

Resistance Thermometers DiwiTherm®, with Digital Display Model DR, Battery Powered/Output 4 ... 20 mA

WIKA Data Sheet TE 50.01



Applications

- Machinery, plant and tank construction
- Chemical industry
- Food and beverage industry
- Automotive industry
- Sanitary, heating and air-conditioning technology

Special Features

- LCD display, 18 mm high figures
- Battery powered or output 4 ... 20 mA
- Versions with insertion sensor, for additional thermowell or with contact bulb for tube skin mounting
- Suitable for all standard thermowell designs
- Intrinsically safe versions (ATEX)

Description

The DiwiTherm® is an ideal combination of a digital indicator and a resistance thermometer. This compact temperature measuring instrument can be used for a variety of applications and works without external power supply. The large-scale LCD display is very clear and easy to read.

An extensive range of insertion lengths, neck lengths, thermowell connections etc. are available for these thermometers, so that they are suitable for all thermowell dimensions and applications.

Operation without thermowell is only recommended for specific applications.

The DiwiTherm® can be manufactured with an optional process connection for tube skin temperature measurement. An analogue 4 ... 20 mA output is also available as an option.



Fig. left: DiwiTherm® Model DR210
Fig. centre: DiwiTherm® Model DR111
Fig. right: DiwiTherm® Model DR610

Intrinsically safe designs are available for applications in hazardous areas. The battery powered models are provided with a type-examination certificate for "intrinsically safe" type of protection according to directive 94/9/EC (ATEX).

Models DiwiTherm®

DR1XX	Insertion sensor
DR2XX	Probe for additional thermowell
DR6XX	Contact bulb for tube skin mounting
DRX1X	Battery powered
DRX2X	Output 4 ... 20 mA
DRX3X	Solar operation (see data sheet TE 50.02)
DRXX0	radial / adjustable every angle (with extension neck)
DRXX1	axial (with connection cable)

Specifications		DiwiTherm®
Measuring range		
Display in °C	- 50 ... + 199.9 °C or - 50 ... + 400 °C	
Display in °F	- 50 ... + 750 °F	
Display		
Principle	3½ - digit, LCD, 18 mm high figures	
Resolution	0,1 °C with measuring range - 50 °C ... + 199.9 °C 1 °C with measuring range - 50 °C ... + 400 °C 1 °F with measuring range - 50 °F ... + 750 °F	
Measuring deviation ¹⁾ DIN IEC 770, 23 °C ± 5 K	± (0.5 K + 0.5 % of measured value in °C + 1 Digit)	
Temperature coefficient	± 0.02 % of measuring span / K _{Tamb} ²⁾	
DiwiTherm® with insertion sensor		
Design	Sensor with connection cable ■ Case for panel mounting, with panel mounting flange	
DiwiTherm® for additional thermowell		
Design	Probe spring-loaded Male thread to thermowell ■ Case with extension neck ■ Case adjustable every angle, axial (rotatable on extension neck 360°)	
Option	■ Case adjustable every angle, axial (rotatable on extension neck 360°)	
DiwiTherm® for tube skin mounting		
Design	Contact bulb for mounting by means of a strap retainer ■ Case with extension neck ■ Case adjustable every angle, axial (rotatable on extension neck 360°) ■ Case for panel mounting, with connection cable and panel mounting flange	
Option	■ Case adjustable every angle, axial (rotatable on extension neck 360°) ■ Case for panel mounting, with connection cable and panel mounting flange	
Case		
Nominal size	100	
Material	Stainless steel	
Ingress protection	IP 65 (EN 60529 / IEC 529)	
Bezel ring	Cam ring (bayonet type)	
Window	Instrument glass	
Electromagnetic compatibility (EMC)		
CE - Conformity per	DIN EN 61326-1 (1998-01)	
Special features		
Sensor	Pt1000	
Ambient and storage temperature	Battery powered design: - 10 ... + 60 °C, with output 4 ... 20 mA: - 10 ... + 70 °C	
Vibration	10 ... 500 Hz 5 g IEC 68 2-6	
Shock	DIN IEC 68 2-27	
Weight	Approx. 1 kg	

DiwiTherm® Battery powered	
Power supply U_B	
Operating duration	DC 3.6 V by battery ³⁾ at least 3 years
Ex-protection	
Permissible ambient temperature	Type-examination certificate for "intrinsically safe" ignition protection (EEx i) per directive 94/9/EG (ATEX)
Maximum values for connection	See operating instructions

DiwiTherm® with output 4 ... 20 mA	
Analogue output	
Load R _A	4 ... 20 mA 2 wire design $R_A \leq (U_B - 10 V) / 0.02 A$ with R _A in Ω and U _B ⁴⁾ in V
Load effect	± 0,05 % of measuring span / 100 Ω
Measuring deviation per DIN IEC 770, 23 °C ± 5 K	± (0.5 K + 0.5 % of measured value)
Temperature coefficient	± 0.02 % of measuring span / K _{TU} ²⁾
Power supply effect	± 0.025 % of measuring span / V
Behaviour of sensor burnout	Up scale, ≥ 21 mA
Behaviour of sensor short circuit	Down scale, ≤ 3.6 mA
Power supply U_B	
Max. permissible ripple	DC 10 ... 30 V by 4 ... 20 mA-loop 10 %
Electrical connection	Terminal box (screw terminals up to 2.5 mm ²)
Input power supply protection	Reverse polarity, overvoltage, and short circuiting

1) In defined measuring range
 2) T_{amb} = ambient temperature (other than 20 °C)
 3) Lithium battery with 3.6 V size AA (Mignon) is included in the standard of delivery
 4) U_B = loop power supply voltage, see power supply

DiwiTherm® with insertion sensor Model DR1X1

Sensor

Material: stainless steel 1.4571

Sensor length $l_1 \leq 150$ mm: rigid sensor tube

Sensor length from 150 mm: measuring cable (MI cable)

The diameter of the sensor shall be approx. 1 mm smaller than the hole diameter of the thermowell or the blind hole.

