 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: <ul style="list-style-type: none"> <li>■ Adjustable stem and dial (rotatable through 360° and tiltable through 90°)</li> <li>■ Case for panel mounting, with connection cable and panel mounting flange</li> </ul>
<b>Power supply U<sub>B</sub></b>	DC 3.6 V from 3.6 V lithium battery, AA size (Mignon), included in delivery <sup>1)</sup>
<b>Operating time</b>	min. 10 years
<b>Special features</b>	If the battery drops below 2.7 V, the display switches into "LO" mode

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

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

1) Not replaceable by the customer.

# DiwiTherm® with probe for insertion

Specifications	
<b>Material</b>	
Probe	Stainless steel
Compression fitting	Stainless steel
<b>Probe diameter</b>	<ul style="list-style-type: none"> <li>■ 2 mm</li> <li>■ 3 mm</li> <li>■ 6 mm</li> <li>■ 8 mm</li> </ul> Note: approx. 1 mm smaller than the bore diameter of the thermometer or the blind bore
<b>Bore diameter</b>	Bore diameter of the thermowell or the blind bore approx. 1 mm > probe diameter  For temperature measurement in a solid body: Diameter of the bore max. 1 mm > probe diameter
<b>Probe length</b>	<ul style="list-style-type: none"> <li>■ 6 mm (with standard probe length 50, 100 or 150 mm)</li> <li>■ 8 mm (with standard probe length 100 or 150 mm)</li> </ul> Special lengths are possible
<b>Process connection</b>	Compression fitting (simple, on-site adjustment to the required insertion length)
<b>Compression fitting</b>	<ul style="list-style-type: none"> <li>■ G ¼ B male thread (not with Ø 8 mm probe)</li> <li>■ G ½ B male thread</li> <li>■ Without process connection</li> </ul>
<b>Cable</b>	Silicone, shielded Application range -40 ... +200 °C with EMC able gland Cable length to customer specification

Regardless of the design, the first 60 mm of the probe tip must not be bent.

## Transition

The junction between the metal part of the probe 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 <sup>1)</sup> in mm	Ø transition sleeve in mm
<b>Probe Ø = transition sleeve Ø</b>	n/a	Identical to probe
<b>Ø 6 mm</b> with crimped transition sleeve	45	7
<b>Ø 6 mm</b> with crimped transition sleeve <sup>2)</sup>	45	8
<b>Ø 8 mm</b> 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)

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

## ■ Tubular design (probe length A < 400 mm, probe diameter ≥ 6 mm)

The tubular design features a rigid construction to the metal probe 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 (probe length A > 400 mm, probe diameter < 6 mm, measuring range > 200 °C)

In sheathed resistance thermometers the flexible part of the probe 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.

