

In-Line Resistance Thermometers Model TR472

WIKA Data Sheet TE 60.28



Applications

- Food and beverage industry, dairies, drink dispensers and bottling plants, breweries
- Biotech and pharmaceutical industries, paint/varnish industry, clean room technology

Special Features

- Hygienic design (dead space free transitions)
- Residue free and quick cleaning of the measuring point (piggable, suitable for SIP and CIP)
- Materials and surface qualities in accordance with the standards and directives of the pharmaceutical industry
- High measuring accuracy with short response times
- Intrinsically safe versions (ATEX)



In-Line Resistance Thermometer, Model TR472

Description

Resistance thermometers for temperature measurement in processes with extremely high hygienic requirements. These thermometers are used in applications where a thermowell immersed into the process medium is not possible or not desired. A wide variety of process connections is available, so that these thermometers can be used for many different processes without any problems.

3- or 4-wire platinum measurement resistances in accuracy classes A and B according to DIN EN 60 751 serve as sensors.

Analogue or digital transmitters built into the connection head are capable of making various output signals such as 4 ... 20 mA, HART® protocol, Profibus PA or FOUNDATION Fieldbus™ available.

Intrinsically safe designs are available for applications in hazardous areas. Model TR472 is provided with a type examination certificate for "intrinsically safe" protection according to directive 94/9/EC (ATEX).

Sensor

1 x Pt100 with 3 or 4 wire connection. The standard temperature range is -50 °C ... +150 °C.

Note: The instrument does not have an exchangeable measuring insert.

Sensor limiting error

- Class B to DIN EN 60 751
- Class A to DIN EN 60 751

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:

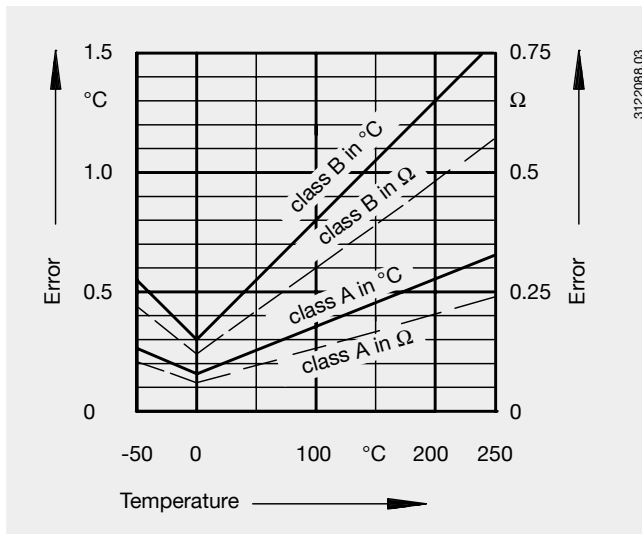
$$\alpha = 3.85 \cdot 10^{-3} \text{ } ^\circ\text{C}^{-1}$$

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.

The limiting error is defined for two classes:

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



Basic values and limiting errors for the platinum measurement resistances per DIN EN 60 751

Temperature (ITS 90) °C	Basic value Ω	Limiting error Class A		Class B	
		°C	Ω	°C	Ω
-50	80.31	± 0.25	± 0.09	± 0.55	± 0.21
0	100	± 0.15	± 0.06	± 0.3	± 0.12
50	119.40	± 0.25	± 0.09	± 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

Documentation / Optimisation of the measuring deviation

The measuring deviation of these thermometers can be determined under close to real process conditions and supplied with a certificate. The standard testing temperature is 70 °C, others on request.

If a digital transmitter is mounted into the thermometer, a determined measuring deviation can be corrected using the "adaption" feature of the transmitter configuration software.

Materials

In sterile processes mainly austenitic CrNiMo steels are used as standard materials.

In the food and beverage sector and in the pharmaceutical industry the qualities 1.4404 and 1.4435 are to be preferred to the titanium-stabilised steel 1.4571 (AISI 316Ti).

For these thermometers WIKA uses stainless steel 1.4435 as standard material for all metallic surfaces that may come into contact with the process medium.