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

Sensor lengths

Sensor \varnothing in mm	Standard sensor lengths l_1 in mm		
6	50	100	150
8	-	100	150

Special lengths are possible.

Process connection

A compression fitting enables easy adaptation to the desired insertion length at the mounting location.

Compression fitting

Material: stainless steel 1.4571

Male thread G $\frac{1}{4}$ B (not with probe \varnothing 8 mm) or G $\frac{1}{2}$ B

Delivery also possible without process connection

Cable

PVC, application range -20 °C ... +100 °C

Silicone, application range -50 °C ... +200 °C

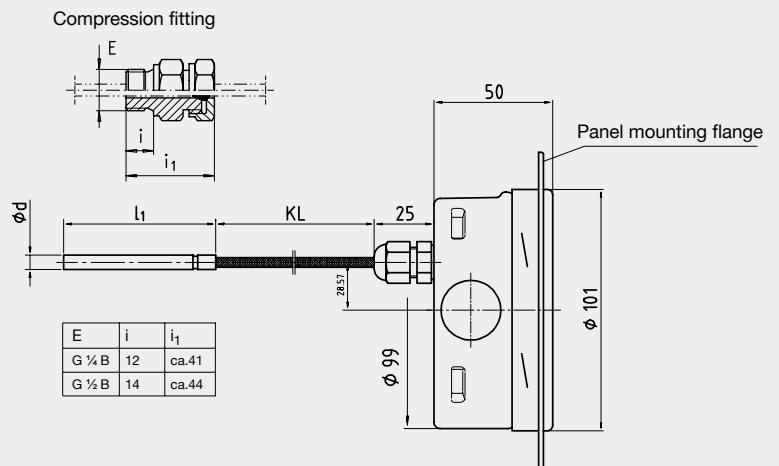
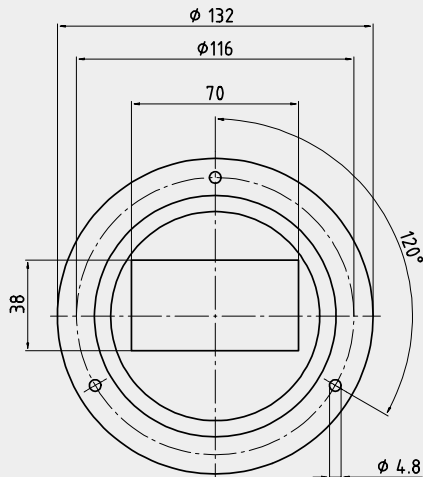
PTFE, application range -50 °C ... +250 °C

Sheathed cable, $d = 6$ mm

Cable length to customer specification

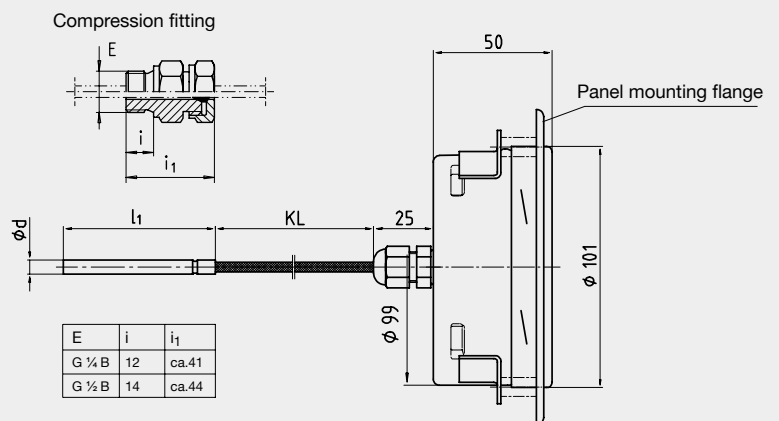
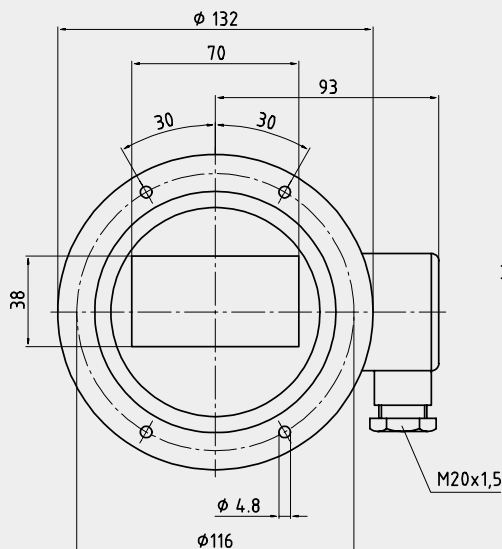
Maximum cable length for versions intended for use in hazardous areas: 3000 mm

