

ModuTEMP 70

Modular Resistance and Thermocouple Temperature Sensors without/with Transmitters 4 to 20 mA

- Measuring resistor 1x / 2x Pt100, thermocouple 1x / 2x „J“, „K“
- Measuring range -50 to +600 °C Pt100, -200 to +800 °C „J“, -200 to +1100 °C „K“
- Accuracy class A, B according to EN 60751, 1, 2 according to EN 60584-2.
- Head form B according to DIN (Al alloy or stainless steel)
- Stem material: stainless steel DIN 1.4541, Inconel 600.
- Extension piece, thermowell material: DIN 1.4541
- Protective tube material: DIN 1.4541, DIN 1.4845
- Housing IP 54, IP 65, IP 68
- Optional headmounted programmable transmitter with output 4 to 20 mA, HART, Profibus, Fieldbus including circuit isolation version and II 1G EEx ia IIC T4 ... T6 (ATEX) version
- Explosion proof II 1/2GD EEx d IIC T1 ... T6 ΔT5 °C (ATEX)



Application

Industrial resistance (RTD) and thermocouple (T/C) temperature sensors MODUTEMP 70 made on the basis of interchangeable measuring inserts with mineral insulation (MI) are meant for accurate remote temperature measuring and temperature control of liquid and gaseous mediums without and with gas or dust explosion danger (certificate ATEX EEx d + EEx ia). The sensors can be supplied with connecting terminal box or with transmitter of output from 4 to 20 mA, possibly HART, Fieldbus, Profibus embedded in the sensor head.

RTD – Sensors are also certified as a part of measuring instruments for invoicing of heat supplied by water, water steam and next by technical gases and fluids. The version with transmitter isn't certified for invoicing measuring.

T/C – For the right (exact) temperature measuring (at sensors meant for immersion into gaseous or liquid medium) must be the immersion depth equal at least to the 20-multiple of external thermowell or protective tube diameter (30-multiple of external diameter at sensors which aren't on the basis of mineral insulated cable).

Sensors J13 – into the thermowell

Sensors into the thermowell must be assembled with appropriate cylindrical or conical thermowell. Using of these sensors without thermowell isn't recommended and at the version with fixed cup EEx is forbidden.

The sensors are meant for temperature measuring in flowing liquid, gaseous and powdery mediums in pipelines, tanks and like these, at middle up to the high pressures (PN 250) and flowing velocities of mediums (80 km/h).

The measuring insert RTD is applicable to 600°C, measuring insert T/C „J“ to 800°C and „K“ to 1100°C, however the measuring range of complete sensor is given by temperature resistance of the used thermowell. The massive highly resistant thermowells made of special materials spin out the time of sensor reaction.

The strengths of these sensors are in easy operating service without breach of pressure technology tightness.

J23, J33 – sensors with the thermowell

The sensors are meant for temperature measuring in flowing liquid, gaseous and powdery mediums in pipelines, tanks and like these, at middle to high pressures and flowing velocities of medium.

J43 - sensors without the thermowell

The sensors are meant for temperature measuring in flowing liquid, gaseous and powdery mediums at relative low pressures and flowing velocities of medium, at higher requirements on short reaction time of change in the temperature.

B00 - sensors without fitting

The sensors are meant for temperature measuring in flowing liquid, gaseous and powdery mediums at relative low pressures and flowing velocities of medium, at higher requirements on short reaction time of change in the temperature.

The required immersion is adjustable with adjusting fixing union.

The length of sensor isn't practically limited, the sensor is supplied with stem coiled in the circle.

Besides this mentioned using it can be used for measuring of surface temperatures and temperatures in difficult accessible places, when is used the stem that can be formed with bends of minimal 30 mm diameter.

B53, B63, B64 – The straight sensors

The sensors are meant for temperature measuring of flowing liquid, gaseous and powdery mediums in furnaces and incinerators and devices like these at overpressure up to app. 100 KPa.

The required immersion is adjustable with adjusting fixing elements.

Using of sensors in fixed closure EExd

Sensors J13 – The sensors into the thermowell

The sensors in version with fixed closure can be embedded into thermowells installed in Zone 0 (20) which meet the requirements of EN 50248 and in Zone 1 (21) and in Zone 2 (22) according to the EN 60079-10.

