

# Miniature resistance thermometer For sanitary applications Model TR21-C, with welded flange connection

WIKA data sheet TE 60.28

## Applications

- Sanitary applications
- Food industry
- Beverage industry
- Bio and pharmaceutical industry, production of active ingredients

## Special features

- Compact design for space-saving fitting
- Simple and fast connection using an M12 plug connector
- Output signal: Pt100 or 4 ... 20 mA via PC-programmable transmitter
- Materials and quality of surface finish in accordance with the standards of Hygienic Designs
- Wetted parts made of stainless steel 1.4435 (316L)



Resistance thermometer without neck tube  
 model TR21-C with clamp connection

## Description

The model TR21-C resistance thermometer is used for temperature measurement in sanitary applications. These thermometers are equipped with process connections, which meet the stringent requirements for hygienic measuring points in terms of materials and design.

The upper standard working range of +150 °C can be increased to +250 °C by use of a neck tube.

The welded junction between the thermowell and the flange makes the use of a sealing as additional material in those areas redundant which are in contact with the product.

## Specifications

### Output signal Pt100

Temperature range	Measuring range -50 ... +150 °C, -50 ... +250 °C
Measuring element	Pt100 (measuring current: 0.1 ... 1.0 mA) standard measuring resistor Pt100 (measuring current: 0.1 ... 1.0 mA) face-sensitive measuring resistor <sup>1)</sup>
Connection method	3-wire 4-wire
Sensor tolerance value <sup>2)</sup> per DIN EN 60751	Class B Class A Class AA

### Output signal 4 ... 20 mA

Temperature range	Measuring range -50 ... +150 °C, -50 ... +250 °C <sup>3)</sup>
Measuring element	Pt100 (measuring current: 0.5 mA) standard measuring resistor Pt100 (measuring current: 0.5 mA) face-sensitive measuring resistor <sup>1)</sup>
Connection method	3-wire
Sensor tolerance value <sup>2) 4)</sup> per DIN EN 60751	Class B Class A Class AA
Measuring span	minimum 20 K, maximum 300 K
Basic configuration	Measuring range 0 ... 150 °C, other measuring ranges are adjustable
Analogue output	4 ... 20 mA, 2-wire
Measuring error per DIN EN 60770, 23 °C ±5 K	0.2 % (transmitter) <sup>4)</sup>
Linearisation	linear to temperature per DIN EN 60751
Linearisation error	±0.1 % <sup>5)</sup>
Switch-on delay, electrical	< 10 ms
Signalling of sensor burnout	configurable: NAMUR downscale < 3.6 mA (typically 3 mA) NAMUR upscale > 21.0 mA (typically 23 mA)
Sensor short-circuit	not configurable, generally NAMUR downscale < 3.6 mA (typically 3 mA)
Load R <sub>A</sub>	$R_A \leq (U_B - 10 \text{ V}) / 0.023 \text{ A}$ with R <sub>A</sub> in Ω and U <sub>B</sub> in V
Effect of load	±0.05 % / 100 Ω
Power supply	DC 10 ... 35 V
Max. permissible residual ripple	10 % at 24 V / maximum 300 Ω load
Power supply input protected against	reverse polarity
Power supply effect	±0.025 % / V
Electromagnetic compatibility (EMC)	2004/108/EC, EN 61326 Emission (Group 1, Class B) and Immunity (industrial locations) <sup>6)</sup>
Temperature units	configurable °C, °F, K
Info data	TAG No., descriptor and message can be stored in transmitter
Configuration and calibration data	permanently stored in EEPROM
Electrical connection	M12 x 1, 4-pin circular connector

### Ambient conditions

Ambient and storage temperature	-40 ... +85 °C
Ingress protection	IP 68 <sup>7)</sup> / IP 69K per IEC 529 / EN 60529 The stated ingress protection only applies when plugged-in using line connectors that have the appropriate ingress protection.
Response time <sup>8)</sup>	t <sub>50</sub> < 3.3 s    t <sub>90</sub> < 9.7 s
Materials	Case and union nut: stainless steel 1.4571 (316Ti)

Readings in % refer to the measuring span

For a correct determination of the overall measuring error, both sensor and transmitter measuring deviations have to be considered.

1) The small design of the face-sensitive measuring resistors leads to reduced heat dissipation with short insertion lengths.