DiwiTherm® Model DR111 with insertion sensor, battery powered, cable outlet on the back, with panel mounting flange for panel mounting



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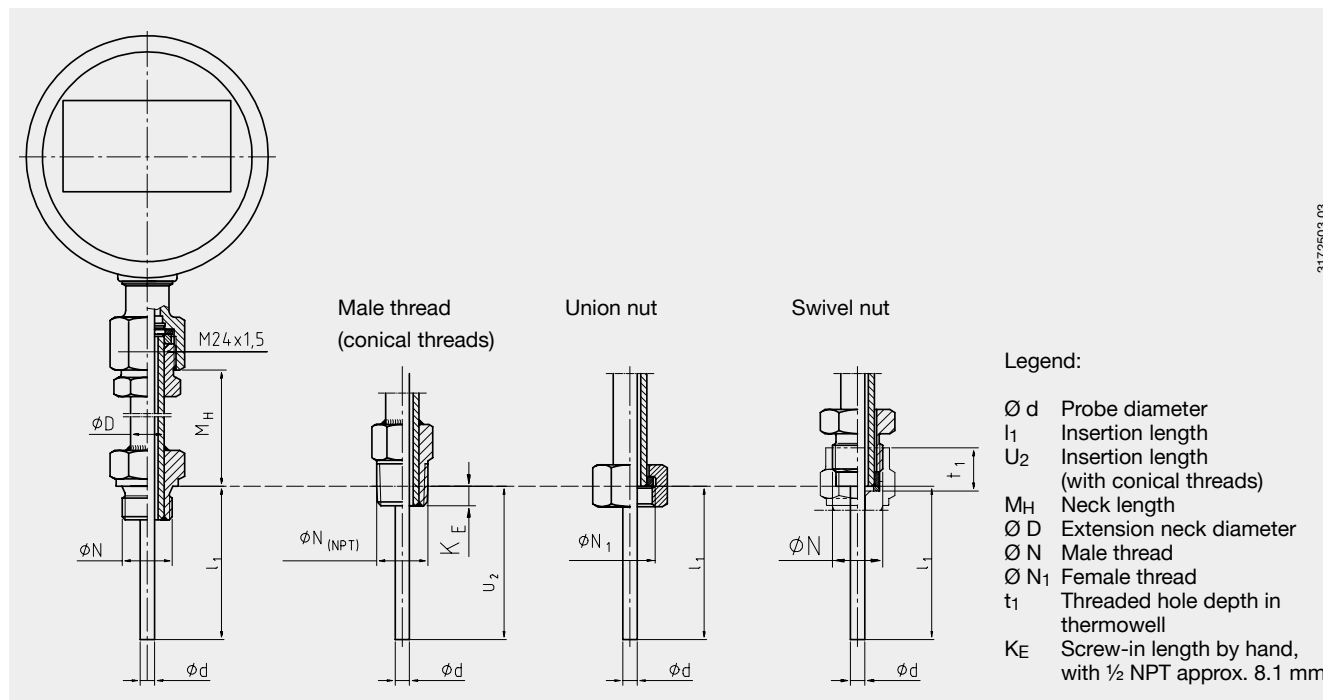
DiwiTherm® Model DR121 with insertion sensor, output 4 ... 20 mA, cable outlet on the back, with panel mounting flange for panel mounting



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**DiwiTherm® for additional thermowell
Model DR2X0**

Connection to thermowell



Probe

Material: stainless steel 1.4571

The probe is made of a vibration-resistant sheathed measuring cable (MI cable).

The diameter of the probe should be approx. 1 mm less than the diameter of the thermowell hole in which the probe is to be fitted.

The diameter of the probe shall be approx. 1 mm smaller than the hole diameter of the thermowell.

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

When fitting the measuring insert with a thermowell, it is very important to determine the correct insertion length (= thermowell length with bottom thicknesses of ≤ 5.5 mm). In this connection the fact that the measuring insert is spring-loaded (spring travel: max. 10 mm) has to be taken into account in order to ensure that the probe presses against the bottom of the thermowell.

Insertion lengths

Probe Ø in mm	Standard insertion lengths l ₁ in mm																
3	110	140	145	170	200	205	230	245	260	295	305	345	350	395	410	445	545
6	-	-	-	170	200	205	230	245	260	295	305	345	350	395	410	445	545
8	-	-	-	-	200	205	230	245	260	295	305	345	350	395	410	445	545

Special lengths are possible.