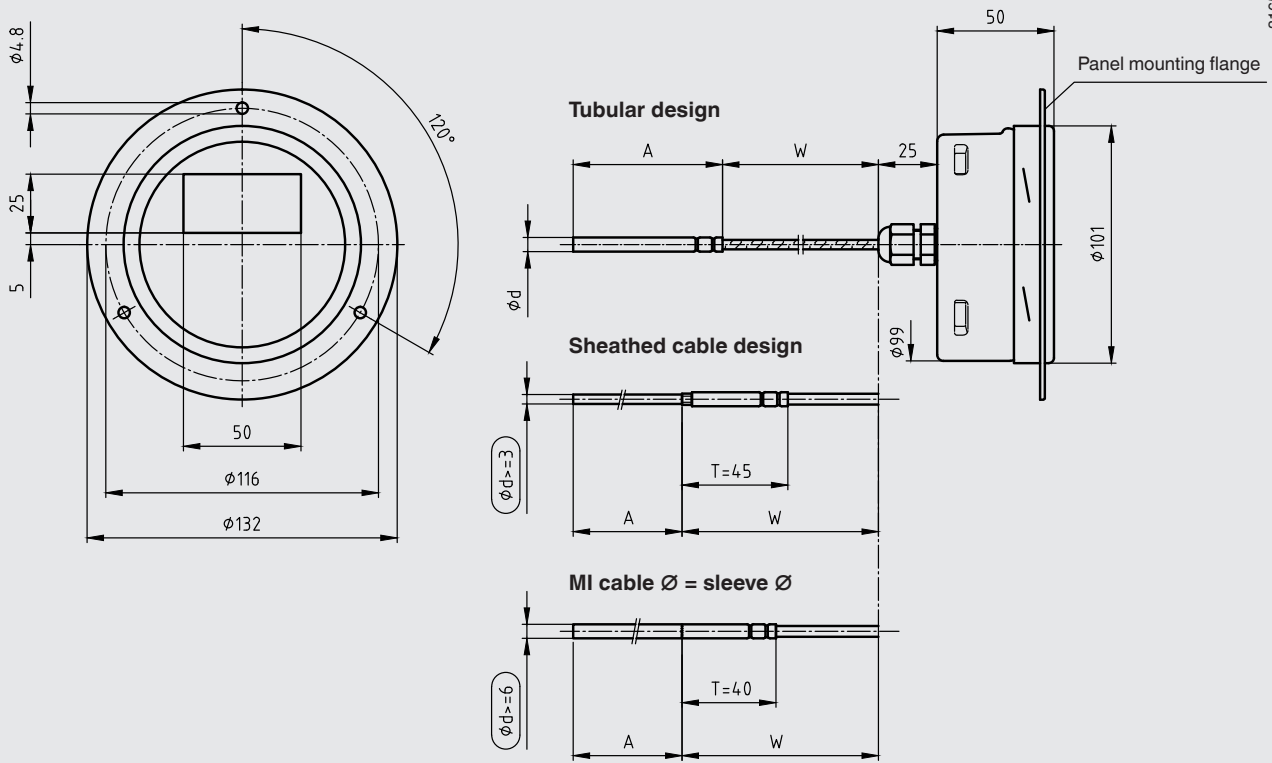
Due to their flexibility and the small possible diameters, sheathed resistance thermometers can also be used in locations that are not easily accessible, since, with the exception of the probe tip and the transition sleeve of the connection cable, the sheath can be bent to a radius of three times the diameter of the cable.

Please note:

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

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

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**Legend:**

- $\phi d$  Probe diameter
- A Insertion length
- W Cable length

## DiwiTherm® for mounting in a thermowell

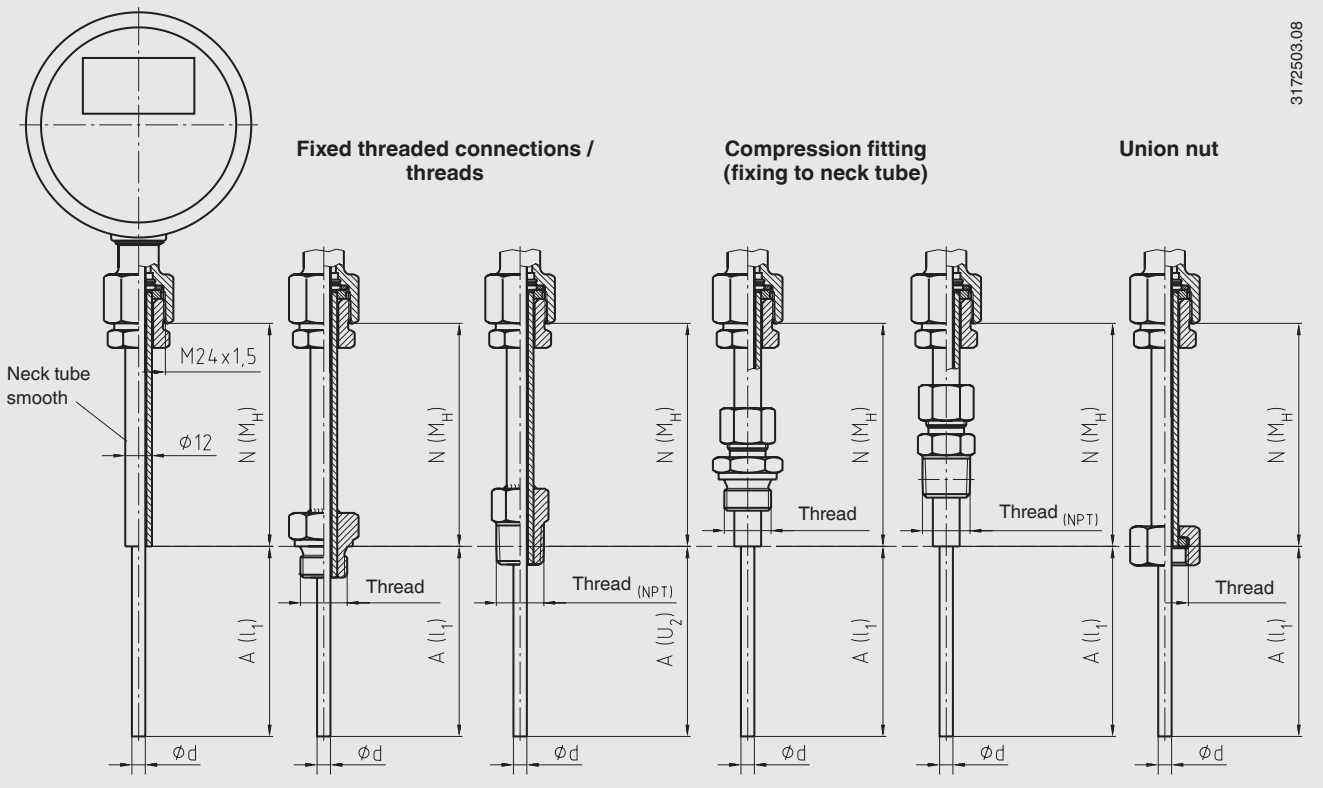
Specifications	
<b>Material</b>	
Probe	Stainless steel
Process connection	Stainless steel
Neck tube	Stainless steel
<b>Probe</b>	Vibration-resistant, sheathed cable (MI cable)
<b>Probe diameter</b>	approx. 1 mm smaller than the bore diameter of the thermowell
<b>Process connection</b>	
Screwed plug	<ul style="list-style-type: none"> <li>■ G ½ B</li> <li>■ M14 x 1.5</li> <li>■ M18 x 1.5</li> <li>■ ½ NPT</li> </ul>
Union nut	G ½ B
Male nut	G ½ B
<b>Neck tube diameter</b>	12 mm
<b>Neck length</b>	150 mm others on request (minimum neck length: 30 mm)
<b>Insertion length</b>	Insertion length = thermowell length for bottom thicknesses at ≤ 5.5 mm In order to ensure that the probe is firmly pressed down onto the bottom of the thermowell, the probe must be spring-loaded (spring travel: max 10 mm).

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

Operation without thermowell is only recommended in certain applications, as liquids or gases can penetrate the case along the spring-loaded probe and damage the electronics.

