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1. Accuracy limits

1.1 Thermometer resistors Pt100 and thermometers with nominal resistance 100 Ω

EN-60751 specifies the resistance value ranges in the function of temperature and classes for accuracy limits: 1/3B, A and B class. Accuracy limit specify max. accuracy in °C or in Ω comparing with standard values. Class „1/3B" should not be used in platinum resistors Pt100 with resistance 100Ω, when operating temperatures is higher than 250°C, and class „A", when operating temperatures is higher than 450°C. Thermometers with 2-wire configuration should not be used with class „A" and higher.

Accuracy limits for resistors Pt100						
Temperature °C	Class A		Class B		Class 1/3 B	
	°C	Ω	°C	Ω	°C	Ω
-200	±0.55	±0.24	±1.3	±0.56	-	-
-100	±0.35	±0.14	±0.8	±0.32	-	-
0	±0.15	±0.06	±0.3	±0.12	±0.1	±0.04
100	±0.35	±0.13	±0.8	±0.30	±0.26	±0.1
200	±0.55	±0.20	±1.3	±0.48	±0.4	±0.16
300	±0.75	±0.27	±1.8	±0.64	±0.6	±0.21
400	±0.95	±0.33	±2.3	±0.79	-	-
500	±1.15	±0.38	±2.8	±0.93	-	-
600	±1.35	±0.43	±3.3	±1.06	-	-
700	-	-	±3.8	±1.17	-	-
800	-	-	±4.3	±1.28	-	-
900	-	-	±4.6	±1.34	-	-

1.2 Thermocouples

EN-60584-2 specifies three classes and values of thermoelectric force in the function of temperature.

Accuracy limits acc. to norm EN-60584-2						
Type	Class 1		Class 2		Class 3	
	Temp. range [°C]	Temp. range [°C]	Temp. range [°C]	Temp. range [°C]	Temp. range [°C]	Temp. range [°C]
Type T	-40 to +125	±0.5	-40 do +133	±1.0	-67 do +40	±1.0
	+125 to +350	±0.004 x t	+133 do +350	±0.0075 x t	-200 do -67	±0.015 x t
Type E	-40 to +375	±1.5	-40 do +333	±2.5	-167 do +40	±2.5
	+375 to +800	±0.004 x t	+333 do +900	±0.0075 x t	-200 do -167	±0.015 x t
Type J	-40 to +375	±1.5	-40 do +333	±2.5	-	-
	+375 to +750	±0.004 x t	+333 do +750	±0.0075 x t	-	-
Type K	-40 to +375	±1.5	-40 do +333	±2.5	-167 do +40	±2.5
	+375 to +1000	±0.004 x t	+333 do +1200	±0.0075 x t	-200 do -167	±0.015 x t
Type R+S	0 to +1100	±1.0	0 do +600	±1.5	-	-
	+1100 to +1600	±[1+0.003 (t −1100)]	+600 do +1600	±0.0025 x t	-	-
Type B 400	-	-	-	-	+600 do +800	±4.0
	-	-	+600 do +1700	±0.0025 x t	+800 do +1700	±0.005 x t

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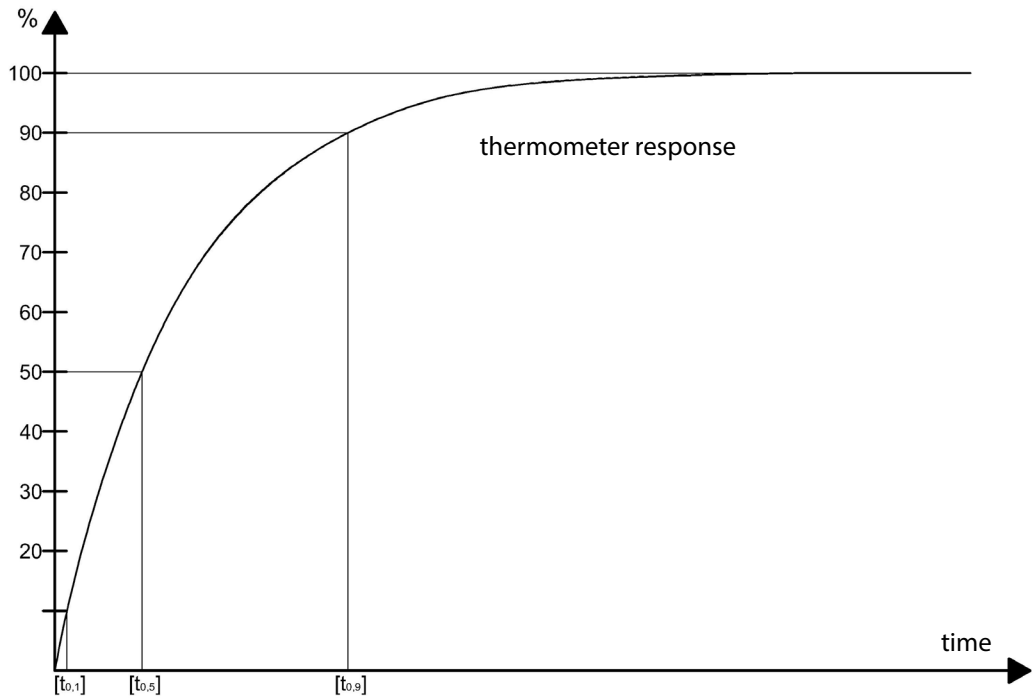
2. Dynamic parameters

2.1 Time of response [t]

Time of response [t], this the time, which thermometer needs, after temperature step change, to show specified percentage of a change. Time of response [$t_{0.5}$], this is the time, after which the thermometer show 50% of value of the temperature step change. On customer request there can be specified time of response for 10% [$t_{0.1}$] or for 90% [$t_{0.9}$]. Time of response can be specified for circulated air or water.

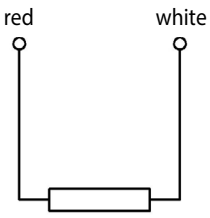


3. Wire configuration

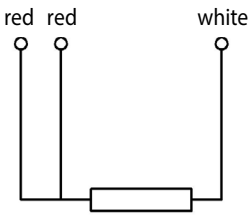
Norm EN- 60751+A2 specify the following wire configuration:

Thermometers with only 2-wire configuration, which are used with 2 outer connecting cables only, should not be applied to class A (pkt3.3.1 EN-60751+A2).

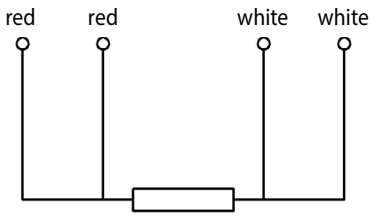
3.1 Configuration symbols



2-wire



3-wire



4-wire

Cable resistance Cu: R = (L x 0.0175) / s
where: L = cable length [m] ; s = cable diam. [mm2] ; 0.0175 = Cu material resistance

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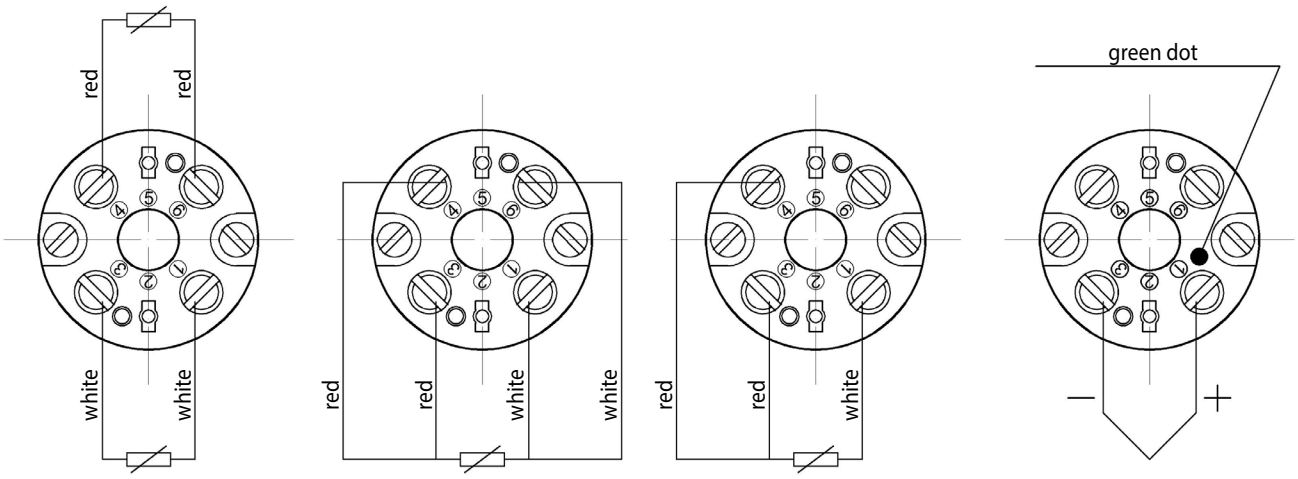
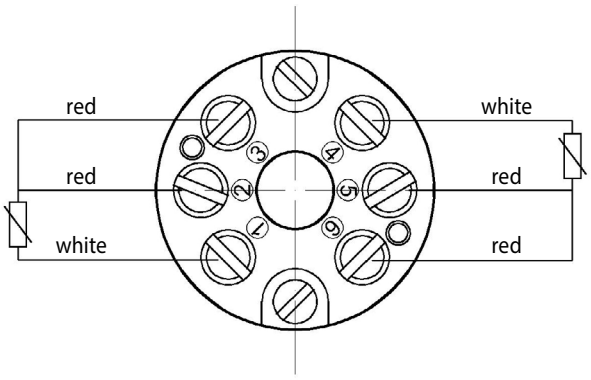
3.2 Resistance thermometers connection

Connecting diagram of terminal block with 4 connections



2xPt100-2p | 1xPt100-4p | 1xPt100-3p | 1xK

Connecting diagram of terminal block with 6 connections



2xPt100-3p

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4. Products quality control

Each manufactured product is quality controlled in our laboratory in compliance with norm requirements. The quality control of manufactured by us platinum resistors was also made by Certified Laboratory D-K 15186-01-00 ZMK GmbH Sachsen-Anhalt.

4.1 Resistance thermometer quality control

This procedure is made for the following sensors: Pt-100/1.3850, Ni-100/1.617, Cu-100/1.426 and also for of unusual resistance in 0°C sensors (Pt-50, Pt-500, Ni-200, Cu-50, itp.) and resistance thermometers equipped with these sensors. There is also possibility of checking the parameters of equipment used for measuring resistance and voltage of sensors.

4.2 Thermocouple quality control

Procedure is done for the following thermocouples PtRh10-Pt (S), NiCr-NiAl (K), Fe-NiCu (J),Cu-CuNi (T) itp., and sensors equipped in above thermocouples.

4.3 Measuring accuracy

- Temperature from 0°C: ±0.03 °C (by confidence level 95%)
- Temperature from 0°C to 100 °C : ±0.10 °C (by confidence level 95)
- Temperature from 100°C to 500 °C : ±0.30 °C (by confidence level 95%)
- Temperature from 500°C to 1200 °C : ±1.3 °C (by confidence level)

4.4 Control and measuring instruments used in the laboratory

- Control platinum resistant thermometer type PW-EZ100 Heraeus Sensor GmbH (Cert.No. D-K 15186-01-00).
- Platinum resistant laboratory sensors of LSM brand (Cert. No. D-K 15186-01-00).
- Control platinum thermometers II class PtRh10-Pt (Certification of Regional Measuring Department in Cracow).
- Standard resistors of 10Ω ,100Ω ,1000Ω, 10000Ω, 1000MΩ kl. 0,01 of ZIP brand
- Resistance decades class. 0,01 (Certification of Regional Measuring Department in Cracow).
- Measurer of insulation in the range of 1MΩ to 10GΩ voltage 0÷1000V.
- Digital multimeter type 6001 (Certification of Regional Measuring Department in Cracow)
- Digital multimeter type FLUKE 8508A (Certification of Regional Measuring Department in Cracow)
- Thermometer bridge 5840E.
- PC for measurements MC8047.
- Pipe furnace type TPK 500 up to 1200 °C.
- Pipe furnace ROF 7/75 up to 1300 °C, with measuring blocks made form aluminum, nickel steel and ceramic.
- Oil thermostat LAUDA US-12 up to 120 °C.
- Liquid thermostat up to 300 °C.
- Ebullioscope for boiling water point measurements.
- Deware instrument for melting water point measurements.

In our laboratory we issue certificates of quality control of resistors and sensors in given measuring range.

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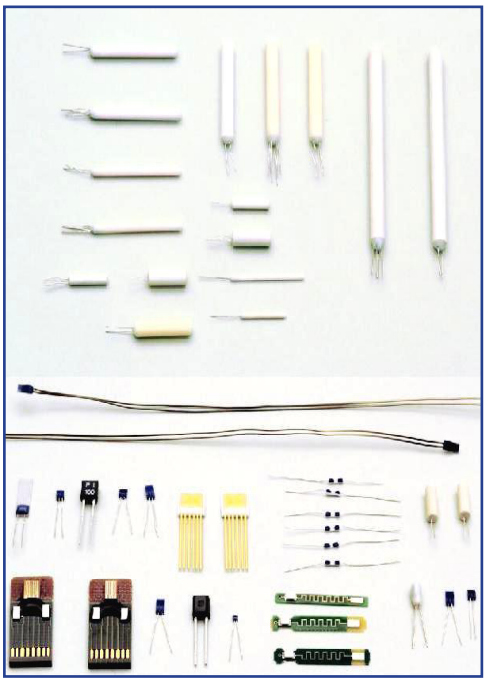
RTD ELEMENTS



RTD elements are designed for industrial measurement in probes, sensors or direct build-in. Depending on demand of measuring RTD's can be manufactured with wire configuration 1xPt100 or 2xPt100 as ceramic, glass, thin-film and thin-film encapsulated (in ceramic can).

Technical specification

Type	Temp Range	Class	Characteristic
OP-A Pt100	-200 do+600°C	B	EN-60751
OP-A Pt100	-100 do +450°C	A	
OP-A Pt100	-50 do +250°C	1/3B (AA)	
OP-A Pt100	0 do +100°C	1/5 B	
ON-A Ni100	-60 do +150°C	-	
FR Pt-100	-70 do +500°C	B, A, 1/3B (AA)	
FR Pt500,1000	-70 do +500°C	B	
GX Pt100	-200 do +400°C	B, A	
GN Pt100	-200 do +400°C	B, A	

Note: Quartz resistors Pt100 available, shock-proof (glass)
and thin-film resistors Pt100, Pt500 i Pt1000, also in class 1/5B and 1/10B

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RESISTOR TYPES AND DIMENSIONS

Ceramic wire type	Nominal resistance Ω	Dimensions d x l [mm]	Self-heating (air) (°C/mW)	Time of response water, v = 0,4 m/s	
				$T_{0,5}$	$T_{0,9}$
OP-A1b	1xPt100	1,5x15	0,08	0,20	0,6
OP-A1	1xPt100	1,5x25	0,08	0,20	0,6
OP-A2	1xPt100	2,6x30	0,08	0,25	0,7
OP-A3	1xPt100	2,8x30	0,06	0,25	0,7
OP-A4	1xPt100	3,0x30	0,06	0,25	0,9
OP-A5	1xPt100	3,5x30	0,06	0,30	1,1
OP-A6	1xPt100	4,0x30	0,06	0,35	1,4
OP-A7	1xPt100	4,5x18	0,08	0,30	1,2
OP-A8	1xPt100	4,5x30	0,06	0,35	1,4
OP-A9	1xPt100	5,0x60	0,06	0,35	1,4
OP-A10a	2xPt100	2,6x30	0,06	0,25	0,7
OP-A11	2xPt100	3,0x30	0,06	0,30	1,0
OP-A12	2xPt100	3,5x30	0,06	0,30	1,1
OP-A13	2xPt100	4,0x30	0,06	0,30	1,4
OP-A14	2xPt100	4,5x30	0,06	0,35	1,4
OP-A15	2xPt100	5,0x60	0,06	0,35	1,4
OP-A20	3xPt 100	4,5x30	0,06	0,35	1,4

Thin film type	Nominal resistance Ω	Dimensions d x l [mm]	Self-heating (air) (°C/mW)	Time of response water, v = 0,4 m/s	
				$T_{0,5}$	$T_{0,9}$
FR 2813	1xPt100	2,8x13	0,06	0,25	0,7
FR 4513	1xPt100	4,5x13	0,06	0,30	1,2
FR 2813	1xPt500	2,8x13	0,06	0,25	0,7
FR 4513	1xPt500	4,5x13	0,06	0,30	1,2
FR 2813	1xPt1000	2,8x13	0,06	0,25	0,7
FR 4513	1xPt1000	4,5x13	0,06	0,30	1,2
FR 2813	2xPt100	2,8x13	0,06	0,25	0,7
FR 4513	2xPt100	4,5x13	0,06	0,30	1,2
FR 2813	2xPt500	2,8x13	0,06	0,25	0,7
FR 4513	2xPt500	4,5x13	0,06	0,30	1,2
FR 2813	2xPt1000	2,8x13	0,06	0,25	0,7
FR 4513	2xPt1000	4,5x13	0,06	0,30	1,2

Glass wire type	Nominal resistance Ω	Dimensions d x l [mm]	Self-heating (air) (°C/mW)	Time of response water, v = 0,4 m/s	
				$T_{0,5}$	$T_{0,9}$
GN2713	1xPt100	2,7x13	0,06	0,30	1,1
GN4515	1xPt100	4,5x15	0,08	0,30	1,2

Ordering Example

OP-A10a-2xPt100-1/3B, OP-A1-1xPt100-A , FR 2813-1xPt100-B, GX2713-1xPt100-A

stands for: resistor types (dimensions), nominal resistance Ω (Pt,Ni,Cu), class acc. to norm PN-EN 60751+A2 pt.3.3

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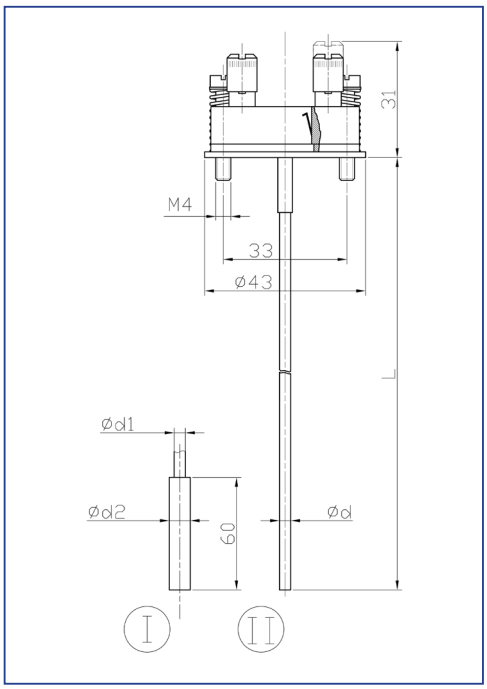
WP-OP-01



Resistance thermometer Insert Pt100

Resistance thermometer insert Pt100 Type WP-OP-01 is to be used as a replaceable part of Resistance Thermometer Pt100 with design suitable to such an action. In this way you may perform very quick replacement of faulty sensor without any disturbance to process. Insert have a spring loaded terminal block.

Standard beaded insert is made of metal protective tube, which covers resistance temperature detector and ceramic insulated connection wires. The protective tube is filled with special sand. Sheathed insert is made of sheathed copper leads, which consists the protection and a metal sleeve, which covers the resistance temperature detector. Sheathed insert is employed in application where severe thermal shock or vibration appear.

Model	Execution
PS I	d2 > d1
PS II	d2 = d1 = d
PS I/Exi	d2 > d1 , intrinsic version
PS II/Exi	d2 = d1 = d , intrinsic version

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Sleeve diam. d2	Sheath diam. d/d1	Material acc. DIN/AISI	Length L	Conn. head mount in	Transmitter
ø 4	ø 3	1.4571 / 316Ti	on request	on request (e.g. NA, DAN, DANAW, MA)	on request
ø 6	ø 3.2, ø 4.5, ø 5				
ø 8	ø 6				

Non-standard models available.

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Ordering Information

WP-OP -01	A	B	C	D	E	F	G	H	I	J	K

A Execution	
PS I	d2 > d1
PS II	d2 = d1 = d
PS I/Exi	d2 > d1 , intrinsic version
PS II/Exi	d2 = d1 = d , intrinsic version

B Resistor	
1xPt100	Single Pt100
2xPt100	Double Pt100

C Class	
B	B
A	A
1/3B	1/3B (AA)

D Lead wire configuration	
2p	2-wire
3p	3-wire
4p	4-wire

E Sheath material	
1.4571	1.4571 / 316Ti
1.4541	1.4541 / 321
1.4841	1.4841 / 310 / 314

F Sleeve and sheath diameter	
4/3	d2= 4mm , d=d1= 3mm
6/3.2	d2= 6mm , d=d1= 3.2mm
6/4.5	d2= 6mm , d=d1= 4.5mm
6/5	d2= 6mm , d=d1= 5mm
8/6	d2= 8mm , d=d1= 6mm

G Measuring insert length L	
	specify in [mm]

H Type of head the insert is to be mounted	
	specify head type

I Operating temperature	
	specify in °C

J Transmitter	
	specify type and temp. range in °C

K Version	
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

WP-OP-01-PS-II-1xPt100-A-3p-1.4571-6/5-450-NA-500-Z

stands for: Sheathed spring loaded insert, shock-proof, single class A resistor, 3-wire lead configuration, sheath material 1.4571, sheath diameter 5 mm, sleeve diameter 6 mm, length 450 mm, to be mounted in NA type head, operating temp. 500°C, standard sensor version (ceramic wire wound element)

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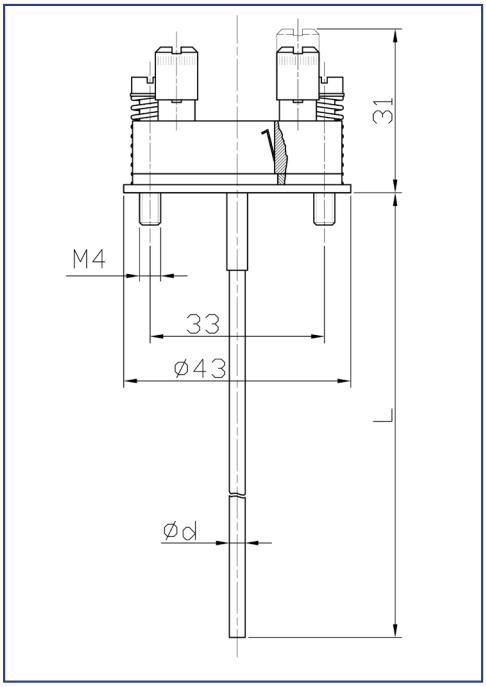
WP-TE-02



Thermocouple Insert

T/C Sensor Insert is to be used as a replaceable part of thermocouple assembly with design suitable to such an action. In this way you may perform very quick replacement of faulty sensor. Connection wires constitutes a thermocouple beginning from junction to terminal board.

Sheathed insert type WP-TE-02-PS, is made of sheathed, mineral insulated thermocouple wires. Metallic oxide (MgO) insulation is compacted into the sheath to mechanically support and electrically insulate the thermocouple wire.

Insert can be equipped with terminal block or transmitter.

Model	Execution
PS	standard version
PS/Exi	intrinsic version

Technical specification

Sheathed sensor insert	Version	Temp. range - Class 1	Characteristic
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	ø 3	-40°C..+500°C -40°C..+700°C	acc. EN 60584-1
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	ø 6	-40°C..+600°C -40°C..+800 (+1000*)°C	

* upper temperature depends on measuring conditions and temperature changes

Sheath diam. d	Material acc. DIN/AISI	Length L	Conn. head mount in	Transmitter
ø 1.5, ø 3, ø 4.5, ø 5, ø 6, ø 8	Inconel 600 / 2.4816	on request	on request (e.g. NA, DAN, DANAW, MA)	on request
	1.4541 / 321			
	1.4841 / 310 / 314			

Non-standard models available.

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Ordering Information

WP-TE -02	A	B	C	D	E	F	G	H	I

A	Execution
PS	Sheathed spring loaded insert
PS/Exi	Intrinsic version

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Sleeve and sheath diameter
1,5	d= 1,5 mm
3	d= 3 mm
4,5	d= 4,5 mm
5	d= 5 mm
6	d= 6 mm
8	d= 8 mm

D	Sheath material
Inconel 600	Inconel 600 / 2.4816
1.4541	1.4541 / 321
1.4841	1.4841 / 310 / 314

E	Measuring insert length L
	specify in [mm]

F	Junction
O	Ungrounded
Z	Grounded

G	Type of head the insert is to be mounted
	specify head type

H	Operating temperature
	specify in °C

I	Transmitter
	specify type and temp. range in °C

Ordering Example

WP-TE-02-PS-1xK-3-Inconel600-150-Z-NA-700

stands for: Sheathed insert with spring, with thermoelement 1xNICr-NiAl, sheath diameter ø3 mm, sheath material Inconel 600, length 150mm, grounded, connection head type NA, operating temp. up to 700°C, w/o transmitter.

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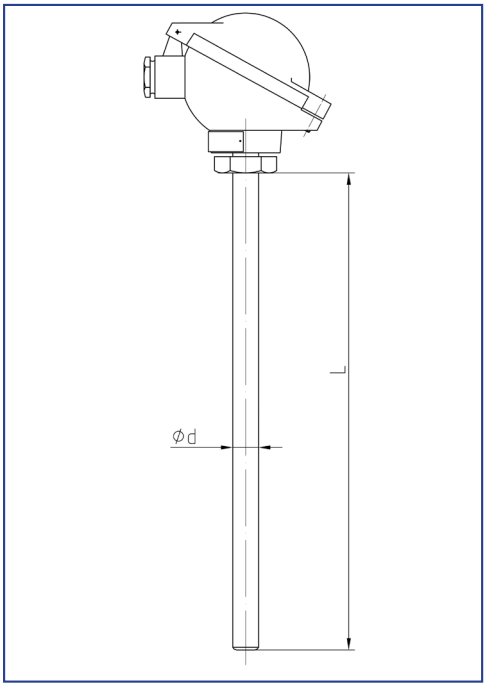
TOP-PD-03



Resistance Thermometer Pt100 without process connection fitting

Straight Resistance Thermometer type TOP-PD-03 features good dynamic characteristic and is suitable for measurement of rapidly changing temperature of process gas and liquid. Short response time is due to thin walled protective tube made of alloy steel. Temperature limits are from -200°C up to +600°C.

Thermometer could be provided with clamp connection UZG-47.

Type	Execution
TOP-PD-03	Basic - acc to catalog card
TOP-PD-03/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TOP-PD-03/Exi	Intrinsic safe – acc to Atex
TOP-PD-03/Exe	Increased safety – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Diameter d	Material acc. DIN/AISI	Length L
ø 6, ø 10, ø 12	1.4404 / 316L	on request
ø 4, ø 6, ø 8, ø 9, ø 10, ø 11, ø 12, ø 15	1.4571 / 316Ti	
ø 10, ø 11, ø 15	1.7335 / A182 Grade F11	
ø 12 , ø 13,7	2.4602 / Hastelloy C22	

Connection head	Transmitter
on request (e.g. NA, DAN, DANAW, MA)	on request

Threaded compression fitting type UZG-47
on request, acc. to catalog card – ***UZG-47***

Non-standard models available.

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Ordering Information

TOP-PD-03	A	B	C	D	E	F	G	H	I	J	K

A	Execution
U	with non-replaceable insert
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2-wire
3p	3-wire
4p	4-wire

E	Protection tube diameter
4	d= 4 mm
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm
11	d= 11 mm
12	d= 12 mm
13,7	d= 13,7 mm
15	d= 15 mm

F	Length L
	specify in [mm]

G	Protection tube material
1.4571	1.4571 / 316Ti
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22

H	Connection head
	specify head type

I	Operating temperature
	specify in °C

J	Transmitter
	specify type and temp. range in °C

K	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PD-03-PS-1xPt100-B-2p-10-250-1.4571-NA-400-Z

stands for: RTD with replaceable insert, vibration-proof, with single class B resistor, 2-wire lead configuration, protection tube diameter 10 mm, length 250 mm, material 1.4571, connection head type NA , operating temperature 400°C, standard sensor version (ceramic wire wound element)

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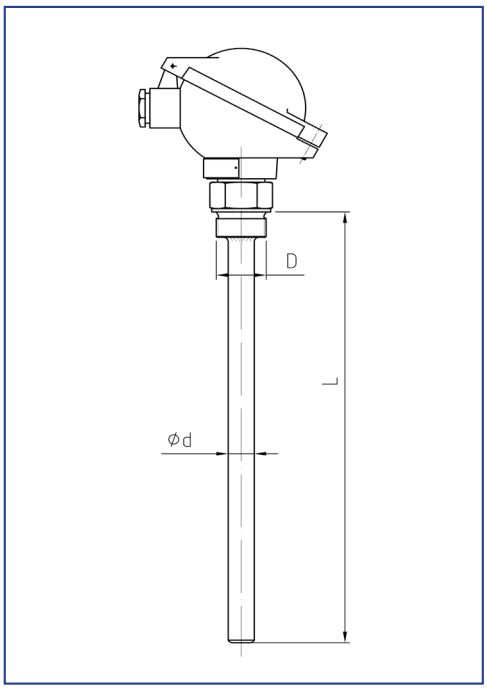
TOP-PKG-04



Resistance Thermometer Pt100 with directly connected instrument thread

Straight Resistance Thermometer type TOP-PKG-04 with fitting has been designed for gas and liquid temperature measurement in pipes and vessels in range from -200°C to +600°C. Protection tube is made of alloy steel C22, 1,4571 or 1,7335, and thermometer may be applied for corrosive process fluids.

Type	Execution
TOP-PKG-04	Basic - acc to catalog card
TOP-PKG-04/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TOP-PKG-04/Exi	Intrinsic safe – acc to Atex
TOP-PKG-04/Exe	Increased safety – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Diameter d	Material acc. DIN/AISI	Length L
ø 6, ø 10, ø 12	1.4404 / 316L	on request
ø 4, ø 6, ø 8, ø 9, ø 10, ø 11, ø 12, ø 15	1.4571 / 316Ti	
ø 10, ø 11, ø 15	1.7335 / A182 Grade F11	
ø 12 , ø 13,7	2.4602 / Hastelloy C22	

Connection head	Transmitter
on request (e.g. NA, DAN, DANAW, MA)	on request

Process connection thread D
on request (e.g. M20x1,5, M24x1,5, G1/2", G3/4", 1/2"NPT, 3/4"NPT)

Non-standard models available.

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Ordering Information

TOP-PKG-04	A	B	C	D	E	F	G	H	I	J	K	L

A Execution	
U	with non-replaceable insert
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B Resistor	
1xPt100	Single Pt100
2xPt100	Double Pt100

C Class	
B	B
A	A
1/3B	1/3B (AA)

D Lead wire configuration	
2p	2-wire
3p	3-wire
4p	4-wire

E Protection tube diameter	
4	d= 4 mm
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm
11	d= 11 mm
12	d= 12 mm
13,7	d= 13,7 mm
15	d= 15 mm

F Length L	
	specify in [mm]

G Protection tube material	
1.4571	1.4571 / 316Ti
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22

H Process connection thread D	
	specify type of thread

I Connection head	
	specify head type

J Operating temperature	
	specify in °C

K Transmitter	
	specify type and temp. range in °C

L Version	
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKG-04-PS-1xPt100-B-2p-10-250-1.4571-M20x1,5-NA-400-W

stands for: RTD with replaceable insert, with single class B resistor, 2-wire lead configuration, protection tube diameter 10 mm,, length 250 mm, material 1.4571, process connection M20x1.5, connection head type NA, operating temperature up to 400°C, shockproof sensor version (thin-film element).

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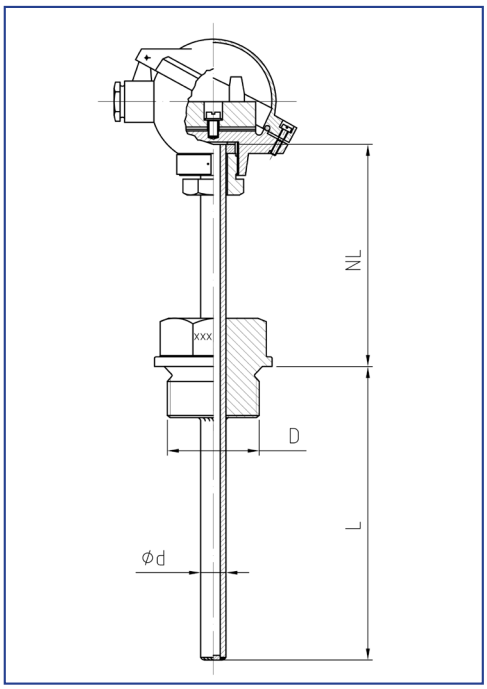
TOP-PKG-05



Resistance Thermometer Pt100 with process connection fitting

Straight Resistance Thermometer type TOP-PKG-05 with process connection fitting and extension tube is aimed for low flow rate gas and liquid service in pipes and pressurized vessels in range from -200°C to +600°C. Protection tube is made of alloy steel and thermometer may applied for corrosive process fluids.

Type	Execution
TOP-PKG-05	Basic - acc to catalog card
TOP-PKG-05/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TOP-PKG-05/Exi	Intrinsic safe – acc to Atex
TOP-PKG-05/Exe	Increased safety – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Diameter d	Material acc. DIN/AISI	Length L
ø 6, ø 10, ø 12	1.4404 / 316L	on request
ø 4, ø 6, ø 8, ø 9, ø 10, ø 11, ø 12, ø 15	1.4571 / 316Ti	
ø 10, ø 11, ø 15	1.7335 / A182 Grade F11	
ø 12 , ø 13,7	2.4602 / Hastelloy C22	

Connection head	Transmitter
on request (e.g. NA, DAN, DANAW, MA)	on request

Process connection thread D
on request (e.g. M20x1,5, M24x1,5, G1/2", G3/4", 1/2"NPT, 3/4"NPT)

Non-standard models available.

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Ordering Information

TOP-PKG-05	A	B	C	D	E	F	G	H	I	J	K	L	M

A	Execution
U	with non-replaceable insert
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2-wire
3p	3-wire
4p	4-wire

E	Protection tube diameter
4	d= 4 mm
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm
11	d= 11 mm
12	d= 12 mm
13,7	d= 13,7 mm
15	d= 15 mm

F	Length L
	specify in [mm]

G	Protection tube material
1.4571	1.4571 / 316Ti
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22

H	Process connection thread D
	specify type of thread

I	Neck tube length NL
	specify in [mm]

J	Connection head
	specify head type

K	Operating temperature
	specify in °C

L	Transmitter
	specify type and temp. range in °C

M	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKG-05-PS-1xPt100-B-2p-10-250-1.4571-M20x1,5-145-NA-400-Z

stands for: Resistance thermometer with replaceable insert, with single class B resistor, 2-wire lead configuration, protection tube diameter 10 mm, length 250 mm, material 1.4571, process connection M20x1,5, neck tube length NL=145 mm, connection head type NA, operating temperature up to 400°C, standard sensor version (ceramic wire wound element)

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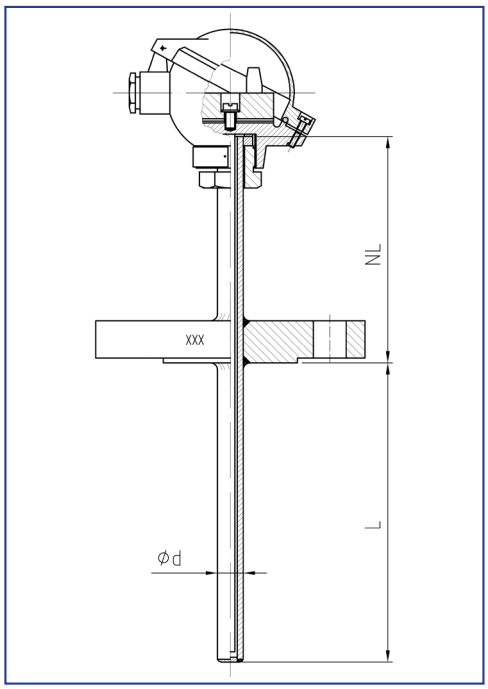
TOP-PF-06



Resistance Thermometer Pt100 with flange

Straight Resistance Thermometer type TOP-PF-06 with fitting has been designed for gas and liquid temperature measurement in pipes and vessels where flange connection is required. Process wetted parts and thermometer may be applied for corrosive process fluids. Temperature limits -200°C to +600°C.

Type	Execution
TOP-PF-06	Basic - acc to catalog card
TOP-PF-06/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TOP-PF-06/Exi	Intrinsic safe – acc to Atex
TOP-PF-06/Exe	Increased safety – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Diameter d	Material acc. DIN/AISI	Length L
ø 6, ø 10, ø 12	1.4404 / 316L	on request
ø 4, ø 6, ø 8, ø 9, ø 10, ø 11, ø 12, ø 15	1.4571 / 316Ti	
ø 10, ø 11, ø 15	1.7335 / A182 Grade F11	
ø 12 , ø 13,7	2.4602 / Hastelloy C22	

Connection head	Transmitter
on request (e.g. NA, DAN, DANAW, MA)	on request

Flange
on request (e.g. DN25 PN40 B1 acc. EN 1092-1, 2"150 RF acc. ASME B16,5)

Non-standard models available.

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Ordering Information

TOP-PF-06	A	B	C	D	E	F	G	H	I	J	K	L	M

A	Execution
U	with non-replaceable insert
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2-wire
3p	3-wire
4p	4-wire

E	Protection tube diameter
4	d= 4 mm
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm
11	d= 11 mm
12	d= 12 mm
13,7	d= 13,7 mm
15	d= 15 mm

F	Length L
	specify in [mm]

G	Protection tube material
1.4571	1.4571 / 316Ti
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22

H	Flange
	specify type of flange

I	Neck tube length NL
	specify in [mm]

J	Connection head
	specify head type

K	Operating temperature
	specify in °C

L	Transmitter
	specify type and temp. range in °C

M	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PF-06-PS-1xPt100-B-2p-10-250-1.4571-2''150 RF-145-NA-400-Z

stands for: Resistance thermometer with replaceable insert, with single class B resistor, 2-wire lead configuration, protection tube diam. 10 mm, length 250 mm, material 1.4571, process connection flanged 2'' 150 RF, neck tube length NL=145 mm, connection head type NA, operating temp. up to 400°C, standard sensor version (ceramic wire wound element).

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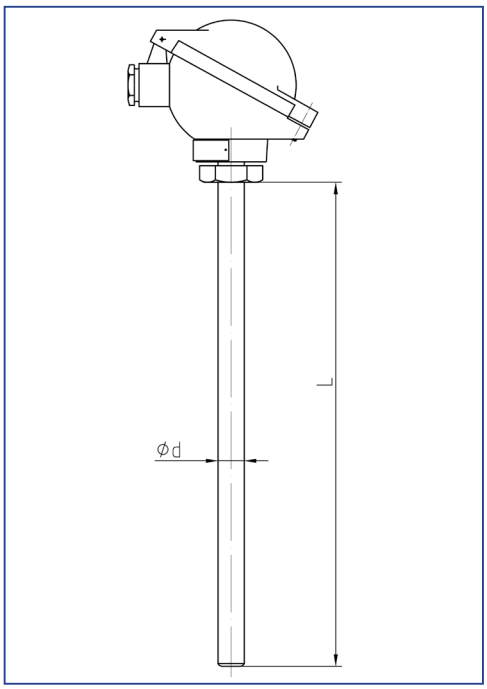
TER-PD-07



Straight Thermocouple (Type J, K, N)

Straight thermocouple TER-PD-07 measure precisely temperature from -40°C to +1100°C; temperature limits depend on kind of thermocouple and thermowell applied. They are applicable mainly for measurement of temperature of process fluids in cases where good dynamic is a primary target. Protection tube is made of stainless steel.

Thermometer could be provided with clamp connection UZG-47.

Type	Execution
TER-PD-07	Basic - acc to catalog card
TER-PD-07/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TER-PD-07/Exi	Intrinsic safe – acc to Atex
TER-PD-07/Exe	Increased safety – acc to Atex

Technical specification

Sheathed sensor insert	Version	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 3	-40°C..+500°C -40°C..+700°C 0°C..+1100°C (- 270°C..+1300°C**)	acc. EN 60584-1	ungrounded
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 6	-40°C..+600°C -40°C..+800 (+1000*)°C 0°C..+1100°C (- 270°C..+1300°C**)		grounded

* upper temp. depends on measuring conditions and temp. changes; **short term

Protect. tube diam. d	Material acc. DIN/AISI	Max operating temp.
ø4, ø5, ø6, ø8, ø9, ø10, ø11, ø12, ø15	1.4571 / 316Ti	+700°C
ø10	1.4841 / 314	+1100°C
ø10, ø11, ø15	1.7335 / A182 Grade F11	+550°C
ø12, ø13,7	2.4602 / Hastelloy C22	+600°C

Connection head	Transmitter
on request (e.g. NA, DANA, DANAW, MA)	on request

Threaded compression fitting type UZG-47
on request, acc. to catalog card – ***UZG-47***

Non-standard models available.

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Ordering Information

TER-PD -07	A	B	C	D	E	F	G	H	I

A	Execution
U	with non-replaceable insert
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg

C	Protection tube diameter
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm
11	d= 11 mm
12	d= 12 mm
13,7	d= 13,7 mm
15	d= 15 mm

D	Protection tube length L
	specify in [mm]

E	Protection tube material
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22

F	Connection head
	specify head type

G	Junction
O	ungrounded
Z	grounded

H	Operating temperature
	specify in °C

I	Transmitter
	specify type and temp. range in °C

Ordering Example

TER-PD-07-PS-1xJ-9-750-1.4571-NA-O-600

stands for: Thermocouple with replaceable insert, with single sensor 1xFe-CuNi, protection tube diameter ø 9 mm and length L=750 mm, protection tube material 1.4571, connection head type NA, ungrounded, operating temperature up to 600°C.

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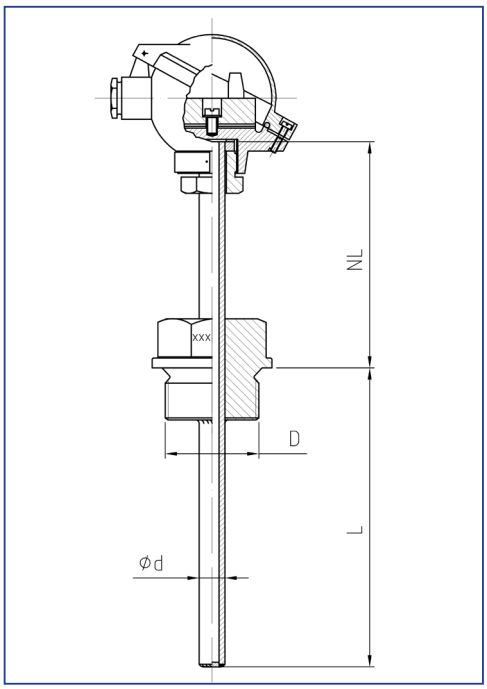
TER-PKG-08



Straight Thermocouple (Type J, K, N) with process connection fitting

Straight thermocouple with process connection fitting and extension tube TER-PKG-08 measure precisely temperature from -40°C to +1100°C; temperature limits depend on kind of thermocouple and thermowell applied.

They are applicable mainly for measurement of temperature of process fluids in cases where good dynamic is a primary target. Protection tube is made of stainless steel.

Type	Execution
TER-PKG-08	Basic - acc to catalog card
TER-PKG-08/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TER-PKG-08/Exi	Intrinsic safe – acc to Atex
TER-PKG-08/Exe	Increased safety – acc to Atex

Technical specification

Sheathed sensor insert	Version	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 3	-40°C..+500°C -40°C..+700°C 0°C..+1100°C (- 270°C..+1300°C**)	acc. EN 60584-1	ungrounded
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 6	-40°C..+600°C -40°C..+800 (+1000*)°C 0°C..+1100°C (- 270°C..+1300°C**)		grounded

* upper temp. depends on measuring conditions and temp. changes; **short term

Protect. tube diam. d	Material acc. DIN/AISI	Max operating temp.
ø4, ø5, ø6, ø8, ø9, ø10, ø11, ø12, ø15	1.4571 / 316Ti	+700°C
ø10	1.4841 / 314	+1100°C
ø10, ø11, ø15	1.7335 / A182 Grade F11	+550°C
ø12, ø13,7	2.4602 / Hastelloy C22	+600°C

Process connection thread D
on request (e.g. M20x1,5, M24x1,5, G1/2", G3/4", 1/2"NPT, 3/4"NPT)

Connection head	Transmitter
on request (e.g. NA, DANA, DANAW, MA)	on request

Non-standard models available.

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Ordering Information

TER-PKG -08	A	B	C	D	E	F	G	H	I	J	K

A	Execution
U	with non-replaceable insert
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg

C	Protection tube diameter
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm
11	d= 11 mm
12	d= 12 mm
13,7	d= 13,7 mm
15	d= 15 mm

D	Protection tube length L
	specify in [mm]

E	Protection tube material
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22

F	Process connection thread D
	specify type of thread

G	Neck tube length NL
	specify in [mm]

H	Connection head
	specify head type

I	Junction
O	ungrounded
Z	grounded

J	Operating temperature
	specify in °C

K	Transmitter
	specify type and temp. range in °C

Ordering Example

TER-PKG-08-PS-1xJ-6-150-1.4571-M20x1,5-145-NA-O-500-MESO-H (0-500)

stands for: Thermocouple with replaceable insert, with single sensor 1 x Fe-CuNi, protection tube diam. ø6 mm and length L=150 mm, tube material 1.4571, process connection M20x1.5, neck tube length NL=145 mm, connection head type NA, ungrounded, operating temp. up to 500 °C, temperature transmitter type MESO-H for range 0-500 °C.

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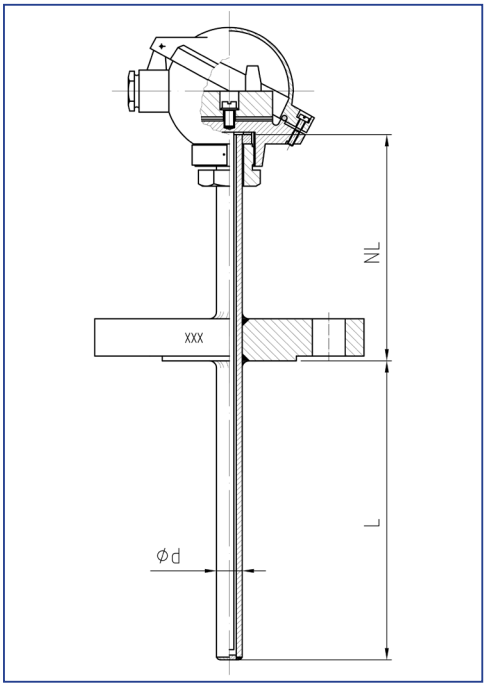
TER-PF-09



Straight Thermocouple (Type J, K, N) with flange

Straight thermocouple with flange TER-PF-09 is a sensing element for temperature measurement in industrial pipelines with high flow rates and in pressurized vessels, for liquids as well as for gases, in applications, which require flange connection.

Process fluid wetted parts allow corrosive process service application.

Type	Execution
TER-PF-09	Basic - acc to catalog card
TER-PF-09/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TER-PF-09/Exi	Intrinsic safe – acc to Atex
TER-PF-09/Exe	Increased safety – acc to Atex

Technical specification

Sheathed sensor insert	Version	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 3	-40°C..+500°C -40°C..+700°C 0°C..+1100°C (- 270°C..+1300°C**)	acc. EN 60584-1	ungrounded
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 6	-40°C..+600°C -40°C..+800 (+1000*)°C 0°C..+1100°C (- 270°C..+1300°C**)		grounded

* upper temp. depends on measuring conditions and temp. changes; **short term

Protect. tube diam. d	Material acc. DIN/AISI	Max operating temp.
ø4, ø5, ø6, ø8, ø9, ø10, ø11, ø12, ø15	1.4571 / 316Ti	+700°C
ø10	1.4841 / 314	+1100°C
ø10, ø11, ø15	1.7335 / A182 Grade F11	+550°C
ø12, ø13,7	2.4602 / Hastelloy C22	+600°C

Flange
on request (e.g. DN25 PN40 B1 acc. EN 1092-1, 2"150 RF acc. ASME B16,5)

Connection head	Transmitter
on request (e.g. NA, DANA, DANAW, MA)	on request

Non-standard models available.

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Ordering Information

TER-PF -09	A	B	C	D	E	F	G	H	I	J	K

A	Execution
U	with non-replaceable insert
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg

C	Protection tube diameter
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm
11	d= 11 mm
12	d= 12 mm
13,7	d= 13,7 mm
15	d= 15 mm

D	Protection tube length L
	specify in [mm]

E	Protection tube material
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22

F	Flange
	specify type of flange

G	Neck tube length NL
	specify in [mm]

H	Connection head
	specify head type

I	Junction
O	ungrounded
Z	grounded

J	Operating temperature
	specify in °C

K	Transmitter
	specify type and temp. range in °C

Ordering Example

TER-PF-09-PS-1xK-10-400-1.4571-2''150 RF-145-NA-O-400

stands for: Single thermocouple with replaceable insert, 1 x Fe-CuNi, d=10mm, length 400 mm made of 1.4571, flange 2'' 150 RF, neck tube length NL=145 mm, connection head type NA, junction ungrounded, operating temp. up to 400°C.

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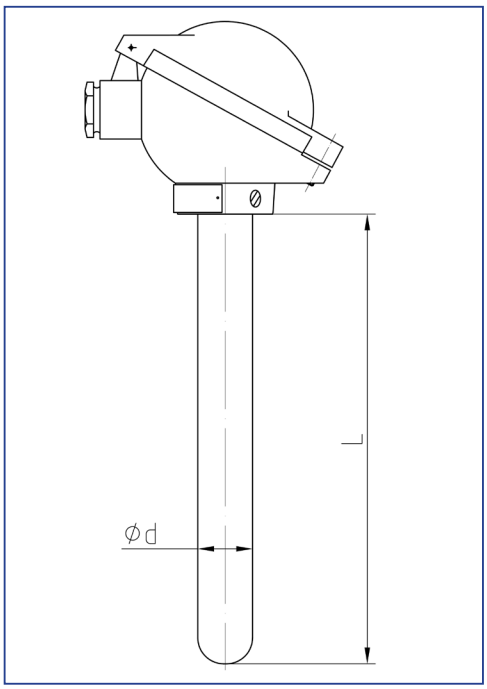
TER-P-10



Straight Thermocouple (Type J, K) with heat resistant protective tube

Straight thermocouple TER-P-10 has been designed for precision measurement of temperature in range limits from -40°C to +1200°C, depending on kind of thermocouple and suitable protection tube material.

It is employed mainly for measurement of high temperature of gas and liquid process fluids. Thermowell is made of heat resistant steel.

Type	Execution
TER-P-10	Basic - acc to catalog card
TER-P-10/Exi	Intrinsic safe – acc to Atex
TER-P-10/Exe	Increased safety – acc to Atex

Technical specification

Sensor insert		Version	Temp. range - Class 1	Characteristic	Junction
Basic	1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	ø 3	-40°C..+700°C -40°C..+1000°C	acc. EN 60584-1	ungrounded
Sheathed	1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	ø 6, ø 8	-40°C..+800°C -40°C..+1200°C		grounded

Protect. tube diam. d	Material acc. DIN/AISI	Max operating temp.	Connection head	Transmitter
ø20 , ø22	1.4841 / 314	+1150°C	on request (e.g. DAA, DANA, DANAW)	on request
ø19.1 , ø22	Kanthal AF	+1400°C		

Non-standard models available.

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Ordering Information

TER-P-10	A	B	C	D	E	F	G	H	I	J

A	Execution
U	with non-replaceable insert
PS	with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Insert diameter
6	d= 6 mm
8	d= 8 mm

D	Protection tube diameter
19,1	d= 19,1 mm
20	d= 20 mm
22	d= 22 mm

E	Protection tube length L
	specify in [mm]

F	Protection tube material
1.4841	1.4841 / 314
Kanthal	Kanthal AF

G	Connection head
	specify head type

H	Junction
O	ungrounded
Z	grounded

I	Operating temperature
	specify in °C

J	Transmitter
	specify type and temp. range in °C

Ordering Example

TER-P-10-PS-1xK-6-20-400-1.4841-DAN-O-1000

stands for: Straight thermocouple with replaceable insert, thermoelement type 1 x NiCr-NiAl, insert diameter, ø6 mm, protection tube diameter ø20 mm, immersion length L=400 mm, material 1.4841, connection head type DAN, junction ungrounded, operating temperature up to 1000°C, w/o transmitter.

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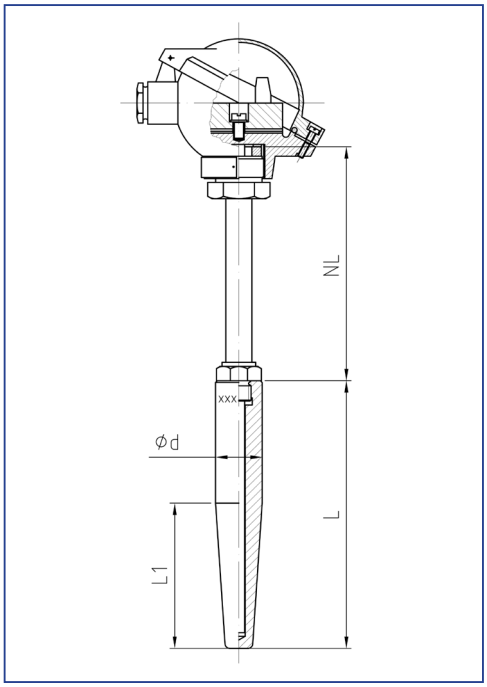
TER-W-11



Straight Thermocouple (Type J, K, N) for high pressure application

Thermocouple TER-W-11 has been designed for rugged condition applications in pipelines and boilers, at operating temperature up to +600°C and operating pressure up to 40 MPa.

Pressure resistant weld-in thermowell (acc to DIN 43772, form 4) is made of 1.7380 or 1.7335. Thermocouple is equipped with replaceable sheathed measuring insert.

Type	Execution
TER-W-11	Basic - acc to catalog card
TER-W-11/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TER-W-11/Exi	Intrinsic safe – acc to Atex
TER-W-11/Exe	Increased safety – acc to Atex

Technical specification

Sheathed sensor insert	Version	Temp. range - Class 1	Characteristic	Connection head
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	ø 3 ø 6	-40°C..+600°C	acc. EN 60584-1	on request (e.g. BAEG, NA, DAN, DANAW)

T-well length L[mm]	T-well diam. d[mm]	Material acc. DIN/AISI	Max operating temp.	Transmitter
110, 140, 170, 200, 260 or 410 mm	ø18h7 ø24h7 ø26h7	1.7335 / A182 Grade F11	+600°C	on request
		1.7380 / A182 Grade F22		
		1.4903 / A182 Grade F91	+650°C	
		1.4541 / SS321	+900°C	

Junction	Response time ($T_{0,9}$)		Operating pressure
	d = Ø18h7	d = Ø24h7 ; Ø26h7	
ungrounded	$T_{0,9}$ = 20 sec	$T_{0,9}$ = 30 sec	up to 40 MPa
grounded	$T_{0,9}$ = 60 sec	$T_{0,9}$ = 70 sec	

Non-standard models available.

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Ordering Information

TER-W-11	A	B	C	D	E	F	G	H	I	J	K

A	Execution
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Weld-in thermowell diameter
18	d= 18h7 mm
24	d= 24h7 mm
26	d= 26h7 mm

D	Weld-in thermowell length L
	specify in [mm]

E	Weld-in thermowell cone length L1
	specify in [mm]

F	Weld-in thermowell material
1.7335	1.7335 / A182 Grade F11
1.7380	1.7380 / A182 Grade F22
1.4903	1.4903 / A182 Grade F91
1.4541	1.4541 / SS321

G	Neck tube length NL
	specify in [mm]

H	Connection head
	specify head type, acc. to catalog card – ***Connection Heads***

I	Junction
O	ungrounded
Z	grounded

J	Operating temperature
	specify in °C

K	Transmitter
	specify type and temp. range in °C

Ordering Example

TER-W-11-PS-1xK-18-200-65-1.7335-145-NA-O

stands for: High pressure thermocouple with replaceable insert, element type 1 x NiCr-NiAl, protection tube diameter ø18h7, thermowell length L=200 mm, cone length L1=65 mm, material 1.7335, neck tube length NL=145 mm, connection head type NA, junction ungrounded, without transmitter

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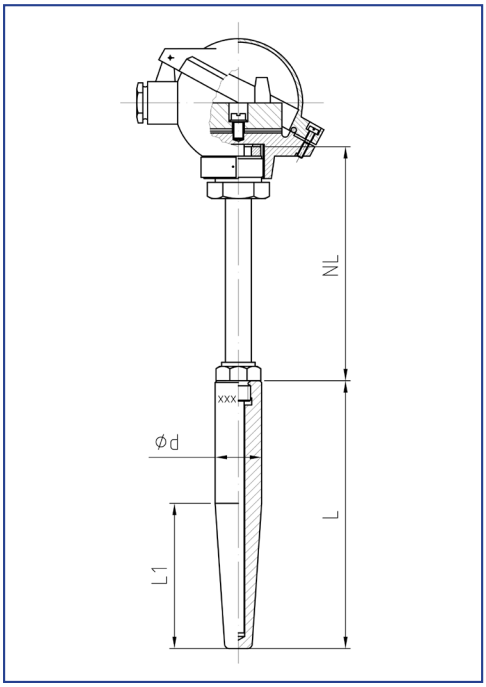
TOP-W-12



Resistance Thermometer Pt100 for high pressure application

Resistance thermometer TOP-W-12 has been designed for rugged condition applications in pipelines and boilers, at operating temperature up to +600°C and operating pressure up to 40 MPa.

Pressure resistant protection tube is made of boiler quality steel, which allows installation by welding. Resistance thermometer is equipped with replaceable sheathed, spring loaded measuring insert.

Type	Execution
TOP-W-12	Basic - acc to catalog card
TOP-W-12/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TOP-W-12/Exi	Intrinsic safe – acc to Atex
TOP-W-12/Exe	Increased safety – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

T-well length L[mm]	T-well diam. d[mm]	Material acc. DIN/AISI	Max operating temp.	Connection head	Transmitter
110, 140, 170, 200, 260 or 410 mm	ø18h7 ø24h7 ø26h7	1.7335 / A182 Grade F11	+600°C	on request (e.g. BAEG, NA, DAN, XE-DANAW)	on request
		1.7380 / A182 Grade F22			
		1.4903 / A182 Grade F91	+650°C		
		1.4541 / SS321	+900°C		

Medium	Response time ($T_{0,9}$)		Operating pressure
	d = Ø18h7	d = Ø24h7 ; Ø26h7	
Air	$T_{0,9}$ = 360 sec	$T_{0,9}$ = 410 sec	up to 40 MPa
Water	$T_{0,9}$ = 52 sec	$T_{0,9}$ = 92 sec	

Non-standard models available.

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Ordering Information

TOP-W-12	A	B	C	D	E	F	G	H	I	J	K	L	M

A	Execution
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2-wire
3p	3-wire
4p	4-wire

E	Weld-in thermowell diameter
18	d= 18h7 mm
24	d= 24h7 mm
26	d= 26h7 mm

F	Weld-in thermowell length L
	specify in [mm]

G	Weld-in thermowell cone length L1
	specify in [mm]

H	Weld-in thermowell material
1.7335	1.7335 / A182 Grade F11
1.7380	1.7380 / A182 Grade F22
1.4903	1.4903 / A182 Grade F91
1.4541	1.4541 / SS321

I	Neck tube length NL
	specify in [mm]

J	Connection head
	specify head type

K	Operating temperature
	specify in °C

L	Transmitter
	specify type and temp. range in °C

M	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-W-12-PS-1xPt100-3p-18-200-65-1.7335-145-NA-Z

stands for: High pressure resistance thermometer, with replaceable insert, resistance temperature detector 1 x Pt100, 3-wire configuration, protection tube diameter Ø 18 h7, thermowell length L=200 mm, cone length L1=65 mm, material 1.7335, neck tube length NL=145 mm, connection head type NA, w/o transmitter, standard sensor version

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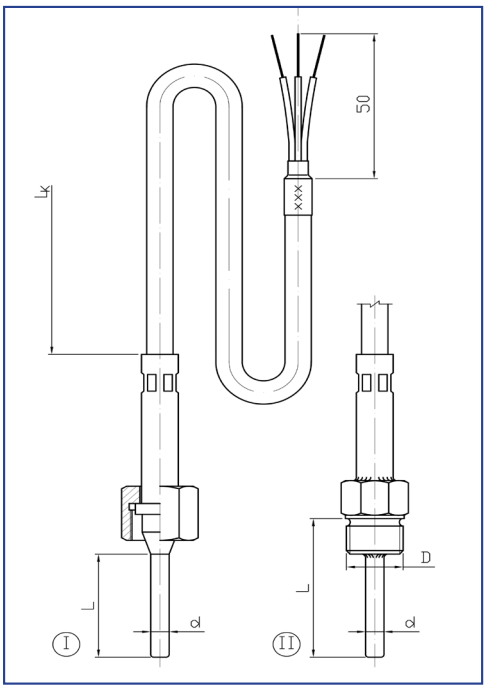
TOP-PTKbm-13



Resistance Thermometer Pt100
Miniature with connection cable

Miniature resistance thermometer TOP-PTKbm-13 is made for temperature measurement in industry and laboratory applications and heat pipelines.

Miniature and thin-wall protection tube gives good dynamic and additional nut or process connection fitting allows fast, easy assembling and proper tightness.

Type	Execution	Version
TOP-PTKbm-13	Basic - acc to catalog card	(I) or (II)
TOP-PTKbm-13/ExiM1	Intrinsic safe for mining purposes – acc to Atex	
TOP-PTKbm-13/Exi	Intrinsic safe – acc to Atex	

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]	Process connection thread
ø3,5 , ø4, ø5 , ø6	1.4571/316Ti	as per client request	on request (e.g. M10x1, M12x1 G1/4" G1/8")

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø4,2	L2TS-2x0,34mm2	teflon, silicone	+180°C
3, 4 wire	ø2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C
3, 4 wire	ø4,3	L4TS-4x0,22mm2	teflon, silicone	+180°C
2 wire	ø4,3	L2SDS-2x0,25mm2	silicone, screen, silicone	
3, 4 wire	ø4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	
3, 4 wire	ø4	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-PTKbm-13	A	B	C	D	E	F	G	H	I	J	K

A	Execution
-	Basic
/ExiM1	Intrinsic safe for mining purposes
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube dimensions d x L
d	specify in mm
L	specify in mm

E	Process connection type
I	turnable nut (female thread)
II	weld-in fitting (male thread)

F	Process connection thread D
	specify type of thread

G	Protection tube material
1.4571	1.4571 / 316Ti

H	Lead wire configuration and cable type
2p-L2TS	2 wire (L2TS-2x0,34mm2)
3p-L4TS	3 wire (L4TS-4x0,22mm2)
4p-L4TS	4 wire (L4TS-4x0,22mm2)
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)
2p-L2SDS	2 wire(L2SDS-2x0,25mm2)
3p-L4TDS	3 wire (4TDS-4x0,25mm2)
4p-L4TDS	4 wire (4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

I	Cable length L_K
	specify in mm

J	Operating temperature
	specify in °C

K	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PTKbm-13-1xPt100-A-6x30-I-M10x1-1.4571-4p-L4TS-3000-150-Z

stands for: Resistance thermometer, basic execution, with resistor 1xPt100 class A, protection tube dimensions ø6x30mm, with nut and thread M10x1, tube material 1.4571, configuration 4-wire, cable type L4TS length 3000mm, operating temp. up to 150°C, standard sensor version (ceramic wire wound element).

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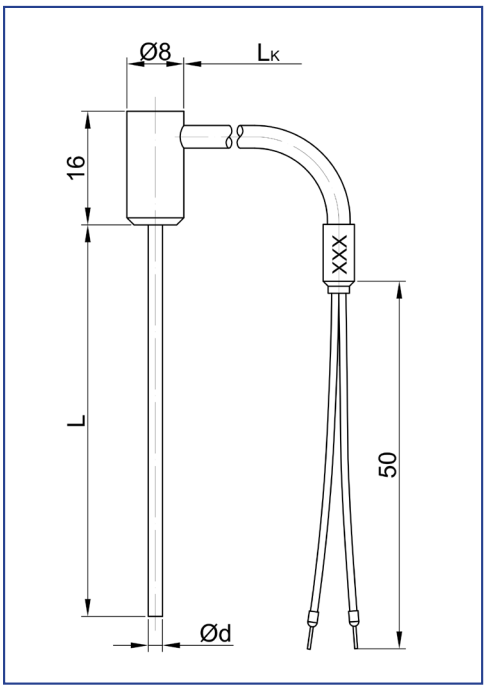
TOP-KKbm-14



Resistance Thermometer Pt100
Angular, Miniature

Angular resistance thermometer type TOP-KKbm-14 miniature, is designed for temperature measurement of small machine parts and instruments up to +300°C.

Small construction allows fast and precise measurement. Connection cable, with not limited length, is for connection to any required equipment.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	5 mA	2 wire

Protect. tube diam. d	Material acc. DIN/AISI	Tube Length L [mm]
ø2 , ø3, ø4	1.4571/316Ti	on request (min. 15 mm)

Car connections
as per client request

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits	Cable Length L_K [mm]
2 wire	ø2,6	L2TGL-2x0,38mm2	teflon, glass fibre, screen	+180°C	on request

Non-standard models available.

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Ordering Information

TOP-KKbm-14	A	B	C	D	E	F	G	H	I	J

A Resistor	
1xPt100	Single Pt100

B Class	
B	B

C Protection tube diameter	
2	d= 2 mm
3	d= 3 mm
4	d= 4 mm

D Car connections	
	specify type

E Protection tube length L	
	specify in mm (min. 15 mm)

F Protection tube material	
1.4571	1.4571 / 316Ti

G Lead wire configuration and cable type	
2p-L2TGL	2 wire (L2TGL-2x0,38mm2)

H Cable length L_K	
	specify in mm

I Operating temperature	
	specify in °C

J Version	
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-KKbm-14-1xPt100-B-2-WT-100-3p-L2TGL-1000-Z

stands for: Miniature thermometer with cable and resistor 1xPt100 class B, protection tube diameter ø2 mm, with car connections, protection tube length L=100 mm, 2-wire configuration , cable type L2TGL length Lk=1000 mm, standard sensor version (ceramic wire wound element).

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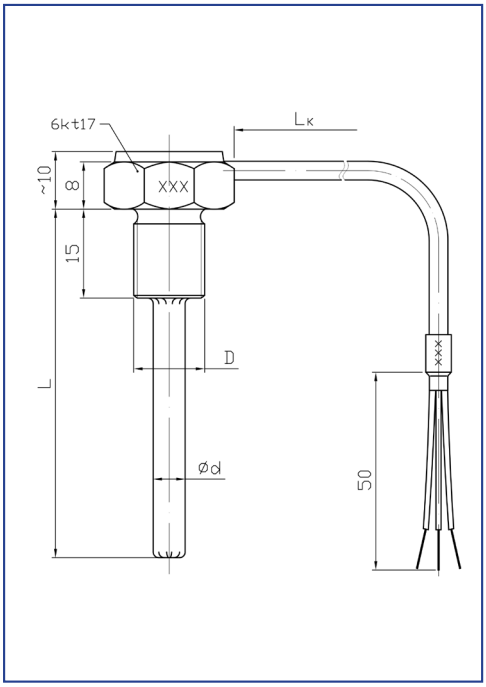
TOP-KKbm-15



Resistance Thermometer Pt100
Angular, Miniature

Angular resistance thermometer TOP-KKbm-15 miniature, has been designed for temperature measurement in machinery, machine sets and sub-assemblies up to +250°C.

Small dimensions allows fast and precise measurement Additional process connection fitting allows fast and easy assembling. Connection cable long as required is made for connecting thermometer to outer instruments.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]	Process connection thread D
ø3, ø4, ø5 , ø6	1.4571/316Ti	on request	on request (e.g. M10x1, M12x1, G1/2")

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C
3, 4 wire	ø4	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-KKbm-15	A	B	C	D	E	F	G	H	I	J

A	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

B	Class
B	B
A	A
1/3B	1/3B (AA)

C	Protection tube diameter
3	d= 3 mm
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm

D	Process connection thread D
	specify type of thread

E	Protection tube length L
	specify in mm

F	Protection tube material
1.4571	1.4571 / 316Ti

G	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-2x0,22mm2)
4p-L4GGD	4 wire (L4GGD-2x0,22mm2)
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-KKbm-15-1xPt100-A-5-M10x1-100-1.4571-3p-L4TT-1000-Z

stands for: Miniature resistance thermometer with resistor 1xPt100 class A, protection tube diameter ø5 mm, thread M10x1, length L=100 mm, material 1.4571, configuration 3-wire, cable type L4TT length Lk=1000 mm, standard sensor version (ceramic wire wound element).

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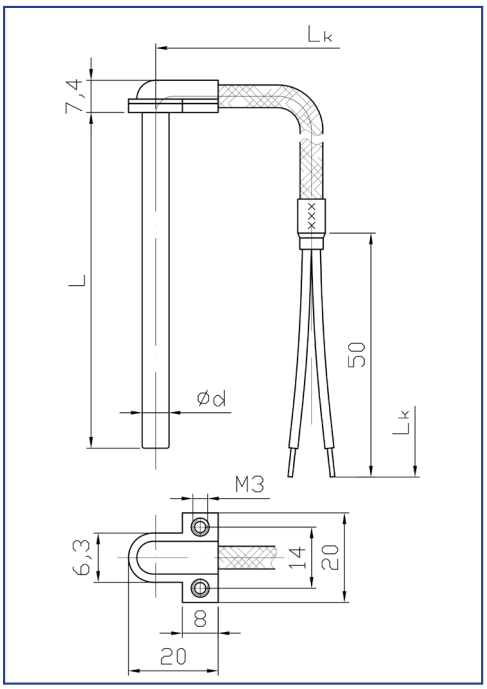
TOP-KKbm-16



Resistance Thermometer Pt100
Angular

Angular resistance thermometer TOP-KKbm-16, has been designed for temperature measurement in small machinery, machine sets and sub-assemblies up to +250°C. Small dimensions allows fast and precise measurement.

Thermometer could be provided with clamp connection UZG-47.

Type	Execution
TOP-KKbm-16	Basic - acc to catalog card
TOP-KKbm-16/Exi	Intrinsic safe – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+250°C / *(-50°C..+250°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]
ø3, ø3,5, ø4, ø5, ø6, ø8	1.4571/316Ti	on request

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø4	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Threaded compression fitting type UZG-47
on request, acc. to catalog card – ***UZG-47***

Non-standard models available.

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Ordering Information

TOP-KKbm-16	A	B	C	D	E	F	G	H	I	J

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter
3	d= 3 mm
3,5	d= 3,5 mm
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm
8	d= 8 mm

E	Protection tube length L
	specify in mm

F	Protection tube material
1.4571	1.4571 / 316Ti

G	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-2x0,22mm2)
4p-L4GGD	4 wire (L4GGD-2x0,22mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-KKbm-16/Exi-1xPt100-A-6-265-1.4571-3p-L4GGD-1000-Z

stands for: Angular resistance thermometer, intrinsic safe, with resistor 1xPt100 class A, protection tube diameter ø6 mm, length L=265 mm, material 1.4571, configuration 3-wire, cable type L4GGD length Lk=1000mm, standard sensor version (ceramic wire wound element).

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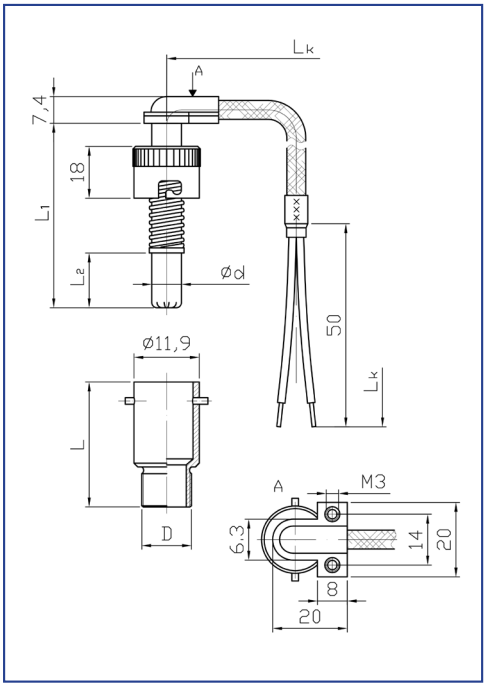
TOP-KZKbm-17



Resistance Thermometer Pt100
Angular with clasp lock

Angular resistance thermometer clasp lock with spring TOP-KZKbm-17 special made, is designed for temperature measurement in aggregates, machineries, machine sets and sub-assemblies especially in heating plates.

Special clasp lock allows fast mounting, replacement and demounting of thermometer. Cable of client required length allows access to far away situated tag points.

Type	Execution
TOP-KZKbm-17	Basic - acc to catalog card
TOP-KZKbm-17/Exi	Intrinsic safe – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+250°C / *(-50°C..+250°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]	Length L_2 [mm]	Process connection thread D
ø6 , ø8	1.4571/316Ti	on request	on request	on request (e.g. M10x1, M12x1)
	MO59/CuZn39Pb2			

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits	Length L [mm]
2 wire	ø2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C	on request
3, 4 wire	ø3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C	
3, 4 wire	ø4	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C	

Non-standard models available.

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Ordering Information

TOP-KZKbm-17	A	B	C	D	E	F	G	H	I	J	K

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
6	d= 6 mm
8	d= 8 mm

E	Protection tube length L/L_2
	specify in mm

F	Protection tube material
1.4571	1.4571/316Ti
MO59	MO59/CuZn39Pb2

G	Process connection fitting thread D
	specify type of thread

H	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-2x0,22mm2)
4p-L4GGD	4 wire (L4GGD-2x0,22mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

I	Cable length L_K
	specify in mm

J	Operating temperature
	specify in °C

K	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-KZKbm-17-1xPt100-A-8-77/21-1.4571-M12x1-3p-L4GGD-1200-Z

stands for: Angular resistance thermometer clasp lock, basic execution, with resistor 1xPt100 class A, protection tube diam. ø8 mm, length L=77 and L2=21mm, protection tube material 1.4571, thread M12x1, configuration 3-wire, cable type L4GGD, length Lk=1200 mm, standard sensor version (ceramic wire wound element).