J23, J33 – The sensors with the thermowell

Sinks of sensors in version with fixed closure can be embedded in Zone 0 (20), in Zone 1 (21) and Zone 2 (22) according to EN 60079-10. Other parts of temperature sensors (head, extension piece, connecting thread, measuring insert) can be installed in Zone 1 (21) or in Zone 2 (22).

B63, B64 – The straight sensors

The protective tubes of sensors in version with fixed closure can be embedded in Zone 1 (21) and Zone 2 (22) according to EN 60079-10. Other parts of temperature sensors (head, adjustable fixing union or adjustable fixing flange, measuring insert) can be installed in Zone 1 (21) or in Zone 2 (22) too.

Combined protection of EEx d and EEx ia

For especially heavy conditions in medium with explosive danger can be combined the protections EEx d and EEx ia with using of certified converter EEx ia in the head of sensor with fixed closure EEx d.

Description

Modular conception, variable dimensions and materials simplify the ordering and application of modular temperature sensor MODUTEMP 70. The conformity to individual customer's requirements is reached through the variability of materials and most dimensions especially of length.

The fitting of sensors is usually composed of head :

- and extension piece - at sensors into the thermowell,
- and thermowell with lengthening piece and fixing shift pipe union - at sensors into the thermowell,
- and protective tube - at straight sensors.

The sensors are completed with interchangeable measuring insert which is fixed in the sensor head with two spring screws securing the downforce to the thermowell bottom, resp. protective tube.

RTD – The sensor of resistance sensing device is one or are two measuring resistances embedded in the stem of interchangeable measuring insert which are connected through the inside line into the terminal block in the head. There is used the defined resistance change according to the temperature interchange. The resistance signal is furthermore converted to unitized linearized current signal of 4 to 20 mA, possibly to output HART, Profibus, Fieldbus at sensors with transmitter.

T/C – The sensor of sensing device is one or two measuring thermocouples embedded in the stem of interchangeable measuring insert which are connected into the terminal block in the head. There is used the defined change of thermoelectric voltage according to the temperature interchange. The output signal of thermocouples is furthermore converted to unitized linearized current signal of 4 up to 20 mA, possibly to output HART, Profibus, Fieldbus at sensors with transmitter.

Sensors J13 – The sensors into the Thermowell

The sensors are assembled with fixing union into thermowell which can be a part of the delivery. These thermowells are either welded or screwed in the weldments on the pipeline, technological device and the like according to their version, possibly screwed to the mating flange in case of the thermowell with the flange.

J23, J33 – The sensors with the thermowell

The sensors are assembled with fixing union into straight or oblique weldment on the pipeline, technological device and the like. Sensors with welded fixing flange are mounted with this flange. The immersible part of the thermowell (at sensor with flange also the adjoining part of fixing flange) can be equipped with special plastic spray paint (Halar, Hyflon, polyamide, and the like) for increase of the corrosion resistance. The increase of abrasion resistance of the thermowell can be arranged e.g. with the spray paint of resistant corundum coating.

J00 - The sensors without fitting

The sensors are assembled with fixing union into straight or oblique weldment on the pipeline, technological device and the like. They are often used also without adjustable fixing union.

B53, B63, B64 – The straight sensors

The sensors are assembled with adjusting mounting flange or adjusting fixing union into furnaces and the like. The increase of abrasion resistance of the sensor protective tube can be provided e.g. with the spray paint of resistant corundum coating.

Construction for “demanding applications”

The high degree of protection IP 68 (head H6 and H7), shake-proof interchangeable measuring inserts with mineral insulation, all-stainless-steel version inclusive head (head H7) and other characteristics predestine this product for very demanding application.

Stainless steel version

The main stainless steel components DIN 1.4541 are already included in the basic price of sensors. At the choice of the sensor with stainless steel head H7 it is also appropriate for aggressive medium of chemical productions.

Sensors with the converter

The sensors T1070 and T1570 with the converter can be also assembled with transmitters into the head with outputs of 1x/2x 4-20 mA, possibly HART, Profibus, Fieldbus. The modular arrangement of sensors enables an application of transmitters with diameter of 44 mm to 64 mm, additional assembling of transmitters onto the measuring insert and also into the head cover and also the use of two converters in one head.