### Connection to thermowell (with neck tube)

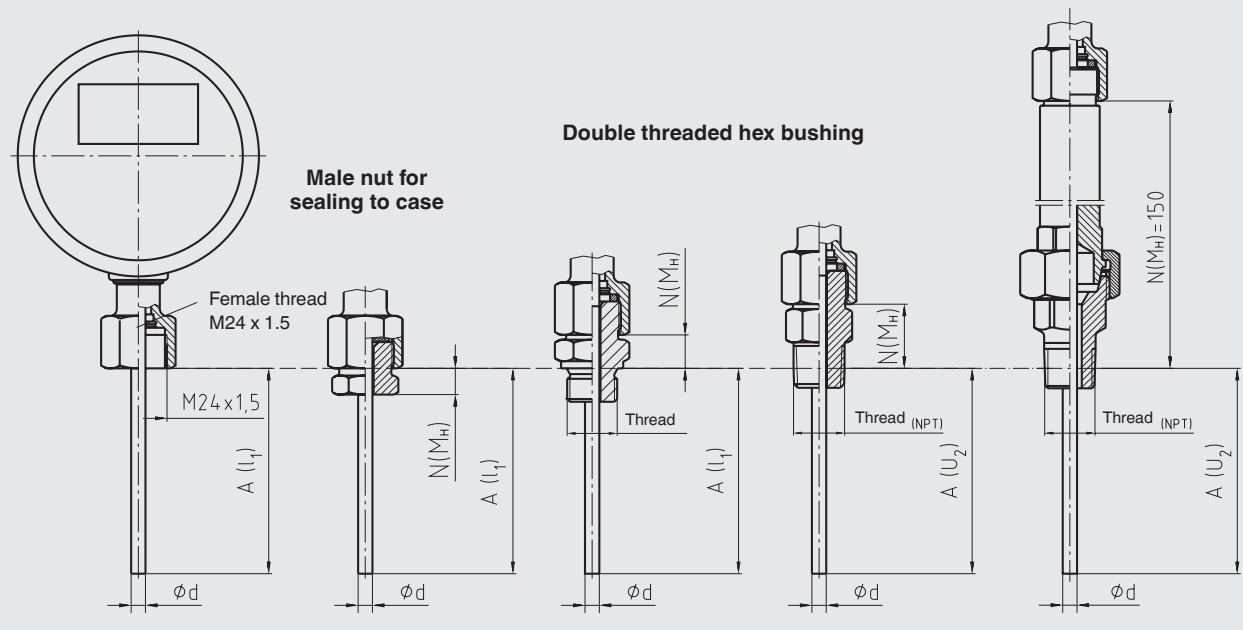
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### Connection to thermowell