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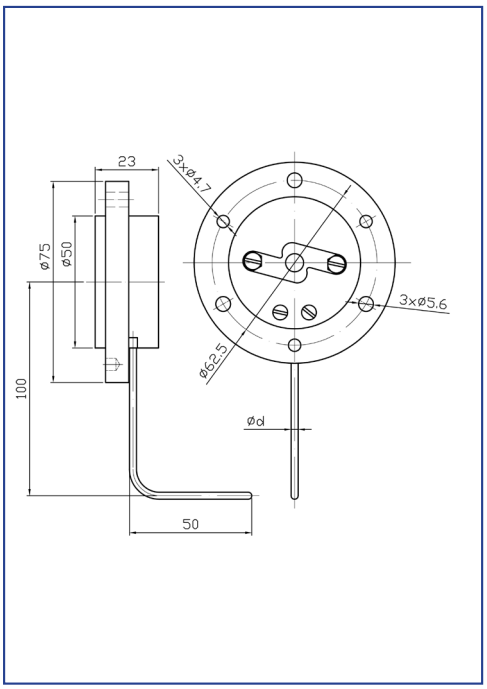
TOP-SpKbm-18



Resistance Thermometer Pt100
Angular, Special

Angular resistance thermometer TOP-SpKbm-18 special, is designed for temperature measurement in machineries, machine sets under vibrations (for example in fibre industry) in the range from -50°C to +300°C.

Protection tube made from MO59 or stainless steel 1.4571 allows wide applications whatever medium is being measured.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+300°C / *(-50°C..+300°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube dim.	Material acc. DIN/AISI
ø3 x 0,15	1.4571/316Ti
ø3 x 0,5	MO59/CuZn39Pb2

Non-standard models available.

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Ordering Information

TOP-SpKbm-18	A	B	C	D	E	F	G

A Resistor	
1xPt100	Single Pt100
2xPt100	Double Pt100

B Class	
B	B
A	A
1/3B	1/3B (AA)

C Lead wire configuration	
2p	2 wire (L2GGD-2x0,22mm2)
3p	3 wire (L4GGD-2x0,22mm2)

D Protection tube dimensions	
3 x 0,15	d=ø3 x 0,15(wall thickness)
3 x 0,50	d=ø3 x 0,50(wall thickness)

E Protection tube material	
1.4571	1.4571/316Ti
MO59	MO59/CuZn39Pb2

F Operating temperature	
	specify in °C

G Version	
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-SpKbm-18-1xPt100-B-2p-3x0,15-1.4571-200-Z

stands for: Angular resistance thermometer, special, with resistor 1xPt100 class B, configuration 2-wire, protection tube diam. ø3 mm, material 1.4571, length L=100 mm, operating temperature up to +200°C, standard sensor version (ceramic wire wound element).

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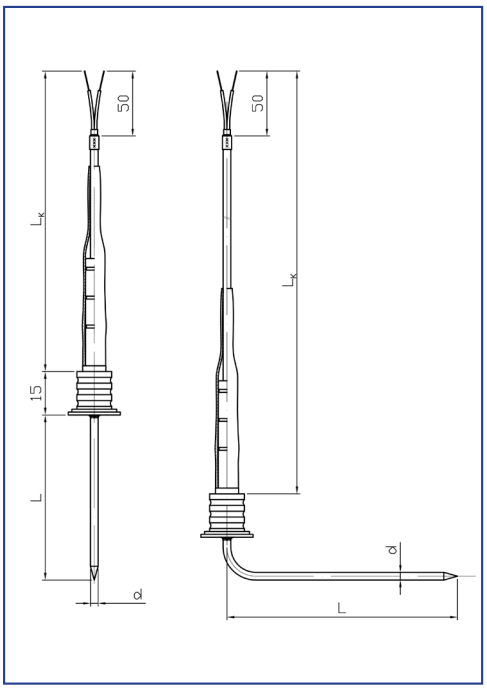
TOP-Sp(P/K)Kbm-19



Resistance Thermometer Pt100, Special
Straight - TOP-SpPKbm-19
or
Angular - TOP-SpKKbm-19

Straight resistance thermometer special type TOP-SpPKbm-19 and angular special type TOP-SpKKbm-19 is for temperature measurement of various medium. Mainly is used in pharmaceutical industry for temp. measurement in autoclaves.

Thermometer has good tightness of cable to insert connection, due to silicone fulfillment. Offered protection tube (stainless steel 1.4404) is widely used in various medium, is permitted to use in food industry.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+250°C / *(-50°C..+250°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]
on request	1.4404/316L	on request

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits	Length L [mm]
2x 4 wire	ø5,8	L8TS-8x0,22mm2	teflon, silicone	+180°C	on request
3, 4 wire	ø5,2	L4TS-4x0,25mm2			
3, 4 wire	ø4	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C	

Non-standard models available.

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Ordering Information

TOP-Sp	A	Kbm-19	B	C	D	E	F	G	H	I	J

A	Execution
P	Straight
K	Angular

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
	specify in mm

E	Protection tube length L
	specify in mm

F	Protection tube material
1.4571	1.4571/316Ti

G	Lead wire configuration and cable type
2x4p-L8TS	2x 4 wire (L8TS-2x0,22mm2)
3p-L4TS	3 wire (L4TS-2x0,25mm2)
4p-L4TS	4 wire (L4TS-2x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-SpPKbm-19-1xPt100-A-4-150-1.4571-3p-L4TS-1000-150-Z

stands for: Straight resistance thermometer special with resistor 1xPt100, class A, protection tube diameter d=Ø 4mm, length L=150 mm, material 1.4571, configuration 3-wire, cable type L4TS length Lk=1000 mm, operating temp. up to 150°C, standard sensor version (ceramic wire wound element).

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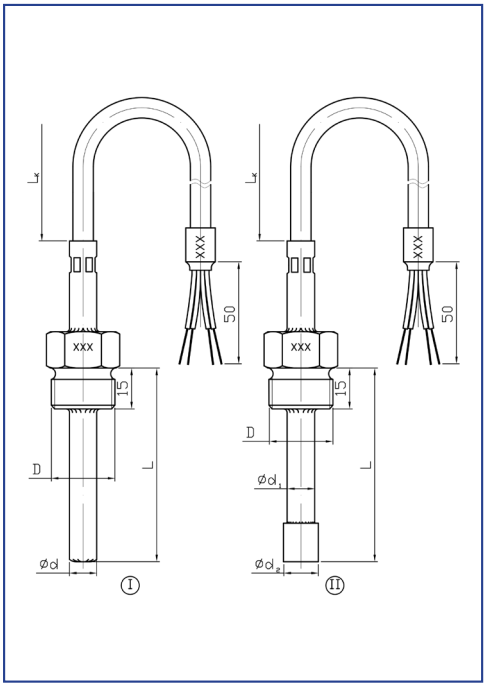
TOP-PKGKbm-20



Resistance Thermometer Pt100 with process connection fitting and cable with sheathed tube

Resistance thermometer type TOP-PKGKbm-20 with process connection fitting and cable, is designed for temperature measurement in aggregates, machineries, machine sets and sub-assemblies

Threaded process connection fitting allows easy and tight assembling of thermometer to tag point. Protection tube is made from sheathed cover with Cu wires and is used in thermometers under vibrations and thermal shocks.

Model	Execution
I	Basic protection tube
II	Protection tube with sleeve

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Model I Diameter d	Model II Diameter d_2/ d_1	Material acc. DIN/AISI	Length L [mm]
ø3, ø3,5, ø4,5, ø5, ø6	ø 4/3, ø 6/5, ø 8/6	1.4571/316Ti	on request

Process connection thread D
on request (e.g. M10x1, M12x1, M20x1,5, G1/2", G1/4", G1/8")

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
2 wire	ø 4,2	L2TS-2x0,34mm2	teflon, silicone	+180°C
3, 4 wire	ø 4,3	L4TS-4x0,22mm2	teflon, silicone	+180°C
3, 4 wire	ø 2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C
3 wire	ø 3,8	L6TT-6x0,22mm2	teflon, teflon	+260°C
2 wire	ø 4,3	L2SDS-2x0,25mm2	silicone, screen, silicone	+180°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-PKGKbm-20	A	B	C	D	E	F	G	H	I	J	K	L

A	Execution
I	Basic protection tube
II	Protection tube with sleeve

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
3	d= 3 mm
3,5	d= 3,5 mm
4,5	d= 4,5 mm
5	d= 5 mm
6	d= 6 mm

E	Diameter of sleeve d_2 and sheath d_1
4/3	d_2= 4 mm ; d_1= 3 mm
6/5	d_2= 6 mm ; d_1= 5 mm
8/6	d_2= 8 mm ; d_1= 6 mm

F	Process connection thread D
	specify type of thread

G	Protection tube material
1.4571	1.4571 / 316Ti
	specify other material

H	Protection tube length L
	specify in mm

I	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
2p-L2TS	2 wire (L2TS-2x0,34mm2)
3p-L4TS	3 wire (L4TS-4x0,22mm2)
4p-L4TS	4 wire (L4TS-4x0,22mm2)
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)
3p-L6TT	3 wire (L6TT-6x0,22mm2)
2p-L2SDS	2 wire (L2SDS-2x0,25mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

J	Cable length L_K
	specify in mm

K	Operating temperature
	specify in °C

L	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKGKbm-20-I-1xPt100-A-6-M20x1,5-1.4571-250-3p-L4TS-1500-Z

stands for: Resistance thermometer with process connection fitting and cable, with basic protection tube, with resistor 1xPt100 class A, protection tube diameter d=ø6 mm, thread M20x1,5, material 1.4571, length L=250 mm, configuration 3-wire, cable type L4TS length Lk=1500 mm, standard sensor version (ceramic wire wound element)

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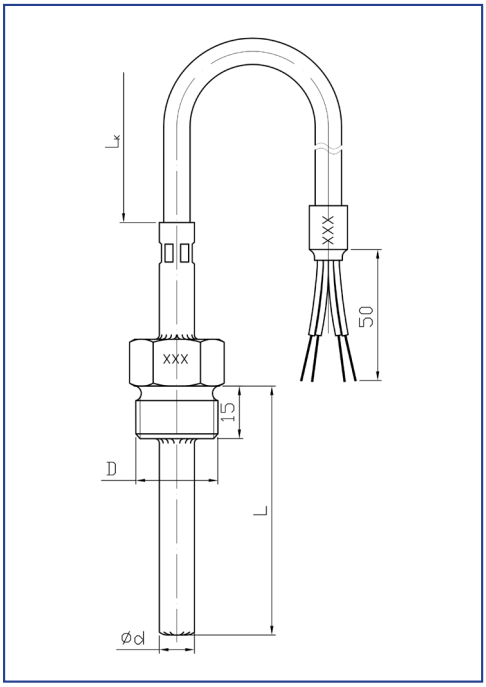
TOP-PKGKbm-21



Resistance Thermometer Pt100 with process connection fitting and cable

Resistance thermometer Pt100 TOP-PKGKbm-21 with process connection fitting and cable has been designed for temperature measurement in machinery, machine sets and sub-assemblies.

Thread fitting allows quick and safe mounting of thermometer in machine socket. Protection tube made 1.4571 SS allows corrosive fluid applications. Heat resistant cable features temperature limit up to. +400°C.

Type	Execution
TOP-PKGKbm-21	Basic - acc to catalog card
TOP-PKGKbm-21/ExiM1	Intrinsic for mining purposes – acc to Atex
TOP-PKGKbm-21/Exi	Intrinsic – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire configuration
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]
ø4, ø5, ø6, ø8, ø9, ø10	1.4571/316Ti	on request

Process connection thread D
on request (e.g. M10x1, M12x1, M20x1,5, G1/2", G1/4", G3/8")

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
2 wire	ø 4,2	L2TS-2x0,34mm2	teflon, silicone	+180°C
3, 4 wire	ø 4,3	L4TS-4x0,22mm2	teflon, silicone	+180°C
3, 4 wire	ø 2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C
2x 3 wire	ø 3,8	L6TT-6x0,22mm2	teflon, teflon	+260°C
2 wire	ø 4,3	L2SDS-2x0,25mm2	silicone, screen, silicone	+180°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-PKGKbm-21	A	B	C	D	E	F	G	H	I	J	K

A	Execution
-	Basic
/ExiM1	Intrinsic safe for mining purposes
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm

E	Process connection thread D
	specify type of thread

F	Protection tube material
1.4571	1.4571 / 316Ti
	specify other material

G	Protection tube length L
	specify in mm

H	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
2p-L2TS	2 wire (L2TS-2x0,34mm2)
3p-L4TS	3 wire (L4TS-4x0,22mm2)
4p-L4TS	4 wire (L4TS-4x0,22mm2)
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)
2x3p-L6TT	2x3 wire (L6TT-6x0,22mm2)
2p-L2SDS	2 wire (L2SDS-2x0,25mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

I	Cable length L_K
	specify in mm

J	Operating temperature
	specify in °C

K	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKGKbm-21-1xPt100-A-6-M20x1,5-1.4571-250-3p-L4TS-2000-Z

stands for: Resistance thermometer with cable and process connection fitting, resistance temperature detector 1xPt100 class A, protection tube diameter ø6 mm, process connection M20x1,5, material 1.4571, length L=250 mm, 3-wire configuration, cable L4TS length Lk=2000 mm, standard sensor version (ceramic wire wound element).

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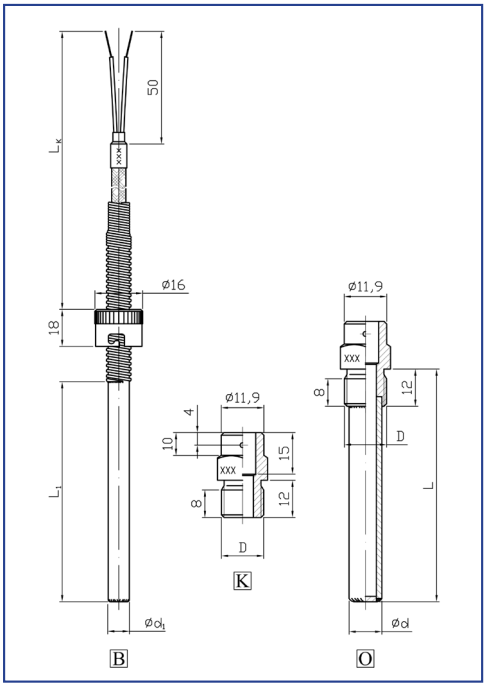
TOP-PZKbm-22



Resistance Thermometer Pt100 with bayonet coupling

Resistance thermometer Pt100 TOP-PZKbm-22 with flexible cable and additional process connection fitting or protection tube has been designed for temperature measurement of movement parts of machinery, press, injection casts, bearings and sub-assemblies of difficult access. Additional process connection fitting or thermowell make easy assembling to tag point and bayonet coupling allows fast thermometer replacement without non-measure intervals.

Type	Execution	Version
TOP-PZKbm-22	Basic - acc to catalog card	Ⓑ or Ⓚ or Ⓞ
TOP-PZKbm-22/ExiM1	Intrinsic for mining purposes – acc to Atex	
TOP-PZKbm-22/Exi	Intrinsic – acc to Atex	

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Thermometer protect. tube diam. d_1	Material acc. DIN/AISI	Length L_1 [mm]
ø4, ø5, ø6	1.4571/316Ti	on request

Process connection thread D	Material acc. DIN/AISI
on request (e.g. M14x1,5, M16x1,5, M20x1,5, G1/2")	1.4571/316Ti

Additional Thermowell diam. d	Material acc. DIN/AISI	Length L [mm]
ø10, ø11, ø12	1.4571/316Ti	on request

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-PZKbm-22	A	B	C	D	E	F	G	H	I	J	K	L	M	N

A	Execution
B	Basic
K	With process connection fitting
O	With additional thermowell
B/ExiM1	Intrinsic safe for mining purposes – Basic
K/ExiM1	Intrinsic safe for mining purposes – with fitting
O/ExiM1	Intrinsic safe for mining purposes – with thermowell
B/Exi	Intrinsic safe - Basic
K/Exi	Intrinsic safe - with fitting
O/Exi	Intrinsic safe - with thermowell

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Thermometer protection tube diameter d_1
4	d_1= 4 mm
5	d_1= 5 mm
6	d_1= 6 mm

E	Thermometer protection tube length L_1
	specify in mm

F	Thermometer protection tube material
1.4571	1.4571 / 316Ti

G	Additional thermowell diameter d (option)
10	d= 10 mm
11	d= 11 mm
12	d= 12 mm

H	Additional thermowell length L (option)
	specify in mm

I	Additional thermowell material (option)
1.4571	1.4571 / 316Ti
	specify other material

J	Process connection thread D (option)
	specify type of thread

K	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

L	Cable length L_K
	specify in mm

M	Operating temperature
	specify in °C

N	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PZKbm-22-B/Exi-1xPt100-A-6-100-1.4571-100-3p-L4TDS-1500-Z

stands for: Resistance thermometer in basic execution without fitting neither thermowell, intrinsic safe, resistor 1xPt100 class A, protection tube diameter d_1=ø6, length L_1=100 mm, material 1.4571, configuration 3-wire, cable L4TDS length Lk=1500 mm, standard sensor version (ceramic wire wound element).

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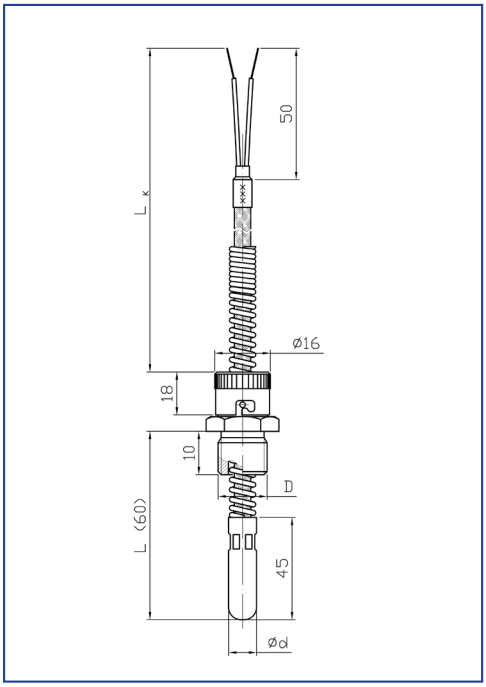
TOP-PZKbm-23



Resistance Thermometer Pt100 with bayonet coupling

Clasp lock resistance thermometer TOP-PZKbm-23 has been designed for temperature measurement of bearings, injection moulding press cylinders, moulding and vulcanization forms, heat plates using Resistance Temperature Detector Pt100.

Clasp lock mounting features easy and quick installation, replace and dismantling of the thermometer.

Type	Execution
TOP-PZKbm-23	Basic - acc to catalog card
TOP-PZKbm-23/ExiM1	Intrinsic for mining purposes – acc to Atex
TOP-PZKbm-23/Exi	Intrinsic – acc to Atex
TOP-PZKbm-23/Exe	Increased safety – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Thermometer protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]
ø4, ø5, ø6	1.4571/316Ti	on request
	MO59/CuZn39Pb2	

Process connection thread D	Material acc. DIN/AISI
on request (e.g. M14x1,5, M16x1,5, M20x1,5, G1/2")	1.4571/316Ti

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,2	L4TT-4x0,22mm2	teflon, teflon	+260°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C

Non-standard models available.

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Ordering Information

TOP-PZKbm-23	A	B	C	D	E	F	G	H	I	J	K

A	Execution
-	Basic
/ExiM1	Intrinsic safe for mining purposes
/Exi	Intrinsic safe
/Exe	Increased safety

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm

E	Protection tube material
1.4571	1.4571 / 316Ti
M59	MO59/CuZn39Pb2
	specify other material

F	Process connection thread D
	specify type of thread

G	Sensor length L
	specify in mm

H	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)

I	Cable length L_K
	specify in mm

J	Operating temperature
	specify in °C

K	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PZKbm-23-I-1xPt100-A-4-M59-M12x1-80-3p-L4TT-2000-Z

stands for: Clasp lock resistance thermometer with round ending, with resistor 1xPt100 class A, protection tube diameter ø 4 mm, material M59, thread M12x1, length L=80mm, configuration 3-wire, cable type L4TT length Lk=2000 mm, standard sensor version (ceramic wire wound element).

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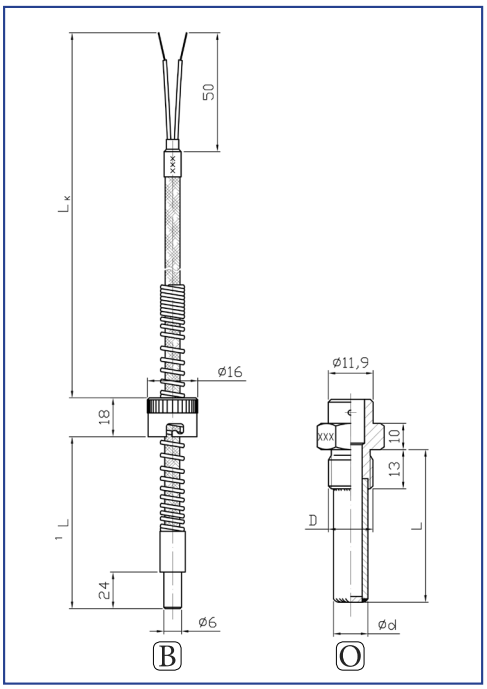
TOP-ZKbm-24



Resistance Thermometer Pt100 with Clasp Lock, Miniature

Clasp lock resistance thermometer TOP-ZKbm-24 has been designed mainly for temperature measurement of tires vulcanization process. It can be also be used for temperature measurement of bearings, cylinders, moulding and vulcanization forms, heat plates etc.

Clasp lock mounting features easy and quick installation, replace and dismantling of the thermometer. Connection cable of client request length, allows access to long distance tag points.

Type	Execution	Version
TOP-ZKbm-24	Basic - acc to catalog card	without thermowell (B) or with thermowell (O)
TOP-ZKbm-24/Exi	Intrinsic – acc to Atex	

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Additional Thermowell diam. d	Material acc. DIN/AISI	Thermowell length L [mm]	Thermometer length L_1 [mm]
ø10, ø11, ø12	1.4571/316Ti	on request	on request

Process connection thread D
on request (e.g. G1/2", R3/8")

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
2x 3 wire	ø 4,5	L6TDT-6x0,22mm2	teflon, screen, teflon	+180°C
2 wire	ø 4,3	L2SDS-2x0,25mm2	silicon, screen, silicon	+180°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-ZKbm-24	A	B	C	D	E	F	G	H	I	J	K

A	Execution
B	Basic - without thermowell
O	Basic - with thermowell
B/Exi	Intrinsic - without thermowell
O/Exi	Intrinsic - with thermowell

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Additional Thermowell diameter d (option)
10	d= 10 mm
11	d= 11 mm
12	d= 12 mm

E	Immersion length L_1 or L (when thermowell required)
	specify in mm

F	Thermometer / Thermowell material
1.4571	1.4571 / 316Ti
	specify other material

G	Process connection thread D (option)
	specify type of thread

H	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
2x3p-L6TDT	2x 3 wire (L6TDT-6x0,22mm2)
2p-L2SDS	2 wire (L2SDS-2x0,25mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

I	Cable length L_K
	specify in mm

J	Operating temperature
	specify in °C

K	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-ZKbm-24-O-1xPt100-A-10-150-1.4571-R3/8-3p-L4TDS-3000-Z

stands for: Clasp lock resistance thermometer with connection cable and additional thermowell, resistor 1xPt100 class A, thermowell diameter ø10 mm, thermowell length L=150 mm, material 1.4571, process connection thread D is R3/8", configuration 3-wire, cable type L4TDS length Lk=3000 mm, standard sensor version (ceramic wire wound element).

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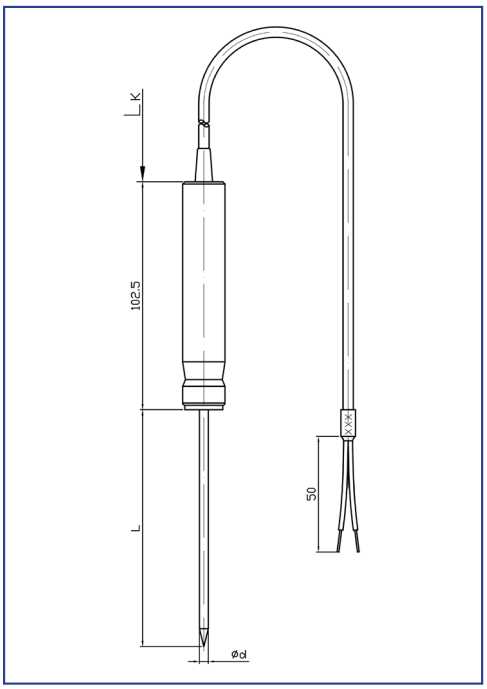
TOP-SpPKbm-25



Resistance Thermometer Pt100 for meat temp. measurement

The primary application of TOP-PKbSp-25 type resistance thermometer is temperature measurement of meat and meat products. It is also applicable for temperature measurement of other food products when it is required to drive the thermometer into such a product.

Protection tube is made of acid-proof stainless steel 1.4404, certified for food industry application.

Sub-assemblies which are in contact with meat products are welded with WIG method, which do not add any other material. All protection tube is polished onto roughness Ra<0,8 mm.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]
ø4, ø5, ø6	1.4404/316L	on request

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
3 wire	ø 4,3	L3TT-3x0,5mm2	teflon, teflon	+260°C
2 wire	ø 4,3	L2SDS-2x0,25mm2	silicone, screen, silicone	+180°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-SpPKbm-25	A	B	C	D	E	F	G	H	I

A	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

B	Class
B	B
A	A
1/3B	1/3B (AA)

C	Protection tube diameter d
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm

D	Protection tube length L
	specify in mm

E	Protection tube material
1.4404	1.4404 / 316L

F	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
3p-L3TT	3 wire (L3TT-3x0,5mm2)
2p-L2SDS	2 wire (L2SDS-2x0,25mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

G	Cable length L_K
	specify in mm

H	Operating temperature
	specify in °C

I	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-SpPKbm-25-1xPt100-A-4-120-1.4404-3p-L4GGD-2000-Z

stands for: Resistance thermometer for temp. measurement of meat, resistor 1xPt100 class A, protection tube diameter ø4 mm, length 120 mm, material 1.4404, configuration 3-wire, cable type L4GGD length Lk=2000 mm, standard sensor version (ceramic wire wound element).

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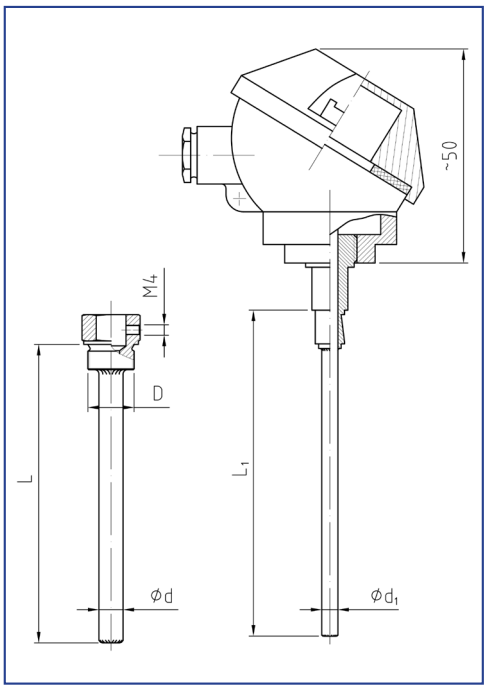
TOP-Pm-26



Resistance Thermometer Pt100
Miniature Straight

Straight miniature resistance thermometer Type TOP-Pm-26 has been designed for precise measurement of gas and liquid fluids particularly of water in central heating networks using Resistance Temperature Detectors 1xPt100 and 2xPt100 of B, A, 1/3B class, which may be provided in matched pairs.

Temperature ranges from -50°C to +250°C. Stainless steel (1.4571) protection tube material allows corrosive fluids service too.

Thermometer is offered in additional protection tube and fixed using a screw.

Type	Execution
TOP-Pm-26	Basic - acc to catalog card
TOP-Pm-26/Exi	Intrinsic – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Thermometer protect. tube diam. d_1	Material acc. DIN/AISI	Length L_1 [mm]
ø4, ø6	1.4571/316Ti	on request

Connection head	Max operating temp.	Transmitter
MA	+100°C	on request

Additional Thermowell diam. d	Material acc. DIN/AISI	Length L [mm]	Process connection thread D
ø6, ø8	1.4571/316Ti	on request	on request (e.g. M20x1,5, M24x1,5, G1/2", G3/4", 1/2"NPT, 3/4"NPT)

Max operating pressure
1,6 MPa

Non-standard models available.

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Ordering Information

TOP-Pm-26	A	B	C	D	E	F	G	H	I	J	K	L	M	N

A Execution	
-	Basic
/Exi	Intrinsic safe

B Resistor	
1xPt100	Single Pt100
2xPt100	Double Pt100

C Class	
B	B
A	A
1/3B	1/3B (AA)

D Lead wire configuration	
2p	2-wire
3p	3-wire
4p	4-wire

E Thermometer protect. tube diam. d_1	
4	d_1= 4 mm
6	d_1= 6 mm

F Protection tube length L_1	
	specify in [mm]

G Additional Thermowell diam. d	
6	d= 6 mm
8	d= 8 mm

H Additional Thermowell material	
1.4571	1.4571 / 316Ti
	specify other material

I Process connection thread D	
	specify type of thread

J Immersion Length L	
	specify in [mm]

K Connection head	
MA	MA

L Operating temperature	
	specify in °C

M Transmitter	
	specify type and temp. range in °C

N Version	
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-Pm-26-1xPt100-A-3p-6-200-8-1.4571-G1/2-180-MA-Z

stands for: Resistance thermometer miniature straight in basic execution, with additional protection tube and resistor 1xPt100 class A, configuration 3-wire, sensor protection tube diameter d_1=ø6 mm, length L_1=200 mm, additional protection tube diameter d=ø8 mm, material 1.4571, thread G1/2", thermowell immersion length L=180 mm, head type MA, standard sensor version.

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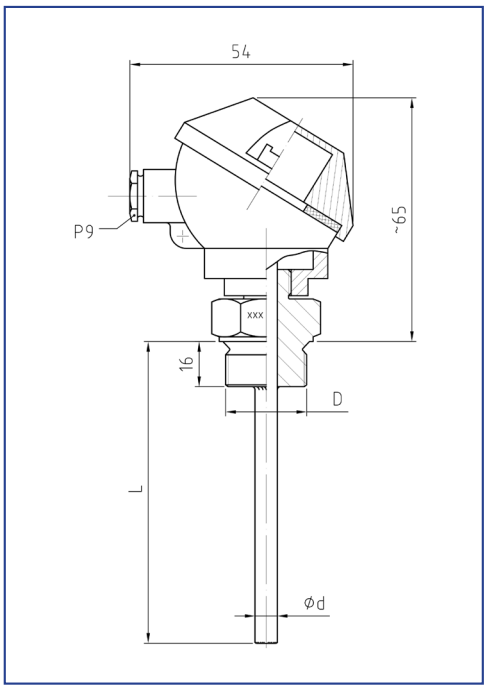
TOP-PKGm-27



Resistance Thermometer Pt100 Miniature Straight with process connection fitting

Straight miniature resistance thermometer with screwed fitting typeTOP-PK-Gm-27 has been designed for temperature measurements of gaseous and liquid process fluids in vessels and pipes. Temperature limits: -50°C to +300°C.

Protection tube is made of 1.4571 stainless steel, which allows corrosive fluid application.

Type	Execution
TOP-PKGm-27	Basic - acc to catalog card
TOP-PKGm-27/Exi	Intrinsic – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]	Process connection thread D
ø4, ø5, ø6, ø8, ø9, ø10, ø12	1.4571/316Ti	on request	on request (e.g. M12x1,5, M18x1,5, G1/2", 1/2"NPT)

Connection head	Max operating temp.	Transmitter
MA	+100°C	on request

Non-standard models available.

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Ordering Information

TOP-PKGm-27	A	B	C	D	E	F	G	H	I	J	K	L

A Execution	
-	Basic
/Exi	Intrinsic safe

B Resistor	
1xPt100	Single Pt100
2xPt100	Double Pt100

C Class	
B	B
A	A
1/3B	1/3B (AA)

D Lead wire configuration	
2p	2-wire
3p	3-wire
4p	4-wire

E Protection tube diam. d	
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm
12	d= 12 mm

F Protection tube length L	
	specify in [mm]

G Protection tube material	
1.4571	1.4571 / 316Ti
	specify other material

H Process connection thread D	
	specify type of thread

I Connection head	
MA	MA

J Operating temperature	
	specify in °C

K Transmitter	
	specify type and temp. range in °C

L Version	
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKGm-27/Exi-1xPt100-A-3p-8-300-1.4571-M20x1,5-MA-Z

stands for: Resistance thermometer miniature straight with screwed fitting, intrinsic safe, with resistor 1xPt100 class A, configuration 3-wire, sensor protection tube diameter ø8 mm, immersion length 300 mm, material 1.4571, thread M20x1,5, connection head type MA, standard sensor version (ceramic wire wound element).

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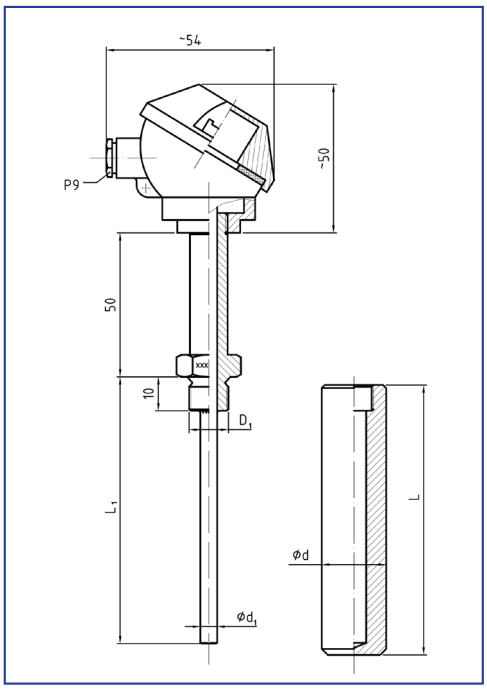
TOP-PGm-28



Resistance Thermometer Pt100 Miniature Straight with additional weld-in thermowell

Straight miniature resistance thermometer type TOP-PGm-28 has been designed for precise measurement of gas and liquid fluids particularly of water in central heating networks using Resistance Temperature Detectors 1xPt100 and 2xPt100 of A, B, 1/3B class.

Temperature limits: -50°C to +250°C. Protection tube is made of 1.4571 stainless steel and weld-in thermowell of steel A10, A12 or other, for direct welding to pipeline.

Type	Execution
TOP-PGm-28	Basic - acc to catalog card
TOP-PGm-28/Exi	Intrinsic – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Thermometer protect. tube diam. d_1	Material acc. DIN/AISI	Immersion length L_1 [mm]
ø3, ø4, ø5, ø6	1.4571/316Ti	on request

Process connection thread D_1
on request (e.g. M8x1, M24x1,5, G1/2", G3/4", 1/2"NPT, 3/4"NPT)

Additional Thermowell diam. d	Material acc. DIN/AISI
specify in mm	on request (e.g. 1.4571, 1.0715)

Connection head	Max operating temp.	Transmitter
MA	+100°C	on request

Non-standard models available.

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Ordering Information

TOP-PGm-28	A	B	C	D	E	F	G	H	I	J	K	L	M

A Execution	
-	Basic
/Exi	Intrinsic safe

B Resistor	
1xPt100	Single Pt100
2xPt100	Double Pt100

C Class	
B	B
A	A
1/3B	1/3B (AA)

D Lead wire configuration	
2p	2-wire
3p	3-wire
4p	4-wire

E Thermometer protect. tube diam. d_1	
3	d_1 = 3 mm
4	d_1 = 4 mm
5	d_1 = 5 mm

F Immersion Length L_1	
	specify in mm

G Process connection thread D_1	
	specify type of thread

H Additional Thermowell material	
1.4571	1.4571 / 316Ti
1.0715	1.0715
	specify other material

I Additional Thermowell diam. d	
	specify diameter in mm

J Connection head	
MA	MA

K Operating temperature	
	specify in °C

L Transmitter	
	specify type and temp. range in °C

M Version	
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PGm-28-1xPt100-A-3p-3-200-M8x1-1.4571-10-MA-Z

stands for: Resistance thermometer miniature straight with outer protection tube, in basic execution, with resistor 1xPt100 class A, configuration 3-wire, sensor protection tube diameter ø3, immersion length L_1=200 mm, sensor thread M8x1, additional protection tube material 1.4571, additional thermowell diameter ø10, connection head type MA, standard sensor version.

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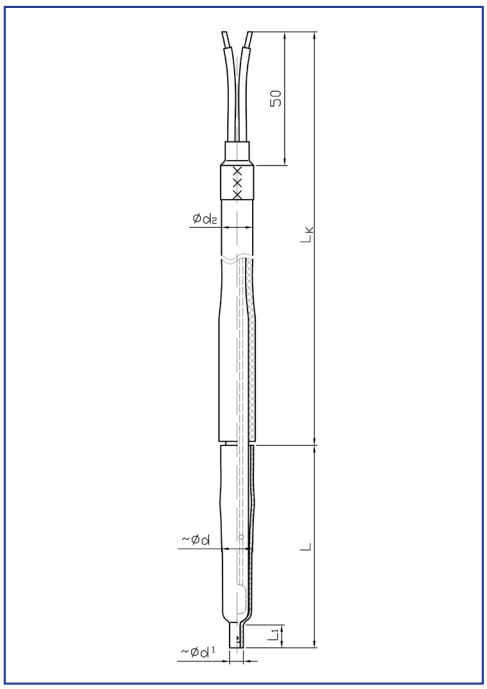
TOP-OP-30



Resistance Thermometer Pt100 Miniature Straight with shrinkable insulation sleeve

Resistance thermometer Pt100 or PTC type TOP-OP-30 has been designed for measurement of electric motor winding temperature.

Resistor is protected by Cu braid which works as an screen as well; the outer sheath is made of thermal-shrink insulation sleeve.

The thermometer features excellent dynamic characteristic.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+180°C / *(-50°C..+180°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-50°C..+180°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Measuring element	Version	Characteristic	Measuring range	Max. sensor current	Lead wire config.
Thermistor PTC	standard	acc. DIN 44081 and DIN 44082	on request	8 mA	2 wire
				5 mA	

Insulation sleeve diam. d/d_1 (approx)	Material	Length L/L_1 (approx)
specify in mm (depends on measuring element)	PVC	on request

Configuration	Cable dimension d_2	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 4,3	L2SDS-2x0,25mm2	silicone, screen, silicone	+180°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C

Non-standard models available.

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Ordering Information

TOP-OP-30	A	B	C	D	E	F	G	H

A	Measuring Element
1xPt100	RTD Single Pt100
nxPTC type	No. of PTC sensors

B	RTD Pt100 Class
B	B
A	A
1/3B	1/3B (AA)

C	Insulation sleeve diameter d/d_1 (approx)
	specify in mm

D	Insulation sleeve length L/L_1 (approx)
	specify in mm

E	Lead wire configuration and cable type
2p-L2SDS	2 wire (L2SDS-2x0,25mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)

F	Cable length L_K
	specify in mm

G	Operating temperature
	specify in °C

H	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-OP-30-1xPt100-A-4/2,5-40/8-3p-L4TDS-1000-100-Z

stands for: Resistance thermometer, with resistor 1xPt100 class A, insulation sleeve diameter d=4 mm and d_1=2,5 mm, insulation sleeve length L=40 mm and L_1=8 mm, configuration 3-wire, cable type L4TDS, cable length 1000 mm, operating temperature up to 100°C, standard sensor version (ceramic wire wound element).

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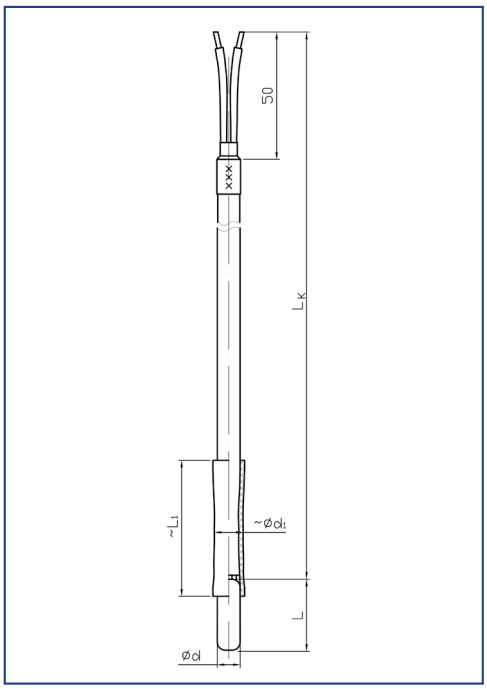
TOP-OP-31



Thermometer-resistor Pt100
Simple

Thermometer-resistor Pt100 TOP-OP-31 is the easiest example of Resistance thermometer for very precise temperature measurement of various environment. Limits are only:

- temperature range, depending on connecting cable insulation
- mechanical endurance of ceramic body of resistor.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Resistor dimensions d x L	Shrinking tube dimensions (approx) d_1 x L_1
specify in mm, acc. to catalog card – ***RTD Elements***	specify in mm (depends on measuring element and cable)

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
2 wire	ø 4,2	L2TS-2x0,34mm2	teflon, silicone	+180°C
3, 4 wire	ø 4,3	L4TS-4x0,22mm2	teflon, silicone	+180°C

Non-standard models available.

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Ordering Information

TOP-OP-31	A	B	C	D	E	F	G	H

A	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

B	Class
B	B
A	A
1/3B	1/3B (AA)

C	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
2p-L2TS	2 wire (L2TS-2x0,34mm2)
3p-L4TS	3 wire (L4TS-4x0,22mm2)
4p-L4TS	4 wire (L4TS-4x0,22mm2)

D	Resistor dimensions d x L
	specify in mm, acc. to catalog card – *RTD Elements*

E	Shrinking tube dim. d_1 x L_1 (approx)
	specify in mm

F	Cable length L_K
	specify in mm

G	Operating temperature
	specify in °C

H	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-OP-31-1xPt100-A-3p-L4GGD-2,5x30-3,5x60-6000-Z

stands for: Thermometer-resistor 1xPt100 class A, configuration 3-wire, cable type L4GGD, resistor OP-A2 (2,5x30), shrinking tube dimensions 3,5x60, cable length Lk=6000 mm, standard sensor version (ceramic wire wound element).

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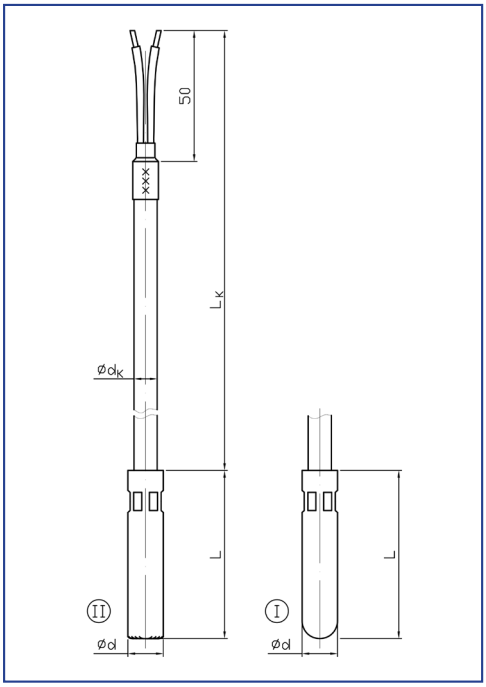
TOP-PKbm-32



Resistance Thermometer Pt100, Ni100 with connection cable

Miniature resistance thermometer TOP-PKbm-32 has been designed for temperature monitoring of vibrating machine sub-assemblies, particularly bearings.

Made of alloy steel protection sleeve and special connecting cable allow temperature measurement up to +400°C (up to +180°C for Ni100) even in aggressive environment.

Type	Execution	Version
TOP-PKbm-32	Basic - acc to catalog card	I or II
TOP-PKbm-32/ExiM1	Intrinsic for mining purposes – acc to Atex	
TOP-PKbm-32/Exi	Intrinsic – acc to Atex	
TOP-PKbm-32/Exe	Increased safety – acc to Atex	

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 2xPt100 1xNi100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Max operating temp.	Tip design	Length L [mm]
ø3, ø3,5, ø4, ø5, ø6	1.4571/316Ti	+400°C	round	on request (minimum 25 mm)
	M59/CuZn39Pb2		flat	

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
2 wire	ø 4,2	L2TS-2x0,34mm2	teflon, silicone	+180°C
3, 4 wire	ø 4,3	L4TS-4x0,22mm2	teflon, silicone	+180°C
3, 4 wire	ø 2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C
2x 3 wire	ø 3,8	L6TT-6x0,22mm2	teflon, teflon	+260°C
2 wire	ø 4,3	L2SDS-2x0,25mm2	silicone, screen, silicone	+180°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-PKbm-32	A	B	C	D	E	F	G	H	I	J

A	Execution
I	Basic - round ending
II	Basic - flat ending
I/ExiM1	Intrinsic safe for mining purposes - round ending
II/ExiM1	Intrinsic safe for mining purposes - flat ending
I/Exi	Intrinsic safe - round ending
II/Exi	Intrinsic safe - flat ending
I/Exe	Increased safety - round ending
II/Exe	Increased safety - flat ending

B	Resistor
1xNi100	Single Ni100
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm

E	Protection tube length L
	specify in mm (min. 25 mm)

F	Protection tube material
1.4571	1.4571 / 316Ti
M59	M59 / CuZn39Pb2

G	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
2p-L2TS	2 wire (L2TS-2x0,34mm2)
3p-L4TS	3 wire (L4TS-4x0,22mm2)
4p-L4TS	4 wire (L4TS-4x0,22mm2)
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)
2x3p-L6TT	2x3 wire (L6TT-6x0,22mm2)
2p-L2SDS	2 wire (L2SDS-2x0,25mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKbm-32-I/Exi-1xPt100-A-6-40-M59-3p-L4TFDT-2000-150-Z

stands for: Resistance thermometer, intrinsic save, round ending, resistor 1xPt100 class A, protection tube diameter ø6mm and length L=40mm, material M59, 3-wire lead configuration, cable type L4TFDT, length 2000 mm, operating temperature up to 150°C, standard sensor version (ceramic wire wound element).

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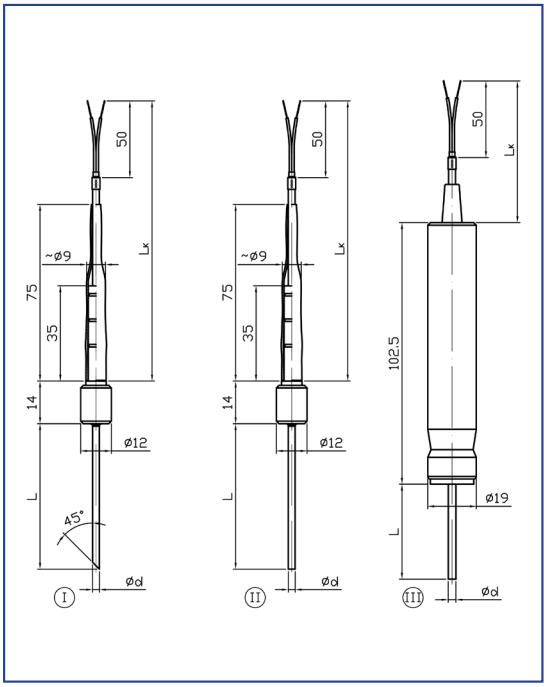
TOP-SpPKbm-33



Resistance Thermometer Pt100 with connection cable special

Resistance thermometer miniature type TOP-SpPKbm-33 with connection cable of silicone, teflon or glass fibre insulation has been designed for temperature measurements up to +400°C.

Miniature execution allows fast and precise measurement in various environments and places. Small dimensions allows easy and fast installation of thermometer. Resistor can be of 2, 3 or 4 -wire configuration.

Type	Execution	Version
TOP-SpPKbm-33	Basic - acc to catalog card	I or II or III
TOP-SpPKbm-33/ExiM1	Intrinsic for mining purposes – acc to Atex	
TOP-SpPKbm-33/Exi	Intrinsic – acc to Atex	

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protection tube diameter d	Material acc. DIN/AISI	Length L [mm]
ø2.2, ø3, ø3,5, ø4	1.4571/316Ti	on request

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 4,3	L4TS-4x0,22mm2	teflon, silicone	+180°C
3, 4 wire	ø 5,2	L4TS(L)-4x0,25mm2	teflon, silicone	+180°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C
3 wire	ø 3,8	L6TT-6x0,22mm2	teflon, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-SpPKbm-33	A	B	C	D	E	F	G	H	I	J

A	Execution
I	Basic - with sharp tip
II	Basic - with flat tip
III	Basic - with teflon handle
I/ExiM1	Intrinsic safe for mining purposes - with sharp tip
II/ExiM1	Intrinsic safe for mining purposes - with flat tip
III/ExiM1	Intrinsic safe for mining purposes - with teflon handle
I/Exi	Intrinsic - with sharp tip
II/Exi	Intrinsic - with flat tip
III/Exi	Intrinsic - with teflon handle

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
2,2	d= 2,2 mm
3	d= 3 mm
3,5	d= 3,5 mm
4	d= 4 mm

E	Protection tube length L
	specify in mm

F	Protection tube material
1.4571	1.4571 / 316Ti

G	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4TS	3 wire (L4TS-4x0,22mm2)
4p-L4TS	4 wire (L4TS-4x0,22mm2)
3p-L4TS(L)	3 wire (L4TS-4x0,25mm2)
4p-L4TS(L)	4 wire (L4TS-4x0,25mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)
3p-L6TT	3 wire (L6TT-6x0,22mm2)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-SpPKbm-33-II-1xPt100-A-4-150-1.4571-3p-L4TS-2000-160-Z

stands for: Resistance thermometer with flat tip, with resistor 1xPt100 class A, protection tube diameter ø4mm, length L=150mm, material 1.4571, configuration 3-wire, cable type L4TS, length Lk=2000 mm, operating temperature up to 160°C, standard sensor version.

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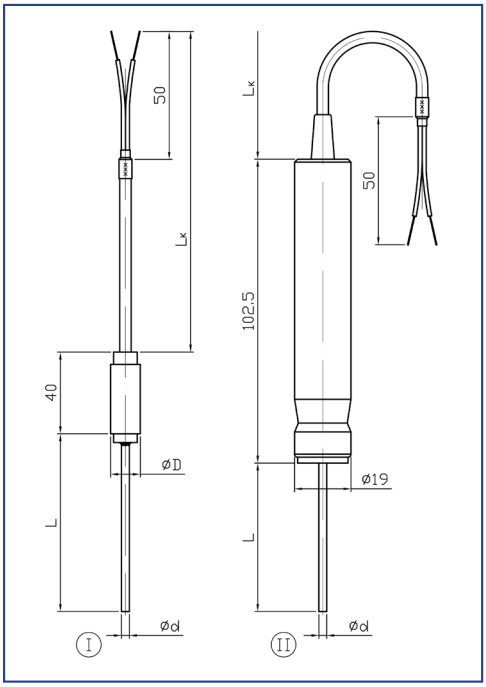
TOP-SpPKbm-34



Resistance Thermometer Pt100 Miniature with connection cable special-sheathed

Resistance thermometer miniature type TOP-SpPKbm-33 with connection cable of silicone or teflon insulation has been designed for temperature measurements up to +260°C.

Protection tube is made of sheathed Cu tube and is designed for vibrations and thermal shock environments. Allows fast and precise measurement.

Type	Execution	Version
TOP-SpPKbm-34	Basic - acc to catalog card	I or II
TOP-SpPKbm-34/Exi	Intrinsic – acc to Atex	

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire configuration
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+250°C / *(-50°C..+250°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Diameter d [mm]	Diameter D [mm] (Model I)	Material acc. DIN/AISI	Length L [mm]
ø3, ø3,2, ø4,5, ø5, ø6	ø6, ø8	1.4571/316Ti	on request

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
3, 4 wire	ø 4,3	L4TS-4x0,22mm2	teflon, silicone	+180°C
3, 4 wire	ø 5,2	L4TS(L)-4x0,25mm2	teflon, silicone	+180°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-SpPKbm-34	A	B	C	D	E	F	G	H	I	J	K

A Execution	
I	Basic
II	With teflon handle
I/Exi	Intrinsic - Basic
II/Exi	Intrinsic - With teflon handle

B Resistor	
1xPt100	Single Pt100
2xPt100	Double Pt100

C Class	
B	B
A	A
1/3B	1/3B (AA)

D Sheath diameter d	
3	d= 3 mm
3,2	d= 3,2 mm
4,5	d= 4,5 mm
5	d= 5 mm
6	d= 6 mm

E Sleeve diameter D (only Model I)	
6	D= 6 mm
8	D= 8 mm

F Immersion length L	
	specify in mm

G Protection tube material	
1.4571	1.4571 / 316Ti

H Lead wire configuration and cable type	
3p-L4TS	3 wire (L4TS-4x0,22mm2)
4p-L4TS	4 wire (L4TS-4x0,22mm2)
3p-L4TS(L)	3 wire (L4TS-4x0,25mm2)
4p-L4TS(L)	4 wire (L4TS-4x0,25mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

I Cable length L_K	
	specify in mm

J Operating temperature	
	specify in °C

K Version	
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-SpPKbm-34-I-1xPt100-A-3,2-6-250-1.4571-3p-L4TT-2000-160-Z

stands for: Resistance thermometer, basic execution, with resistor 1xPt100 class A, sheath diameter d=3,2 mm, sleeve diameter D=6 mm, immersion length L=250mm, material 1.4571, configuration 3-wire, cable type L4TT, length Lk=2000 mm, operating temp. up to 160°C, standard sensor version (ceramic wire wound element).

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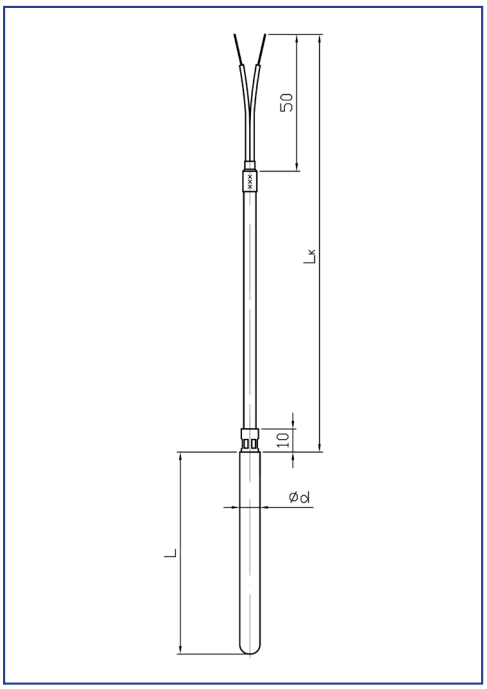
TOP-Kbm-35



Resistance Thermometer Pt100
Oil-proof

Resistance thermometer TOP-Kbm-35 has been designed for precise temperature measurement of machine sub-assemblies. Accurate measurement is done by resistor, mounted into alloy steel protection tube.

Due to use of glass fibre insulated cable, temperature measurement is limited from -50°C to +400°C.

Solution named „Oil-proof" includes special barrier preventing liquid penetration into a sensor. The barrier can be used on various length from the sensor end, depending on Client request.

Type	Execution
TOP-Kbm-35	Basic - acc to catalog card
TOP-Kbm-35/Exi	Intrinsic – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]
ø8, ø9 ø10	1.4571/316Ti	on request

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
2 wire	ø 4,2	L2TS-2x0,34mm2	teflon, silicone	+180°C
3, 4 wire	ø 4,3	L4TS-4x0,22mm2	teflon, silicone	+180°C
3, 4 wire	ø 2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C
2x 3 wire	ø 3,8	L6TT-6x0,22mm2	teflon, teflon	+260°C
2 wire	ø 4,3	L2SDS-2x0,25mm2	silicone, screen, silicone	+180°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-Kbm-35	A	B	C	D	E	F	G	H	I	J

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm

E	Protection tube length L
	specify in mm

F	Protection tube material
1.4571	1.4571 / 316Ti

G	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
2p-L2TS	2 wire (L2TS-2x0,34mm2)
3p-L4TS	3 wire (L4TS-4x0,22mm2)
4p-L4TS	4 wire (L4TS-4x0,22mm2)
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)
2x3p-L6TT	2x3 wire (L6TT-6x0,22mm2)
2p-L2SDS	2 wire (L2SDS-2x0,25mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-Kbm-35-1xPt100-A-4- 250-1.4571-3p-L4TDS-2000-160-Z

stands for: Resistance thermometer with resistor 1xPt100 class A, protection tube 8x1 mm length 250, material 1.4571, configuration 3-wire, cable type L4TDS length Lk=2000 mm, operating temp. up to 160°C, standard sensor version (ceramic wire wound element).

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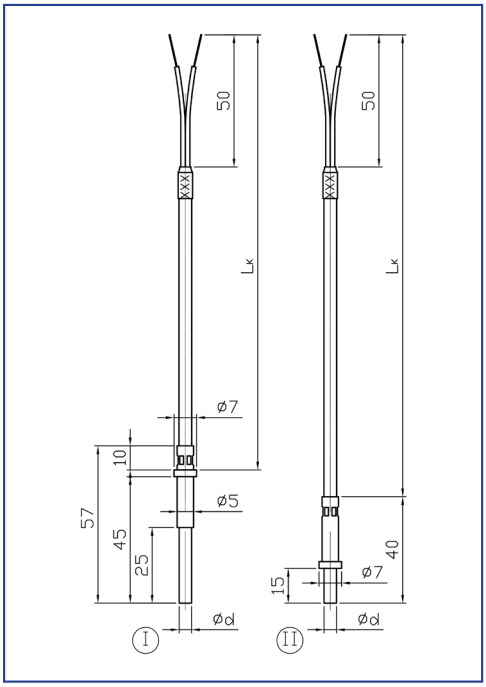
TOP-PKbm-36



Resistance Thermometer Pt100 Miniature

Resistance thermometer type TOP-PKbm-36 has been designed for temperature measurements up to +400°C. Miniature execution allows fast and precise measurement in various environments and places. Miniature dimensions allows easy and fast installation of thermometer even in cases of limited access space.

Model	Execution
I	with immersion length L=45 mm
II	with immersion length L=15 mm

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protection tube diameter d [mm]	Material acc. DIN/AISI
ø2, ø3, ø3.5	1.4571/316Ti

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-PKbm-36	A	B	C	D	E	F	G	H	I

A	Execution
I	with immersion length L=45 mm
II	with immersion length L=15 mm

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
2	d= 2 mm
3	d= 3 mm
3,5	d= 3,5 mm

E	Protection tube material
1.4571	1.4571 / 316Ti

F	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)

G	Cable length L_K
	specify in mm

H	Operating temperature
	specify in °C

I	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKbm-36-I-1xPt100-A-3-1.4571-3p-L4GGD-3000-160-Z

stands for: Resistance thermometer, model I with immersion length L=45 mm, with resistor 1xPt100 class A, protection tube diameter 3 mm, material 1.4571, configuration 3-wire, cable type L4GGD length Lk=3000mm, operating temp. up to 160°C, standard sensor version (ceramic wire wound element).

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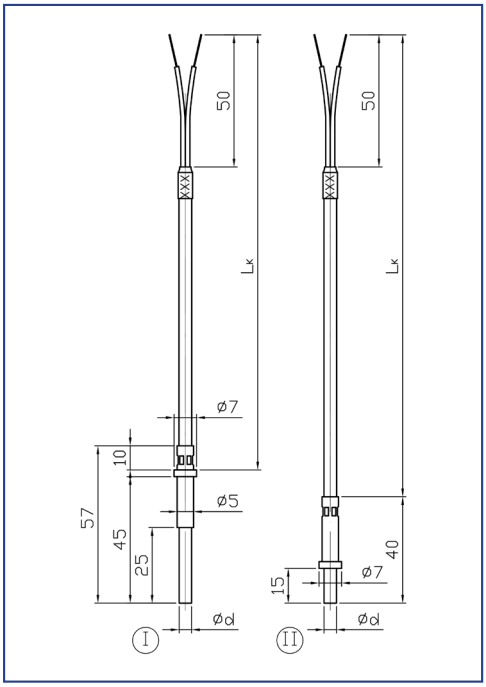
TER-PKbm-37



Thermocouple Miniature

Miniature thermocouple type TER-PKbm-37 has been designed for temperature measurement up to +400°C. Thanks miniature dimensions assures short response time and precise temperature measurement. Thermometer is applicable in variety of location and process fluids even in cases of limited access space.

Thermocouple is made of sheathed thermo-elements.

Type	Execution	Version
TER-PKbm-37	Basic - acc to catalog card	I or II
TER-PKbm-37/Exi	Intrinsic – acc to Atex	

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+300°C	acc. EN 60584-1
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+400°C	

Junction
ungrounded
grounded

Sheath diameter d [mm]	Material acc. DIN/AISI
ø1, ø1.5, ø2, ø3	2.4816/Inconel 600

Thermocouple	Configuration	Dimension	Compensation Cable Type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		
		ø 3,2	L2TDT-J-0,22mm2	teflon, screen, teflon	+260°C
		ø 3,0	L2TDT-K-0,22mm2		
		ø 4,2	L2SS-J-0,22mm2	silicone, silicone	+180°C
		ø 3,5	L2SS-K-0,22mm2		
Double	4 wire (2-pair)	ø 4,0	L4GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,6	L4GGD-K-0,22mm2		

Non-standard models available.

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Ordering Information

TER-PKbm-37	A	B	C	D	E	F	G	H

A	Execution
I	Basic - immersion length L=45 mm
II	Basic - immersion length L=15 mm
I/Exi	Intrinsic safe - immersion length L=45 mm
II/Exi	Intrinsic safe - immersion length L=15 mm

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Protection tube diameter d
1	d= 1 mm
1,5	d= 1,5 mm
2	d= 2 mm
3	d= 3 mm

D	Protection tube material
2.4816	2.4816/Inconel 600

E	Compensation cable type
2p-L2GGD-J	2 wire (L2GGD-J-0,22)
2p-L2TDT-J	2 wire (L2TDT-J-0,22)
2p-L2SS-J	2 wire (L2SS-J-0,22)
4p-L4GGD-J	4 wire (L4GGD-J-0,22)
2p-L2GGD-K	2 wire (L2GGD-K-0,22)
2p-L2TDT-K	2 wire (L2TDT-K-0,22)
2p-L2SS-K	2 wire (L2SS-K-0,22)
4p-L4GGD-K	4 wire (L4GGD-K-0,22)

F	Cable length L_K
	specify in mm

G	Junction
O	ungrounded
Z	grounded

H	Operating temperature
	specify in °C

Ordering Example

TER-PKbm-37-I/Exi-1xJ-3-2.4816-2p-L2GGD-J-1000-O-280

stands for: Thermocouple miniature, intrinsic safe, immersion length L=45 mm, 1xFe-CuNi, protection tube diameter 3 mm,material Inconel 600, configuration 2-wire, cable type L2GGD-J length Lk=1000 mm, ungrounded, operating temp. up to 280°C.

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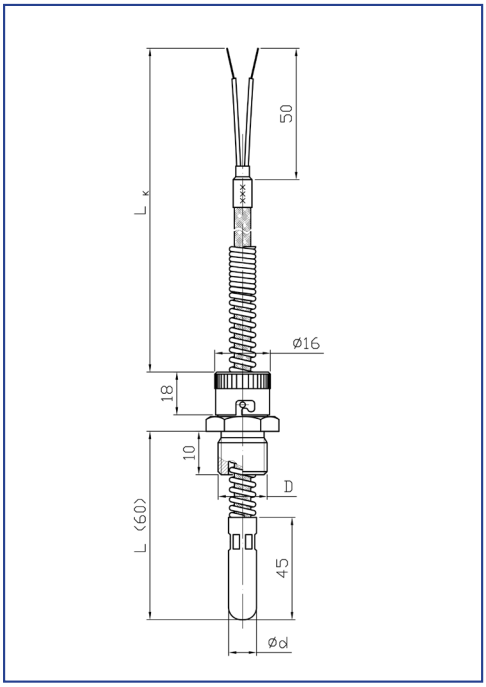
TER-PZKbm-38



Thermocouple with flexible cable

Thermocouple with flexible cable type TER-PZKbm-38 has been designed for temperature measurement of bearings, injection moulding press cylinders, moulding and vulcanization forms, heat plates and others using thermo-elements Fe-CuNi (J), NiCr-Ni (K) or Cu-CuNi for temperature ranges from -40°C to +400°C.

Clasp lock mounting features easy and quick installation, replace and dismantling of the thermocouple. Metal braid protected connection cable is corrosion resistant and allows for remote location of thermometer.

Type	Execution
TER-PZKbm-38	Basic - acc to catalog card
TER-PZKbm-38/ExiM1	Intrinsic for mining purposes – acc to Atex
TER-PZKbm-38/Exi	Intrinsic – acc to Atex

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+300°C	acc. EN 60584-1	ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+400°C		

Protection tube diameter d [mm]	Material acc. DIN/AISI	Length L [mm]
ø4, ø5, ø6	1.4571/316Ti	on request

Process connection thread D
on request (e.g. M10x1, M12x1, M14x1,5)

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		
Double	4 wire (2-pair)	ø 4,0	L4GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,6	L4GGD-K-0,22mm2		

Non-standard models available.

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Ordering Information

TER-PZKbm-38	A	B	C	D	E	F	G	H	I

A	Execution
-	Basic
/ExiM1	Intrinsic safe for mining purposes
/Exi	Intrinsic safe

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Protection tube diameter d
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm

D	Protection tube material
1.4571	1.4571/316Ti

E	Process connection thread D
	specify type of thread

F	Immersion length L
	specify in mm

G	Compensation cable type
2p-L2GGD-J	2 wire (L2GGD-J-0,22)
4p-L4GGD-J	4 wire (L4GGD-J-0,22)
2p-L2GGD-K	2 wire (L2GGD-K-0,22)
4p-L4GGD-K	4 wire (L4GGD-K-0,22)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

Ordering Example

TER-PZKbm-38-1xK-6-1.4571-M12x1-60-3p-L4GGD-K-4000-380

stands for: Thermocouple with flexible cable, 1xNiCr-NiAl, protection tube diameter ø6 mm, material 1.4571, thread M12x1, immersion length L=60 mm, configuration 3-wire, cable type L4GGD-K length Lk=4000 mm, operating temp. up to 380°C.

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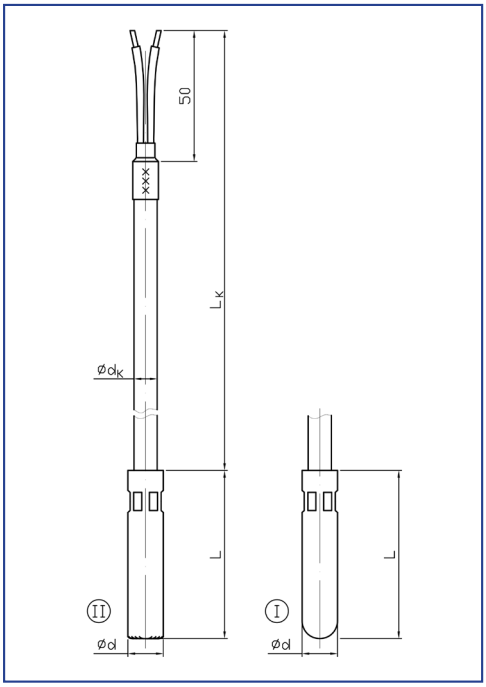
TER-PKbm-40



Thermocouple miniature with connection cable

Miniature thermocouple TER-PKbm-40 has been designed for temperature monitoring of machine sub-assemblies, particularly bearings.

Made of alloy steel protection tube and special connecting cable allow temperature measurement in wide range in various environments.

Type	Execution	Version
TER-PKbm-40	Basic - acc to catalog card	I or II
TER-PKbm-40/ExiM1	Intrinsic for mining purposes – acc to Atex	
TER-PKbm-40/Exi	Intrinsic – acc to Atex	

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+300°C	acc. EN 60584-1
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+400°C	

Junction
ungrounded
grounded

Protection tube diameter d [mm]	Material acc. DIN/AISI	Length L [mm]
ø4, ø5, ø6	1.4571/316Ti	on request

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		
		ø 3,2	L2TDT-J-0,22mm2	teflon, screen, teflon	+260°C
		ø 3,0	L2TDT-K-0,22mm2		
		ø 4,2	L2SS-J-0,22mm2	silicone, silicone	+180°C
		ø 3,5	L2SS-K-0,22mm2		
Double	4 wire (2-pair)	ø 4,0	L4GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,6	L4GGD-K-0,22mm2		

Non-standard models available.

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Ordering Information

TER-PKbm-40	A	B	C	D	E	F	G	H	I

A	Execution
I	Basic - round ending
II	Basic - flat ending
I/ExiM1	Intrinsic safe for mining purposes - round ending
II/ExiM1	Intrinsic safe for mining purposes - flat ending
I/Exi	Intrinsic safe - round ending
II/Exi	Intrinsic safe - flat ending

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Protection tube diameter d
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm

D	Protection tube length L
	specify in mm

E	Protection tube material
1.4571	1.4571/316Ti

F	Compensation cable type
2p-L2GGD-J	2 wire (L2GGD-J-0,22)
2p-L2TDT-J	2 wire (L2TDT-J-0,22)
2p-L2SS-J	2 wire (L2SS-J-0,22)
4p-L4GGD-J	4 wire (L4GGD-J-0,22)
2p-L2GGD-K	2 wire (L2GGD-K-0,22)
2p-L2TDT-K	2 wire (L2TDT-K-0,22)
2p-L2SS-K	2 wire (L2SS-K-0,22)
4p-L4GGD-K	4 wire (L4GGD-K-0,22)

G	Cable length L_K
	specify in mm

H	Junction
O	ungrounded
Z	grounded

I	Operating temperature
	specify in °C

Ordering Example

TER-PKbm-40-I/Exi-1xJ-5-50-1.4571-2p-L2GGD-J-3000-O-250

stands for: Thermocouple intrinsic safe with round ending, 1xFe-CuNi, protection tube diameter ø5 mm, protection tube length L=50 mm, material 1.4571, configuration 2-wire, cable type L2GGD-J length Lk=3000 mm, ungrounded, operating temp. up to 250°C.

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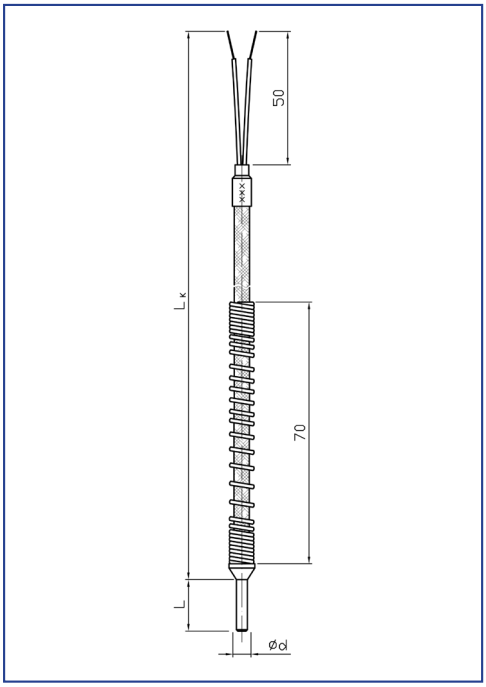
TOP-SpPKbm-41



Resistance Thermometer Pt100
Miniature
Special - shockproof

Resistance thermometer miniature type TOP-SpPKbm-41 with connection cable, has been designed for temperature measurement in superchargers and turbo-superchargers bearings, and other instruments, where huge vibrations are noticed.

Applied thin-film resistor Pt100 what protects measurement under vibrations up to +260°C.

Type	Execution
TOP-SpPKbm-41	Basic - acc to catalog card
TOP-SpPKbm-41/ExiM1	Intrinsic for mining purposes – acc to Atex
TOP-SpPKbm-41/Exi	Intrinsic – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+250°C / *(-50°C..+250°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protection tube diameter d [mm]	Material acc. DIN/AISI
ø2.5	1.4571/316Ti

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
3, 4 wire	ø 2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-SpPKbm-41	A	B	C	D	E	F	G	H	I	J

A	Execution
-	Basic
/ExiM1	Intrinsic safe for mining purposes
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube length L
	specify in mm

E	Protection tube diameter d
2,5	d= 2,5 mm

F	Protection tube material
1.4571	1.4571 / 316Ti

G	Lead wire configuration and cable type
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-SpPKbm-41-1xPt100-A-10-2,5-3p-L4TT-2000-100-Z

stands for: Resistance thermometer, basic execution, with resistor 1xPt100 class A, protection tube length 10mm, diameter 2,5mm, configuration 3-wire, cable type L4TT length Lk=2000 mm, operating temp. up to 100°C, standard sensor version (ceramic wire wound element).

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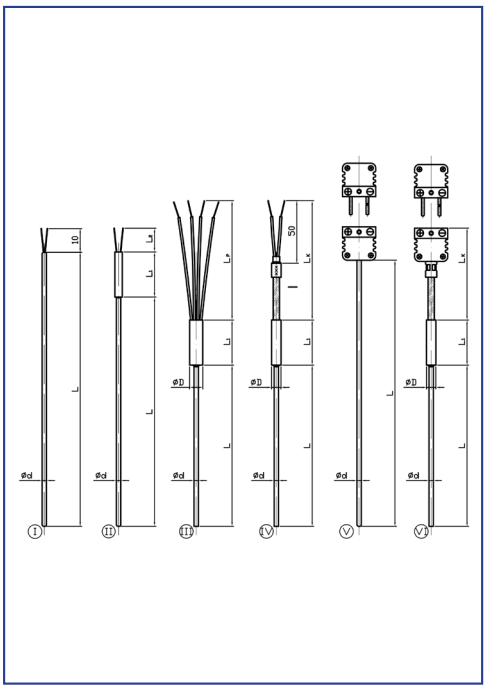
TP-42



Sheathed Thermocouple (Type J, K, N)

Thermocouple is made of sheathed, mineral insulated thermocouple wires. Metallic oxide (MgO) insulation is compacted into the sheath to mechanically support and electrically insulate the thermocouple wire and junction Such a design allows small diameter and good flexibility of T/C. Sheathed thermocouple is highly mechanical and chemical resistant and has very low time of response.

Type	Execution	Version
TP-42	Basic - acc to catalog card	I ÷ VI
TP-42/ExiM1	Intrinsic for mining purposes – acc to Atex	
TP-42/Exi	Intrinsic – acc to Atex	

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+800°C	acc. EN 60584-1
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+1000°C (+1100°C)*	
1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	0°C..+1200°C (-270°C..+1300°C)*	

Junction
ungrounded
grounded

* short term

Sheath diameter d [mm]	Sleeve diameter D [mm]	Sleeve length L_1 [mm]	Sheath material acc. AISI/DIN
ø0,5 ø1,0 ø1,5 ø2,0 ø3,0 ø4,5 ø6,0 ø8,0	on request	on request	2.4816 / Inconel 600 1.4571 / 316Ti 1.4541 / 321

Thermocouple	Configuration	Compensation cable type
Single	2 wire (1-pair)	on request
Double	4 wire (2-pair)	

Medium	Response Time $T_{0,5}$
Water	0,35 ÷ 2,5 sec

Bending radius R_{MIN}	Operating pressure
3 d	up to 20 MPa

Non-standard models available.

