

Modular temperature sensors with fitting

- Measuring range: -200 to +1300 °C
- 1×/2× RTD sensor Pt100 or TC sensor J, K, N
- Accuracy class A, B (RTD) and 1, 2 (TC)
- Many designs of protective fittings and heads
- Possibility of mounting the transmitter into head
- Verification for fiscal metering
- Intrinsically safe version, Flameproof enclosure and Protection by enclosure



Description

Modular concept, variable dimension and used materials simplify ordering and application of modular temperature sensor ModuTEMP® 70.

Main part of the sensor is exchangeable measuring insert assembled with head and in some versions with protective fitting of the sensor.

Exchangeable measuring insert is fastened in sensor head by two suspended screws, providing down-force on thermowell bottom (or protective tube).

RTD - Resistance sensor is made of one or two measuring resistors, embedded in the stem of exchangeable measuring insert. Resistors are connected by inner wiring to the terminal block in the sensor head. There is used defined resistance change according to temperature change. At sensors with transmitter is resistance signal further transformed to linearized unified current signal 4 to 20 mA, optionally to HART, Profibus, Fieldbus output.

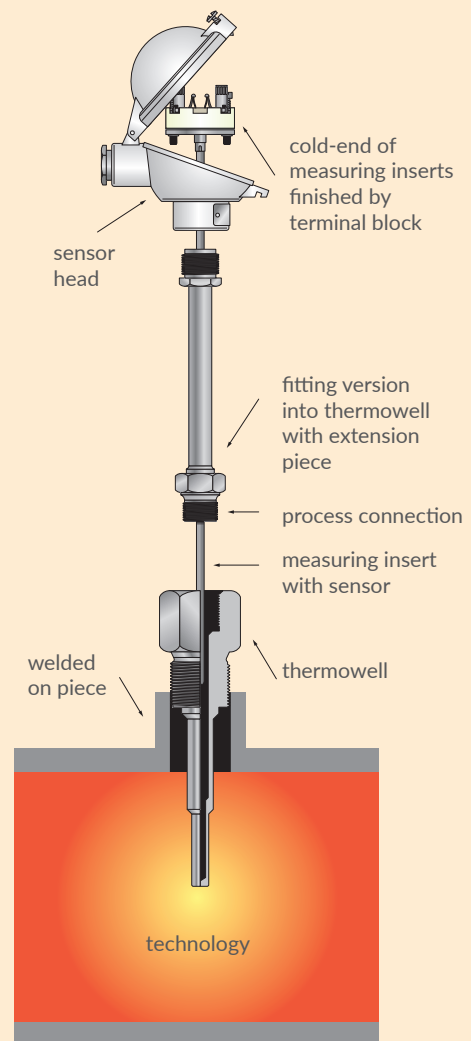
TC - Thermocouple sensor is made of one or two thermocouples, embedded in the stem of exchangeable measuring insert and connected to terminal block in the sensor head. There is used the defined change of thermoelectric voltage according to the temperature change. At sensors with transmitter is output thermocouple signal further transformed to linearized unified current signal 4 to 20 mA, optionally to HART, Profibus, Fieldbus output.