### “nipple-union-nipple” neck tube

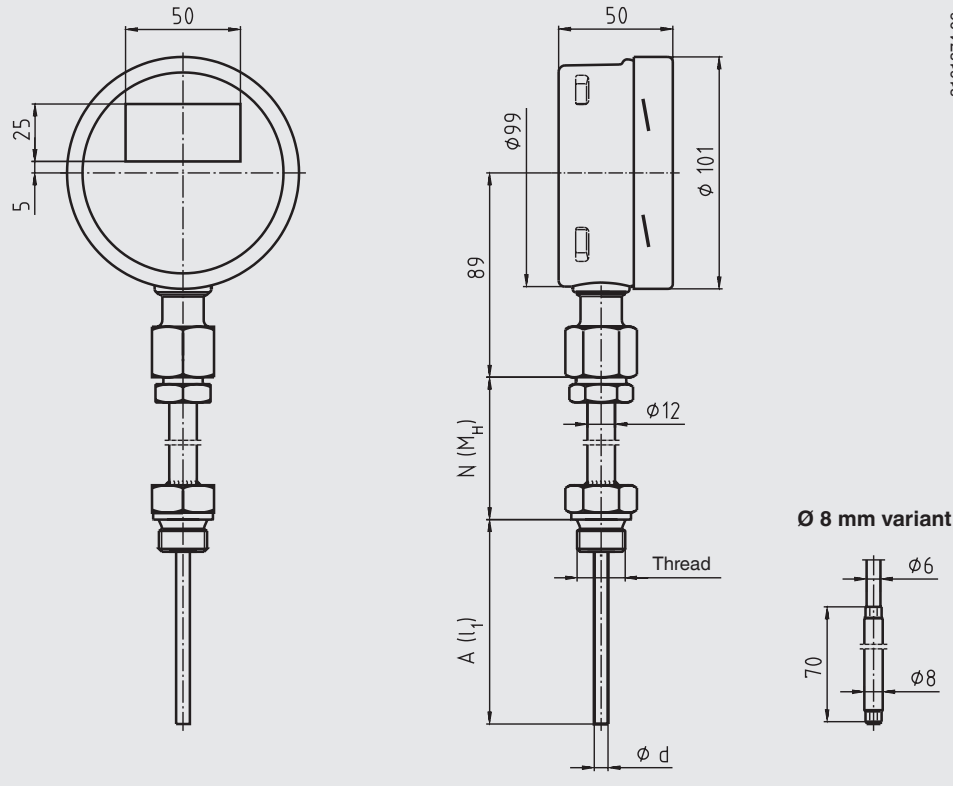
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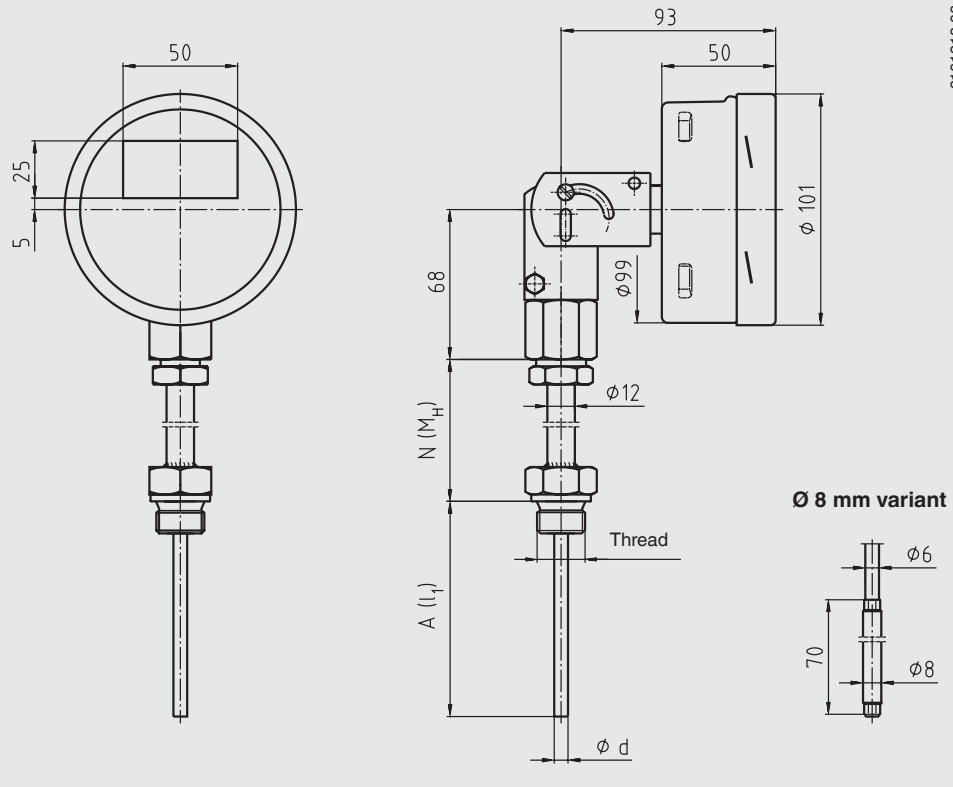
**Legend:**

- Ø d Probe diameter
- A (I<sub>1</sub>) Insertion length (with parallel threads)
- A (U<sub>2</sub>) Insertion length (with tapered threads)
- N(M<sub>H</sub>) 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**