Technical Specifications

T1070

Measuring Resistor:

1xPt100, accuracy class A, B according to EN 60751,
inside wiring: two-wire, four-wire
2xPt100, accuracy class A, B according to EN 60751,
inside wiring: two-wire, three-wire

Measuring Range:

-50 to +600 °C
-50 to +450 °C EExd version (Code ED)

Measuring Current:

recommended ≤ 1 mA
maximal 3 mA

Output signal:

linearized 4 to 20 mA

Dielectric Strength:

500 V eff

Electrical insulation resistance:

min. 100 M Ω according to EN 60751,
for temperature (25 \pm 10)°C, max. 80 % relative humidity

T1570

Thermocouple:

„J“, „K“, accuracy class 1, 2 according to EN 60584-2

Measuring Range:

-200 to +800 °C - thermocouple „J“
(material DIN 1.4541)
-200 to +1100 °C - thermocouple „K“
(material DIN 2.4816)
-40 to +450 °C - EExd version (Code ED)

Output signal:

linearized 4 to 20 mA

Dielectric Strength:

500 V eff

Electrical insulation resistance:

min. 100 M Ω according to EN 61515,
for temperature (25 \pm 10)°C, max. 80 % relative humidity

RTD, T/D**Materials:**

- Head - Aluminium alloy (H1, H2, H3, H4, H5, H6)
- Stainless steel 42 29 31 (H7)
- Stem - Stainless steel DIN 1.4541
- for Pt100 and T/C „J“
- Stainless steel Inconel 600
- (2.4816 DIN) for T/C „K“

Housing:

IP 54, IP 65, IP 68 (according to head)

Operation conditions**Maximal Temperature of Head:**

100 °C (without transmitter)
80 °C (with transmitter PT-011, PT-031 and P3301)
85 °C (with transmitter P5102, P5201 and P5310)

Ambient temperature for EExd version (Code ED):

-40 to +65 °C

Modular Resistance and Thermocouple Temperature Sensors ModuTEMP 70

Ambiente temperature for EExd version (Code ED):

Customers have to assure installation of temperature sensors to do not increase of maximal surface temperature and temperature of armature influenced by outside temperature (measured medium, sun heating, etc.) defined by EN 50014 (for gases) and EN 50281 (for dusts). Customers have to calculate plus 5 °C (self heating of maximal operating energy output, $P_{imax}=1$ W) for defining of ambient temperature. Maximal ambient temperature for electrical device of explosion group II for explosive atmosphere of gases, steams and foges see Table 1.

Maximal ambient temperature for electrical device of explosion group II for explosive atmosphere of dusts is lower value of:

- ignition temperature of dust in layer decreased of 75 °C,
- 2/3 of ignition temperature of dust in turbulent state

Table 1

Temperature Class	Max. Ambient Temperature	Max. Temperature of Measured Medium
T1	450 °C	445 °C
T2	300 °C	295 °C
T3	200 °C	195 °C
T4	135 °C	130 °C
T5	100 °C	95 °C
T6	85 °C	80 °C

Other specifications

EMC (Electromagnetic Compatibility):

According to EN 61326-1:98 / A1:99

Explosion proof (Code ED):

⊕ II 1/2GD EEx d IIC T1 ... T6 ΔT5°C only for head H6, H7

Maximal permissible operating properties:

I_{imax} : 30 mA

P_{imax} : 1 W

CAUTION!

It is possible to use for EExd version other cable gland with connection thread M20x1.5 and with approving ⊕ II 2G EEx d IIC for explosion proof version and for ambient temperature -40 to +65 °C.

It is due to lock cable against possible rotation and displacement for using with cable glands (KME1, KME2).

ATTENTION! Temperature sensors in EExd version (code ED) have not to be removed in operation, cover of head and cable gland keep tight when circuit alive!

Any construction changes of EExd version are prohibited and can be cause of explode!

Information and attention of EExd head

FTZÚ 03ATEX0297

⊕ II 1/2GD EExd IIC T1 ... T6 ΔT5°C

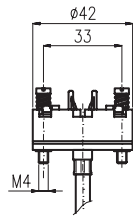
(-40°C ≤ Ta ≤ +65°C)

KEEP TIGHT WHEN CIRCUIT ALIVE!