Process connection (Standard process connection)

Material: stainless steel 1.4571

Male thread: G ½ B
M14 x 1.5
M18 x 1.5
½ NPT

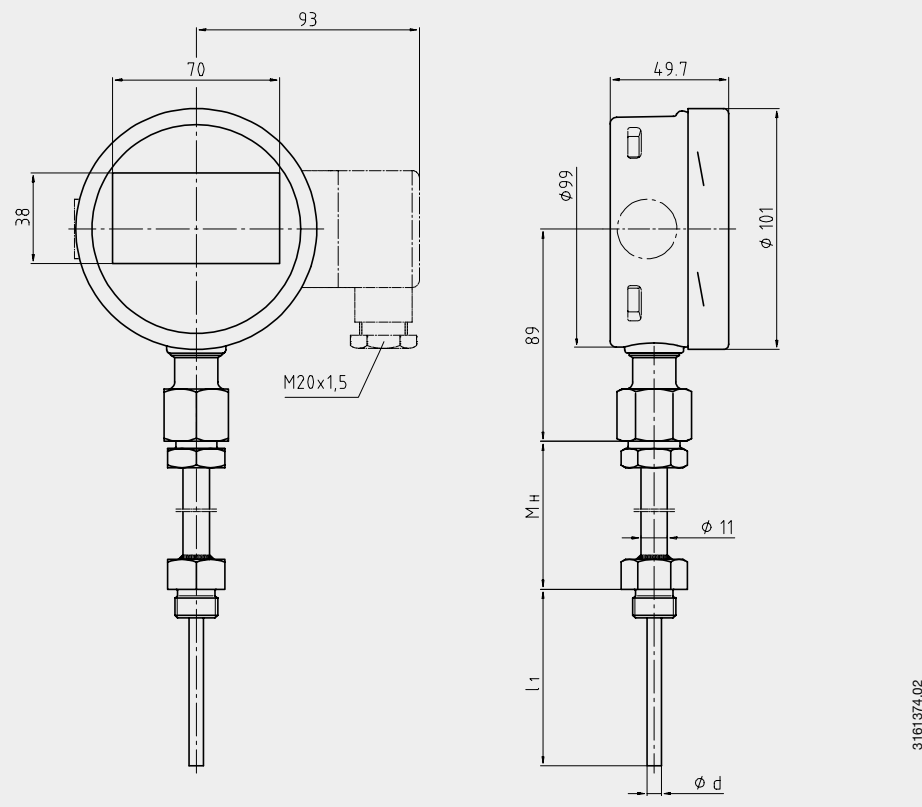
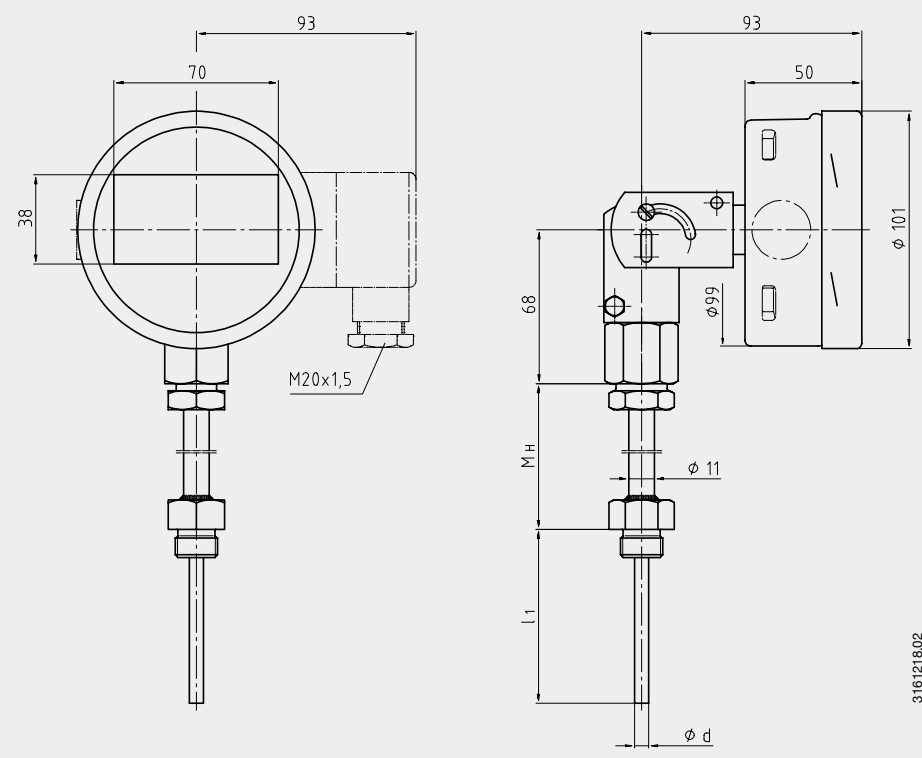
Union nut: G ½ B