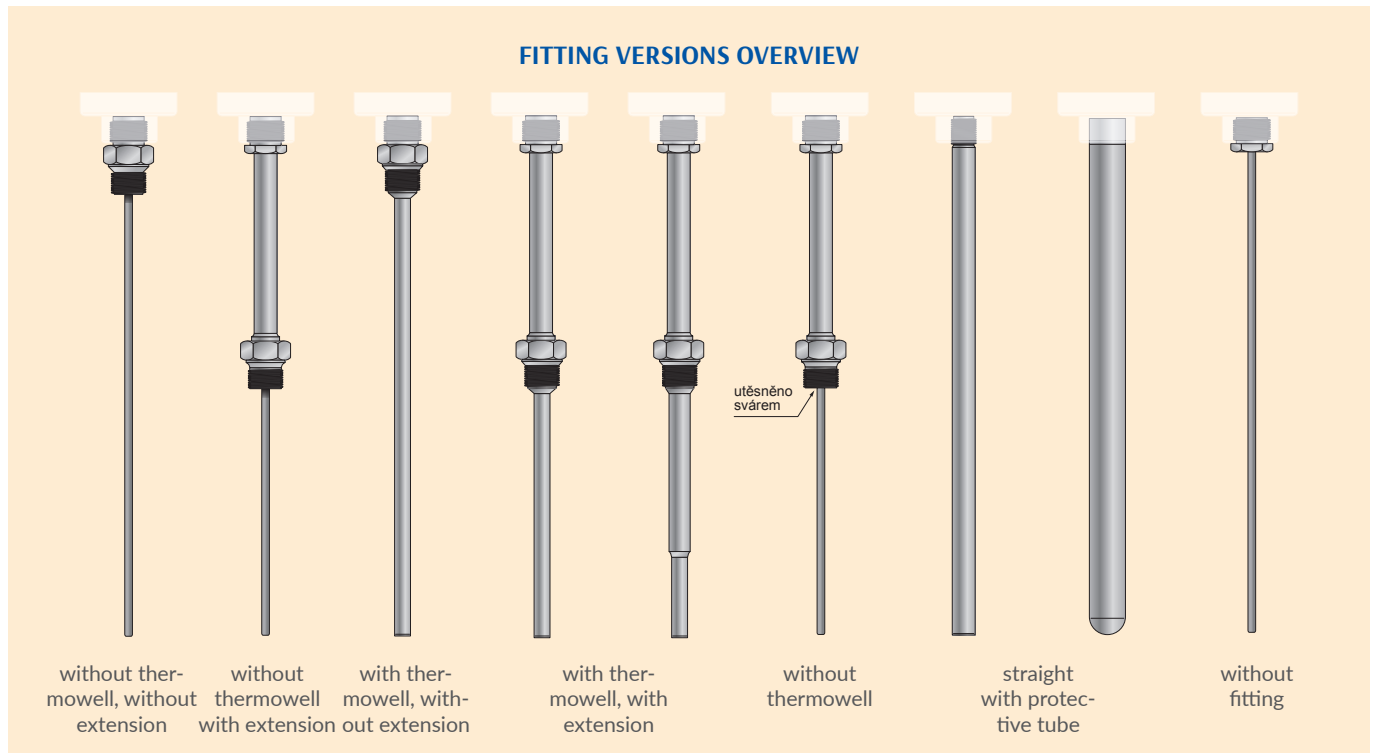
Application

Industrial resistance (RTD) and thermocouple (TC) temperature sensors ModuTEMP® 70 made on the basis of interchangeable measuring inserts with mineral insulation are designed for accurate remote temperature measuring and temperature control of liquid and gaseous mediums in non-hazardous or in hazardous locations with potentially explosive atmosphere of gases or dusts (ATEX certificate).

Sensors can be supplied with connecting terminal box or with transmitter with output from 4 to 20 mA, possibly HART, Fieldbus, Profibus mounted in the sensor head.

INSTALLATION EXAMPLE OF MODUTEMP® 70 INTO THERMOWELL VERSION





Sensors with thermowell (J23, J32, J33, J63)

Sensors are intended for temperature measurement of flowing fluids, gasses and powdery mediums in pipelines, tanks, etc., at low to medium pressures and flowing velocities of a medium.

Thermowell is in this case an integral part of the sensor.

Submersible part of the sensor (thermowell) or possibly adjacent part for sealing (at sensor with a flange) can be coated by special plastic paint (Halar, Hyflon, polyamide, etc.) to increase corrosion resistance. Increasing resistance of thermowell against abrasion and erosion can be provided by coating with resistant corundum or other layer.

Sensors into thermowell (J13, J16, J21P)

The sensors into the thermowell must be assembled with appropriate cylindrical or conical thermowell. Using this sensors without thermowell is not recommended and for flameproof enclosure (code ED) and protection by enclosure (code ET) version is prohibited.