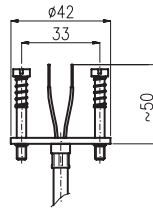
Sensors Weight T1070 and T1570 [kg]									
Sensor Version	J13	J23		J33		J43	B00	B63	B64
	With Extension Piece	Without Extension Piece	With Extension Piece	With Screwing	With Flange	Without Thermowell	Without Armature	Straight Ø 14	Straight Ø 14
Without transmitter with head H1									
Nominal Length									
L100	0,52	0,37	0,47	0,65	1,5	0,52	--	--	--
L110	--	--	--	--	--	--	0,32	--	--
L160	0,53	0,38	0,49	0,7	1,54	0,53	--	--	--
L170	--	--	--	--	--	--	0,33	--	--
L230	--	0,39	--	--	--	--	--	--	--
L240	--	--	--	--	--	--	0,34	--	--
L250	0,55	--	0,53	0,75	1,59	0,55	--	0,69	0,69
L300	--	--	--	--	--	--	0,35	--	--
L310	--	--	--	--	--	--	--	0,8	0,8
L380	--	0,42	--	--	--	--	--	--	--
L390	--	--	--	--	--	--	0,37	--	--
L400	0,58	--	0,58	0,8	1,68	0,58	--	0,98	0,98
L500	--	--	--	--	--	--	0,39	1,17	1,17
L530	--	0,46	--	--	--	--	--	--	--
L540	--	--	--	--	--	--	0,4	--	--
L630	0,63	--	0,63	0,95	1,82	0,63	--	--	--
L710	--	--	--	--	--	--	0,42	1,57	1,57
L770	--	--	--	--	--	--	0,43	--	--
L800	--	--	--	--	--	--	--	1,75	1,75
L1000	--	--	--	--	--	--	0,48	2,14	2,14
L1400	--	--	--	--	--	--	0,55	2,91	2,91
L1600	--	--	--	--	--	--	--	3,3	3,3
L2000	--	--	--	--	--	--	0,66	4,08	4,08
L999									
Head Weight [kg]									
H2					0,04				
H3					0,05				
H4, H5			0,2				--		0,2
H6			0,16				--		0,16
H7			0,7				--		0,7
H9									
Transmitter Weight [kg]									
PT-010					0,02				
P5102					0,04				
P5201					0,05				
P3301					0,04				

Resistance and Thermocouple Insert with Mineral Insulated

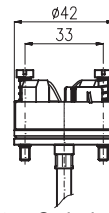
S1
With Terminal Board



S2
With Free Outlet



S3
With Transmitter

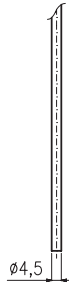


for Transmitter Ordering see Accessories

D1
For Sensors without Armature, into Thermowell, without Thermowell
(Only for Thermoelectric Sensors)



D2



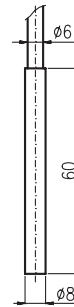
D3

For All Armature



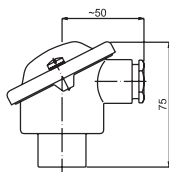
D5

For Sensors without Armature, without Thermowell, into Thermowell \varnothing 8 mm



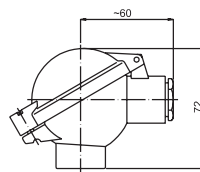
HEAD

H1
DIN B, Standard
IP 54, Cable Outlet M20x1,5



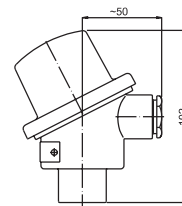
Material Al Alloy

H2
DIN B, Spherical
IP 65, Cable Outlet M20x1,5



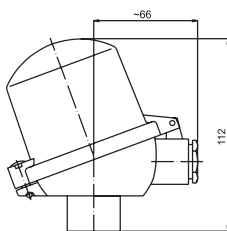
Material Al Alloy

H3
DIN B, with High Cap
for Mounting of Transmitter
IP 54, Cable Outlet M20x1,5



Material Al Alloy

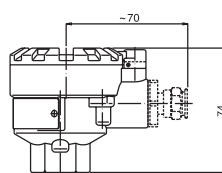
H4, H5
DIN B, with High Cap for Mounting of Transmitter
IP 65, Cable Outlet M20x1,5, (H5 + Outside and Inside Ground Clamp)
Head H5 for Mounting of Transmitter EEx ia for EEx Area