Surface

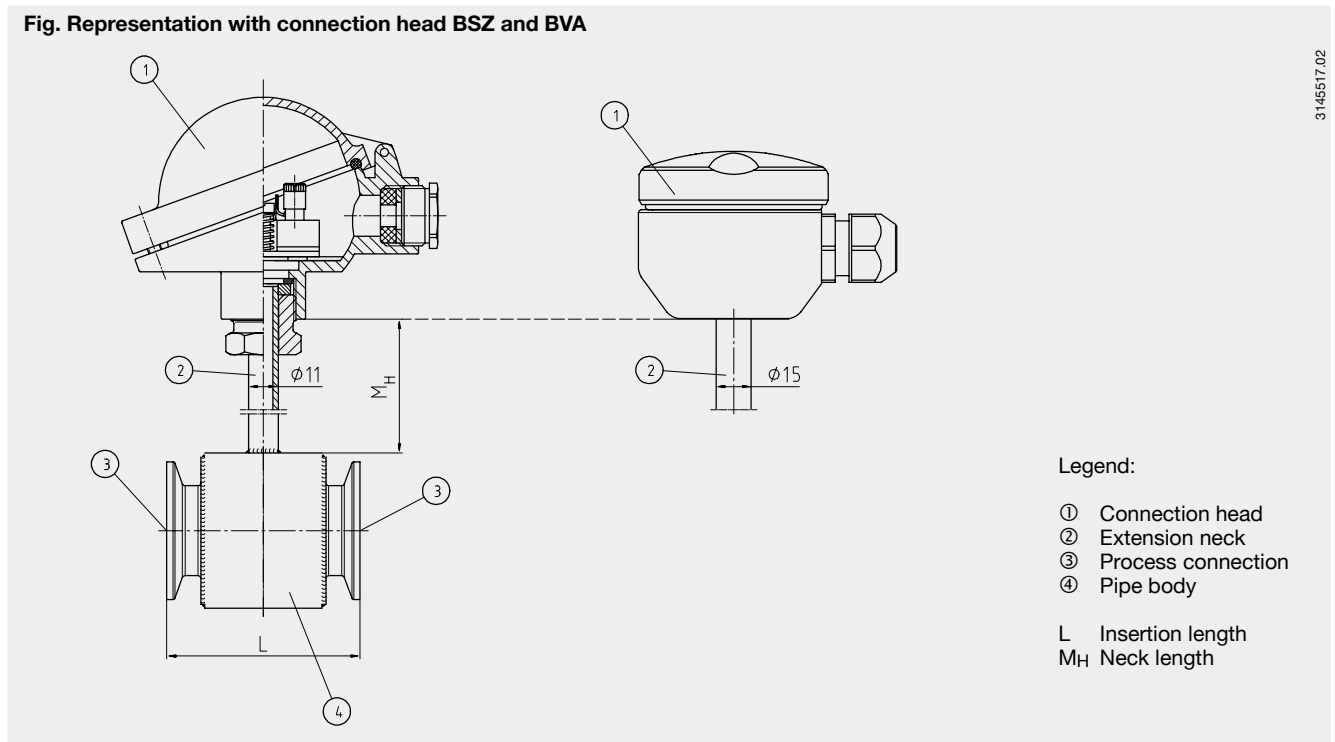
The possibility of cleaning a plant in the scope of CIP/SIP processes is mainly influenced by the quality of the surfaces in contact with the process medium. In order to avoid concentration of pathogenic organisms, the surface in contact with the product should be passive and free of microscopic faults.

All model TR472 surfaces that may come into contact with the process medium achieve an average surface roughness of $R_a \leq 0.8 \mu\text{m}$.

On request we supply the surfaces exposed to the product with an electropolished finish.

TR472 components

Fig. Representation with connection head BSZ and BVA



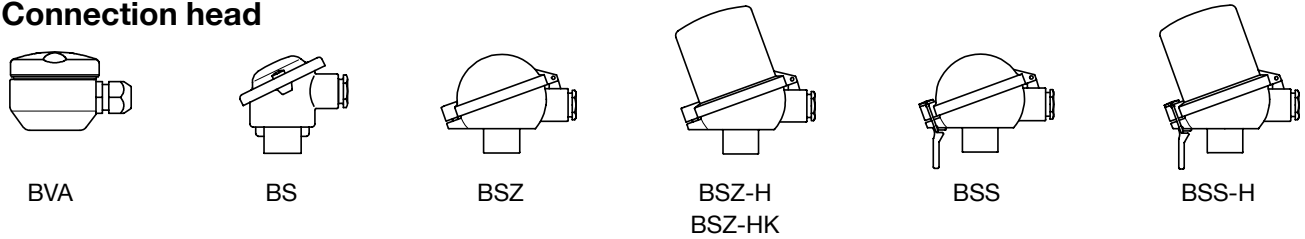
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Legend:

- ① Connection head
- ② Extension neck
- ③ Process connection
- ④ Pipe body

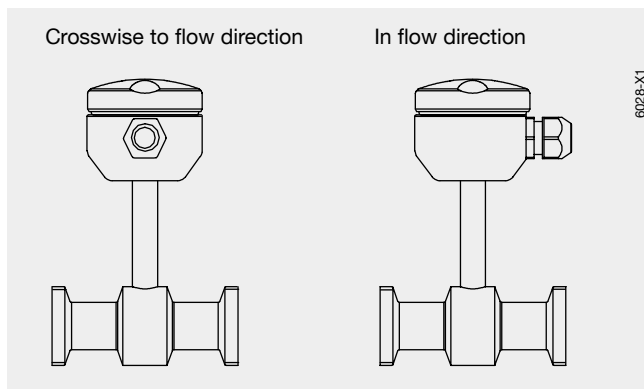
L Insertion length
M_H Neck length

Connection head



Model	Material	Cable entry	Ingress protection	Cap	Surface finish
BVA	stainless steel	M20 x 1.5	IP 65	screw cover	blank
BS	aluminium	M20 x 1.5	IP 65	cap with 2 screws	silver bronze, painted
BSZ	aluminium	M20 x 1.5	IP 65	flap cap with screw	silver bronze, painted
BSZ-H	aluminium	M20 x 1.5	IP 65	flap cap with screw	silver bronze, painted
BSZ-HK	plastic	M20 x 1.5	IP 65	flap cap with screw	blank
BSS	aluminium	M20 x 1.5	IP 65	flap cap with clip	silver bronze, painted
BSS-H	aluminium	M20 x 1.5	IP 65	flap cap with clip	silver bronze, painted

Position of the cable outlet at the connection head



Extension neck

Material: stainless steel

The extension neck is screwed to the connection head (M24 x 1.5 mm).

Standard neck length M_H : 50 mm

Standard diameter $\varnothing d$: 11 mm

When the connection head Model BVA (stainless steel) is used, the extension neck is welded to the head and the neck diameter is 15 mm.

In many applications the extension neck is also used as a part cooling element between connection head and medium in order to protect any head mount transmitters from high medium temperatures.

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.

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.

Pipe body

Material: stainless steel 1.4435

Process connection

Material: stainless steel 1.4435

- Tri-clamp
- Clamp per DIN 32 676
- Thread per DIN 11 851 (DIN 11 887)
- Thread per DIN 11 864-1 Form A
- Thread NEUMO BioConnect®
- Thread SMS
- Thread IDF
- Thread APV RJT
- Other on inquiry

Sealing ring (option)