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Ordering Information

TP-42	A	B	C	D	E	F	G	H	I	J	K

A Execution

WT	Basic
WTT	with sleeve and conn. piece
WTTp	with sleeve and loose wires
WTTKbm	with T/C extension wire cable
WTW	with T/C plug
WTG	with T/C socket
WTG/W	with T/C socket and plug
WTW/G	with T/C plug and socket
WTTWKbm	with T/C plug and extension wire cable
WTTGKbm	with T/C socket and extension wire cable
WTTG/WKbm	with T/C socket and plug and ext. wire cable
WTTW/GKbm	with T/C plug and socket and ext. wire cable
WT/Exi	Intrinsic safe - basic
WTT/Exi	Intrinsic safe - with sleeve and conn. piece
WTTp/Exi	Intrinsic safe - with sleeve and loose wires
WTTKbm/Exi	Intrinsic safe - with T/C extension wire cable
WTW/Exi*	Intrinsic safe - with T/C plug
WTTWKbm/Exi*	Intrinsic safe - with T/C plug and ext. wire cable
WT/ExiM1	Intrinsic safe for mining - basic
WTT/ExiM1	Intrinsic safe for mining - with sleeve and conn. piece
WTTp/ExiM1	Intrinsic safe for mining - with sleeve and loose wires
WTTKbm/ExiM1	Intrinsic safe for mining - with T/C ext. wire cable
WTW/ExiM1*	Intrinsic safe for mining - with T/C plug
WTTWKbm/ExiM1*	Intrinsic safe for mining - with T/C plug and ext. wire cable

B Type of thermocouple

1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg

C Sheath diameter d

	specify in mm

D Sheath length L

	specify in mm

E Sheath material

2.4816	2.4816 / Inconel 600
1.4571	1.4571 / 316Ti
1.4541	1.4541 / 321

F Sleeve diameter and length D x L_1

	specify in mm

G Compensation cable type

L2GGD-J-0,22	L2GGD-J-0,22mm2
L2GGD-K-0,22	L2GGD-K-0,22mm2
L2TDT-J-0,22	L2TDT-J-0,22mm2
L2TDT-K-0,22	L2TDT-K-0,22mm2
L2SS-J-0,22	L2SS-J-0,22mm2
L2SS-K-0,22	L2SS-K-0,22mm2
L4GGD-J-0,22	L4GGD-J-0,22mm2
L4GGD-K-0,22	L4GGD-K-0,22mm2

H Cable length L_K or Wire length L_P

	specify in mm

I Junction

O	ungrounded
Z	grounded

J Operating temperature

	specify in °C

K Operating temperature socket/plug

	specify in °C

*NOTE: * Intrinsic safe version plug connectors can not be disconnected under voltage.*

Ordering Example: TP-42-WTTp-2xK-3-160-2.4816-6x40-100-Z-400

stands for: Sheathed thermocouple, model with sleeve and loose wires, with sensor 2x NiCr-NiAl, sheath diameter ø3mm, sheath length L=160 mm, sheath material 2.4816(Inconel600), sleeve diam. D=6 mm and length L_1=40 mm, wire length L_p=100 mm, grounded junction, operating temperature 400°C.

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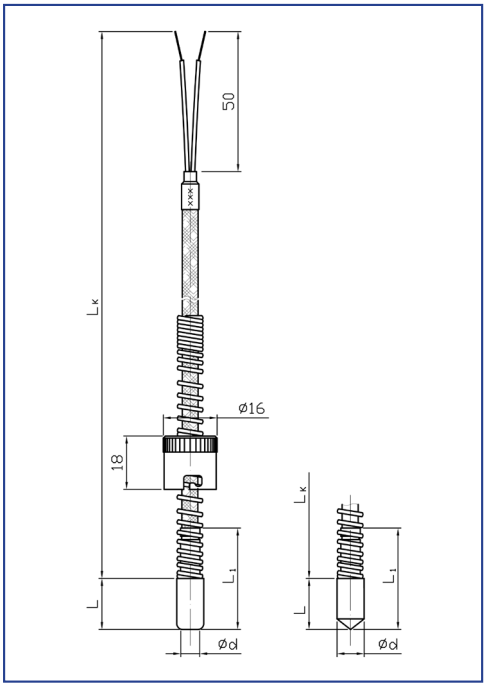
TER-PZKbm-43



Thermocouple with flexible cable

Thermocouple with flexible cable type TER-PZKbm-43 has been designed for temperature measurement of bearings, injection moulding press cylinders, moulding and vulcanization forms, heat plates using thermo-element Fe-CuNi (J), NiCr-NiAl (K) in the range up to +400°C.

Clasp lock mounting features easy and quick installation, replace and dismantling of the thermocouple and connection cable with metal screen protects against external factors and allows access to far away tag points.

Model	Execution
I	With straight protection tube
II	With tapered protection tube

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+300°C	acc. EN 60584-1	ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+400°C		grounded

Protection tube diameter d [mm]	Material acc. DIN/AISI	Length L_1 [mm]	Process connection
ø5, ø6, ø8	1.4571/316Ti	on request	bayonet lock cap

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		
Double	4 wire (2-pair)	ø 4,0	L4GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,6	L4GGD-K-0,22mm2		

Non-standard models available.

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Ordering Information

TER-PZKbm-43	A	B	C	D	E	F	G	H	I

A	Execution
I	With straight protection tube
II	With tapered protection tube

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Protection tube diameter d
5	d= 5 mm
6	d= 6 mm
8	d= 8 mm

D	Protection tube length L
	specify in mm

E	Protection tube material
1.4571	1.4571/316Ti

F	Compensation cable type
2p-L2GGD-J	2 wire (L2GGD-J-0,22)
4p-L4GGD-J	4 wire (L4GGD-J-0,22)
2p-L2GGD-K	2 wire (L2GGD-K-0,22)
4p-L4GGD-K	4 wire (L4GGD-K-0,22)

G	Cable length L_K
	specify in mm

H	Junction
O	ungrounded
Z	grounded

I	Operating temperature
	specify in °C

Ordering Example

TER-PZKbm-43-I-1xK-6-12-1.4571-4p-L4GGD-K-800-O-300

stands for: Sheathed thermocouple with straight protection tube, with thermoelement 1xNiCr-NiAl, protection tube diameter ø6 mm, length L=12mm, material 1.4571, configuration 4-wire, cable type L4GGD-K, length Lk=800 mm, ungrounded junction, operating temp up to 300°C.

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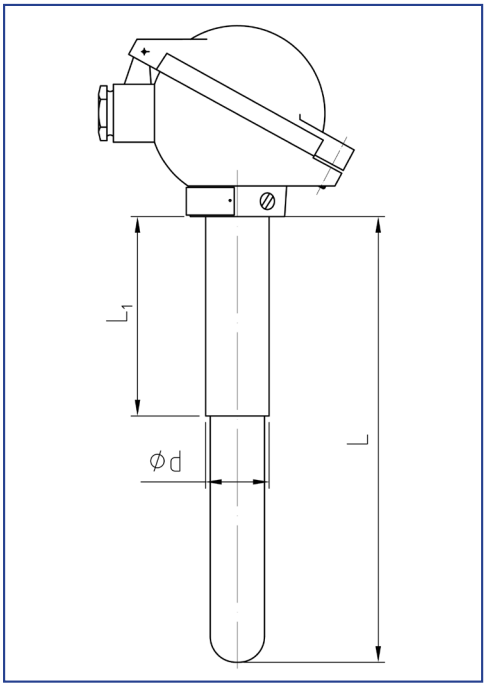
TER-P-44



Straight Thermocouple PtRh10-Pt(S), PtRh30-PtRh6(B)

Straight thermocouple PtRh10-Pt(S), PtRh30-PtRh6(B) type TER-P-44 has been designed for high temperature measurement up to +1600°C mainly in iron blast furnaces, in fire boxes of heat treatment heaters and for other high temperature applications.

Where feasible the thermocouple can be equipped with short protection tube to be used for fixing of ceramic protection tube. This additional protection tube may be applied along the whole ceramic tube when special mechanical protection is required. However, operating temperature is limited to +1400°C then.

The thermocouples are made in basic or intrinsic save execution.

Type	Execution
TER-P-44	Basic - acc to catalog card
TER-P-44/Exi	Intrinsic – acc to Atex

Technical specification

Sheathed sensor insert	Max. operating temp.		Characteristic	Junction
PtRh10-Pt (S)	permanent work	+1150°C	acc. EN 60584-1	ungrounded
	short time work	+1300°C		
PtRh30-PtRh6 (B)	permanent work	+1600°C		
	short time work	+1800°C		

Protection tube diameter d [mm]	Material acc. DIN/AISI	Max. operating temp.	Length L_1 [mm]
ø22, ø30, ø33,7	1.4841/314	+1150°C	on request
ø19.1, ø22	Kanthal AF	+1400°C	

Ceramic protect. tube diameter	Material acc. DIN/AISI	Max. operating temp.	Length L [mm]
depends on protection tube diam. d	Ker 799 (gas leakage proof)	+1700°C	on request

Connection head	Max operating temp.	Transmitter
DAA, DANA, DANAW	+100°C	on request

Non-standard models available.

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Ordering Information

TER-P-44	A	B	C	D	E	F	G	H	I	J	K

A Execution	
-	Basic
/Exi	Intrinsic safe

B Type of thermocouple	
1xS	Single PtRh-Pt10
2xS	Double PtRh-Pt10
1xB	Single PtRh30-PtRh6
2xB	Double PtRh30-PtRh6

C Protection tube diameter d	
19,1	d= 19,1 mm
22	d= 22 mm
30	d= 30 mm
33,7	d= 33,7 mm

D Protection tube material	
1.4841	1.4841/314
Kanthal AF	Kanthal AF

E Protection tube length L_1	
	specify in mm

F Ceramic protection tube material	
Ker799	Ker 799

G Length L	
	specify in mm

H Junction	
O	ungrounded

I Connection head	
	specify head type

J Operating temperature	
	specify in °C

K Transmitter	
	specify type and temp. range in °C

Ordering Example

TER-P-44/Exi-1xB-22-1.4841-200-799-400-O-DAA

stands for: Straight thermocouple in intrinsic save execution with thermoelement 1xPtRh30-PtRh6 and protection tube diameter ø22 mm, material 1.4841, length L1=200mm, ceramic protection tube Ker 799, length L=400 mm, ungrounded junction, with connection head DAA, w/o transmitter.

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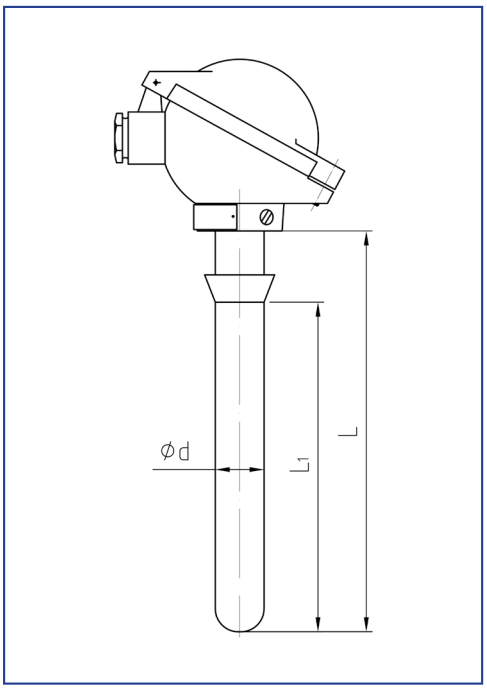
TER-P-45



Straight Thermocouple PtRh10-Pt(S), PtRh30-PtRh6(B)

Straight thermocouple PtRh10-Pt(S), PtRh30-PtRh6(B) type TER-P-45 has been designed for high temperature measurement up to +1600°C by permanent work and +1800°C by short time work mainly in iron blast furnaces, in fire boxes of heat treatment heaters and for other high temperature applications.

Where feasible the thermocouple can be equipped with protection tube to be used for fixing of ceramic protection tube. This additional protection tube is applied along the whole ceramic tube when special mechanical protection is required. However, operating temperature is limited to +1400°C then.

Type	Execution
TER-P-45	Basic

Technical specification

Sheathed sensor insert	Max. operating temp.		Characteristic	Junction
PtRh10-Pt (S)	permanent work	+1150°C	acc. EN 60584-1	ungrounded
	short time work	+1300°C		
PtRh30-PtRh6 (B)	permanent work	+1600°C		
	short time work	+1800°C		

Protection tube diameter d [mm]	Material acc. DIN/AISI	Max. operating temp.	Length L_1 [mm]
ø22, ø30, ø33,7	1.4841/314	+1150°C	on request
ø19.1, ø22	Kanthal AF	+1400°C	

Ceramic tube diameter	Material acc. DIN/AISI	Max. operating temp.	Length L [mm]
depends on protection tube diam. d	Ker 799 (gas leakage proof)	+1700°C	on request

Connection head	Max operating temp.	Transmitter
DAA, DANA, DANAW	+100°C	on request

Non-standard models available.

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Ordering Information

TER-P-45	A	B	C	D	E	F	G	H	I	J

A	Type of thermocouple
1xS	Single PtRh-Pt10
2xS	Double PtRh-Pt10
1xB	Single PtRh30-PtRh6
2xB	Double PtRh30-PtRh6

B	Protection tube diameter d
19,1	d= 19,1 mm
22	d= 22 mm
30	d= 30 mm
33,7	d= 33,7 mm

C	Protection tube material
1.4841	1.4841/314
Kanthal AF	Kanthal AF

D	Length L_1
	specify in mm

E	Ceramic tube material
Ker799	Ker 799

F	Length L
	specify in mm

G	Junction
O	ungrounded

H	Connection head
	specify head type

I	Operating temperature
	specify in °C

J	Transmitter
	specify type and temp. range in °C

Ordering Example

TER-P-45-1xB-30-1.4841-350-799-400-O-DAA

stands for: Straight thermocouple with thermoelement 1xPtRh30-PtRh6 and protection tube diameter ø30 mm, material 1.4841, length L1=350 mm, ceramic tube Ker 799, length L=400 mm, ungrounded junction, with connection head type DAA, w/o transmitter.

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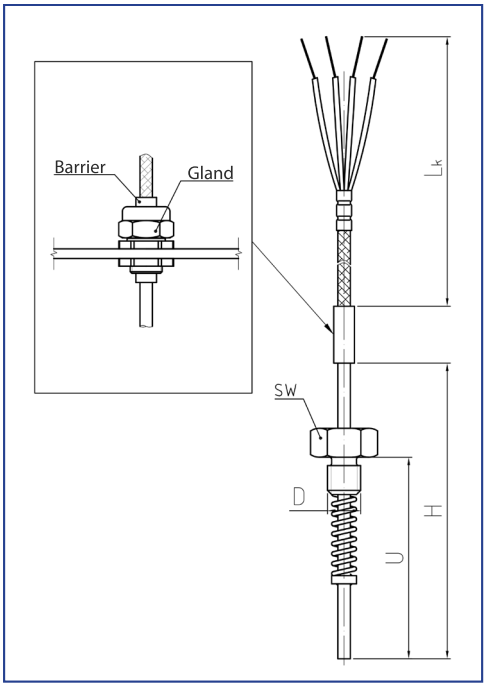
TER-PZKbm-46



Thermocouple with flexible cable

Thermocouple with flexible cable type TER-PZKbm-46 has been designed for temperature measurement of bearings, injection moulding press cylinders, moulding and vulcanization forms, heat plates using thermo-element Fe-CuNi (J), NiCr-NiAl (K) in the range from -40°C up to +400°C.

Threaded process connection fitting features easy and quick installation, replace and dismantling of the thermocouple and connection cable with metal screen protects against external factors and allows access to far away tag points.

In the case of the problem of migration of oil in the cable, it is possible to use a design that solves this problem.

A spring mounted in a thermocouple provides proper pressure between the tip of thermocouple and the bearing surface.

Type	Execution	Version
TER-PZKbm-46	Basic - acc to catalog card	Basic or Oil proof
TER-PZKbm-46/ExiM1	Intrinsic for mining purposes – acc to Atex	
TER-PZKbm-46/Exi	Intrinsic – acc to Atex	

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Material	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+300°C	Inconel 600	wg PN-EN 60584-1	ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+400°C			grounded

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 4,4	L2VDV-K-0,22mm2	PVC-screen-PVC	+105°C
		ø 4,5	L2TDT-J-0,22mm2	teflon-screen-teflon	+200°C
Double	4 wire (2-pair)	ø 3,2	L2TDT-K-0,22mm2		
		ø 5,2	L4VDV-K-0,22mm2	PVC-screen-PVC	+105°C

Compensation cables: oil-proof

Non-standard models available.

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Ordering Information

TER-PZKbm-46	A	B	C	D	E	F	G	H	I	J	K

A	Execution
I	Basic
II	Oil proof
I/ExiM1	Intrinsic safe for mining purposes - basic
II/ExiM1	Intrinsic safe for mining purposes - oil proof
I/Exi	Intrinsic safe - basic
II/Exi	Intrinsic safe - oil proof

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Sheath diameter d
3	d= 3 mm
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm

D	Sheath material
2.4816	2.4816 / Inconel 600

E	Process connection fitting D(thread) / SW(hexagon)
M8	D=M8, SW=13 mm
M10x1	D=M10x1, SW=17 mm
M12x1	D=M12x1, SW=19mm

F	Immersion length U
	specify in mm

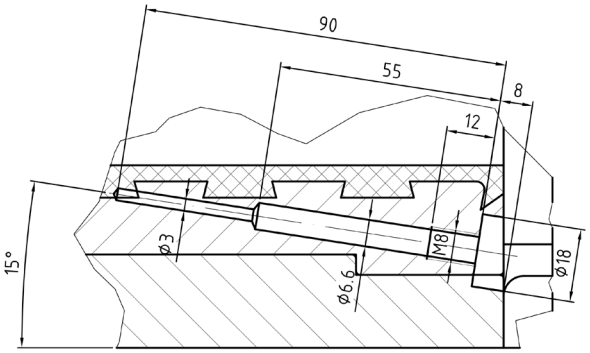
G	Thermocouple length H
	specify in mm

H	Compensation cable type
2p-L2VDV-K	2 wire (L2VDV-K-0,22)
4p-L4VDV-K	4 wire (L4VDV-K-0,22)
2p-L2TDT-J	2 wire (L2TDT-J-0,22)
2p-L2TDT-K	2 wire (L2TDT-K-0,22)

I	Cable length L_K
	specify in mm

J	Junction
O	ungrounded
Z	grounded

K	Operating temperature
	specify in °C



Ordering Example

TER-PZKbm-46-I-1xK-6-Inconel600-M12x1-90-200-2p-L2VDV-K-4000-O-200

stands for: Sheathed thermocouple with basic execution, without oil-proof option, with thermoelement 1xNiCr-NiAl, sheath diameter ø6 mm, material Inconel600, process connection thread M12x1, length U=90mm, length H=200mm, configuration 2-wire, cable type L2VDV-K, length Lk=4000 mm, ungrounded junction, operating temp up to 200°C.

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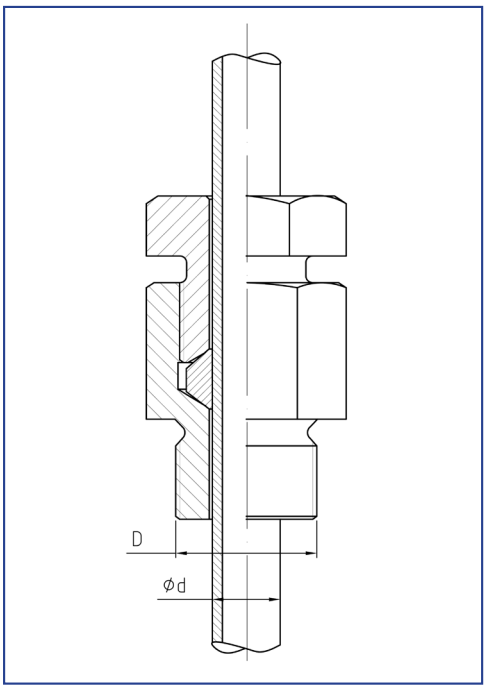
UZG-47



Adjustable Process Connection Fitting

Adjustable process connection fitting UZG-47 has been designed for fixing resistance thermometers and thermocouples to pipelines, reactors in cases where sensor has protection tube without any threaded fitting. Such assembling assures unlimited sensor moves.

Technical specification

Body material acc. DIN/AISI	Ferrule material acc. DIN/AISI	Protection tube diameter d [mm]	Thread D
on request (eg. 1.4571/316Ti, 1.4841/314, MO58)	Stainless Steel	from ø3 up to ø22	on request (e.g. M12x1, M18x1,5, M27x2, G 1/2", 1/2 NPT")
	PTFE (Tarflen)		
	MO58 (CuZn40Pb2)		

Non-standard models available.

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Ordering Information

UZG-47	A	B	C	D

A	Protection tube diameter d
	specify in mm (from ø3 up to ø22)

B	Ferrule material
SST	stainless steel
PTFE	PTFE (Tarflen)
MO58	MO58 (brass - CuZn40Pb2)

C	Process connection thread D
	specify type of thread

D	Body material
1.4571	1.4571/316Ti
1.4841	1.4841/314
MO58	MO58 (CuZn40Pb2)

Ordering Example

UZG-47-8-PTFE-G1/2-1.4571

stands for: Threaded connection fitting UZG-47, fixing pipe diameter ø8, ferrule made of PTFE(teflon), process connection thread G1/2", body material 1.4571/316Ti

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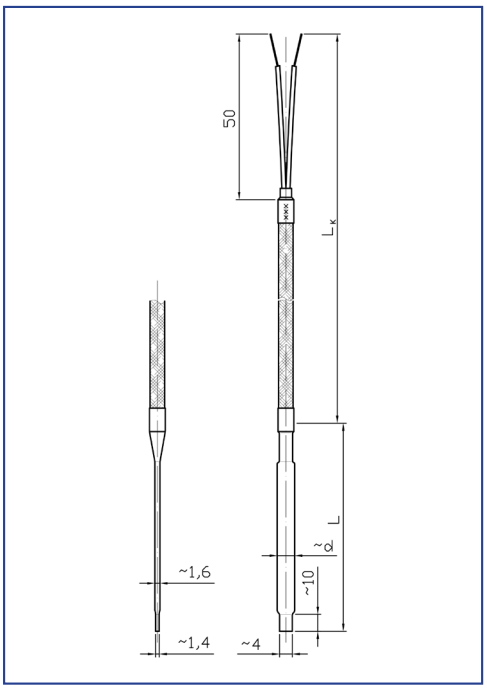
TOP-SPłKbm-48



Resistance Thermometer Pt100
Flat

Flat resistance thermometer with resistor Pt100 type TOP-SpPłKbm-48 has been designed for temperature measurement of electric motor windings, where only small chinks are available and for material stored in layers (e.g. paper).

Sensor is fixed on laminated box and sheathed by shrink cable.

Technical specification

RTD type	Version	Characteristic	Measuring range	Accuracy class	Max. sensor current	Lead wire config.
1xPt100	standard / shockproof	acc. EN-60751	-0°C..+100°C	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
				1/3B (AA)	2 mA	

Laminated box wideness d [mm]	Laminated box length L [mm]	Measuring length
10 mm	on request	10 mm
12 mm		

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-SPłKbm-48	A	B	C	D	E	F	G	H	I

A	Resistor
1xPt100	Single Pt100

B	Class
B	B
A	A
1/3B	1/3B (AA)

C	Box thickness
1,6	thickness =1,6 mm

D	Box wideness d
10	d = 10 mm
12	d = 12 mm

E	Box length L
	specify in mm

F	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)

G	Cable length L_K
	specify in mm

H	Operating temperature
	specify in °C

I	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-SPłKbm-48-1xPt100-A-1,6-10-20-3p-L4GGD-2000-50-Z

stands for: Flat resistor 1xPt100 class A, laminated box: thickness 1,6 mm, wideness d=10 mm, length L=20mm, configuration 3-wire, connection cable type L4GGD length Lk=2000 mm, operating temp. up to 50°C, standard sensor version (ceramic wire wound element).

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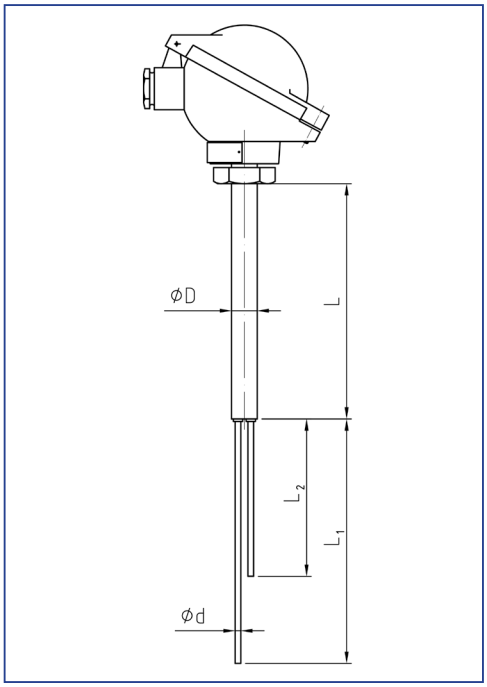
TER-nP-49



Straight Thermocouple (Type J, K) with connection head Multipoint

Straight multiple sheathed thermocouple type TER-nP-49 with connection head has been designed for high range temperature measurements -40°C to +1100°C.

The main area of application is temperature measurement of process fluids where high temperature variations are expected, short sensor time constant is required and there is need for temperature diagram for various points.

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Sheath diameter d [mm]	Sheath material	Characteristic
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+700°C	ø 3, ø 4.5, ø 6, ø 8	Inconel 600 / 2.4816	acc. EN 60584-1
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+1100°C			

Protect. tube diam. D [mm]	Material acc. DIN/AISI	Max operating temp.	Protect. tube length L [mm]	Sensor length L_n [mm]
ø10, ø20 , ø22	1.4841 / 314	+1100°C	on request	on request

Connection head	Max operating temp.	Transmitter
DAA, DANA, DANAW with silicon sealing	+150°C	on request

Junction
ungrounded
grounded

Non-standard models available.

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Ordering Information

TER	A	P-49	B	C	D	E	F	G	H	I	J	K

A	Amount of thermocouples n
	specify amount

B	Type of thermocouple
J	Fe-CuNi
K	NiCr-NiAl

C	Junction
O	ungrounded
Z	grounded

D	Protection tube diameter D
10	D= 10 mm
20	D= 20 mm
22	D= 22 mm

E	Protection tube length L
	specify in [mm]

F	Protection tube material
1.4841	1.4841 / 314

G	Sheath diameter d
3	d= 3 mm
4,5	d= 4,5 mm
6	d= 6 mm
8	d= 8 mm

H	Sensor lengths L_1/ L_2/.../ L_n
	specify in [mm]

I	Sheath material
2.4816	Inconel 600 / 2.4816

J	Connection head
	specify head type

K	Operating temperature
	specify in °C

Ordering Example

TER-2-P-49-1xK-O-22-500-1.4841-3-200/100-2.4816-DANAW-500

stands for: Double thermocouple straight 1xNiCr-NiAl, ungrounded, protection tube diameter ø22 mm, length L=500 mm, material 1.4841, sheathed thermocouples diameter ø3 mm, lengths L1=200 mm, L2=100 mm and material Inconel600 (2.4816), connection head type DANAW, operating temp. up to 500°C.

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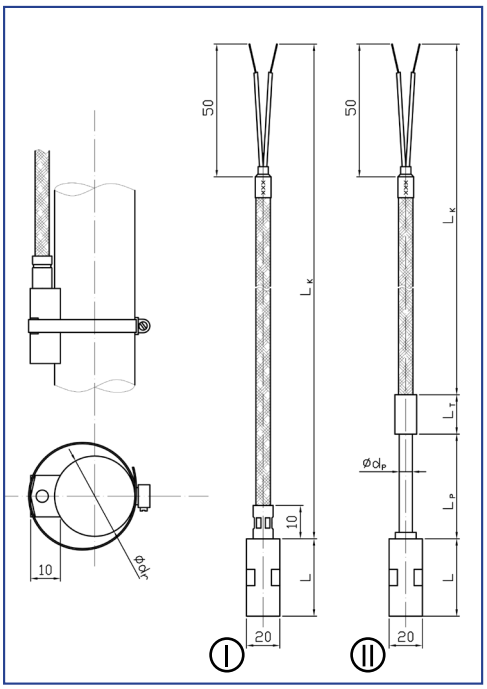
TOP-SpWKbm-50



Contact Resistance Thermometer Pt100 for pipeline

Contact resistance thermometer type TOP-SpWKbm-50 has been designed for temperature measurement of pipelines and other round elements in the range of -50°C to +400°C, using shock-proof resistor Pt100.

Thermometer is fixed to the pipeline using a metal band clip.

Type	Execution	Version
TOP-SpWKbm-50	Basic - acc to catalog card	(I) or (II)
TOP-SpWKbm-50/ExiM1	Intrinsic for mining purposes – acc to Atex	
TOP-SpWKbm-50/Exi	Intrinsic – acc to Atex	

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Sheath diameter d_p [mm]	Material acc. DIN/AISI	Sheath length L_p [mm]
ø5, ø6	1.4571/316Ti	on request

Pipeline diameter d_r [mm]	Contact ending material acc. DIN/AISI	Contact ending length L [mm]
on request	1.4571/316Ti	on request (min. 35 mm)
	MO59/CuZn39Pb2	

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-SpWKbm-50	A	B	C	D	E	F	G	H	I	J	K	L	M

A	Execution
I	Basic with cable
II	Basic sheathed with cable
I/ExiM1	Intrinsic safe for mining purposes - with cable
II/ExiM1	Intrinsic safe for mining purposes - sheathed with cable
I/Exi	Intrinsic safe with cable
II/Exi	Intrinsic safe sheathed with cable

B	Resistor
1xPt100	Single Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Contact ending length L
	specify in mm (min. 35 mm)

E	Contact ending material
1.4571	1.4571/316Ti
MO59	MO59/CuZn39Pb2

F	Sheath diameter d_p
5	d_p= 5 mm
6	d_p= 6 mm

G	Sheath material
1.4571	1.4571 / 316Ti

H	Sheath length L_p
	specify in mm

I	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TTFD-4x0,22mm2)

J	Cable length L_K
	specify in mm

K	Pipeline diameter d_r
	specify in mm

L	Operating temperature
	specify in °C

M	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-SpWKbm-50-II-1xPt100-A-40-MO59-6-1.4571-60-3p-L4GGD-2000-50-100-Z

stands for: Contact resistance thermometer sheathed with cable, with resistor 1xPt100 class A, ending length L=40mm, ending material MO59, sheath diameter dp=6mm, material 1.4571, sheath length Lp=60 mm, configuration 3-wire, cable type L4GGD, length Lk=2000 mm, pipeline diameter dr=50mm, operating temp. up to +100°C, standard sensor version

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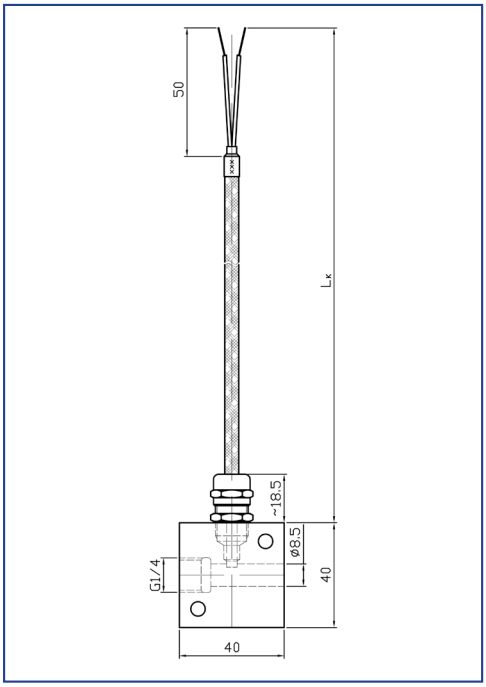
TOP-SpWKbm-50-S



Resistance Thermometer Pt100 with radiator (shockproof)

Resistance thermometer type TOP-SpWKbm-50 has been designed for temperature measurement in the range of -50°C to +150°C, using shock-proof resistor Pt100.

The thermometer is commonly used in tire industry.

Technical specification

RTD type	Version	Characteristic	Measuring range	Accuracy class	Max. sensor current	Lead wire config.
1xPt100	shockproof	acc. EN-60751	-50°C..+150°C	B	8 mA	3 wire

Radiator dimensions [mm]	Material acc. DIN/AISI	Connection thread
40 x 40 x 20	1.4301/304	G1/4"

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
3 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C

Non-standard models available.

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Ordering Information

TOP-SpWKbm-50-S	A	B	C	D	E	F	G	H

A Resistor	
1xPt100	Single Pt100

B Class	
B	B

C Radiator material	
1.4301	1.4301 / 304

D Connection thread	
G1/4	G1/4"

E Lead wire configuration and cable type	
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)

F Cable length L_K	
	specify in mm

G Operating temperature	
	specify in °C

H Version	
W	Shockproof (thin-film element)

Ordering Example

TOP-SpWKbm-50-S-1xPt100-B-1.4301-G1/4-3p-L4TDS-2000-100-W

stands for: Resistance thermometer with radiator, with resistor 1xPt100 class B, radiator material 1.4301, thread G1/4'', configuration 3-wire, cable type L4TDS, length L_K=2000 mm, operating temp. up to +100°C, shockproof (sensor version (thin-film element)

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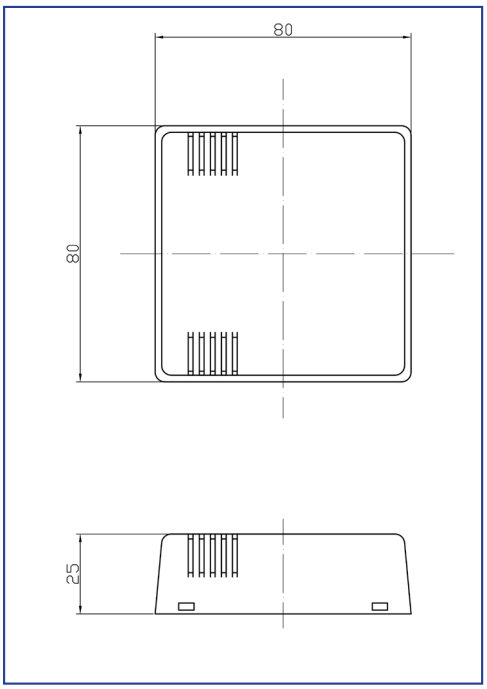
KTO-51



Ambient temperature sensor

Ambient temperature sensor type KTO-51 has been designed for temperature measurement indoors – especially in air conditioning systems (HVAC).

Esthetic plastic protection box, designed to be mounted through two screw bolts on wall or under plaster plug in socket Ø55 mm. RTD sensor can be of 2, 3 or 4 wire configuration.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 1xPt1000 1xNi100	standard / *shockproof	acc. EN-60751	-30°C..+70°C / *(-30°C..+70°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-30°C..+70°C / *(0°C..+70°C)	1/3B (AA)	3 mA	

Protection box dimensions [mm]	Material	Temp. range	Ingress Protection
80 x 80 x 25	Polymer ABS	-30°C..+70°C	IP 40

Dynamic reaction time (in air)	
Time constant	Time
$T_{0,63}$ (0 m/s)	40 s
$T_{0,63}$ (2 m/s)	10 s

Non-standard models available.

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Ordering Information

KTO- 51	A	B	C	D	E	F	G

A	Resistor
1xPt100	Single Pt100
1xPt1000	Single Pt1000
1xNi100	Single Ni100

B	Class
B	B
A	A
1/3B	1/3B (AA)

C	Lead wire configuration
2p	2 wire
3p	3 wire
4p	4 wire

D	Protection box material
ABS	Polymer ABS

E	Operating temperature
	specify in °C

F	Transmitter
	specify type and temp. range in °C

G	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

KTO-51-1xPt100-A-3p-ABS-75-Z

stands for: Ambient temperature sensor, with resistor 1xPt100 class A, 3-wire configuration, protection box material polymer ABS, max operating temperature 75°C, w/o transmitter, standard sensor version (ceramic wire wound element).

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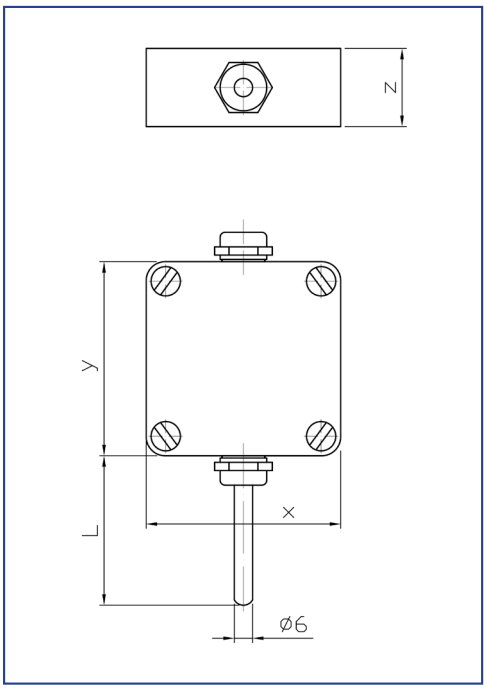
KTO-52



Ambient temperature sensor with protection tube

Ambient temperature sensor type KTO-52 has been designed for temperature measurement indoors and outdoors – particularly in air conditioned systems.

Good looking plastic protection box, with terminal block inside, is adjusted for wall installation using two screws bolts distances 46 x 34 mm. Thermometer resistor can be of 2, 3, or 4 wire configuration. A wide range of transmitters can be installed inside the protection box.

Type	Execution
KTO-52	Basic - acc to catalog card
KTO-52/Exi	Intrinsic – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 1xPt1000 1xNi100	standard / *shockproof	acc. EN-60751	-30°C..+80°C / *(-30°C..+80°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-30°C..+80°C / *(0°C..+80°C)	1/3B (AA)	3 mA	

Protect. tube diameter [mm]	Material acc. DIN/AISI	Protect. tube length L [mm]
ø6	1.4571 / 316Ti	on request

Protection box dimensions x,y,z [mm]	Material	Temp. range	Ingress Protection	Transmitter
50 x 65 x 35	Polymer ABS	-30°C..+70°C	IP 54	on request (depends on ambient humidity)
60 x 65 x 35	Aluminum alloy	-30°C..+80°C		

Dynamic reaction time (in air)	
Time constant	**Time**
$T_{0,63}$ (0 m/s)	100 s
$T_{0,63}$ (2 m/s)	25 s

Non-standard models available.

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Ordering Information

KTO-52	A	B	C	D	E	F	G	H	I

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
1xPt1000	Single Pt1000
1xNi100	Single Ni100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2 wire
3p	3 wire
4p	4 wire

E	Protection tube length L
	specify in mm

F	Housing material
ABS	Polymer ABS
AL	Aluminum alloy

G	Operating temperature
	specify in °C

H	Transmitter
	specify type and temp. range in °C

I	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

KTO-52/Exi-1xPt100-A-3p-60-AL-75-Z

stands for: Ambient temperature sensor, intrinsic safe execution, with resistor 1xPt100 class A, configuration 3-wire, protection tube length L=60 mm, aluminum alloy housing, max. operating temp. 75°C, w/o transmitter, standard sensor version (ceramic wire wound element).

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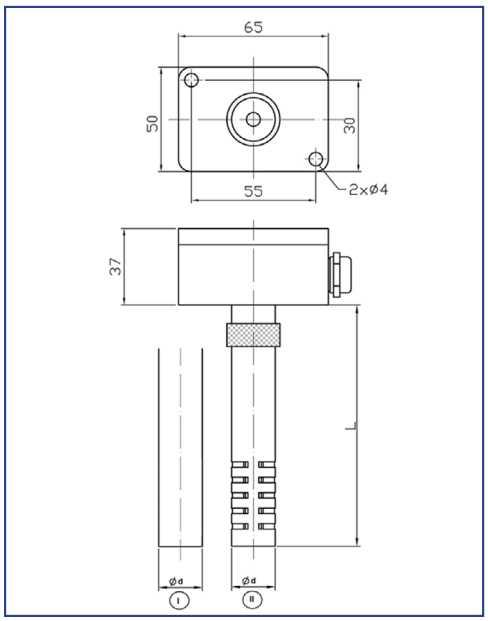
KTK-53



Duct temperature sensor with protection tube

Duct temperature sensor type KTK-53 has been designed for air temperature measurement in a ventilating ducts where plastic protection box need to be fixed.

A terminal block or transmitter can be installed inside the protection box. Resistance thermometer is placed in openwork pipeline part, results of it can be checked using line in 2, 3, or 4 wire configuration.

Type	Execution	Version
KTK-53	Basic - acc to catalog card	(I) or (II)
KTK-53/Exi	Intrinsic – acc to Atex	

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 1xPt1000 1xNi100	standard / *shockproof	acc. EN-60751	-30°C..+80°C / *(-30°C..+80°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-30°C..+80°C / *(0°C..+80°C)	1/3B (AA)	3 mA	

Type	Protect. tube diameter d [mm]	Protect. tube length L [mm]
Standard (I)	Ø4, Ø6, Ø8	on request
Perforated (II)	Ø8, Ø10	

Protection box dimensions x,y,z [mm]	Material	Temp. range	Ingress Protection	Transmitter
65 x 50 x 37	Polymer ABS	-30°C..+70°C	IP 54	on request (depends on ambient humidity)
65 x 60 x 37	Aluminum alloy	-30°C..+80°C		

Dynamic reaction time (in air)	
Time constant	Time
$T_{0,63}$ (0 m/s)	100 s
$T_{0,63}$ (2 m/s)	25 s

Non-standard models available.

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Ordering Information

KTK-53	A	B	C	D	E	F	G	H	I	J	K

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
1xPt1000	Single Pt1000
1xNi100	Single Ni100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2 wire
3p	3 wire
4p	4 wire

E	Protection tube type
I	Standard
II	Perforated

F	Protection tube diameter d
	specify in mm

G	Protection tube length L
	specify in mm

H	Housing material
ABS	Polymer ABS
AL	Aluminum alloy

I	Operating temperature
	specify in °C

J	Transmitter
	specify type and temp. range in °C

K	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

KTK-53-1xPt100-A-3p-I-6-80-Al-25-Z

stands for: Duct temperature sensor with resistor 1xPt100 class A, configuration 3-wire, standard protection tube, diameter d=6mm, length L=80mm, aluminium alloy housing, operating temp. 25°C, w/o transmitter, standard sensor version (ceramic wire wound element).

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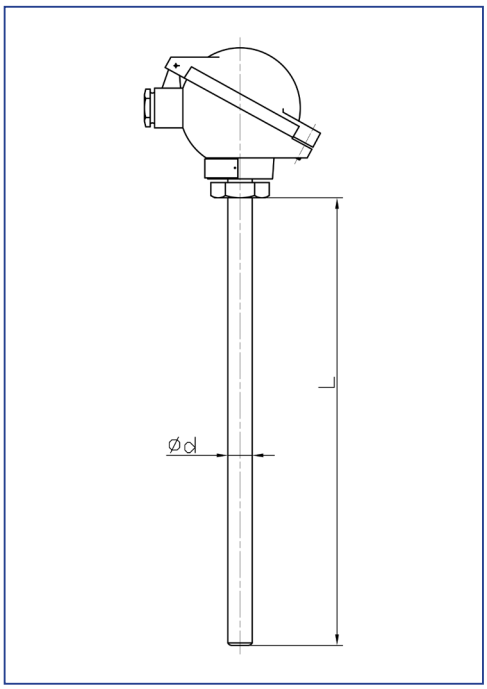
TER-PD-54



Straight Thermocouple (Type J, K, N) with sheathed thermo-element

Straight thermocouple type TER-PD-54 is aimed for temperature measurement of gases and liquids in range -40°C to +1000°C. Thanks to sheathed sensor, thermocouple may be bended and is highly mechanically and chemically resistant.

Type	Execution
TER-PD-54	Basic - acc to catalog card
TER-PD-54/ExiM1	Intrinsic for mining purposes – acc to Atex
TER-PD-54/Exi	Intrinsic – acc to Atex
TER-PD-54/Exe	Increased safety – acc to Atex

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+800°C	acc. EN 60584-1
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+1000°C	
1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	0°C..+1100°C (- 270°C..+1300°C)*	

Junction
ungrounded
grounded

*short term

Sheathed thermo-element diameter d [mm]	Material acc. DIN/AISI	Sensor length L [mm]
ø3, ø4.5, ø6	2.4816 / Inconel 600	on request

Connection head	Transmitter	Threaded compression fitting type UZG-47
on request (e.g. NA, DANA, DANAW)	on request	on request, acc. to catalog card – ***UZG-47***

Non-standard models available.

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Ordering Information

TER-PD -54	A	B	C	D	E	F	G	H	I

A	Execution
-	Basic
/ExiM1	Intrinsic safe for mining purposes
/Exi	Intrinsic safe
/Exe	Increased safety

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg

C	Junction
O	ungrounded
Z	grounded

D	Sheathed thermo-element diameter d
3	d= 3 mm
4,5	d= 4,5 mm
6	d= 6 mm

E	Sensor length L
	specify in [mm]

F	Sheathed thermo-element material
2.4816	2.4816 / Inconel 600
	specify other material

G	Connection head
	specify head type

H	Operating temperature
	specify in °C

I	Transmitter
	specify type and temp. range in °C

Ordering Example

TER-PD-54-2xK-O-3-200-2.4816-NA-400

stands for: Straight thermocouple, basic execution, with sheathed thermo-element 2xNiCr-NiAl, ungrounded, sheath diameter ø3 mm, length L=200 mm, sheath material 2.4816, connection head NA, operating temp. 400°C, w/o transmitter.

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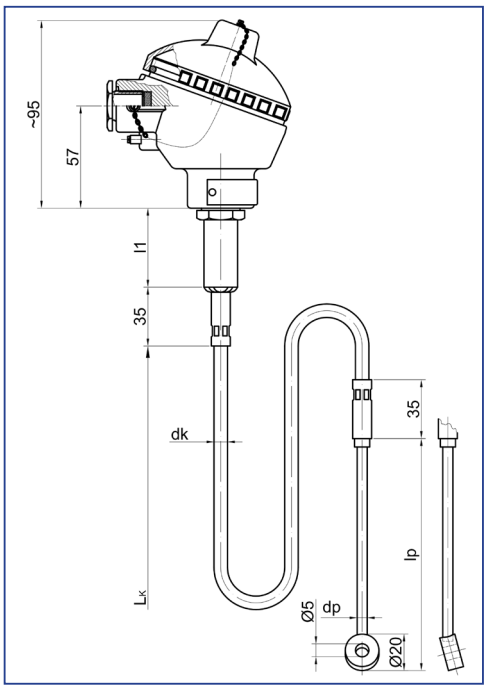
TER-PD-54-skin



Skin Thermocouple (Type J, K, N) with sheathed thermo-element

Sheathed thermocouple with extension cable and connection head aimed for reactor and vessel skin temperature measurement. The head is foreseen for surface installation at the platform.

Type	Execution	Version
TER-PD-54-skin	Basic - acc to catalog card	(I) or (II)
TER-PD-54-skin/Exi	Intrinsic – acc to Atex	
TER-PD-54-skin/Exe	Increased safety – acc to Atex	

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+800°C	acc. EN 60584-1
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+1000°C	
1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	0°C..+1100°C (- 270°C..+1300°C)*	

Junction
ungrounded
grounded

*short term

Sheathed thermo-element diameter d_p [mm]	Material acc. DIN/AISI	Length l_p [mm]
ø3, ø4.5, ø6	2.4816 / Inconel 600	on request

Connection head	Transmitter
on request (e.g. NA, DANA, DANAW)	on request

Non-standard models available.

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Ordering Information

TER-PD -54-skin	A	B	C	D	E	F	G	H	I

A	Execution
I	Armored extension wires
II	Non-armored extension wires
I/Exi	Intrinsic - armored ext. wires
II/Exi	Intrinsic - non-armored ext. wires
I/Exe	Increased safety - armored ext. wires
II/Exe	Increased safety - non-armored ext. wires

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg

C	Junction
O	ungrounded
Z	grounded

D	Sheathed thermo-element length l_p
	specify in [mm]

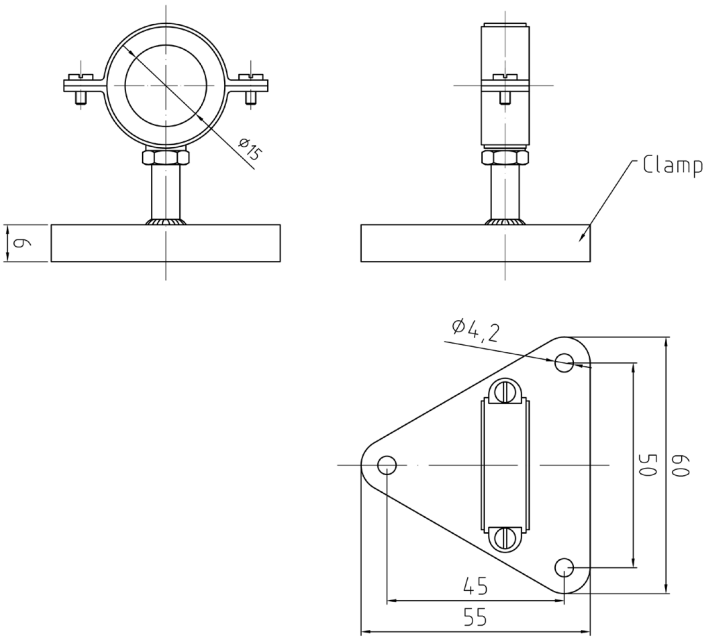
E	Sheathed thermo-element diameter d_p
3	d= 3 mm
4,5	d= 4,5 mm
6	d= 6 mm

F	Extension wires length L_K
	specify in mm

G	Connection head
	specify head type

H	Operating temperature
	specify in °C

I	Transmitter
	specify type and temp. range in °C



Ordering Example

TER-PD-54-skin-II-2xK-O-200-3-500-DANA-400

stands for: Skin thermocouple with non-armored extension wires, with thermo-element 2xNiCr-NiAl, ungrounded, sheath length l_p=200 mm, diameter d_p=ø3 mm, extension wire length L_K=500mm, connection head DANA, operating temp. up to 400°C, w/o transmitter.

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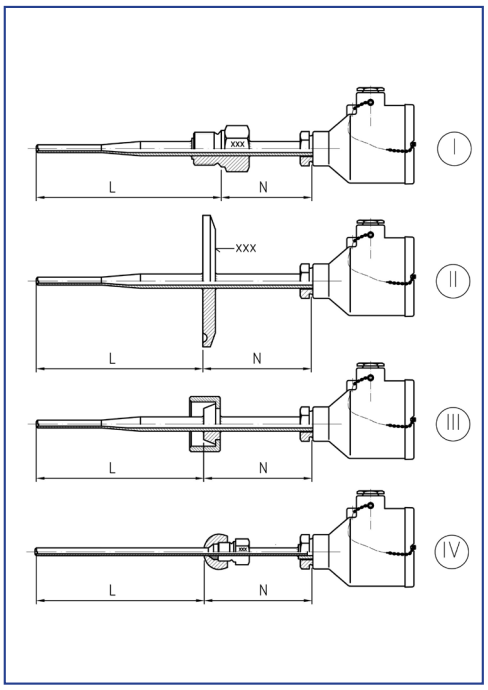
TOP-PF-55



Resistance Thermometer Pt100 with sanitary connection

Resistance thermometer with sanitary connection TOP-PF-55 meets international hygienic standards and has been designed for temperature measurement particularly in food, pharmaceutical and chemical industry.

Protection tube is made of food applicable stainless steel 1.4404 (316L). According to hygienic requirements, it assures measuring surface roughness optionally Ra<0,8 mm or Ra<0,4 mm.

Type	Execution	Version
TOP-PF-55	Basic - acc to catalog card	I
TOP-PF-55/Exi	Intrinsic – acc to Atex	II
		III
TOP-PF-55/Exe	Increased safety – acc to Atex	IV

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protection tube type	Process connection fitting G ½"	Process connection fitting½" NPT	Triclamp	Disc with nut
Necked tube ø10 to ø6	L ≥ 70mm	L ≥ 55mm	L ≥ 55mm	L ≥ 55mm
Immersion ø6 / extension ø10	L < 70mm	L < 55mm	L < 55mm	L < 55mm
Tube with sphere ø25 with pipe ø6	L from 25 ÷ 500 [mm]			

Process connection fitting	Triclamp	Disc acc. DIN 11851	Sphere
G ½ ", ½ NPT	½ ",¾ ", 1", 1 ½ ", 2 ", 3 ", 4 "	for pipes DN10, DN25, DN32, DN40, DN50	ø25 with PEEK or 1.4571 ferrule

Non-standard models available.

Stainless steel connection head	Transmitter
on request (e.g. BEG, BAEG)	on request

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Ordering Information

TOP-PF-55	A	B	C	D	E	F	G	H	I	J	K	L	M

A	Execution
I	With process connection fitting
II	With clamp acc. ISO 2852 / DIN 32676 (Tri-clamp)
III	With disc and nut acc. DIN 11851
IV	With adjustable sphere clamp (Sphere)

B	ATEX Execution
-	Basic
/Exi	Intrinsic safe
/Exe	Increased safety

C	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

D	Class
B	B
A	A
1/3B	1/3B (AA)

E	Lead wire configuration
2p	2 wire
3p	3 wire
4p	4 wire

F	Type of protection tube
Z	Necked tube ø10 to ø6
R	Immersion ø6 / extension ø10
K	Tube with sphere ø25 with pipe ø6

G	Immersion length L
	specify in [mm]

H	Neck tube length N
	specify in [mm]

I	Type of connection
G½	process connection fitting G ½ "
½NPT	process connection fitting ½ NPT
TC½(¾)	triclamp ½" or ¾"
TC1(1½)	triclamp 1" or 1 ½"
TC2	triclamp 2"
TC2½	triclamp 2 ½"
TC3	triclamp 3"
TC4	triclamp 4"
SP2	sphere ø25 with PEEK ferrule
SP4	sphere ø25 with 1.4571 ferrule
DN10	disc DIN11851 for pipe DN10
DN25	disc DIN11851 for pipe DN25
DN32	disc DIN11851 for pipe DN32
DN40	disc DIN11851 for pipe DN40
DN50	disc DIN11851 for pipe DN50

J	Surface roughness
Ra0,8	Ra < 0,8µm
Ra0,4	Ra < 0,4µm

K	Connection head
	specify head type

L	Transmitter
	specify type and temp. range in °C

M	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PF-55-II-1xPt100-B-2p-Z-150-100-TC2-Ra0,8-BEG-Z

stands for: Resistance thermometer with sanitary connection, basic, single Pt100 class B, configuration 2-wire confiig., necked tube diam. 10/6 mm, immersion length L=150mm, neck length N=100mm, process connection Tri-clamp 2'', surface roughness Ra < 0,8µm, connection head type BEG, standard sensor version (ceramic wire wound element).

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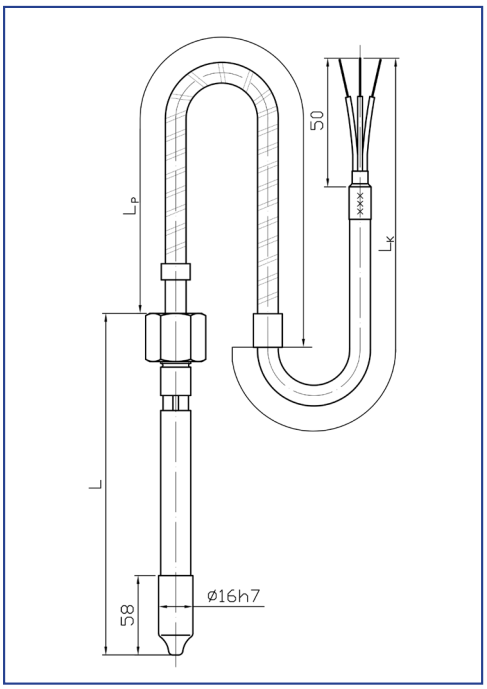
TER-PSp-57



Thermocouple with cable and metal armour

Special thermocouple type TER-PSp-57 has been designed for temperature measurement in rubber industry particularly in vulcanization process.

Ending of special shape assures appropriate measurement in the process. Metal armour (peschel) secures cable against any damages.

Cable connection point cannot excess +200°C.

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J)	-40°C..+300°C	acc. EN 60584-1	grounded

Protection tube diameter d [mm]	Material acc. DIN/AISI	Length L [mm]
ø16 h7	1.4571/316Ti	on request

Metal armour diameter d_p [mm]	Material acc. DIN/AISI	Length L_p [mm]
ø7	1.4571/316Ti	on request

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits	Length L_K [mm]
Single	2 wire (1-pair)	ø 3,7	L2TS-J-0,22mm2	teflon, silicone	+180°C	on request

Non-standard models available.

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Ordering Information

TER-PSp-57	A	B	C	D	E	F	G	H

A Type of thermocouple

1xJ	Single Fe-CuNi

B Protection tube diameter d

16	d= 16h7 mm

C Protection tube length L

	specify in mm

D Protection tube material

1.4571	1.4571/316Ti

E Metal armour length L_P

	specify in mm

F Compensation cable type

2p-L2TS-J	2 wire (L2TS-J-0,22)

G Cable length L_K

	specify in mm

H Operating temperature

	specify in °C

Ordering Example

TER-PSp-57-1xJ-16-310-5000-2p-L2TS-J-2500-200

stands for: Special thermocouple with thermo-element 1xFe-CuNi, protection tube diameter ø16h7 mm, length L=310mm, metal armour length Lp=5000mm, configuration 2-wire, cable type L2TS-J length, Lk=2500mm, operating temp. up to 200°C.

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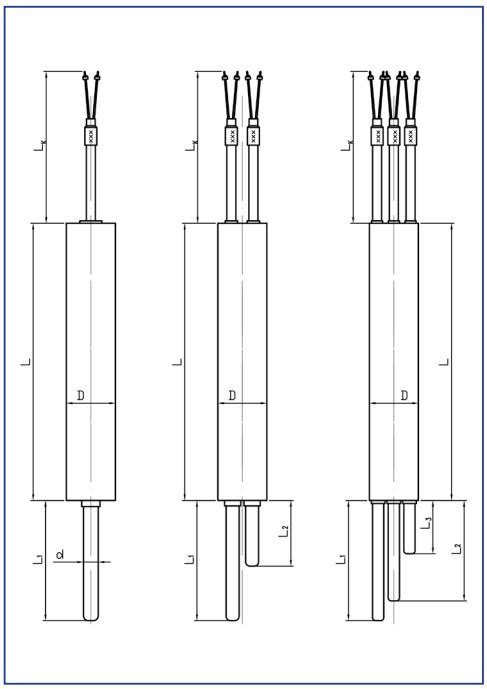
TP-nPKb-58



Straight Thermocouple (Type J, K) Multipoint with cable

Straight multiple sheathed thermocouple type TP-nPKb-58 with connection cable has been designed for precise, high range temperature measurements -40°C to +1000°C.

The main area of application is temperature measurement of process fluids where high temperature variations are expected and short sensor time constant is required at different immersion lengths.

Thermometer could be provided with clamp connection UZG-47.

Technical specification

Sheathed sensor insert	Version	Temp. range - Class 1	Sheath material	Characteristic
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	ø 3	-40°C..+500°C -40°C..+700°C	Inconel 600 / 2.4816	acc. EN 60584-1
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	ø 6	-40°C..+600°C -40°C..+800(+1000*)°C		

* Upper temperature depends on working conditions and protection tube material

Protect. tube diam. d	Material acc. DIN/AISI	Protect. tube length L [mm]	Sensor length L_n [mm]	Junction
ø20 , ø22	1.4841 / 314	on request	on request	ungrounded
	1.4762 / 446			grounded

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		
Double	4 wire (2-pair)	ø 4,0	L4GGD-J-0,22mm2		
		ø 3,6	L4GGD-K-0,22mm2		

Non-standard models available.

Threaded compression fitting type UZG-47
on request, acc. to catalog card – ***UZG-47***

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Ordering Information

TP	A	PKb-58	B	C	D	E	F	G	H	I	J	K

A	Amount of thermocouples n
	specify amount

B	Type of thermocouple
J	Fe-CuNi
K	NiCr-NiAl

C	Junction
O	ungrounded
Z	grounded

D	Protection tube diameter D
20	D= 20 mm
22	D= 22 mm

E	Protection tube length L
	specify in [mm]

F	Protection tube material
1.4841	1.4841 / 314
1.4762	1.4762 / 446

G	Sheath diameter d
3	d= 3 mm
6	d= 6 mm

H	Sensor lengths L_1/ L_2/.../ L_n
	specify in [mm]

I	Compensation cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)

J	Cable length L_K
	specify in mm

K	Operating temperature
	specify in °C

Ordering Example

TP-2-PKb-58-K-O-22-1.4841-100-300/150-3-2p-L2GGD-2000-150

stands for: Straight dual thermocouple NiCr-NiAl, junction ungrounded, tube ø22 mm and length L=100 mm, material 1.4841, sheathed sensors lengths of L1=300, L2=150 and diameter ø3 mm, configuration 2-wire, cable type L2GGD, cable length Lk=2000 mm, operating temperature up to 150°C.

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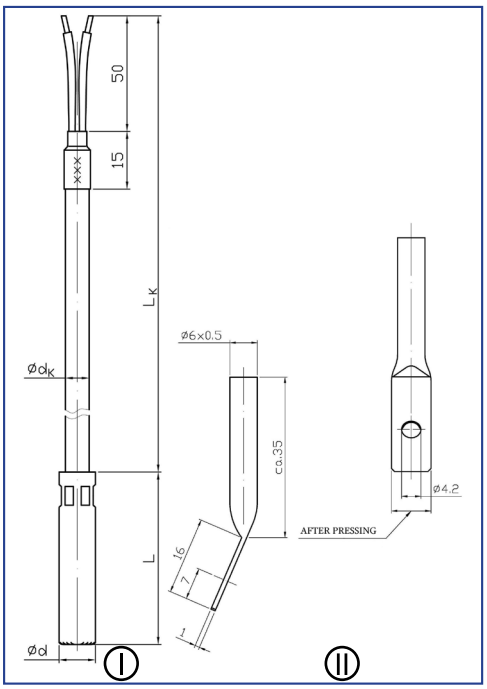
TOP-PKbm-59



Resistance Thermometer Pt100, Ni100 with connection cable

Resistance thermometer with cable type TOP-PKbm-59 has been designed for temperature monitoring of vibrating machine sub-assemblies, particularly bearings.

Made of alloy steel protection sleeve and special connecting cable allow temperature measurement up to +400°C (up to +180°C for Ni100) even in aggressive environment.

Type	Execution
TOP-PKbm-59	Basic (I)
	With special mounting (II)

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 2xPt100 1xNi100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Max operating temp.	Tip design	Length L [mm]
ø4, ø5, ø6	1.4571/316Ti	+400°C	basic	on request (minimum 25 mm)
			special	

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
2 wire	ø 4,2	L2TS-2x0,34mm2	teflon, silicone	+180°C
3, 4 wire	ø 4,3	L4TS-4x0,22mm2	teflon, silicone	+180°C
3, 4 wire	ø 2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C
2x 3 wire	ø 3,8	L6TT-6x0,22mm2	teflon, teflon	+260°C
2 wire	ø 4,3	L2SDS-2x0,25mm2	silicone, screen, silicone	+180°C
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-PKbm-59	A	B	C	D	E	F	G	H	I	J

A	Execution
I	Basic
II	With special mounting

B	Resistor
1xNi100	Single Ni100
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm

E	Protection tube length L
	specify in mm (min. 25 mm)

F	Protection tube material
1.4571	1.4571 / 316Ti

G	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
2p-L2TS	2 wire (L2TS-2x0,34mm2)
3p-L4TS	3 wire (L4TS-4x0,22mm2)
4p-L4TS	4 wire (L4TS-4x0,22mm2)
3p-L4TT	3 wire (L4TT-4x0,22mm2)
4p-L4TT	4 wire (L4TT-4x0,22mm2)
2x3p-L6TT	2x3 wire (L6TT-6x0,22mm2)
2p-L2SDS	2 wire (L2SDS-2x0,25mm2)
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKbm-59-I-1xPt100-A-6-40-1.4571-3p-L4TFDT-2000-150-Z

stands for: Resistance thermometer, basic execution, resistor 1xPt100 class A, protection tube diameter ø6 and length L=40mm, material 1.4571, 3-wire lead configuration, cable with PTFE insulation with metal braid, length 2000 mm, operating temperature up to 150°C, standard sensor version (ceramic wire wound element).

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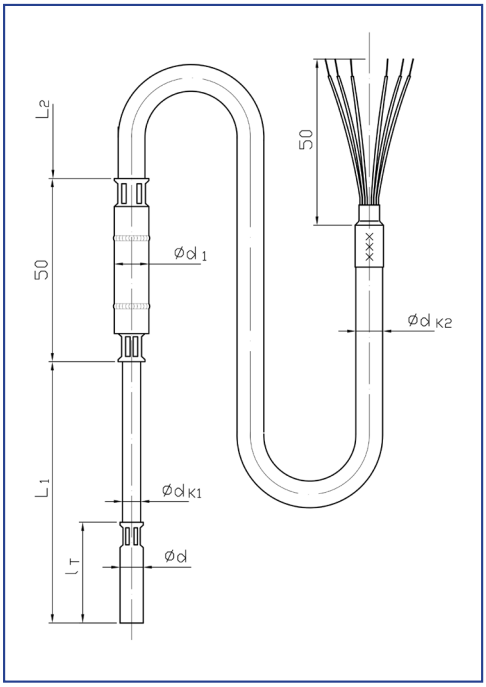
TOP-PKbm-60



Resistance Thermometer Pt100
Miniature
Oil-proof

Resistance thermometer with cable TOP-PKbm-60 has been designed for temperature measurement of vibrating assemblies such as bearings and in autoclaves. In the cable connection there is a barrier, which forbids oil or other fluid leakage via cable.

Stainless steel protection tube and appropriate cable allows precise measurement even in corrosive chemical fluid and temperature up to +260°C applications.

Type	Execution
TOP-PKbm-60	Basic - acc to catalog card
TOP-PKbm-60/ExiM1	Intrinsic for mining purposes – acc to Atex
TOP-PKbm-60/Exi	Intrinsic – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+250°C / *(-50°C..+250°C)	B	1 mA
				A	
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	

Protection tube diam. d	Cable between protection tube and barrier		Connection Cable		Insulation	Ground wire	Temp. limits
	Diameter d_{K1}	Type	Diameter d_{K2}	Type			
ø3,2 mm	ø2,6 mm	L6TFDT-6x0,04 mm2	ø4,2 mm	L6TFDT-6x0,14 mm2	teflon, film, screen, teflon	-	+200°C
ø4,0 mm	ø3,7 mm	L4TDT-4x0,22 mm2	ø3,7 mm	L4TDT-4x0,22 mm2	teflon, screen, teflon	L1T-1x0,5 mm2	+200°C

Protection tube diam. d	Protection tube length L_T	Length L_1	Cable length L_2
ø3,2 mm	11; 15; 18; 20; 50 mm	on request	on request
ø4,0 mm	15; 18; 20; 22 mm		

Non-standard models available.

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Ordering Information

TOP-PKbm-60	A	B	C	D	E	F	G	H	I	J	K

A	Execution
-	Basic
/ExiM1	Intrinsic safe for mining purposes
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Protection tube diameter d
3,2	d= 3,2 mm
4,0	d= 4,0 mm

E	Protection tube length L_T
	specify in mm

F	Protection tube material
	1.4571 / 316Ti

G	Lead wire configuration and cable type
1	cable L4TDT-4x0,22mm2 (2xPt100)
2	cable L4TDT-4x0,22mm2 (1xPt100)
3	cable L6TDT-4x0,04mm2 & L6TFDT-4x0,14mm2 (2xPt100)
4	cable L6TDT-4x0,04mm2 & L6Tf-DT-4x0,14mm2 (2xPt100) & ground wire

H	Length L_1
	specify in mm

I	Cable length L_2
	specify in mm

J	Operating temperature
	specify in °C

K	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKbm-60-2xPt100-A-3,2-20-1.4571-4-500-1000-150-W

stands for: Resistance thermometer, basic execution, RTD 2xPt100 class A, protection tube diam. ø3,2 mm, L_T=20 mm, material 1.4571, cable L6TDT-4x0,04mm2 & L6TfDT-4x0,14mm2 and ground wire, length L_1=500 mm and connection cable length L_2=1000 mm, operating temperature 150°C, shockproof (thin-film element).

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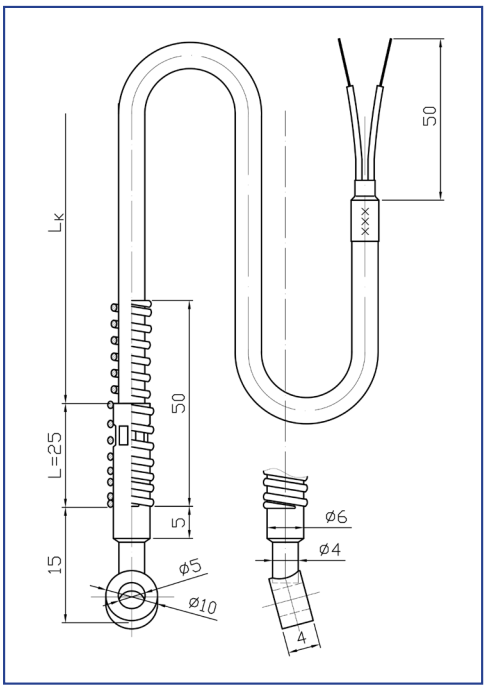
TER-PKbm-61



Special Thermocouple Miniature with connection cable

Thermocouple type TER-PKbm-61 has been designed for temperature measurement in instruments of rubber (tire) industry.

Ending (protection tube) of special ring shape, fixed, allows appropriate measurement.

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J)	-40°C..+300°C	acc. EN 60584-1	ungrounded
1xNiCr-NiAl (K)	-40°C..+400°C		grounded

Protection tube diameter d [mm]	Tube Material acc. DIN/AISI	Length L [mm]	Ring Diameter OD/ID	Ring Material acc. DIN/AISI
ø6	1.4571/316Ti	25 mm	ø10 / ø5	M59/CuZn39Pb2

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		

Non-standard models available.

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Ordering Information

TER-PKbm-61	A	B	C	D	E	F	G	H	I

A	Type of thermocouple
1xJ	Single Fe-CuNi
1xK	Single NiCr-NiAl

B	Protection tube diameter d
6	d= 6 mm

C	Protection tube material
1.4571	1.4571/316Ti

D	Protection tube length L
25	L= 25 mm

E	Ring diameter OD/ID
10/5	OD/ID=10/5 mm

F	Compensation cable type
2p-L2GGD-J	2 wire (L2GGD-J-0,22)
2p-L2GGD-K	2 wire (L2GGD-K-0,22)

G	Cable length L_K
	specify in mm

H	Junction
O	ungrounded
Z	grounded

I	Operating temperature
	specify in °C

Ordering Example

TER-PKbm-61-1xK-6-1.4571-25-10/5-2p-L2GGD-K-800-O-300

stands for: Thermocouple special miniature, with thermo-element 1xNiCr-NiAl, protection tube diameter ø6 mm, material 1.4571, length 25mm, ring diameter ø10/ø5, configuration 2-wire, cable type L2GGD-K, length Lk=800 mm, ungrounded, operating temp. up to 300°C.

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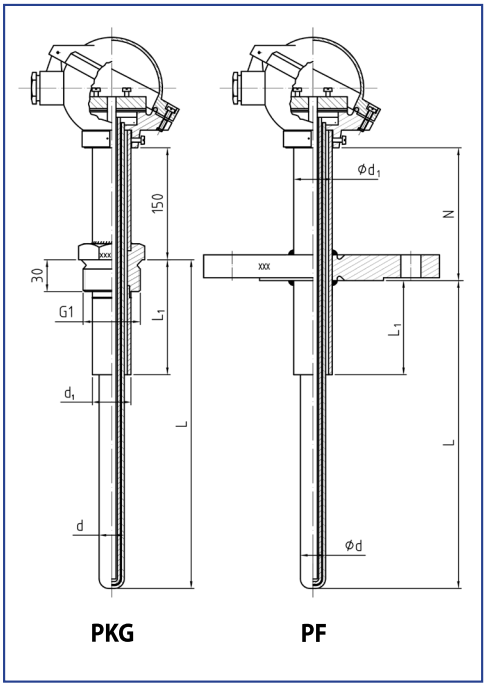
TER-PF/PKG-64



Straight Thermocouple with process connection fitting PtRh10-Pt(S), PtRh30-PtRh6(B)

Straight thermocouple with process connection fitting type TER-PF/PGK-64 has been designed for very high temperature measurement up to +1600°C in permanent work and +1800°C in short time work, particularly in blast furnaces, heating power stations and by thermal processes.

Depending on the requirements and operating conditions, thermocouple can be equipped with short protection tube or whole length protection tube, equipped with threaded or flanged connection, allowing thermocouple connection to the tag point.

Type	Execution	Version
TER-PF/PKG-64	Basic - acc to catalog card	PKG or PF
TER-PF/PKG-64/Exi	Intrinsic safe – acc to Atex	
TER-PF/PKG-64/Exe	Increased safety – acc to Atex	

Technical specification

Sheathed sensor insert	Temp. range - Class 1 Permanent work	Temp. range - Class 1 Short time work	Characteristic	Junction
PtRh10-Pt (S)	-40°C..+1300°C	-40°C..+1600°C	acc. EN 60584-1	ungrounded
PtRh30-PtRh6 (B)	400°C..+1600°C	400°C..+1800°C		

Protection tube diameter d_1 [mm]	Material acc. DIN/AISI
ø22, ø30, ø33.7	1.4841/314
	1.4404/316L
	1.4762/446
ø19.1, ø22	Kanthal AF

Ceramic tube diameter d [mm]	Material acc. DIN/AISI	Max. operating temp.
depends on protection tube diameter d_1	Ker 799 (gas leakage proof)	+1700°C

Connection head	Transmitter
on request (e.g. DAA, DANA, DANAW)	on request

Flanged process connection fitting
on request (e.g. DN25 PN40 B1 acc. EN 1092-1, 2"150 RF acc. ASME B16,5)

Threaded process connection fitting
on request (e.g. M27x2, G1", G1 1/4", 1"NPT,)

Non-standard models available.