Material Al Alloy

H6

Housing IP 68, EEx d,
IP 68, Thread for Outlet M20x1,5

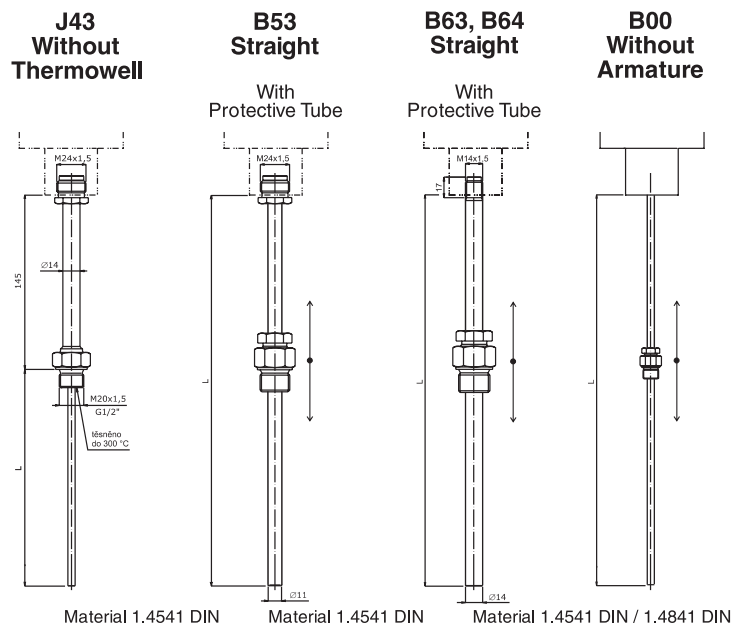
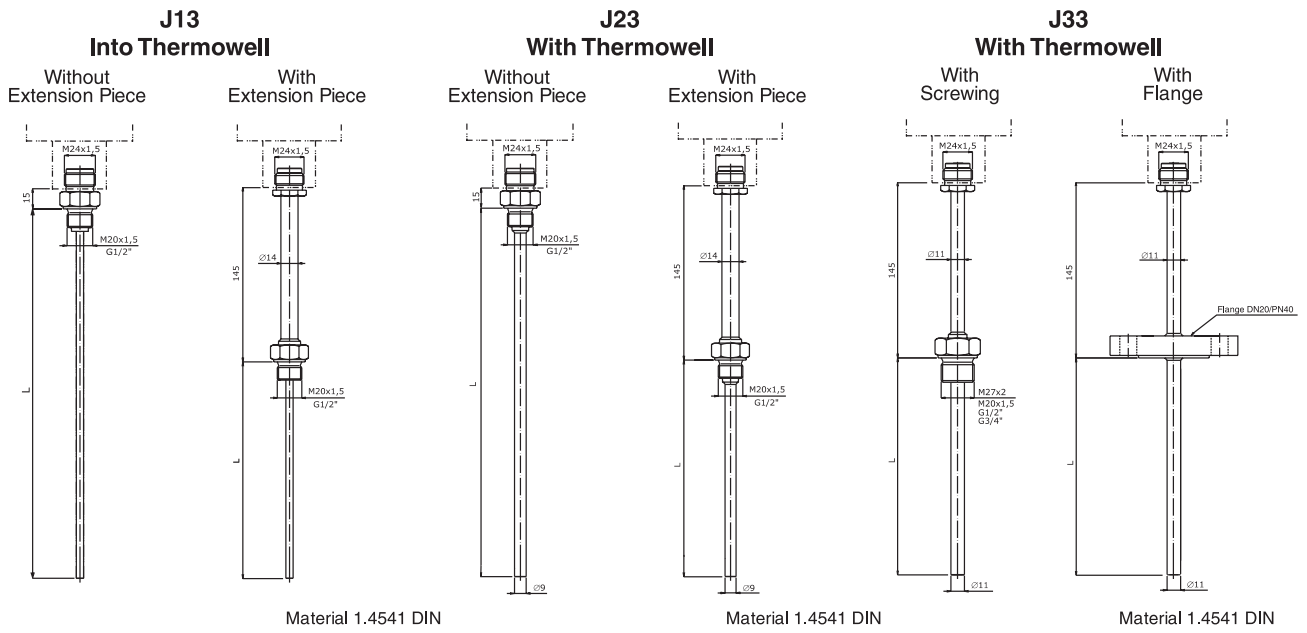