Material: NBR, PTFE or EPDM



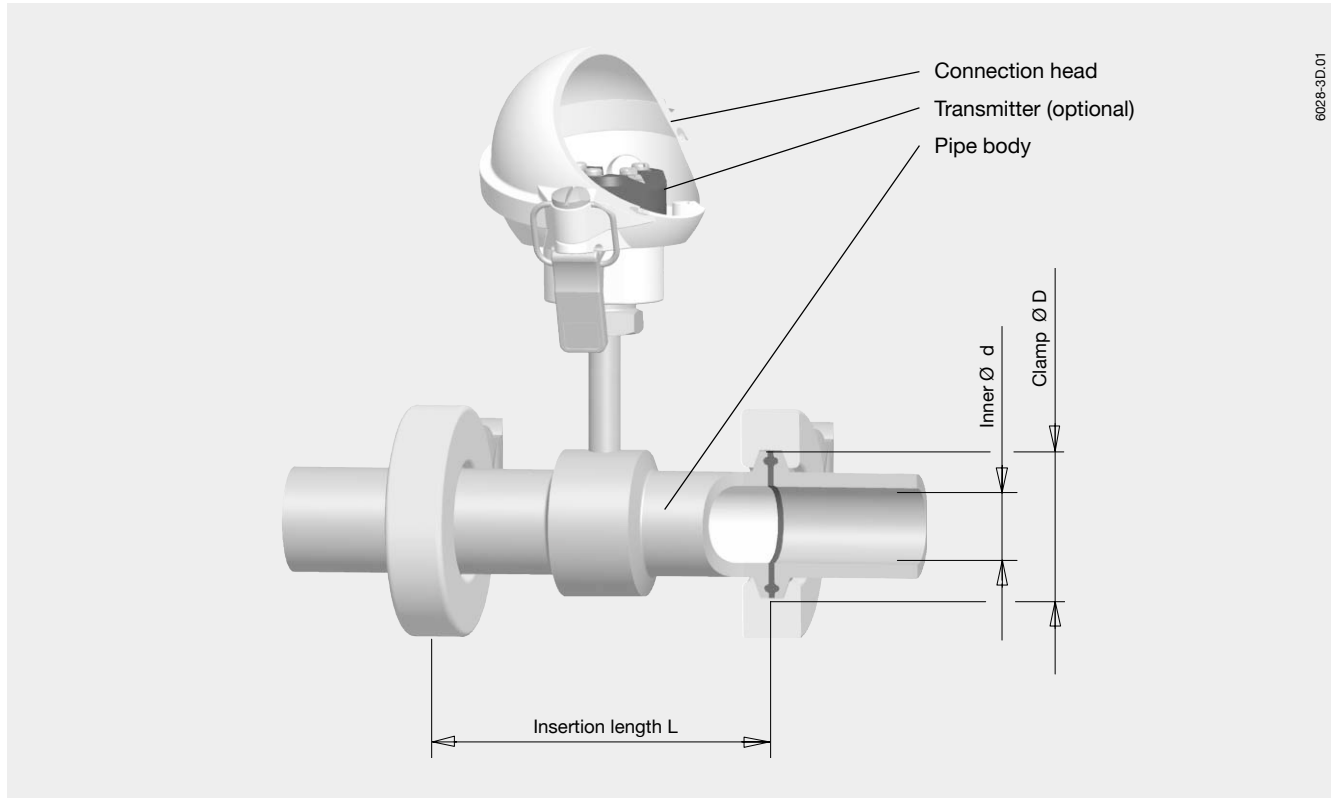
Fig. Connection head with digital indicator, Model DIH10

Connection head	Transmitter					
	T12	T19	T24	T31	T32	T53
BVA	○	○	○	○	○	○
BS	–	○	○	○	–	○
BSZ	○	○	○	○	○	○
BSZ-H / BSZ-HK	●	●	●	●	●	●
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
T31	Analogue transmitter, fixed range	optional	TE 31.01
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

Dimensions in mm

Version connection with clamp



6028-3D.01

Tri-clamp for pipes per ISO 1127

DN	For pipe Outside Ø x thickness	Dimensions in mm			PN ¹⁾
		d	L	D	
8	13.5 x 1.6	10.3	71	25	40
10	17.2 x 1.6	14.0	71	25	40
15	21.3 x 1.6	18.1	71	34	40
20	26.9 x 1.6	23.7	71	50.5	40
25	33.7 x 2	29.7	71	50.5	40
32	42.4 x 2	38.4	71	50.5	40
40	48.3 x 2	44.3	71	64	40

Tri-clamp for pipes per ASME BPE

DN	For pipe Outside Ø x thickness	Dimensions in mm			PN ¹⁾
		d	L	D	
1"	25.4 x 1.65	22.2	71	50.5	40
1 1/2"	38.1 x 1.65	34.8	71	50.5	40
2"	50.8 x 1.65	47.5	71	64	40

Tri-clamp for pipes per BS4825 Part 3 and O.D.-Tube

DN	For pipe Outside Ø x thickness	Dimensions in mm			PN ¹⁾
		d	L	D	
1/2"	12.7 x 1.6	9.5	71	25	40
3/4"	19.05 x 1.6	15.85	71	25	40
1"	25.4 x 1.6	22.2	71	50.5	40
1 1/2"	38.1 x 1.6	34.9	71	50.5	40
2"	50.8 x 1.6	47.6	71	64	40