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Ordering Information

TER	A	64	B	C	D	E	F	G	H	I	J	K	L	M

A	Type of process connection
PKG	Threaded process connection
PF	Flanged process connection

B	Execution
PS	Basic
PS/Exi	Intrinsic safe
PS/Exe	Increased safety

C	Type of thermocouple
1xS	Single PtRh-Pt10
2xS	Double PtRh-Pt10
1xB	Single PtRh30-PtRh6
2xB	Double PtRh30-PtRh6

D	Steel protection tube diameter d_1
19,1	d_1= 19,1 mm
22	d_1= 22 mm
30	d_1= 30 mm
33,7	d_1= 33,7 mm

E	Steel protection tube material
1.4841	1.4841/314
1.4404	1.4404/316L
1.4762	1.4762/446
Kanthal AF	Kanthal AF

F	Steel protection tube length L_1
	specify in mm

G	Immersion length L
	specify in mm

H	Process connection fitting (flanged or threaded)
	specify type

I	Ceramic protection tube material
Ker799	Ker 799

J	Type of ceramic protection tube
I	Single
II	Double

K	Connection head
	specify head type

L	Operating temperature
	specify in °C

M	Transmitter
	specify type and temp. range in °C

Ordering Example

TER-PF-64-PS-1xB-30-1.4841-350-750-DN25PN40B1-799-I-DAA-1200

stands for: Straight basic thermocouple with short metal protection tube and flange, thermo-element 1x PtRh30-PtRh6, protection tube diameter ø30 mm, material 1.4841, length L1=350 mm, immersion length L=750 mm, flange DN25 PN40 form B1, ceramic tube type Ker 799, single tube, connection head type DAA, operating temp. up to 1200°C, without transmitter.

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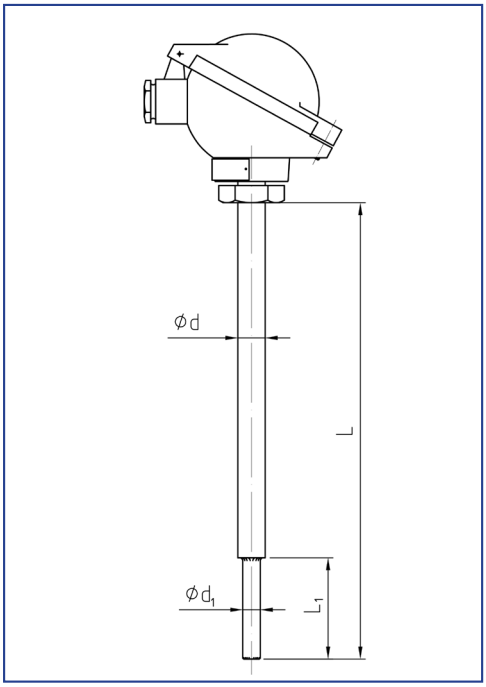
TOP-PD-71



Resistance Thermometer Pt100 Stepped

Resistance thermometer type TOP-PD-71, with fast time of response, has been designed for temperature measurement of instruments, gases and liquids in several processes. Diameter reduction assures shorter response time.

Thermometer could be provided with clamp connection UZG-47.

Type	Execution
TOP-PD-71	Basic - acc to catalog card
TOP-PD-71/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TOP-PD-71/Exi	Intrinsic safe – acc to Atex
TOP-PD-71/Exe	Increased safety – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protection tube diameter d [mm]	Stepped tip diameter d_1 [mm]	Length L	Length L	Material acc. DIN/AISI
ø 6, ø 8	ø 4	on request	on request	1.4571 / 316Ti

Connection head	Transmitter
on request (e.g. NA, DAN, DANAW)	on request

Threaded compression fitting type UZG-47
on request, acc. to catalog card – ***UZG-47***

Non-standard models available.

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Ordering Information

TOP-PD-71	A	B	C	D	E	F	G	H	I	J	K	L	M

A	Execution
U	with non-replaceable insert
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2-wire
3p	3-wire
4p	4-wire

E	Protection tube diameter d
6	d= 6 mm
8	d= 8 mm

F	Stepped tip diameter d_1
4	d_1= 4 mm

G	Protection tube length L
	specify in [mm]

H	Stepped tip length L_1
	specify in [mm]

I	Protection tube material
1.4571	1.4571 / 316Ti
	specify other material

J	Connection head
	specify head type

K	Operating temperature
	specify in °C

L	Transmitter
	specify type and temp. range in °C

M	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PD-71-U-1xPt100-B-2p-6-4-250-40-1.4571-NA-400-Z

stands for: Resistance thermometer with non-replaceable insert, with single resistor Pt100, class B, configuration 2-wire, protection tube diameter d=ø6 mm, d1=ø4mm length L=250 mm, L1=40 mm, material 1.4571, connection head NA, operating temp. up to 400°C, w/o transmitter, standard sensor version (ceramic wire wound element).

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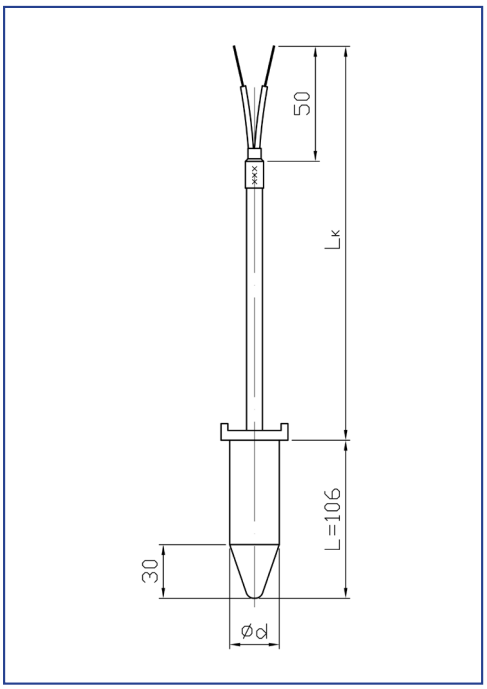
TER-PKbm-75



Special Thermocouple with connection cable

Thermocouple type TER-PKbm-75 has been designed for temperature measurement in instruments of rubber (tire) industry.

Ending (protection tube) of special ring shape, fixed, allows appropriate measurement.

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J)	0°C..+150°C	acc. EN 60584-1	grounded

Protection tube diameter d [mm]	Material acc. DIN/AISI	Length L [mm]	Diameter of thermocouple
ø 19 h9	1.4571/316Ti	106 mm	ø 0,8 mm

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C

Non-standard models available.

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Ordering Information

TER-PKbm-75	A	B	C	D	E	F	G	H

A	Type of thermocouple	
1xJ	Single Fe-CuNi	

B	Junction	
Z	grounded	

C	Protection tube diameter d	
19	d= 19 h9 mm	

D	Protection tube material	
1.4571	1.4571/316Ti	

E	Protection tube length L	
106	L= 106 mm	

F	Compensation cable type	
2p-L2GGD-J	2 wire (L2GGD-J-0,22)	

G	Cable length L_K	
	specify in mm	

H	Operating temperature	
	specify in °C	

Ordering Example

TER-PKbm-75-1xJ-Z-19-1.4571-106-2p-L2GGD-J-800-100

stands for: Thermocouple with connection cable , with thermo-element 1xFe-CuNi, grounded, protection tube diameter ø19 h9, material 1.4571, length 106mm, configuration 2-wire, cable type L2GGD-J, length Lk=800 mm, operating temp. up to 100°C.

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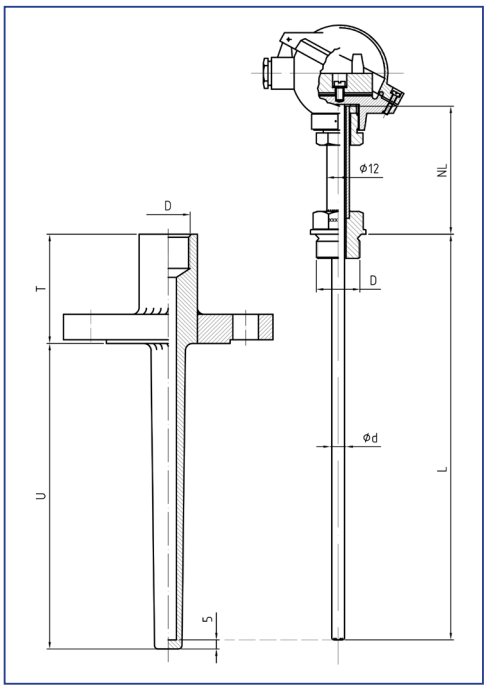
TER-PKG-78



Straight Thermocouple (Type J, K, N) with process connection fitting and additional thermowell

Thermocouple type TER-PKG-78 is used for temperature measurement of process gases and liquids in cases with high pressure, temperature fluctuation and harmful medium appears.

Thermocouple consists of replaceable sensor insert type WP-OP-02-PS with 1 or 2 converters in head connection. Flanged, welded and screwed thermowell models are available.

Type	Execution
TER-PKG-78	Basic - acc to catalog card
TER-PKG-78/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TER-PKG-78/Exi	Intrinsic safe – acc to Atex
TER-PKG-78/Exe	Increased safety – acc to Atex

Technical specification

Sheathed sensor insert	Version	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 3 ø 4,5	-40°C..+500°C -40°C..+700°C 0°C..+1100°C (- 270°C..+1300°C**)	acc. EN 60584-1	ungrounded
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 6 ø 8	-40°C..+600°C -40°C..+800 (+1000*)°C 0°C..+1100°C (- 270°C..+1300°C**)		grounded

* upper temp. depends on measuring conditions and temp. changes; **short term

Extension tube diam. d	Material acc. DIN/AISI	Max operating temp.	Process connection thread D
ø12	1.4571 / 316Ti	+700°C	on request (e.g. M20x1,5, M24x1,5, G1/2", G3/4", 1/2"NPT, 3/4"NPT)

Additional thermowell	Connection head	Transmitter
on request, acc. to catalog card – *THERMOWELLS for thermometers and thermocouples*	on request (e.g. NA, DANA, DANAW)	on request

Non-standard models available.

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Ordering Information

TER-PKG-78	A	B	C	D	E	F	G	H	I	J	K

A Execution

PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B Type of thermocouple

1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg

C Sheathed insert diameter d

3	d= 3 mm
4,5	d= 4,5 mm
6	d= 6 mm
8	d= 8 mm

D Process connection thread D

	specify type of thread

E Length L

	specify in [mm]

F Neck tube length NL

	specify in [mm]

G Connection head

	specify head type

H Junction

O	ungrounded
Z	grounded

I Operating temperature

	specify in °C

J Transmitter

	specify type and temp. range in °C

K Additional thermowell

	on request, acc. to catalog card – ***THERMOWELLS***

Ordering Example

TER-PKG-78-PS/Exi-1xK-6-M20x1,5-250-145-NA-O-600

stands for: Thermocouple, intrinsic safe with replaceable insert, 1x NiCr-NiAl sensor, diameter ø6, process connection M20x1,5, length L=250 mm, neck tube length NL=145 mm, connection head type NA, ungrounded, operating temp. up to 600°C. w/o transmitter, w/o additional thermowell

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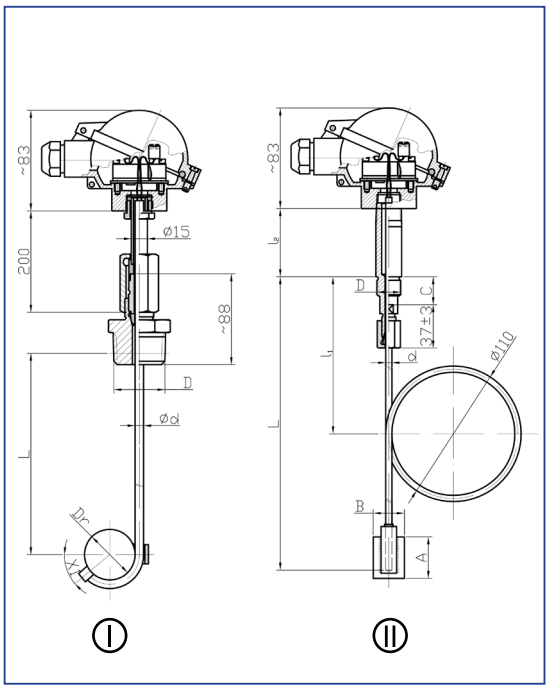
TER-PKG-78-skin



Thermocouple (Type K, N) for temperature measurement of pipes in industrial furnaces

Thermocouple TER-PKG-78-skin has been designed for temperature measurement of pipes in industrial furnace both for convectional and radiation zones.

Thermocouple is manufactured of appropriate expansion loops, essential because of high temperature difference before assembly and during operational time. Thermocouples with sheath from 1,6mm are used.

We offer execution with transmitter in head or only with terminal block, intrinsic safe or for zone without explosion danger.

Type	Execution	Version
TER-PKG-78-skin	Basic - acc to catalog card	I or II
TER-PKG-78-skin/Exi	Intrinsic safe – acc to Atex	
TER-PKG-78-skin/Exe	Increased safety – acc to Atex	

Technical specification

Sheathed sensor insert	Version	Temp. range - Class 1	Characteristic	Junction
1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 6 ø 8	-40°C..+800 (+1100*)°C 0°C..+1100°C (- 270°C..+1300°C*)	acc. EN 60584-1	ungrounded grounded

*short term work

Sheath insert type	Sheath material	Diameter d [mm]	Length L [mm]
WP-TE-02-PS	Inconel 600; 1.4845; 1.4841; 1.4749	Ø6, Ø8	on request

Connection head	Transmitter	Process connection thread D
on request (e.g. NA, DANA, DANAW, XE-DANA)	on request	on request (e.g. M27x12, G1", G1 1/2"", 1"NPT, 1,5"NPT)

Non-standard models available.
Sensor is always designed for furnace construction and special requirements its manufacturer or purchaser. Assembly according to the attached instruction.

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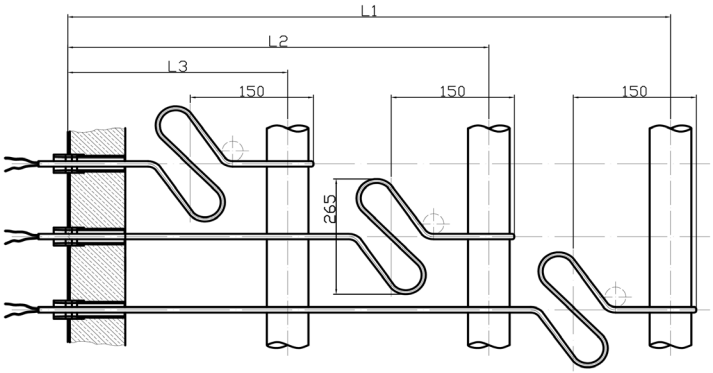
Assembling (version I)



Ordering Information

TER-PKG-78-skin	A	B	C	D	E	F	G	H	I	J	K

A Execution

I	With expansion loop "S"
II	With spiral expansion loop
I/Exi	With loop "S" ; intrinsic safe
II/Exi	With spiral loop ; intrinsic safe
I/Exe	With loop "S" ; increased safety
II/Exe	With spiral loop ; increased safety

B Type of thermocouple

1xK	Single NiCr-NiAl
1xN	Single NiCrSi-NiSiMg

C Sheathed insert diameter d

6	d= 6 mm
8	d= 8 mm

D Sheath material

	specify material

E Process connection thread D

	specify type of thread

F Length L

	specify in [mm]

G Connection head

	specify head type

H Junction

O	ungrounded
Z	grounded

I Operating temperature

	specify in °C

J Transmitter

	specify type and temp. range in °C

K Pipe line: outer diameter and material

	specify diameter and material

Ordering Example

TER-PKG-78-skin-I/Exe-1xK-8-1.4845-1.5"NPT-1000-XE-DANA-1000-248H (0...1000)-50

stands for: Thermocouple with loop "S" in increased safety, with thermo-element 1x NiCr-NiAl, diameter ø8 mm, sheath material 1.4845, thread of process fitting 1-1/2"NPT, insert length L=1000 mm, head XE-DANA; designed for operating up to +1000°C, with transmitter Emerson type 248H range 0 to + 1000°C, pipeline diameter 50mm,

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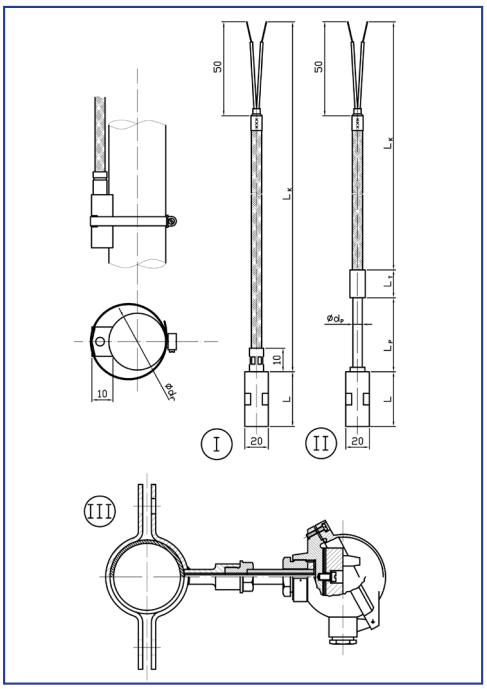
TER-SpKbm-84



Contact Thermocouple Fe-CuNi(J), NiCr-Ni(K) for pipelines

Contact thermocouple type TOP-SpKbm-84 is for temperature measurement of pipelines's walls and other cylinders in the temp. range -40°C to +400°C, using thermo-element Fe-CuNi(J), NiCr-Ni(K).

Thermocouple is mounted on the pipeline using metal band.

Type	Execution	Version
TER-SpKbm-84	Basic - acc to catalog card	(I) or (II) or (III)
TER-SpKbm-84/ExiM1	Intrinsic safe for mining purposes – acc to Atex	
TER-SpKbm-84/Exi	Intrinsic safe – acc to Atex	

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+300°C	acc. EN 60584-1
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+400°C	

Sheath diameter d_p [mm]	Material acc. DIN/AISI	Sheath length L_p [mm]
ø3, ø4.5, ø5, ø6	2.4816/Inconel 600	on request
	1.4571/316Ti	

Pipeline diameter d_r [mm]	Contact ending material acc. DIN/AISI	Contact ending length L [mm]
on request	1.4571/316Ti	on request (min. 35 mm)
	MO59/CuZn39Pb2	

Connection head (valid only for Model III)	Transmitter
on request (e.g. NA, DANA, XE-DANA)	on request

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		
		ø 3,0	L2TDT-J-0,22mm2	teflon, screen, teflon	+260°C
		ø 4,2	L2TDT-K-0,22mm2		

Non-standard models available.

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Ordering Information

TER-SpKbm-84	A	B	C	D	E	F	G	H	I	J	K	L	M

A	Execution
I	Basic with cable
II	Basic sheathed with cable
III	Basic with distance tube and head
I/ExiM1	Intrinsic safe for mining purposes - with cable
II/ExiM1	Intrinsic safe for mining purposes - sheathed with cable
III/ExiM1	Intrinsic safe for mining purposes - with distance tube and head
I/Exi	Intrinsic safe with cable
II/Exi	Intrinsic safe sheathed with cable
III/Exi	Intrinsic safe with distance tube and head

B	Type of thermocouple
1xJ	Single Fe-CuNi
1xK	Single NiCr-NiAl

C	Contact ending length L
	specify in mm (min. 35 mm)

D	Contact ending material
1.4571	1.4571/316Ti
MO59	MO59/CuZn39Pb2

E	Sheath diameter d_p
4,5	d_p = 4,5 mm
6	d_p = 6 mm

F	Sheath material
Inconel600	2.4816/Inconel 600
1.4571	1.4571/316Ti

G	Sheath length L_p
	specify in mm

H	Compensation cable type
2p-L2GGD-J	2 wire (L2GGD-J-0,22)
2p-L2TDT-J	2 wire (L2TDT-J-0,22)
2p-L2GGD-K	2 wire (L2GGD-K-0,22)
2p-L2TDT-K	2 wire (L2TDT-K-0,22)

I	Cable length L_K
	specify in mm

J	Pipeline diameter d_r
	specify in mm

K	Operating temperature
	specify in °C

L	Connection head (valid only for Model III)
	specify head type

M	Transmitter (valid only for Model III)
	specify type and temp. range in °C

Ordering Example

TER-SpKbm-84-I/Exi-1xK-60-MO59-4,5-Inconel600-250-2p-L2GGD-K-2000-50-180

stands for: Contact thermocouple, intrinsic safe, with connection cable, with thermo-element NiCr-NiAl, ending length L=60 mm, contact ending material MO59, sheath diam ø4,5 and material Inconel 600, Sheath length L_R=250 mm, configuration 2-wire, cable type L2GGD-K, length Lk=2000 mm, pipeline diameter 50mm, operating temp. up to +180°C.

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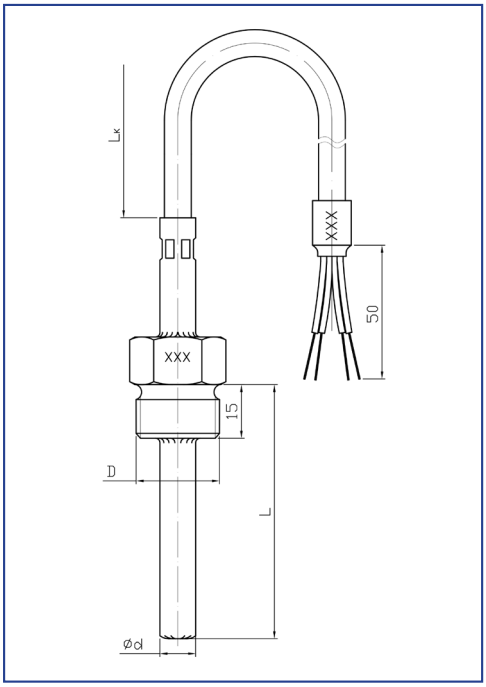
TER-PKGKbm-91



Thermocouple with process connection fitting and cable

Thermocouple with process connection fitting and cable has been designed for temperature measurement in industry instruments and aggregates. Connection fitting allows easy assembling (threading) to tag point. Cable connecting point temperature cannot excess +150°C.

Type	Execution
TER-PKGKbm-91	Basic - acc to catalog card
TER-PKGKbm-91/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TER-PKGKbm-91/Exi	Intrinsic safe – acc to Atex

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+300°C	acc. EN 60584-1	ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+400°C		grounded

Sheathed protection tube diam. d	Material acc. DIN/AISI	Immersion length L [mm]	Process connection thread D
ø1, ø1,5, ø2, ø3, ø4,5, ø6	2.4816/Inconel 600	on request	on request (e.g. M10x1, M12x1, M20x1,5, G1/2", G1/4", G3/8")
	1.4571/316Ti		
	1.4541/321		

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		
		ø 3,2	L2TDT-J-0,22mm2	teflon, screen, teflon	+260°C
		ø 3,0	L2TDT-K-0,22mm2		
Double	4 wire (2-pair)	ø 4,0	L4GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,6	L4GGD-K-0,22mm2		

Non-standard models available.

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Ordering Information

TER-PKGKbm-91	A	B	C	D	E	F	G	H	I	J

A	Execution
-	Basic
/ExiM1	Intrinsic safe for mining purposes
/Exi	Intrinsic safe

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Junction
O	ungrounded
Z	grounded

D	Sheathed protection tube diameter d
1	d= 1 mm
1,5	d= 1,5 mm
2	d= 2 mm
3	d= 3 mm
4,5	d= 4,5 mm
6	d= 6 mm

E	Immersion length L
	specify in mm

F	Sheath material
Inconel600	2.4816/Inconel 600
1.4571	1.4571/316Ti
1.4541	1.4541/321

G	Process connection thread D
	specify type of thread

H	Compensation cable type
2p-L2GGD-J	2 wire (L2GGD-J-0,22)
2p-L2TDT-J	2 wire (L2TDT-J-0,22)
4p-L4GGD-J	4 wire (L4GGD-J-0,22)
2p-L2GGD-K	2 wire (L2GGD-K-0,22)
2p-L2TDT-K	2 wire (L2TDT-K-0,22)
4p-L4GGD-K	4 wire (L4GGD-K-0,22)

I	Cable length L_K
	specify in mm

J	Operating temperature
	specify in °C

Ordering Example

TER-PKGKbm-91-1xK-O-6-100-1.4571-M10x1-2p-L2GGD-K-4000-200

stands for: Thermocouple with process connection fitting and cable, basic execution, 1xNiCr-NiAl ungrounded , sheathed protection tube diameter 6mm, protection tube length 100mm, sheath material 1.4571/316Ti, thread M10x1, configuration 2-wire, cable type L2GGD-K length Lk=4000 mm, operating temp. up to 200°C.

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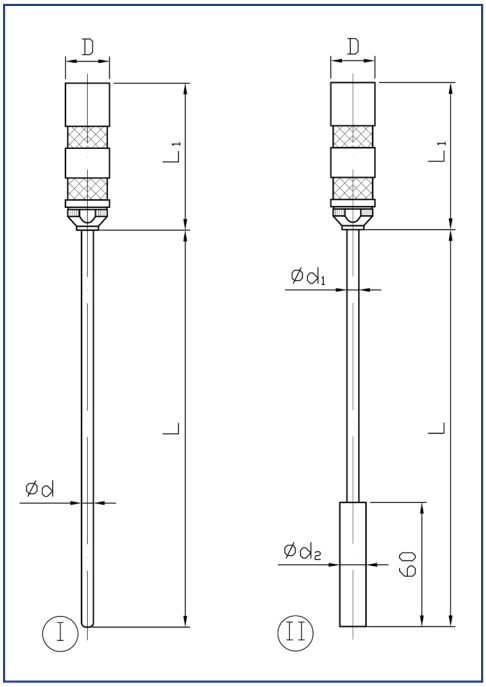
TOP-WTW-92



Resistance Thermometer Pt100 with LEMO connector

Resistance thermometer with LEMO connection type TOP-WTW-92 has been designed for temperature measurement in various environments, both in industry and laboratory.

LEMO connection is fixed on the thermometer protection tube and allows connection to cable.

Type	Execution	Version
TOP-WTW-92	Basic - acc to catalog card	I or II
TOP-WTW-92/Exi	Intrinsic safe – acc to Atex	

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protection tube Model	Protect. tube diam. d	Material acc. DIN/AISI	Length L [mm]
I	ø3 , ø3.5 , ø4 , ø5 , ø6	1.4571/316Ti	on request
II	ø4/3 , ø6/5 , ø8/6		

Connector Type	Series
LEMO (socket)	0S, 1S, 2S (more info at ***www.lemo.com***)

Non-standard models available.

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Ordering Information

TOP-WTW-92	A	B	C	D	E	F	G	H	I	J

A	Execution
I	With basic protection tube
II	With protection tube with sleeve
I/Exi	Intrinsic safe with basic protection tube
II/Exi	Intrinsic safe with protect. tube with sleeve

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2 wire
3p	3 wire
4p	4 wire

E	Protection tube diameter d , d_2/d_1
3	d= 3 mm
3,5	d= 3,5 mm
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm
4/3	d_2= 4 mm , d_1=3 mm
6/5	d_2= 6 mm , d_1=5 mm
8/6	d_2= 8 mm , d_1=6 mm

F	Protection tube length L
	specify in mm

G	LEMO Connector (socket)
0S	serie 0S
1S	serie 1S
2S	serie 2S

H	LEMO Plug included
Y	plug included
N	plug not included

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-WTW-92-I-1xPt100-B-2p-4-150-1S-N-Z

stands for: Resistance thermometer with basic protection tube, with resistor 1 x Pt100 class B, configuration 2-wire, protection tube diameter ø4 mm, length 150 mm, connection socket LEMO 1S, LEMO plug not included, standard sensor version (ceramic wire wound element).

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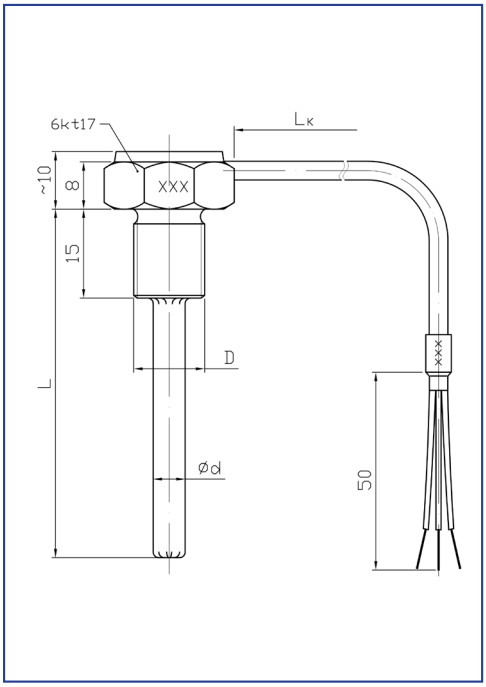
TER-KKbm-93



Thermocouple
Angular Miniature

Angular, miniature thermocouple type TER-KKbm-93, has been designed for temperature measurement in machinery, machine sets and sub-assemblies up to +400°C.

Small dimensions allows fast and precise measurement. Additional process connection fitting allows fast and easy assembling. Connection cable long as required, is made for connecting thermocouple to outer instruments.

Type	Execution
TER-KKbm-93	Basic - acc to catalog card
TER-KKbm-93/Exi	Intrinsic safe – acc to Atex

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+300°C	acc. EN 60584-1	ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+400°C		grounded

Sheathed protection tube diam. d	Material acc. DIN/AISI	Length L [mm]	Process connection thread D
ø1, ø1,5, ø2, ø3, ø4,5, ø6	2.4816/Inconel 600	on request	on request (e.g. M10x1, M12x1, M20x1,5, G1/2", G1/4", G3/8")

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		
		ø 3,2	L2TDT-J-0,22mm2	teflon, screen, teflon	+260°C
		ø 3,0	L2TDT-K-0,22mm2		
Double	4 wire (2-pair)	ø 4,0	L4GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,6	L4GGD-K-0,22mm2		
		ø 6,0	L4JFJ-J-0,22mm2	PVC, film, PVC	+105°C
		ø 6,0	L4JFJ-K-0,22mm2		

Non-standard models available.

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Ordering Information

TER-KKbm-93	A	B	C	D	E	F	G	H	I	J

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Junction
O	ungrounded
Z	grounded

D	Sheathed protection tube diameter d
1	d= 1 mm
1,5	d= 1,5 mm
2	d= 2 mm
3	d= 3 mm
4,5	d= 4,5 mm
6	d= 6 mm

E	Process connection thread D
	specify type of thread

F	Immersion length L
	specify in mm

G	Sheath material
Inconel600	2.4816/Inconel 600

H	Compensation cable type
2p-L2GGD-J	2 wire (L2GGD-J-0,22)
2p-L2TDT-J	2 wire (L2TDT-J-0,22)
4p-L4GGD-J	4 wire (L4GGD-J-0,22)
4p-L4JFJ-J	4 wire (L4JFJ-J-0,22)
2p-L2GGD-K	2 wire (L2GGD-K-0,22)
2p-L2TDT-K	2 wire (L2TDT-K-0,22)
4p-L4GGD-K	4 wire (L4GGD-K-0,22)
4p-L4JFJ-K	4 wire (L4JFJ-K-0,22)

I	Cable length L_K
	specify in mm

J	Operating temperature
	specify in °C

Ordering Example

TER-KKbm-93-1xK-O-6-M10x1-50-Inconel600-2p-L2GGD-K-4000-200

stands for: Thermocouple angular miniature 1xNiCr-NiAl, basic execution, ungrounded, sheathed protection tube diameter 6mm, thread M10x1, immersion length 50mm, sheath material Inconel600.2.4816, configuration 2-wire, cable type L2GGD-K length Lk=4000 mm, operating temp. up to 200°C.

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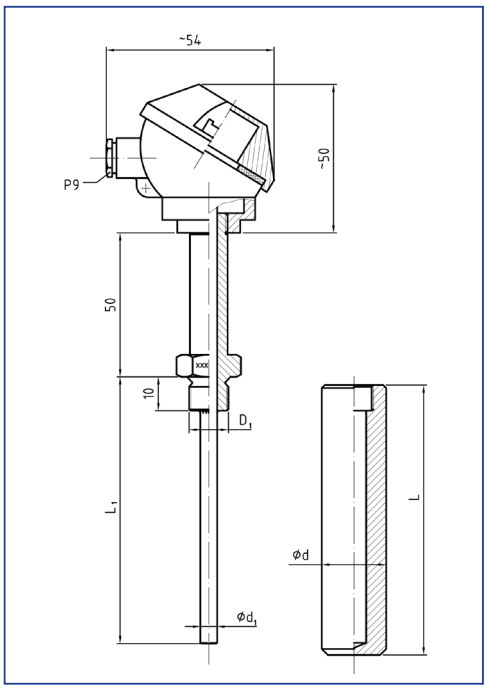
TER-PKGm-97



Straight Thermocouple (Type J, K)
Miniature

Miniature thermocouple type TER-PKGm-97 is for precise temperature measurement of gases and liquids.

Type	Execution
TER-PKGm-97	Basic - acc to catalog card
TER-PKGm-97/Exi	Intrinsic safe – acc to Atex

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+400°C	acc. EN 60584-1	ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)			grounded

Sheathed protection tube diam. d_1 [mm]	Material acc. DIN/AISI	Immersion length L_1 [mm]	Process connection thread D_1
ø1, ø1.5, ø2, ø3, ø4.5	1.4571/316Ti	on request	on request (e.g. M8x1, M12x1, G1/4", G3/8")

Additional Thermowell diam. d	Material acc. DIN/AISI
specify in mm	on request (e.g. 1.4571, 1.0715)

Connection head	Max operating temp.	Transmitter
MA	+100°C	on request

Non-standard models available.

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Ordering Information

TER-PKGm-97	A	B	C	D	E	F	G	H	I	J	K

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Junction
O	ungrounded
Z	grounded

D	Sheathed protection tube diameter d_1
1	d_1= 1 mm
1,5	d_1= 1,5 mm
2	d_1= 2 mm
3	d_1= 3 mm
4,5	d_1= 4,5 mm

E	Immersion length L_1
	specify in [mm]

F	Process connection thread D_1
	specify type of thread

G	Additional thermowell material
1.4571	1.4571 / 316Ti
1.0715	1.0715
	specify other material

H	Additional Thermowell diam. d
	specify diameter in mm

I	Connection head
MA	MA

J	Operating temperature
	specify in °C

K	Transmitter
	specify type and temp. range in °C

Ordering Example

TER-PKGm-97-1xJ-O-3-200-M8x1-1.4571-10-MA-300

stands for: Straight miniature thermocouple, basic, single thermo-element Fe-CuNi, junction ungrounded, protection tube diameter ø3 mm, immersion length L1=200 mm, thread M8x1, additional thermowell material 1.4571 and diameter d=10 mm, connection head MA, operating temp. up to 300°C.

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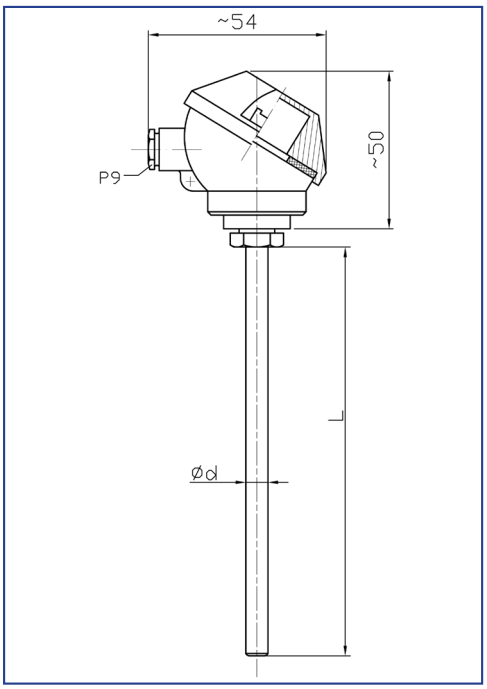
TOP-PDm-98



Resistance Thermometer Pt100
Miniature Straight
Sheathed

Resistance thermometer miniature, straight type TOP-PDm-98 is for precise temperature measurement of gases and liquids. Sheathed sensor assures good mechanical vibration resistance.

Thermometer could be provided with clamp connection UZG-47.

Type	Execution
TOP-PDm-98	Basic - acc to catalog card
TOP-PDm-98/Exi	Intrinsic safe – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Sheathed protection tube diam. d	Material acc. DIN/AISI	Immersion length L [mm]
ø 3, ø 3.2, ø 5, ø 6	2.4816/Inconel 600	on request
	1.4571/316Ti	
	1.4541/321	

Connection head	Max operating temp.	Transmitter
MA	+100°C	on request

Threaded compression fitting type UZG-47
on request, acc. to catalog card – ***UZG-47***

Non-standard models available.

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Ordering Information

TOP-PDm-98	A	B	C	D	E	F	G	H	I	J	K

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2 wire
3p	3-wire
4p	4-wire

E	Sheath diameter d
3	d= 3 mm
3,2	d= 3,2 mm
5	d= 5 mm
6	d= 6 mm

F	Immersion length L
	specify in [mm]

G	Sheath material
Inconel600	2.4816/Inconel 600
1.4571	1.4571/316Ti
1.4541	1.4541/321

H	Connection head
MA	MA

I	Operating temperature
	specify in °C

J	Transmitter
	specify type and temp. range in °C

K	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PDm-98-1xPt100-A-3p-3-200-1.4571-MA-200-Z

stands for: Resistance thermometer miniature, basic execution, straight, sheathed, with resistor 1xPt100 class A, 3 wire configuration, sheath diameter ø3 mm, length L=200 mm, material 1.4571, connection head MA, operating temp. up to 200°C, without transmitter, standard sensor version (ceramic wire wound element).

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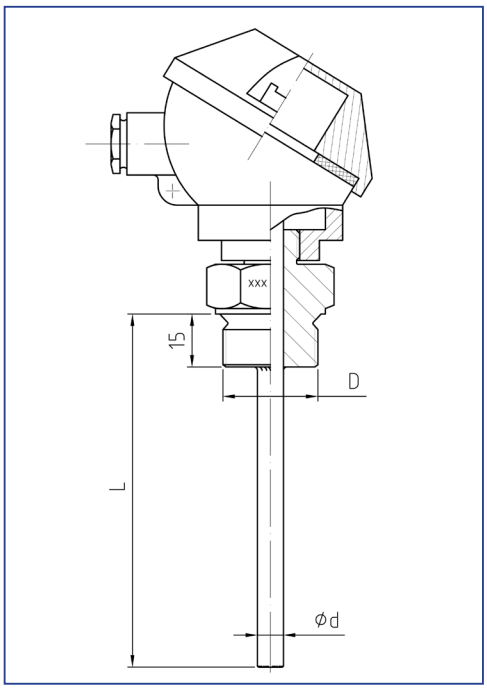
TER-PKGm-99



Sheathed Thermocouple with process connection fitting

Sheathed thermocouple type TER-PKGm-99 with process connection fitting is for temperature measurement of gases and liquids in the range of -40°C..+1000°C.

Type	Execution
TER-PKGm-99	Basic - acc to catalog card
TER-PKGm-99/Exi	Intrinsic safe – acc to Atex

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+700°C	acc. EN 60584-1	ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+1000°C		grounded

Sheathed protection tube diam. d [mm]	Material acc. DIN/AISI	Length L [mm]	Process connection thread D
ø3, ø4.5, ø6	2.4816/Inconel 600	on request	on request (e.g. M12x1,5, M20x1,5, G1/2", G3/4")
	1.4571/316Ti		
	1.4541/321		

Connection head	Max operating temp.	Transmitter
MA	+100°C	on request (max ø25x20 mm)

Non-standard models available.

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Ordering Information

TER-PKGm-99	A	B	C	D	E	F	G	H	I	J

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Junction
O	ungrounded
Z	grounded

D	Sheath diameter d
3	d= 3 mm
4,5	d= 4,5 mm
6	d= 6 mm

E	Immersion length L
	specify in [mm]

F	Sheath material
Inconel600	2.4816/Inconel 600
1.4571	1.4571/316Ti
1.4541	1.4541/321

G	Process connection thread D
	specify type of thread

H	Connection head
MA	MA

I	Operating temperature
	specify in °C

J	Transmitter (max space ø25x20 mm)
	specify type and temp. range in °C

Ordering Example

TER-PKGm-99-1xJ-O-3-200-Inconel600-M12x1,5-MA-300

stands for: Sheathed thermocouple, basic execution, single thermo-element Fe-CuNi, junction ungrounded, sheath diameter d=ø3 mm, immersion length L=200 mm, sheath material Inconel 600/2.4816, thread M12x1,5, connection head type MA, operating temp up to 300°C.

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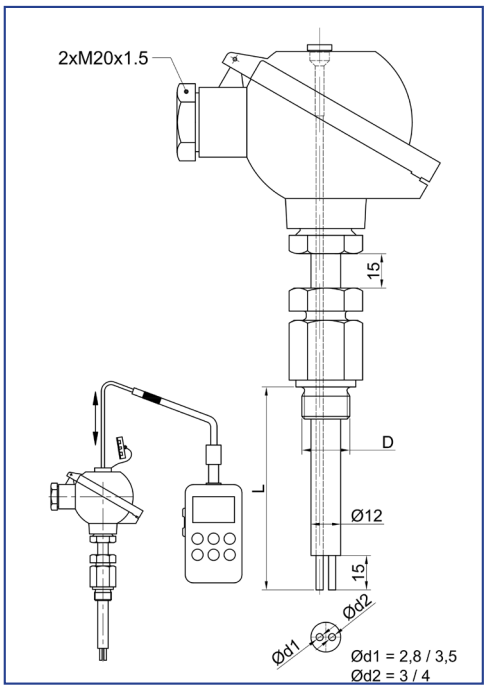
TOP-PKG-100



Resistance Thermometer Pt100

Sheathed resistance thermometer with in-line inspection, with collar, cap nut and screw joint, optional adjustable cable exit direction. Connection head have two cable glands M20x1,5 and inside there is a ceramic block with two 3 wire Pt100 sensor outputs. The sensor is dedicated for tire industries.

Model	Execution	Insert type
PS	with replaceable insert	WP-OP-01/PS

Technical specification

RTD type	Characteristic	Version	Measuring range	Accuracy class	Max. sensor current	Lead wire config.
2xPt100	acc. EN-60751	shockproof	0°C..+220°C	B	5 mA	2x 3 wire
				A		
				1/3B (AA)		
				1/5 B		
				1/10 B		

Protection tube diameter [mm]	Material acc. DIN/AISI
ø12	1.4571/316Ti

Process connection thread D
on request (e.g. M20x1,5, M27x2, G1/2", G3/4", G3/8')

Sheathed measuring insert diameter [mm]	Material acc. DIN/AISI	Length L [mm]
ø3	1.4571/316Ti	on request
ø2,8 (inspection entry)		

Connection head	Max operating temp.	Transmitter
DANDwin	+100°C	on request

Ingress protection
IP67

Non-standard models available.

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Ordering Information

TOP-PKG-100	A	B	C	D	E	F	G	H	I	J	K	L

A Execution	
PS	With replaceable insert

B Resistor	
2xPt100	Double Pt100

C Class	
B	B
A	A
1/3B	1/3B (AA)
1/5B	1/5 B
1/10B	1/10 B

D Lead wire configuration	
2x3p	2 x 3-wire

E Protection tube diameter d	
12	d= 12 mm

F Protection tube length L	
	specify in [mm]

G Protection tube material	
1.4571	1.4571 / 316Ti

H Process connection thread D	
	specify type of thread

I Connection head	
DANDwin	DANDwin

J Operating temperature	
	specify in °C

K Transmitter	
	specify type and temp. range in °C

L Version	
W	Shockproof (thin-film element)

Ordering Example

TOP-PKG-100-PS-2xPt100-1/10B-2x3p-12-250-1.4571-M20x1,5-DANDwin-W

stands for: RTD with replaceable insert, with double resistor class 1/10B, 2x3 wire lead configuration, protection tube diameter 12 mm,, length 250 mm, material 1.4571, process connection M20x1.5, connection head type DANDwin, shockproof (thin-film element).

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TET-101/Exi-DS18B20

MULTIPOINT DIGITAL TEMPERATURE SENSOR

Purpose of multipoint temperature sensor TET-101-DS18B20 with bail type installation as well as flange or thread type installation is to provide measurement of temperature vertical distribution in grain silos, fodder facilities and bio-gas storage vessels. Measurement range is in practice limited to -40°C do +125°C. Measurement may be done in up to 64 points, distributed at several depths depending on customer requirements. Temperature detector – integrated circuit DS18B20 (Dallas) features digital serial signal transmission that allows data bus connection via single 2- or 3-wire bus cable; 1 -wire transmission protocol is applied. Detectors are protected by metal tube or metal reinforced hose assuring high tensile strength. Protecting hose features helical steel wire construction covered by anti-static plastic sheath. Outer sheath is smooth enough to avoid adhering of product to be poured into silo. The basic version assures tensile strength up to 700 kN. On customer request an anchor eye is provided at the end of measuring cable however it may increase material adhering to the measuring cable. Measuring cable is fastened inside the silo using bail or mounted to the nozzle provided on the silo roof. In case of big silos there are several measuring cables which distribution as well as position of detectors are modified according to customer wish. The cables can be connected to one 1 -wire bus. Connection head is located outside of silo/vessel to easy installation work. In case of small plants bus cable may be led directly to control room / PC. For hazardous area IS solution signal is connected via Zener barrier that is located in safe area to electronic module which assures conversion of 1 -wire protocol to RS232/485 bus (protocol MODBUS RTU). For bio-gas plant vessels sensors In metal protection tubes are more suited than wire measuring cables.

Technical specification

Detector	Measuring Range	Accuracy	Connection
Dallas DS18B20	-55°C...+125°C	±0,5% of range -10°C...+85°C	3/2 -wire

Length of measuring cable	No of Outputs	Transmission	Power Supply	Acceptance	Data Recording
Max 60 m	1	Modbus / RS485	24 VDC	ATEX CE	SCADA

Characteristic

- Each measuring cable May consists of maximum 64 measuring points with DS18B20 detectors.
- Measuring cable is connected to electronic module assuring conversion OneWire protocol to MODBUS RTU / RS485.
- Up to 64 measuring cables can be connected to one RS485.
- Temperature indication, recording and alarm system – SCADA – is implemented on PC, which may be located in distance up to 1200 m.
- Area classification: Ex II 1/2G Ex ia IIC T* Ga/Gb; Ex II 1D Ex ia IIIC T* °C Da

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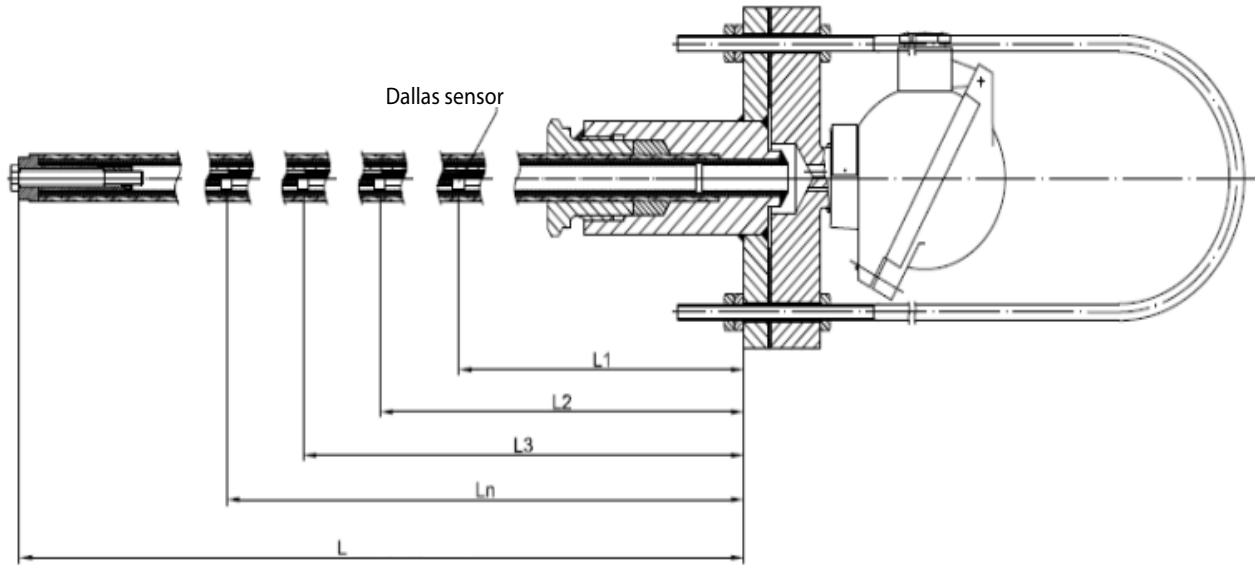
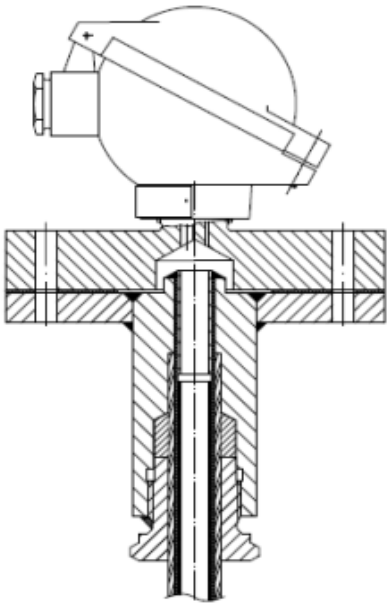
Process Mechanical Connection

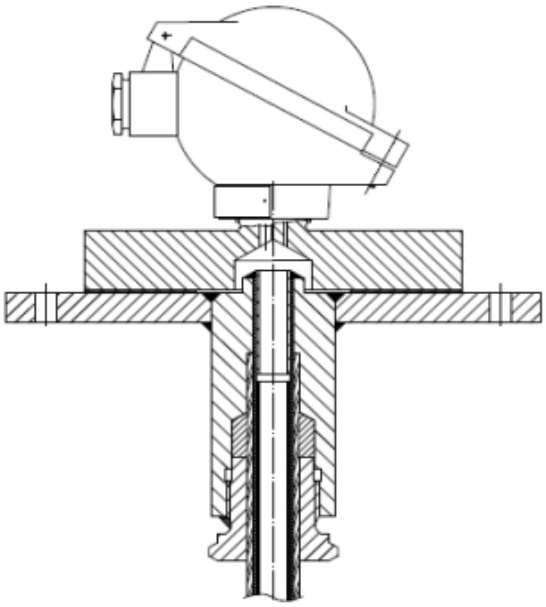


Bail Connection

Option 1



Option 2



Flange connection

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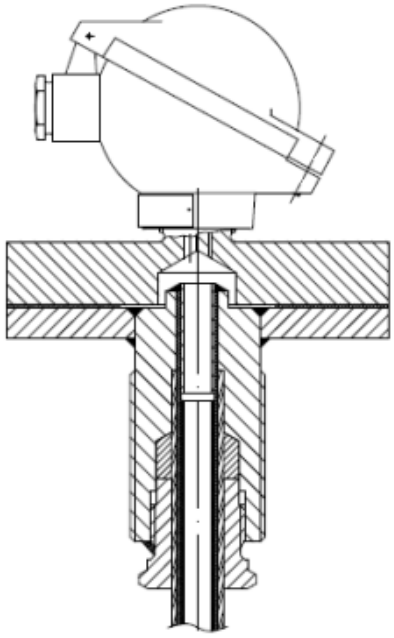
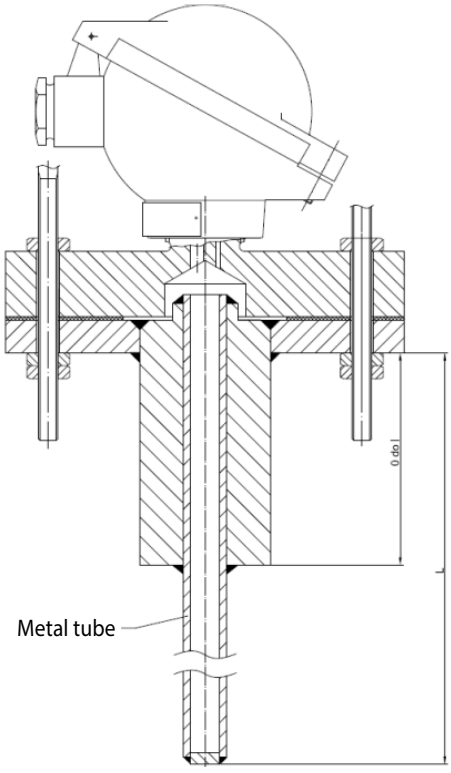


Thread Nozzle Connection



Flange Connection, Metal Tube Protected Sensors

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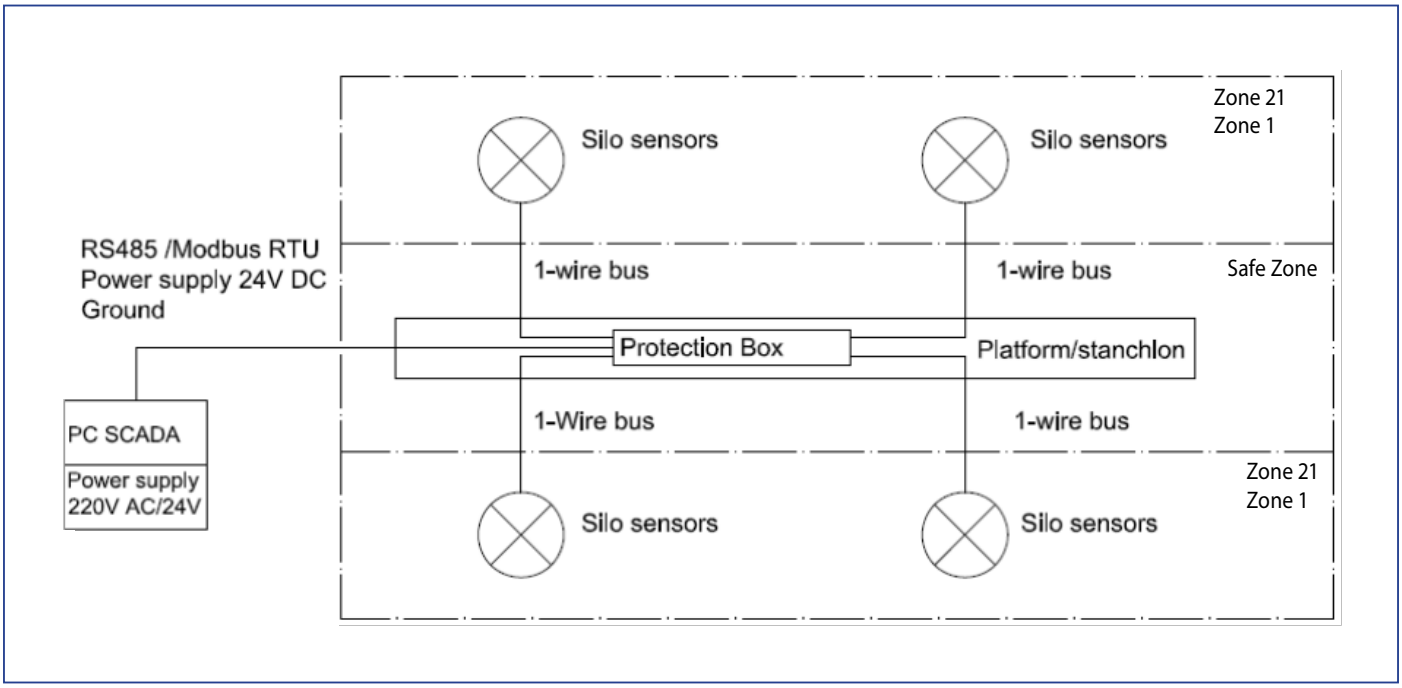
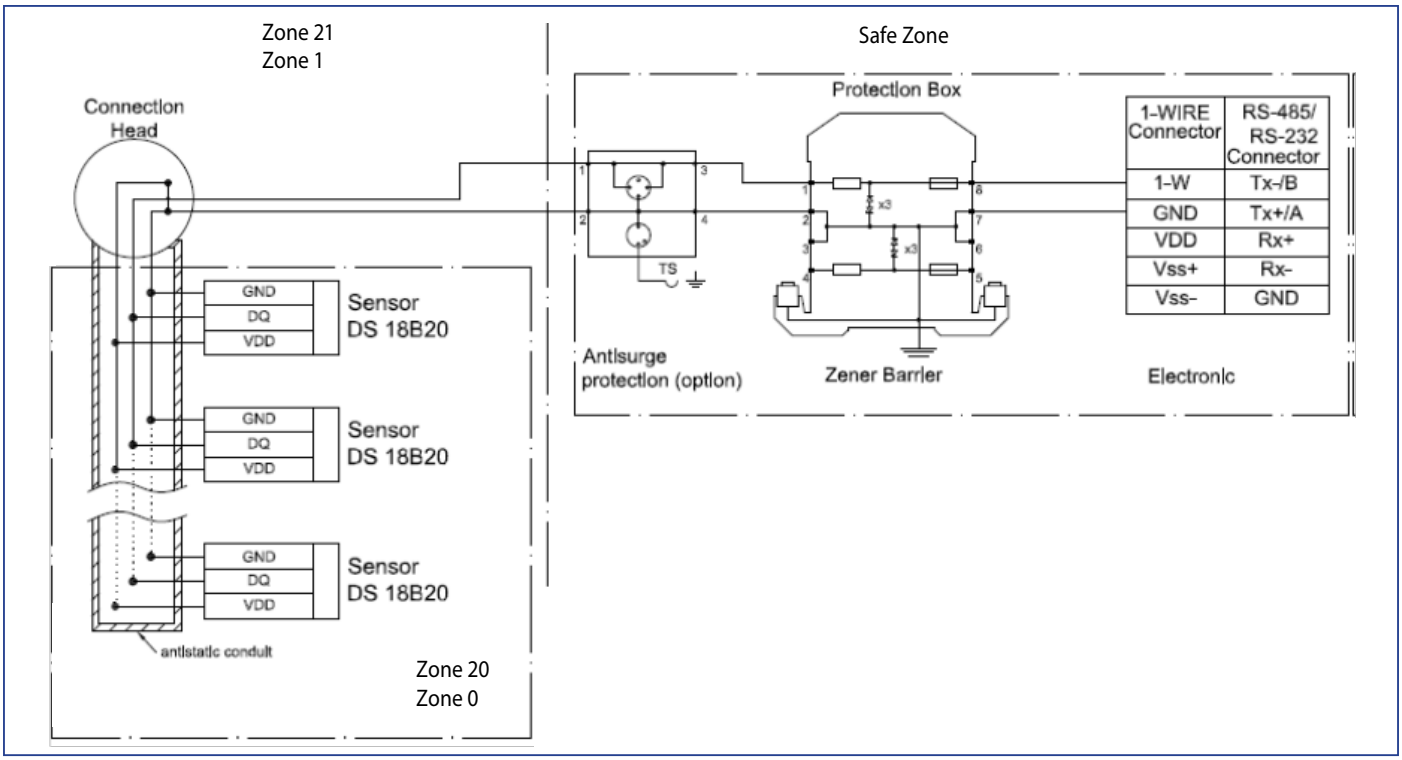


Note: example of signal connection



Hazardous area signal connection

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Ordering Information

TET-101/Exi-DS18B20	A	B	C	D	E	F	G	H

A	Execution
hose	Hose protection
tube	Metal tube protection, specify OD/Material

B	Type of process connection
bail	Bail
thread	Thread nozzle , specify type
flange	Flange nozzle, specify DN & PN

C	Outside sheath diameter
16	16 mm
	specify other diam. in mm

D	Length of cable / metal tube
	specify in m (max 60m for one cable)

E	Number of measuring points
	specify amount (max 32 points)

F	Detector positions
	Distance of the first detector from nozzle / bail [mm]
	Detector spaces [mm]
(optionally)	Special arrangement (Show on vessel drawing)

G	Electric connection
	Connection head, specify type
JB	Protection box

H	Anti-surge protection
yes	Required
not	Not required

Detail information regarding measuring arrangement shall be provided in:

"Multipoint Thermometer process data sheet"

Multipoint temperature sensor consists a part of Temperature Monitoring System described in separate data sheet.

Ordering Example

TET-101/Exi-DS18B20-hose-bail-16-3500-6-1000-500-XE_DAND-not

stands for: Detector with bail mounting, hose protection of measuring cable OD 16 mm & length 3500mm, 6 detectors, the first one in 1000mm distance from bail, spaced every 500mm, connection head type XE-DAND, without anti-surge protection.

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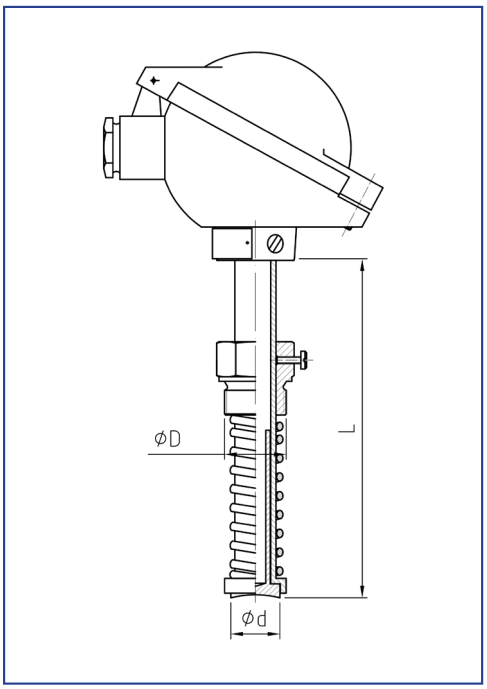
TOP-PKG-141



Resistance Thermometer Pt100 for bearings

Resistance thermometer for bearings type TOP-PKG-141 is for precise temperature measurement of cylinder part – particularly bearings tracks

Resistor is placed in the measuring ending, which is tightened to bearing track, what allows precise temperature measurement in the range of -50°C to +250°C.

Immersion length of measuring ending is adjustable.

Type	Execution
TOP-PKG-141	Basic - acc to catalog card
TOP-PKG-141/Exi	Intrinsic safe – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Measuring ending diameter d [mm]	Measuring ending radius	Length L	Material acc. DIN/AISI	Process connection thread D
ø 20	radius adjusted to bearing race	adjusted up to 85 mm	1.4571 / 316Ti	on request (e.g. M24x1,5, M27x2, G1‴)

Connection head	Transmitter
on request (e.g. NA, DAN, DANAW)	on request

Non-standard models available.

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Ordering Information

TOP-PKG-141	A	B	C	D	E	F	G	H	I	J

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2-wire
3p	3-wire
4p	4-wire

E	Process connection thread D
	specify type of thread

F	Protection tube length L
	specify in [mm]

G	Connection head
	specify head type

H	Operating temperature
	specify in °C

I	Transmitter
	specify type and temp. range in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKG-141-1xPt100-A-3p-M24x1,5-80-NA-Z

stands for: Resistance thermometer, basic execution, with single resistor 1xPt100 class A, configuration 3-wire, thread M24x1,5, length L=80 mm, connection head type NA, standard sensor version (ceramic wire wound element).

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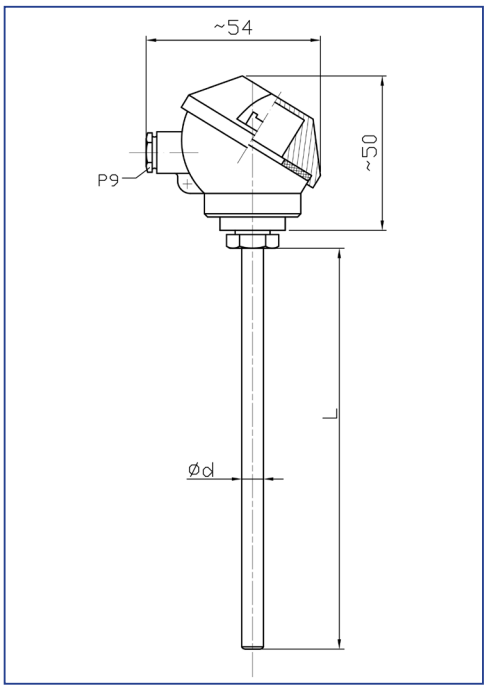
TER-Pdm-142



Sheathed Thermocouple Miniature

Straight miniature thermocouple type TER-Pdm-142 is for precise temperature measurement of gases and liquids. in the range of -40°C to +1000°C. Sheathed thermo-element is mounted to MA connection head.

Thermometer can be provided with clamp connection UZG-47.

Type	Execution
TER-Pdm-142	Basic - acc to catalog card
TER-Pdm-142/Exi	Intrinsic safe – acc to Atex

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+700°C	acc. EN 60584-1	ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+1000°C		grounded

Sheathed protection tube diam. d [mm]	Material acc. DIN/AISI	Immersion length L [mm]
ø3, ø4.5, ø6	2.4816/Inconel 600	on request

Connection head	Max operating temp.	Transmitter
MA	+100°C	on request (max ø25x20 mm)

Medium	Response Time $T_{0,5}$
Water	0,5 ÷ 2,5 sec

Threaded compression fitting type UZG-47
on request, acc. to catalog card – ***UZG-47***

Non-standard models available.

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Ordering Information

TER-Pdm-142	A	B	C	D	E	F	G	H

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Junction
O	ungrounded
Z	grounded

D	Sheathed protection tube diameter d
3	d= 3 mm
4,5	d= 4,5 mm
6	d= 6 mm

E	Immersion length L
	specify in [mm]

F	Connection head
MA	MA

G	Operating temperature
	specify in °C

H	Transmitter (max space ø25x20 mm)
	specify type and temp. range in °C

Ordering Example

TER-Pdm-142/Exi-1xK-O-3-250-MA-400

stands for: Thermocouple miniature, straight, intrinsic safe, with sheathed thermo-element 1xNiCr-NiAl, ungrounded, sheath diameter ø3 mm, length L=250mm, connection head type MA, operating temp up to 400°C.

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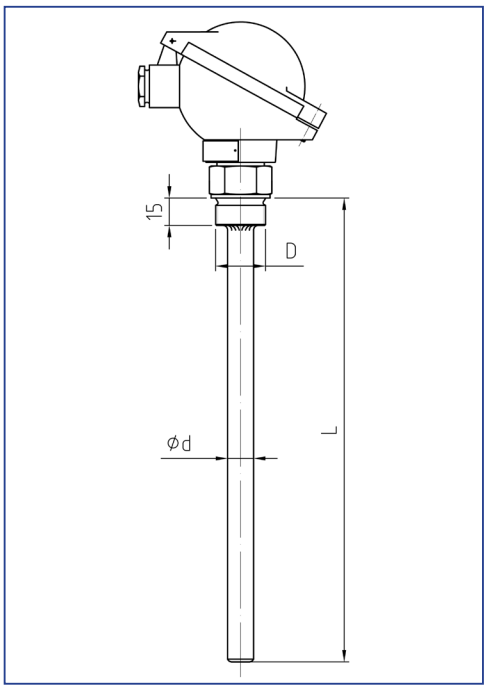
TER-PKG-157



Straight Thermocouple (Type J, K, N) with process connection fitting

Thermocouple type TER-PKG-157 has been designed for temperature measurement in industry instruments, pipelines, high pressure containers in gases and liquids temp. ranges from -40°C to +1000°C.

Type	Execution
TER-PKG-157	Basic - acc to catalog card
TER-PKG-157/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TER-PKG-157/Exi	Intrinsic safe – acc to Atex
TER-PKG-157/Exe	Increased safety – acc to Atex

Technical specification

Sheathed sensor insert	Version	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 3	-40°C..+500°C -40°C..+700°C 0°C..+1100°C (- 270°C..+1300°C**)	acc. EN 60584-1	ungrounded
1xFe-CuNi (J), 2xFe-CuNi (J) 1xNiCr-NiAl (K), 2xNiCr-NiAl (K) 1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	ø 6	-40°C..+600°C -40°C..+800 (+1000*)°C 0°C..+1100°C (- 270°C..+1300°C**)		grounded

* upper temp. depends on measuring conditions and temp. changes; **short term

Protect. tube diam. d	Material acc. DIN/AISI	Max operating temp.
ø6, ø8, ø9, ø10, ø11, ø12, ø15	1.4571 / 316Ti	+700°C
ø10	1.4841 / 314	+1100°C
ø10, ø11, ø15	1.7335 / A182 Grade F11	+550°C
ø12, ø13,7	2.4602 / Hastelloy C22	+600°C

Process connection thread D
on request (e.g. M20x1,5, M24x1,5, G1/2", G3/4", 1/2"NPT, 3/4"NPT)

Connection head	Transmitter
on request (e.g. NA, DANA, DANAW)	on request

Non-standard models available.

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Ordering Information

TER-PKG-157	A	B	C	D	E	F	G	H	I	J

A	Execution
U	with non-replaceable insert
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg

C	Protection tube diameter d
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm
11	d= 11 mm
12	d= 12 mm
13,7	d= 13,7 mm
15	d= 15 mm

D	Immersion length L
	specify in [mm]

E	Protection tube material
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22

F	Process connection thread D
	specify type of thread

G	Connection head
	specify head type

H	Junction
O	ungrounded
Z	grounded

I	Operating temperature
	specify in °C

J	Transmitter
	specify type and temp. range in °C

Ordering Example

TER-PKG-157-PS/Exi-1xK- 8-400-M20x1,5-1.4571-NA-O

stands for: Thermocouple, Intrinsic safe with replaceable insert, with thermo-element 1xNiCr-NiAl, with protection tube diameter d=ø8 mm, length L=400 mm, thread M20x1,5, tube material 1.4571, connection head NA, ungrounded , w/o transmitter.

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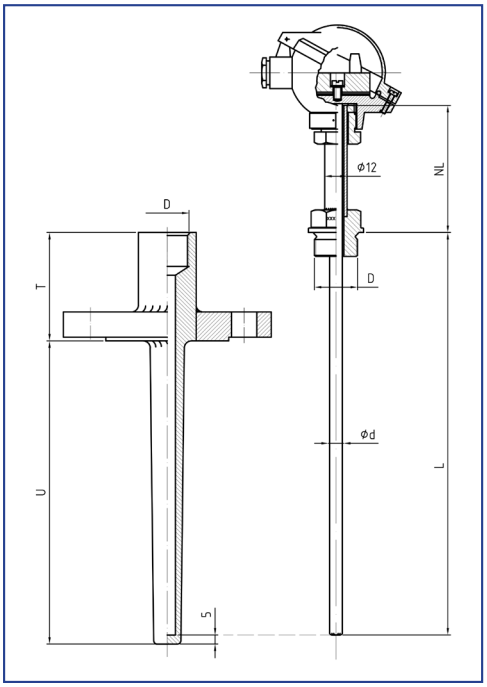
TOP-PKG-158



Resistance Thermometer Pt100 for high pressure application

Resistance thermometer type TOP-PKG-158 is a sensing device for temperature measurement of process gases and liquids in cases with high pressure, temperature fluctuation and harmful medium appears. Thermometer consists of spring loaded replaceable sensor insert type WP-OP-01-PS with 1 or 2 transmitters in head connection. Flanged, welded and screwed thermowell models are available.

Type	Execution
TOP-PKG-158	Basic - acc to catalog card
TOP-PKG-158/ExiM1	Intrinsic safe for mining purposes – acc to Atex
TOP-PKG-158/Exi	Intrinsic safe – acc to Atex
TOP-PKG-158/Exe	Increased safety – acc to Atex

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Sheathed protection tube diam. d	Material acc. DIN/AISI	Length L [mm]	Process connection thread D
ø3, ø4, ø6, ø8	1.4571/316Ti	on request	on request (e.g. M20x1,5, M24x1,5, G1/2", G3/4", 1/2"NPT, 3/4"NPT)

Extension tube diam. d	Material acc. DIN/AISI	Max operating temp.	Connection head	Transmitter
ø12	1.4571 / 316Ti	+700°C	on request (e.g. NA, DANA, DANAW)	on request

Additional thermowell
on request, acc. to catalog card – *THERMOWELLS for thermometers and thermocouples*

Non-standard models available.

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Ordering Information

TOP- PKG-158	A	B	C	D	E	F	G	H	I	J	K	L	M

A	Execution
U	with non-replaceable insert
PS	with replaceable insert
PS/ExiM1	Intrinsic safe for mining purposes with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert
PS/Exe	Increased safety with replaceable insert

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Lead wire configuration
2p	2-wire
3p	3-wire
4p	4-wire

E	Sheathed insert diameter d
3	d= 3 mm
4	d= 4 mm
6	d= 6 mm
8	d= 8 mm

F	Process connection thread D
	specify type of thread

G	Length L
	specify in [mm]

H	Neck tube length NL
	specify in [mm]

I	Connection head
	specify head type

J	Operating temperature
	specify in °C

K	Transmitter
	specify type and temp. range in °C

L	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

M	Additional thermowell
	on request, acc. to catalog card – ***THERMOWELLS***

Ordering Example

TOP-PKG-158-PS-1xPt100-A-3p-6-M20x1,5-400-145-NA-Z

stands for: Resistance thermometer, with replaceable insert, with resistor 1xPt100 class A, configuration 3-wire, sheath diam. d= 6mm, thread M20x1,5, insert length L=400 mm, neck tube length NL=145 mm, connection head type NA, w/o transmitter, standard sensor version (ceramic wire wound element), w/o additional thermowell.

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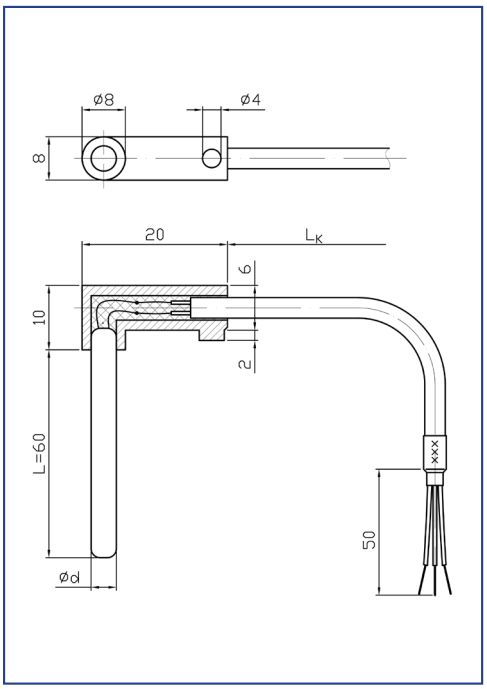
TOP-KSpKbm-162



Resistance Thermometer Pt100
Angular, Miniature

Resistance thermometer Pt100 type TOP-KSpKbm-162 has been designed for temperature measurement in non-pressure equipment.

Ceramic resistor is connected to plastic part, which allows to mount thermometer in special measuring socket.

Connection cable of teflon and metal screen insulation assures appropriate thermometer working in difficult environment conditions.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+250°C / *(-50°C..+250°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Sensor diam. d	Immersion length L	Medium	Velocity	Response Time $T_{0,9}$
ø5	60 mm	Water	0,4 m/s	1,4 sec

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits	Length L [mm]
2, 3, 4 wire	ø4	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C	on request

Non-standard models available.