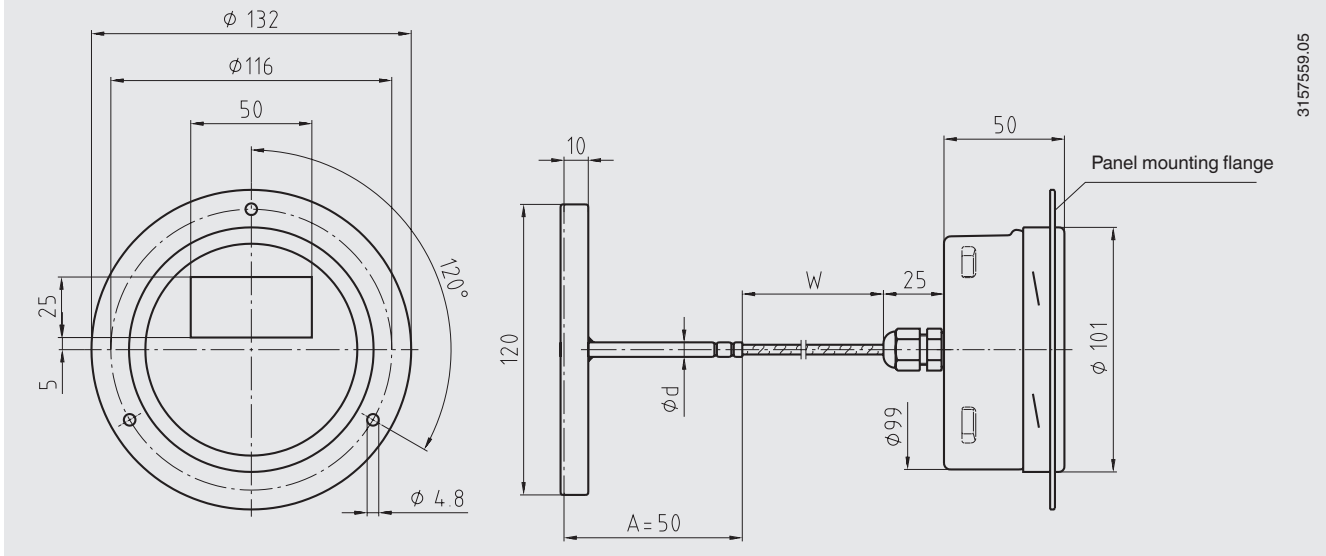


- Legend:
- Ø d Probe diameter
  - A (l<sub>1</sub>) Insertion length (with parallel threads)
  - A (l<sub>2</sub>) Insertion length (with tapered threads)
  - N(M<sub>H</sub>) Neck length

## DiwiTherm® for mounting on a pipe surface

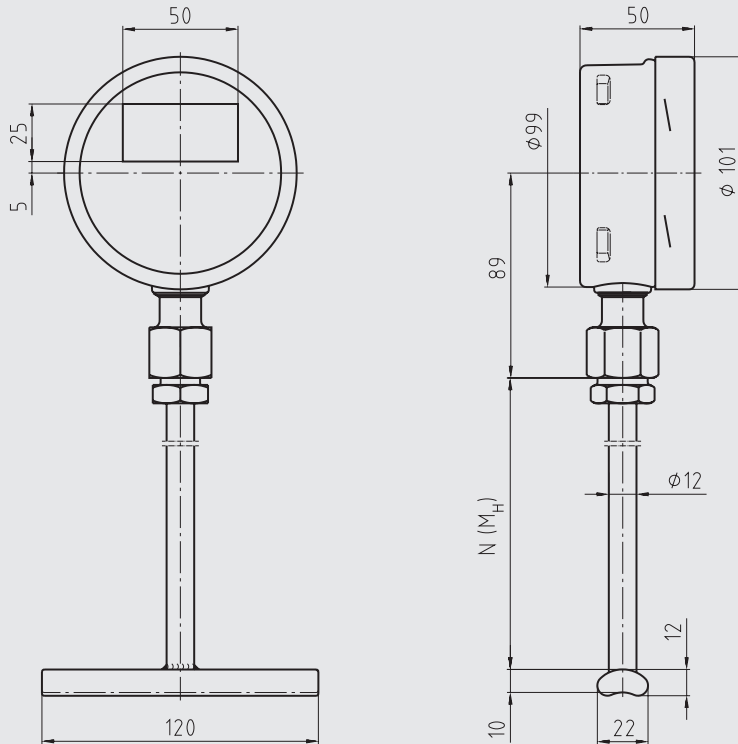
Specifications	
<b>Material</b>	
Contact bulb	Stainless steel
Neck tube	Stainless steel
<b>Mounting tube</b>	120 mm
<b>Fixing</b>	With a tightening strap (not included in delivery)
<b>Cable</b>	Silicone, shielded Application range -40 ... +200 °C with EMC able gland Cable length to customer specification  Note: 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.
<b>Neck tube diameter</b>	12 mm
<b>Neck length</b>	150 mm others on request (minimum neck length: 100 mm)
<b>Application range neck tube</b>	-40 ... +200 °C