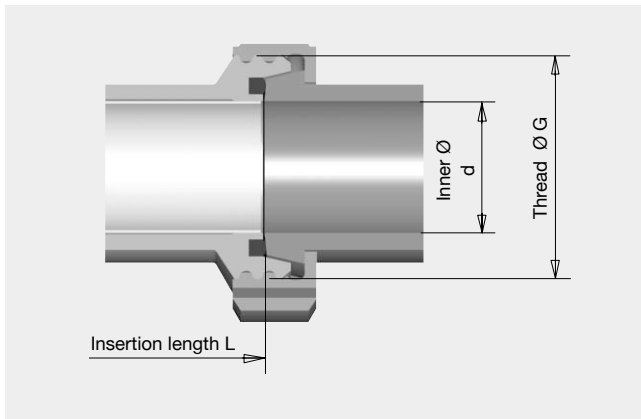
Clamp DIN 32 676 for pipes per DIN 11850

DN	For pipe Outside Ø x thickness	Dimensions in mm			PN ¹⁾
		d	L	D	
25	28 x 1	26	71	50.5	40
32	34 x 1	32	71	50.5	40
40	40 x 1	38	71	50.5	40
50	52 x 1	50	71	64	40

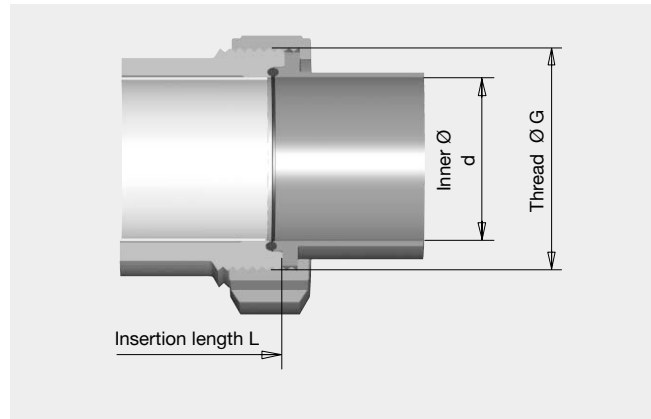
1) For max. pressure range consider pressure range of clamp-ring.

Version connection with thread

Thread DIN 11 851 (DIN 11 887) for pipes DIN 11 850 column 2 and 3



Thread NEUMO BioConnect®

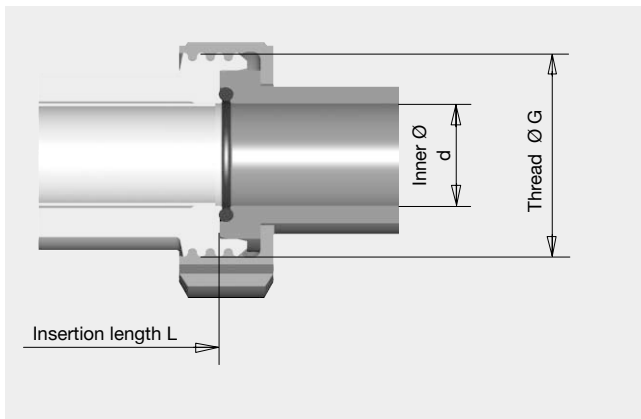


Thread NEUMO BioConnect® for pipes per DIN 11 850

DN	For pipe Outside Ø x thickness	Dimensions in mm			PN
		d	G	L	
10	13 x 1.5	10	Rd 28 x 1/8	84	40
15	19 x 1.5	16	Rd 34 x 1/8	84	40
20	23 x 1.5	20	Rd 28 x 1/6	84	40
25	29 x 1.5	26	Rd 52 x 1/6	84	40
32	35 x 1.5	32	Rd 58 x 1/6	84	40
40	41 x 1.5	38	Rd 65 x 1/6	84	40
50	53 x 1.5	50	Rd 78 x 1/6	84	25
65	70 x 2	66	Rd 95 x 1/6	88	25