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Ordering Information

TOP-KSpKbm-162	A	B	C	D	E	F	G

A	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

B	Class
B	B
A	A
1/3B	1/3B (AA)

C	Immersion length L
60	L= 60 mm

D	Lead wire configuration and cable type
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

E	Cable length L_K
	specify in mm

F	Operating temperature
	specify in °C

G	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-KSpKbm-162-1xPt100-A-60-3p-L4TFDT-1000-100-Z

stands for: Resistance thermometer, with resistor 1xPt100, class A, immersion length L=60 mm, configuration 3-wire, connection cable type L4TFDT, length Lk=1000 mm, operating temp. up to 100°C, standard sensor version (ceramic wire wound element).

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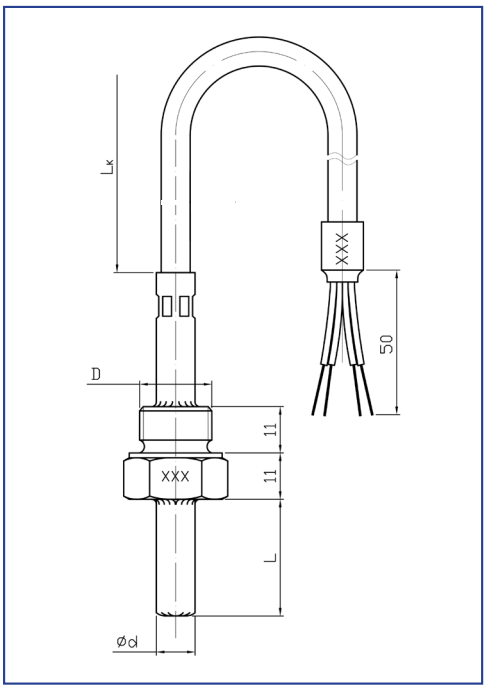
TOP-PKGKbm-171



Resistance Thermometer Pt100 with process connection fitting and cable

Resistance thermometer miniature type TOP-PKGKbm-171 is for temperature measurement inside tire on press AUBO in the tire industry.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+250°C / *(-50°C..+250°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Immersion length L [mm]	Process connection thread D
ø4, ø6	1.4571/316Ti	on request (min.25 mm)	M12x1 or M12x1,5

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
3, 4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	+180°C
3 wire	ø 3,8	L6TT-6x0,22mm2	teflon, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-PKGKbm-171	A	B	C	D	E	F	G	H	I	J

A	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

B	Class
B	B
A	A
1/3B	1/3B (AA)

C	Protection tube diameter d
4	d= 4 mm
6	d= 6 mm

D	Immersion length L
	specify in mm

E	Process connection thread D
M12x1	M12x1
M12x1,5	M12x1,5

F	Protection tube material
1.4571	1.4571 / 316Ti
	specify other material

G	Lead wire configuration and cable type
3p-L4TDS	3 wire (L4TDS-4x0,25mm2)
4p-L4TDS	4 wire (L4TDS-4x0,25mm2)
3p-L6TT	3 wire (L6TT-6x0,25mm2)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-PKGKbm-171-1xPt100-A-4-40-M12x1-1.4571-3p-L4TDS-1000-150-Z

stands for: Resistance thermometer miniature, with resistor 1xPt100, class A, protection tube diameter 4 mm, length L=40mm, process thread M12x1, protection tube material 1.4571, configuration 3-wire, cable type L4TDS, length L_K=1000 mm, operating temp. up to 150°C, standard sensor version (ceramic wire wound element).

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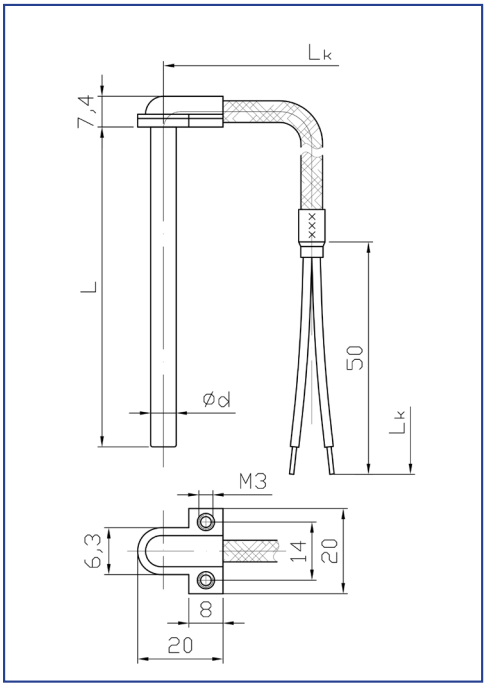
TER-KtKbm-183



Angular Thermocouple Miniature with connection cable

Angular thermocouple miniature with connection cable type TER-KtKbm-183 is for temperature measurement in various machines and its sub-assemblies.

Type	Execution
TER-KtKbm-183	Basic - acc to catalog card
TER-KtKbm-183/Exi	Intrinsic safe – acc to Atex

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+300°C	acc. EN 60584-1	ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+400°C		grounded

Protection tube diam. d	Material acc. DIN/AISI	Length L [mm]	Process connection thread D
ø4, ø5, ø6	1.4571/316Ti	on request (min. 20 mm)	on request (e.g. M10x1, M12x1, M20x1,5, G1/2", G1/4", G3/8")

Thermocouple	Configuration	Dimension	Compensation cable type	Insulation	Temp. limits
Single	2 wire (1-pair)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		
		ø 3,2	L2TDT-J-0,22mm2	teflon, screen, teflon	+260°C
		ø 3,0	L2TDT-K-0,22mm2		
Double	4 wire (2-pair)	ø 4,0	L4GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,6	L4GGD-K-0,22mm2		

Non-standard models available.

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Ordering Information

TER-KtKbm-183	A	B	C	D	E	F	G	H	I

A	Execution
-	Basic
/Exi	Intrinsic safe

B	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl

C	Junction
O	ungrounded
Z	grounded

D	Protection tube diameter d
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm

E	Protection tube length L
	specify in mm

F	Protection tube material
1.4571	1.4571/316Ti

G	Compensation cable type
2p-L2GGD-J	2 wire (L2GGD-J-0,22)
2p-L2TDT-J	2 wire (L2TDT-J-0,22)
4p-L4GGD-J	4 wire (L4GGD-J-0,22)
2p-L2GGD-K	2 wire (L2GGD-K-0,22)
2p-L2TDT-K	2 wire (L2TDT-K-0,22)
4p-L4GGD-K	4 wire (L4GGD-K-0,22)

H	Cable length L_K
	specify in mm

I	Operating temperature
	specify in °C

Ordering Example

TER-KtKbm-183/Exi-1xJ-O-5-50-1.4571-2p-L2GGD-J-3000-250

stands for: Angular thermocouple 1xFe-CuNi, Intrinsic safe execution, ungrounded, protection tube diameter ø5 mm, length L=50 mm, material 1.4571, configuration 2-wire, cable type L2GGD-J length L_K=3000 mm, operating temp. up to 250°C.

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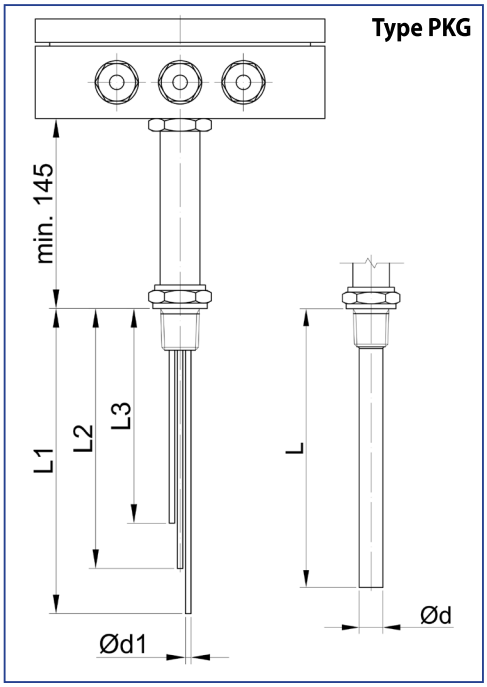
TER-PKG/PF/PD-189



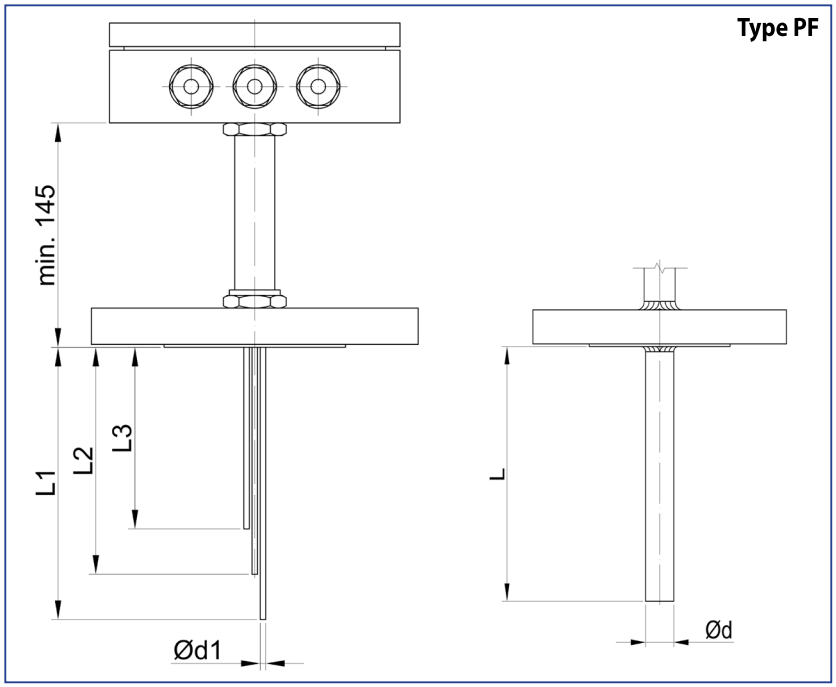
Straight Thermocouple (Type J, K) Multipoint

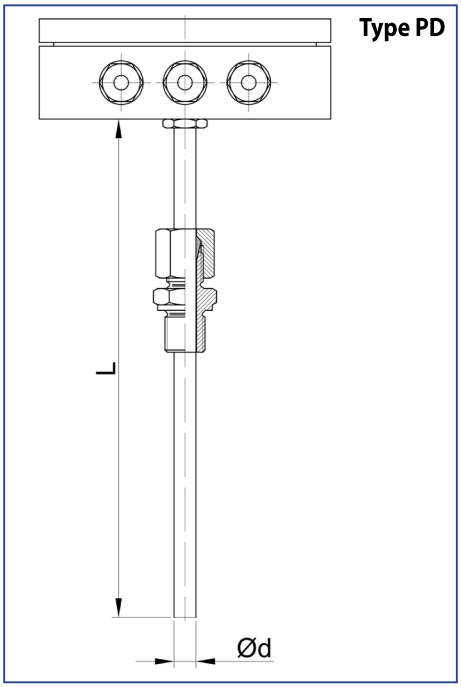
Multipoint thermocouple type TER-PKG/PF/PD-189 is designed for measurement of temperature distribution in containers, reactors and towers in the range of -40°C to +800 (+1100*)°C (depending on protection tube and thermocouple used) The measurement is done by several thermocouples with tips situated in different positions. Immersion lengths of thermocouples are made according to clients requirements.

Thermocouple can be equipped with process connection fitting or different flanged connections. Sheathed thermo-element below threaded connection can be without protection tube or with protection tube.

Thermocouple can be equipped with transmitter fixed into connection head.

Type	Execution
TER-PKG/PF/PD-189	Basic - acc to catalog card
TER-PKG/PF/PD-189/Exi	Intrinsic safe – acc to Atex





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TER-PKG/PF/PD-189

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+600°C	acc. EN 60584-1	ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+800 °C (+1100 °C)*		

* upper temperature is limited by work environment and protection tube material

Protect. tube diam. d	Material acc. DIN/AISI	Max operating temp.	Sensor length L_n [mm]
ø10, ø11, ø12, ø13.5, ø15	1.4571 / 316Ti	+700°C	on request
ø10, ø22	1.4841 / 314	+1100°C	
ø10, ø11, ø15	1.7335 / A182 Grade F11	+550°C	
ø13,7	2.4602 / Hastelloy C22	+600°C	

Process connection		
Type PKG	threaded	on request (e.g. M24x1,5, G1/2", G1",1"NPT)
Type PF	flanged	on request (e.g. DN25 PN40 B1 acc. EN 1092-1, 2"150 RF acc. ASME B16,5)

Junction/Protection box	Max. ambient temp.	Cable gland thread	Transmitter
depends on number of measure points	+150°C	on request (e.g. M20x1,5, 1/2"NPT)	on request

Threaded compression fitting type UZG-47
on request, acc. to catalog card – ***UZG-47***

To help ensure you are quoted the correct product, please complete:

"Multipoint Thermometer process data sheet"

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Ordering Information

TER	A	189	B	x	C	D	E	F	G	H	I	J	K	L	M

A Type of process connection

PKG	threaded connection
PF	flanged connection
PD	threaded compression fitting type UZG-47

B Number of measure points n

	specify amount

C Type of thermocouple

J	Fe-CuNi
K	NiCr-NiAl

D Execution

U	with non-replaceable insert
U/Exi	Intrinsic safe with non-replaceable insert
PS	with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert

E Sheathed insert diameter d_1

3	d_1= 3 mm
4,5	d_1= 4,5 mm
6	d_1= 6 mm

F Protection tube diameter d

10	d= 10 mm
12	d= 12 mm
13,7	d= 13,7 mm
15	d= 15 mm
22	d= 22 mm
	specify other diam. in mm

G Immersion lengths L_1/ L_2/.../ L_n

	specify in mm

H Protection tube material

1.4571	1.4571 / 316Ti
1.4404	1.4404 / 316L
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22
1.4841	1.4841 / 314
	specify other material

I Process connection

	specify type of thread or flange or compression fitting

J Cable gland number and size

m x M20x1,5	number x M20x1,5
m x 1/2NPT	number x 1/2"NPT
	specify amount and type of thread

K Junction / Protection Box

	specify head type

L Operating temperature

	specify in °C

M Transmitter

	specify type and temp. range in °C

Ordering Example

TER-PF-189-3xK-PS/Exi-3-12-1500/1400/1300-1.4571-DN25PN40B1-400-3xM20x1,5

stands for: Flanged multipoint thermocouple, with three thermoelements NiCr-NiAl, intrinsic safe with replaceable insert, sheath diam. ø3 mm, protection tube diam. ø12 mm, immersion lengths L1=1500mm, L2=1400mm, L3=1300mm material 1.4571, flanged connection DN25 PN40 form B1, cable inlets 3 x M20x1,5, operating temperature 400°C, w/o transmitter.

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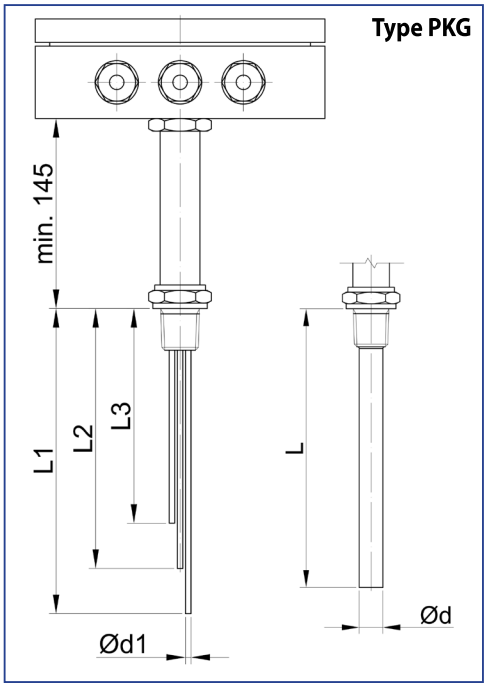
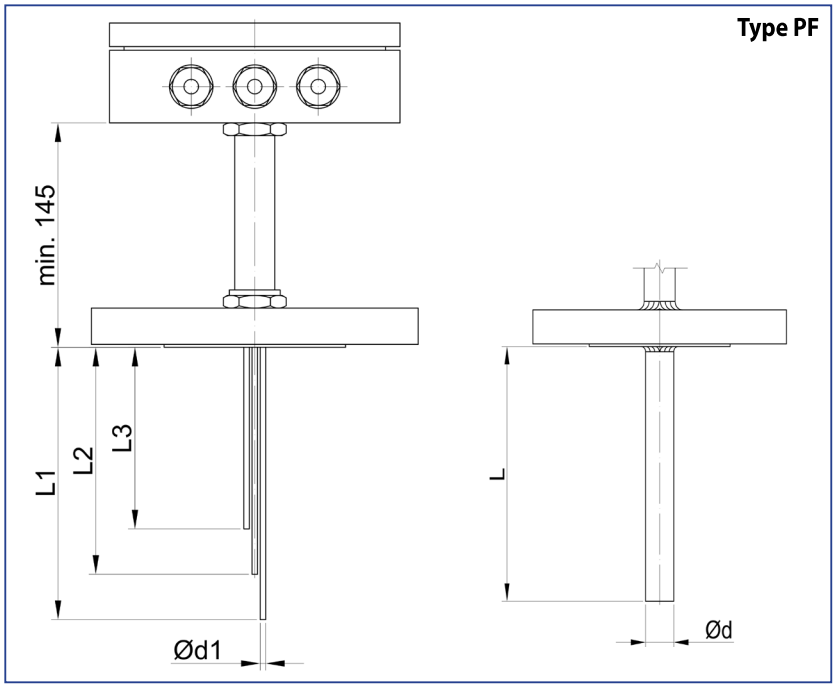
TOP-PKG/PF/PD-193

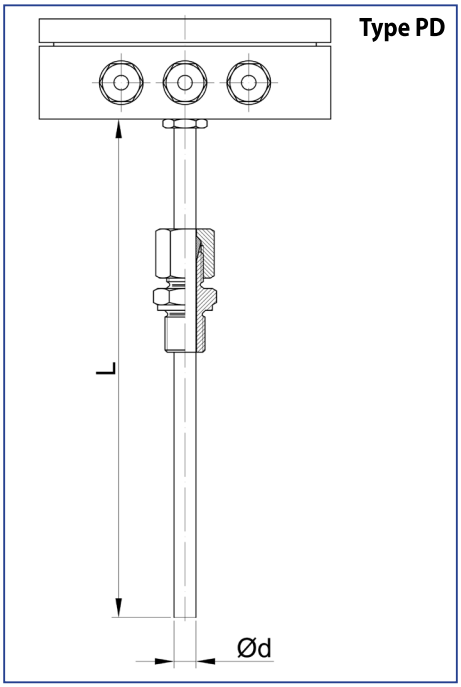


Resistance Thermometer Pt100 Multipoint

Multipoint resistance thermometer type TOP-PKG/PF/PD-193 with three types of process connections (flanged, threaded or adjustable fitting) is designed for measurement of temperature distribution in containers and columns in the temp. range from -40°C to +600°C. The measurement is done by several resistors situated in different positions.

Type	Execution
TOP-PKG/PF/PD-193	Basic - acc to catalog card
TOP-PKG/PF/PD-193/Exi	Intrinsic safe – acc to Atex





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TOP-PKG/PF/PD-193

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100	standard / *shockproof	acc. EN-60751	-40°C..+600°C / *(-40°C..+500°C)	B	8 mA	2, 3, 4 wire
			-40°C..+450°C / *(-40°C..+300°C)	A	5 mA	3, 4 wire

Protect. tube diam. d	Material acc. DIN/AISI	Max operating temp.	Sensor length L_n [mm]
ø10, ø11, ø12, ø13.5, ø15	1.4571 / 316Ti	+700°C	on request
ø10, ø22	1.4841 / 314	+1100°C	
ø10, ø11, ø15	1.7335 / A182 Grade F11	+550°C	
ø13,7	2.4602 / Hastelloy C22	+600°C	

Process connection		
Type PKG	threaded	on request (e.g. M24x1,5, G1/2", G1",1"NPT)
Type PF	flanged	on request (e.g. DN25 PN40 B1 acc. EN 1092-1, 2"150 RF acc. ASME B16,5)

Junction / Protection Box	Max. ambient temp.	Cable gland thread	Transmitter
depends on number of measure points	+150°C	on request (e.g. M20x1,5, 1/2"NPT)	on request

Threaded compression fitting type UZG-47
on request, acc. to catalog card – ***UZG-47***

To help ensure you are quoted the correct product, please complete:

"Multipoint Thermometer process data sheet"

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Ordering Information

TOP	A	193	B	C	D	E	F	G	H	I	J	K	L	M	N

A	Type of process connection
PKG	threaded connection
PF	flanged connection
PD	threaded compression fitting type UZG-47

B	number of measure points n
2xPt100	two
3xPt100	three
nxPt100	specify amount

C	Class
B	B
A	A

D	Execution
U	with non-replaceable insert
U/Exi	Intrinsic safe with non-replaceable insert
PS	with replaceable insert
PS/Exi	Intrinsic safe with replaceable insert

E	Lead wire configuration
2p	2-wire
3p	3-wire
4p	4-wire

F	Sheathed insert diameter d_1
3	d_1= 3mm
4,5	d_1= 4,5 mm
6	d_1= 6 mm

G	Protection tube diameter d
10	d= 10 mm
12	d= 12 mm
13,7	d= 13,7 mm
15	d= 15 mm
22	d= 22 mm
	specify other diam. in mm

H	Sensor lengths L_1/ L_2/.../ L_n
	specify in [mm]

I	Protection tube material
1.4571	1.4571 / 316Ti
1.4404	1.4404 / 316L
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22
1.4841	1.4841 / 314
	specify other material

J	Process connection
	specify type of thread or flange or compression fitting

K	Cable gland number and size
m x M20x1,5	number x M20x1,5
m x 1/2NPT	number x 1/2"NPT
	specify amount and type of thread

L	Junction / Protection Box
	specify head type

M	Operating temperature
	specify in °C

N	Transmitter
	specify type and temp. range in °C

Ordering Example

TOP-PKG-193-3xPt100-B-PS-2p-6-15-250/300/500-1.4571-M27x2-NA-400

stands for: Threaded multipoint thermometer, with replaceable insert, with three resistors class B, 2-wire configuration, sheath diam. ø 6 mm, protection tube diameter ø15, immersion lengths L1=250mm, L2=300mm, L3=500mm, material 1.4571, threaded connection M27x2, connection head type NA, sensor operating temperature 400°C, w/o transmitter.

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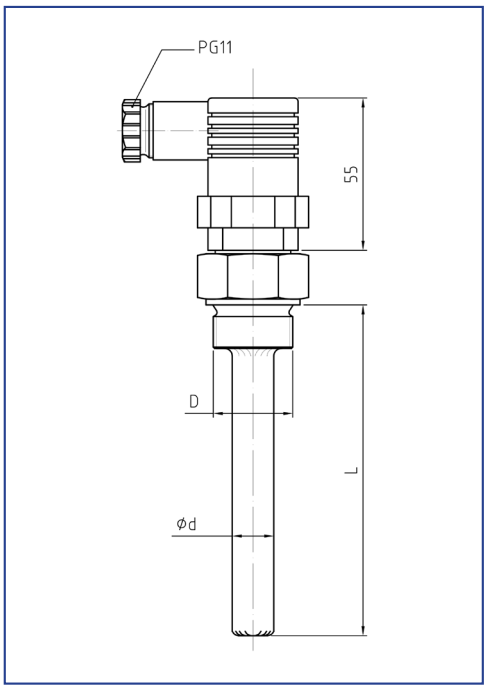
TOP-GDM-201



Resistance Thermometer Pt100 with rectangular connector

Resistance thermometer Pt-100 with rectangular connector is for temperature measurement of machines, instruments, gases, liquids and solids, both in industry and in laboratory conditions.

Thermometer has rectangular connection of firm Hirschmann type GDM protection IP65, allowing cable disconnecting, miniaturization of sensor and working in difficult conditions.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100	standard / *shockproof	acc. EN-60751	-50°C..+300°C / *(-50°C..+300°C)	B	8 mA	2, 3, 4 wire
				A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Immersion length L [mm]	Process connection thread D
ø4, ø6, ø8, ø9, ø10	1.4571/316Ti	on request	on request (e.g. M14x1,5, M20x1,5, G1/2", 1/2"NPT)

Connector	Ingress Protection
GDM (firm Hirschmann)	IP65

Non-standard models available.

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Ordering Information

TOP-GDM-201	A	B	C	D	E	F	G	H	I

A	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

B	Class
B	B
A	A
1/3B	1/3B (AA)

C	Lead wire configuration
2p	2-wire
3p	3-wire
4p	4-wire

D	Protection tube diam. d
4	d= 4 mm
6	d= 6 mm
8	d= 8 mm
9	d= 9 mm
10	d= 10 mm

E	Immersion length L
	specify in [mm]

F	Protection tube material
1.4571	1.4571 / 316Ti

G	Process connection thread D
	specify type of thread

H	Operating temperature
	specify in °C

I	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-GDM-201-1xPt100-A-3p-6-150-1.4571-M20x1,5-250-Z

stands for: Resistance thermometer, with resistor 1xPt100, class A, configuration 3-wire, protection tube diameter d=ø6 mm, immersion length L=150 mm, tube material 1.4571, thread M20x1,5, operating temp. up to 250°C, standard sensor version (ceramic wire wound element).

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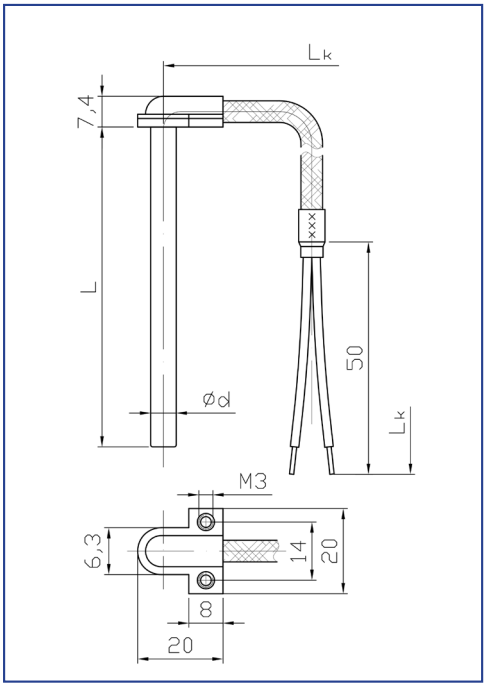
TOP-KtKbm-217



Resistance Thermometer Pt100
Miniature
Angular
with connection cable

Resistance thermometer angular with connecting cable type TOP-KtKbm-217 is for temperature measurement of various machine sub-assemblies.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Protect. tube diam. d	Material acc. DIN/AISI	Max. operating temperature	Immersion length L [mm]
ø4, ø5, ø6	1.4571/316Ti	+400°C	on request (min. 40 mm)

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits	Length L [mm]
2 wire	ø2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C	on request
3, 4 wire	ø3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen		
2 wire	ø4,3	L2SDS-2x0,25mm2	silicone, screen, silicone	+180°C	
3, 4 wire	ø4,4	L4TDS-4x0,25mm2	teflon, screen, silicone		
3, 4 wire	ø4	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C	

Non-standard models available.

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Ordering Information

TOP-KtKbm-217	A	B	C	D	E	F	G	H	I

A	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

B	Class
B	B
A	A
1/3B	1/3B (AA)

C	Protection tube diameter d
4	d= 4 mm
5	d= 5 mm
6	d= 6 mm

D	Immersion length L
	specify in mm

E	Protection tube material
1.4571	1.4571 / 316Ti

F	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-2x0,22mm2)
4p-L4GGD	4 wire (L4GGD-2x0,22mm2)
2p-L2SDS	2 wire(L2SDS-2x0,25mm2)
3p-L4TDS	3 wire (4TDS-4x0,25mm2)
4p-L4TDS	4 wire (4TDS-4x0,25mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TFDT-4x0,22mm2)

G	Cable length L_K
	specify in mm

H	Operating temperature
	specify in °C

I	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-KtKbm-217-1xPt100-A-6-40-1.4571-3p-L4TFDT-2000-150-Z

stands for: Resistance thermometer, with resistor 1xPt100, class A, protection tube diameter ø6 mm, immersion length L=40, material 1.4571, configuration 3-wire, cable type L4TFDT, length L_K=2000 mm, operating temp. up to 150°C, standard sensor version (ceramic wire wound element).

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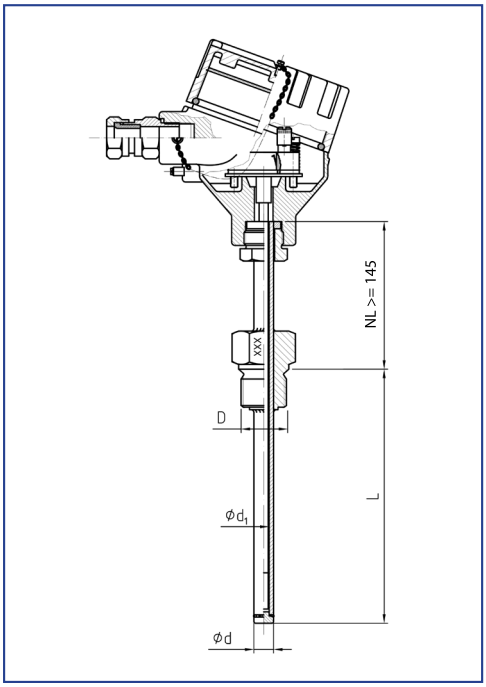
TOP-Exd-PKG-230



Resistance Thermometer Pt100 Flame-proof acc. to ATEX with threaded thermowell

Resistance thermometer type TOP-Exd-PKG-230 signed II 2 G Ex db IIC T* Gb has been designed for temperature measurement in explosion zone 1 or 2 of gases area and can work with non-intrinsic safe wire configuration.

Resistance thermometer type TOP-Exd-PKG-230 signed II 1/2 D Ex ta IIIC T*°C Da/Db for use in dust area with non-intrinsic safe wire configuration.

Connection head is optionally equipped with 1 or 2 cable inserts, and with terminal block or transmitter.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire configuration
1xPt100, 1xPt500, 1xPt1000 / 2xPt100, 2xPt500, 2xPt1000	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B DIN (AA)	3 mA	

Protection tube diameter d [mm]	Material	Immersion length L [mm]	Process connection thread D
ø10x1,5 ; ø11x2 ; ø12x1,5 ; ø12x2,5 ; ø13.5x2,3 ; ø15x3	stainless steel, acid resistant steel, heat-resisting steel, boiler steel, alloy steel	on request (max L up to 2000 mm)	on request (e.g. M12x1,5; M14x1,5; M16x1,5; M18x1,5; M20x1,5; M24x1,5; M27x2; M33x3; G1/2"; G3/4"; G1"; 1/2"NPT; 3/4"NPT; 1"NPT)

Connection head	Temp. range (depends on connection head sealing)	Cable gland thread	Purpose	Transmitter
XD-AHH; XD-AD; XD-ADwin; XD-AHwin; XD-SD; XD-SB; XD-SH	-50°C..+150°C (o-ring silicon); -50°C..+85°C (o-ring silicon with hole); -20°C..+200°C (o-ring fluoroelastomer)	Typ 501/421	for basic cables	w/o transmitter (with terminal block) or with transmitter
		Typ 501/453	for armored cable	

Non-standard models available.

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Ordering Information

TOP-Exd-PKG-230	A	B	C	D	E	F	G	H	I	J	K	L	M	N

A	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100
1xPt500	Single Pt500
2xPt500	Double Pt500
1xPt1000	Single Pt1000
2xPt1000	Double Pt1000

B	Class
B	B
A	A
1/3B	1/3B DIN (AA)

C	Lead wire configuration
2p	2-wire
3p	3-wire
4p	4-wire

D	Sheathed insert diameter d_1
6	d_1= 6 mm
8	d_1= 8 mm

E	Protection tube diameter d
10	d= 10x1,5 mm
11	d= 11x2 mm
12	d= 12x1,5 mm
13,5	d= 13,5x2,3 mm
15	d= 15x3 mm
	or bigger (minimal wall thickness 1,5 mm)

F	Immersion length L (max L up to 2000 mm)
	specify in [mm]

G	Protection tube material
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
2.4602	2.4602 / Hastelloy C22

H	Process connection thread D
	specify type of thread

I	Neck tube length NL (NL>=145 mm)
	specify in [mm]

J	Connection head
	specify head type

K	Cable gland (flameproof)
1x 501/421	1x type 501/421
2x 501/421	2x type 501/421
1x 501/453	1x type 501/453
2x 501/453	2x type 501/453

L	Operating temperature
	specify in °C

M	Transmitter
	specify type and temp. range in °C

N	Explosion Zone
Zone 1	Non-intrinsic safe circuit
Zone 20/21	Non-intrinsic safe circuit

Ordering Example

TOP-Exd-PKG-230-1xPt100-A-3p-6-10-1500-1.4571-M20x1,5-145-XD-AD-1x501/421

stands for: Resistance thermometer, flame-proof, with threaded fitting, with single resistor class. A, configuration 3-wire, sheath diameter ø6, protection tube diameter ø10 mm, length L=1500mm, material 1.4571, thread M20x1,5, neck tube length NL=145 mm, connection head type XD-AD, cable insert 1 x type 501/421, w/o transmitters.

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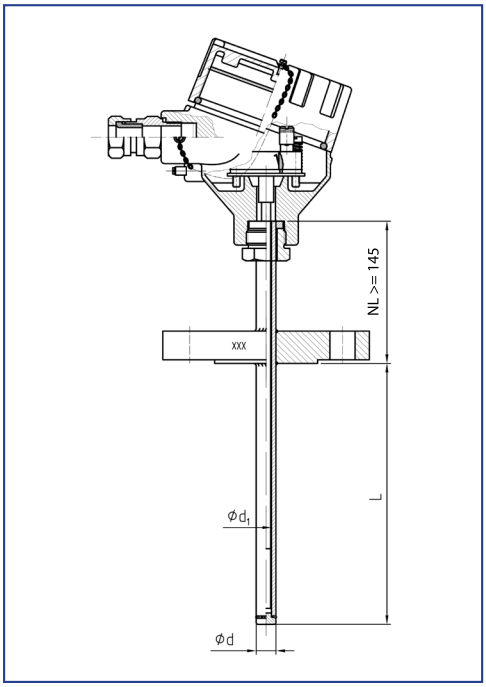
TOP-Exd-PF-231



Resistance Thermometer Pt100 Flame-proof acc. to ATEX with flanged thermowell

Resistance thermometer type TOP-Exd-PF-231 signed II 2 G Ex db IIC T* Gb has been designed for temperature measurement in explosion zone 1 or 2 of gases area and can work with non-intrinsic safe wire configuration.

Resistance thermometer type TOP-Exd-PF-231 signed II 1/2 D Ex ta IIIC T*°C Da/Db for use in dust area with non-intrinsic safe wire configuration.

Connection head is optionally equipped with 1 or 2 cable inserts, and with terminal block or transmitter.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire configuration
1xPt100, 1xPt500, 1xPt1000 / 2xPt100, 2xPt500, 2xPt1000	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B DIN (AA)	3 mA	

Protection tube diameter d [mm]	Material	Immersion length L [mm]	Flanged process connection
ø10x1,5 ; ø11x2 ; ø12x1,5 ; ø12x2,5 ; ø13.5x2,3 ; ø15x3	stainless steel, acid resistant steel, heat-resisting steel, boiler steel, alloy steel	on request (max L up to 2000 mm)	on request (e.g. DN25 PN40 B1 acc. EN 1092-1 or 2"150 RF acc. ASME B16,5)

Connection head	Temp. range (depends on connection head sealing)	Cable gland thread	Purpose	Transmitter
XD-AHH; XD-AD; XD-ADwin; XD-AHwin; XD-SD; XD-SB; XD-SH	-50°C..+150°C (o-ring silicon); -50°C..+85°C (o-ring silicon with hole); -20°C..+200°C (o-ring fluoroelastomer)	Typ 501/421	for basic cables	w/o transmitter (with terminal block) or with transmitter
		Typ 501/453	for armored cable	

Non-standard models available.

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Ordering Information

TOP-Exd-PF-231	A	B	C	D	E	F	G	H	I	J	K	L	M	N

A Resistor	
1xPt100	Single Pt100
2xPt100	Double Pt100
1xPt500	Single Pt500
2xPt500	Double Pt500
1xPt1000	Single Pt1000
2xPt1000	Double Pt1000

B Class	
B	B
A	A
1/3B	1/3B DIN (AA)

C Lead wire configuration	
2p	2-wire
3p	3-wire
4p	4-wire

D Sheathed insert diameter d_1	
6	d_1= 6 mm
8	d_1= 8 mm

E Protection tube diameter d	
10	d= 10x1,5 mm
11	d= 11x2 mm
12	d= 12x1,5 mm
13,5	d= 13,5x2,3 mm
15	d= 15x3 mm
	or bigger (minimal wall thickness 1,5 mm)

F Immersion length L (max L up to 2000 mm)	
	specify in [mm]

G Protection tube material	
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
2.4602	2.4602 / Hastelloy C22

H Flanged process connection	
	specify type of flange

I Neck tube length NL (NL>=145 mm)	
	specify in [mm]

J Connection head	
	specify head type

K Cable gland (flameproof)	
1x 501/421	1x type 501/421
2x 501/421	2x type 501/421
1x 501/453	1x type 501/453
2x 501/453	2x type 501/453

L Operating temperature	
	specify in °C

M Transmitter	
	specify type and temp. range in °C

N Explosion Zone	
Zone 1	Non-intrinsic safe circuit
Zone 20/21	Non-intrinsic safe circuit

Ordering Example

TOP-Exd-PF-231-1xPt100-A-3p-6-10-1500-1.4571-DN25PN40B1-145-XD-AD-1x501/421-APAQ-HRFX(0-100)

stands for: Resistance thermometer flame-proof with flange, with single resistor class. A, configuration 3-wire, sheath diam. 6 mm, protection tube diam. ø10 mm, length L=1500mm, material 1.4571, flange DN25PN40 form B1, neck tube length NL=145mm, connection head type XD-AD, cable insert 1 x type 501/421, transmitter type APAQ temp. range 0-100°C.

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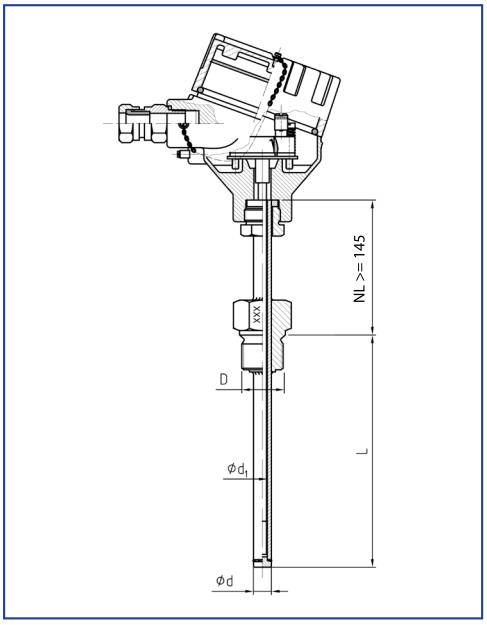
TER-Exd-PKG-232



Thermocouple
Flame-proof acc. to ATEX
with threaded thermowell

Thermocouple type TER-Exd-PKG-232 signed II 2 G Ex db IIC T* Gb has been designed for temperature measurement in explosion zone 1 or 2 of gases area and can work with non-intrinsic safe wire configuration.

Thermocouple type TER-Exd-PKG-232 signed II 1/2 D Ex ta IIIC T*°C Da/Db for use in dust area with non-intrinsic safe wire configuration.

Connection head is optionally equipped with 1 or 2 cable inserts, and with terminal block or transmitter.

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..(+750°C)*	wg EN 60584-1	Ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..(+1000°C)*		
1xCu-CuNi(T), 2xCu-CuNi(T)	-40°C..(+350°C)*		
1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg(N)	-40°C..(+1000°C)*		
1xNiCr-CuNi(E), 2xNiCr-CuNi(E)	-40°C..(+900°C)*		

* upper temperature is limited by work environment and protection tube material

Protection tube diameter d [mm]	Material	Immersion length L [mm]	Process connection thread D
ø10x1,5 ; ø11x2 ; ø12x1,5 ; ø12x2,5 ; ø13.5x2,3 ; ø15x3	stainless steel, acid resistant steel, heat-resisting steel, boiler steel, alloy steel	on request (max L up to 2000 mm)	on request (e.g. M12x1,5; M14x1,5; M16x1,5; M18x1,5; M20x1,5; M24x1,5; M27x2; M33x3; G1/2"; G3/4"; G1"; 1/2"NPT; 3/4"NPT; 1"NPT)

Connection head	Temp. range (depends on connection head sealing)	Cable gland thread	Purpose	Transmitter
XD-AHH; XD-AD; XD-ADwin; XD-AHwin; XD-SD; XD-SB; XD-SH	-50°C..+150°C (o-ring silicon); -50°C..+85°C (o-ring silicon with hole); -20°C..+200°C (o-ring fluoroelastomer)	Typ 501/421	for basic cables	w/o transmitter (with terminal block) or with transmitter
		Typ 501/453	for armored cable	

Non-standard models available.

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Ordering Information

TER-Exd-PKG-232	A	B	C	D	E	F	G	H	I	J	K	L

A	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xT	Single Cu-CuNi
2xT	Double Cu-CuNi
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg
1xE	Single NiCr-CuNi
2xE	Double NiCr-CuNi

B	Sheathed insert diameter d_1
6	d_1= 6 mm
8	d_1= 8 mm

C	Protection tube diameter d
10	d= 10x1,5 mm
11	d= 11x2 mm
12	d= 12x1,5 mm
13,5	d= 13,5x2,3 mm
15	d= 15x3 mm
	or bigger (minimal wall thickness 1,5 mm)

D	Immersion length L (max L up to 2000 mm)
	specify in [mm]

E	Protection tube material
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
2.4602	2.4602 / Hastelloy C22
	specify other material

F	Process connection thread D
	specify type of thread

G	Neck tube length NL (NL>=145 mm)
	specify in [mm]

H	Connection head
	specify head type

I	Cable gland (flameproof)
1x 501/421	1x type 501/421
2x 501/421	2x type 501/421
1x 501/453	1x type 501/453
2x 501/453	2x type 501/453

J	Operating temperature
	specify in °C

K	Transmitter
	specify type and temp. range in °C

L	Explosion Zone
Zone 1	Non-intrinsic safe circuit
Zone 20/21	Non-intrinsic safe circuit

Ordering Example

TER-Exd-PKG-232-1xK-8-15-1000-1.4571-M20x1,5-145-XD-AD-1x501/421-400

stands for: Thermocouple flame-proof with threaded fitting, 1xNiCr-NiAl, sheath diameter ø8 mm, protection tube diameter ø15 mm, length L=1000mm, material 1.4571, thread M20x1,5, neck tube length NL=145mm, connection head type XD-AD, cable insert 1 x type 501/421, operating temp up to 400°C, w/o transmitter.

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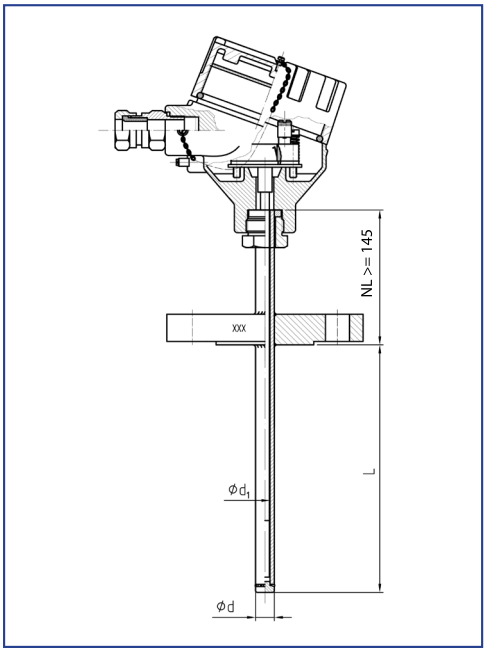
TER-Exd-PF-233



Thermocouple Flame-proof acc. to ATEX with flanged thermowell

Thermocouple type TER-Exd-PF-233 signed II 2 G Ex db IIC T* Gb has been designed for temperature measurement in explosion zone 1 or 2 of gases area and can work with non-intrinsic safe wire configuration.

Thermocouple type TER-Exd-PF-233 signed II 1/2 D Ex ta IIIC T*°C Da/Db for use in dust area with non-intrinsic safe wire configuration.

Connection head is optionally equipped with 1 or 2 cable inserts, and with terminal block or transmitter.

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..(+750°C)*	wg EN 60584-1	Ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..(+1000°C)*		
1xCu-CuNi(T), 2xCu-CuNi(T)	-40°C..(+350°C)*		
1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg(N)	-40°C..(+1000°C)*		
1xNiCr-CuNi(E), 2xNiCr-CuNi(E)	-40°C..(+900°C)*		

* upper temperature is limited by work environment and protection tube material

Protection tube diameter d [mm]	Material	Immersion length L [mm]	Flanged process connection
ø10x1,5 ; ø11x2 ; ø12x1,5 ; ø12x2,5 ; ø13.5x2,3 ; ø15x3	stainless steel, acid resistant steel, heat-resisting steel, boiler steel, alloy steel	on request (max L up to 2000 mm)	on request (e.g. DN25 PN40 B1 acc. EN 1092-1 or 2"150 RF acc. ASME B16,5)

Connection head	Temp. range (depends on connection head sealing)	Cable gland thread	Purpose	Transmitter
XD-AHH; XD-AD; XD-ADwin; XD-AHwin; XD-SD; XD-SB; XD-SH	-50°C..+150°C (o-ring silicon); -50°C..+85°C (o-ring silicon with hole); -20°C..+200°C (o-ring fluoroelastomer)	Typ 501/421	for basic cables	w/o transmitter (with terminal block) or with transmitter
		Typ 501/453	for armored cable	

Non-standard models available.

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Ordering Information

TER-Exd-PF-233	A	B	C	D	E	F	G	H	I	J	K	L

A	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xT	Single Cu-CuNi
2xT	Double Cu-CuNi
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg
1xE	Single NiCr-CuNi
2xE	Double NiCr-CuNi

B	Sheathed insert diameter d_1
6	d_1= 6 mm
8	d_1= 8 mm

C	Protection tube diameter d
10	d= 10x1,5 mm
11	d= 11x2 mm
12	d= 12x1,5 mm
13,5	d= 13,5x2,3 mm
15	d= 15x3 mm
	or bigger (minimal wall thickness 1,5 mm)

D	Immersion length L (max L up to 2000 mm)
	specify in [mm]

E	Protection tube material
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
2.4602	2.4602 / Hastelloy C22
	specify other material

F	Flanged process connection
	specify type of flange

G	Neck tube length NL (NL>=145 mm)
	specify in [mm]

H	Connection head
	specify head type

I	Cable gland (flameproof)
1x 501/421	1x type 501/421
2x 501/421	2x type 501/421
1x 501/453	1x type 501/453
2x 501/453	2x type 501/453

J	Operating temperature
	specify in °C

K	Transmitter
	specify type and temp. range in °C

L	Explosion Zone
Zone 1	Non-intrinsic safe circuit
Zone 20/21	Non-intrinsic safe circuit

Ordering Example

TER-Exd-PF-233-1xK-8-15-1000-1.4571-DN25PN40B1-145-XD-AD-1x501/421-400

stands for: Thermocouple flame-proof with flange, 1xNiCr-NiAl, sheath diameter ø8 mm, protection tube diameter ø15 mm, length L=1000mm, material 1.4571, flange DN25PN40 form B1, neck tube length NL=145mm, connection head type XD-AD, cable insert 1 x type 501/421, operating temp. up to 400°C, w/o transmitter.

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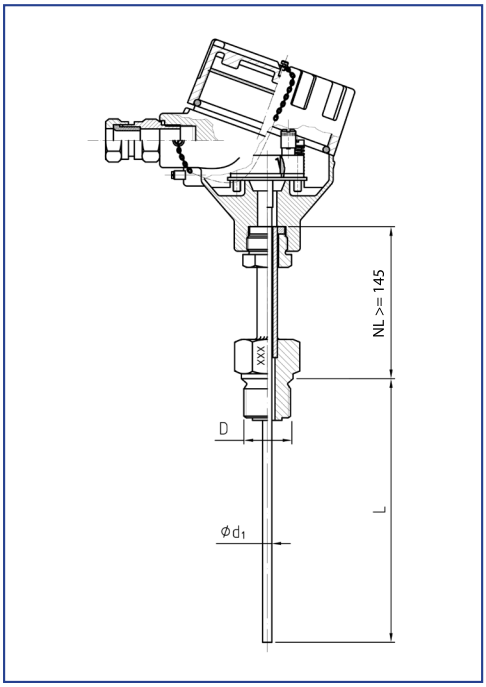
TOP-Exd-PKGz-236



Resistance Thermometer Pt100 Flame-proof acc. to ATEX for mounting into existing thermowell

Resistance thermometer type TOP-Exd-PKGz-236 signed II 2 G Ex db IIC T* Gb has been designed for temperature measurement in explosion zone 1 or 2 of gases area and can work with non-intrinsic safe wire configuration.

Resistance thermometer type TOP-Exd-PKGz-236 signed II 1/2 D Ex ta IIIC T*°C Da/Db for use in dust area with non-intrinsic safe wire configuration.

Thermometer is dedicated for mounting into existing thermowell in the installation.

Connection head is optionally equipped with 1 or 2 cable inserts, and with terminal block or transmitter.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire configuration
1xPt100, 1xPt500, 1xPt1000 / 2xPt100, 2xPt500, 2xPt1000	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B DIN (AA)	3 mA	

Sheathed insert diameter d_1 [mm]	Length L [mm]	Process connection thread D
ø 6, ø 8	on request (max L up to 2000 mm)	on request (e.g. M12x1,5; M14x1,5; M16x1,5; M18x1,5; M20x1,5; M24x1,5; M27x2; M33x3; G1/2"; G3/4"; G1"; 1/2"NPT; 3/4"NPT; 1"NPT)

Connection head	Temp. range (depends on connection head sealing)	Cable gland thread	Purpose	Transmitter
XD-AHH; XD-AD; XD-ADwin; XD-AHwin; XD-SD; XD-SB; XD-SH	-50°C..+150°C (o-ring silicon); -50°C..+85°C (o-ring silicon with hole); -20°C..+200°C (o-ring fluoroelastomer)	Typ 501/421	for basic cables	w/o transmitter (with terminal block) or with transmitter
		Typ 501/453	for armored cable	

Non-standard models available.

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Ordering Information

TOP-Exd-PKGz-236	A	B	C	D	E	F	G	H	I	J	K	L	M

A Resistor	
1xPt100	Single Pt100
2xPt100	Double Pt100
1xPt500	Single Pt500
2xPt500	Double Pt500
1xPt1000	Single Pt1000
2xPt1000	Double Pt1000

B Class	
B	B
A	A
1/3B	1/3B DIN (AA)

C Lead wire configuration	
2p	2-wire
3p	3-wire
4p	4-wire

D Sheathed insert diameter d_1	
6	d_1= 6 mm
8	d_1= 8 mm

E Immersion length L (max L up to 2000 mm)	
	specify in [mm]

F Process connection fitting material	
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
2.4602	2.4602 / Hastelloy C22

G Process connection thread D	
	specify type of thread

H Neck tube length NL (NL>=145 mm)	
	specify in [mm]

I Connection head	
	specify head type

J Cable gland (flameproof)	
1x 501/421	1x type 501/421
2x 501/421	2x type 501/421
1x 501/453	1x type 501/453
2x 501/453	2x type 501/453

K Operating temperature	
	specify in °C

L Transmitter	
	specify type and temp. range in °C

M Explosion Zone	
Zone 1	Non-intrinsic safe circuit
Zone 20/21	Non-intrinsic safe circuit

Ordering Example

TOP-Exd-PKGz-236-2xPt100-A-3p-6-1500-1.4571-M20x1,5-145-XD-AD-2x501/421

stands for: Resistance thermometer, flame-proof, with double resistor class. A, configuration 3-wire, sheath diameter ø6 mm, length L=1500mm, material 1.4571, thread M20x1,5, neck tube length NL=145mm, connection head type XD-AD, cable insert 2 x type 501/421, w/o transmitters.

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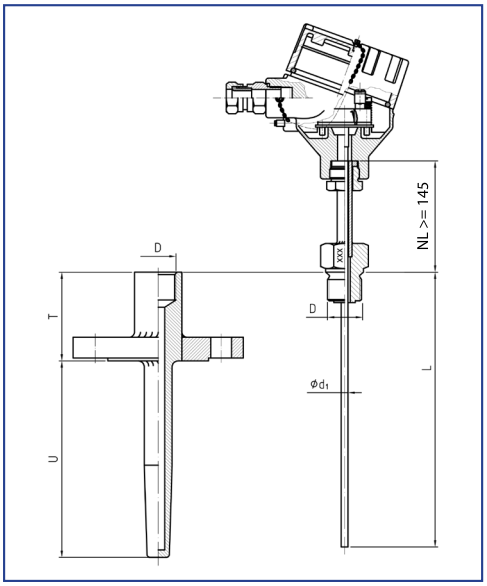
TOP-Exd-PKG/PF-237



Resistance Thermometer Pt100 Flame-proof acc. to ATEX with flanged thermowell

Resistance thermometer type TOP-Exd-PKG/PF-237 signed II 2 G Ex db IIC T* Gb has been designed for temperature measurement in explosion zone 1 or 2 of gases area and can work with non-intrinsic safe wire configuration.

Resistance thermometer type TOP-Exd-PKG/PF-237 signed II 1/2 D Ex ta IIIC T*°C Da/Db for use in dust area with non-intrinsic safe wire configuration.

Connection head is optionally equipped with 1 or 2 cable inserts, and with terminal block or transmitter.

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire configuration
1xPt100, 1xPt500, 1xPt1000 / 2xPt100, 2xPt500, 2xPt1000	standard / *shockproof	acc. EN-60751	-200°C..+600°C / *(-70°C..+500°C)	B	8 mA	2, 3, 4 wire
			-100°C..+450°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B DIN (AA)	3 mA	

Sheathed insert diameter d_1 [mm]	Length L [mm]	Flanged process connection of additional thermowell	Process connection thread D
ø 6, ø 8	on request (max L up to 1100 mm)	on request (e.g. DN25 PN40 B1 acc. DIN1092-1; 2"150 RF acc. ASME B16,5)	on request (e.g. M12x1,5; M14x1,5; M16x1,5; M18x1,5; M20x1,5; M24x1,5; M27x2; M33x3; G1/2"; G3/4"; G1"; 1/2"NPT; 3/4"NPT; 1"NPT)

Connection head	Temp. range (depends on connection head sealing)	Cable gland thread	Purpose	Transmitter
XD-AHH; XD-AD; XD-ADwin; XD-AHwin; XD-SD; XD-SB; XD-SH	-50°C..+150°C (o-ring silicon); -50°C..+85°C (o-ring silicon with hole); -20°C..+200°C (o-ring fluoroelastomer)	Typ 501/421	for basic cables	w/o transmitter (with terminal block) or with transmitter
		Typ 501/453	for armored cable	

Additional thermowell
on request, acc. to catalog card – *THERMOWELLS for thermometers and thermocouples*

Non-standard models available.

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Ordering Information

TOP-Exd-PKG/PF-237	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O

A Resistor	
1xPt100	Single Pt100
2xPt100	Double Pt100
1xPt500	Single Pt500
2xPt500	Double Pt500
1xPt1000	Single Pt1000
2xPt1000	Double Pt1000

B Class	
B	B
A	A
1/3B	1/3B DIN (AA)

C Lead wire configuration	
2p	2-wire
3p	3-wire
4p	4-wire

D Sheathed insert diameter d_1	
6	d_1= 6 mm
8	d_1= 8 mm

E Length L (max L up to 2000 mm)	
	specify in [mm]

F Process connection fitting material	
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
2.4602	2.4602 / Hastelloy C22

G Process connection thread D	
	specify type of thread

H Neck tube length NL (NL>=145 mm)	
	specify in [mm]

I Additional thermowell flange	
	specify type

J Connection head	
	specify head type

K Cable gland (flameproof)	
1x 501/421	1x type 501/421
2x 501/421	2x type 501/421
1x 501/453	1x type 501/453
2x 501/453	2x type 501/453

L Operating temperature	
	specify in °C

M Transmitter	
	specify type and temp. range in °C

N Explosion Zone	
Zone 1	Non-intrinsic safe circuit
Zone 20/21	Non-intrinsic safe circuit

O Additional thermowell (option)	
TW	acc. to catalog card – *THERMOWELLS*

Ordering Example

TOP-Exd-PKG/PF-237-1xPt100-A-3p-6-600-1.4571-G1/2-145-DN25PN40B1-XD-AD-1x501/421-TW

stands for: Resistance thermometer flame-proof, with single resistor class. A, config 3-wire, sheath diam. ø6 mm, length L=600mm, material 1.4571,process connection fitting G1/2", neck tube length NL=145mm, t-well flange DN25PN40 form B1, neck tube length NL=145mm, connection head XD-AD, cable insert 1 x typ 501/421, w/o transmitter, with additional thermowell

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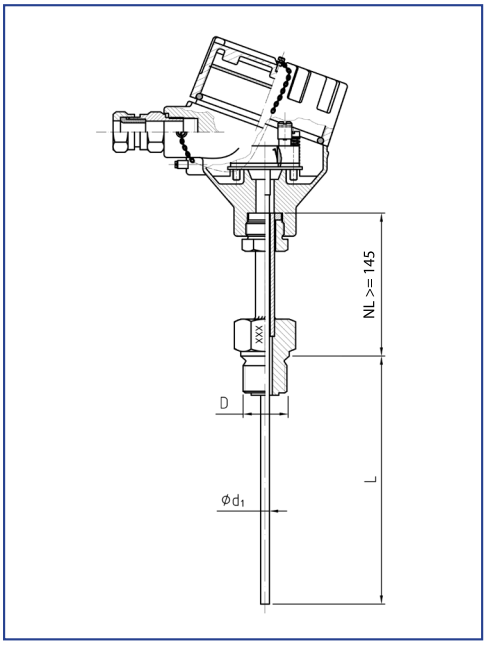
TER-Exd-PKGz-238



Thermocouple
Flame-proof acc. to ATEX
for mounting into existing thermowell

Thermocouple type TER-Exd-PKGz-238 Ex signed II 2 G Ex db IIC T* Gb has been designed for temperature measurement in explosion zone 1 or 2 of gases area and can work with non-intrinsic safe wire configuration.

Thermocouple type TER-Exd-PKGz-238 Ex signed II 1/2 D Ex ta IIIC T*°C Da/Db for use in dust area with non-intrinsic safe wire configuration.

Thermocouple is dedicated for mounting into existing thermowell in the installation.

Connection head is optionally equipped with 1 or 2 cable inserts, and with terminal block or transmitter.

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..(+750°C)*	wg EN 60584-1	Ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..(+1000°C)*		
1xCu-CuNi(T), 2xCu-CuNi(T)	-40°C..(+350°C)*		
1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg(N)	-40°C..(+1000°C)*		
1xNiCr-CuNi(E), 2xNiCr-CuNi(E)	-40°C..(+900°C)*		

* upper temperature is limited by work environment and protection tube material

Sheathed insert diameter d_1 [mm]	Length L [mm]	Process connection thread D
ø 6, ø 8	on request (max L up to 2000 mm)	on request (e.g. M12x1,5; M14x1,5; M16x1,5; M18x1,5; M20x1,5; M24x1,5; M27x2; M33x3; G1/2"; G3/4"; G1"; 1/2"NPT; 3/4"NPT; 1"NPT)

Connection head	Temp. range (depends on connection head sealing)	Cable gland thread	Purpose	Transmitter
XD-AHH; XD-AD; XD-ADwin; XD-AHwin; XD-SD; XD-SB; XD-SH	-50°C..+150°C (o-ring silicon); -50°C..+85°C (o-ring silicon with hole); -20°C..+200°C (o-ring fluoroelastomer)	Typ 501/421	for basic cables	w/o transmitter (with terminal block) or with transmitter
		Typ 501/453	for armored cable	

Non-standard models available.

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Ordering Information

TER-Exd-PKGz-238	A	B	C	D	E	F	G	H	I	J	K

A Type of thermocouple

1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xT	Single Cu-CuNi
2xT	Double Cu-CuNi
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg
1xE	Single NiCr-CuNi
2xE	Double NiCr-CuNi

B Sheathed insert diameter d_1

6	d_1 = 6 mm
8	d_1 = 8 mm

C Length L (max L up to 2000 mm)

	specify in [mm]

D Process connection fitting material

1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
2.4602	2.4602 / Hastelloy C22
	specify other material

E Process connection thread D

	specify type of thread

F Neck tube length NL (NL>=145 mm)

	specify in [mm]

G Connection head

	specify head type

H Cable gland (flameproof)

1x 501/421	1x type 501/421
2x 501/421	2x type 501/421
1x 501/453	1x type 501/453
2x 501/453	2x type 501/453

I Operating temperature

	specify in °C

J Transmitter

	specify type and temp. range in °C

K Explosion Zone

Zone 1	Non-intrinsic safe circuit
Zone 20/21	Non-intrinsic safe circuit

Ordering Example

TER-Exd-PKGz-238-1xK-8-1000-1.4571-M20x1,5-145-XD-AD-1x501/421-400

stands for: Thermocouple flame-proof, 1xNiCr-NiAl, sheath diameter ø8 mm, length L=1000mm, material 1.4571, thread M20x1,5, neck tube length NL=145mm, connection head type XD-AD, cable insert 1 x type 501/421, operating temp up to 400°C, w/o transmitter.

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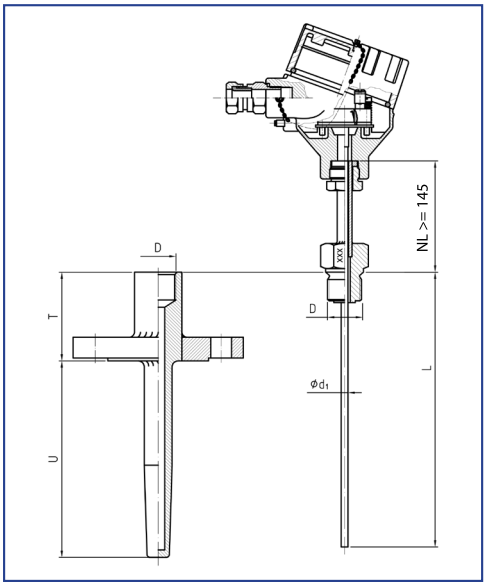
TER-Exd-PKG/PF-239



Thermocouple Flame-proof acc. to ATEX with flanged thermowell

Thermocouple type TER-Exd-PKG/PF-239 Ex signed II 2 G Ex db IIC T* Gb has been designed for temperature measurement in explosion zone 1 or 2 of gases area and can work with non-intrinsic safe wire configuration.

Thermocouple type TER-Exd-PKG/PF-239 Ex signed II 1/2 D Ex ta IIIC T*°C Da/Db for use in dust area with non-intrinsic safe wire configuration.

Connection head is optionally equipped with 1 or 2 cable inserts, and with terminal block or transmitter.

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic	Junction
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..(+750°C)*	wg EN 60584-1	Ungrounded
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..(+1000°C)*		
1xCu-CuNi(T), 2xCu-CuNi(T)	-40°C..(+350°C)*		
1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg(N)	-40°C..(+1000°C)*		
1xNiCr-CuNi(E), 2xNiCr-CuNi(E)	-40°C..(+900°C)*		

* upper temperature is limited by work environment and protection tube material

Sheathed insert diameter d_1 [mm]	Length L [mm]	Flanged process connection of additional thermowell	Process connection thread D
ø 6, ø 8	on request (max L up to 1100 mm)	on request (e.g. DN25 PN40 B1 acc. DIN1092-1; 2"150 RF acc. ASME B16,5)	on request (e.g. M12x1,5; M14x1,5; M16x1,5; M18x1,5; M20x1,5; M24x1,5; M27x2; M33x3; G1/2"; G3/4"; G1"; 1/2"NPT; 3/4"NPT; 1"NPT)

Connection head	Temp. range (depends on connection head sealing)	Cable gland thread	Purpose	Transmitter
XD-AHH; XD-AD; XD-ADwin; XD-AHwin; XD-SD; XD-SB; XD-SH	-50°C..+150°C (o-ring silicon); -50°C..+85°C (o-ring silicon with hole); -20°C..+200°C (o-ring fluoroelastomer)	Typ 501/421	for basic cables	w/o transmitter (with terminal block) or with transmitter
		Typ 501/453	for armored cable	

Non-standard models available.

Additional thermowell
on request, acc. to catalog card – *THERMOWELLS for thermometers and thermocouples*

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Ordering Information

TER-Exd-PKG/ PF-239	A	B	C	D	E	F	G	H	I	J	K	L	M

A	Type of thermocouple
1xJ	Single Fe-CuNi
2xJ	Double Fe-CuNi
1xK	Single NiCr-NiAl
2xK	Double NiCr-NiAl
1xT	Single Cu-CuNi
2xT	Double Cu-CuNi
1xN	Single NiCrSi-NiSiMg
2xN	Double NiCrSi-NiSiMg
1xE	Single NiCr-CuNi
2xE	Double NiCr-CuNi

B	Sheathed insert diameter d_1
6	d_1= 6 mm
8	d_1= 8 mm

C	Length L (max L up to 2000 mm)
	specify in [mm]

D	Process connection fitting material
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
2.4602	2.4602 / Hastelloy C22
	specify other material

E	Process connection thread D
	specify type of thread

F	Neck tube length NL (NL>=145 mm)
	specify in [mm]

G	Additional thermowell flange
	specify type

H	Connection head
	specify head type

I	Cable gland (flameproof)
1x 501/421	1x type 501/421
2x 501/421	2x type 501/421
1x 501/453	1x type 501/453
2x 501/453	2x type 501/453

J	Operating temperature
	specify in °C

K	Transmitter
	specify type and temp. range in °C

L	Explosion Zone
Zone 1	Non-intrinsic safe circuit
Zone 20/21	Non-intrinsic safe circuit

M	Additional thermowell (option)
TW	acc. to catalog card – ***THERMOWELLS***

Ordering Example

TER-Exd-PKG/PF-239-1xK-8-350-1.4571-G1/2-145-DN25PN40B1-XD-AD-1x501/421-400-TW

stands for: Thermocouple flame-proof with single resistor class A, config. 3-wire, sheath diam ø8 mm, length L=350 mm, material 1.4571, process connection fitting G1/2", neck tube length NL=145mm, t-well flange DN25PN40 form B1, connection head XD-AD, cable insert 1 x typ 501/421, operating temp. up to 400°C, w/o transmitter, with additional thermowell

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AR601

Temperature Microprocessor Controller Type AR601

- high accuracy and durability against noise of industry environment
- programmable from 3- key film keyboard IP65
- access to configuration protected by password
- universal input: Pt100 and thermocouple J, K, S
- digital filtration by programming integration
- digital readout with resolution 0.1 °C for Pt100, 1°C for T/C
- 1 threshold ON-OFF or PID with relay output or SSR
- signaling of luminous diode of relay state
- ability of lockout of threshold value changes

Technical specification

Universal input (chosen from keyboard), range of indicators and controllers:
- Pt100 (3- or 2-wire) .....-100 ÷ 850 °C
- thermocouple J.....0 ÷ 800 °C
- thermocouple K .....0 ÷ 1200 °C
- thermocouple S.....0 ÷ 1600 °C
- electronic compensation of thermocouple cold junctions

Digital readout LED (standard 4 digits):
- readout range .....-999÷9999
- height of numbers:.....9 mm

Measuring accuracy:
- Pt100.....0,2 % span ±1 of digit
- thermocouple .....0,3 % span ±1 of digit

Relay output:
- for resistance .....8A / 250V~
- for inductive resistance .2A / 250V~

Output SSR: .....transistor OC, 12V=/20mA

Signaling:
- found errors .....information on screen
- activity of relay .....diode LED red

Table box: .....48x48x79mm, window of table 46x46 mm

Power supply:.....230V~ (± 10%)

Operating temp. range:.....0 ÷ 50 °C

Relative humidity range:.....0 ÷ 90 %

PARAMETERS OF CONFIGURATION (programmable, with password protected):
- Type of input .....Pt100, J, K, S
- Digital filter.....programming integration 1 ÷ 10 sek.
- Threshold characteristic.ON-OFF or PID, HEATING or COLLING
- Hysteresis for ON-OFF...H1 = 0,1 ÷ 2000,0 °C
- Proportionality range for PID Xp = 0,1 ÷ 2000,0 °C
- Differentiation ratio for PID Td = 0 ÷ 999 sek, 0 switch of action D
- Integration ratio for PID .Ti = 0 ÷ 3600 sek, 0 switch of action I
- Zero offset.....-50,0°C ÷ +50,0°C

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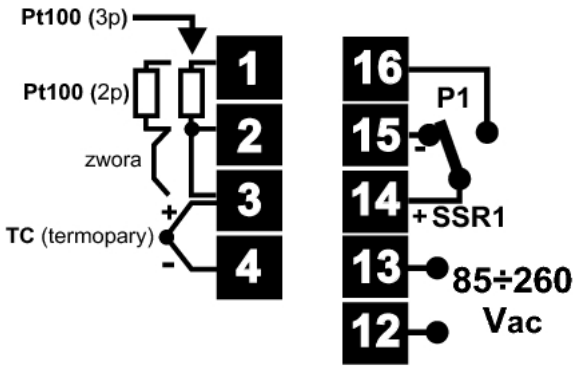
Ordering Information

AR601	A											

A	Output
P	Relay
S	SSR

Description Of Wire Connections



Input 3-wire Pt100 :
- for terminals 1-2-3.

Input 2- wire Pt100 :
- for terminals 1-2, gripper for terminals 2-3.

Thermocouple input J, K, S :
- for terminals 2-3, gripper for terminals 3-4,
('+' t/c for terminal 2, '-' for terminal 3).

Power supply 230V~ :
- for terminals 15-16.

Relay output :
- P1 for terminals 12-13-14.

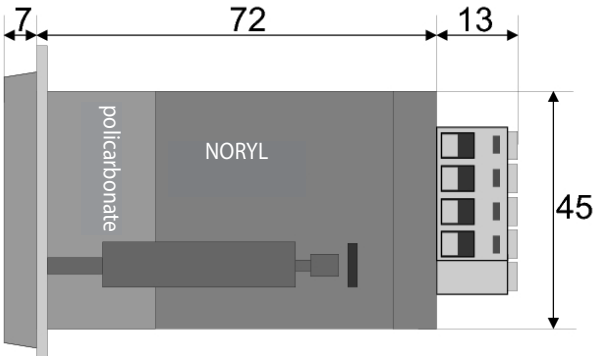
Output SSR:
+ SSR for terminal 13, - SSR for terminal 14.

Assembly Data

Table box .....INCABOX XT
- front panel .....polycarbonate, IP65
- box body.....self-extinguishing NORYL 94V-0

Box dimensions.....8 x 48 x 79 mm

Window of table .....46 x 46 mm



Ordering Example

AR601-S

stands for: Temperature controller AR601 with output type SSR.

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AR642

Universal Microprocessor Controller Type AR642

- table protection box 96 x 48 x 79 mm
- usage for stable control
- 2 control outputs with characteristics
  - -output 1 : ON-OFF with hysteresis, PID, AUTOTUNING PID
  - -output 2 : ON-OFF with hysteresis
- programmable work characteristic (process control, ramping)
- manual function for output control (type on-off)
- two row digital readout LED with brightness adjustment
- programmable indication range (for analog inputs)
- access to configuration protected by password
- programmable from 3-key keyboard IP65
- optional:
  - -interface RS232C or RS485, MODBUS-RTU, galvanic insulation
  - -analog output 0/4÷20mA or 0÷10V
  - -third relay output or SSR (ON-OFF)

Technical specification

Universal input (chosen from keyboard), range of indicators and controllers:

RTD:
- Pt100 (3- or 2-wire).....-200 ÷ 850 °C
- Ni100 (3- or 2-wire).....-50 ÷ 170 °C

Thermocouple:
- thermocouple J.....0 ÷ 800 °C
- thermocouple K .....0 ÷ 1200 °C
- thermocouple S.....0 ÷ 1600 °C
- thermocouple B .....300 ÷ 1800 °C
- thermocouple R .....0 ÷ 1600 °C
- thermocouple T.....0 ÷ 350 °C
- temperature compensations of thermocouple cold junctions

Analog:
- current (Rwe = 110 Ω)...0 ÷ 20mA, 4÷20mA
- voltage (Rwe = 100 kΩ) .0 ÷ 10V
- voltage (Rwe = 2,2 MΩ) .0 ÷ 60mV

Measuring accuracy: .....0,1 % span ±1 digit
- thermocouple input ....0,2 % span ±1 digit, <2°C (temperature of cold ends)

Power supply:.....24V= / 30mA

Digital readout LED: (standard 2 x 4 dgits)
- range of readout .....-1999÷9999,
- height of numbers: .....9 mm (red), 9 mm (green)

Outputs:
- relay.....8A / 250V~ (for resist.)
- SSR (transistor type NPN OC, option) 2V/20mA
- Analog output (without galvanic insulation from input, option):
  - -current..... 0 ÷ 20mA , 4÷20mA
  - -output resistance ..... Ro < 350 Ω
  - -voltage ..... 0 ÷ 10V,
  - -output resistance ..... Io < 4,5mA
  - -deviation of output level ..... <0,1 % output span

Signalling:
- found errors .....message on screen
- activity of relays .....diode LED red

Power supply:
- grid supply .....230V~ (85÷260 V~) / 3VA, voltage (option) 24V~ (15÷50 V~)/ 3VA

Operating temperature range:..0 ÷ 50 °C

Relative humidity range:.....0 ÷ 90 % (without condensation),

Internal protection: .....IP65 from the front, IP20 from wire connections

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Ordering Information

AR642	A	B	C	D								

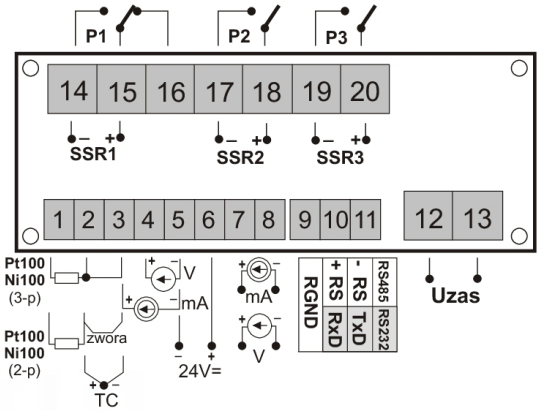
A	Power supply
S1	230 VAC (85 – 260 V)
S2	24 VDC (18 – 72 V)
S3	24 VAC (15 – 50 V)

B	Output 1
P	Relay
S	SSR (transistor NPN OC)

C	Output 2
P	Relay
S	SSR (transistor NPN OC)

D	Additional options
RS485	Series interface RS485
RS232	Series interface RS232
WA	Analog output 0/4 – 20 mA
WU	Analog output 0 – 10 V
P	Output 3 relay
S	Output 3 SSR (NPN OC)

Description Of Wire Connections



Protection Box And Mounting Style

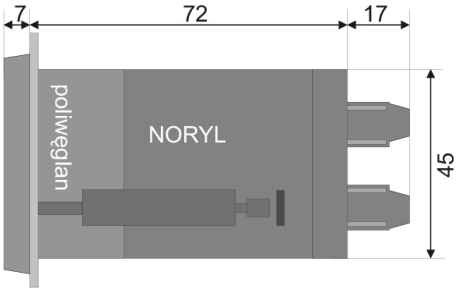
Table INCABOX XT .....96x48 XT L57

Material.....polycarbonate, self-extinguishing NORYL 94V-0

Dimensions of box.....96 x 48 x 79 mm

Window of table .....92 x 46 mm

Mounting.....grips of the box side



Ordering Example

AR642-S1-P-P-RS485

stands for: Universal controller AR642, power supply 230 VAC (85 – 260 VAC), output 1 – relay, output 2 – relay, series interface RS485.

