

Resistance Thermometers for Sterile Process Technology Model TR48X

WIKA Data Sheet TE 60.29



Applications

- Food industry
- Sterile process technology
- Bio and pharmaceutical industry

Special Features

- Hygienic and dead-space-free design
- Materials and surface finish quality according to the guide lines and standards of the pharmaceutical industry
- Process connection: union nut, aseptic screwed connection, aseptic flange, Clamp, VARIVENT®
- 3A certified
- Intrinsically safe versions (ATEX)

Description

Resistance thermometers for the sterile process technology. The materials and designs of the available process connections are in compliance with the requirements of the food industry.

Thermometers with standard geometric features allow the dismantling of the measuring insert without having to remove the thermowell from the process. Therefore there is no need for removing the whole thermometer from the plant in order to carry out inspections or replace the measuring insert when servicing is necessary while the plant is running.

Designs with tapered probe tip guarantee a short response time.



Resistance Thermometer Model TR481, Female Union Nut (milk-thread)

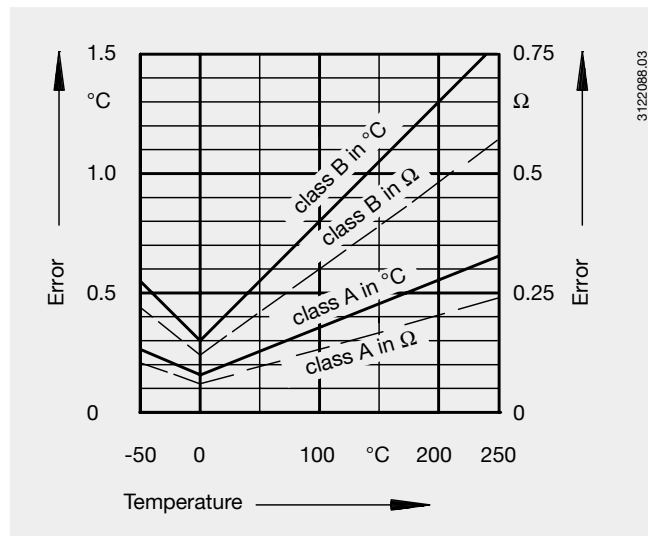
Intrinsically safe designs are available for applications in hazardous areas. The models of the TR48X series are provided with a type examination certificate for "intrinsically safe" protection according to directive 94/9/EC (ATEX). Manufacturer's Declarations in accordance with EN 50 020 and NAMUR NE 24 are also available.

Optionally we can fit analogue or digital transmitters from the WIKA range into the connection head of the TR48X.

Sensor

The sensor is located in the measuring insert, which is interchangeable and spring loaded. The diameter of the measuring insert – and thus the thermowell – limits the number of sensors and their method of connection.

Sensor / Sensor method of connection	Thermowell diameter in mm		
	4.5	6	9.5 tapered to 6
1 x Pt100, 2 wire	x	x	x
1 x Pt100, 3 wire	x	x	x
1 x Pt100, 4 wire	x	x	x
2 x Pt100, 2 wire	x	x	x
2 x Pt100, 3 wire	–	x	x



Sensor method of connection

- 2 wire
- 3 wire
- 4 wire

With 2-wire connection the lead resistance of the measuring insert compounds the error.

Sensor limiting error

- class B to DIN EN 60 751
- class A to DIN EN 60 751
- 1/3 DIN B at 0 °C

It makes no sense to combine 2-wire connection with class A or 2-wire connection with 1/3 DIN B, because the lead resistance error of the measuring insert over-rides the higher sensor accuracy.

Temperature (ITS 90) °C	Basic value Ω	Limiting error			
		Class A		Class B	
°C	Ω	°C	Ω	°C	Ω
-50	80.31	± 0.25	± 0.10	± 0.55	± 0.22
0	100	± 0.15	± 0.06	± 0.3	± 0.12
50	119.40	± 0.25	± 0.10	± 0.55	± 0.21
100	138.51	± 0.35	± 0.13	± 0.8	± 0.30
150	157.33	± 0.45	± 0.17	± 1.05	± 0.39
200	175.86	± 0.55	± 0.2	± 1.3	± 0.48
250	194.1	± 0.65	± 0.24	± 1.55	± 0.56

Basic values and limiting errors

Basic values and limiting errors for the platinum measurement resistances are laid down in DIN EN 60 751.