Available for temperature range -50...+150 °C in Classes A and B.

Face-sensitive measuring resistors are generally used for thermowell insertion lengths smaller than 11 mm.

2) For detailed specifications for Pt100 sensors, see Technical Information IN 00.17 at [www.wika.com](http://www.wika.com)

3) The temperature transmitter should therefore be protected from temperatures over 85 °C

4) For measuring spans smaller than 50 K additional 0.1 K

5) ± 0.2 % for measuring ranges with a lower limit less than 0 °C

6) Use resistance thermometers with shielded cable, and ground the shield on at least one end of the lead, if the lines are longer than 30 m or leave the building

7) 1 MWs/ 24 h

8) Measurement in accordance with DIN EN 60751 4.3.3

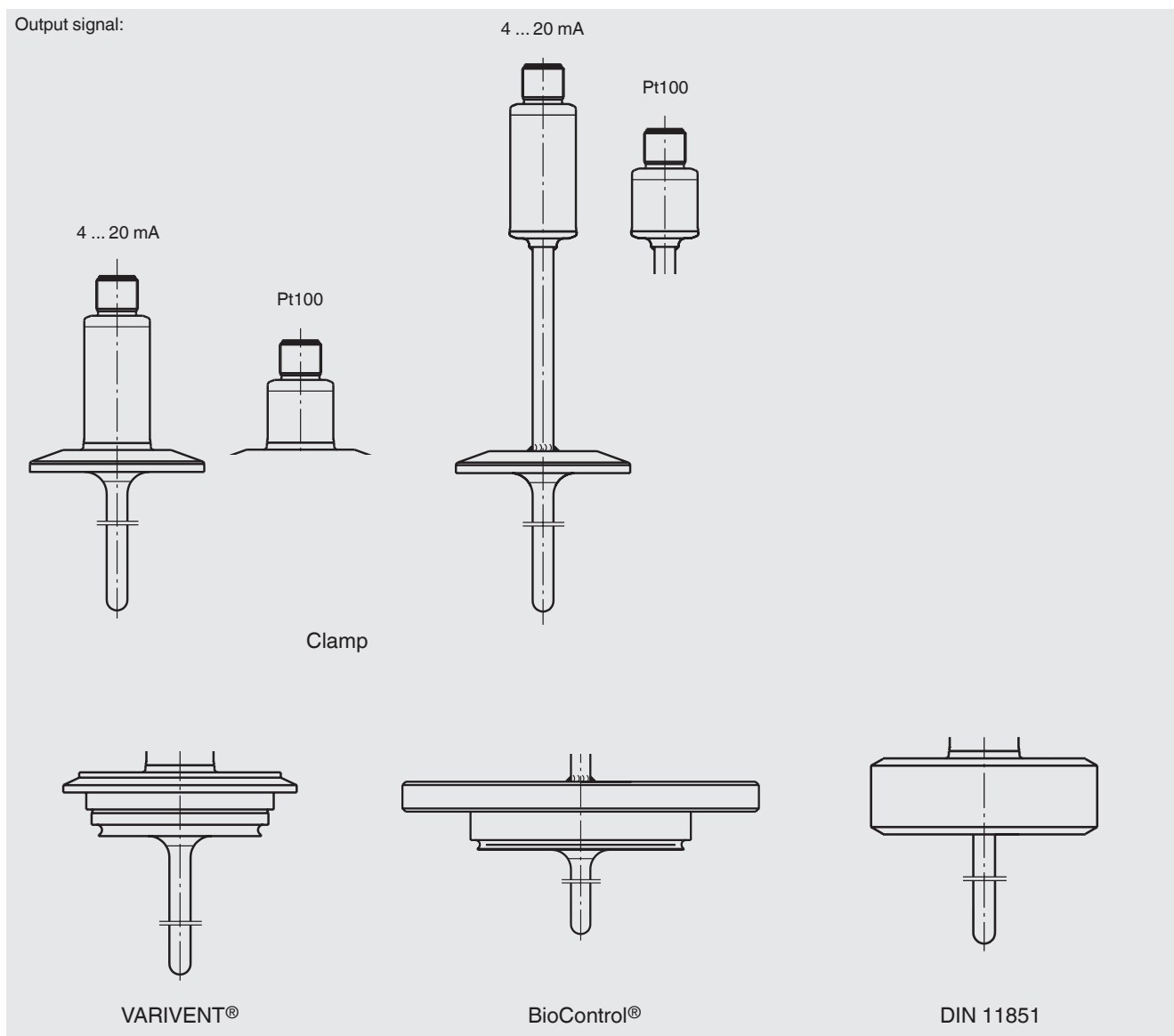
## Thermowell model TW22

Surface finish	Standard: $R_a < 0.8 \mu\text{m}$ Optional: $R_a < 0.8 \mu\text{m}$ electropolished, $R_a < 0.4 \mu\text{m}$ , $R_a < 0.4 \mu\text{m}$ electropolished