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AR517

Universal Microprocessor Indicator Type AR517

- table protection box 96 x 48 x 79 mm
- digital readout LED with brightness adjustment
- programmable indication range (for analog inputs)
- access to configuration protected by password
- programmable from 3-key keyboard IP65
- set includes a tack film with basic measuring units
- optional:
  - -interface RS232C or RS485, MODBUS-RTU, galvanic insulation
  - -analog output 0/4÷20mA or 0÷10V (retransmission)
  - -minimal measuring range
  - -input RTD: 10°C
  - -thermocouple input: 2 mV

Technical specification

Universal input (chosen from keyboard), range of indicators and controllers:

RTD:
- Pt100 (3- or 2-wire).....-200 ÷ 850 °C
- Ni100 (3- or 2-wire).....-50 ÷ 170 °C

Thermocouple:
- thermocouple J.....0 ÷ 800 °C
- thermocouple K .....0 ÷ 1200 °C
- thermocouple S.....0 ÷ 1600 °C
- thermocouple B .....300 ÷ 1800 °C
- thermocouple R .....0 ÷ 1600 °C
- thermocouple T.....0 ÷ 350 °C
- temperature compensations of thermocouple cold junctions

Analog:
- current (Rwe = 110 Ω)...0 ÷ 20mA, 4÷20mA
- voltage (Rwe = 100 kΩ) .0 ÷ 10V
- voltage (Rwe = 2,2 MΩ) .0 ÷ 60mV

Measuring accuracy: .....0,1 % span ±1 digit
- thermocouple input ....0,2 % span ±1 digit, <2°C
  .....(temperature of cold ends)

Power supply:.....24V= / 30mA

Digital readout LED: (standard 2 x 4 dgits)
- range of readout .....-1999÷9999,
- height of numbers: .....20 mm

Analog output: (without galvanic insulation from input, option)
-current..... 0 ÷ 20mA , 4÷20mA
-output resistance ..... Ro < 350 Ω
-voltage ..... 0 ÷ 10V,
-output resistance ..... Io < 4,5mA
-deviation of output level ..... <0,1 % output span

Signaling:
- found errors .....message on screen

Power supply:
- grid supply .....230V~ (85÷260 V~) / 3VA,
- low voltage(option).....24V~ (15÷50 V~)/ 3VA

Operating temperature range:..0 ÷ 50 °C

Relative humidity range:.....0 ÷ 90 % (without condensation),

Internal protection: .....IP65 from the front,
IP20 from wire connections

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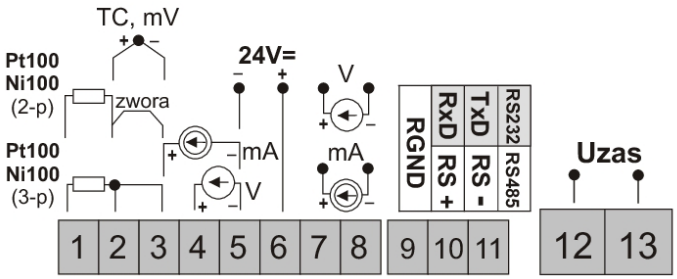
Ordering Information

AR517	A	B

A	Power supply
S1	230 VAC (85 – 260 V)
S2	24 VDC (18 – 72 V)
S3	24 VAC (15 – 50 V)

B	Additional options
RS485	Series interface RS485
RS232	Series interface RS232
WA	Analog output 0/4 – 20 mA
WU	Analog output 0 – 10 V

Description Of Wire Connections



Protection Box And Mounting Style

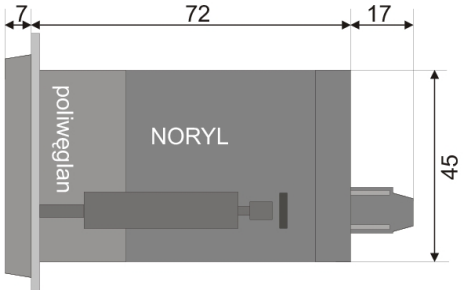
Table INCABOX XT .....96x48 XT L57

Material.....polycarbonate, self-extinguishing NORYL 94V-0

Dimensions of box.....96 x 48 x 79 mm

Window of table .....92 x 46 mm

Mounting.....grips of the box side



Ordering Example

AR517-S1-RS485

stands for: Universal indicator AR517, power supply 230 V (85 – 260 V), additional series interface RS485

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AR520

Universal Microprocessor Indicator Type AR520

- high accuracy and durability against noise of industry environment
- table protection 96 x 48 x 90 mm
- 3 alarms ON-OFF with output relays (or SSR) or without relays
- manual function for output control
- function of saving measuring data
- memory of minimal and maximal values
- computing of average value in given time
- digital readout LED with brightness adjustment
- programmable indication range (for analog inputs, resistance and potentiometric)
- sound alarm of alerts
- access to configuration protected by password
- programmable from 4-key keyboard IP54
- set includes a tack film with basic measuring units
- optional:
  - -series interface RS232C or RS485, MODBUS-RTU
  - -analog output 0/4÷20mA, 0÷10V (continuous-adjustable, restrans.)
  - -third relay output or SSR
  - -possible to open, transparent protection cover IP54

Technical specification

Universal input (chosen from keyboard), range of indicators and controllers:

RTD:
- Pt100 (3- or 2-wire) ....-200 ÷ 850 °C
- Pt500 (3- or 2-wire) ....-150 ÷ 600 °C
- Pt1000 (3- or 2-wire) ....-200 ÷ 600 °C

Thermocouple:
- thermocouple J.....-150 ÷ 1150 °C
- thermocouple K .....-150 ÷ 1350 °C
- thermocouple S.....0 ÷ 1650 °C
- thermocouple B .....300 ÷ 1800 °C
- thermocouple R .....0 ÷ 1600 °C
- thermocouple T.....-150 ÷ 350 °C
- temperature compensations of thermocouple cold junctions

Analog:
- current (Rwe = 50 Ω) ...0 ÷ 20mA, 4÷20mA
- voltage (Rwe > 10 MΩ) ..0 ÷ 60mV, ±60mV
- voltage (Rwe > 500 kΩ) .0 ÷ 1V, 0÷10V, ±1V, ±10V

Other:
- resistance.....0 ÷ 5kW
- potentiometric .....100Ω ÷ 5kΩ

Measuring accuracy: .....0,1 % span ±1 digit

Power supply:.....24V= / 30mA

Digital readout LED: (standard 2 x 4 dgits)
range of readout: -1999÷9999; height of numbers: 9 mm (red), 9 mm (green)

Outputs:
- relay.....switch 8A / 250V~ (for resist.)
- SSR (transistor OC, option) 12V/20mA
- universal analog output (chosen from keyboard,option):
  - -current..... 0 ÷ 20mA , 4÷20mA
    - -output resistance ..... Ro < 500 Ω
  - -voltage ..... 0 ÷ 10V,
    - -output resistance ..... Io < 4,5mA
  - -deviation of output level ..... <0,1 %

Signalling:
found errors-message on screen; activity of relays-diode LED red; additional alarm - diode LED green

Power supply:
- grid supply .....230V~ (85÷260 V~) / 3VA,
- low voltage DC .....24V= (18÷72 V=) / 3VA

Operating temperature range: ..0 ÷ 50 °C

Relative humidity range:.....0 ÷ 90 % (without condensation)

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Ordering Information

AR520	A	B	C	D								

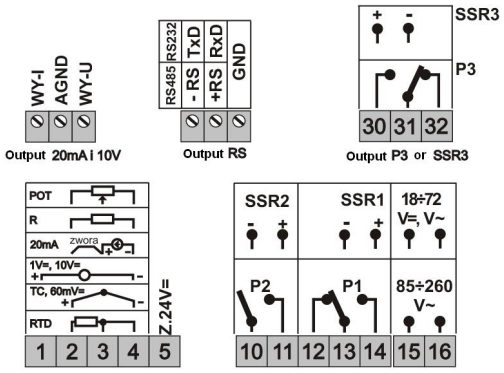
A	Power supply
S1	230 VAC (85 – 260 V)
S2	24 VDC (18 – 72 V)
S3	24 VAC (15 – 50 V)

B	Output 1
B	No
P	Relay
S	SSR (transistor NPN OC)

C	Output 2
B	No
P	Relay
S	SSR (transistor NPN OC)

D	Additional options
RS485	Series interface RS485
RS232	Series interface RS232
WAN	Analog output – without separation
WAG	Analog output – with separation
P	Third output – relay
S	Third output – SSR
PO	Internal protection IP 54

Description Of Wire Connections



Protection Box And Mounting Style

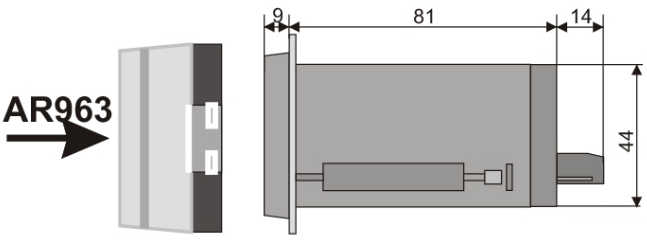
Table protection box .....INCABOX, 01.109L075

Material.....self-extinguishing NORYL 94V-0

Dimensions of box.....96 x 48 x 90 mm

Window of table .....92 x 44 mm

Protection box IP54 .....AR963 (option)



Ordering Example

AR520-S1-P-B-RS485

stands for: Universal indicator AR520, power supply 230 V (85 – 260 V), input 1 relay, no 2 input, additional series interface RS485.

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RMT 248H

Temperature Transmitter Type ROSEMOUNT 248H

Temperature transmitter type ROSEMOUNT 248H is universal, intelligent, 2-wire transmitter with HART protocol, for assembling in sensor connection head. One can communicate directly through handy HART communicator or using PC. Execution is intrinsic safe with certificate Baseefa 03ATEX0030X and ATEX marking: Ex II 1G; EExia IIC T5/T6 and GOST.

Technical specification

INPUT

Sensor	Type	Acc. to standard	Current	Measuring range
Resistor Pt100..Pt1000	line 2, 3, 4-wire	EN 60751 NAMUR	0,2 mA	-200..+850°C
Resistor Ni120				-70..+300°C
Thermocouple	E, J, K, L, T, U, B, R, S	EN 60584	-	-10mV.. +100mV min. range 2,5mV

OUTPUT

Current	Protocol	Resistance (Drawing 1)	Sensor failure (configurable)
4 – 20 mA	HART	250Ω ≤ RL ≤ 1100Ω	3,75mA .. 23mA

Sensor	Accuracy	Power supply Uz	Ambient temperature	Influence of ambient temp. change
Resistor	±0,1 % of range	18 – 42 VDC	-40°C ..+85°C	±0,004 % of range / °C
Thermocouple				

Galvanic isolation	Mounting
500 V AC	in connection head

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Ordering Information

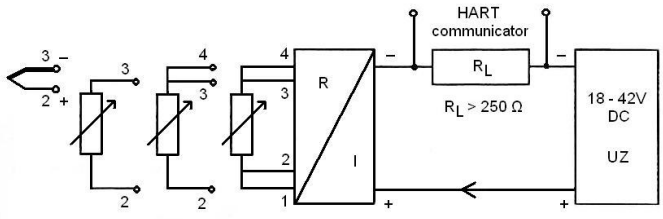
RMT248HAI1	A	B	C

A	Sensor type
Pt100	Pt100
Ni120	Ni120
Pt1000	Pt1000
E	Thermocouple type E
J	Thermocouple type J
K	Thermocouple type K
L	Thermocouple type L
T	Thermocouple type T
U	Thermocouple type U
B	Thermocouple type B
R	Thermocouple type R
S	Thermocouple type S

B	Configuration
2p	2-wire
3p	3-wire
4p	4-wire

C	Temperature range ($T_1 \div T_2$)
	specify in °C

Drawing 1. **Resistance overcharge**



Drawing 2. **Configuration**

Ordering Example:

RMT248HAI1-Pt100-3p-0÷300°C

stands for: Temperature transmitter type 248 HAI1 with HART protocol, intrinsic safe, sensor type resistor Pt100, configuration 3-wire, range 0÷300°C.

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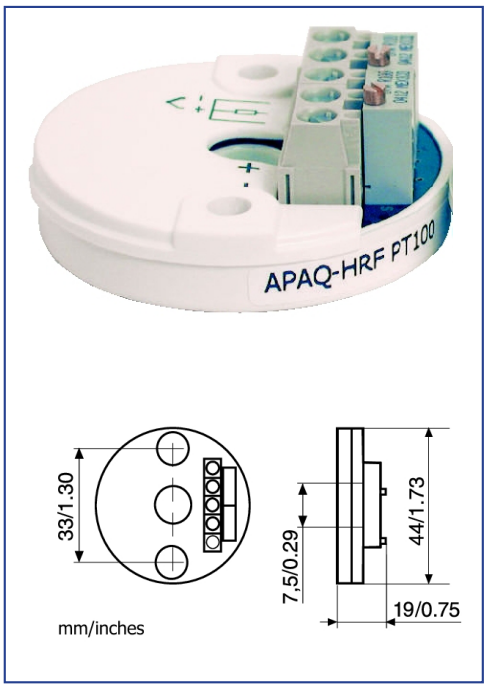
APAQ-HRF



Temperature Transmitter Type APAQ-HRF

Temperature transmitter type APQ-HRF is analog 2-wire transmitter for assembling in connection head of the Pt100 sensor. The transmitter is configurable using welded connections and two potentiometers. Execution is basic and intrinsic safe with DEMCO 03 ATEX 135011X.

Type	Execution
APQ-HRF	Basic
APQ-HRFX	Intrinsic safe Ex II 1G; EExia IIB T4/T5/T6

Technical specification

INPUT

Sensor	Type	Current	Range of zero set up	Range of upper level set up [°C]
Resistor Pt100	line 3-wire	1 mA	-50°C..+50°C	50, 100, 150, 200 300, 400, 500

OUTPUT

Current	Resistance (Drawing 1)	Sensor failure (configurable)
4 – 20 mA	250Ω ≤ RL ≤ 1100Ω	3,75mA .. 23mA

Accuracy	Ambient temperature	Influence of ambient temp. change	Voltage Uz	Influence of voltage change
±0,2 % of range	-40°C ..+85°C	±0,004 % of range / °C	8 – 30 VDC	±0,02% / V

Galvanic separation
not present

Mounting
in connection head

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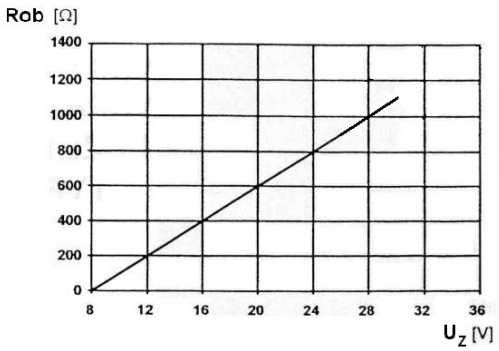
Ordering Information

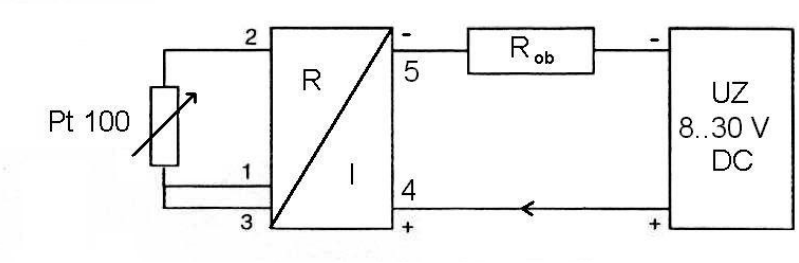
APAQ-HRF	A	B

A	Execution
	Basic
X	Intrinsic safe

B	Temperature range ($T_1 \div T_2$)
	specify in °C



Drawing 1. **Resistance overcharge**



Drawing 2. **Configuration**

Ordering Example:

APAQ-HRF-X-0÷100°C

stands for: Transmitter type APAQ-HRF intrinsic safe, working by temperature range 0÷100°C.

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AR250

Two-Wire Relative Humidity Transmitter Type AR250

Two-wire relative humidity transmitter type AR250 is designed for measuring and control of relative humidity in air-conditioning and industrial systems. Transmitter converts capacity changes of thin-film sensor into standard output signal 4-20 mA, which can be measured by a meter.

Electronic system of the transmitter is made in two-wire technology. Output current 4-20 mA and power supply are sent by the same wires. All system is placed into polycarbonate box of internal protection IP65, adjusted to be assembly in rooms or in ventilator canals.

Technical specification

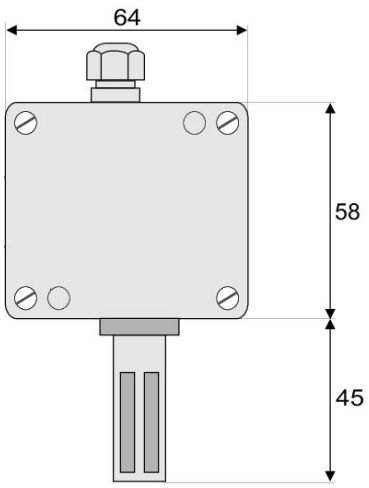
Type of sensor	Power supply Uz	Ambient temperature
Thin-film capacity sensor	Depends of output signal	-20°C..+80°C

INPUT

Measuring range	Accuracy in the range 10-90% R.H.
2 – 98 % R.H.	± 3 %

OUTPUT

Output current	Power supply
4 – 20 mA	12 – 36 V DC; Rob = (U_z – 12)/22 [mA]
0 – 10 V DC	18 – 30 V DC



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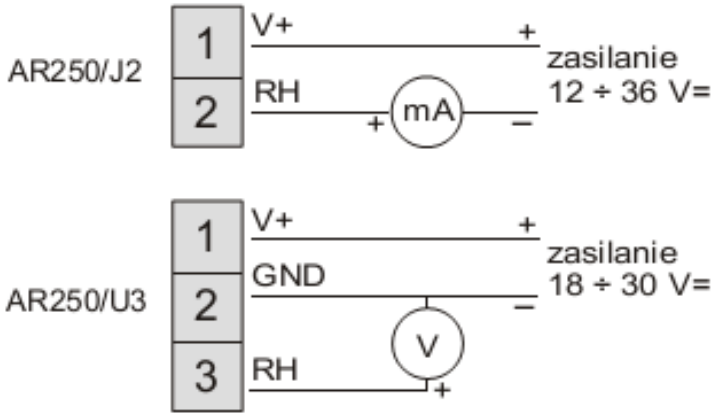
Ordering Information

AR250	A

A	Output
J2	Current (2P) 4 – 20 mA
U3	Voltage (3P) 0 – 10 C

TERMINAL STRIP



Ordering Example:

AR250-J2

stands for: Relative humidity sensor type AR250, with current output 4 – 20 mA.

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AR252

Two-Wire Relative Humidity And Temperature Transmitter Type AR252

Two-wire relative humidity and temperature transmitter type AR250 is designed for measuring and control of relative humidity and temperature in air-conditioning and industrial systems.

Transmitter converts capacity changes of thin-film sensor and platinum temp. sensor into standard output signal 4-20 mA or 0-10 V, which can be measured by a meter.

Electronic system of the transmitter is made in two-wire technology. Output current 4-20 mA and power supply are sent by the same wires. All system is placed into polycarbonate box of internal protection IP65, adjusted to be assembly in rooms or in ventilator canals.

Technical specification

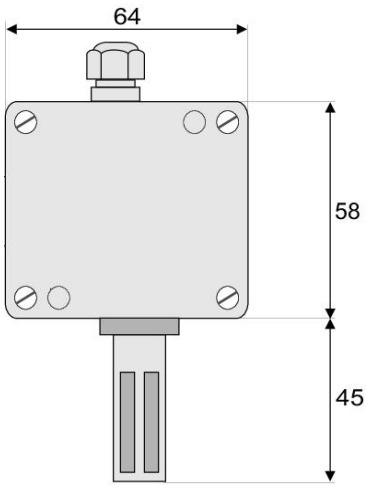
Type of sensor	Power supply Uz	Ambient temperature
Thin-film capacity sensor, Pt100	Depends of output signal	-30°C..+80°C -20°C..+70°C with LCD display

INPUT

Measuring range		Accuracy in the range 10-90% R.H.
0 – 100 % RH	(0-10 % RH) i (90-100 % RH)	± 5 or 4 % RH
	10 – 90 % RH	± 3 or 2 % RH
-30°C..+80°C		0,4°C or 0,3 °C

OUTPUT

Output current	Power supply
4 – 20 mA	12 – 36 V DC; Rob = (U_z – 12)/22 [mA]
0-10 V DC	18 – 30 V DC
Interface RS485 or RS232	9-28 V AC or 9-36 V DC



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Ordering Information

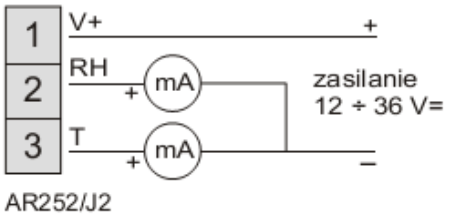
AR252	A	B	C

A	Output
J2	Current (2P) 4 – 20 mA
U3	Voltage (3P) 0 – 10 V DC
R4	Interface RS 485
R2	Interface RS 232

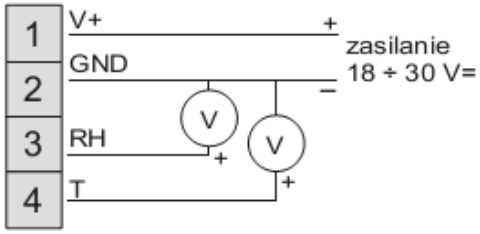
B	Accuracy
4%	4% RH, 0,4 °C
2%	2% RH, 0,3 °C

C	LCD display
LCD	LCD display

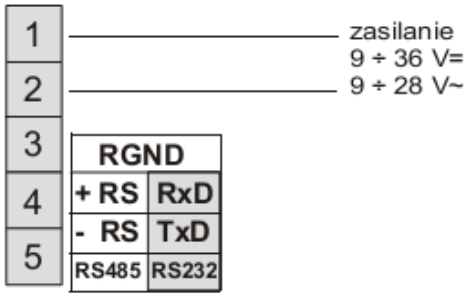
TERMINAL STRIP



AR252/J2



AR252/U3



AR252/R4
AR252/R2

Ordering Example:

AR252-J2-2%-LCD

stands for: Relative humidity and temperature transmitter type AR250, with current output 4 – 20 mA, accuracy 2% RH i 0,3 °C, with LCD display.

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AR 580

Temperature Transmitter Type AR 580

Temperature transmitter type AR 580 is universal, 2-wire transmitter, for assembling on the rail TS 35 (rail DIN) in the industry area. It converts measured temperature from RTD sensor or thermocouple onto current or voltage signal.

The transmitter is configurable using AR950 programming device.

Technical specification

INPUT

Sensor	Type	Acc. to standard	Current	Measuring range
Resistor Pt100	line 2 ,3 - wire	PN-EN 60751	0,3 mA	min. 40°C
Thermocouple	J, K, S	PN-EN 60584	-	min. 5 mV

OUTPUT

Output signal	Resistance (Drawing 1)	Sensor interval (configurable)
4 – 20 mA or 20 – 4 mA 0 – 10 V or 10 – 0 V	Rob = (U_z – 10)/0,02 [A] Rob > 2500 ohm	(I) >20,5 mA lub 3,8 mA U > 10,6 V

Sensor	Accuracy	Power supply Uz	Ambient temperature	Influence of ambient temp. change
Resistor Pt100	±0,20% of range	10 – 36 VDC 18 – 36 VDC	0°C..+65°C	±0,01% range / °C
Thermocouple	±0,30% of range			

Galvanic separation	Mounting
not present	on rail

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Ordering Information

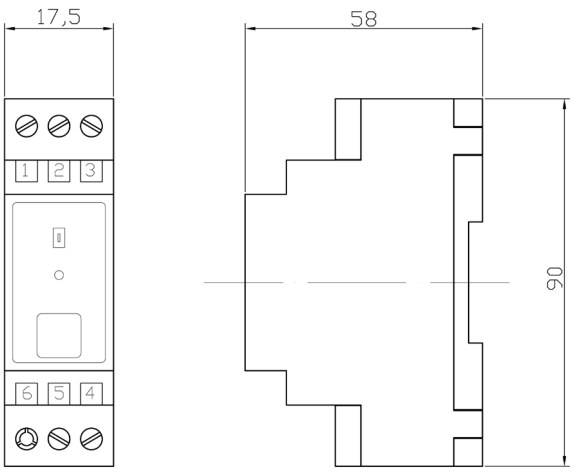
AR 580	A	B	C	D								

A	Sensor type
Pt100–2p	Pt100 – 2p
Pt100–3p	Pt100 – 3p
J	Thermocouple type J
K	Thermocouple type K
S	Thermocouple type S

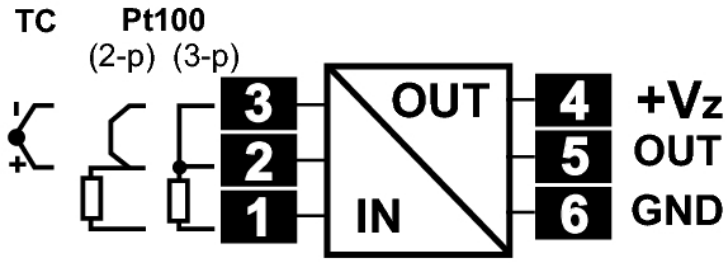
B	Temperature range ($T_1 \div T_2$)
	specify in °C

C	Output
4–20mA	4 – 20 mA
20–4mA	20 – 4 mA
0–10V	0 – 10 V
10–0V	10 – 0 V

D	Compensation of cold ends
auto	Auto
(example) 25°C	Stable temp. (e.g. 25°C)



Description Of Wire Connections



Ordering Example:

AR580-J-100÷500-4÷20mA-auto

stands for: Transmitter type AR 580 for thermocouple type J, temperature range 100÷500°C, output signal 4 – 20 mA, with automatic compensation of cold ends.

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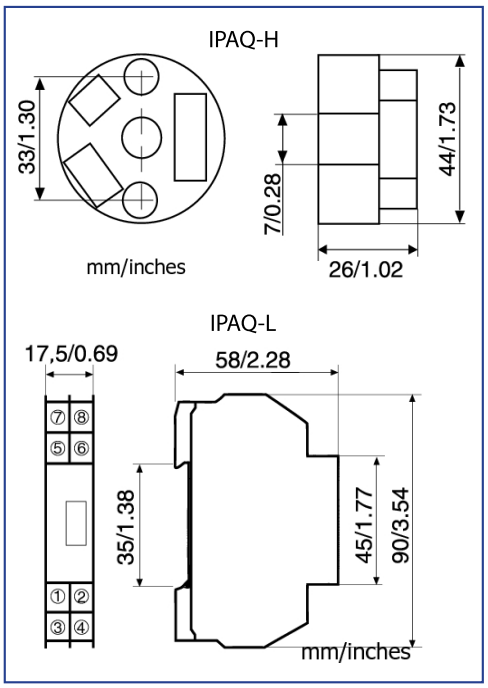
IPAQ-H/L



Temperature Transmitter Type IPAQ–H, IPAQ–L

Temperature transmitter type IPAQ is intelligent, universal 2-wire transmitter for assembling in connection head of the sensor or on the rail. The transmitter is configurable manually with PC using software IPRO 4. Execution is basic and intrinsic safe with DEMCO 02 ATEX 132033 certification.

Type	Execution
IPAQ-H/L	Basic
IPAQ-H/LX	Intrinsic safe Ex II 1G; Eex [ia] IIC T6

Technical specification

INPUT

Cooperative sensor	Type	Acc. to standard	Current	Measuring range
Resistor Pt100	line 3, 4-wire	EN 60751	0,4 mA	-200°C..+1000°C
Resistor Pt1000				-200°C..+200°C
Thermocouple	E, J, K, L, T, U, B, R, S	EN 60584	-	-10 to 500mV

OUTPUT

Current	Resistance (Drawing 1)	Sensor interval (configurable)
4 – 20 mA 20 – 40 mA	Rob = (U_z – 8)/0,02 [A]	>20,5 mA lub <3,8 mA

Cooperative sensor	Accuracy	Voltage Uz	Ambient temp.	Influence of ambient temp.
Resistor	±0,1 % of range	8 – 36 V DC 8 – 30 V DC (Exi)	-40°C..+85°C	±0,2% of range
Thermocouple	±0,2 % of range			±0,3% of range

Galvanic separation
1500 VAC

Mounting
in connection head
on rail

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Ordering Information

IPAQ	A	B	C	D	E

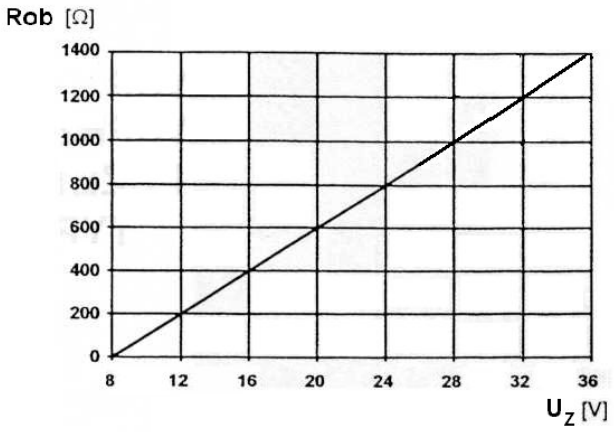
A	Mounting
H	in connection head
L	on rail

B	Execution
	Basic
X	Intrinsic safe

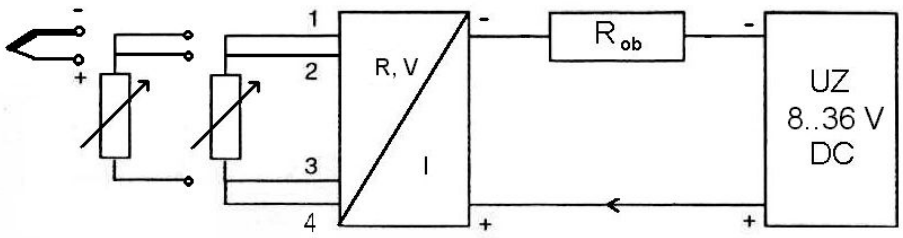
C	Sensor type
Pt100	Pt100
Pt1000	Pt1000
E	Thermocouple type E
J	Thermocouple type J
K	Thermocouple type K
L	Thermocouple type L
T	Thermocouple type T
U	Thermocouple type U
B	Thermocouple type B
R	Thermocouple type R
S	Thermocouple type S

D	Configuration
3p	3-wire
4p	4-wire

E	Temperature range ($T_1 \div T_2$)
	specify in °C



Drawing 1. **Resistance overcharge**



Drawing 2. **Configuration**

Ordering Example:

IPAQ-HX-Pt100-3p-0÷100°C

stands for: Transmitter IPAQ in connection head, intrinsic safe, range 0÷100°C.

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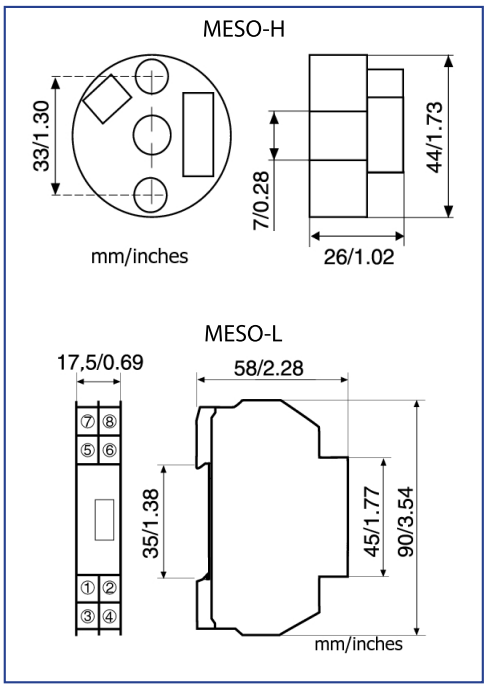
MESO-H/L



Temperature Transmitter Type MESO–H, MESO–L

Temperature transmitter type MESO is intelligent, universal 2-wire transmitter with HART protocol for assembling in connection head of the sensor or on the rail The transmitter is configurable manually using HART protocol or with PC using software MEPRO2.

Type	Execution
MESO-H/L	Basic
MESO-H/LX	Intrinsic safe Ex II 1G; EExia IIC T4/T5/T6

Technical specification

INPUT

Cooperative sensor	Type	Acc. to standard	Current	Measuring range
Resistor Pt100	line 3, 4-wire	EN 60751 PN-83/M-53852	0,4 mA	-200°C..+1000°C
Resistor Pt1000				-200°C..+200°C
Thermocouple	E, J, K, L, T, U, B, R, S	EN 60584	-	-10 to 500mV

OUTPUT

Current	Protocol	Resistance (Drawing 1)	Sensor interval (configurable)
4 – 20 mA 20 – 40 mA	HART	Rob = (U_z – 10)/0,023 [A]	>20,5 mA lub <3,8 mA

Cooperative sensor	Accuracy	Voltage Uz	Ambient temp.	Influence of ambient temp.
Resistor	±0,1 % of range	10 – 42 V DC 12 – 30 VDC (Exi)	-40°C..+85°C	±0,2% of range
Thermocouple				±0,3% of range

Galvanic separation
1500 VAC

Mounting
in connection head
on rail

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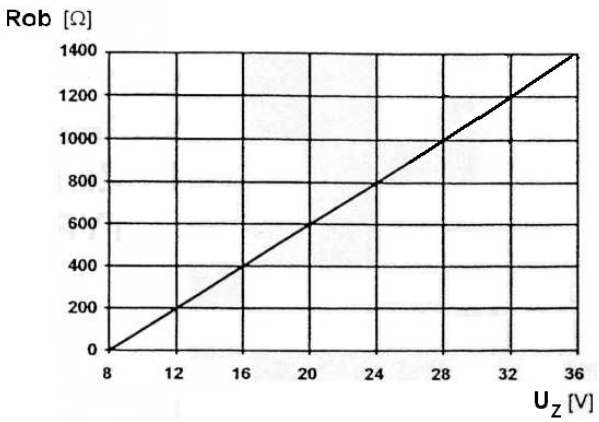
Ordering Information

MESO	A	B	C	D	E

A	Mounting
H	in connection head
L	on rail

B	Execution
	Basic
X	Intrinsic safe

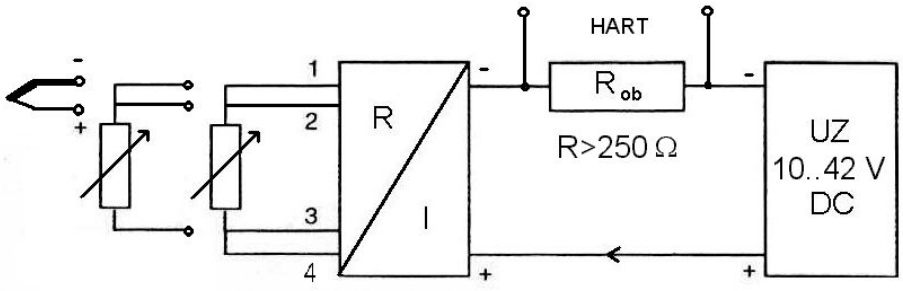


Drawing 1. **Resistance overcharge**

C	Sensor type
Pt100	Pt100
Ni100	Ni100
Pt1000	Pt1000
Ni1000	Ni1000
E	Thermocouple type E
J	Thermocouple type J
K	Thermocouple type K
L	Thermocouple type L
T	Thermocouple type T
U	Thermocouple type U
B	Thermocouple type B
R	Thermocouple type R
S	Thermocouple type S

D	Configuration
3p	3-wire
4p	4-wire

E	Temperature range ($T_1 \div T_2$)
	specify in °C



Drawing 2. **Configuration**

Ordering Example:

MESO-HX-Pt100-3p-0÷300°C

stands for: Transmitter MESO in connection head, intrinsic safe, resistor Pt100, 3-wire configuration, range 0÷300°C.

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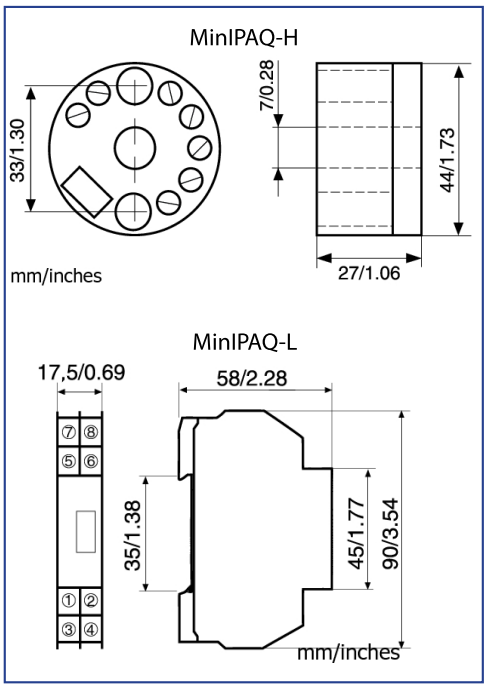
MINIPAQ-H/L



Temperature Transmitter Type MINIPAQ-H, MINIPAQ-L

Temperature transmitter type MinIPAQ is universal 2-wire transmitter for assembling in connection head of the sensor or on the rail in the industry environment. The transmitter is configurable with PC using software MinIPAQ.

Technical specification

INPUT

Cooperative sensor	Type	Acc. to standard	Current	Measuring range
Resistor Pt100	line 3, 4-wire	EN 60751	0,4 mA	min. 10 °C
Resistor Pt1000				
Thermocouple	E, J, K, L, T, U, B, R, S	EN 60584	-	min. 2 mV

OUTPUT

Current	Resistance (Drawing 1)	Sensor interval (configurable)
4 – 20 mA 20 – 40 mA	Rob = (U_z – 8)/0,02 [A]	>20,5 mA lub <3,8 mA

Cooperative sensor	Accuracy	Voltage Uz	Ambient temp.	Influence of ambient temp.
Resistor	±0,15% of range	8 – 36 V DC	-40°C..+85°C	±0,2% of range
Thermocouple	±0,30% of range			±0,3% of range

Galvanic separation
not present

Mounting
in connection head
on rail

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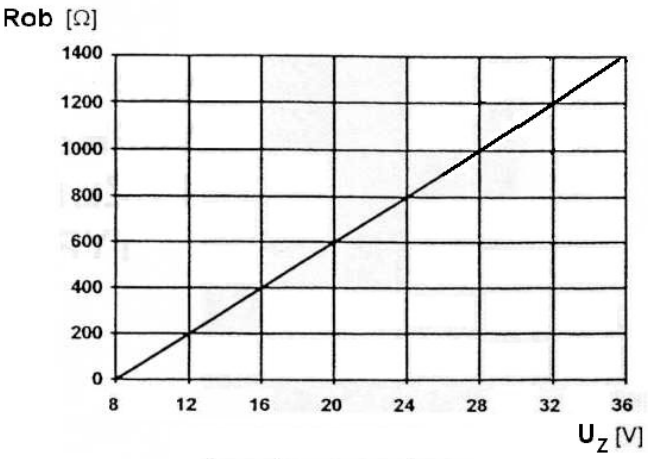
Ordering Information

MINIPAQ	A	B	C

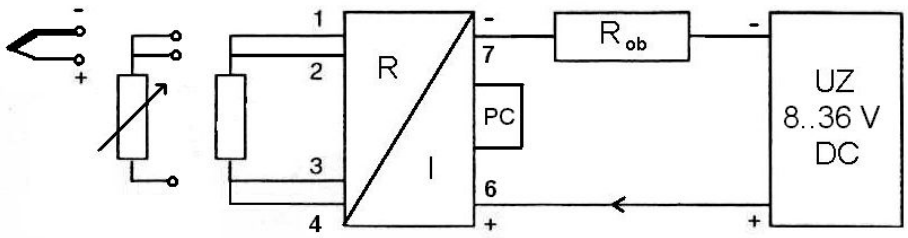
A	Mounting
H	in connection head
L	on rail

B	Sensor type
Pt100	Pt100
Pt1000	Pt1000
E	Thermocouple type E
J	Thermocouple type J
K	Thermocouple type K
L	Thermocouple type L
T	Thermocouple type T
U	Thermocouple type U
B	Thermocouple type B
R	Thermocouple type R
S	Thermocouple type S

C	Temperature range ($T_1 \div T_2$)
	specify in °C



Drawing 1. **Resistance overcharge**



Drawing 2. **Configuration**

Ordering Example:

MINIPAQ-L-K-0÷600°C

stands for: Transmitter MINIPAQ on rail, thermocouple type K, range 0÷600°C.

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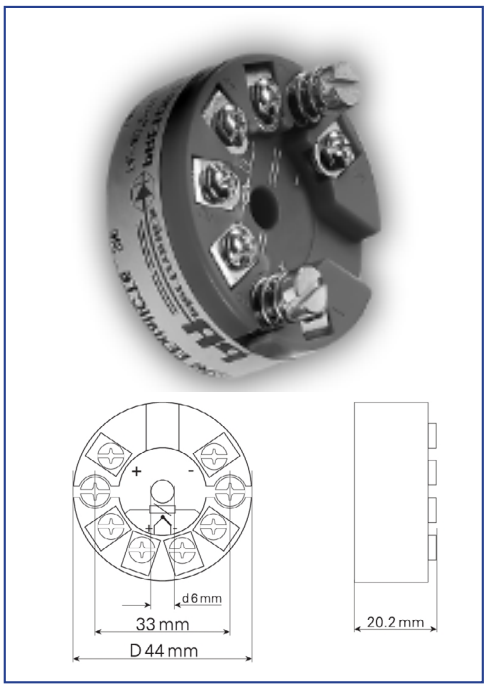
PRetop 5331



Temperature Transmitter Type PRetop 5331

Temperature transmitter type 5331 is universal, intelligent, 2-wire transmitter for assembling in sensor connection head. The transmitter is configurable using PC software. Execution is basic and intrinsic safe with certificate KEMA 06 ATEX 0062X and GOST.

Type	Execution
5331 A	Basic
5331 B	Intrinsic safe Ex II 1G; EExia IIC T1...T6

Technical specification

INPUT

Cooperative sensor	Type	Acc. to standard	Current	Measuring range
Resistor Pt100...Pt1000	line 3, 4-wire	EN 60751	0,4 mA	-200°C..+850°C
Resistor Ni100...Ni1000				-60°C..+250°C
Thermocouple	E, J, K, L, T, U, B, R, S	EN 60584	-	-12mV to 800mV min. range 5mV

OUTPUT

Current	Resistance (Drawing 1)	Sensor interval (configurable)
4 – 20 mA	Rob = (U_z – 8)/0,023 [A]	23 mA or 3,5 mA

Cooperative sensor	Accuracy	Voltage Uz	Ambient temp.	Influence of ambient temp.
Resistor	±0,05 % of range	8 – 35 VDC 8 – 28 VDC (Exi)	-40°C..+85°C	±0,01% of range / °C
Thermocouple	±1 °C			± 0,05 °C / °C

Galvanic separation
not present
1500 V AC

Mounting
in connection head

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Ordering Information

PRetop5331	U	V	X	Y	Z

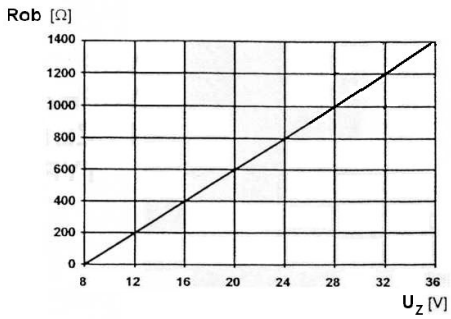
U	Execution
A	Basic
B	Intrinsic safe

V	Sensor type
Pt100	Pt100
Ni100	Ni100
Pt1000	Pt1000
Ni1000	Ni1000
E	Thermocouple type E
J	Thermocouple type J
K	Thermocouple type K
L	Thermocouple type L
T	Thermocouple type T
U	Thermocouple type U
B	Thermocouple type B
R	Thermocouple type R
S	Thermocouple type S

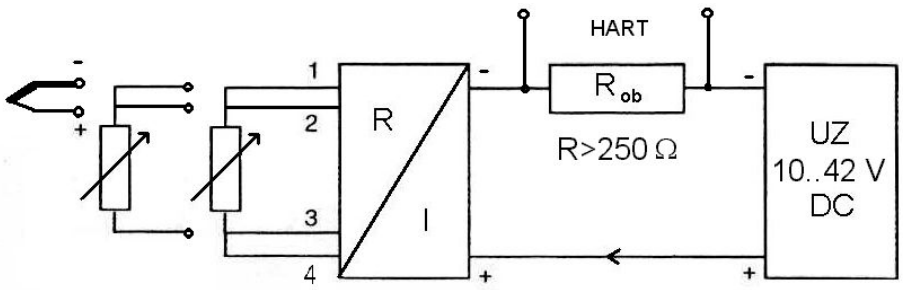
X	Configuration
2p	2-wire
3p	3-wire
4p	4-wire

Y	Temperature range ($T_1 \div T_2$)
	specify in °C

Z	Galvanic separation
0	not present
1	1500 V AC



Drawing 1. **Resistance overcharge**



Drawing 2. **Configuration**

Ordering Example:

PRetop5331-B-Pt100-3p-0÷100°C-0

stands for: Temperature transmitter type 5331, intrinsic safe, sensor type resistor Pt100, configuration 3-wire , temp. range 0÷100°C, galvanic isolation not present.

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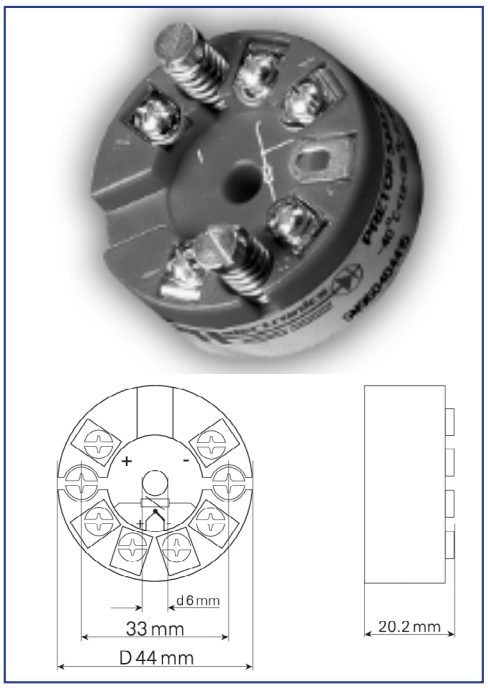
PRetop 5333



Temperature Transmitter Type PRetop 5333

Temperature transmitter type PRetop 5333 is programmable, 2-wire transmitter for assembling in sensor connection head of resistor Pt100..Pt1000. The transmitter is configurable using PC software. Execution is basic and intrinsic safe with certificate KEMA 03 ATEX 1535X and GOST.

Type	Execution
5333 A	Basic
5333 B	Intrinsic safe Ex II 1G; EExia IIC T1...T6

Technical specification

INPUT

Cooperative sensor	Type	Acc. to standard	Current	Resistor change range	Minimal range
Resistor Pt100...Pt1000	line 3-wire	EN 60751	> 0,2, < 0,4 mA	-200°C..+850°C	25°C

OUTPUT

Current	Resistance (Drawing 1)	Sensor interval (configurable)
4 – 20 mA	Rob = (U_z – 8)/0,023 [A]	23 mA or 3,5 mA

Accuracy	Ambient temp.	Influence of ambient temp.	Power supply Uz	Influence of resistance changes
±0,1 % of range	-40°C..+85°C	±0,01% of range / °C	8 – 35 VDC 8 – 28 VDC (Exi)	±0,01 % / 100 Ω

Galvanic separation	Mounting
not present	in connection head

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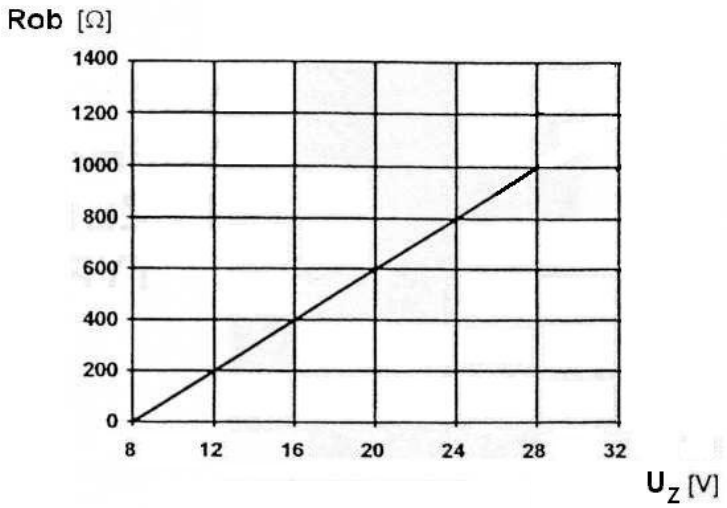
Ordering Information

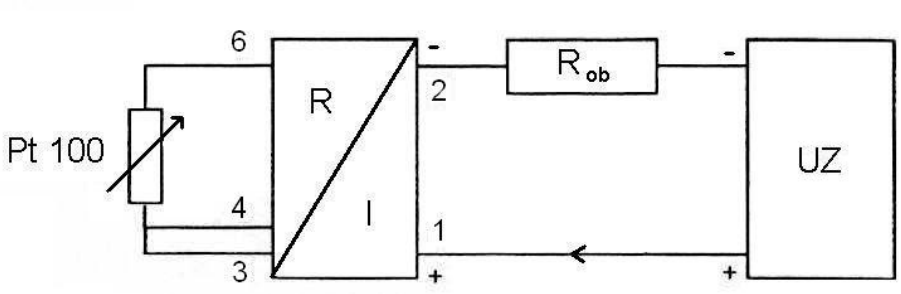
PRetop5333	X	Y

X	Execution
A	Basic
B	Intrinsic safe

Y	Temperature range ($T_1 \div T_2$)
	specify in °C



Drawing 1. **Resistance overcharge**



Drawing 2. **Configuration**

Ordering Example:

PRetop5333-A-0÷100°C

stands for: Temperature transmitter type PRetop 5333 basic execution, range 0÷100°C.

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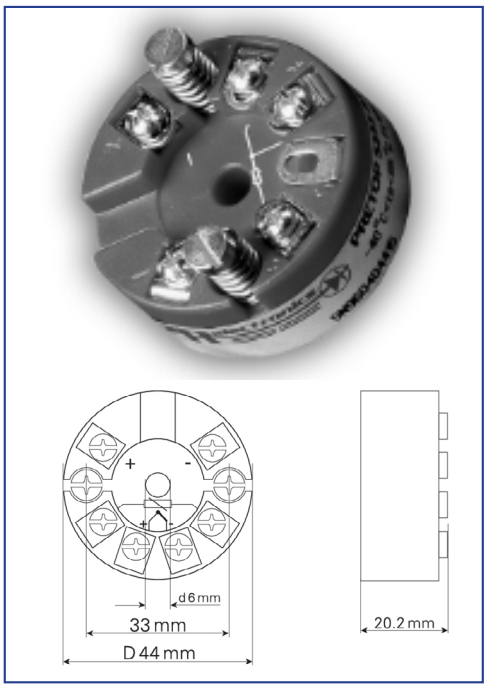
PRetop 5334



Temperature Transmitter Type PRetop 5334

Temperature transmitter type PRetop 5334 is programmable, 2-wire transmitter for assembling in sensor connection head of thermocouple. The transmitter is configurable using PC software. Execution is basic and intrinsic safe with certificate KEMA 06 ATEX 0062X and GOST.

Type	Execution
5334 A	Basic
5334 B	Intrinsic safe Ex II 1G; EExia IIC T1...T6

Technical specification

INPUT

Cooperative sensor	Type	Acc. to standard	Range of in voltage	Minimal in voltage
Thermocouple	B, E, J, K, L, N, R S, T, U, W3	EN 60584	-12mV..+150 mV	5 mV

OUTPUT

Current	Resistance (Drawing 1)	Sensor interval (configurable)
4 – 20 mA	Rob = (U_z – 7,2)/0,023 [A]	23 mA or 3,5 mA

Accuracy	Ambient temp.	Influence of ambient temp. change	Power supply Uz	Influence of resistance changes
±0,1 % of range	-40°C..+85°C	±0,01°C / °C	8 – 35 VDC 8 – 28 VDC (Exi)	±0,01 % / VDC

Galvanic separation	Mounting
1500 V AC	in connection head

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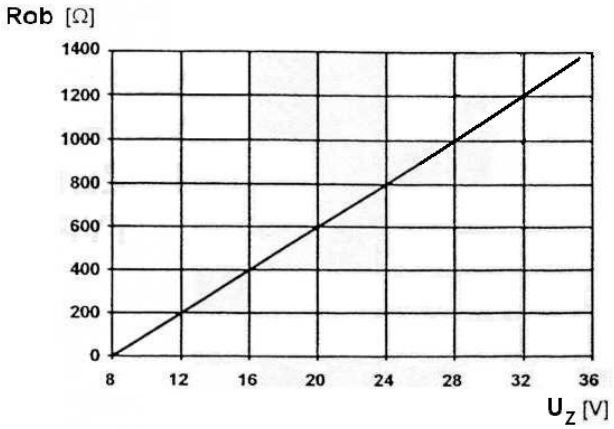
Ordering Information

PRetop5334	X	Y	Z

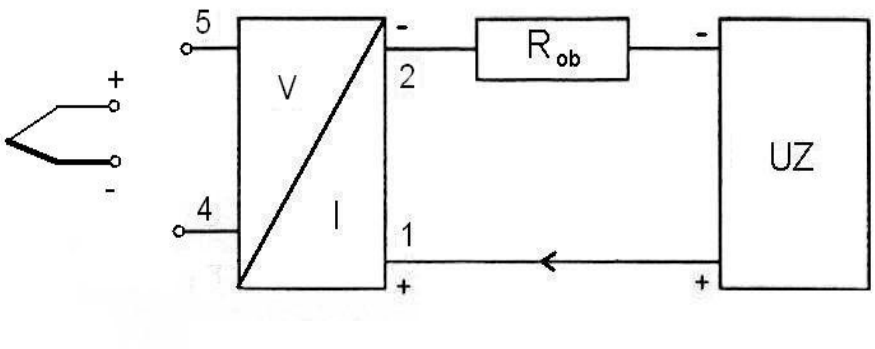
X	Execution
A	Basic
B	Intrinsic safe

Y	Sensor type
B	Thermocouple type B
E	Thermocouple type E
J	Thermocouple type J
K	Thermocouple type K
L	Thermocouple type L
N	Thermocouple type N
R	Thermocouple type R
S	Thermocouple type S
T	Thermocouple type T
U	Thermocouple type U
W3	Thermocouple type W3

Z	Temperature range ($T_1 \div T_2$)
	specify in °C



Drawing 1. **Resistance overcharge**



Drawing 2. **Configuration**

Ordering Example:

PRetop5334-B-K-0÷300°C

stands for: Temperature transmitter type PRetop 5334 intrinsic safe, thermocouple type K, range 0÷300°C.

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PRetop 5335

Temperature Transmitter
Type PRetop 5335

Temperature transmitter type 5335 s universal, intelligent, 2-wire transmitter with HART protocol, for assembling in sensor connection head. One can communicate directly through handy HART protocol or using PC. Execution is basic and intrinsic safe with certificate KEMA 03 ATEX 1508X and GOST.

Usage declaration for SIL2.

Type	Execution
5335 A	Basic
5335 D	Intrinsic safe Ex II 1G; EExia IIC T1...T6

Technical specification

INPUT

Cooperative sensor	Type	Acc. to standard	Current	Measuring range
Resistor Pt100...Pt1000	line 2,3, 4-wire	EN 60751 PN-83/M-53852	0,2 mA	-200°C..+850°C
Resistor Ni100...Ni1000				-60°C..+250°C
Thermocouple	E, J, K, L, T, U, B, R, S	EN 60584	-	-800 mV..+800 mV min. range 2,5mV

OUTPUT

Current	Protocol	Resistance (Drawing 1)	Sensor interval (configurable)
4 – 20 mA	HART	Rob = (U_z – 8)/0,023 [A]	23 mA or 2,3 mA

Cooperative sensor	Accuracy	Voltage Uz	Ambient temp.	Influence of ambient temp.
Resistor	±0,05 % of range	8 – 35 VDC 8 – 28 VDC (Exi)	-40°C..+85°C	±0,05% of range / °C
Thermocouple	±0,5 °C			± 0,025 °C / °C

Galvanic separation	Mounting
1500 V AC	in connection head

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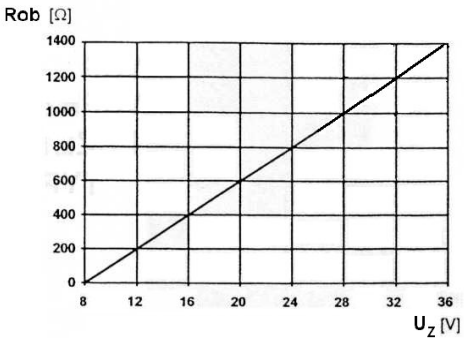
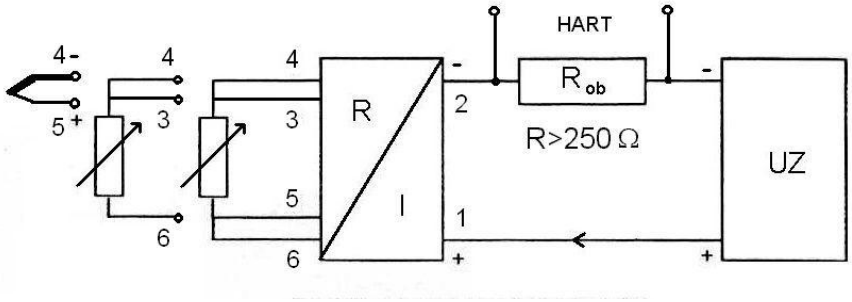
Resistance overcharge



Configuration



Ordering Information

PRetop5335	V	X	Y	Z

V	Execution
A	Basic
D	Intrinsic safe

X	Sensor type
Pt100	Pt100
Ni100	Ni100
Pt1000	Pt1000
Ni1000	Ni1000
E	Thermocouple type E
J	Thermocouple type J
K	Thermocouple type K
L	Thermocouple type L
T	Thermocouple type T
U	Thermocouple type U
B	Thermocouple type B
R	Thermocouple type R
S	Thermocouple type S

Y	Configuration
2p	2-wire
3p	3-wire
4p	4-wire

Z	Temperature range ($T_1 \div T_2$)
	specify in °C

Ordering Example:

PRetop5335-D-Pt100-3p-0÷300°C

stands for: Temperature transmitter type 5335, intrinsic safe, sensor type resistor Pt100, configuration 3-wire, range 0÷300°C.

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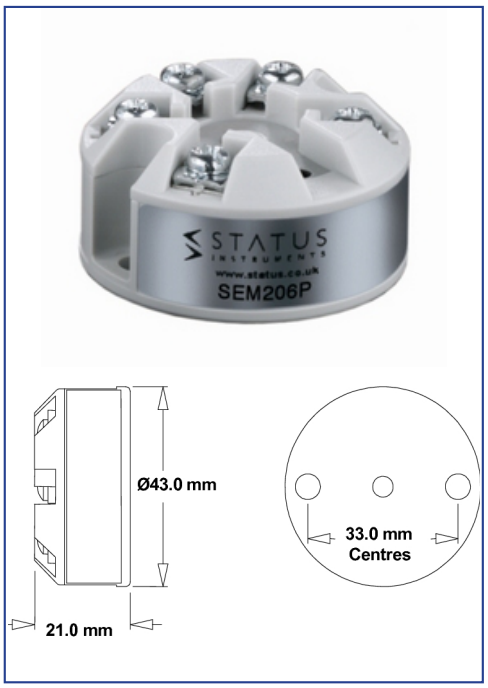
SEM 206P



Temperature Transmitter Type SEM 206P for RTD sensors

Temperature transmitter type SEM 206P is a digital, 2 or 3-wire transmitter for assembling in connection head of the RTD sensor. A change of range and calibration of transmitter is set up by Status software which adjust zero and span temperature, in accordance to output signal 4 and 20mA.

Shielded LED indicator shows correct end of span programming and indicates damage of RTD sensor.

Technical specification

INPUT

Cooperative sensor	Type	Acc. to standard	Current	Measuring range
Resistor Pt100	line 2,3-wire	EN 60751	< 1 mA	-200°C..+850°C min. 5°C

OUTPUT

Current	Resistance (Drawing 1)	Sensor interval
4 – 20 mA	Rob = $(U_z - 8)/0{,}02$ [A]	>20,5 mA

Cooperative sensor	Span Accuracy	Voltage Uz	Ambient temp.	Influence of ambient temp.
Resistor (RTD)	±0,1% span (-100°C..+500°C) ±0,2% span (-200°C..+850°C)	8-30 VDC	-20°C..+80 °C	0,01°C / °C zero 0,05% / °C span

Galvanic separation	Mounting
not present	in connection head

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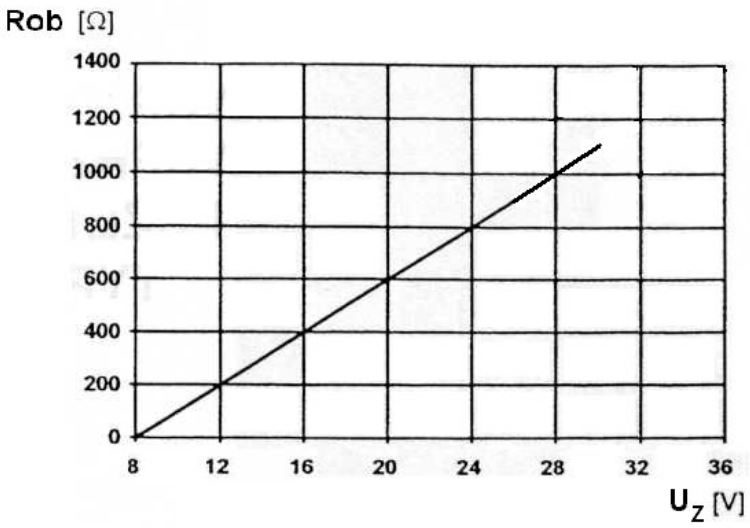
Ordering Information

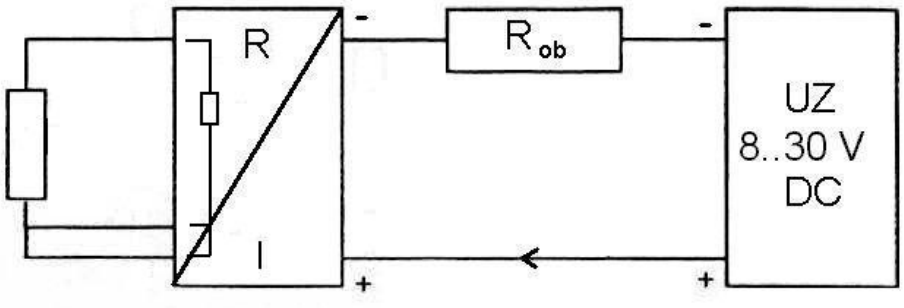
SEM206P	A	B

A	Sensor type
P	Pt100

B	Temperature range ($T_1 \div T_2$)
	specify in °C



Drawing 1. **Resistance overcharge**



Drawing 2. **Configuration**

Ordering Example:

SEM206 P–0+100°C

stands for: Transmitter type SEM 206, for RTD sensor Pt100 measuring temp. range 0-100 °C.

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SEM 206TC

Temperature Transmitter Type SEM 206TC for thermocouples

Temperature transmitter type SEM 206TC is a 2-wire, digital transmitter, for assembling in connection head of the thermocouple. A change of range and calibration of transmitter is set up by Status software which adjust zero and span temperature in accordance to output signal 4 and 20mA.

Shielded LED indicator shows correct end of span programming and indicates damage of RTD sensor.

Technical specification

INPUT

Cooperative sensor	Type	Acc. to standard	Measuring range	Minimum range
Thermocouple	K	EN 60584	-200°C..+1370°C	min. 10°C
	J		-200°C..+1200°C	
	T		-200°C..+400°C	
	R		0°C..+1760°C	
	S		0°C..+1760°C	
	L		0°C..+1200°C	
	N		0°C..+1300°C	

OUTPUT

Current	Resistance (Drawing 1)	Sensor interval
4 – 20 mA	Rob = (U_z – 8)/0,02 [A]	>20,5 mA

Cooperative sensor	Span Accuracy	Power supply	Ambient temp.	Influence of ambient temp.
Thermocouple K, J, T, R, S, B, L, N	0,04% span or 0,5°C	8-300 VDC	-20°C..+80 °C	zero ±4 mV / °C span 0,01% / °C

Galvanic separation	Mounting
not present	in connection head

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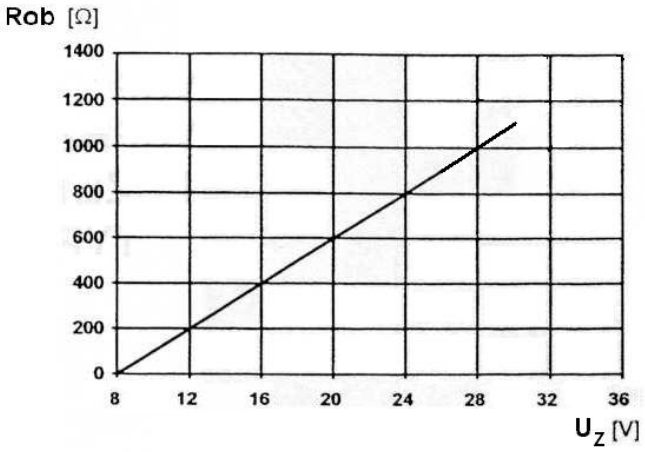
Ordering Information

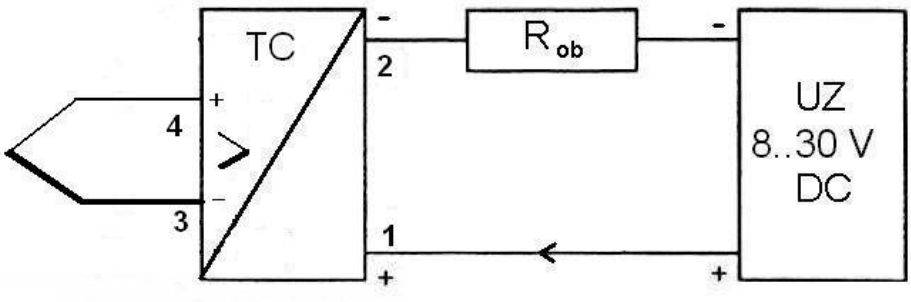
SEM206	A	B

A	Sensor type
1/TC-K	Thermocouple type K
1/TC-J	Thermocouple type J
1/TC-T	Thermocouple type T
2/TC-R	Thermocouple type R
2/TC-S	Thermocouple type S
3/TC-L	Thermocouple type L
4/TC/N	Thermocouple type N

B	Temperature range ($T_1 \div T_2$)
	specify in °C



Drawing 1. **Resistance overcharge**



Drawing 2. **Configuration**

Ordering Example:

SEM206–1/TC–K–0+600°C

stands for: Transmitter type SEM 206, for thermocouple type K, measuring range 0-600 °C.

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AR604

Temperature controller Type AR604

Microprocessor temperature controller type AR604 with double readout of measuring and ordering value is designed for regulation of constant value.

- high accuracy and resistance to interference,
- programming with button PGM and potentiometer with button function,
- access to configuration parameters secured by password,
- universal input: Pt100 and thermocouples J, K, S, N, E.
- digital filtration by programmed integration,
- digital readout with indication resolution 0,1°C for Pt100 i 1°C for thermocouples
- 1 threshold ON-OFF or PID with relay output or SSR
- signalling state of relay by illuminating diode
- possibility of blocking changes of threshold values

Technical specification

Universal input:
- Pt100 (3- or 2-wire).....-100 ÷ 850 °C (set-up of a factory)
- thermocouple J.....0 ÷ 800 °C
- thermocouple K .....0 ÷ 1200 °C
- thermocouple S.....0 ÷ 1600 °C
- electronic compensation of thermocouple cold ends
- Resistance of leads for Pt100 Rd < 30 Ω (3-wire for each line)

Input current Pt100:
- digital readout .....2 x 4 digit LED
- indications range .....-999÷9999
- indication resolution....0,1°C or 1°C
- upper display (red).....7mm
- lower display (green)....7mm

Accuracy:
- Pt100.....0,2 % measuring range ±1 digit
- thermocouple .....0,3 % measuring range ±1 digit
- thermocouple inputs additionally ±2°C (temperature of cold ends)
- response time .....0,5 ÷ 2 s (programmable)

Output:
relay:
- for resistance loads .....8A / 250V~
- for inductive loads.....2A / 250V~
- life by full load.....min. 2x105 switch
- SSR (transistorized NPN OC) 2V, resistance current limit 440 Ω

Signalling:
- detected errors .....messages on display
- relay activities .....1 diode LED red

Dimensions:
- table housing .....48 x 48 x 79 mm
- window of table .....46 x 46 mm

Leakproofness class:
- IP50 – .....front panel,
- IP20 – .....connections

Power supply:.....power network 230Vac (85÷260 Vac) / 3VA
- low voltage AC.....24Vac (15÷50 Vac) / 3VA
- low voltage DC .....24Vdc (18÷72 Vdc) / 3W

Work temperature range .....0 ÷ 50 °C

Relative humidity range .....0 ÷ 90 % (without condensation)

Mass.....125g

Compatibility EMC;resistance :..PN-EN 61000-6-1:2002(U)

Emissivity:.....PN-EN 61000-6-3:2002(U)

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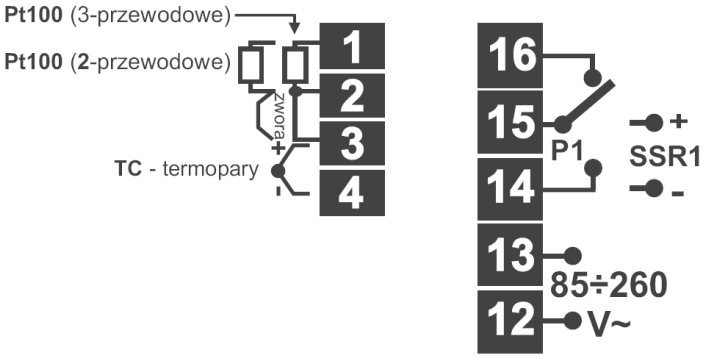
Ordering Information

AR604	A	B										

A	Power supply
S1	230 VAC (85 – 260 V)
S2	24 VAC/DC

B	Output 1
P	Relay
S	SSR (transistorized NPN OC)

Description Of Wire Connections



Input 3-wire Pt100 :
- for clamps 1-2-3.

Input 2-wire Pt100 :
- for clamps 1-2, cramp in clamps 2-3.

Input of thermocouples J, K, S :
- for clamps 3-4 ('+' thermocouples for clamps 3, '-' to clamp 4).

Power supply :
- for clamps 12-13.

Relay output:
- P1 for clamps 14-15-16.

Output SSR:
- „+" SSR1 for clamp 14 „-" SSR1 for clamp 15.

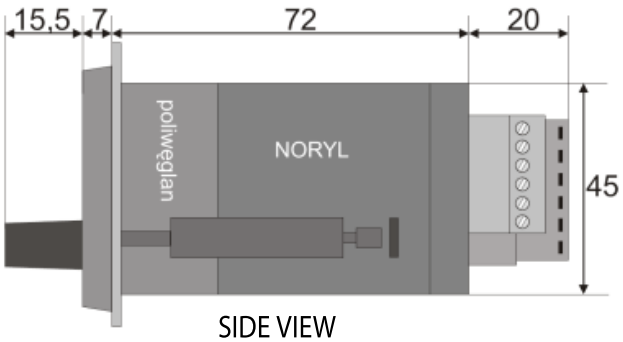
Assembly Data

Housing of table .....INCABOX 48x48 XT L57
- front panel .....polycarbonate
- housing frame.....self-extinguishing NORYL 94V-0

Housing dimensions .....48 x 48 x 79 mm

Window of table .....46 x 46 mm

Clamping .....handles on housing side



SIDE VIEW

Ordering Example

AR604-S1-P

stands for: Universal regulator AR604, power supply 230 VAC (85 – 260 VAC), output – relay

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AR662

Universal Microprocessor Controller Type AR662

Microprocessor universal controller with thermometric and analog input, 2 relay outputs SRR, 1 analog output, double readout of measured and set value ON-OFF, PID, RAMPING, RS485/232, rail 53x90x58mm

Technical specification

- high accuracy and resistance to noises in production area
- universal thermometric and analog input
- temperature sensors Pt100, Ni100
- thermocouples J, K, S, R, T, B
- current 0÷20mA, 4÷20mA
- voltage 0÷60mV, 0÷10V
- 2 output relay or SRR
- output 1: ON-OFF with hysteresis, PID, AUTOTUNING PID
- output 2: ON-OFF with hysteresis
- optional:
- interface RS232C or RS485, MODBUS-RTU
- analog output 0/4÷20mA or 0÷10V (continous-controls, retransmission)
- built in power supply 24Vdc/30mA for object transmitters supply
- programmable type of input, range of readouts and other parameters
- option to protect configurable parameters by password
- option to block of set value
- programmable digital filtration
- programmable operation characteristic (process controller, RAMPING)
- manual option of output controls (type ON-OFF) double display LED, height of digits 10 and 14 mm, control of brightness
- signalizing:
- found errors: information on display
- activity of relays: diode LED red
- freeware software ARSoft-WZ1 for parameters configuration
- software ARSoft-WZ2 for record and visualization of measuring data
- cooperation with operator panel AR295
- measurement accuracy:
- 0,1% of full range ±1 digit,
- thermocouple input: 0,2% of full rage ±1 digit,
- <2°C (temperature of cold ends)
- response time: 0,3÷2s (programmable)
- power supply:
- 230Vac (85÷260 Vac) / 3VA
- 24Vac/dc (18÷72Vdc/3W, 15÷50Vac/3VA)
- operation temperature range: 0÷50°C
- relative humidity range: 0÷90% (without condensation)
- housing dimensions 53x90x58 mm for mounting on rail TS35 (DIN EN 50022-35)

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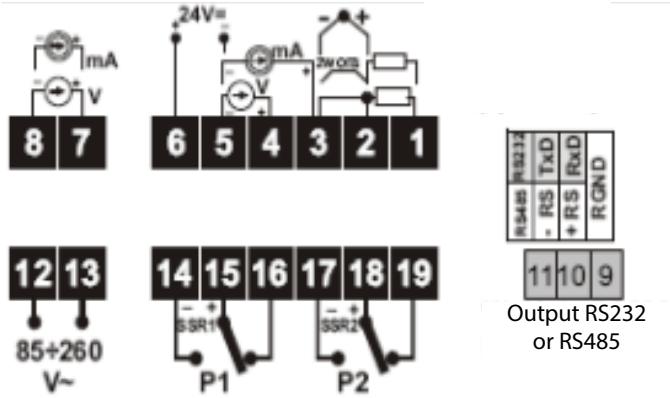
Ordering Information

AR662	A	B										

A	Power supply
S1	230 VAC (85 – 260 V)
S2	24 VAC/DC

B	Output 1
P	Relay
S	SSR (transistorized NPN OC)

Description Of Wire Connections



Input 3-wire Pt100 :
- for clamps 1-2-3.