The sensors in combination with suitable thermowell are intended for temperature measurement of flowing fluids, gasses and powdery mediums in pipelines, tanks, etc., at middle to high pressures (PN 250, PN 400) and flowing velocities of mediums (90 m/s).

Measuring insert RTD is efficient up to 700 °C, measuring insert TC "J" up to 800 °C and "K", "N" up to 1300 °C, although measuring range of complete sensor is given by temperature resistance of used thermowell. The massive high-proof thermowells made of special materials extend the time of the sensor reaction. The strengths of these sensors are in easy operating service without breach of pressure technology tightness.

Sensors without thermowell (J43)

These sensors do not have protective thermowell and the sheath of measuring insert is directly in contact with the medium. The measuring insert is inseparably connected (welded, soldered) with a sensor fitting. Sensors are intended for measurement with higher requirements on quick reaction time

of temperature change. They are used for lower pressures and lower velocities of medium.

Sensors without fitting (B00, B01)

Sensors are intended for temperature measurement of flowing and non-flowing fluids, gasses and powdery mediums at relative low pressures and flowing velocities of medium, at higher requirements on short reaction time of temperature change.

The required immersion is adjustable by fixing shift pipe union.

The stem length of sensor is not limited. Sensors with a length over one meter are supplied as default with measuring stem coiled into a circle.

The sensor can be used also for measurement of surface temperature and temperature in hard accessible places, where is used of advantage of workable stem with minimal curve diameter 5D, where D is diameter of the sensor stem.

Straight sensors (B53, B63, B64, B66, B73, B74, B83, B84, B85, B86, B84Z, B842, B843, B852, B853)

Straight sensors are intended for temperature measurement of liquid, gaseous and powdery mediums in furnaces, incinerators with overpressure up to 100 kPa.

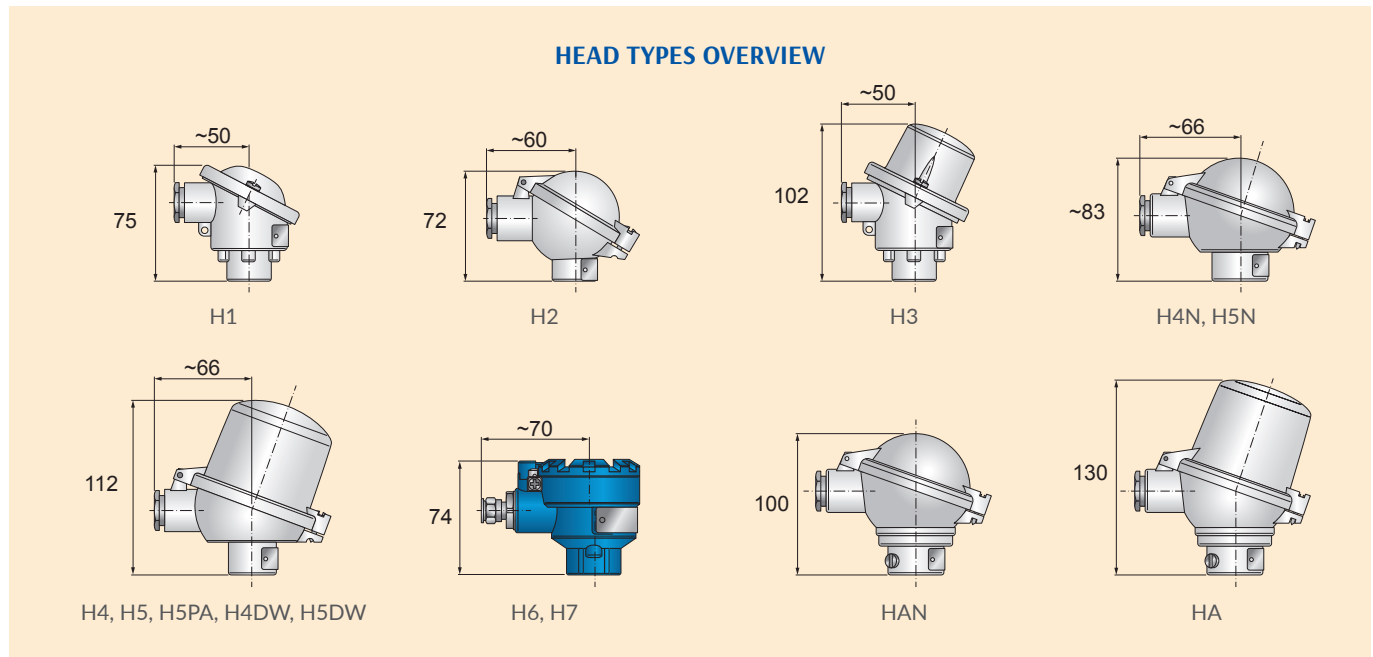
Increasing resistance against abrasion and erosion can be provided by coating with resistant corundum or other layer.