Materials	Stainless steel 1.4435 (316L)
Connection to the thermometer	welded
Thermowell diameter	6 mm, optional: probe tip reduced to 4.5 mm (from $U_1 > 25 \text{ mm}$ )
Pressure ratings	cf. table of dimensions

## Available documentation/certification

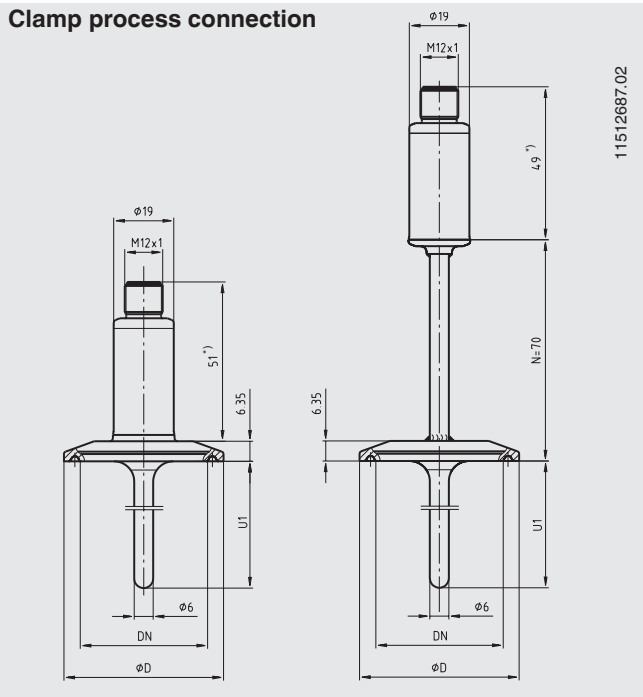
- 2.2 Test certificate
- 3.1 Acceptance test certificate
- DKD certificate

## Overview of the combination options



Dimensions in mm

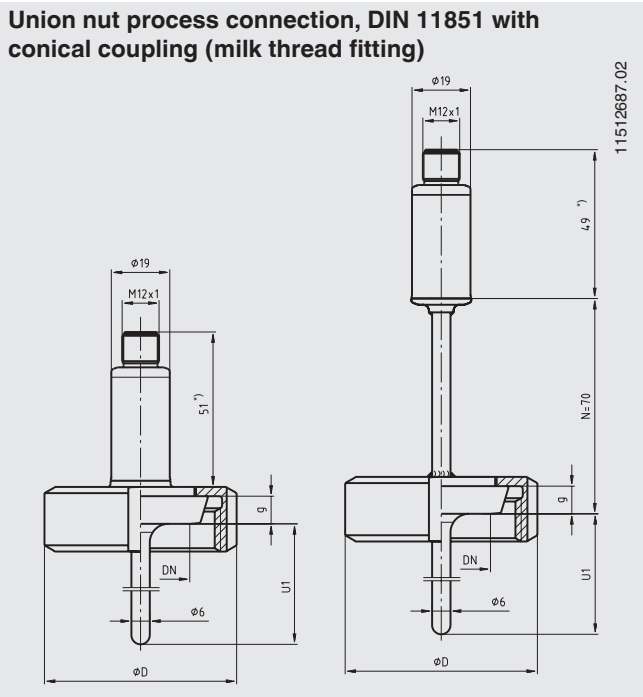
Clamp process connection



Process connection	Nominal width in mm/inch.	PN in bar	Dimensions in mm $\phi D$
DIN 32676	DN 10 ... 20	16	34.0
	DN 25 ... 40	16	50.5
	DN 50	16	64.0
Tri-clamp	$\frac{1}{2}$ "	16	25.0
	$\frac{3}{4}$ "	16	25.0
	1"	16	50.5
	1 $\frac{1}{2}$ "	16	50.5
	2"	16	64.0
ISO 2852	DN 12 ... 21.3	16	34.0
	DN 25 ... 38	16	50.5
	DN 40 ... 51	16	64.0