Material Al Alloy

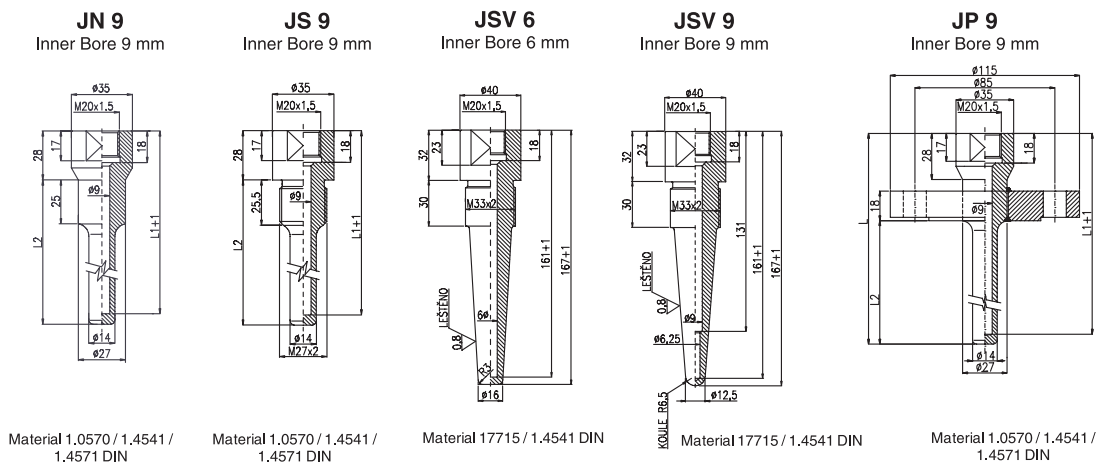
H7

Material Stainless Steel

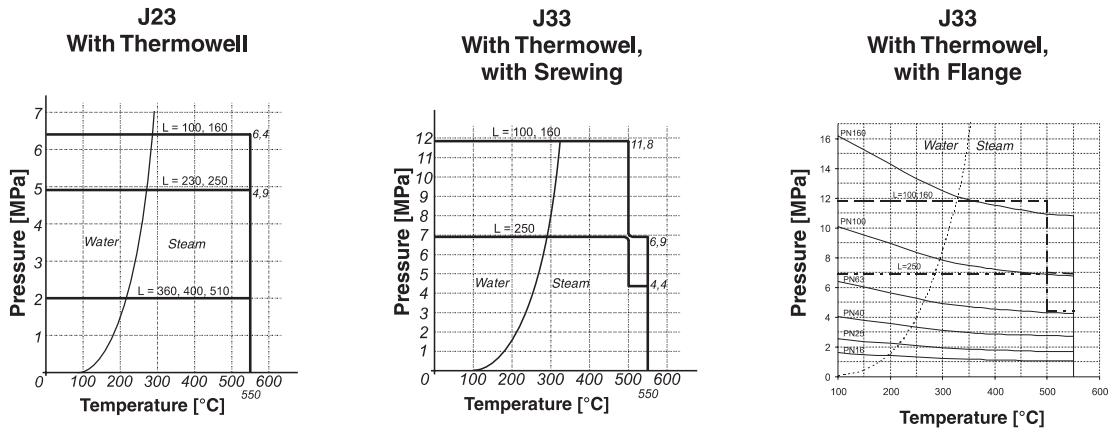
ARMATURES



THERMOWELLS

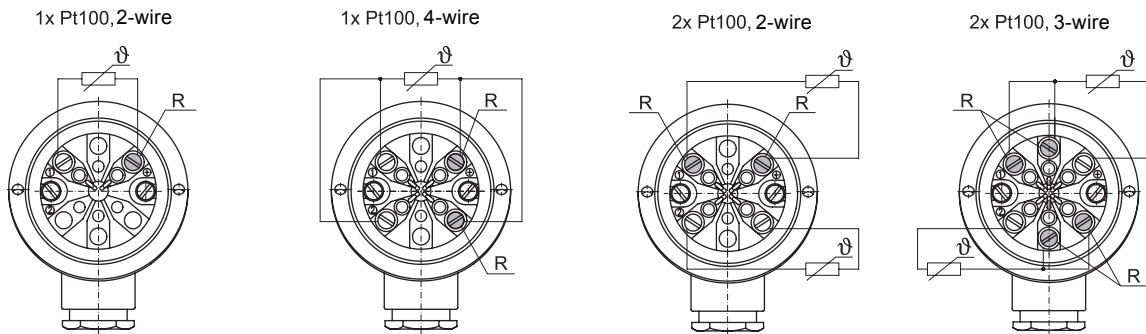


Application of Load Thermowell in Flowing Medium for Nominal Length Declared



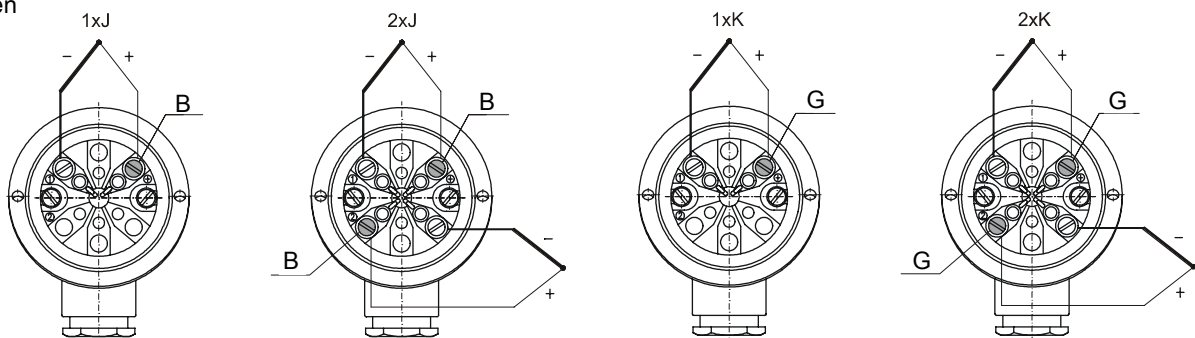
Picture 1
Electrical Connections RTD

R - red

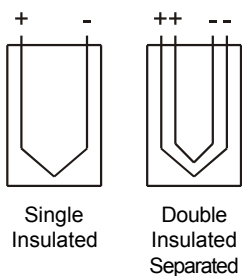


Electrical Connections T/C

B - black
G - green



Measuring junctions



Modular Resistance and Thermocouple Temperature Sensors ModuTEMP 70

ModuTEMP 70 - Modular Resistance and Thermocouple Temperature Sensors with Replaceable Mineral Insulated Insert				
Type	Description			
T1070	Resistance Temperature Sensors			
T1570	Thermocouple Temperature Sensors			
Code	Temperature Sensor	Measuring Range	Sheath Material	
Resistance				
04	1xPt100, Two-wire Inside Wiring	-50 to +600 °C	DIN 1.4541	
06	1xPt100, Four-wire Inside Wiring	-50 to +600 °C	DIN 1.4541	
08	2xPt100, Two-wire Inside Wiring	-50 to +600 °C	DIN 1.4541	
07	2xPt100, Three-wire Inside Wiring	-50 to +600 °C	DIN 1.4541 (Not for Code ED)	
Thermocouple				
21	1x"J" (Fe-CuNi), Insulated	-200 to +800 °C	DIN 1.4541	
61	2x"J" (Fe-CuNi), Insulated, Isolated Junctions	-200 to +800 °C	DIN 1.4541	
22	1x"K" (NiCr-NiAl), Insulated	-200 to +1100 °C	Inconel 600	
62	2x"K" (NiCr-NiAl), Insulated, Isolated Junctions	-200 to +1100 °C	Inconel 600	
99	Other			
Code	Accuracy Class			
1	B according to EN 60751 for Resistance Sensor			
2	A according to EN 60751 for Resistance Sensor (for Sensors with Four-wire Inside Wiring Only, Range -50 to +300 °C)			
7	2 according to EN 60584-2 for Thermocouple Sensor			
6	1 according to EN 60584-2 for Thermocouple Sensor			
9	Other			
Code	Armature Sensor Version	Diameter Extension Piece	Armature Material	
J13	IntoThermowell	14 x 2,5 mm	1.4541	
J23	With Thermowell \varnothing 9 x 1 mm	14 x 2,5 mm	1.4541	