The nominal value of Pt100 sensors is 100 Ω at 0 °C. The temperature coefficient α can be stated simply to be between 0 °C and 100 °C with:

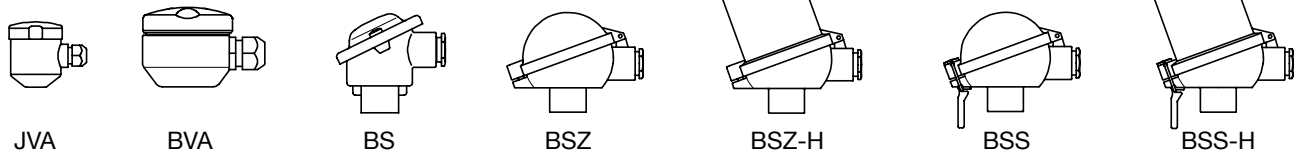
$$\alpha = 3.85 \cdot 10^{-3} \text{ °C}^{-1}$$

The relationship between the temperature and the electrical resistance is characterised by polynomials which are defined in DIN EN 60 751. Furthermore, this standard lays down the basic values in °C stages.

Class	Limiting error in °C
A	$0.15 + 0.002 \cdot t $ ¹⁾
B	$0.3 + 0.005 \cdot t $

1) |t| is the value of the temperature in °C without consideration of the sign

Connection head



Model	Material	Cable entry	Ingress protection	Cap	Surface finish
JVA	stainless steel	M 12 x 1.5 ¹⁾	IP 65	crew cap	blank
BVA	stainless steel	M 20 x 1.5 ¹⁾	IP 65	crew cap	blank
BS	aluminium	M 20 x 1.5	IP 65	cap with 2 screws	silver bronze, painted
BSZ	aluminium	M 20 x 1.5	IP 65	flap cap with screw	silver bronze, painted
BSZ-H	aluminium	M 20 x 1.5	IP 65	flap cap with screw	silver bronze, painted
BSS	aluminium	M 20 x 1.5	IP 65	flap cap with clip	silver bronze, painted
BSS-H	aluminium	M 20 x 1.5	IP 65	flap cap with clip	silver bronze, painted

1) Cable gland, metal

Connection heads of stainless steel: Welded with the extension neck
 Connection heads of aluminium: Screw-fitted to the extension neck
 (M24 x 1.5)

Connection head with digital indicator (option)

As an optional alternative to the standard connection head the thermometer may be equipped with the digital indicator DIH10. The connection head used in this case is similar to the head model BSZ-H. For operation a 4 ... 20 mA transmitter is necessary, which is mounted to the measuring insert. The scale range of the indicator is configured identical to the measuring range of the transmitter. Intrinsically safe versions, explosion protection type EEx (i), are also available.



Fig. Connection head with digital indicator, Model DIH10

Transmitter (option)

Depending on used connection head a transmitter can be mounted into the thermometer.

- mounted instead of terminal block
- mounted within the cap of the connection head
- mounting not possible

Mounting of two transmitters on request.

Connection head	Transmitter				
	T12	T19	T24	T32	T53
JVA	–	–	–	–	–
BVA	○	○	○	○	○
BS	–	○	○	–	○
BSZ	○	○	○	○	○
BSZ-H	●	●	●	●	●
BSS	○	○	○	○	○
BSS-H	●	●	●	●	●

Model	Description	Explosion protection	Data sheet
T19	Analogue transmitter, configurable	without	TE 19.01
T24	Analogue transmitter, PC configurable	optional	TE 24.01
T12	Digital transmitter, PC configurable	optional	TE 12.01
T32	Digital transmitter, HART® protocol	optional	TE 32.01
T53	Digital transmitter FOUNDATION Fieldbus™ and PROFIBUS PA	standard	TE 53.01

Thermowell

Material: stainless steel 1.4435
Surface: roughness $R_a \leq 0.8 \mu\text{m}$,
optional: electropolished, $R_a \leq 0.6 \mu\text{m}$
Diameter: 4.5 mm,
6 mm, 6 mm tapered to 4.5 mm,
9.5 mm tapered to 6 mm,
others on request

Is is not possible to combine all diameters with all sensor designs (number/sensor method of connecton).

More details on request.

Insertion length with Models TR481, TR482, TR483, TR484, TR485

25 mm, 50 mm, 100 mm, 150 mm, others on request

Nominal length with Model TR489

100 mm, 150 mm, 200 mm, 250 mm, others on request

Explosion protection (option)

Resistance thermometers of the Model series TR48X are available with a type examination certificate for "intrinsically safe" ignition protection (TÜV 02 ATEX 1793 X).