Spatial sensors for explosive atmosphere of gasses or dusts (P1E)

Spatial sensors are intended for ambient temperature measurement in locations of their installation.



HEAD TYPES OVERVIEW



Ordering table

TYPE	
<input type="radio"/> T1070	Modular resistance temperature sensor
<input type="radio"/> T1570	Modular thermocouple temperature sensor

TEMPERATURE SENSOR

Resistance (RTD) / sheath material / max. temperature of use	
<input type="radio"/> 04	1x Pt100, 2wire / 1.4404 / to 500 °C
<input type="radio"/> 06	1x Pt100, 4wire / 1.4404 / to 600 °C
<input type="radio"/> 06HT	1x Pt100, 4wire / Inconel 600 / to 700 °C <i>only for code F7</i>
<input type="radio"/> 07	2x Pt100, 3wire / 1.4404 / to 600 °C
<input type="radio"/> 08	2x Pt100, 2wire / 1.4404 / to 500 °C
<input type="radio"/> 09	2x Pt100, 4wire / 1.4404 / to 600 °C
<input type="radio"/> ...VR	Increased resistance to vibration and shock <i>only for code 06.F2</i>

Thermocouple (TC) / sheath material / measuring range	
<input type="radio"/> 21	1x "J" (Fe-CuNi) / 1.4541 / -200 to +800 °C
<input type="radio"/> 61	2x "J" (Fe-CuNi) / 1.4541 / -200 to +800 °C
<input type="radio"/> 22	1x "K" (NiCr-NiAl) / Inconel 600 / -200 to +1100 °C
<input type="radio"/> 62	2x "K" (NiCr-NiAl) / Inconel 600 / -200 to +1100 °C
<input type="radio"/> 23	1x "N" (NiCrSi-NiSi) / Inconel 600 / -200 to +1100 °C
<input type="radio"/> 63	2x "N" (NiCrSi-NiSi) / Inconel 600 / -200 to +1100 °C
<input type="radio"/> 22HT	1x "K" (NiCr-NiAl) / Microbell, Pyrosil / -200 to +1300 °C
<input type="radio"/> 62HT	2x "K" (NiCr-NiAl) / Microbell, Pyrosil / -200 to +1300 °C
<input type="radio"/> 23HT	1x "N" (NiCrSi-NiSi) / Microbell, Pyrosil / -200 to +1300 °C
<input type="radio"/> 63HT	2x "N" (NiCrSi-NiSi) / Microbell, Pyrosil / -200 to +1300 °C
<input type="radio"/> ...U	Grounded version of junction TC

Thermocouples have isolated lines, in number 2 the measuring connections are separated from each other.