J33	With Thermowell \varnothing 11 x 2 mm	11 x 2 mm	1.4541	
J43	Without Thermowell	14 x 2,5 mm	1.4541	
B00	Without Armature	-	-	
B53	Straight with Protective Tube \varnothing 11 mm	-	1.4541	
B63	Straight with Protective Tube \varnothing 14 mm	-	1.4541	
B64	Straight with Protective Tube \varnothing 14 mm	-	1.4841	
J99	Other			
Code	Nominal Length			
	Into / with / without Thermowell / J13 to J43 /	Straight / B63, B64 /	Straight / B53 /	without Armature / B00 /
L100	100	-	-	-
L160	160	-	-	-
L250	250	-	-	-
L400	400	-	-	-
L630	630	-	-	-
L115	-	-	-	115
L175	-	-	-	175
L245	-	245	245	245
L305	-	305	305	305
L395	-	395	395	395
L500	-	500	-	500
L545	-	-	545	545
L710	-	710	-	710
L775	-	-	775	775
L800	-	800	-	800
L1000	-	1000	-	1000
L1400	-	1400	-	1400
L2000	-	2000	-	2000
L999	Other	Other	Other	Other
Code	Head			
H1	Al Alloy, Cable Outlet M20x1.5, Housing IP 54			
H2	Al Alloy, Cable Outlet M20x1.5, Housing IP 65			
H3	Al Alloy, with High Cap for Mounting of Transmitter \varnothing 44 mm into Cap, Cable Outlet M20x1.5, Housing IP 54			
H4	Al Alloy, with High Cap for Mounting of Transmitter \varnothing 44 mm to \varnothing 62 mm into Cap, Cable Outlet M20x1.5, Housing IP 65			
H5	Al Alloy, with High Cap for Mounting of Transmitter \varnothing 44 mm to \varnothing 62 mm into Cap, Cable Outlet M20x1.5, Housing IP 65, Outside and Inside Ground Clamp			
H6	Al Alloy, Thread for Cable Outlet M20x1.5, without Cable Outlet, Housing IP 68, Outside and Inside Ground Clamp			
H7	Stainless Steel, Thread for Cable Outlet M20x1.5, without Cable Outlet, Housing IP 68, Outside and Inside Ground Clamp			
H9	Other			
Code	Cold-end version of measuring insert			
S1	with terminal block (diameter 42 mm) on flange of measuring insert			
S2	without terminal block, set for mounting transmitter on flange of measuring insert (instead of terminal block)			
S3	with transmitter (see accessories table for transmitter)			
S9	Other			