U1 = variable insertion length  
\* Version with output signal Pt100 is 19 mm shorter

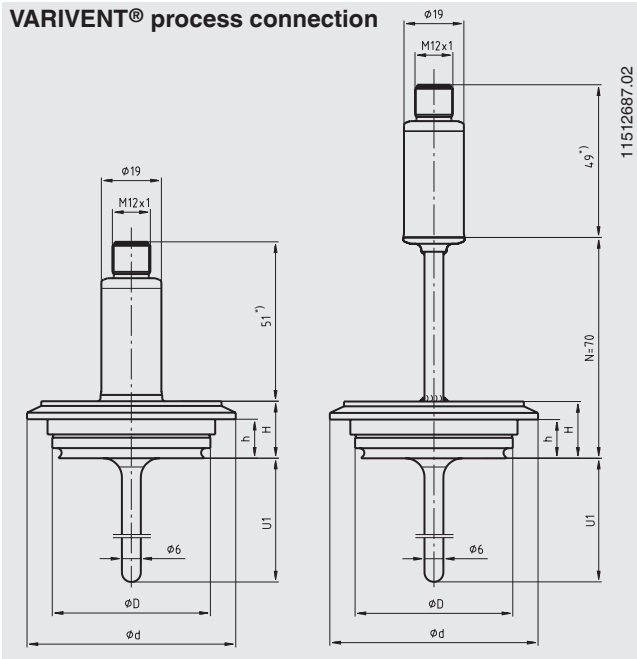
Union nut process connection, DIN 11851 with conical coupling (milk thread fitting)



Nominal width in mm	PN in bar	Dimensions in mm			
		$\phi D$	$\phi d_6$	G	g
DN 20	40	54	36.5	RD 44 x $\frac{1}{16}$	8
DN 25	40	63	44.0	RD 52 x $\frac{1}{16}$	10
DN 32	40	70	50.0	RD 58 x $\frac{1}{16}$	10
DN 40	40	78	56.0	RD 65 x $\frac{1}{16}$	10
DN 50	25	92	68.5	RD 78 x $\frac{1}{16}$	11

U1 = variable insertion length  
\* Version with output signal Pt100 is 19 mm shorter

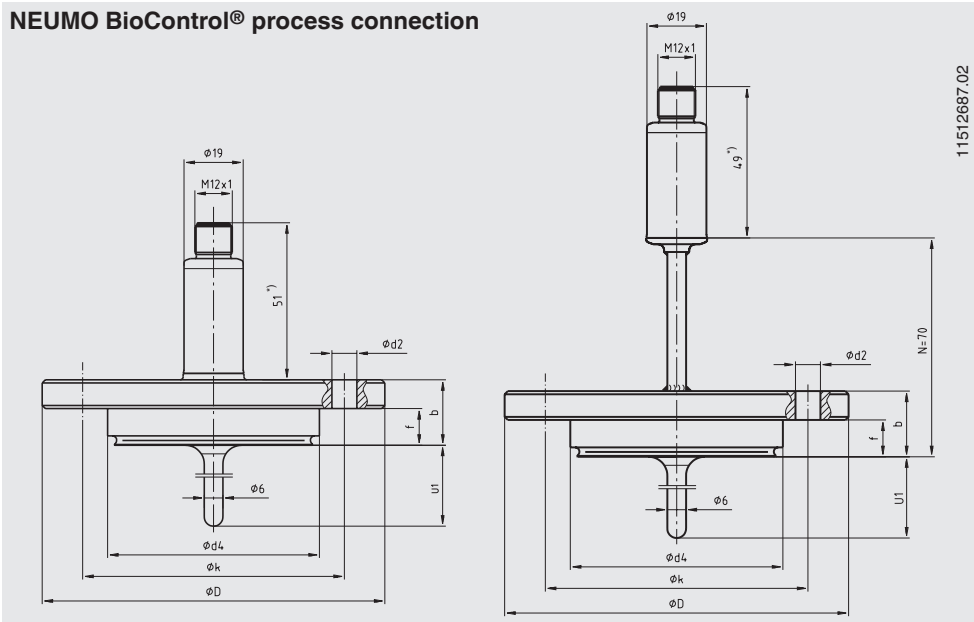
## VARIVENT® process connection



Process connection	Nominal width in mm	PN in bar	Dimensions in mm			
			$\phi D$	$\phi d$	H	h
Form B	DN 10, DN 15	25	31	52.7	20	13.65
Form F	DN 25, DN 32	25	50	66.0	18	12.30
Form N	DN 40, DN 50	16	64	84.0	18	12.30