ACCURACY CLASS

Resistance (RTD) according to EN 60751 / inside wiring material / measuring range	
<input type="radio"/> F2	B / Cu / -70 to +500 °C <i>not for code 06HT</i>
<input type="radio"/> F3	B / Ni / -200 to +600 °C <i>only for codes 06, 07, 09</i>
<input type="radio"/> F7	B / Ni / -200 to +700 °C <i>only for code 06HT</i>
<input type="radio"/> F4	A / Cu / -30 to +300 °C <i>only for codes 06, 07, 09</i>
<input type="radio"/> F5	A / Cu / -100 to +450 °C <i>only for codes 06, 07, 09</i>

Thermocouple (TC) according to EN 60584-1

<input type="radio"/> T7	2
<input type="radio"/> T6	1

Not allowable to use two-wire connection because of nickel inner wiring.

FITTING OF THE SENSOR

With thermowell: Thermowell diameter / extension piece diameter / fitting material	
<input type="radio"/> J23	9x1 mm, PN 63 / 14x2,5 mm / 1.4541
<input type="radio"/> J32	11x2 mm reduced to 6x1,3 mm, PN 100 / 11x2 mm / 1.4541
<input type="radio"/> J33	11x2 mm, PN 100 / 11x2 mm / 1.4541
<input type="radio"/> J63	14x2,5 mm reduced to 11x2,4 mm, PN 160 / 14x2,5 mm / 1.4541

Max. use temperature up to +600 °C; for medium pressure up to 1 bar and for low flow velocity it can be used up to +800 °C.

Sensor head is NOT POSSIBLE to turn with cable outlet to the to the desired position after installation to the technology.v

Into thermowell: Extension piece diameter / fitting material

<input type="radio"/> J13	14x2,5 mm / 1.4541 (17248)
<input type="radio"/> J16	20x3 mm / 1.4541 (17248)
<input type="radio"/> J16WH	with 6HR 27 mm welded to the adapter under the sensor head 20 x 3 mm / 1.4541

J21P with rotary fitting in the middle of extension piece *
21,3 x 2,6 mm / 1.4541

Max. temperature of connection thread is 600 °C.

* - Spring stroke of insert 15 mm.

Without thermowell

extension piece diameter / fitting material

J43 14x2,5 mm / 1.4541

Without fitting

B00 without fitting

B01 without fitting, with SST thermometer holder for wallmounting
Standard for heads H4, H5..., H6 and H7; it is possible to use for heads H1, H2 and H3, but the version B00 with holder DH1 is cheaper.

Straight sensor with protective tube

diameter / fitting material / max. temperature of use

<input type="radio"/> B53	11x2 mm / 1.4541 / to 800 °C
<input type="radio"/> B63	14x2,5 mm / 1.4541 / to 800 °C
<input type="radio"/> B64	14x2,5 mm / 1.4845 / to 1100 °C
<input type="radio"/> B66	15x1,3 mm / Kanthal AF / to 1300 °C <i>only for code ...HT and head codes H4..., H5...</i>
<input type="radio"/> B73	20x3 mm / 1.4541 / to 800 °C
<input type="radio"/> B74	20x3 mm / 1.4845 / to 1100 °C
<input type="radio"/> B83	22x2 mm / 1.4541 / to 800 °C
<input type="radio"/> B84	22x2 mm / 1.4845 / to 1100 °C
<input type="radio"/> B85	22x2 mm / 1.4762 / to 1100 °C
<input type="radio"/> B86	22x1,3 mm / Kanthal AF / to 1300 °C <i>only for code ...HT</i>
<input type="radio"/> ...C	Inner ceramic protective tube Ø 15 mm of C610

only for tubes 22x2 mm and 22x1.3 mm and heads HA, HAN, not for S8

B84Z 22x3,5 mm / 1.4845 / to 1100 °C

B842 22x7,5 mm in length 200 mm, then 22x2 mm / 1.4845 to 1100 °C

B843 22x7,5 mm in length 300 mm, then 22x2 mm / 1.4845 to 1100 °C

B852 22x7,5 mm in length 200 mm, then 22x2 mm / 1.4762 to 1100 °C

B853 22x7,5 mm in length 300 mm, then 22x2 mm / 1.4762 to 1100 °C

Spatial sensor for explosive atmosphere

P1E L = 75 mm *only for codes: accuracy F4 / lenght L75 / head H5N, H5, H6, H7 / cold-junction end S1, S2, S4, S5 / insert diameter D1, D3*