Swivel nut: G ½ B

Extension neck

Material: stainless steel 1.4571

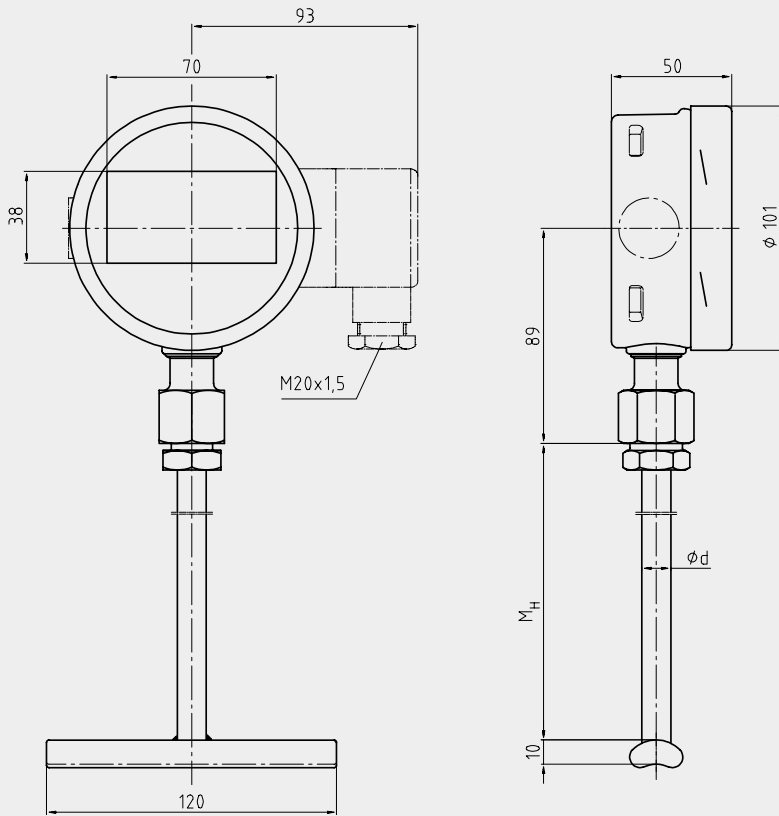
Extension neck diameter: 11 mm
Standard neck length: 150 mm
other on inquiry
(minimum neck length: 30 mm)

Dimensions in mm**DiwiTherm® Model DR2X0 for additional thermowell, with extension neck**
Connection from case to extension neck: fixed, radial bottom**DiwiTherm® Model DR2X0 for additional thermowell, with extension neck**
Connection from case to extension neck: adjustable every angle, centre back

Inspection plug (at 9 o'clock) with battery powered design only,
terminal box (at 3 o'clock) with output 4 ... 20 mA design only

**DiwiTherm® for tube skin mounting
Model DR6X0**

DiwiTherm® Model DR6X0 for tube skin mounting, with extension neck
 Connection from case to extension neck: fixed, radial bottom



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Tube skin mounted contact bulb

Material: stainless steel 1.4571

Fastening tube: 120 mm

Fastening by means of strap retainer
(not included in the scope of delivery)**Extension neck**

Material: stainless steel 1.4571

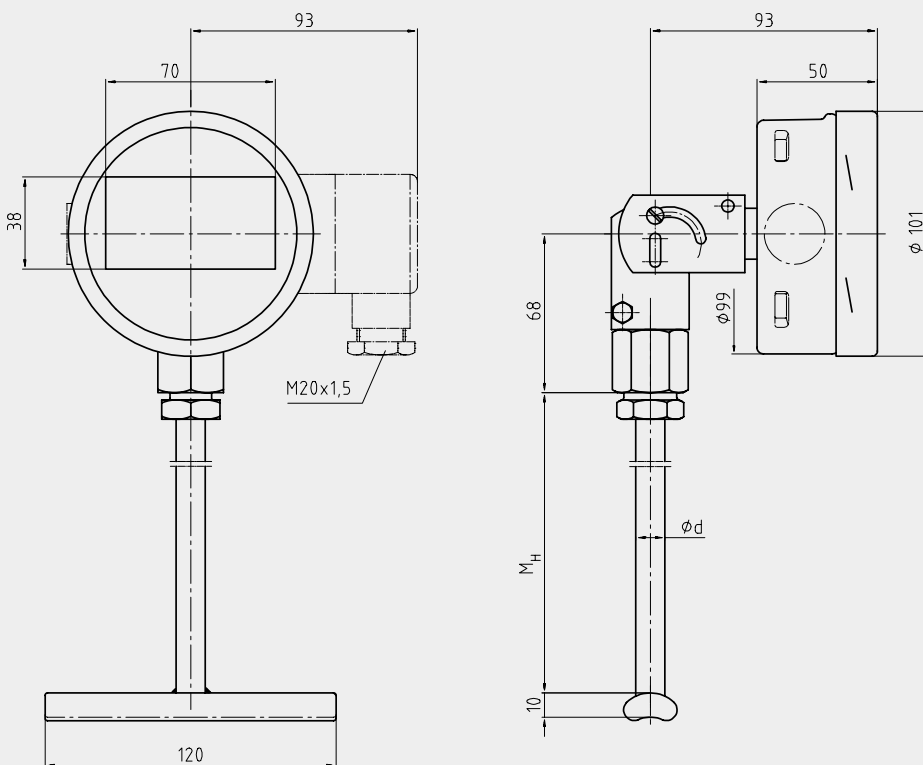
Extension neck diameter: 11 mm

Standard neck length: 150 mm

other on inquiry

(minimum neck length: 100 mm)

DiwiTherm® Model DR6X0 for tube skin mounting, with extension neck
 Connection from case to extension neck: adjustable every angle, centre back



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Inspection plug (at 9 o'clock) with
 battery powered design only,
 terminal box (at 3 o'clock) with
 output 4 ... 20 mA design only

DiwiTherm® for tube skin mounting Model DR6X1

Tube skin mounted contact bulb

Material: stainless steel 1.4571

Fastening tube: 120 mm

Fastening by means of strap retainer (not included in the scope of delivery)