These thermometers comply with the requirements of directive 94/9/EC (ATEX), EEx-i, for gases and dust.

Manufacturer's Declarations in accordance with EN 50 020 and NAMUR NE 24 are also available.

The classification / suitability of the instrument (permissible power P_{max} , minimum neck length and permissible ambient temperature) for the respective category can be seen on the type-examination certificate and in the operating instructions.

The responsibility for using suitable thermowells rests with the user.

The permissible ambient temperature ranges of the built-in transmitters can be taken from the corresponding transmitter approval.

Extension neck

Not with Model TR489

Material: stainless steel
Length: 70 mm, others on request
Diameter: \varnothing 15 mm, others on request
 \varnothing 10 mm with connection head JVA (stainless steel)

Process connection

- Model TR481, union nut DIN 11 851
- Model TR482, aseptic screwed connection DIN 11 864-1
- Model TR483, aseptic flange DIN 11 864-2
- Model TR484, Clamp DIN 32 676 / Tri-clamp
- Model TR485, VARIVENT®
- Model TR489, special process connection for example with collar compression fitting or with ball compression fitting

Material of wetted parts: stainless steel 1.4435
Surface of wetted parts: roughness $R_a \leq 0.8 \mu\text{m}$,
optional: electropolished,
 $R_a \leq 0.6 \mu\text{m}$

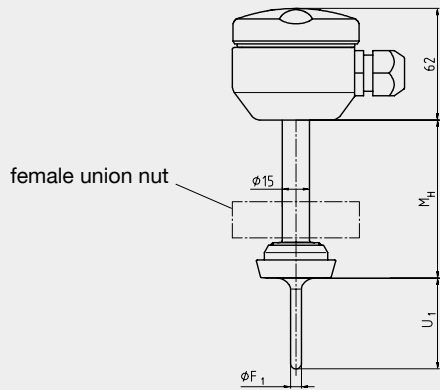
Pressure ratings (static)

- Models TR481, TR482, TR483 and TR484: 40 bar
- Model TR485: 25 bar
- Model TR489: 1bar max.

Model survey / Dimensions in mm

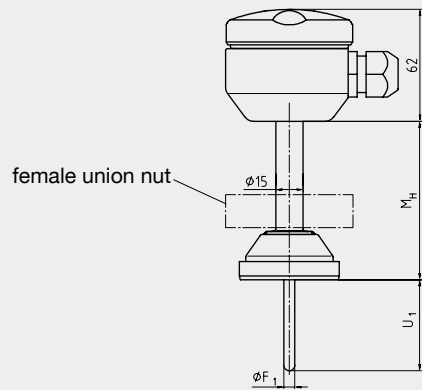
Drawings are shown with connection head model BVA.

Model TR481, union nut DIN 11 851



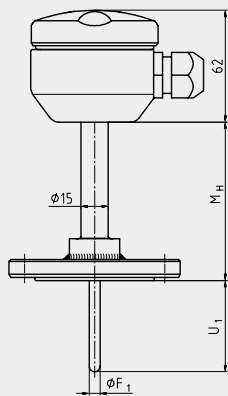
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Model TR482, aseptic screwed connection DIN 11 864-1



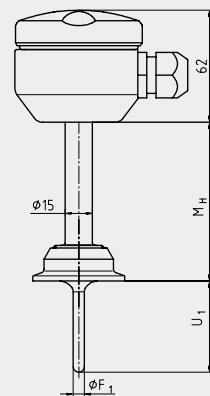
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Model TR483, aseptic flange DIN 11 864-2



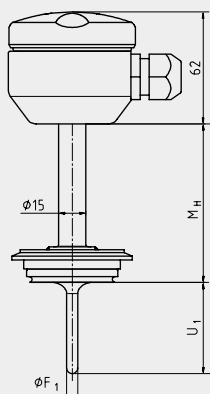
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Model TR484, Clamp DIN 32 676 / Tri-Clamp



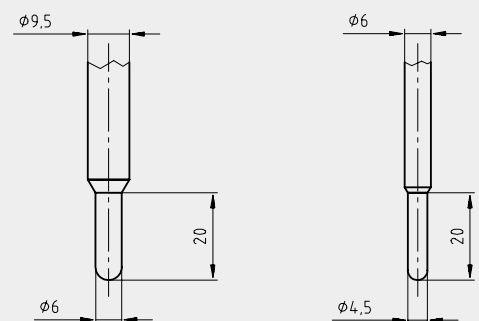
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Model TR485, VARIVENT®



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Dimensions of tapered thermowell probe tips



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Legend:

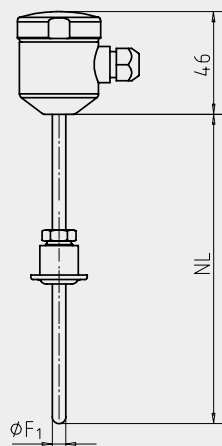
- M_H Neck length
- U₁ Insertion length
- ØF₁ Thermowell outer diameter

Model survey / Dimensions in mm

Drawings are shown with connection head model JVA.