NOMINAL IMMERSION LENGTH FOR SENSORS WITH THERMOWELL / INTO THERMOWELL / WITHOUT THERMOWELL

NOMINAL LENGTH FOR SENSORS WITHOUT FITTING / STRAIGHT

For sensors WITH THERMOWELL [mm]

<input type="radio"/> L...	100, 160
<input type="radio"/> L...	250, 400, 630 <i>not for code J23 N000</i>
<input type="radio"/> L...	230, 380, 530 <i>only for code J23 N000</i>

For sensors INTO THERMOWELL [mm]

L... 100, 160, 165, 195, 250, 255, 400, 405, 630

For sensors WITHOUT THERMOWELL [mm]

L... 100, 160, 250, 400, 630

For sensors WITHOUT FITTING [mm]

L... 115, 175, 245, 305, 335, 395, 500, 545, 710, 775, 800, 1000, 1400, 2000

For STRAIGHT sensors [mm]

L... 180, 250, 310, 400, 500, 600, 710, 800, 1000, 1200, 1400,

	1600, 2000
○ L...	other – fill custom length in mm
HEAD	
○ H1	Al alloy, cable outlet M20×1.5 for cable Ø 4 to 12.5 mm, IP 65
○ H2	Al alloy, cable outlet M20×1.5 for cable Ø 4 to 12.5 mm, IP 65
○ H3	Al alloy, with high cap for mounting of transmitter with Ø 44 mm, cable outlet M20×1.5 for cable Ø 4 to 12.5 mm, IP 65
○ H4N	Al alloy, with low cap, cable outlet M20×1.5 for cable Ø 4 to 12.5 mm, IP 65
○ H4	Al alloy, with high cap for mounting of transmitter with Ø 62 mm, cable outlet M20×1.5 for cable Ø 4 to 12.5 mm, IP 65
○ H5N	Al alloy, with low cap, ground clamps, cable outlet M20×1.5 for cable Ø 5 to 10 mm, IP 65
○ H5	Al alloy, with high cap for mounting of transmitter with Ø 62 mm, ground clamps, cable outlet M20×1.5 for cable Ø 5 to 10 mm, IP 65
○ H5PA	Polyamide, with high cap for mounting of transmitter with Ø 62 mm, Tmax 80 °C, cable outlet M20×1.5 for cable Ø 4 to 12.5 mm, IP 65
○ H6	Al alloy, ground clamps, thread for cable outlet M20×1.5, IP 68
○ H7	Stainless steel, ground clamps, thread for cable outlet M20×1.5, IP 68
○ ...D	Double cable outlet <i>only for codes H4, H4N, H5, H5N</i>
○ ...W	Sensor head with peephole for display <i>only for codes H4 Z1, H4D Z1, H5 Z1E a S2, S3; not for double sensors</i>
COLD-END OF MEASURING INSERT	
○ S1	With ceramic terminal block (diameter 42 mm) on flange of measuring insert
○ S2	For single sensor, without terminal block, with set for mounting of transmitter on flange of measuring insert (instead of terminal block)