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



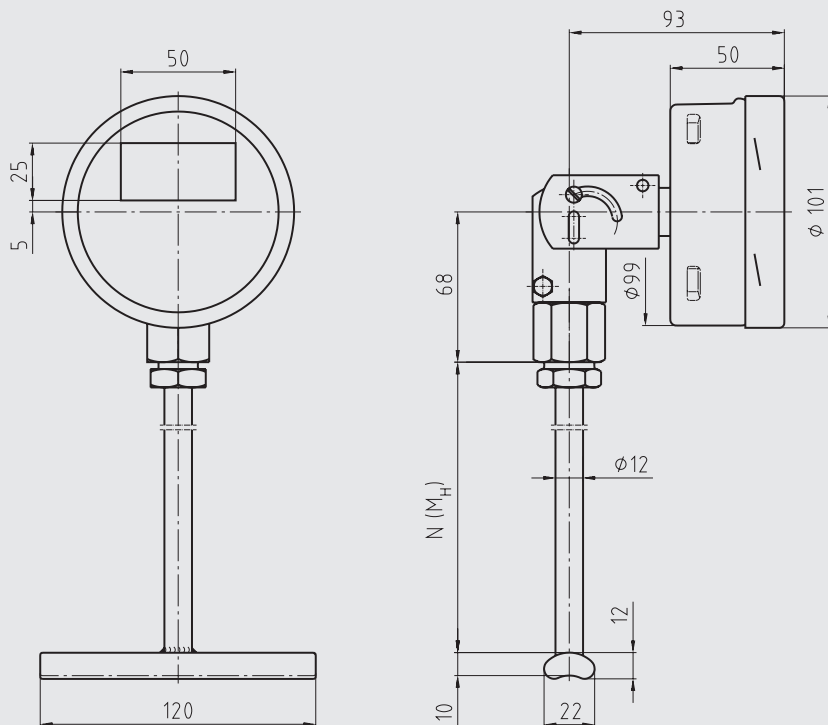


**DiwiTherm® model TR75 for mounting on a pipe surface, with neck tube**  
**Connection from case to neck tube: fixed, lower mount**



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**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**



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## 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 probe and the outside wall of the vessel or pipe as well as a heat loss as low as possible from the probe and the measuring point to the environment.

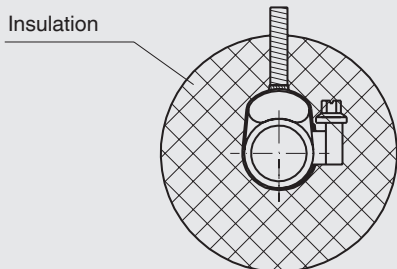
The probe should have direct, metallic contact with the measuring point and sit firmly on the surface of the measuring point.

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

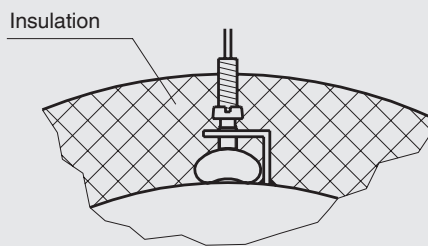


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### ■ Mounting on tanks







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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## Approvals

Logo	Description	Country
	<b>EU declaration of conformity</b> <ul style="list-style-type: none"> <li>■ EMC directive</li> <li>EN 61326 emission (group 1, class B) and interference immunity (industrial application)</li> <li>■ RoHS directive</li> </ul>	European Union
	<b>EAC (option)</b> EMC directive	Eurasian Economic Community
	<b>KazInMetr (option)</b> Metrology, measurement technology	Kazakhstan
-	<b>MTSCHS (option)</b> Permission for commissioning	Kazakhstan
	<b>BelGIM (option)</b> Metrology, measurement technology	Belarus
	<b>UkrSEPRO (option)</b> Metrology, measurement technology	Ukraine
	<b>Uzstandard (option)</b> Metrology, measurement technology	Uzbekistan

## Certificates (option)

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

The different certifications can be combined with each other.

Approvals and certificates, see website

## Ordering information

Model / Instrument design / Process connection / Neck length N(MH) / Connection cable, sheathed cable / Probe diameter  $\varnothing$  d / Insertion length A / Certificates / Options

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