Model TR489, special process connection

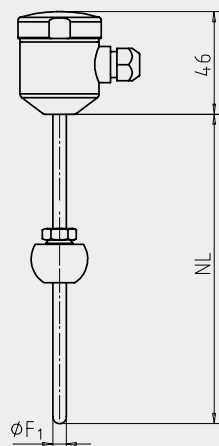
Collar compression fitting



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Model TR489, special process connection

Ball compression fitting

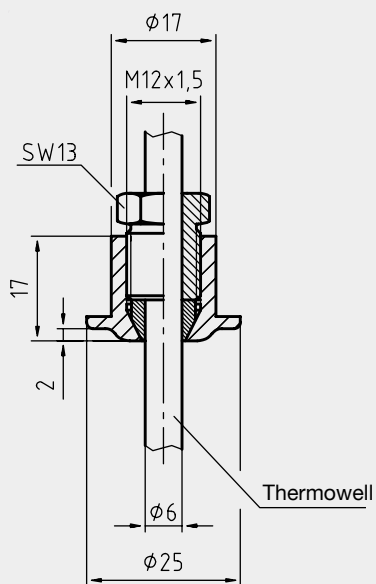


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Legend:

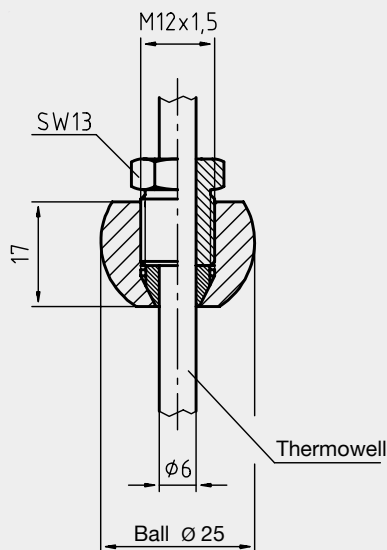
NL Nominal length
 ϕF_1 Thermowell outer diameter

Collar compression fitting with thermowell diameter 6 mm



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Ball compression fitting with thermowell diameter 6 mm

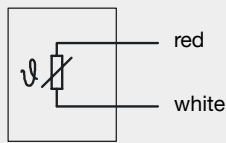
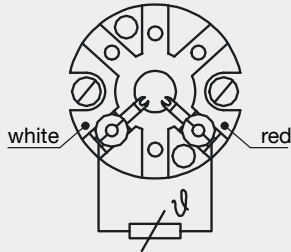


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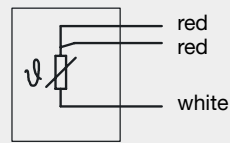
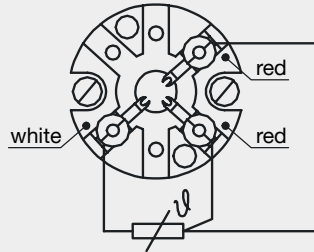
Electrical connection

Connection head Models BVA, BS, BSZ, BSZ-H, BSS and Model BSS-H

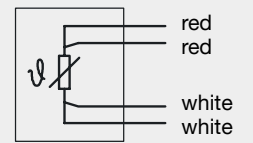
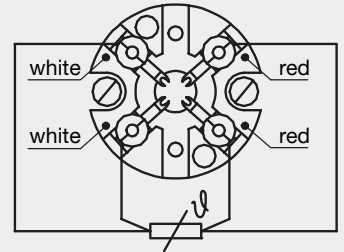
1 x Pt 100, 2 wire