Input 2-wire Pt100 :
- for clamps 1-2, cramp in clamps 2-3.

Input of thermocouples J, K, S :
- for clamps 3-4 ('+' thermocouples for clamps 3, '-' to clamp 4).

Power supply :
- for clamps 12-13.

Relay output:
- P1 for clamps 14-15-16.

Output SSR:
- „+" SSR1 for clamp 14 „-" SSR1 for clamp 15.

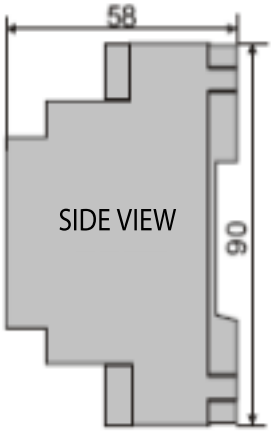
Assembly Data

Housing of table .....INCABOX 48x48 XT L57
- front panel .....polycarbonate
- housing frame.....self-extinguishing NORYL 94V-0

Housing dimensions .....48 x 48 x 79 mm

Window of table .....46 x 46 mm

Clamping .....handles on housing side



Ordering Example

AR662-S1-P

stands for: Universal microprocessor controller AR662, power supply 230 VAC (85 – 260 VAC), output – relay

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TC52

Analog temperature controller Type TC52

Compact dimensions (48mm x 48mm)

- Proportional steering and On./Off.
- Input on sensors type: J, K or PT100 (set up of a factory)
- Built-in weld joint for thermocouples
- Transparent knob for easy settings
- Available mounting adapters into holes 96mm x 96 mm or 72 mm x 72 mm.

Technical specification

INPUT
- J, K or PT100 set up of a factory
- Direct input from sensors
- Built-in compensation cold ends for thermocouples

ACCURACY:
- Setting: +/- 3% full scale
- Repetition: +/- 3% ful scale
- RANGE: 0...200 OR 0...400 st C

OUTPUT:
- Relay: 1 C/O (SPDT) 5A 230V
- AC/24 V

STEERING:
- Temporarily proportional
- ON/OFF – turn on/turn off

TEMPERATURE SETTINGS
- Transparent knob on front panel

DIODE INDICATORS
- Relay condition
- Power supply

POWER SUPPLY:
- Tolerance +/- 15%
- 230V AC 50Hz
- 110V AC 60 Hz

HOUSING:
- ABS Plastic

TEMPERATURE:
- Operation 0 do 50 st C
- Storage -5 do 50 st C

HUMIDITY:
- 95% RH

WEIGHT:
- 180 grams

DIMENSION:
- 48x48x100

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Ordering Information

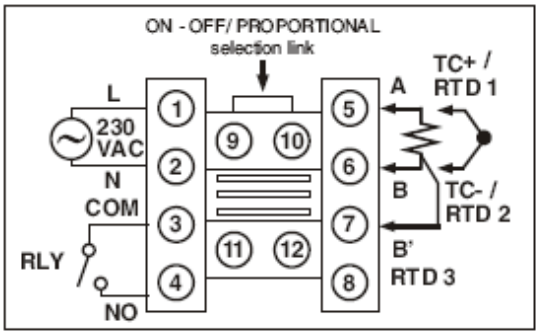
TC52	A	B	C									

A	Temperature range
0...200	0 ÷ 200°C
0...400	0 ÷ 400°C

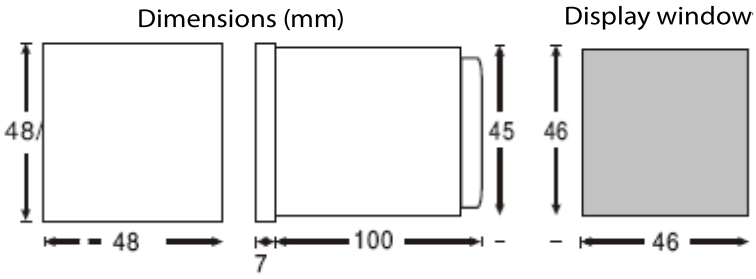
C	Power supply
230	230 VAC
110	110 VAC

B	Sensor type
Pt100	Resistance thermometer Pt100
J	Thermocouple type J
K	Thermocouple type K

Connection rail and electrical connections description



Assembly Data



Ordering Example

TC52-0... 400-J-230

stands for: Regulator TC 52 set up on temperature range from 0 oC to 400 oC for thermocouple type J, supplied by voltage 230 V

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M-300

Programmable indicator Type M-300

Modern, universal, precise, 3-canal panel indicator with electronic recording of measuring results on cards MMC. For instrument one can directly connect different types of temperature sensors, transmitters with analog output or impulsive output.

Usage:

- Measurement of temperature, humidity, pressure and other dimensions with results recording.
- Work in scattering measuring systems with local indication of measuring results.
- Food industry, iron and steel industry, glass-making industry, control of storage hall, production lines.

Technical specification

- 3 measuring inputs.
- Direct connection of temperature sensors RTD / TC.
- Analog inputs current loop 0/4-20 mA with power supply from instrument.
- Impulsive input for frequency measuring or two-states.
- Large display LED.
- Recording of results on removable memory cards MMC (electric recorder).
- Function of measuring gating, gradient detection, recording release.
- Function alarm – steering, 2 relay inputs.
- Communication port RS-485, report Modbus RTU, software for visualization.

INPUTS:

Instrument has three independent measuring inputs:

• **RTD/TC** – for direct connection of sensors type: Pt100, Pt200, Pt500, Pt1000, Ni100, Cu50, **thermoelements** J, K, L, N, R, S, T, U, B, E,

• **0/4-20mA** – for connection of sensors in standard current loop with possibility of power supply from instrument,

• **PULSE** – impulsive input for sensors connection with impulsive output with range 0,001 Hz for 10 kHz or as two-state input for controlling the work results or multiplication (gating) of measuring value.

Ranges of work inputs are programmable in wide range, enable digital filtration of states non fixed and fluctuation signals.

MEASURING FUNCTIONS:

- Display LED with four signaling diodes enables:
  - -display of results from three different measuring canals,
  - -display of information about overflow alarming states,
  - -display of information about existing errors.
- Refreshing of results can be programming in range from 0,2 s to 5 s.
- Analog input 0/4-20mA can realize measuring with line, elemental or user characteristic. User characteristic enables programming of self curve conversion.

Ordering Information

M-300

Ordering Example: M-300

stands for: M-300 – programmable indicator

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MPI-8/4

Data Recorder Type MPI
8 or 4 channel

MPI-8/4 – multi-channel, microprocessor measuring instrument. It is designed for temperature measurement and other physical or analytic quantities such as humidity, pressure, flow, level etc.

Usage:

- Multi-point measurement of optional physical or analytic measurements,
- Measurements in heat-engineering and industrial applications,
- Laboratory measurements,
- Recording of results with present alarm signaling of overflow,
- Communication with super-ordinated system, record on memory cards.

Technical specification

- 4 or 8 measuring inputs,
- Cooperation with sensors RTD: Pt100, Pt1000, Ni100,
- Cooperation with thermoelements J, L, K, T, U, E, N, B, R, S,
- Cooperation with converters in standard 0/4-20mA,
- 5 alarm-steering semiconductors,
- High precision of temperature measurements:
- Resolution 0,1°C, accuracy ±0,5°C,
- For Pt100, Pt1000 in range -50 do +150°C,
- Resolution 0,01°C, accuracy ±0,2°C,
- Accuracy of current inputs ±0,1%,
- Digital linearization of sensors characteristics,
- Display LCD 2x16 signs, alphanumeric,
- Cyclic or continuous displaying of chosen channel,
- Recording of measuring results on memory card MMC- 32MB or 120 MB,
- Removing, possibility of data readout from card in reading apparatus MMC,
- 5 two-state outputs type OC,
- Alarm signaling with acknowledgment,
- Programming from computer or keyboard (some parameters),
- Communication RS-485: ASCII, MODBUS RTU,

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Ordering Information

MPI	A	B										

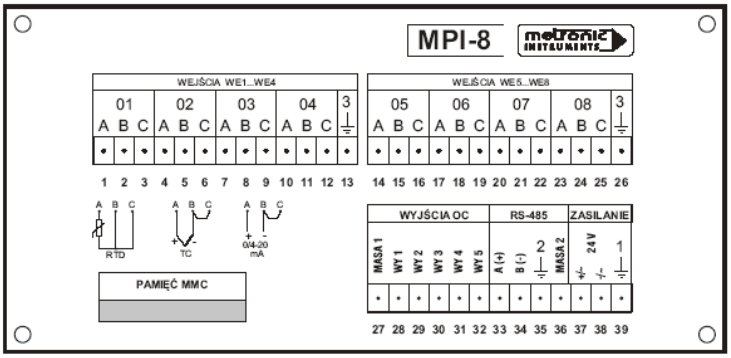
A	Measuring inputs
4	4 inputs
8	8 inputs

B	Inputs type 0/4–20mA (rest RTD, TC, U or R)
	specify quantity

Time of full records in days

Save after	5 s	10 s	30 s	1 min.	2 min.	5 min.	10 min.	30 min.	1 h
Save time In Days	14,4	28,8	86	173	345	864	1 727	5 182	10 365

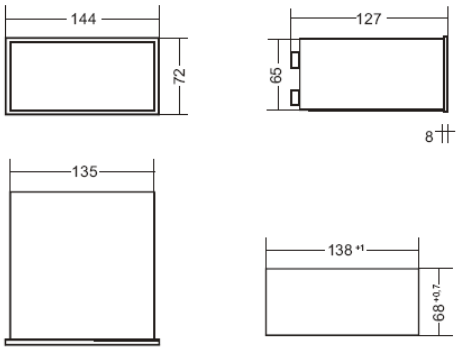
Output description (back side of indicator)



Assembly Data

Housing .....“NORYL” - 1/4 DIN - 72x144 mm

Dimensions (mm)



Ordering Example

MPI-8-6

stands for: Data recorder with 8 measuring inputs, 6 inputs type 0/4–20mA (rest RTD, TC, U or R)

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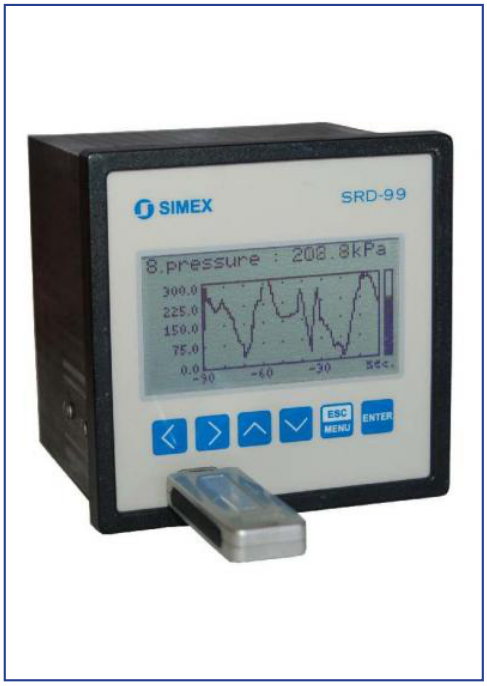
SRD-99

Data Recorder
Type SRD-99



Data recorder SRD-99 designed for recording and display of present or averaging values, and presentation various technological parameters by diagram of trends. The instrument has got max. 8 measuring inputs: sensors Pt 100/500/1000 or current signals 0/4-20 mA; 1 impulse input (digital) operating process of recording and 1 USB input Host for data storing in the flash memory (input is not designed for direct connection of register with PC). Internal analog-digital transmitter has got resolution 16 bits, which gives a big effect resolution of recording. Additionally there is the possibility of alphanumeric description (vocabulary) individually for each recording channels. The various language versions assisted by full descriptions and configuration software SRD-Toolkit cause that process of instrument programming is easy.

- Possibility of connecting several recorders in one net, remote collecting data,
- Direct diagram of trends separately for each channel,
- Free configuration and recording software,
- Isolated connection of communication RS-485 in standard.
- Recording of results with present alarm signaling of overflow,
- Communication with super-ordinated system, record on memory cards.

Technical specification

Voltage:
- 19V ÷ 50V DC; 16V ÷ 35V AC
- 85 ÷ 260V AC/DC

Power input: .....typical 7 VA; max. 12 VA

Display:
- graphical LCD, illuminated 128 x 64 points

Measuring inputs:
- at choice 1, 4 or 8 inputs Pt 100, 500, 1000 (configuration 2-, or 3-wire) or 0/4 - 20 mA; common ground

Measuring range:
- ± 9999 + comma (current input); -100°C ÷ +600°C (inputs RTD) with resolution 0,1°C

Accuracy of measurement: .....± 0,25% ± one figure

Digital input: .....1 input 24 V,

Output of sensors supply:
- 24 V DC ± 5% (max. 200 mA for current inputs, max. 50 mA for inputs type Pt), not separated from inputs of measurement

Junction of communication:
- RS-485 or input USB Host, galvanic separated

Report of transmission: .....MODBUS RTU

Speed of transmission: .....1200 ÷ 115200 bit/sek.

Memory of data:
- 2 MB (above 500 000 measurements) in version with interface RS-485;
- 8 MB (above 2 000 000 measurements) in version with RS-485 and USB Host

Internal protection:
- Version without USB:
  - -IP 40 (front)
  - -IP 65 (front after use of additional frame)
- Version with USB:
  - -IP 20,
  - -IP 42 (after use of transparent door with key - type STD-99, look at: optional accessories)

Operation temperature: .....0°C ÷ +50°C

Storage temperature: .....-10°C ÷ +70°C

Dimensions: .....96 x 96 x 100 mm

Dimensions of mounting hole: .90,5 x 90,5 mm

Mounting depth: .....min. 102 mm

Thickness of table plate: .....max. 5 mm

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Ordering Information

SRD-99	A	B	C	D	E							

A	Voltage
S1	19 – 50 VDC
S2	16 – 35 VAC
S3	85 – 260 VAC

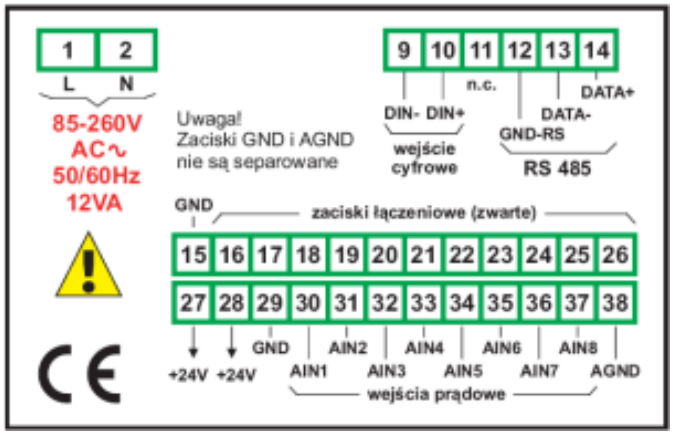
B	Type of inputs
WA	Analog input 0/4 – 20 mA
RTD	Input RTD (Pt100, Pt500, Pt1000)

C	Number of inputs
1	1 input
4	4 input
8	8 input

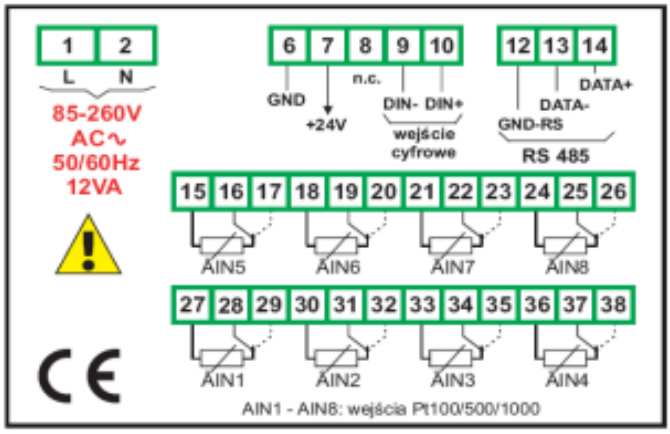
D	Interface
RS485	Interface in series RS485
USB	Interface USB

E	Additional accessories
U/4	Converter SRS-U/4-Z45 (USB/RS-485)
2/4	Converter SRS-2/4-Z45 (RS-232/RS-485)
D	Door with key STD-99 (IP 42)

EXAMPLE OF PROPER CONNECTION



Version with current inputs



Version with PT inputs

Ordering Example

SRD-99-S3-WA-8-USB-D

stands for: Data recorder SRD-99, power supply 230 V (85 – 260 V), 8 analog inputs, interface USB with additional transparent door with key

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ETC

Microprocessor Temperature Indicator Type ETC

- Possibility to calibrate type of input (Pt100, thermocouple type J, K, T, S, R).
- Type of regulation - ON/OFF or PID.
- Self tuning function for automatic adjusting regulating parameters.
- Measuring parameter is shown on the display the same time with set parameter.
- Logical relay output.
- Alarm output.
- Protection degreeIP65.

Technical specification

Accuracy: .....±0,2%(full sclae) ±1 digit

Measuring range:.....depend on input sensor:
-Pt100-200..... 600°C
-Pt100 ..... -99,9...300°C
-thermocouple J ..... 0...600°C
-thermocouple K..... 0...1200°C
-thermocouple T..... 0...400°C
-thermocouple S..... 0...1600°C
-thermocouple R..... 0...1600°C

Output: .....relay, 2A, 250V AC logical 0/12V DC, 30mA (on demand)

Alarm output:.....1 normally open, 2A, 250V AC

Display:
-4 red LED digits, Measuring parameter
-4 green or yellow LED digits , Set parameter

Keyboard: .....micro-switch

Power supply :
-230V AC +15%, -20%, 50/60Hz,
-24V AC ±10%, 50/60Hz (choose during ordering)

Working temperature: .....0...50°C

Size:.....ETC 4420 48x48x87mm

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Ordering Information

ETC	A	B	C	D								

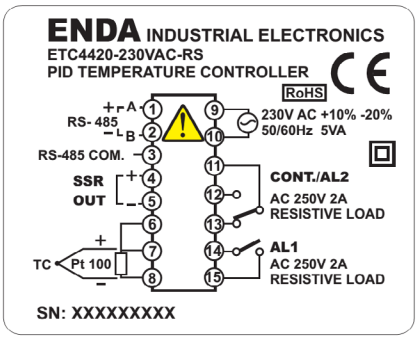
A	Size
4420	48x48x87mm
7420	72x72x97mm
8420	48x96x87mm
9420	96x96x50mm

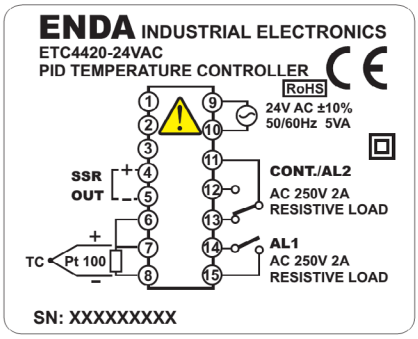
B	Power supply
230	230 VAC
24	24 VAC
9-30 VDC; 7-24 VDC	SM

C	Measuring inputs
RS	RS 485/Modbus
without	Brak RS 485/Modbus

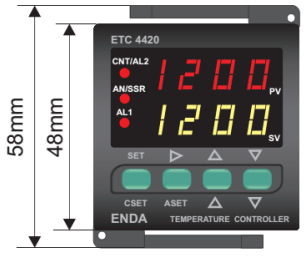
D	Inputs type 0/4–20mA (rest RTD, TC, U or R)
R	Relay and logical output 0-12VDC

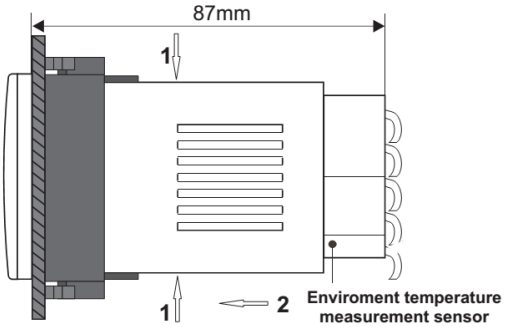
Output description (back side of indicator)





Assembly Data





Ordering Example

ETC-4420–230–RS–R

stands for: Microprocessor indicator ETC 4420, power supply 230 VAC, possibility to send data by RS485/Modbus with relay and logical outputs

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ETI 741

CE RoHS Compliant

Microprocessor Temperature Indicator Type ETI 741

Microprocessor temperature indicator ETI 741 series, is universal device which allows to configure both resistance and thermocouples inputs. Device with protection degree of IP65 can be mounted on board – front and rear panel protection degree of IP20. Because of easy way of configure and its universality device is very often chosen by customers.

Technical specification

Size: .....72x72 mm.
Dispaly: .....4 digits.
Unit choose: .....°C, °F.
Power supply: .....230V AC or 9...30VDC/7...24VAC, 24AC ±10%
Power consumption: .....Max 7VA
Data storage: .....EPROM (min. 10 years)
Mounting: .....On board
Working temperature: .....0..50°C/-25..70°C
Protection degree IP: .....front: IP65, Rear: IP20
Easy to operate.
Input configuration.

Sensor type	Temperature range [°C]	Accuracy
Thermocouple J (Fe-CuNi)	0..600	± 0,2% ±1
Thermocouple K (NiCr-Ni)	0..1200	
Thermocouple T (Cu-CuNi)	0..400	
Thermocouple S (Pt10Rh-Pt)	0..1600	
Thermocouple R (Pt13Rh-Pt)	0..1600	
Pt100	-200..600	

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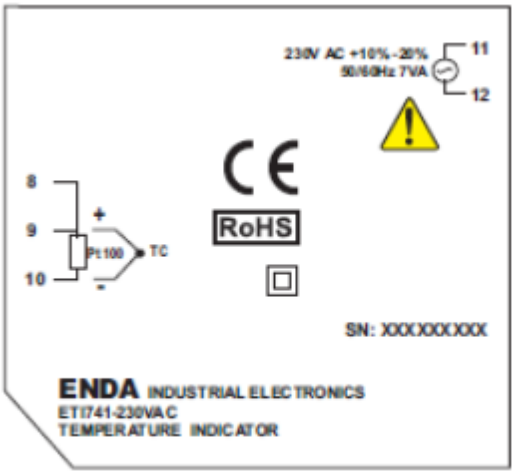
Ordering Information

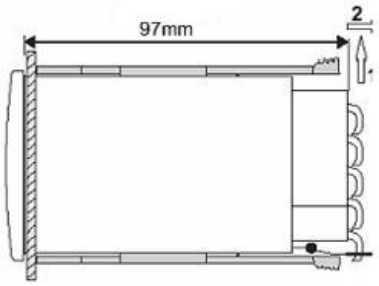
ETI741	A

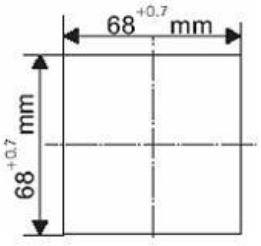
A	Power supply
230	230 VAC
9...30VDC/7...24VAC, 24AC ±10%	9...30VDC/7...24VAC, 24AC ±10%

Output description (back side of indicator)



Assembly Data





Ordering Example

ETI471-230

stands for: Microprocessor indicator ETI741 with power supply 230V

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P300

Portable Temperature Meter with probe NTC Type P300

Portable, precise temperature meter type P300 with probe NTC (thermistor) has been designed for temperature measurement of medium which does not need continuous monitoring or which place of measure is various.

The advantages of this instrument are: resistance to splashing(IP54); additionally illuminated display LCD, the possibility of connecting sensor with meter and leading measurement by one hand, storing the results, and storing max. and min. of measurement value.

Technical specification

Range of measurement : .....NTC (thermistor): from -40°C to +200°C

Accuracy :

- ..... ±0,5°C: from 0°C to +100°C
- ..... ±1,0°C: of the range

Resolution: .....0,1°C

Voltage : .....2 x 1,5V AA, life of battery about 160 hours .

Weight : 240g

Operating temp. : .....from 0°C to +50°C

Ordering Information

P300	A

A	Additional options
W	Esthetic plastic suitcase

Ordering Example : P300-W

stands for: Portable temperature meter type P300 with sonde and esthetic plastic suitcase.

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P400 / P410

Portable Precise Temperature Meter Type P400 / P410

Portable, precise temperature meter type P400 – for input Pt-100 or P410 – for input „K", has been designed for temperature measurement of medium which does not need continuous monitoring or which place of measure is various.

The advantages of this instrument are: high precision of measurement in relation to the price of the sale, the possibility of connecting sensor with meter and leading measurement by one hand, storing the results and storing max. and min. of measurement value.

Technical specification

Range of measurement:
-P400: ..... from -99.9°C to +850°C
-P410: ..... from -99.9°C to +1370°C

Input :
-P400: Pt100
-P410:..... "K"

Communication:.....Interface RS-232

Accuracy :
-P400 : ..... ±0,3°C
-P410 :..... ±0,5°C

Resolution :
-0,1°C :..... in range from -99,9°C to +399,9°C
-1,0°C: ..... of the range

Voltage : ..... 2 x 1,5V AA, life of battery about 160 hours

Weight: 240g

Operating temperature: .....from 0°C to +50°C

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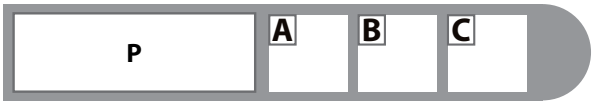
Ordering Information



A	Type of meter
400	Input Pt100
410	Input „K"

B	Type of probe
S0	Without probe
S1	With probe of measurement

C	Additional options
O	Software for communication with meter
W	Esthetic plastic suitcase

Ordering Example

P410-S1-OW

stands for: Portable, precise temperature meter type P410 (for inputs „K") with probe of measurement, software for PC, esthetic plastic suitcase.

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CP82 / QP99

CP82

QP99

Deflection thermometer with universal capillary -40...+40 or 0..+120°C or 50...+350°C

Thermometers with brazen capillary with diameter 2,4mm secured by sheath of PVC.

Minimal bend radius of capillary 5mm. Length of capillary 1,5m. Three measuring ranges of temperature.

Usage: refrigerating engineering, gastronomy, house instruments, boilers.

Technical specification

CPF82 (round).....temperature range: -40...+40°C

CP82 (round).....temperature range: 0...+120°C

CP82C (round).....temperature range: 50... +350°C

-capillary diameter: 2,4mm, brazen secured by sheath of PVC
-capillary length: 1,5m
-minimal bend radius of capillary capillary: 5mm
-dimensions:
-base (diameter x depth.): 52 x 25 mm
-front panel (diameter): 56mm

QP99 (square).....temperature range: 0÷120°C

QPF99 (square).....temperature range: -40÷40°C

-capillary diameter 2,4mm, brazen secured by sheath of PVC
-capillary length: 1,5m
-minimal bend radius of capillary: 5mm
-dimensions:
-base (diameter x depth): 52 x 22 mm
-front panel (wide x height): 55 x 55 mm

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Ordering Information

A	Type
CPF82	CPF82
CP82	CP82
CP82C	CP82C
QP99	QP99
QPF99	QPF99

B	Front panel (wrapper) colour*
B	black
S	silver

* square meters (QP99 and QPF99) are available only in black colour.

Ordering Example

CPF82-S

stands for: Deflection thermometer with universal capillary CPF82 temperature range: -40...+40°C - round with silver colour of front panel (wrapper)

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TTH300

Temperature Transmitter Type ABB TTH300

Temperature transmitter type TTH 300 from ABB Company, is a universal, 2 wire in head device with HART protocol. It is possible to assembly two resistance or thermocouple temperature sensors to this transmitter. There is also possibility to comply transmitter with special LCD display to see measurements in the place of sensor mounting. One can communicate with transmitter by Hart protocol using in-hand Hart Communicator. Calibrating is easy and intuitive. You can order transmitter in intrinsic safety version with PTB 05ATEX2017X certificate which can be assembly in Zone 0: II 1 G EEx ia IIC T6 E 1; Zone 1 (0): II 2 (1) G EEx [ia] ib IIC T6; Zone 1 (20): II 2 G (1D) Ex [iaD] ib IIC T6

Technical specification

INPUT

Sensor	Type	Acc. to standard	Current	Measuring range
Pt50 (a=0,003850) Pt100 (a=0,003850)2 Pt200 (a=0,003850) Pt500 (a=0,003850) Pt1000 (a=0,003850)	line 2, 3, 4-wire	EN 60751	0,2 mA	-200..+850°C
Ni120 (a=0,006180)	line 2, 3, 4-wire	DIN 43760	0,2 mA	-60°C.. +250°C
Thermocouple	K, J, N, T, E, R, S, B, L, U	EN 60584, DIN 43710, ASTM E 988	-	-125 mV ... 125 mV -125 mV ... 1100 mV

OUTPUT

Current	Protocol	Resistance	Short circuit
4 – 20 mA	HART	250-1100Ω for U = 18V..42V	3,6mA .. 22mA

Sensor	Accuracy	Power supply Uz	Ambient temperature	Influence of ambient temp. change
Resistor Thermocouple	± 0,16 °C ± 0,05 %	18 – 42 VDC	-40°C ..+85°C	-

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Ordering Information

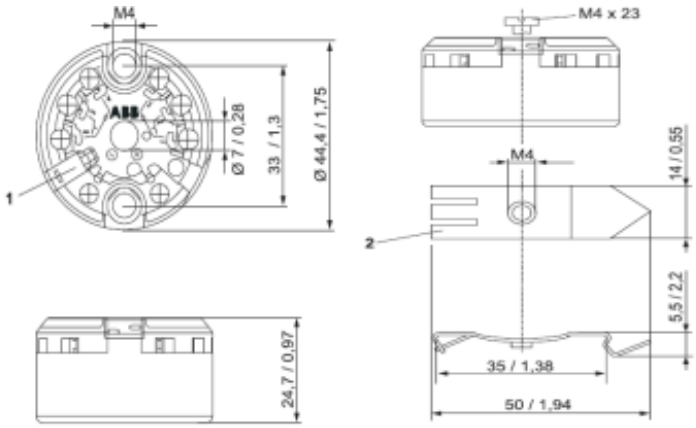
TTH300	A	B	C									

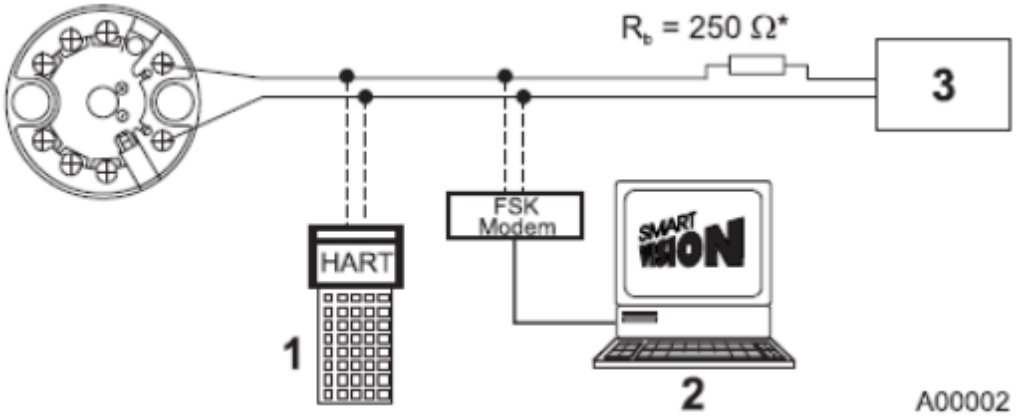
A	Sensor type	
Pt50	2xPt50	Pt50 or 2xPt50
Pt100	2xPt100	Pt100 or 2xPt100
Pt200	2xPt200	Pt200 or 2xPt200
Pt500	2x Pt500	Pt500 or 2x Pt500
Pt1000	2xPt1000	Pt1000 or 2x Pt1000
Ni120	2xNi120	Ni120 or 2xNi120
E	2xE	Thermocouple E or 2xE
J	2xJ	Thermocouple J or 2xJ
N	2xN	Thermocouple N or 2xN
K	2xK	Thermocouple K or 2xK
L	2xL	Thermocouple L or 2xL
T	2xT	Thermocouple T or 2xT
U	2xU	Thermocouple U or 2xU
B	2xB	Thermocouple B or 2xB
R	2xR	Thermocouple R or 2xR
S	2xS	Thermocouple S or 2xS

* There is possibility to attach resistance sensor and thermocouple at one time.

B	Configuration	
2p	2x2p	2-wire
3p	2x3p	3-wire
4p		4-wire

C	Temperature range ($T_1 \div T_2$)
	specify in °C





Ordering Example:

TTH300-2xPt100-2x3p-0...100°C

stands for: Temperature transmitter type TTH300 with Hart protocol in intrinsic safety version, with two Pt100 sensors with 3 wires connections, temperature range 0...100°C.

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TUB

PROTECTION TUBES
for thermometers and thermocouples

Protection tubes for thermometers and thermocouples are widely used for temperature measurements in food, chemical (type NAMUR - Normen-Arbeitsgemeinschaft fűr Mess- und Regeltechnik in der Chemischen Industrie) and heavy industry.

Protection tubes can be screwed or fixed using flange to the tag point. Depending on special requirements protection tubes are made of stainless steel 1.4571, 1.4841, Hastelloy C22 Alloy etc.

Accessible materials	
on stock	**on request**
1.4401	Incoloy 800 / 1.4876
1.4404	Hastelloy C276 / 2.4819
1.4571	Hastelloy C22 / 2.4602
1.4301	Inconel 625 / 2.4856
1.4307	Inconel 600 / 2.4816
1.4841	Monel 400 / 2.4360
1.4541	
1.0460	and other…
1.7380	
1.5415	

Extra options		
certificates	**tests**	**treatment**
3.1 acc. PN-EN 10204	Hydraulic pressure test	Etching / Pickling
3.2 acc. PN-EN 10204	Positive Material Identification	Electropolishing
	Dye penetration testing	Halar (ECTFE) coating
	X-ray test	Teflon (PFA) coating
	Ultrasonographic examination	Tantalum sleeve
	Hardness test	

Possibility of narrowing tubes (NAMUR style)	
outer tube diameter before necking [mm]	**outer tube diameter after necking [mm]**
Ø6	Ø4
Ø8	Ø5
Ø9	Ø7
Ø9	Ø8
Ø10	Ø6
Ø10	Ø8
Ø12	Ø7,5
Ø12	Ø9
Ø14	Ø9
Ø14	Ø10
Ø14	Ø11
Ø16	Ø12,5

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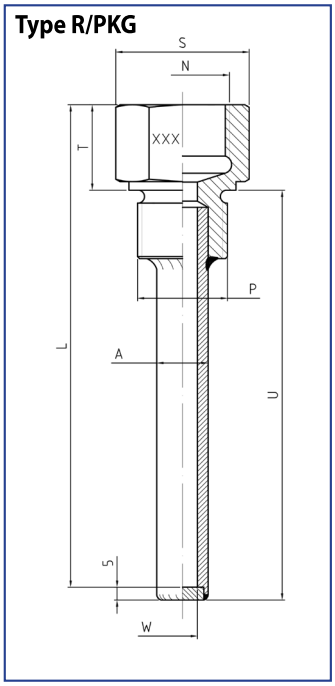
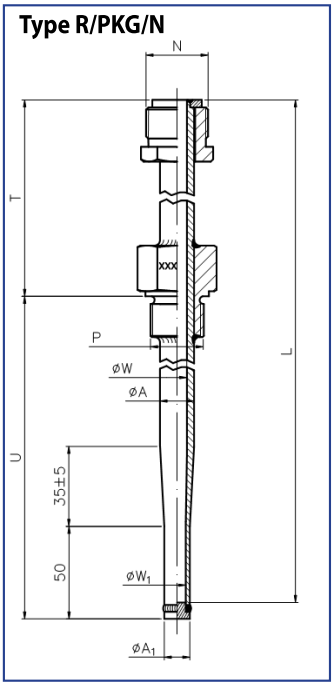
Types of tubular Protection Tubes

Type R/PKG



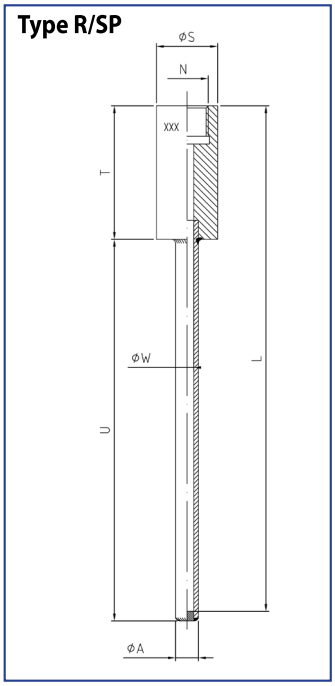
Protection tube threaded

Type R/PKG/N



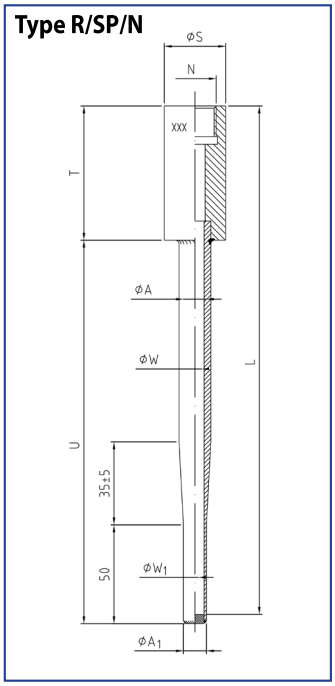
Protection tube threaded, NAMUR

Type R/SP



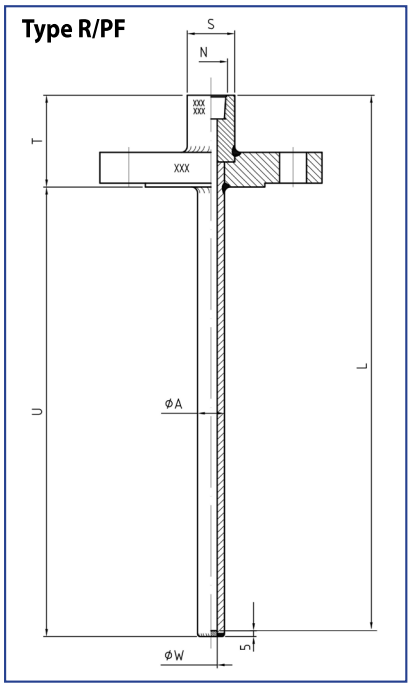
Protection tube in-weld

Type R/SP/N



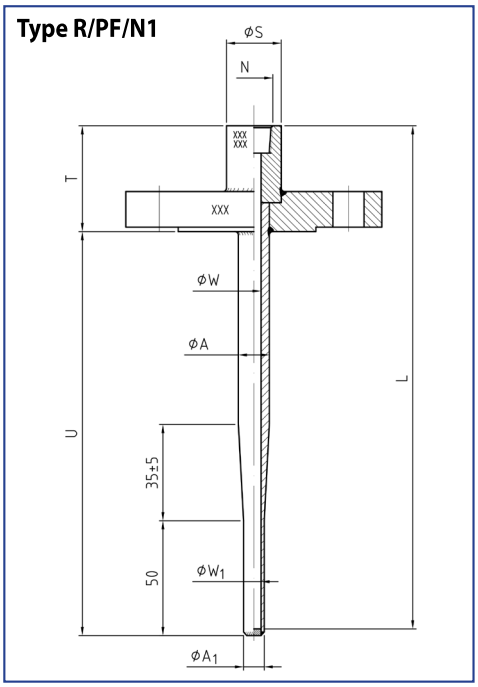
Protection tube in-weld, NAMUR

Type R/PF



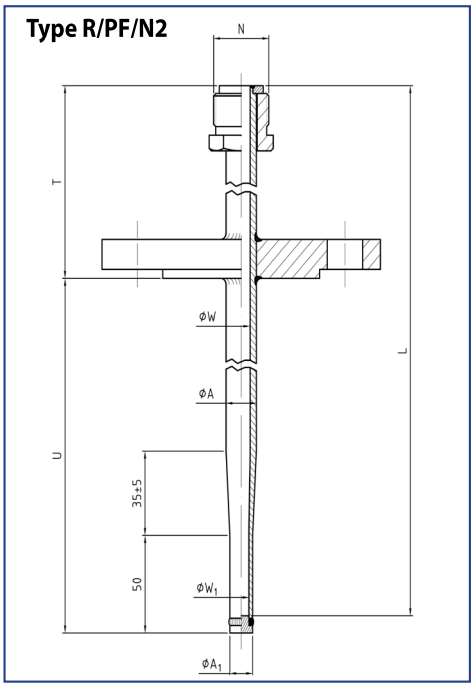
Protection tube with flange and lagging thread, straight

Type R/PF/N1



Protection tube with flange and lagging thread, NAMUR

Type R/PF/N2



Protection tube with flange and instrument thread, NAMUR

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Ordering Information

TUB	A	B	C	D	E	F	G	H	I	J

A	Protection tube type
R/PF/N1	Protection tube with flange NAMUR
R/PF/N2	Protection tube with flange NAMUR
R/PKG/N	Protection tube threaded NAMUR
R/SP/N	Protection tube in-weld NAMUR
R/PF	Protection tube with flange
R/PKG	Protection tube threaded
R/SP	Protection tube in-weld

B	Material
1.4571	1.4571 / 316Ti
1.4841	1.4841 / 314
1.7335	1.7335 / A182 Grade F11
2.4602	2.4602 / Hastelloy C22
	specify material grade

C	Process connection type (flange, thread P)
	specify type

D	Tube diameter outer A / inner W
12 / 7	A=12mm / W=7mm
15 / 9	A=15mm / W=9mm
18 / 12	A=18mm / W=12mm
13,7 / 9,22	A=13,7mm / W=9,22mm (mat. C22)
	specify in mm

E	Tube diameter outer A1 / inner W1 (only if stepped NAMUR style)
9 / 6,1	A1=9mm / W1=6,1mm
	specify in mm

F	Instrument connection thread (inside) N
	specify thread type

G	Immersion length U
	specify in mm

H	Lagging length T
	specify in mm

I	Diameter or hex S of lagging
	specify in mm

J	Sensor immersion length L
	specify in mm

Ordering Example:

TUB-R/PF-1.4571-DN25 PN40-12-7-M12x1-150-60-32-205

stands for: Protection tube with flange, straight, material 1.4571, flange DN25 PN40, tube diam. outer A=12mm, inner W=7mm, lagging thread (inside) M12x1,5, immersion length U=150mm, lagging length T=60mm, lagging diam. S=32mm, sensor immersion length L=205mm.

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T-WELL

THERMOWELLS
for thermometers and thermocouples

Thermowells (barstock) for thermometers and thermocouples are widely used for temperature measurements in food, chemical and heavy industry.

Thermowells can be weld-in, screwed or fixed using flange to the tag point. Depending on special requirements thermowells can be made of stainless steel 1.4571, 1.4841, Hastelloy C22 Alloy etc.

On customer request, we can provide Strength Calculation per ASME PTC 19.3 TW-2010. The process data required to perform such a calculation is as follows:

- flow rate,
- density of medium,
- temperature
- pressure dynamic viscosity.

Accessible materials	
on stock	**on request**
1.4401 1.4404 1.4571 1.4301 1.4307 1.4841 1.4541 1.4462 1.4410 1.0460 1.7335 1.7380 1.5415	1.4762 Alloy 20 / 2.4660 Incoloy 800 / 1.4876 Hastelloy C22 / 2.4602 Inconel 625 / 2.4856 Inconel 600 / 2.4816 Monel 400 / 2.4360 Titanium Gr. 2 Hastelloy C276 / 2.4819 and other…

Extra options		
certificates	**tests**	**treatment**
3.1 acc. PN-EN 10204 3.2 acc. PN-EN 10204	Hydraulic pressure test Positive Material Identification Dye penetration testing X-ray test Ultrasonographic examination Ferrite content measurement Hardness test Impact strength test	Heat treatment Quench hardening Black oxidation Carbonizing Zinc plating Electropolishing Halar (ECTFE) coating Teflon (PFA) coating Tantalum sleeve

Drilling possibilities
bore diameter [mm] (max. depth [mm])
Ø3,4 (400) ; Ø3,5 (400) ; Ø4 (500) ; Ø4,5 (250) ; Ø5 (600) ; Ø6 (700) ; Ø6,07 (700) ; Ø6,2 (1160) ; Ø6,25 (1160) ; Ø6,3 (1160) ; Ø6,5 (1160) ; Ø6,6 (1160) ; Ø6,9 (1160) ; Ø7 (1160) ; Ø7,5 (1160) ; Ø8 (1160) ; Ø8,3 (320) ; Ø8,5 (1160) ; Ø8,73 (1160) ; Ø9 (1160) ; Ø9,5 (1160) ; Ø10 (1160) ; Ø10,5 (1160) ; Ø11 (1160) ; Ø11,1 (500) ; Ø11,6(1160) ; Ø12 (1160) ; Ø12,55 (1160) ; Ø14,02 (1160) ; Ø14,05 (1160) ; Ø15 (1160) ; Ø16 (1160) ; Ø17 (300) and other (up to 200)

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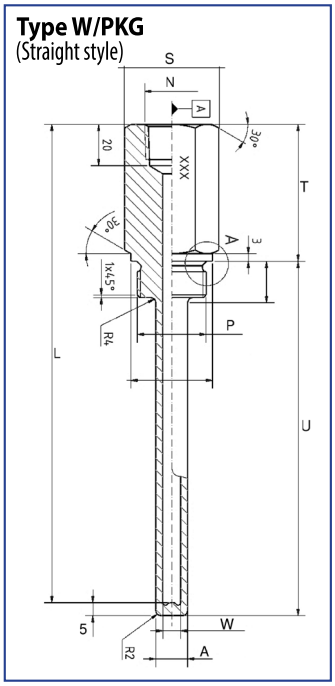
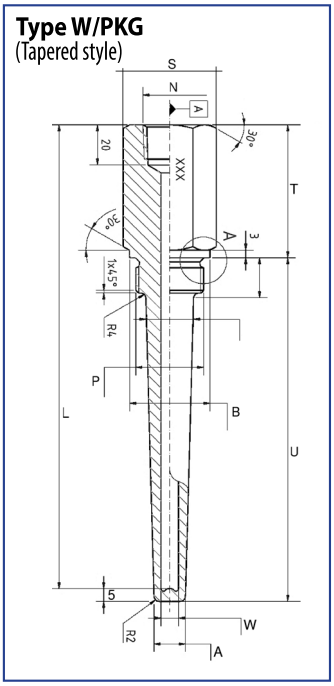
Types of drilled barstock Thermowells

Type W/PKG
(Straight style)



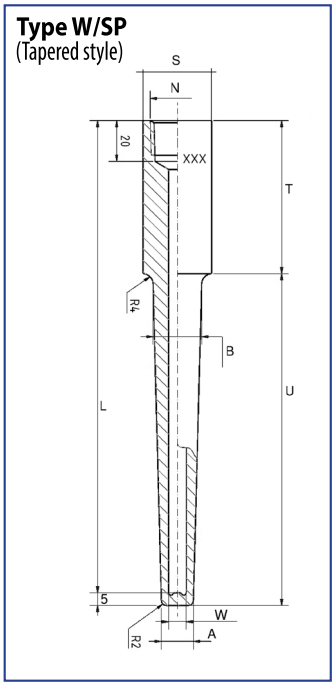
Threaded t-well, straight

Type W/PKG
(Tapered style)



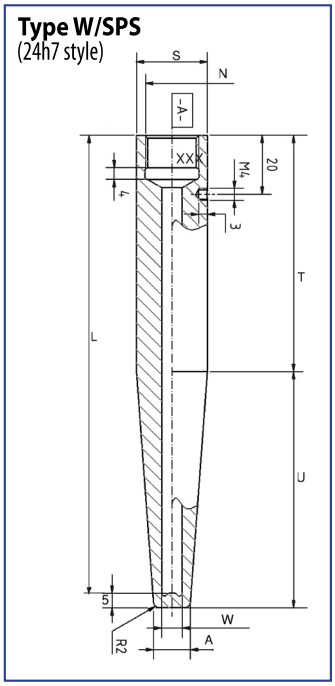
Threaded t-well, tapered

Type W/SP
(Tapered style)



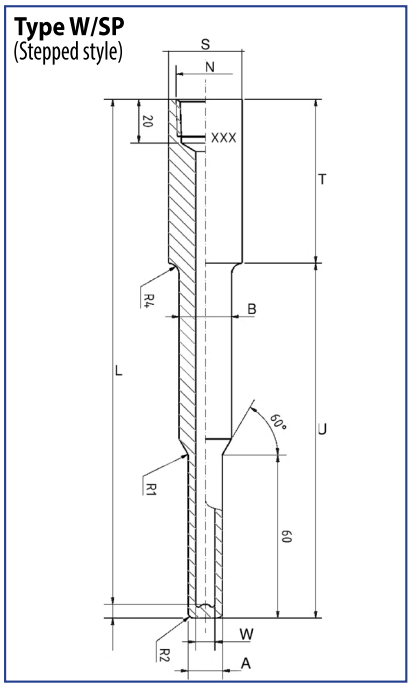
Weld-in t-well, tapered

Type W/SPS
(24h7 style)



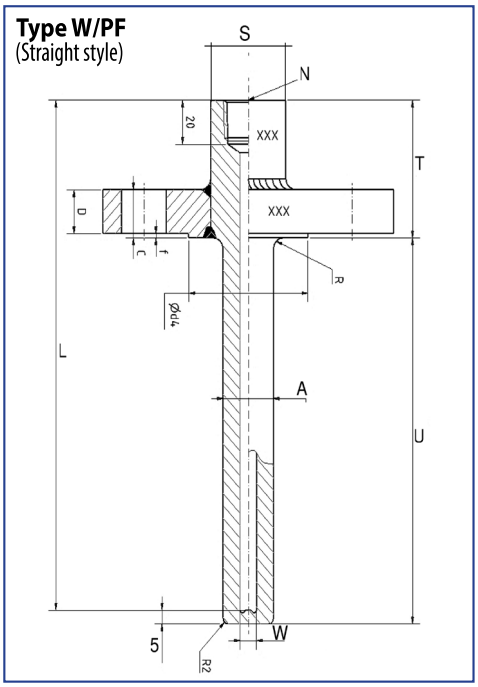
Weld-in t-well, polished (h7)

Type W/SP
(Stepped style)



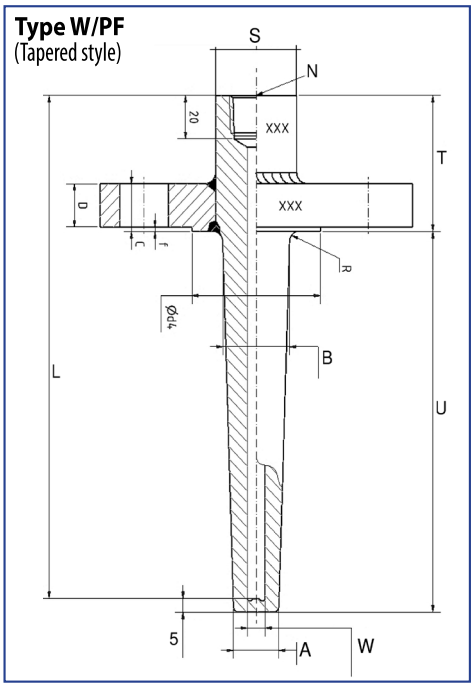
Weld-in t-well, stepped

Type W/PF
(Straight style)



Flanged t-well, straight

Type W/PF
(Tapered style)



Flanged t-well, tapered

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Ordering Information

T-WELL	A	B	C	D	E	F	G	H	I	J	K	L

A	Thermowell type
W/PF	Thermowell with flange
W/PKG	Thermowell threaded
W/SP	Thermowell weld-in
W/SPS	Thermowell Form 4 (acc to DIN 43772)

B	Process connection type (flange, thread P)
	specify type

C	Thermowell style
Z	tapered
P	straight
S	stepped

D	Material
1.4571	1.4571 / 316Ti
1.4404	1.4404 / 316L
1.5415	1.5415 / 15Mo3
1.7335	1.7335 / A182 Grade F11 / 15HM
1.7380	1.7380 / 10H2M
	specify material grade

E	Thermowell diameter A (tip)
	specify in mm

F	Thermowell diameter B (root)
	specify in mm

G	Bore diameter W
	specify in mm

H	Instrument connection thread (inside) N
	specify thread type

I	Immersion length U
	specify in mm

J	Lagging length T
	specify in mm

K	Diameter or hex S of lagging
	specify in mm

L	Boring depth L
	specify in mm

Ordering Example:

T-WELL-W/PKG-G1/2-Z-1.4571-12,5-19-7-M18x1,5-250-60-SW 30-305

stands for: Thermowell threaded, process connection G1/2", tapered, material 1.4571, tip diam. A=12,5 mm, root diam. B=19 mm, bore diam. W=7 mm, instrument thread M18x1,5, immersion length U=250 mm, lagging length T=60mm, lagging SW 30, boring depth L=305 mm.

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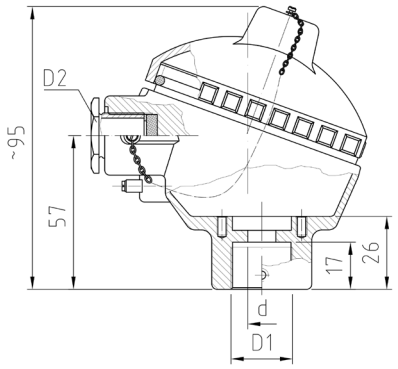
CONNECTION HEAD

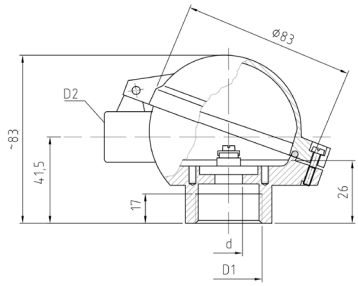
CONNECTION HEADS
for thermometers and thermocouples

We offer connection heads in basic and intrinsic safe (blue colour) executions. Dust-proof connection heads is made from light aluminum alloy AK 132. Inside 2, 3 or 4 terminals connection box or transmitter can be fitted.

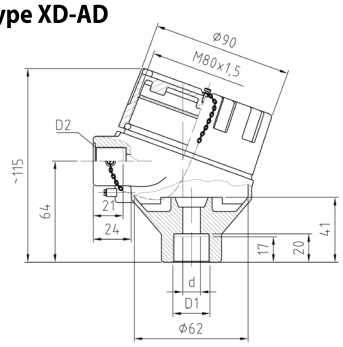
Type DNAG



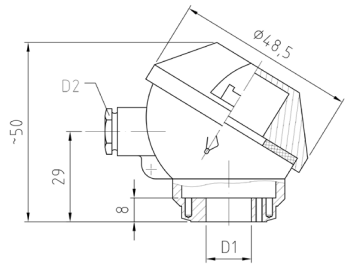
Type XE-DANA



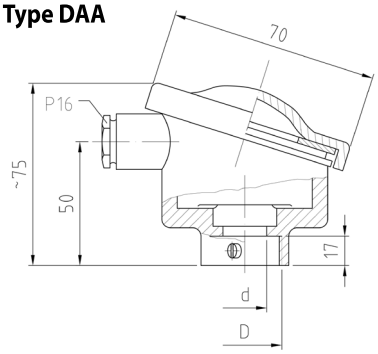
Type XD-AD



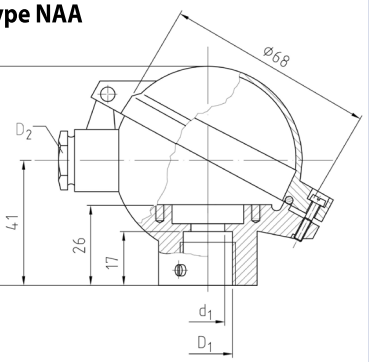
Type MAA



Type DAA



Type NAA



Technical specification

Connection head type	Seal type	Max operating temp.	Material
NAA, DAA, MAA, XE-DANA, DNAG	rubber	+100°C	Aluminum (Al)
NAA, DAA, MAA, XE-DANA, DNAG	silicone	+150°C	

Connection head type	Protection
MAA	IP 54
NAA, DAA, XE-DANA, DNAG	IP 65

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Ordering Information

HEAD	A	B	C	D	E	F	G	H	I	J	K	L

A Connection head type	
NAA	NAA
DAA	DAA
MAA	MAA
DNAG	DNAG
XE-DANA	XE-DANA
XD-AD	XD-AD
	specify type

B Execution	
	Basic
Exi	Intrinsic safe

C Material	
AL	Aluminum
SST	Stainless Steel
PA	Polyamide
PVC	Polyvinyl chloride

D Paint colour	
si	Silver
bl	Blue

E Hole diameter d	
	specify in mm

F Process thread D1=D	
	specify thread

G Thread D2 for cable gland	
	specify thread

H Additional cable gland (optionally)	
	specify type

I Closure	
W	Screwed
Z	With clips

J Seal type	
G	Rubber
S	Silicone

K Connection head operating temperature	
	specify in °C

L Ingress protection rating	
	specify IP

Ordering Example:

HEAD-DAA-Exi-AL-si-14-M24x1,5-M20x1,5-W-G-80-IP65

stands for: Connection head type DAA intrinsic safe, material Aluminum, silver colour , hole diameter d1=d=14mm, process thread D1=D=M24x1,5, cable gland thread D2=M20x1,5, without additional cable gland, screwed closure, with rubber seal, operating temp up to 80°C, protection IP65.

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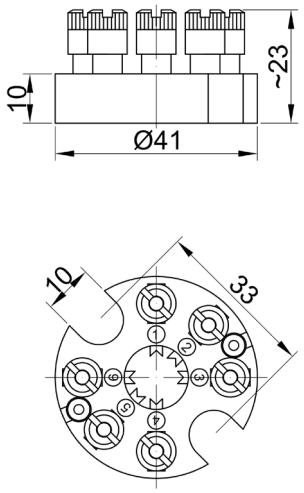
TERMINAL BLOCK

Type ZK-NA

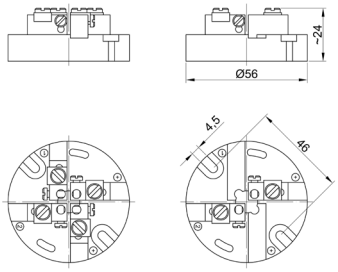


TERMINAL BLOCKS for thermometers and thermocouples

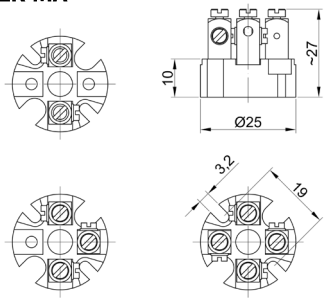
Terminal blocks are made from steatite and semi-vitreous chinaware. They are for connecting thermocouple or thermometer with outer instruments.

Terminal blocks are adjusted to fit in connection heads. They have 2, 3 or 4 connections.

Type ZK-DA



Type ZK-MA



Technical specification

Connection head type	Terminal block type
MA	ZK-MA
NA	ZK-NA
DA	ZK-DA

Non-standard models available.

Ordering Information

TERMINAL BLOCK	A	B

A	Terminal block type
ZK-MA	suitable for MA connection head
ZK-NA	suitable for NA connection head
ZK_DA	suitable for DA connection head
	specify type

B	Number of connections n
	specify number

Ordering Example:

TERMINAL BLOCK-ZK-NA-6

stands for: Terminal block type KASK with 6 connections.

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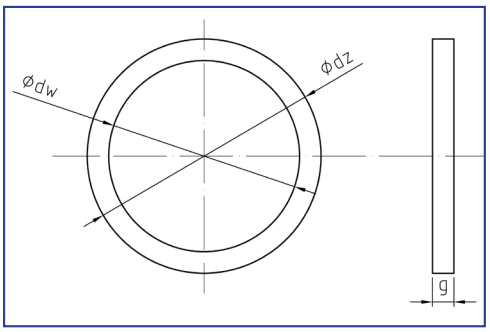
SEALS/ GASKETS



SEALS and GASKETS for thermometers and thermocouples

Seals and gaskets are widely used as an equipment for offered thermometers and thermocouples.

Depending on the operating temperature and other requirements they can be manufactured from stainless steel 1.4571, brass, copper or PTFE.

Technical specification

Material	Outer diameter dz [mm]	Inner diameter dw [mm]	Thickness g [mm]
Stainless steel - 1.4571	on request	on request	on request
Brass MO58			
Copper Cu			
PTFE (Tarflen)			

Non-standard models available.

Ordering Information

A	B	C	D	E

A Type	
Gasket	Gasket
Seal	Seal

B Material	
1.4571	Stainless Steel (1.4571)
PTFE	PTFE (Tarflen)
MO58	Brass MO58 (CuZn40Pb2)
CU	Copper (Cu)
	specify material

C Outer diameter d_z	
	specify in mm

D Inner diameter d_w	
	specify in mm

E Thickness g	
	specify in mm

Ordering Example:

GASKET-1.4571-8-6-3

stands for: Gasket made from stainless steel 1.4571, outer diameter dz=8mm, inner diameter dw=6mm, thickness 3mm

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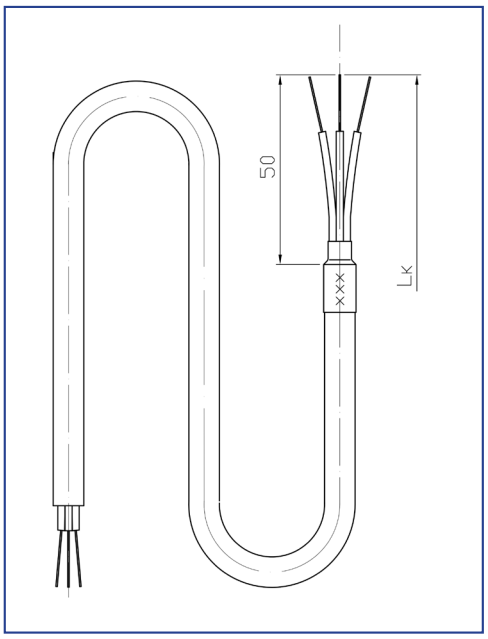
CABLE



CONNECTION CABLES
for thermometers and thermocouples

Connection cables makes equipment for offered thermometers and thermocouples.

Depending on temperature and other conditions they can be manufactured from fibre glass, teflon or silicone.

Technical specification

CABLES FOR RESISTANCE THERMOMETERS

Number of wires	Diameter	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	
2 wire	ø 4,2	L2TS-2x0,34mm2	teflon, silicone	+180°C
4 wire	ø 4,3	L4TS-4x0,22mm2	teflon, silicone	
4 wire	ø 2,9	L4TT-4x0,22mm2	teflon, teflon	+260°C
6 wire	ø 3,8	L6TT-6x0,22mm2	teflon, teflon	
2 wire	ø 4,3	L2SDS-2x0,25mm2	silicone, screen, silicone	+180°C
4 wire	ø 4,4	L4TDS-4x0,25mm2	teflon, screen, silicone	
4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

CABLES FOR THERMOCOUPLES

Thermocouple	Type	Dimension	Compensation Cable Type	Insulation	Temp. limits
Single	1-pair (2 wire)	ø 3,2	L2GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,3	L2GGD-K-0,22mm2		
		ø 3,2	L2TDT-J-0,22mm2	teflon, screen, teflon	+260°C
		ø 3,0	L2TDT-K-0,22mm2		
		ø 4,2	L2SS-J-0,22mm2	silicone, silicone	+180°C
		ø 3,5	L2SS-K-0,22mm2		
Double	2-pairs (4 wire)	ø 4,0	L4GGD-J-0,22mm2	glass fibre, glass fibre, screen	+400°C
		ø 3,6	L4GGD-K-0,22mm2		

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Ordering Information

CABLE	A	B										

A	Connection cable type
L2GGD-2x0,22	L2GGD-2x0,22mm2
L4GGD-4x0,22	L4GGD-4x0,22mm2
L4TS-2x0,34	L4TS-2x0,34mm2
L4TS-4x0,22	L4TS-4x0,22mm2
L4TT-4x0,22	L4TT-4x0,22mm2
L6TT-6x0,22	L6TT-6x0,22mm2
L2SDS-2x0,25	L2SDS-2x0,25mm2
L4TDS-4x0,25	L4TDS-4x0,25mm2
L4TFDT-4x0,22	L4TFDT-4x0,22mm2
L2GGD-J-0,22	L2GGD-J-0,22mm2
L2GGD-K-0,22	L2GGD-K-0,22mm2
L2TDT-J-0,22	L2TDT-J-0,22mm2
L2TDT-K-0,22	L2TDT-K-0,22mm2
L2SS-J-0,22	L2SS-J-0,22mm2
L2SS-K-0,22	L2SS-K-0,22mm2
L4GGD-J-0,22	L4GGD-J-0,22mm2
L4GGD-K-0,22	L4GGD-K-0,22mm2

B	Cable length L_K
	specify in mm

Ordering Example:

CABLE-L4GGD-4x0,22-1500

stands for: Connection cable for thermometer resistors L4GGD-4x0,22mm2, cut length L_K=1500mm

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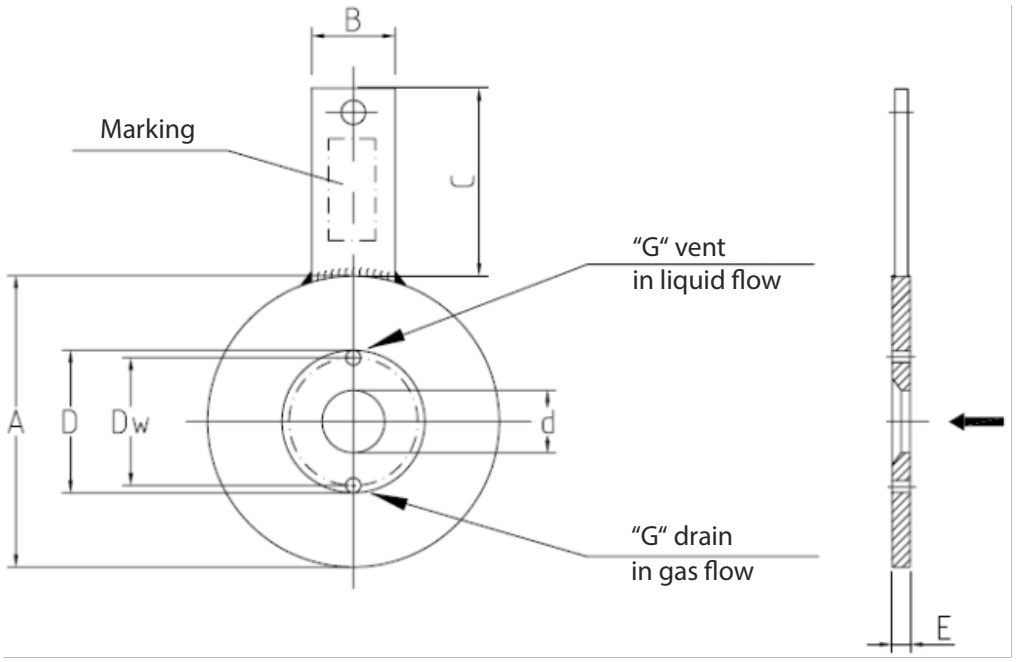
OPL-401

ORIFICE PLATES according to EN ISO 5167:2005 for D ≥ 50 mm ASME-MFC-14M-2003 for D < 50 mm Flange Taps

Detailed information is shown on construction drawings provided by Buyer or prepared by Alf-Sensor.

Basic dimensions required according to above mentioned standards are show on the sketch underneath:

Note: bore diameter shall be provided by Buyer, alternatively calculation may be done by Alf-Sensor using data provided (ref to OPL_FLOW QUESTIONNAIRE)



Dimensional data of the paddle type orifice plate
D – pipe internal diameter
d- orifice bore diameter
E – orifice plate thickness
e – orifice plate throat thickness
G – vent & drain hole diameter (according ISA-RP3.2 only)
Dw - diameter of Vent & hole circle (according ISA-RP3.2 only)
NPS & rating – nominal diameter/rating according to ASTM B16.36
Additionally required: fluid state (gas, liquid, steam)

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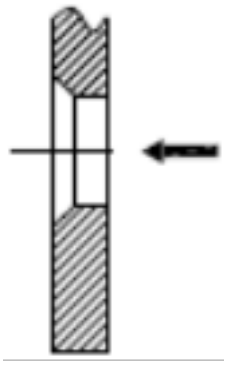
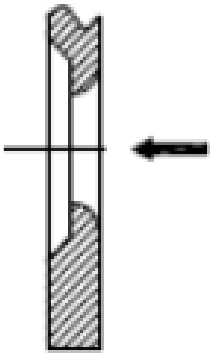
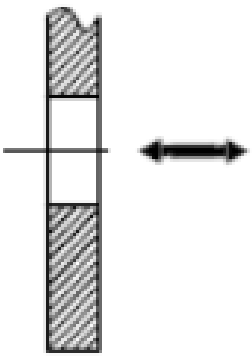
OPL-401 Flange Taps Orifice Plates cntd.



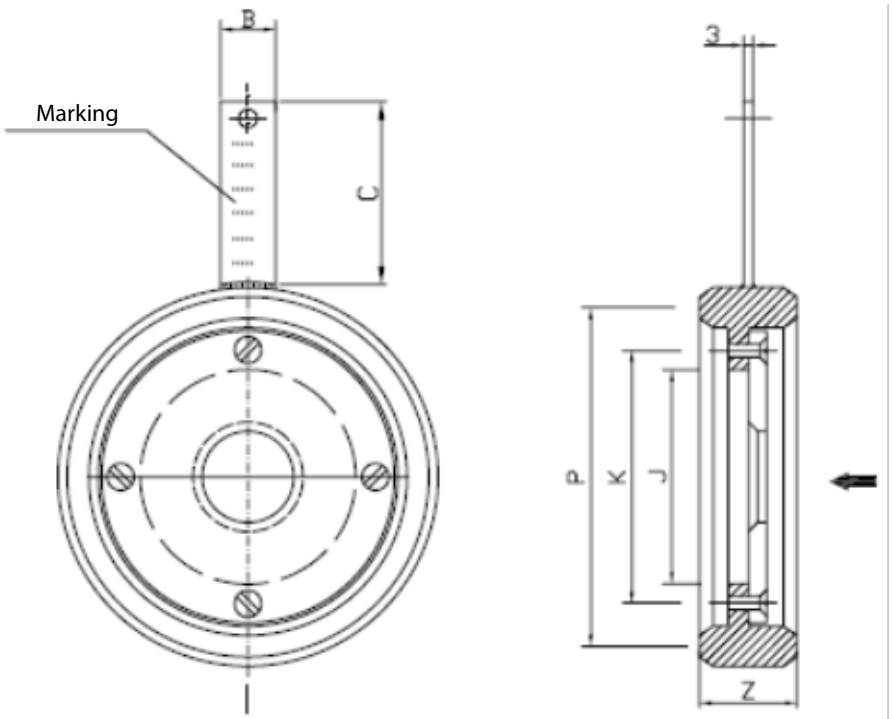
Sharp edge orifice plate concentric, basic design. Flange pressure taps. Installation between orifice flanges according to ASME B16.36 RF facing.



Quadrant bored orifice is applied to measure the flow of high viscosity fluids, when Reynolds Number is below 10 000. The radius „R" is a function of β ratio.



Sharp edge orifice plate concentric, basic design. Installation between flanges according to ASME B16.36 RF facing. For bidirectional flow.



Sharp edge orifice plate concentric.
Installation between flanges according to ASME B16.36 RTJ facing.

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Ordering Information

OPL- 401	A	B	C	D	E	F	G	H				

A	Nominal Pipe Diameter, DN or NPS
	according to EN-DIN
	according to ASME

B	Rating / Facing
	according to EN-DIN
	according to ASME

C	External Diameter of Orifice , A
	specify in mm

D	Internal Pipe Diameter, D
	specify in mm

E	Bore Diameter, d
	specify in mm*

F	Orifice Plate Material
	specify material

G	Process Fluid State
liquid	liquid
gas	gas
steam	steam

H	Special Requirements
	quality certificate
	heat treatment approval NACE
	Charpy V-notch impact testing
	bidirectional flow
	sharp edge

* Bore diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer

Non-standard models available.