○ S4	For double sensor, without terminal block, with set for mounting of two transmitters <i>(nevhodné pro H1, H2, H5N, H6, H7)</i>
○ S5	With ceramic terminal block (diameter 42 mm), embedded pins (according to NAMUR)
○ S9	Other
EXTENSION PIECE (NOT FOR SENSORS WITHOUT FITTING)	
<i>With thermowell</i>	<i>Nominal length of extension piece – N / Max. temperature of connection thread</i>
○ N000	Without extension piece N=15 mm / 120 °C <i>only for J23</i>
○ N145	With extension piece N=145 mm / 600 °C
<i>Into thermowell</i>	<i>Nominal length of extension piece – N / Max. temperature of connection thread</i>
○ N000	Without extension piece N=15 mm / 120 °C
○ N140	With extension piece N=140 mm / 600 °C <i>standard version for L=165, 195, 255 and 405 mm</i>
○ N145	With extension piece N=145 mm / 600 °C <i>standard version for L=100, 160, 250, 400 and 630 mm</i>
<i>Without thermowell</i>	<i>Nominal length of extension piece – N / Max. temperature of connection thread</i>
○ N145	With extension piece N=145 mm / 500 °C <i>(300 °C for insert diameter 3 mm, code D1)</i>
○ N...	Other (fill custom length in mm)
PROCESS CONNECTION (NOT FOR SENSORS WITHOUT THERMOWELL)	
○ P1	Male thread M14×1,5
○ P2	Male thread M18×1,5
○ P3	Male thread M20×1,5
○ P4	Male thread M27×2
○ P5	Male thread G½"
○ P6	Male thread G¾"
○ P7	Male thread ½"NPT
○ P8	Flat flange DN20/PN40
○ P9	Other
<i>Note: Some process connections may not be compatible with some types of fittings.</i>	
MEASURING INSERT DIAMETER (ONLY FOR SENSORS WITHOUT THERMOWELL/FITTING)	
○ D1	3 mm
○ D2	4,5 mm <i>(only for TC)</i>
○ D3	6 mm
○ D5	6 mm with distance sleeve 8 mm
○ D9	Other
OPTIONAL ACCESSORIES AND VERSIONS	
VERSIONS FOR EXPLOSIVE ATMOSPHERE OF GASSES OR DUSTS	
Flameproof enclosure "Ex d" only for gasses and protection by enclosure "Ex t" only for dusts, intrinsically safe version "Ex i" for gasses and dusts	
PROTECTIVE SPRAYS FOR THERMOWELLS AND PROTECTIVE TUBES / T_{MAX} WITH SPRAY	
○ X01	polyamid PA11 / 100 °C (depends on measured medium)
○ X02	ethylen-chlorotrifluorethylen E-CTFE „Halar“ / 170 °C (depends on measured medium)
○ X03	perfluoralkoxy – kopolymer tetrafluorethylen u perfluorovaného vinylétheru PFA / 260 °C (depends on measured medium)
○ X04	ethylentetrafluorethylen ETFE „Hyflon“ / 130 °C (depends on measured medium)