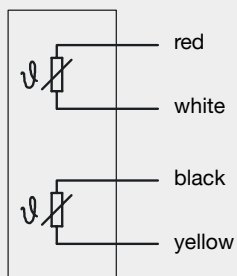
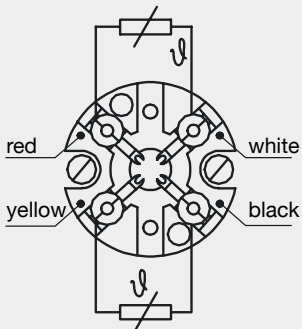
1 x Pt 100, 3 wire



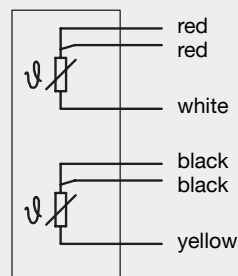
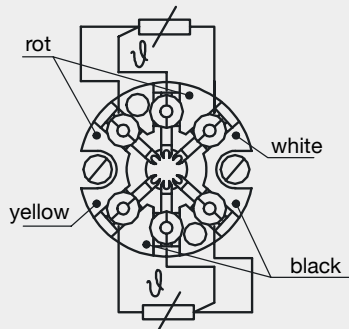
1 x Pt 100, 4 wire



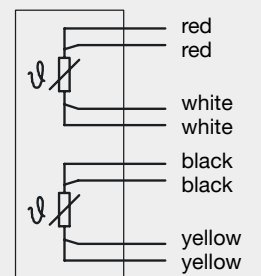
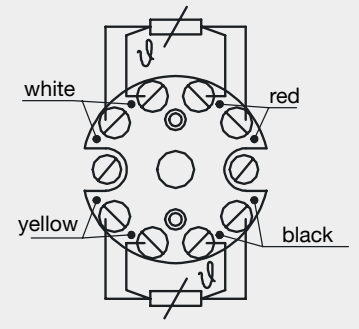
2 x Pt 100, 2 wire



2 x Pt 100, 3 wire



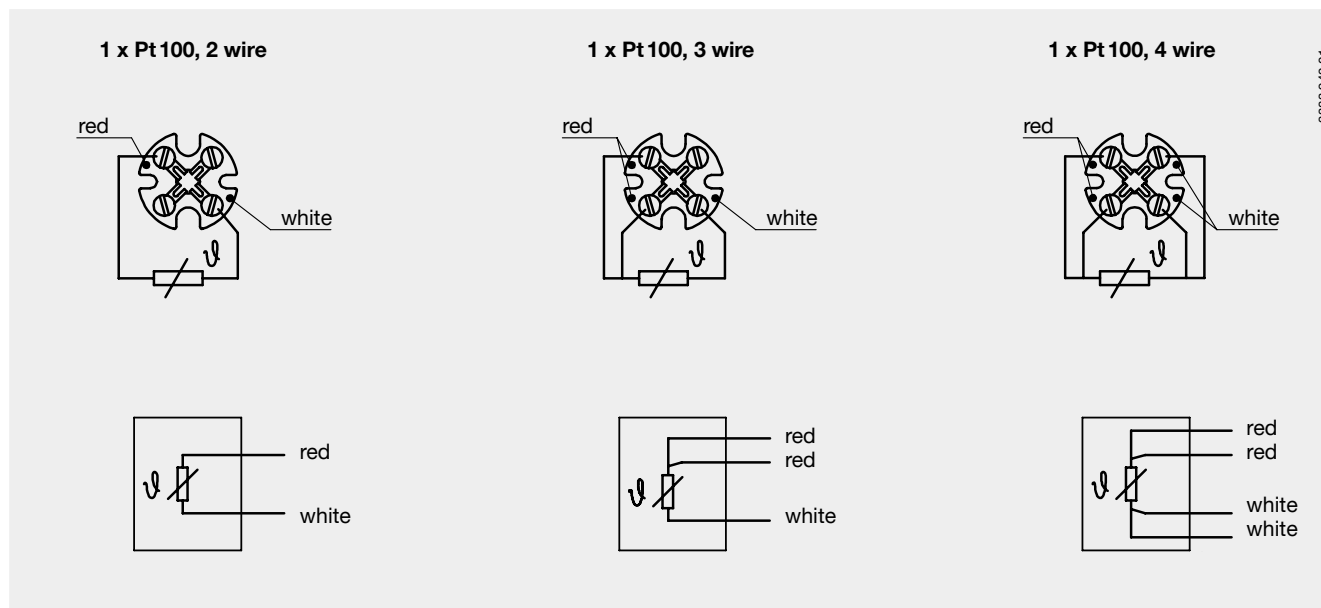
2 x Pt 100, 4 wire



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Electrical connection

Connection head Model JVA



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.