DN	For pipe Outside Ø x thickness	Dimensions in mm			PN
		d	G	L	
15	19 x 1.5	16	M30 x 1.5	84	40
20	23 x 1.5	20	M36 x 2	84	40
25	29 x 1.5	26	M42 x 2	84	40
32	35 x 1.5	32	M52 x 2	84	40
40	41 x 1.5	38	M56 x 2	84	40
50	53 x 1.5	50	M86 x 2	84	25
65	70 x 2	66	M90 x 3	88	25

Thread DIN 11 864-1 form A for pipes DIN 11 850 column 2 and 3

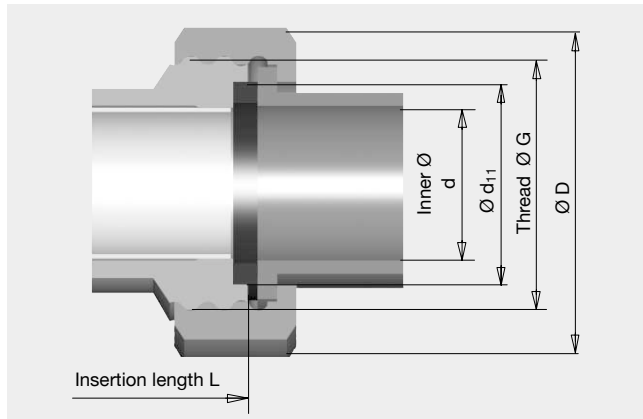


Thread NEUMO BioConnect® for pipes per ISO 1127

DN	For pipe Outside Ø x thickness	Dimensions in mm			PN
		d	G	L	
15	21.3 x 1.6	18.1	M30 x 1.5	84	40
20	26.9 x 1.6	23.7	M36 x 2	84	40
25	33.7 x 2	29.7	M42 x 2	84	40
32	42.4 x 2	38.4	M52 x 2	84	40
40	48.3 x 2	44.3	M56 x 2	84	40
50	60.3 x 2	56.3	M86 x 2	84	25
65	76.1 x 2.3	71.5	M90 x 3	88	25

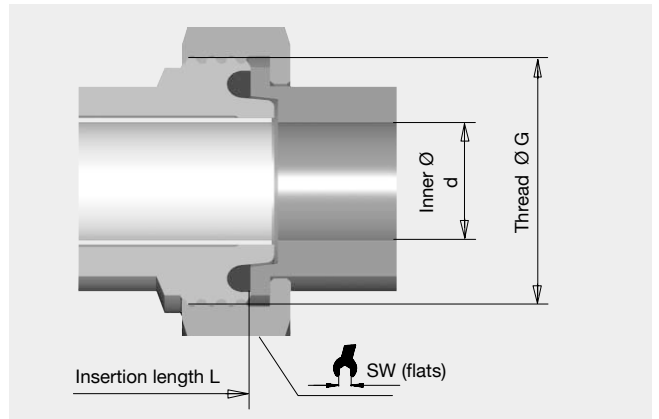
DN	For pipe Outside Ø x thickness	Dimensions in mm			PN
		d	G	L	
10	13 x 1.5	10	Rd 28 x 1/8	84	40
15	19 x 1.5	16	Rd 34 x 1/8	84	40
20	23 x 1.5	20	Rd 28 x 1/6	84	40
25	29 x 1.5	26	Rd 52 x 1/6	84	40
32	35 x 1.5	32	Rd 58 x 1/6	84	40
40	41 x 1.5	38	Rd 65 x 1/6	84	40
50	53 x 1.5	50	Rd 78 x 1/6	84	25
65	70 x 2	66	Rd 95 x 1/6	88	25

Thread SMS



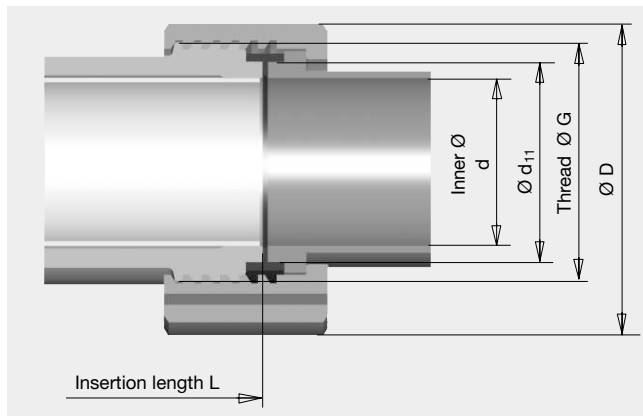
DN	For pipe Outside Ø x thickness	Dimensions in mm					PN
		d	G	L	D	d ₁₁	
1"	25.6 x 1.5	22.6	Rd 40 x 1/6	71	51	32	40
1½"	38.6 x 1.5	35.6	Rd 60 x 1/6	71	74	48	40
2"	51.6 x 1.5	48.6	Rd 70 x 1/6	71	84	61	40