U1 = variable insertion length  
 \* Version with output signal Pt100 is 19 mm shorter

## NEUMO BioControl® process connection



U1 = variable insertion length  
 \* Version with output signal Pt100 is 19 mm shorter


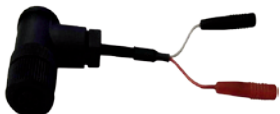
Case size	Nominal width of tube	Dimensions in mm						
		$U_1$ 1)	$\phi d_4$	$\phi D$	f	b	$\phi k$	$\phi d_2$
Size 25	DN 8	5	30.5	64	11	20	50	4 x $\phi 7$
	DN 10	6	30.5	64	11	20	50	4 x $\phi 7$
	DN 15	9	30.5	64	11	20	50	4 x $\phi 7$
	DN 20	11	30.5	64	11	20	50	4 x $\phi 7$
Size 50	DN 25	15	50.0	90	17	27	70	4 x $\phi 9$
	DN 40	20	50.0	90	17	27	70	4 x $\phi 9$
	DN 50	25	50.0	90	17	27	70	4 x $\phi 9$
	DN 65	35	50.0	90	17	27	70	4 x $\phi 9$
	DN 80	45	50.0	90	17	27	70	4 x $\phi 9$
Size 65	DN 100	55	50.0	90	17	27	70	4 x $\phi 9$
	DN 40	20	68.0	120	17	27	95	4 x $\phi 11$
	DN 50	25	68.0	120	17	27	95	4 x $\phi 11$
	DN 65	35	68.0	120	17	27	95	4 x $\phi 11$
	DN 80	45	68.0	120	17	27	95	4 x $\phi 11$
	DN 100	55	68.0	120	17	27	95	4 x $\phi 11$

1) Recommended insertion length for installation in BioControl® flow-through housing

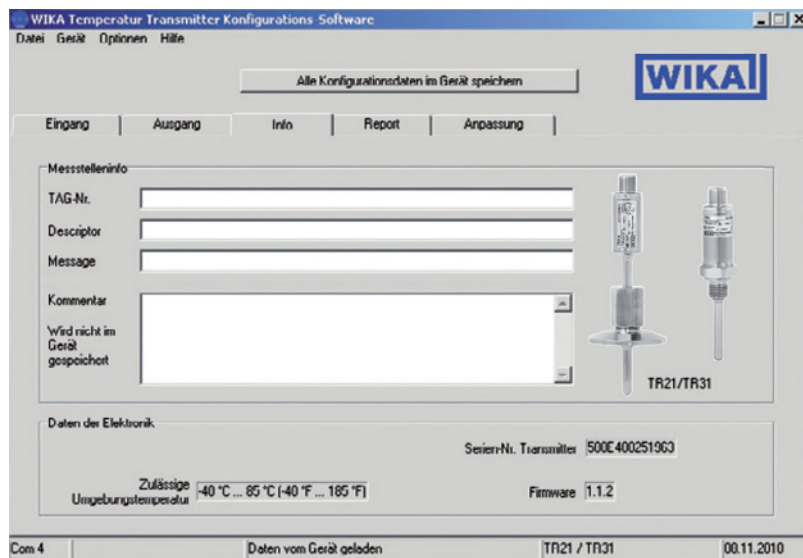
Other process connections and nominal widths available on request.