Cable

PVC, application range -20 °C ... +100 °C

Silicone, application range -50 °C ... +200 °C

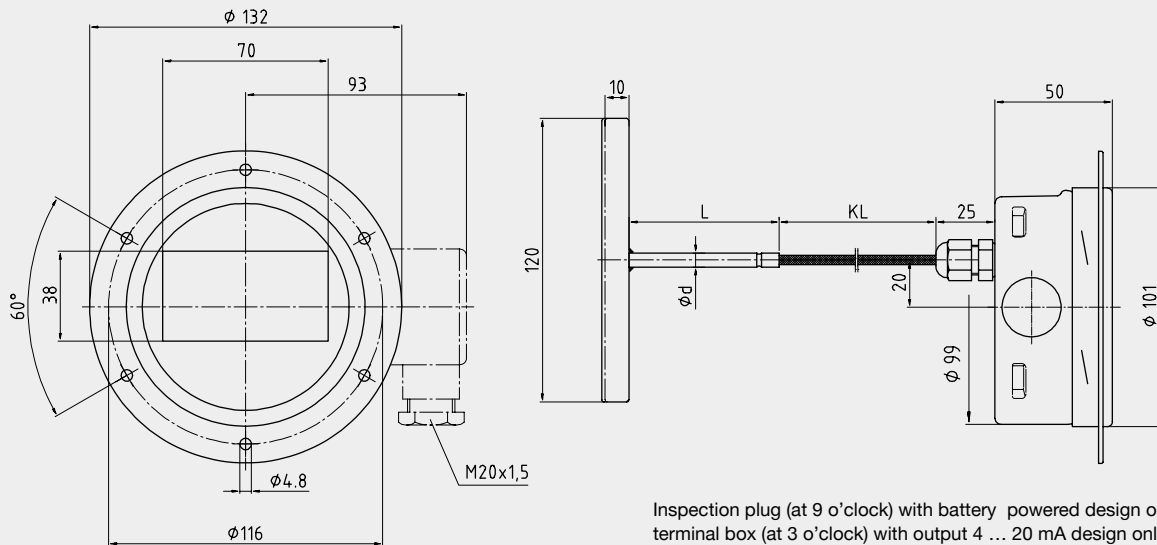
PTFE, application range -50 °C ... +250 °C

Sheathed cable, d = 6 mm

Cable length to customer specification

Maximum cable length for versions intended for use in hazardous areas: 3000 mm

DiwiTherm® Typ DR6X1 for tube skin mounting, cable outlet on the back, with panel mounting flange for panel mounting



Inspection plug (at 9 o'clock) with battery powered design only, terminal box (at 3 o'clock) with output 4 ... 20 mA design only

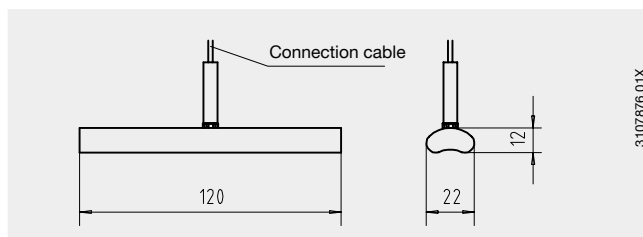
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Mounting instructions for contact bulb

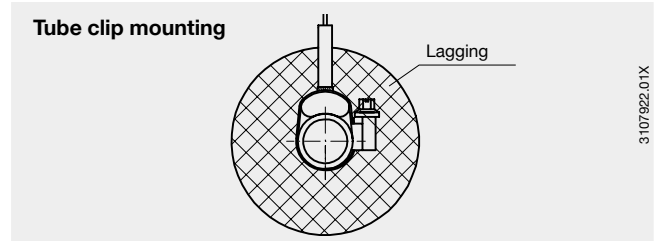
General

The contact bulb has been designed for mounting on a tube or tank skin. The contact bulb is to be mounted so that it lays over the measuring point down its full length. Basic requirements to ensure perfect measurement results are good thermal contact between the skin mounted contact bulb and the outside wall of the tube or tank with minimal heat loss to the ambient from the skin mounted contact bulb and measuring point.

In so far as temperatures under 200 °C are to be expected a heat conductive paste can be used to optimise the heat transmission between skin mounted contact bulb and tube. Lagging must be applied where the skin mounted contact bulb has been mounted to avoid error due to heat loss. This lagging must have sufficient temperature resistance and is not provided with the instrument.



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Mounting on tubes

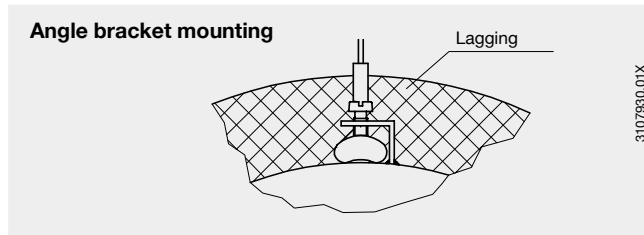
The geometry of the contact bulb has been designed for tubes with external diameters between 20 and 160 mm. Tube clips are adequate for fastening the skin mounted contact bulb to the tube. The skin mounted contact bulb should have direct metallic contact with the measuring point and have firm contact with the surface of the tube.

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.