Ordering Example:

OPL-401-4”-300RF-149,0- 98,2-50,12-1.4404-steam-sharp edge

stands for: Flange taps orfice plate, NPS 4 inches, Flange 300 lbs / facing RF, External diameter of orfice 149,0 mm, Internal pipe diameter 98,2 mm, Bore diameter 50,12 mm, Orfice plate material 1.4404 = SS316L, Process fluid: steam, Special requirement: Sharp edge orifice

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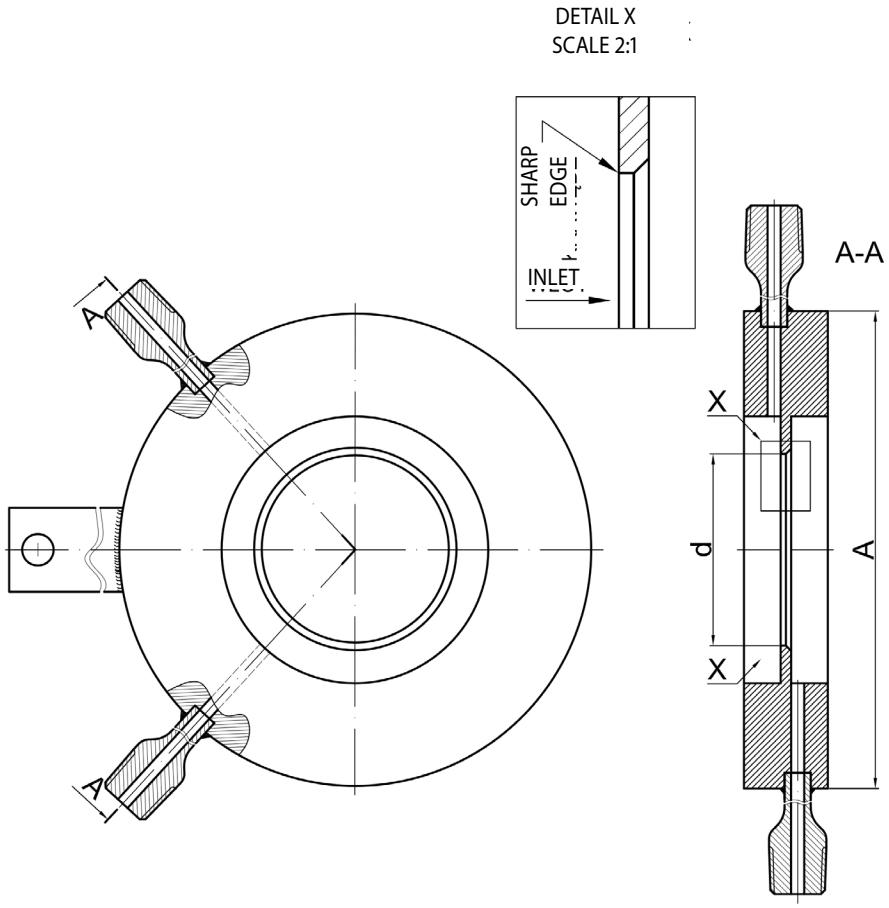
OPL-402

ORIFICE PLATES according to EN ISO 5167:2005 for D ≥ 50 mm ASME-MFC-14M-2003 for D < 50 mm Corner Taps

Detailed information is shown on construction drawings provided by Buyer or prepared by Alf-Sensor.

Basic dimensions required according to above mentioned standards are show on the sketch underneath:

Note: bore diameter shall be provided by Buyer, alternatively calculation may be done by Alf-Sensor using data provided (ref to OPL_FLOW QUESTIONNAIRE)



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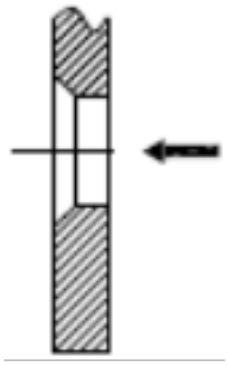
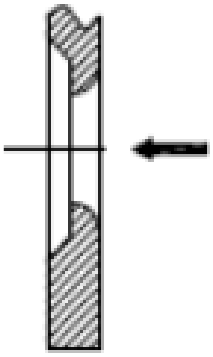
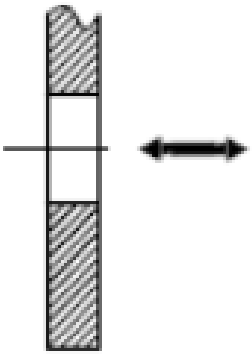
OPL- 402 Corner Taps Orifice Plates cntd.



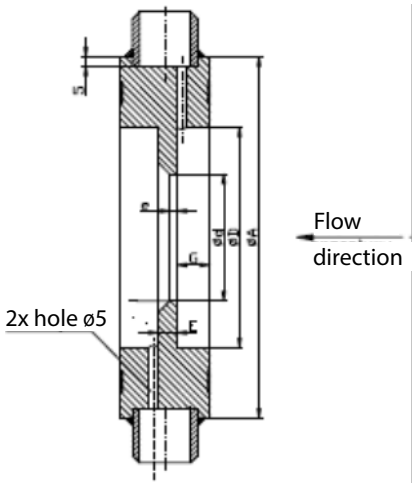
Sharp edge orifice plate concentric, basic design. Flange pressure taps. Installation between orifice flanges according to ASME B16.36 RF facing.



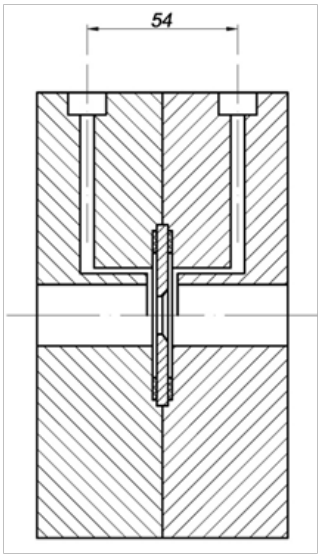
Quadrant bored orifice is applied to measure the flow of high viscosity fluids, when Reynolds Number is below 10 000. The radius „R" is a function of β ratio.

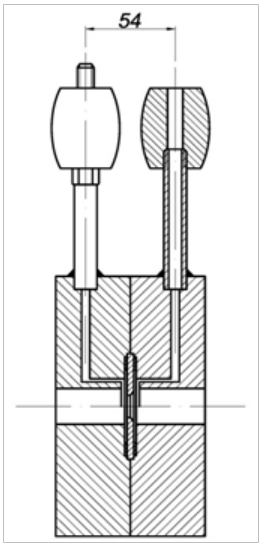


Sharp edge orifice plate concentric, basic design. Installation between flanges according to ASME B16.36 RF facing. For bidirectional flow.



Corner taps orifice plate.
Remote mounting of difference pressure transmitter.





Corner taps orifice plate.
Integral mounting of difference pressure transmitter.

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Ordering Information

OPL- 402	A	B	C	D	E	F	G	H	I	J		

A	Corner Taps Version
point	single point taps
chamber	annular chamber taps

B	Nominal Pipe Diameter, DN or NPS
	according to EN-DIN
	according to ASME

C	Rating / Facing
	according to EN-DIN
	according to ASME

D	Internal Pipe Diameter, D
	specify in mm

E	External Diameter of Orifice , A
	specify in mm

F	Bore Diameter, d
	specify in mm*

G	Orifice Plate Material
	specify material

H	Process Fluid State
liquid	liquid
gas	gas
steam	steam

I	Pressure Tap Connections
weld pipe ½"	weld pipe ½"
½"NPT (F)	thread ½"NPT (F)
tube ½" for compression fitting	tube ½" for compression fitting
compact	compact (using Parker make HEFS3 manifold)

J	Special Requirements
	quality certificate
	heat treatment approval NACE
	Charpy V-notch impact testing
	bidirectional flow
	sharp edge

* Bore diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer

Non-standard models available.

Ordering Example:

OPL-402-point-DN100-PN16/B1-98,2-163-50,12-1.4404-gas-1/2"NPT(F)-sharp edge

stands for: Orifice plate, corner taps pressure connections, Nominal pipe diameter DN100, Flange PN16 / facing B1 acc. to EN 1092-1, Internal pipe diam. 98,2 mm, Outsider orifice diam 163 mm, Orifice plate bore diam. 50,12 mm, Orifice plate material 1.4404 = SS316L, Fluid state: gas, Pressure taps connection: thread ½"NPT(F), Special requirement: Sharp edge orifice plate

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OPL-403

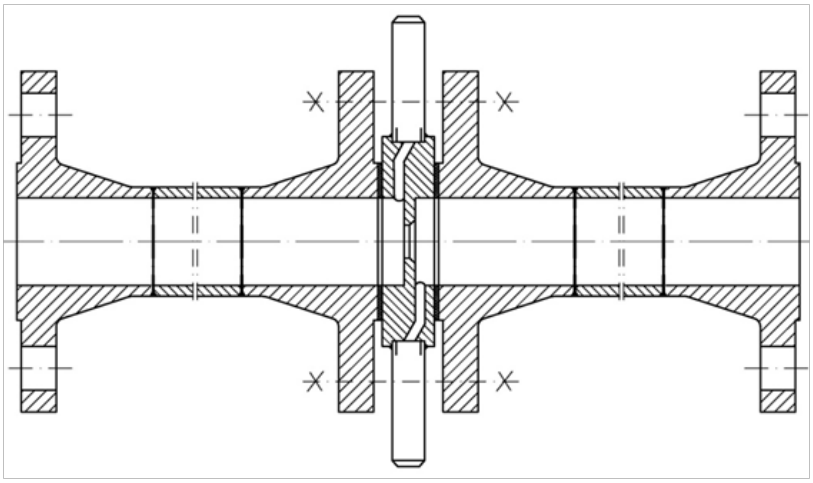
METER RUN according to EN ISO 5167:2005 for D ≥ 50 mm ASME-MFC-14M-2003 for D < 50 mm

Detailed dimensional information is presented on the construction drawings issued by Alf-Sensor for approval.

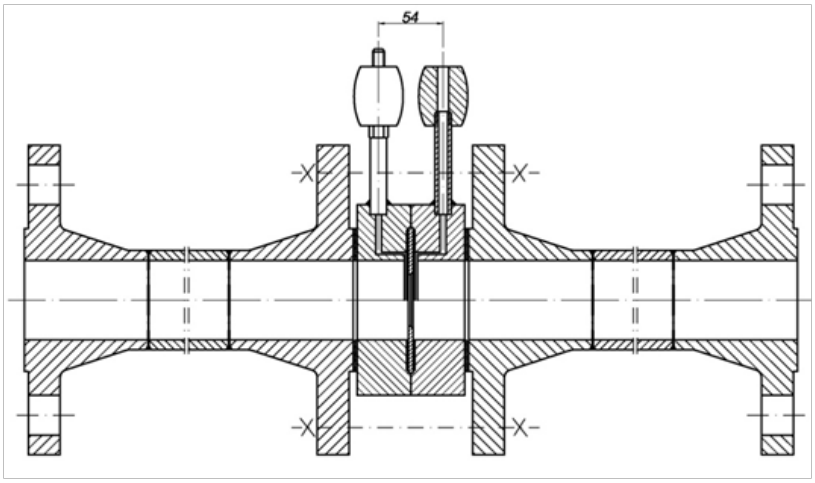
Meter runs are used in two cases:

1. Required measurement accuracy is better than 1%
2. DN of pipeline (or measuring section) <2".
   In this case computations should be executed according to ASME-MFC-14M-2003 standard.

Note: Buyer shall submit calculation sheet of element, if done by him. Otherwise Al-Sensor can make calculation on the base of FLOW QUESTIONNAIRE filled in by Buyer.



METER RUN, remote dP transmitter connection



METER RUN, compact dP transmitter connection

The standard lengths of Meter Run is 900mm for DN25 (NPS 1") and 1300 for DN40 (NPS 1,5")

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Ordering Information

OPL- 403	A	B	C	D	E	F	G	H				

A	Nominal Pipe Diameter, DN or NPS
	according to EN-DIN
	according to ASME

B	Rating / Facing
	according to EN-DIN
	according to ASME

C	Internal Pipe Diameter, D
24,70	24,70 mm for DN25
38,30	38,30 mm dla DN40

D	Bore Diameter, d
	specify in mm*

E	Material
1.4571	SS316Ti=1.4571
1.4404	SS316L = 1.4404

F	Process Fluid State
liquid	liquid
gas	gas
steam	steam

G	Pressure Tap Connections
weld pipe ½"	weld pipe ½"
½"NPT (F)	thread ½"NPT (F)
tube ½" for compression fitting	tube ½" for compression fitting
compact	compact (using Parker make HEFS3 manifold)

H	Special Requirements
	quality certificate
	heat treatment approval NACE
	Charpy V-notch impact testing
	bidirectional flow
	calculations acc to EN 13480
	additional examination acc to EN 13480
	3.2 certificate

* Bore diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer

Note: Internal diameter of pipeline could be changed after preparing strength calculations

Non-standard models available.

Ordering Example:

OPL-403-DN40-PN40/B1-40,2-30,02-1.4404-steam-compact

stands for: Meter run, Nominal pipe diameter DN40, Flange PN40 / facing B1 acc. EN 1092-1, Internal pipe diameter (Alf-Sensor standard) 38,30 mm, Bore 30,02 mm, Material 1.4404 = SS316L, Process fluid : steam, Compact connection to Parker make 3-valve manifold HEFS3, Special requirements: None, default is sharp edge orifice

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OPL-404

Orifice plate and orifice flange assembly according to EN ISO 5167:2005 for D ≥ 50 mm ASME-MFC-14M-2003 for D < 50 mm Flange Taps

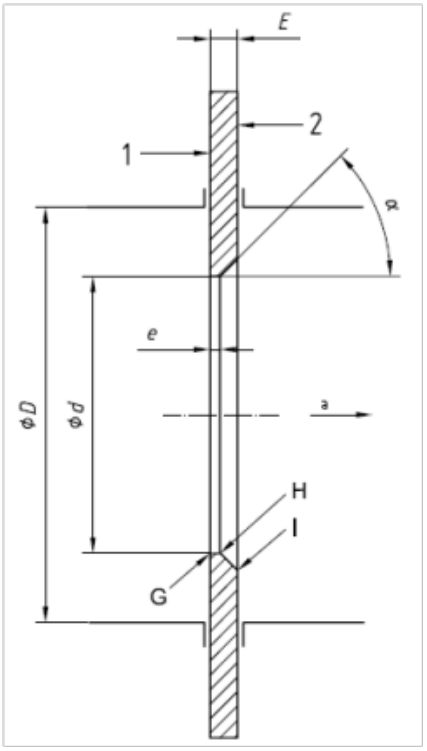
Detailed description is shown on the construction drawings submitted by Customer Or prepared by Alf-Sensor.

The assembly consists of:

- Orifice plate manufactured according to Data Sheet Kat401_EN
- Orifice flanges, 2 ea
- Gaskets, 2 ea
- Mounting bolts,
- Jack screws

Dimensional data of flow elements are described in the table.

Note: Purchaser shall advise bore diameter or to fill in the FLOW QUESTIONNAIRE to allow calculation by Alf Sensor.



Dimensional data of the paddle type orifice plate
D – pipe internal diameter
d- orifice bore diameter
E – orifice plate thickness
e – orifice plate throat thickness
G – vent & drain hole diameter (according ISA-RP3.2 only)
Dw - diameter of Vent & hole circle (according ISA-RP3.2 only)
NPS & rating – nominal diameter/rating according to ASTM B16.36
Additionally required: fluid state (gas, liquid, steam)

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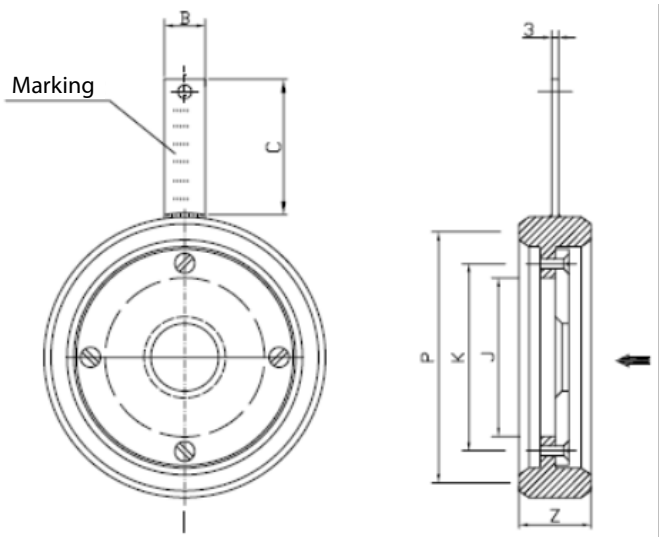
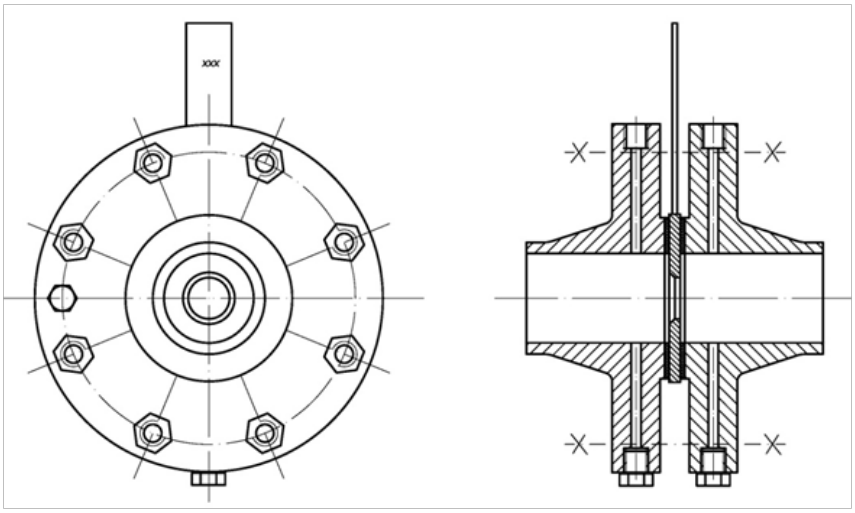
OPL-404 Orifice plate/orifice flange assembly contd.



Sharp edge orifice plate concentric, for flanges ASME B16.36 RTJ facing



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Ordering Information

OPL- 404	A	B	C	D	E	F	G	H	I	J	K	L

A Nominal Pipe Size, NPS	
	according to ASME

B Rating / Facing	
	according to ASME B16.36

C Internal Pipe Diameter, D	
	specify in mm

D Bore Diameter, d	
	specify in mm*

E Orifice Plate Material	
1.4571	SS316Ti=1.4571
1.4404	SS316L = 1.4404
1.4301	SS304 = 1.4301

F Flange Material	
	specify material

G Bolt and Nut Size	
	specify size

H Bolt and Nut Material	
	specify material

I Gasket Material	
	specify material

J Process Fluid State	
liquid	liquid
gas	gas
steam	steam

K Pressure Tap Connections	
pipe NPS ½" for welding connection	pipe NPS ½" for welding connection
½"NPT (F)	thread ½"NPT (F)
tube ½" for compression fitting	tube ½" for compression fitting
compact	compact (using Parker make HEFS3 manifold)

L Special Requirements	
	quality certificate
	bidirectional flow
	additional examination
	sharp edge

* Bore diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer

Non-standard models available.

Ordering Example:

OPL-404-6"-300RF-154,1-70,12-1.4404-P245GH-42CrMo4-graphite/316ss-liquid-1/2"NPT(F)-sharp edge

stands for: Orifice plate / orifice flange assembly, NPS 6", flange 300 lbs / RF facing, internal pipe diameter 154,1 mm, bore diameter 70,12 mm, orifice plate material 1.4404 = SS316L, flange P245GH, Bolt material42CrMo4, Gasket material graphite/ SS316L, Process fluid: liquid, thread ½"NPT (F) tap connection, Sharp edge orifice plate

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OPL-405

Orifice plate and neck flange assembly according to EN ISO 5167:2005 for D ≥ 50 mm ASME-MFC-14M-2003 for D < 50 mm Corner Taps

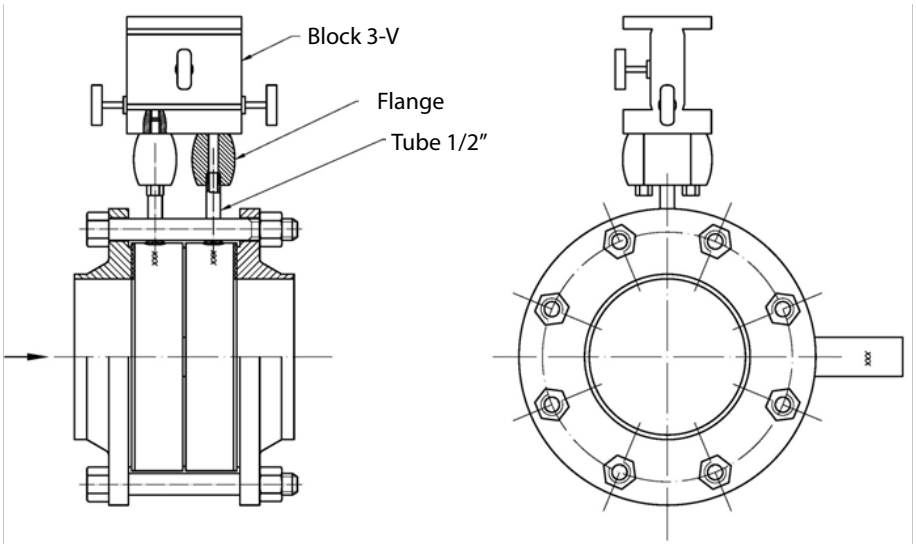
Detailed description is shown on the construction drawings submitted by Customer Or prepared by Alf-Sensor.

The assembly consists of:

- Orifice plate manufactured according to Data Sheet Kat402_EN
- Neck flanges, 2 ea
- Gaskets, 2 ea
- Mounting bolts,
- Jack screws

Dimensional data of flow elements are described in the table.

Note: Purchaser shall advise bore diameter or to fill in the FLOW QUESTIONNAIRE to allow calculation by Alf Sensor.



Orifice / orifice flange assembly, compact PT connection

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Ordering Information

OPL- 405	A	B	C	D	E	F	G	H	I	J	K	

A	Nominal Pipe Diameter, DN or NPS
	according to EN-DIN
	according to ASME

B	Rating / Facing
	according to EN-DIN
	according to ASME

C	Internal Pipe Diameter, D
	specify in mm

D	Bore Diameter, d
	specify in mm*

E	Orifice Plate Material
1.4571	SS316Ti=1.4571
1.4404	SS316L = 1.4404
1.4301	SS304 = 1.4301

F	Flange Material
	specify material

G	Bolt and Nut Material
	specify material

H	Gasket Material
	specify material

I	Process Fluid State
liquid	liquid
gas	gas
steam	steam

J	Pressure Tap Connections
pipe NPS ½" for welding connection	pipe NPS ½" for welding connection
½"NPT (F)	thread ½"NPT (F)
tube ½" OD for compression fitting	tube ½" OD for compression fitting
compact	compact (using Parker make HEFS3 manifold)

K	Special Requirements
	quality certificate
	bidirectional flow
	additional examination
	sharp edge

* Bore diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer

Non-standard models available.

Ordering Example:

OPL-405-DN150-PN40/B1-154,1-70,12-1.4404-P245GH-42CrMo4-graphite/316ss-liquid-compact-sharp edge

stands for: Orifice plate / orifice / Neck flange assembly, DN 150, flange PN40/ B1 facing, internal pipe diam. 154,1 mm, bore diameter 70,12 mm, orifice plate material 1.4404 = SS316L, flange P245GH, Bolt material42CrMo4, Gasket material graphite/ SS316L, Process fluid: liquid, Compact tap connection (to Parker make type HEFS3 manifold), Sharp edge orifice plate

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OPL-406

Restriction orifice and neck flange assembly

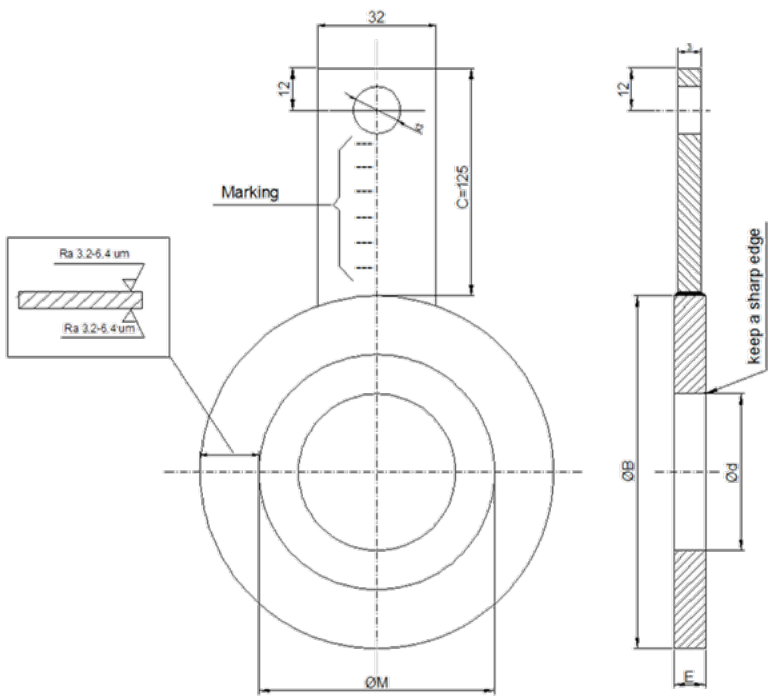
Orifice (orifice plate) restriction single- or multi-hole provides an inexpensive item for a specified pressure drop flow under varying pressure on upstream the side.

The assembly consists of:

- Restriction orifice manufactured according to Data Sheet Kat407_EN
- Neck flanges, 2 ea
- Gaskets, 2 ea
- Mounting bolts, number according to pipe ND and rating according to PN-EN 1092-1

Dimensions of restriction orifice due to the flange standards, ASME B16.5 or BS EN 1092-1 and are described in the following table:

Note: bore diameter shall be provided by Buyer, alternatively calculation may be done by Alf-Sensor using data provided (ref to OPL_FLOW QUESTIONNAIRE).



Dimensional data of the restriction orifice:
D – restriction orifice bore diameter
E – restriction orifice thickness
M – diameters gasket
DN, PN – nominal diameter / pressure rating according to EN-PN 1092-1 or
NPS & rating – nominal diameter / rating according to ASTM B16.5

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Ordering Information

OPL- 406	A	B	C	D	E	F	G	H	I	J		

A Nominal Pipe Diameter, DN or NPS	
	according to EN-DIN
	according to ASME

B Rating / Facing	
	according to EN-DIN
	according to ASME

C Internal Pipe Diameter, D	
	specify in mm

D Bore Diameter, d	
	specify in mm*

E Restriction Orifice Thickness, E	
	specify in mm

F Restriction Orifice Material	
	specify material

G Neck Flange Material	
	specify material

H Mounting Bolt and Nut Material	
	specify material

I Gasket Material	
	specify material

J Special Requirements	
	e.g. multi-hole orifice

* Bore diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer

Ordering Example:

OPL-406-DN50-PN40/B1-52,51-5-4-1.4301-P245GH-42CrMo4-graphite/316SS-liquid

stands for: Restriction orifice, nominal pipe diameter DN150, flange PN40 / facing B1 acc. to EN 1092-1, internal pipe diameter 52,51 mm, restriction orifice bore diameter 5 mm, restriction orifice thickness 4 mm , restriction orifice material 1.4301, neck flange material P245GH, bolt material: 42CrMo4, Gasket material: graphite/SS316L, fluid state: liquid

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OPL-407

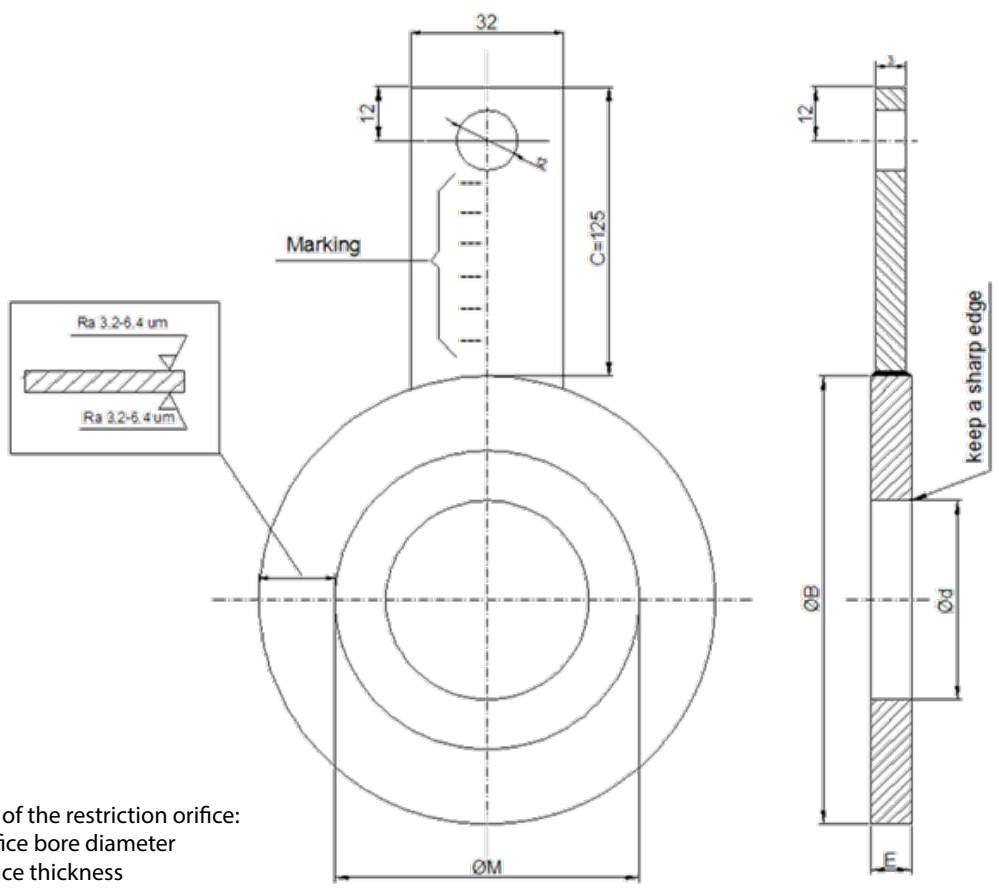
Restriction orifice

Orifice (orifice plate) restriction single- or multi-hole provides an inexpensive item for a specified pressure drop flow under varying pressure on upstream the side.

Dimensions of restriction orifice due to the flange standards, ASME B16.5 or BS EN 1092-1 and are described in the following table:

Note: bore diameter shall be provided by Buyer, alternatively calculation may be done by Alf-Sensor using data provided (ref to OPL_FLOW QUESTIONNAIRE).

Note: full specification is used in conjunction with the construction drawings after receiving the order.



Dimensional data of the restriction orifice:
D – restriction orifice bore diameter
E – restriction orifice thickness
M – diameters gasket
DN, PN – nominal diameter / pressure rating according to EN-PN 1092-1 or
NPS & rating – nominal diameter / rating according to ASTM B16.5

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Ordering Information

OPL- 407	A	B	C	D	E	F	G	H				

A Nominal Pipe Diameter, DN or NPS	
	according to EN-DIN
	according to ASME

B Rating / Facing	
	according to EN-DIN
	according to ASME

C Internal Pipe Diameter, D	
	specify in mm

D Bore Diameter, d	
	specify in mm*

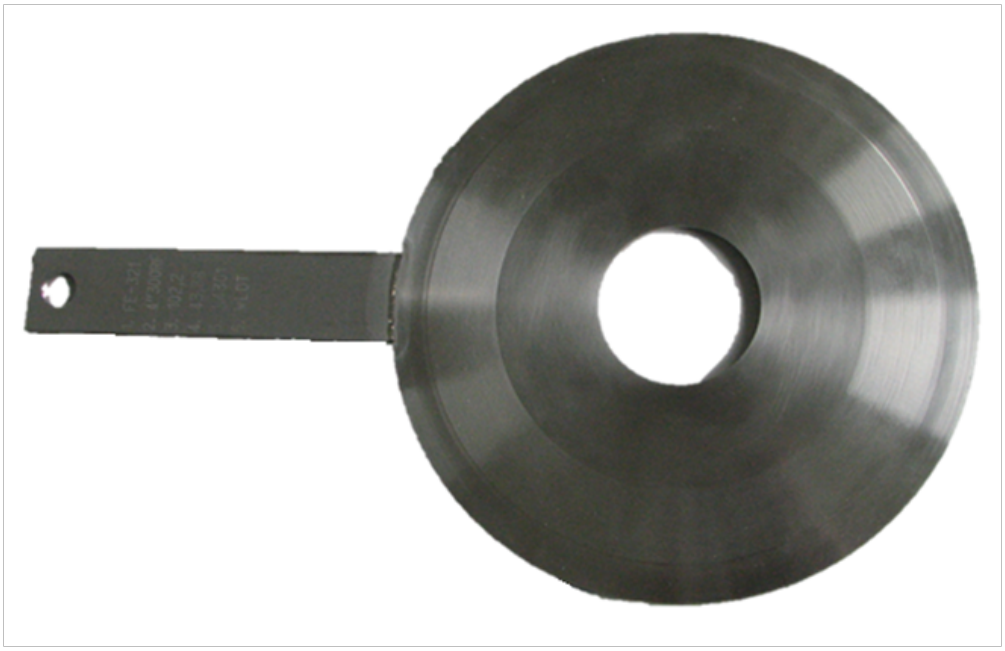
E Restriction Orifice Thickness, E	
	specify in mm

F Restriction Orifice Material	
	specify material

G Outside Diameter, A	
	specify in mm

H Special Requirements	
	e.g. multi-hole orifice

* Bore diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer



Ordering Example:

OPL-407-DN50-PN40/B1-52,51-5-4-1.4301-108

stands for: Restriction orifice, nominal pipe diameter DN50, flange PN 40 / facing B1 according to EN 1092-1, internal pipe diameter 52,51 mm, restriction orifice bore diameter 5 mm, restriction orifice thickness 4 mm , restriction orifice material 1.4301, outside diameter 108 mm

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OPL-408

The ISA 1932 nozzle with carrier rings according to EN ISO 5167:2005 for 50 ≤ D ≤ 500 mm Annular chamber

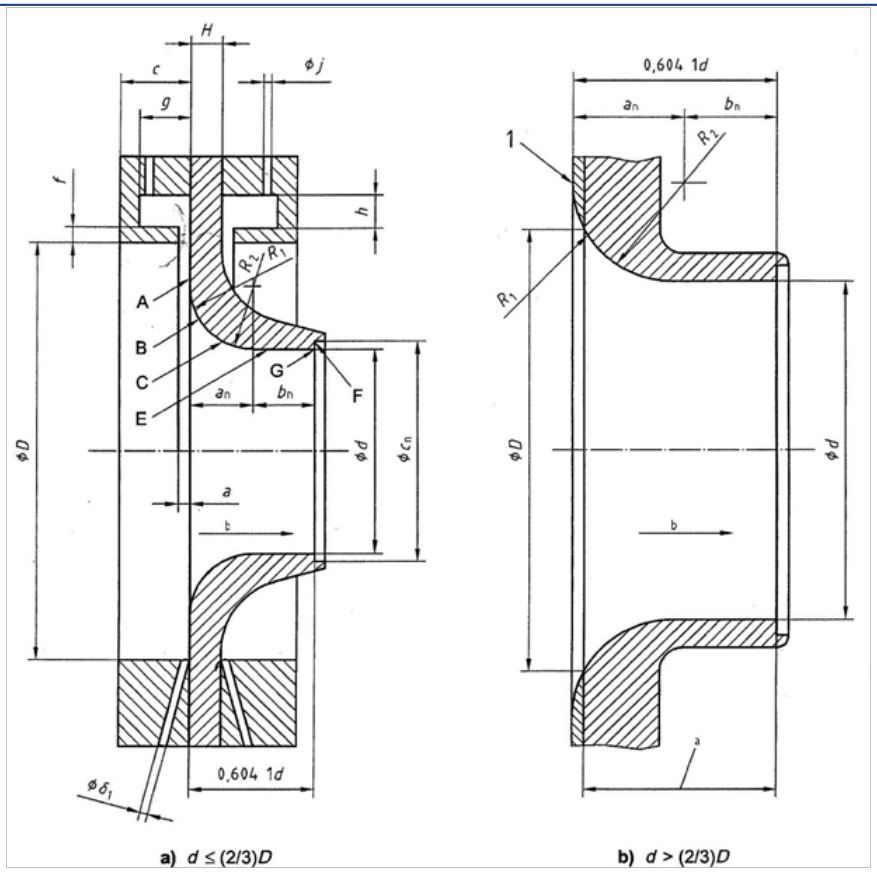
Application and general characteristic of difference pressure primary flow elements (orifice plates, Venturi tubes, long radius nozzles) are shown in data sheet dP FLOW ELEMENTS, General Information. Detail information is show on construction drawings provided by Buyer or prepared by Alf-Sensor.

The assembly consists of:

- The ISA 1932 nozzle manufactured
- Carrier rings, 2 ea
- Gaskets, 1 ea

Basic dimensions required according to above mentioned standards are show on the sketch underneath:

Note: throat diameter shall be provided by Buyer, alternatively calculation may be done by Alf-Sensor using data provided (ref to OPL_FLOW QUESTIONNAIRE).



The ISA 1932 nozzle according to EN-ISO 5167-3

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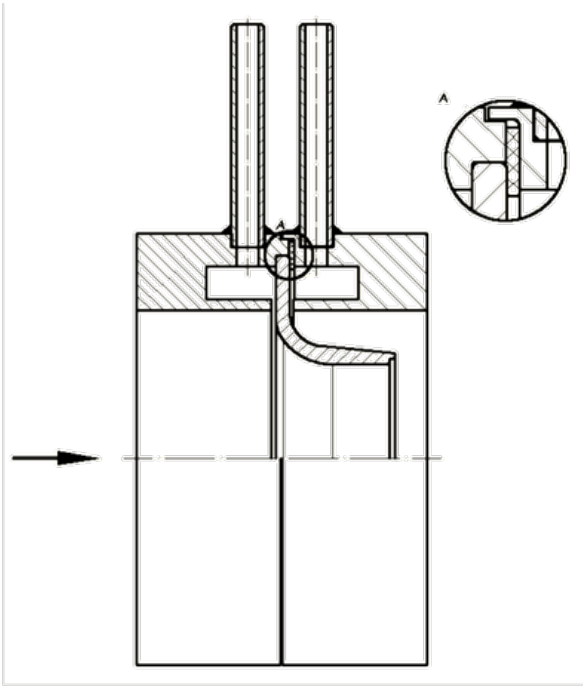
OPL-408 The ISA 1932 nozzle with carrier rings



The ISA 1932 nozzle with carrier rings.

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Ordering Information

OPL- 408	A	B	C	D	E	F	G	H	I	J		

A Nominal Pipe Diameter, DN or NPS	
	according to EN-DIN
	according to ASME

B Rating / Facing	
	according to EN-DIN
	according to ASME

C Internal Pipe Diameter, D	
	specify in mm

D Throat Diameter, d	
	specify in mm*

E Nozzle Material	
	specify material

F Carrier ring Material	
	specify material

G Gasket Material	
	specify material

H Process Fluid State	
liquid	liquid
gas	gas
steam	steam

I Pressure Tap Connections	
tube ½" to welding	tube ½" to welding
½"NPT (F)	thread ½"NPT (F)
½" to male connector	tube ½" to male connector

J Special Requirements	
	additional examination
	type of weld joint (butt or fillet)

* Throat diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer

Ordering Example:

OPL-408-DN150-PN40/B1-154,1-70,12-1.4404-1.4404-graphite/316SS-liquid-tube½" to welding

stands for: The ISA 1932 nozzle with carrier rings, nominal pipe diameter DN150, flange PN40 / facing B1 according to EN 1092-1, internal pipe diameter 154,1 mm, throat diameter 70,12 mm, nozzle material 1.4404 = SS316L, carrier rings material 1.4404 = SS316L, gasket material: graphite/SS316L, fluid state: liquid, pressure connections: tube ½" to welding

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OPL-409

The ISA 1932 nozzle and neck flange assembly according to PN-EN ISO 5167:2005 for 50 ≤ D ≤ 500 mm Annular chamber

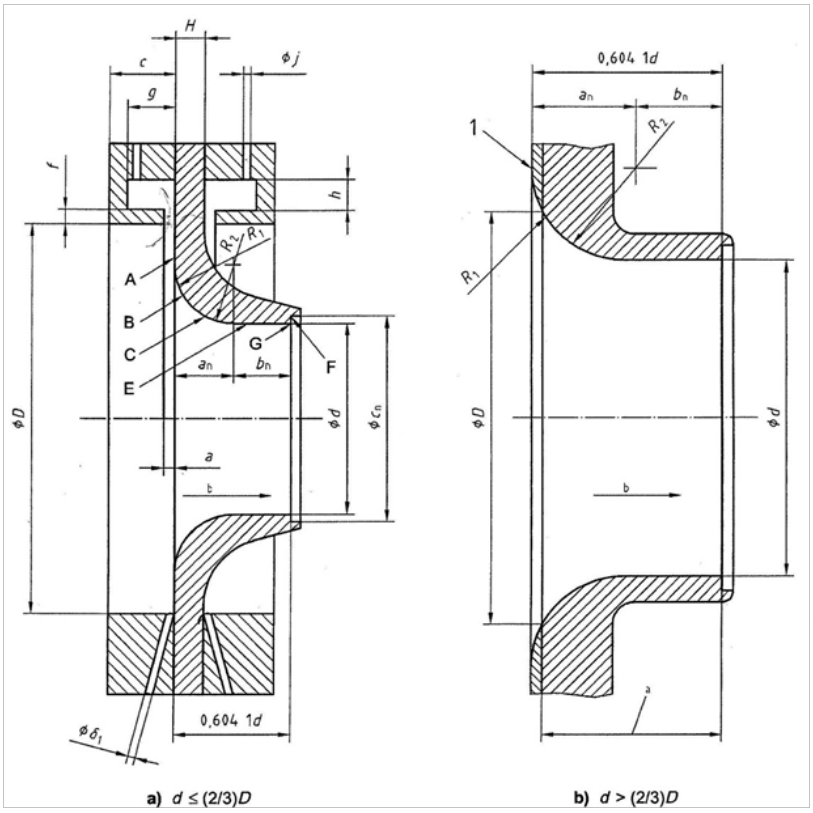
Application and general characteristic of difference pressure primary flow elements (orifice plates, Venturi tubes, long radius nozzles) are shown in data sheet dP FLOW ELEMENTS, General Information. Detail information is show on construction drawings provided by Buyer or prepared by Alf-Sensor.

The assembly consists of:

- The ISA 1932 nozzle manufactured according to Data Sheet Kat408
- Carrier rings, 2 ea
- Neck flanges, 2 ea
- Gaskets, 3 ea
- Mounting bolts, number according to pipe ND and rating according to EN 1092-1

Basic dimensions required according to above mentioned standards are show on the sketch underneath:

Note: throat diameter shall be provided by Buyer, alternatively calculation may be done by Alf-Sensor using data provided (ref to OPL_FLOW QUESTIONNAIRE).



The ISA 1932 nozzle according to EN-ISO 5167-3

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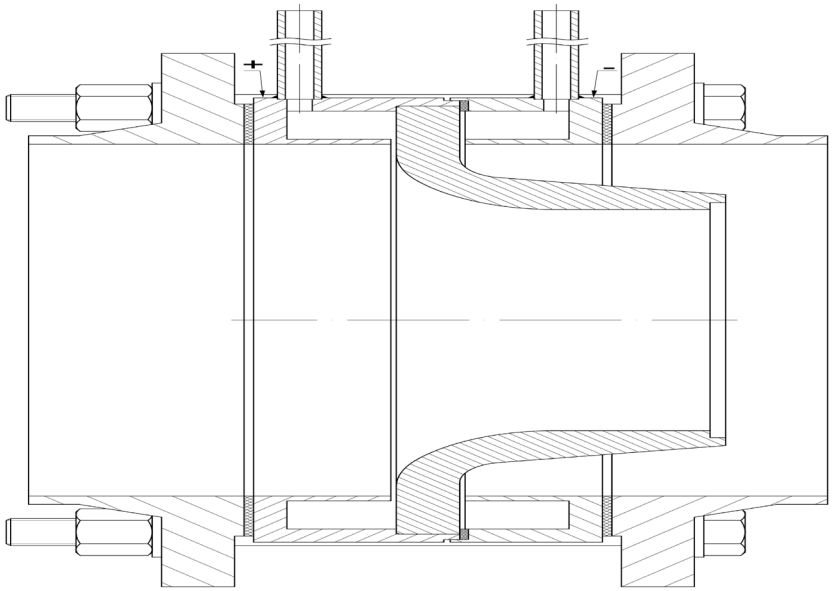
OPL-409 The ISA 1932 nozzle and neck flange assembly



The ISA 1932 nozzles and neck flange assembly, integral mounting of difference pressure transmitter.

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Ordering Information

OPL- 409	A	B	C	D	E	F	G	H	I	J	K	L

A Nominal Pipe Diameter, DN or NPS

	according to EN-DIN
	according to ASME

B Rating / Facing

	according to EN-DIN
	according to ASME

C Internal Pipe Diameter, D

	specify in mm

D Throat Diameter, d

	specify in mm*

E Nozzle Material

	specify material

F Carrier ring Material

	specify material

G Neck flange Material

	specify material

H Mounting bolt Material

	specify material

I Gasket Material

	specify material

J Process Fluid State

liquid	liquid
gas	gas
steam	steam

K Pressure Tap Connections

tube ½" to welding	tube ½" to welding
½"NPT (F)	thread ½"NPT (F)
½" to male connector	tube ½" to male connector

L Special Requirements

	additional examination

* Throat diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer

Ordering Example:

OPL-409-DN150-PN40/B1-154,1-70,12-1.4404-1.4404-P245GH-42CrMo4-graphite/316SS-liquid-tube½" to welding

stands for: The ISA 1932 nozzle, nominal pipe diam. DN150, flange PN40 / facing B1 acc. to EN 1092-1, internal pipe diam. 154,1 mm, throat diam. 70,12 mm, nozzle material 1.4404 = SS316L, carrier rings material 1.4404 = SS316L, neck flange material: P245GH, bolt material: 42CrMo4, gasket material: graphite/SS316L, fluid state: liquid, pressure connections: tube ½" to welding

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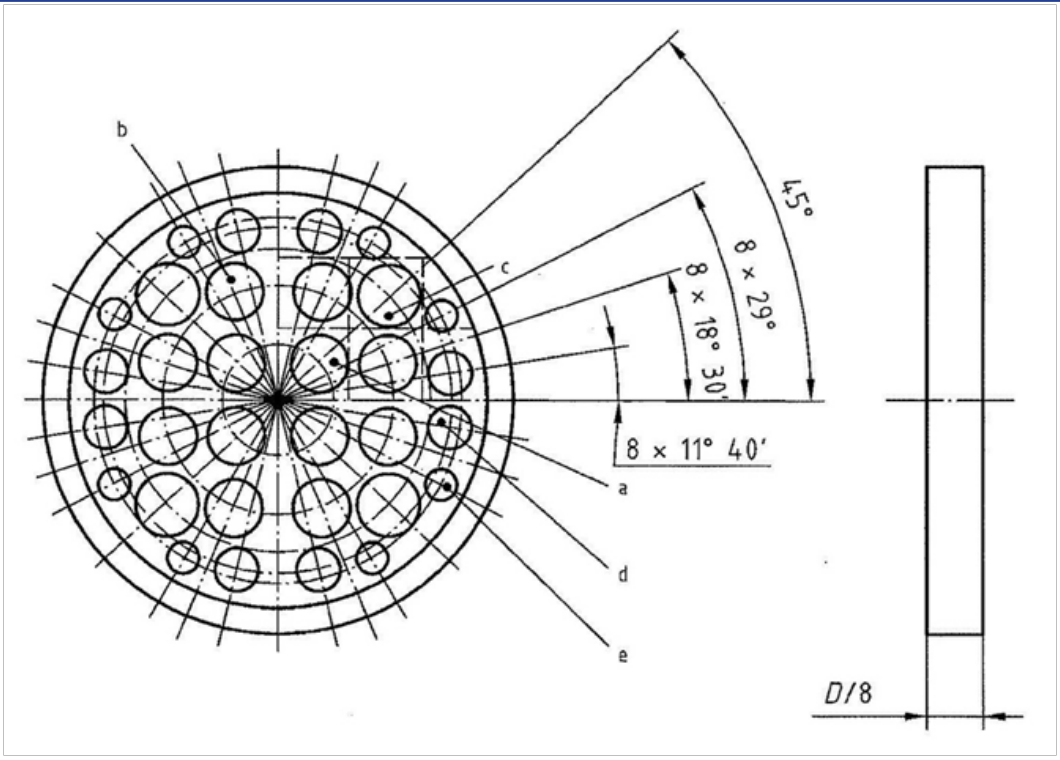
ZANKER-410

Zanker flow conditioner plate according to EN ISO 5167:2005

Zanker flow conditioner plate is used wherever it is not possible to assure required upstream and/or downstream straight length. Conditioner plate can shorten the length of the meter run upstream. Detail information is show on construction drawings provided by Buyer or prepared by Alf-Sensor.

Dimensions conditioner strictly according to the standard.

Note: Zanker flow conditioner plate can be used when $\beta \leq 0.67$.



Zanker flow conditioner plate according to EN-ISO 5167-2

Note: We can make according to client's specific requirements e.g. bevel for butt welding.

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Ordering Information

ZANKER- 410	A	B	C	D	E							

A	Nominal Pipe Diameter, DN or NPS
	according to EN-DIN
	according to ASME

B	Rating / Facing
	according to EN-DIN
	according to ASME

C	Internal Pipe Diameter, D
	specify in mm

D	Conditioner Plate Material
	specify material

E	Special Requirements
	additional examination

Note: The customer shall inform the value of β.

Ordering Example:

ZANKER-410-DN150-PN40/B1-107,1-1.4571

stands for: Zanker flow conditioner plate, nominal pipe diameter DN150, flange PN40 / facing B1 according to EN 1092-1, internal pipe diameter 154,1 mm, Conditioner plate material SS 1.4571

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ZANKER-411

Zanker flow conditioner plate and neck flange assembly according to EN ISO 5167:2005

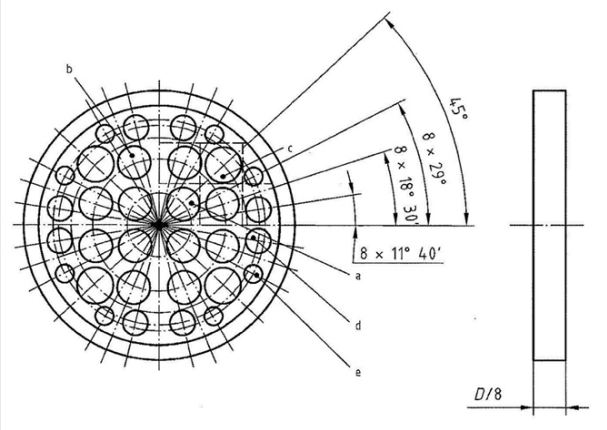
Zanker flow conditioner plate is used wherever it is not possible to assure required upstream and/or downstream straight length. Conditioner plate can shorten the length of the meter run upstream. Detail information is show on construction drawings provided by Buyer or prepared by Alf-Sensor.

The assembly consists of:

- Zanker flow conditioner plate manufactured according to Data Sheet Kat410_EN
- Neck flanges, 2 ea
- Gaskets, 2 ea
- Mounting bolts, number according to pipe ND and rating according to EN 1092-1

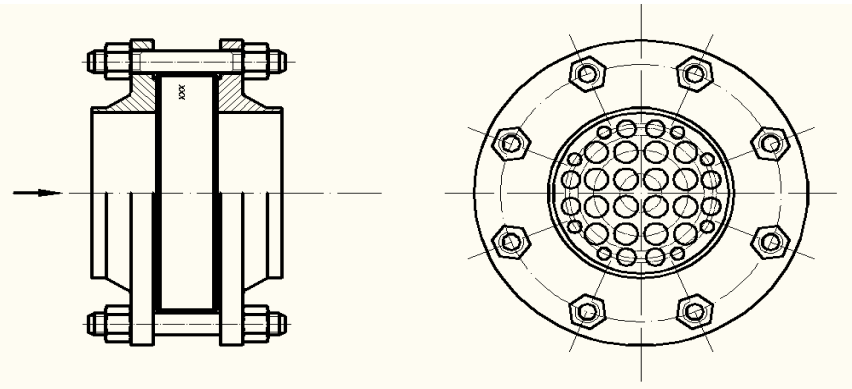
Dimensions conditioner strictly according to the standard.

Note: Zanker flow conditioner plate can be used when $\beta \leq 0.67$.



Zanker flow conditioner plate according to EN-ISO 5167-2

Note: We can make according to client's specific requirements e.g. bevel for butt welding.



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Ordering Information

ZANKER- 411	A	B	C	D	E	F	G	H				

A Nominal Pipe Diameter, DN or NPS

	according to EN-DIN
	according to ASME

B Rating / Facing

	according to EN-DIN
	according to ASME

C Internal Pipe Diameter, D

	specify in mm

D Conditioner Plate Material

	specify material

E Neck flange Material

	specify material

F Mounting bolt and nut Material

	specify material

G Gasket Material

	specify material

H Special Requirements

	additional examination

Note: The customer shall inform the value of β.

Ordering Example:

ZANKER-411-DN150-PN40/B1-107,1-1.4571-P245GH-42CrMo4-graphite/316SS

stands for: Zanker flow conditioner plate and neck flange assembly, nominal pipe diameter DN150, flange PN40 / facing B1 according to EN 1092-1, internal pipe diameter 154,1 mm, conditioner plate material SS 1.4571, neck flange material P245GH, bolt material: 42CrMo4, gasket material: graphite/SS316L

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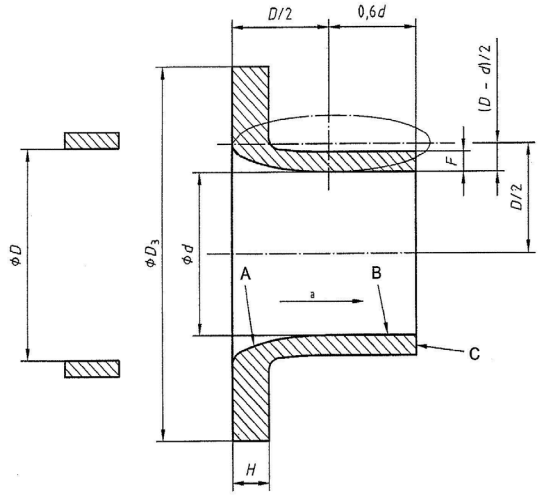
OPL-413

The long radius nozzle according to EN ISO 5167:2005 for 50 ≤ D ≤ 630 mm

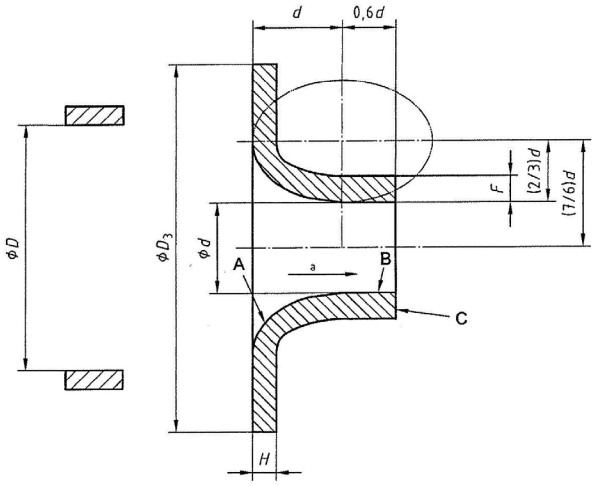
Application and general characteristic of difference pressure primary flow elements (orifice plates, Venturi tubes, long radius nozzles) are shown in data sheet dP FLOW ELEMENTS, General Information. Detail information is show on construction drawings provided by Buyer or prepared by Alf-Sensor.

Basic dimensions required according to above mentioned standards are show on the sketch underneath:

Note: throat diameter shall be provided by Buyer, alternatively calculation may be done by Alf-Sensor using data provided (ref to OPL FLOW QUESTIONNAIRE).

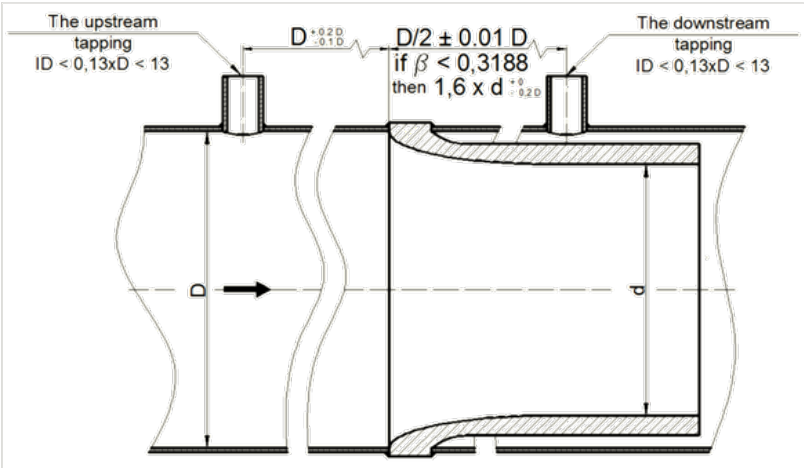


High ratio 0,25 ≤ β ≤ 0,8



Low ratio 0,2 ≤ β ≤ 0,5

The long radius nozzles according to EN-ISO 5167-3



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Ordering Information

OPL- 413	A	B	C	D	E	F	G					

A	Nominal Pipe Diameter, DN or NPS
	according to EN-DIN
	according to ASME

B	Rating / Facing
	according to EN-DIN
	according to ASME

C	Internal Pipe Diameter, D
	specify in mm

D	Throat Diameter, d
	specify in mm*

E	Nozzles Material
	specify material

F	Process Fluid State
liquid	liquid
gas	gas
steam	steam

G	Special Requirements
	additional examination

* Throat diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer

Ordering Example:

OPL- 413-DN150-PN40/B1-154,1-70,12-1.4404-liquid

stands for: The long radius nozzle, nominal pipe diameter DN150, flange PN40 / facing B1 according to EN 1092-1, internal pipe diameter 154,1 mm, throat diameter 70,12 mm, nozzle material 1.4404 = SS316L, fluid state: liquid

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OPL-414

The long radius nozzle and neck flange assembly according to EN ISO 5167:2005 for 50 ≤ D ≤ 630 mm

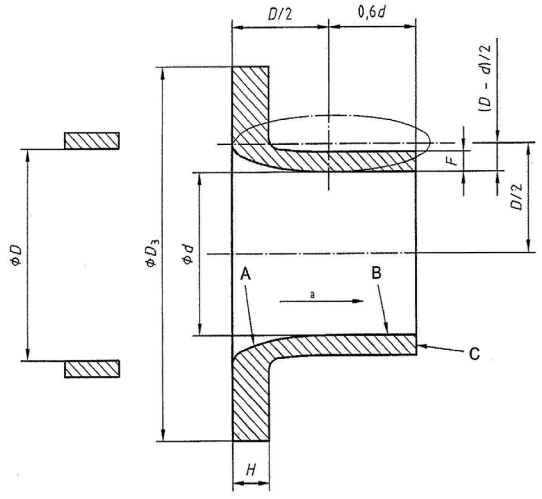
Application and general characteristic of difference pressure primary flow elements (orifice plates, Venturi tubes, long radius nozzles) are shown in data sheet dP FLOW ELEMENTS, General Information. Detail information is show on construction drawings provided by Buyer or prepared by Alf-Sensor.

The assembly consists of:

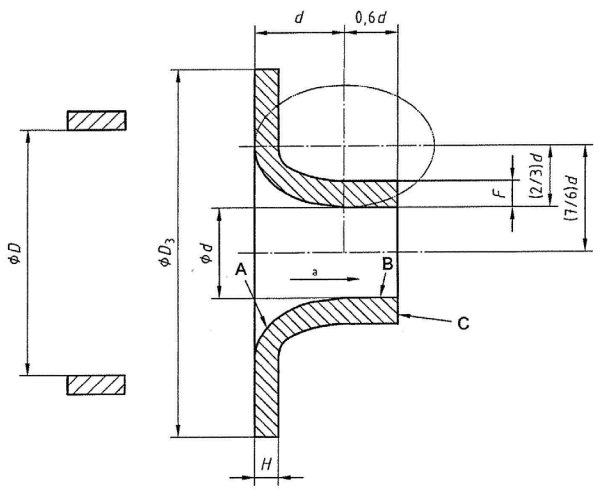
- The long radius nozzle manufactured according to Data Sheet Kat413_EN
- Neck flanges, 2 ea
- Gaskets, 2 ea
- Mounting bolts, number according to pipe ND and rating according to PN-EN 1092-1

Basic dimensions required according to above mentioned standards are show on the sketch underneath:

Note: throat diameter shall be provided by Buyer, alternatively calculation may be done by Alf-Sensor using data provided (ref to OPL FLOW QUESTIONNAIRE).



High ratio 0,25 ≤ β ≤ 0,8



Low ratio 0,2 ≤ β ≤ 0,5

The long radius nozzles according to EN-ISO 5167-3

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Ordering Information

OPL- 414	A	B	C	D	E	F	G	H	I	J		

A Nominal Pipe Diameter, DN or NPS

	according to EN-DIN
	according to ASME

B Rating / Facing

	according to EN-DIN
	according to ASME

C Internal Pipe Diameter, D

	specify in mm

D Throat Diameter, d

	specify in mm*

E Nozzles Material

	specify material

F Neck Flange Material

	specify material

G Mounting Bolt and Nut Material

	specify material

H Gasket Material

	specify material

I Process Fluid State

liquid	liquid
gas	gas
steam	steam

J Special Requirements

	additional examination

* Throat diameter is calculated by Alf-Sensor on the base of FLOW QUESTIONNAIRE filled in by Buyer

Ordering Example:

OPL- 414-DN150-PN40/B1-154,1-70,12-1.4404-P245GH-42CrMo4-graphite/316SS-liquid

stands for: The long radius nozzle, nominal pipe diameter DN150, flange PN40 / facing B1 according to PN-EN 1092-1, internal pipe diameter 154,1 mm, throat diameter 70,12 mm, nozzle material 1.4404 = SS316L, neck flange material P245GH, blot material: 42CrMo4, gasket material: graphite/SS316L, fluid state: liquid

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ORIFICE

FLOW QUESTIONNAIRE / ARKUSZ DANYCH PROCESOWYCH

Nazwa firmy Company				
Nr punktu pomiarowego Tag Number				
Wielkość fizyczna Process Parameter	Wartość Value			Jednostki Units
Medium Fluid to be measured			☐ Gaz / Gas ☐ Ciecz / Liquid ☐ Para / Steam	
Średnica nominalna rurociągu Line Size	☐ Permanent Pressure Loss ☐ Bore size ☐ Flow Rate			
Ciśnienie nominalne kołnierza Flange rating				
Wewnętrzna średnica rurociągu Internal Pipe Diameter				
Przepływ maksymalny Maximum Flow				
Przepływ normalny Normal Flow				
Minimalny mierzony przepływ Minimum Flow to be Measured				
Maksimum zakresu pomiarowego Meter Maximum Scale Flow				
dP przy maksimum zakresu pomiaru dP AT Meter Maximum Scale Flow				
Ciśnienie robocze Working Pressure			☐ Nadciśnienie / Gauge ☐ Bezwzględne / Absolute	
Temperatura robocza Working Temperature				
Gęstość, ciężar właściwy lub MW Density, SG or MW				
Lepkość w temperaturze roboczej Viscosity at Working Temperature				
Ściśliwość (dla gazu) Compressibility, if gas				
Stosunek ciepła właściwego (dla gazu) Specific Heat Ratio, if gas				
Otwór odpowietrzający lub spustowy Drain or Vent, if required	Wymagana średnica Required diameter		Nie None	
Preferowany element spiętrzający Preferre Primary Device	Kryza ostrokrawędziowa Sharp Edge OPL	Kryza kwadrantowa Quarter circle Edge OPL	Kryza z wlotem stożkowym Cone Inlet OPL	Dysza (podać jaka) Nozzle (Show Type)
Przyłącza impulsowe (dla kryzy)Tappings (orifice plate only)	Kołnierzowe Flange Tappings	Przytarczowe Corner		D + D/2
		Punktowe Single	Szczelinowe Annular Slot	
Uwagi Comments				

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Multipoint Thermometer process data sheet (1/2)

To help ensure you are quoted the correct product, please provide the data as shown below:

GENERAL	Revision	Rewizja	
	Tag Numbers	Nr punktów	
	Service	Przeznaczenie	
	Vessel No	Nr zbiornika	
	Ambient Conditions	Warunki otoczenia	
	Temperature °C	Temperatura °C	
	Humidity % RH	Wilgotność % RH	
	Area Classification	Kategoria zagrożenia wybuchowego	
PROCESS FLUID	Material Type (Liquid/Loose/Chips/ etc)	Rodzaj materiału (ciecz/sypki/zrębki/inny)	
	Pressure: min/norm/max [Units]	Ciśnieni: min/norm/maks [jedn]	
	Temperature: min/norm/max °C	Temperatura: min/norm/maks °C	
	Pour Point (°C)	Temperatura krzepnięcia°C	
	Viscosity [Units]	Lepkość [jednostki]	
	Operating Density of Lower Fluid kg/m3	Gęstość robocza [kg/m3]	
	Corrosive Components	Czynniki korozyjne	
TANK DATA	Vessel/Tank Data	Dane zbiornika	
	Fixed/Floating Roof	Dach stały/pływający	
	OD / Wall Thickness [mm]	Średnica / grubość ścianki [mm]	
	Height [mm}	Wysokość [mm]	
	Heating / Insulation	Ogrzewanie/Izolacja	
	Wall Material	Materiał zbiornika	
	Seal Material	Materiał uszczelnienia	
	Mechanical Components Inside Vessel	Elementy mechaniczne wewnątrz	
	Scraper Bucket	Zgarniacz	
	Agitator	Mieszadło	
	Other	Inne	
	Material Feeding	Podawanie materiału	
	Inlet (Top/Bottom)	Wlot (góra/dół)	
	Feeding Load at Sensor [kg]	Obciążenie czujnika materiałem [kg]	
	Material Dispatch	Odbiór materiału	
	Helical Conveyor	Przenośnik ślimakowy	
	Other	Inny	
	Sensor Location	Lokalizacja czujnika	
	In Vessel Center	W osi zbiornika	
	Other	Inna	

to be continued...

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Multipoint Thermometer process data sheet (2/2)

continued...

To help ensure you are quoted the correct product, please provide the data as shown below:

THERMOMETER DATA	Mechanical Protection (Tube/Hose/None)	Mechaniczna ochrona (rura/wąż/..)	
	Protection Tube Inside Vessel, ID [mm]	Rura ochronna w zbiorniku, średnica [mm]	
	Process Connection	Przyłącze procesowe	
	Flange	Kołnierz	
	Thread Fitting	Króciec gwintowany	
	Compression Fitting	Złączka zaciskowa	
	Sensor Anchoring	Kotwiczenie czujnika/osłony	
	Number of Measurement Points	Ilość punktów pomiarowych	
	Immersion lengths U1/U2…/Un [mm]	Zanurzenie U1/U2…/Un [mm]	
	Sensor (RTD, T/C, Other)	Czujnik (RTD, T/C, inny)	
	Electric Connections	Przyłącze elektryczne	
	Junction Box w/o Transmitters	Skrzynka bez przetworników	
	Junction Box with Transmitters	Skrzynka z przetwornikami	
	Cable (multicable/single cables): OD [mm]	Kabel wielożyłowy/pojedyncze, Æ	
NOTES	Transmitter Type (4-20mA, other)	Sygnał wyjściowy przetw. (4-20mA. inny)	
	Additional Information	Dodatkowe informacje	
	Vessel Drawing + Access Space	Rysunek zbiornika, przestrzeń montażowa	

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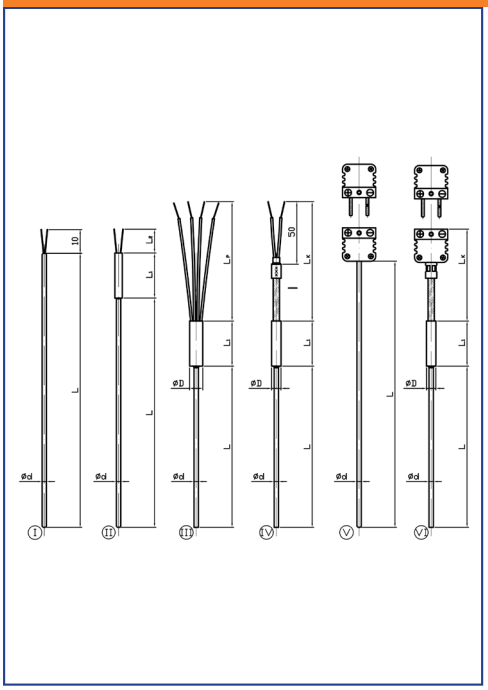
TP-42 (ale TOP)



Sheathed Thermocouple (Type J, K, N)

Thermocouple is made of sheathed, mineral insulated thermocouple wires. Metallic oxide (MgO) insulation is compacted into the sheath to mechanically support and electrically insulate the thermocouple wire and junction Such a design allows small diameter and good flexibility of T/C. Sheathed thermocouple is highly mechanical and chemical resistant and has very low time of response.

Model	Basic insert	Intrinsic save insert	Execution
I	TP-42-WT	TP-42-WT/Exi	Basic
II	TP-42-WTT	TP-42-WTT/Exi	with sleeve and conn. piece
III	TP-42-WTTp	TP-42-WTTp/Exi	with sleeve and loose wires
IV	TP-42-WTTKbm	TP-42-WTTKbm/Exi	with T/C extension wire cable
V	TP-42-WTG	TP-42-WTG/Exi	with T/C socket
VI	TP-42-WTTGKbm	TP-42-WTTGKbm/Exi	with socket and T/C extension wire cable

Technical specification

Sheathed sensor insert	Temp. range - Class 1	Characteristic
1xFe-CuNi (J), 2xFe-CuNi (J)	-40°C..+800°C	acc. EN 60584-1
1xNiCr-NiAl (K), 2xNiCr-NiAl (K)	-40°C..+1000°C (+1100°C)*	
1xNiCrSi-NiSiMg(N), 2xNiCrSi-NiSiMg (N)	0°C..+1200°C (-270°C..+1300°C)*	

Junction
ungrounded
grounded

* short term

Sheath diameter d [mm]	Sleeve diameter D [mm]	Sleeve length L_1 [mm]	Sheath material acc. AISI/DIN
ø0,5 ø1,0 ø1,5 ø2,0 ø3,0 ø4,5 ø6,0 ø8,0	on request	on request	2.4816 / Inconel 600 1.4571 / 316Ti 1.4541 / 321

Thermocouple	Configuration	Compensation cable type
Single	2 wire (1-pair)	on request
Double	4 wire (2-pair)	

Medium	Response Time $T_{0,5}$
Water	0,35 ÷ 2,5 sec

Bending radius R_{MIN}	Operating pressure
3 d	up to 20 MPa

Non-standard models available.

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Ordering Information

	A	B	C	D	E	F	G	H	I	J	K	

stands for:

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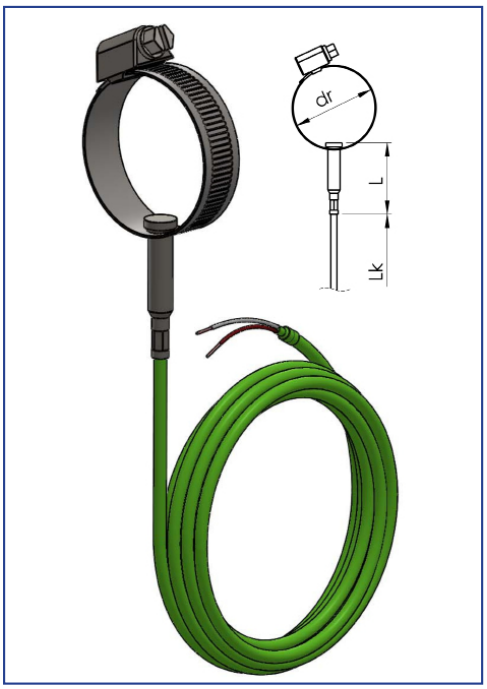
TOP-SpWKbm-50-IV



Contact Resistance Thermometer Pt100 for pipeline

Contact resistance thermometer type TOP-SpWKbm-50-IV has been designed for temperature measurement of pipelines and other round elements in the range of -50°C to +400°C, using shock-proof resistor Pt100.

Thermometer is fixed to the pipeline using a metal band clip.

Type	Execution	Version
TOP-SpWKbm-50-IV	Basic - acc to catalog card	Ⓘⓥ
TOP-SpWKbm-50-IV/Exi	Intrinsic – acc to Atex	

Technical specification

RTD type	Version	Characteristic	Measuring range (standard/*shockproof)	Accuracy class	Max. sensor current	Lead wire config.
1xPt100 / 2xPt100	standard / *shockproof	acc. EN-60751	-50°C..+400°C / *(-50°C..+400°C)	B	8 mA	2, 3, 4 wire
			-50°C..+400°C / *(-50°C..+300°C)	A	5 mA	3, 4 wire
			-50°C..+250°C / *(0°C..+150°C)	1/3B (AA)	3 mA	

Pipeline diameter d_r [mm]	Contact ending material acc. DIN/AISI	Contact ending length L [mm]
on request	1.4571/316Ti	on request (min. 35 mm)
	MO59/CuZn39Pb2	

Configuration	Dimension	Connection Cable Type	Insulation	Temp. limits
2 wire	ø 2,9	L2GGD-2x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 3,1	L4GGD-4x0,22mm2	glass fibre, glass fibre, screen	+400°C
3, 4 wire	ø 4,0	L4TFDT-4x0,22mm2	teflon, film, screen, teflon	+260°C

Non-standard models available.

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Ordering Information

TOP-SpWKbm-50	A	B	C	D	E	F	G	H	I	J

A	Execution
IV	Basic with cable
IV/Exi	Intrinsic safe with cable

B	Resistor
1xPt100	Single Pt100
2xPt100	Double Pt100

C	Class
B	B
A	A
1/3B	1/3B (AA)

D	Contact ending length L
	specify in mm (min. 35 mm)

E	Contact ending material
1.4571	1.4571/316Ti
MO59	MO59/CuZn39Pb2

F	Lead wire configuration and cable type
2p-L2GGD	2 wire (L2GGD-2x0,22mm2)
3p-L4GGD	3 wire (L4GGD-4x0,22mm2)
4p-L4GGD	4 wire (L4GGD-4x0,22mm2)
3p-L4TFDT	3 wire (L4TFDT-4x0,22mm2)
4p-L4TFDT	4 wire (L4TTFD-4x0,22mm2)

G	Cable length L_K
	specify in mm

H	Pipeline diameter d_r
	specify in mm

I	Operating temperature
	specify in °C

J	Version
Z	Standard (ceramic wire wound element)
W	Shockproof (thin-film element)

Ordering Example

TOP-SpWKbm-50-IV-1xPt100-A-40-1.4571-3p-L4GGD-2000-50-(0-100 °C)-Z

stands for: Contact resistance thermometer with cable, with resistor 1xPt100 class A, ending length L=40mm, ending material 1.4571, configuration 3-wire, cable type L4GGD, length Lk=2000 mm, pipeline diameter dr=50mm, operating temp. up to +100°C, standard sensor version

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