Thread APV RJT



DN	For pipe Outside Ø x thickness	Dimensions in mm				PN
		d	G	L	SW	
1"	25.4 x 1.6	22.2	1 13/16 x 8"	71	50	40
1½"	38.1 x 1.6	34.9	2 5/16 x 8"	71	65	40
2"	50.8 x 1.6	47.6	2 7/8 x 6"	71	80	40

Thread IDF



DN	For pipe Outside Ø x thickness	Dimensions in mm					PN
		d	G	L	D	d ₁₁	
1"	25.6 x 1.5	22.6	1"IDF	71	51	32	40
1½"	38.6 x 1.5	35.6	1½"IDF	71	74	48	40
2"	51.6 x 1.5	48.6	2"IDF	71	84	61	40

Fixing materials such as grooved union nuts, clamps or sealing elements are not included in the scope of supply.

Explosion protection (option)

Resistance thermometers Model TR472 are available with a type examination certificate for "intrinsically safe" protection (TÜV 03 ATEX 2233 X).

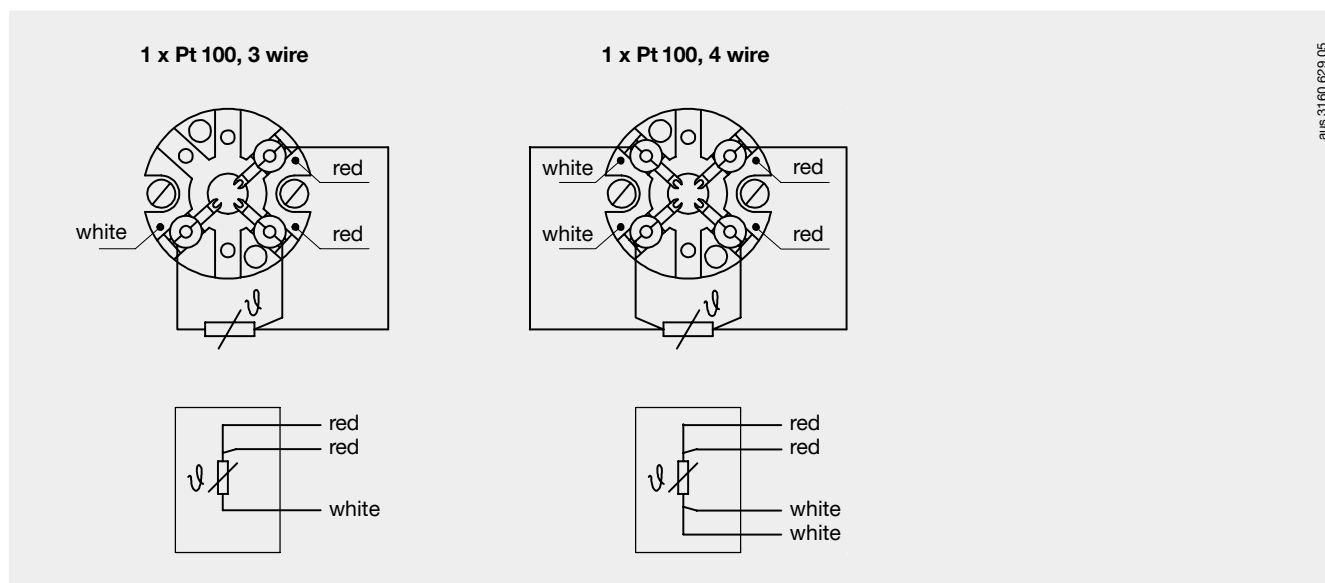
These thermometers comply with the requirements of directive 94/9/EC (ATEX), EEx-i, for gases and dust.

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

Electrical connection



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.