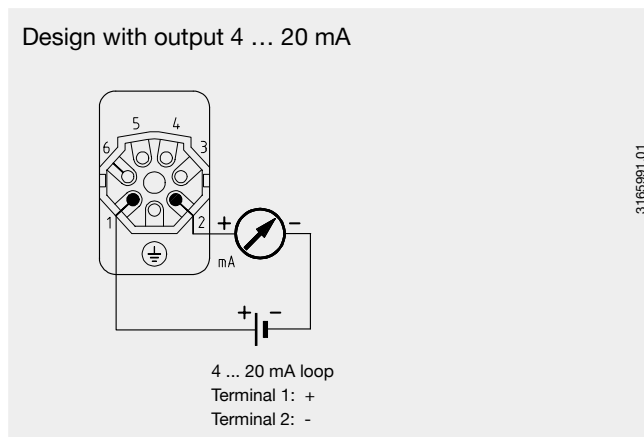
The skin mounted contact bulb should have direct metallic contact with the measuring point and have firm contact with the surface of the tank. In so far as temperatures under 200 °C are to be expected a heat conductive paste can be used to optimise the heat transmission between skin mounted contact bulb and tank. Lagging must be applied where the skin mounted contact bulb has been mounted to avoid error due to heat loss. This lagging must have sufficient temperature resistance and is not provided with the instrument.



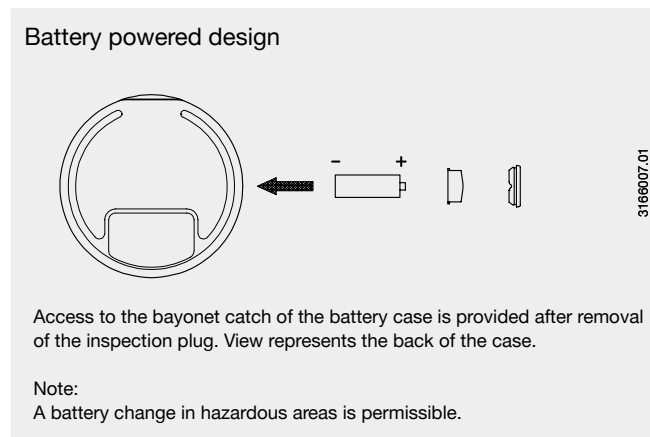
Connector plugs

DiwiTherm® with output 4 ... 20 mA: L-plug per DIN EN 17 5301-803 (DIN 43 650),
Silicone seal between fixed and free connector

Electrical connection



Changing of battery



Explosion protection (option)

Battery powered DiwiTherm® are available with a type examination certificate for "intrinsically safe" ignition protection (II 2G EEx ia IIC T4, DMT 98 ATEX E 018). These thermometers comply with the requirements of directive 94/9/EC (ATEX).

Maximum cable length for versions intended for use in hazardous areas: 3000 mm

The responsibility for using suitable thermowells rests with the user.

Ordering information for DiwiTherm® Model DR111 and DR121

Field No.	Code	Features	
Model			
1	DR111	DR111, DiwiTherm® with insertion sensor, battery powered, with connection cable (axial)	
	DR121	DR121, DiwiTherm® with insertion sensor, with output 4 ... 20 mA, with connection cable (axial)	
Explosion protection			
2	Z	without	
	9	II 2G EEx ia IIC T4 <i>only model DR111 and only if cable shorter than 3000 mm</i>	
Measuring range			
3	EL	-50 °C ... +199.9 °C	
	EQ	-50 °C ... +400 °C	
	ER	-50 °F ... +750 °F	
Process connection			
4	ZZ	without	
	K1	G 1/4 B, compression fitting, stainless steel	
	K2	G 1/2 B, compression fitting, stainless steel	
	??	other <i>please state as additional text</i>	
Sensor diameter			
5	3	6 mm	
	4	8 mm	
	?	other <i>please state as additional text</i>	
Sensor length			
6	1	50 mm	
	2	100 mm	
	3	150 mm	
	?	other <i>please state as additional text</i>	
Sensor material			
7	1	stainless steel 1.4571	
	?	other <i>please state as additional text</i>	
Cable			
8	P	PVC, application range -20 °C ... +100 °C	
	S	Silicone, application range -50 °C ... +200 °C	
	T	PTFE, application range -50 °C ... +250 °C	
	M	sheathed cable (MI cable), d = 6 mm	
	?	other <i>please state as additional text</i>	
Cable length			
9		length in mm, e.g. 0850 for 850 mm <i>with explosion protection max. length 3000 mm</i>	
	????	longer than 9999 mm <i>please state as additional text</i>	
Additional order info			
10	YES	No	
	1	Z	quality certificates <i>see price list</i>
11	T	Z	additional text <i>Please state as clearly understandable text!</i>

Order code:

1	2	3	4	5	6	7	8	9	10	11
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Additional text:

Ordering information for DiwiTherm® Model DR210 and DR220

Field No.	Code	Features	
Model			
1	<input type="checkbox"/> DR210	DR210, DiwiTherm® for additional thermowell, battery powered	
	<input type="checkbox"/> DR220	DR220, DiwiTherm® for additional thermowell, with output 4 ... 20 mA	
Explosion protection			
2	<input type="checkbox"/> Z	without	
	<input type="checkbox"/> 9	II 2G EEx ia IIC T4 <i>only model DR210</i>	
Measuring range			
3	<input type="checkbox"/> EL	-50 °C ... +199.9 °C	
	<input type="checkbox"/> EQ	-50 °C ... +400 °C	
	<input type="checkbox"/> ER	-50 °F ... +750 °F	
Connection from case to extension neck			
4	<input type="checkbox"/> R	fixed, radial	
	<input type="checkbox"/> S	adjustable every angle, axial	
Probe diameter			
5	<input type="checkbox"/> 1	3 mm	
	<input type="checkbox"/> 3	6 mm	
	<input type="checkbox"/> 4	8 mm	
	<input type="checkbox"/> ?	other <i>tubing please state as additional text</i>	
Insertion length			
	<input type="checkbox"/> 0110	110 mm	
	<input type="checkbox"/> 0140	140 mm	
	<input type="checkbox"/> 0145	145 mm	
	<input type="checkbox"/> 0170	170 mm	
	<input type="checkbox"/> 0200	200 mm	
	<input type="checkbox"/> 0205	205 mm	
	<input type="checkbox"/> 0230	230 mm	
	<input type="checkbox"/> 0245	245 mm	
	<input type="checkbox"/> 0260	260 mm	
	<input type="checkbox"/> 0295	295 mm	
	<input type="checkbox"/> 0305	305 mm	
	<input type="checkbox"/> 0345	345 mm	
	<input type="checkbox"/> 0350	350 mm	
	<input type="checkbox"/> 0395	395 mm	
	<input type="checkbox"/> 0410	410 mm	
	<input type="checkbox"/> 0445	445 mm	
	<input type="checkbox"/> 0545	545 mm	
6	<input type="checkbox"/>	length in mm, e.g. 0850 for 850 mm	
Neck length			
7	<input type="checkbox"/> 5	150 mm	
	<input type="checkbox"/> ?	other <i>please state as additional text</i>	
Connection to thermowell / extension neck diameter			
8	<input type="checkbox"/> A1	male thread G 1/2 B / diameter 11 mm	
	<input type="checkbox"/> B1	male thread M14 x 1,5 / diameter 11 mm	
	<input type="checkbox"/> C1	male thread M18 x 1,5 / diameter 11 mm	
	<input type="checkbox"/> I1	union nut M24 x 1,5 / diameter 11 mm	
	<input type="checkbox"/> E1	union nut M27 x 2 / diameter 11 mm	
	<input type="checkbox"/> F1	union nut G 1/2 / diameter 11 mm	
	<input type="checkbox"/> G1	swivel nut G 1/2 B / diameter 11 mm	
	<input type="checkbox"/> ?	other <i>please state as additional text</i>	
Additional order info			
9	<input type="checkbox"/> YES	<input type="checkbox"/> No	
	<input type="checkbox"/> 1	<input type="checkbox"/> Z	quality certificates <i>see price list</i>
10	<input type="checkbox"/> T	<input type="checkbox"/> Z	additional text <i>Please state as clearly understandable text!</i>

Order code:

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Additional text:

Ordering information for DiwiTherm® Model DR611 and DR621

Field No.	Code	Features	
Model			
1	DR611	DR611, DiwiTherm® for tube skin mounting, battery powered, with connection cable (axial)	
	DR621	DR621, DiwiTherm® for tube skin mounting, with output 4 ... 20 mA, with connection cable (axial)	
Explosion protection			
2	Z	without	
	9	II 2G EEx ia IIC T4 <i>only model DR611 and only if cable shorter than 3000 mm</i>	
Measuring range			
3	EL	-50 °C ... +199.9 °C	
	EQ	-50 °C ... +400 °C	
	ER	-50 °F ... +750 °F	
Cable			
4	P	PVC, application range -20 °C ... +100 °C	
	S	Silicone, application range -50 °C ... +200 °C	
	T	PTFE, application range -50 °C ... +250 °C	
	M	sheathed cable (MI cable), d = 6 mm	
	?	other <i>please state as additional text</i>	
Cable length			
5		length in mm, e.g. 0850 for 850 mm <i>with explosion protection max. length 3000 mm</i>	
	????	longer than 9999 mm <i>please state as additional text</i>	
Additional order info			
6	YES	No	
	1	Z	quality certificates <i>see price list</i>
7	T	Z	additional text <i>Please state as clearly understandable text!</i>

Order code:

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Additional text:

Ordering information for DiwiTherm® Model DR610 and DR620

Field No.	Code	Features	
Model			
1	DR610	DR610, DiwiTherm® for tube skin mounting, battery powered	
	DR620	DR620, DiwiTherm® for tube skin mounting, with output 4 ... 20 mA	
Explosion protection			
2	Z	without	
	9	II 2G EEx ia IIC T4 <i>only model DR610</i>	
Measuring range			
3	EL	-50 °C ... +199.9 °C	
	EQ	-50 °C ... +400 °C	
	ER	-50 °F ... +750 °F	
Connection from case to extension neck			
4	R	fixed, radial	
	S	adjustable every angle, axial	
Neck length			
5	5	150 mm	
	?	other <i>please state as additional text</i>	
Additional order info			
6	YES	No	
	1	Z	quality certificates <i>see price list</i>
7	T	Z	additional text <i>Please state as clearly understandable text!</i>

Order code:

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Additional text:

Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing. Modifications may take place and materials specified may be replaced by others without prior notice.