○ X05	polytetrafluorethylen PTFE / 260 °C (depends on measured medium)
○ X07	Hard metal coating (Fe-Cr-Mn-Si-B-C) for abrasive medium / 925 °C
○ X08	Corundum spray for intense abrasive medium / depends on measured medium
○ X99	Other
INDICATION UNITS	
○ Z1	LED display mounted in sensor head <i>only for code H4(D)W and S2, S3; operating temperature -20 to +80 °C</i>
○ Z1E	Intrinsically safe LED display in sensor head (Ex) II 2G Ex ia IIC T6 <i>only for codes H5W and S2, S3; operating temperature -20 to +80 °C</i>
CABLE OUTLET	
○ KM1	Cable outlet, nickel-plated brass, IP 68, M20×1,5, for cable 5 to 10 mm <i>(standard for H6, H7)</i>
○ KM4	Cable outlet, stainless steel, IP 68, M20×1,5, for cable 7 to 12 mm
○ KME1	Cable outlet, nickel-plated brass, Ex d, M20×1,5, IP 68, for fixed assembly cable with diameter 4,5 to 8,5 mm
○ KME2	Cable outlet, nickel-plated brass, Ex d, M20×1,5, IP 68, for fixed assembly cable with diameter 7 to 12 mm
○ KME3	Cable outlet, stainless steel, Ex d, M20×1,5, IP 68, for fixed assembly cable with diameter 4 to 8 mm
○ KME5	Cable outlet, polyamide (light blue), Ex e, M20×1,5, IP 68, for fixed assembly cable with diameter 5 to 9 mm, operating temperature -20 to +95 °C <i>(not for H5PA)</i>
○ KME6	Cable outlet, polyamide (light blue), Ex e, M20×1,5, IP 68, for fixed assembly cable with diameter 6,5 to 12 mm, operating temperature -20 to +95 °C <i>(not for H5PA)</i>
○ KM9	Other
○ PK1	Lock anti pull-up cable for Ex d cable outlet KME1
○ PK2	Lock anti pull-up cable for Ex d cable outlet KME2
<i>The heads H1, H2, H3, H4, H4N, H5, H5N are usually equipped with nickel-plated brass cable outlet for cable with diameter 4 to 12.5 mm</i>	
CALIBRATION IN CUSTOMER DEFINED POINTS, INCLUDING CERTIFICATE OF CALIBRATION	
○ KTE x y	temperature sensor calibration in –x– points and range –y–* * x – replace by number of calibration points; y – replace by code of range: ranges for RTD sensors: 1A ... 0 to 200 °C; 1B ... -40 to 660 °C; 1C ... -196 to 200 °C ranges for TC sensors: 2AA ... -40 to 660 °C; 2AB ... -40 to 1100 °C; 2B ... 400 to 1553 °C; 2C ... -196 to 200 °C
EXTENDED WARRANTY	
○ WE36	Product warranty 36 months <i>not for code VR</i>
○ WE..	Other (the number of months must be added to the code) <i>not for code VR</i>
HEAD-MOUNTING TRANSMITTERS	
○ P5310 H10	with communication LHP <i>see datasheet no. 0824</i>
○ P5310EN2 H10	with communication LHP, (Ex) II 3G Ex nA IIC T4 Gc <i>see datasheet no. 0824</i>
○ P5311 H10	with communication LHP, galvanic isolation <i>see datasheet no. 0824</i>
○ P5311EN2 H10	with communication LHP, galvanic isolation, (Ex) II 3G Ex nA IIC T4 Gc <i>see datasheet no. 0824</i>
○ P5311E11 H10	with communication LHP, galvanic isolation, (Ex) II 1G Ex ia IIC T4-T6 Ga, (Ex) II 1D Ex ia IIIC T106°C Da <i>see datasheet no. 0824</i>
○ P5315 H10	accurate transmitter with communication LHP, galvanic isolation <i>see datasheet no. 2098</i>
○ P5315EN2 H10	accurate transmitter with communication LHP, galvanic isolation, (Ex) II 3G Ex nA [ic] IIC T4 Gc <i>see datasheet no. 2098</i>
○ P5320 H10	accurate transmitter with communication HART, galvanic isolation <i>see datasheet no. 0825</i>
○ P5320EN2 H10	accurate transmitter with communication HART, galvanic isolation, (Ex) II 3G Ex nA [ic] IIC T4 Gc <i>see datasheet no. 0825</i>
○ P5320E11 H10	accurate transmitter with communication HART, galvanic isolation, (Ex) II 1G Ex ia IIC T4-T6 Ga, (Ex) II 1D Ex ia IIIC Txx°C Da <i>see datasheet no. 0825</i>
THERMOWELLS AND WELDED ON PIECES (ONLY FOR VERSION INTO THERMOWELL)	
○ WT70 C	Cylindric thermowell for screwing / welding / with flange, PN 160 <i>see datasheet no. 0993</i>
○ WT70 D	Conical thermowell for welding acc. DIN 43772, PN 250 <i>see datasheet no. 0993</i>
○ WT70 T	Conical thermowell for screwing, PN 400 <i>see datasheet no. 0993</i>
○ NV	Welded on piece for thermowells WT70 C, WT70 D and WT70 T <i>see datasheet no. 0993</i>
FIXING SHIFT PIPE UNIONS AND FLANGES (FOR STRAIGHT VERSIONS / WITHOUT FITTINGS)	
Order example: T1070 04 F2 J33 L160 H3 S1 N145 P3 KTE31A (-40, 200, 500 °C)	