## Accessories

### Configuration set

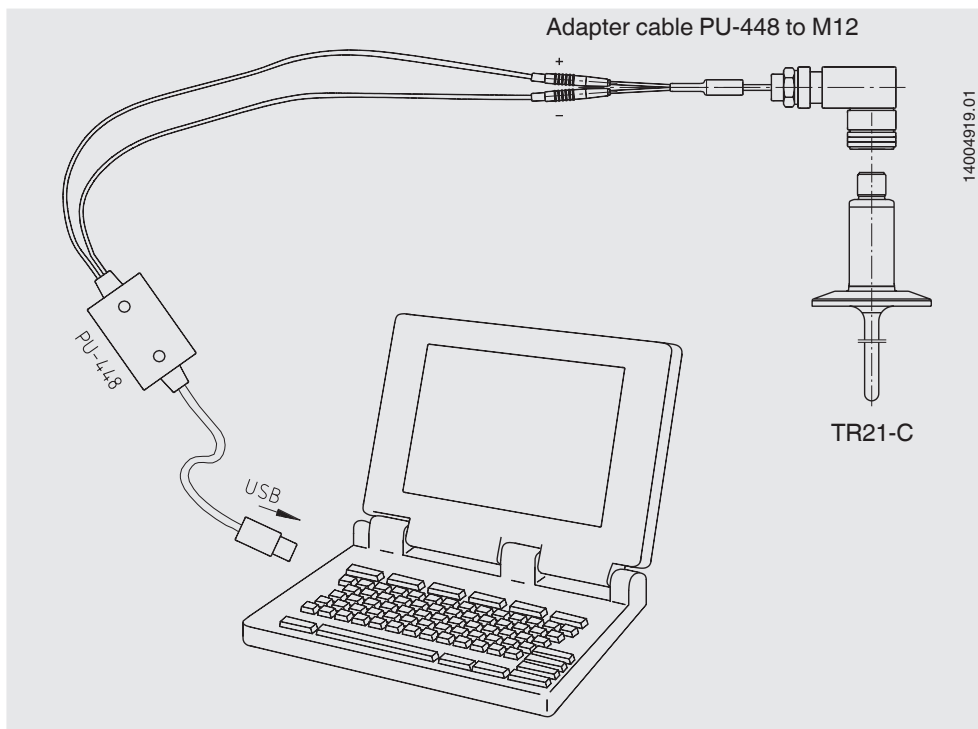
Model	Special features	Order No.
Programming unit Model PU-448 	<ul style="list-style-type: none"> <li>■ Easy to use</li> <li>■ LED statusdisplay</li> <li>■ Compact design</li> <li>■ Now no further power supply is needed for either the programming unit or for the transmitter</li> <li>■ Measuring the loop current of the model T24 transmitter and the model TR21, TR30 and TR31 resistance thermometers is possible</li> </ul>	11606304
Adapter cable M12 to PU-448 	Adapter cable for the connection of a model TR21-C resistance thermometer to the PU-448 programming unit	14003193

## Software



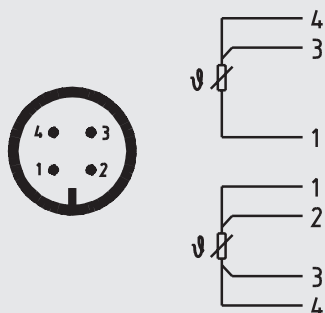
WIKA\_TT configuration software (multilingual) as a free download from [www.wika.com](http://www.wika.com)

## Connecting PU-448 programming unit

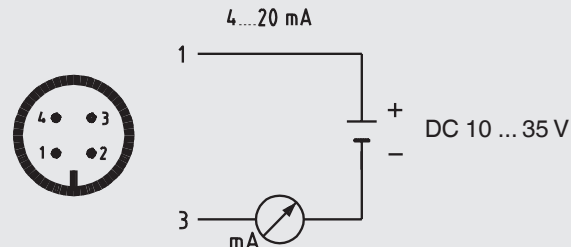


## Electrical connection

**Pt100** (M12 x 1, 4-pin circular connector)

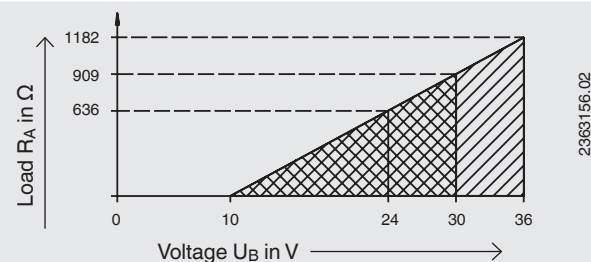


**Transmitter** (M12 x 1, 4-pin circular connector)



## Load diagram

The permissible load depends on the loop supply voltage.



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