Modular Resistance and Thermocouple Temperature Sensors ModuTEMP 70

Code	ONLY FOR VERSION: without Armature, into Thermowell, without Thermowell / B00, J13, J43 / Insert Diameter [mm]	
D1	∅ 3 (Only for Thermocouple Sensors)	
D2	∅ 4,5 (Only for Thermocouple Sensors)	
D3	∅ 6	
D5	∅ 6 with Distance Sleeve ∅ 8 (with Thermowell with Inner Bore 9 mm)	
D9	Other	
Code	ONLY FOR VERSION: into Thermowell, with Thermowell, without Thermowell / J13, J23, J33, J43 / Extension Piece	
	J13, J23	J33, J43
N0	Without Extension Piece	-
N1	With Extension Piece 145 mm	With Extension Piece 145 mm
N9	Other	Other
Code	ONLY FOR VERSION: into Thermowell, with Thermowell, without Thermowell / J13, J23, J33, J43 / Process Connection	
	J13, J23, J43	J33
P3	Female Thread M20x1,5	Female Thread M20x1,5
P4	-	Female Thread M27x2
P5	Female Thread G1/2"	Female Thread G1/2"
P6	-	Female Thread G3/4"
P8	-	Flat Flange DN20/PN40
P9	Other	Other
Code	OPTIONAL ACCESSORIES	
Code	Explosion proof	
ED	Explosion proof II 1/2GD EEx d IIC T1-T6, Measuring Range -50 to +450 °C (Only with Code H6, H7) (for Sensors into and with Thermowell /J13, J23, J33) Explosion proof II 2GD EEx d IIC T1-T6, Measuring Range -50 to +450 °C (Only with Code H6, H7), (for Straight Sensors /B53, B563, B64)	
Code	Cable Outlet	
KM1	Nickel Silver, IP68, Diameter of Cable 5 to 10 mm (for Heads H6, H7)	
KME1	Nickel Silver, Eex d, IP68, for fixed assembly Cable with Diameter 4 to 8,5 mm (for Heads H6, H7)	
KME2	Nickel Silver, Eex d, IP68, for fixed assembly Cable with Diameter 6 to 12 mm (for Heads H6, H7)	
KM9	Other	
PK1	Lock anti pull-up cable for EExd Cable Outlet KME1	
PK2	Lock anti pull-up cable for EExd Cable Outlet KME2	
Example of Order: T1070 04 1 J13 L160 H3 S1 D3 N1 P3		
Example of Order: T1570 21 7 B63 L245 H1 S2		