



PRODUCT MANUAL

Resistance temperature sensor Ex d to heat sink ČSN without converter or with converter type series 240 type 243

FOR DESIGNS WITH CONVERTER A MANUAL IS ENCLOSED TO THE RELEVANT CONVERTER

APPLICATION

- For exact remote measurement of temperature of steady and running liquids (gases and fluids), for which the properties of the heat sink of the sensor selected by the customer are suitable; measurement may be realized up to temperature (max. 450°C) and pressure determined by heat sink resistance
- For explosive environment pursuant to ČSN EN 60079-10 (ČSN EN 61241-10)
 - o Sensor may be installed into the heat sink located in zone 1(21) or zone 2(22); if the heat sink complies with the requirements pursuant to ČSN EN 60079-26, also in zone 0(20)
 - o Other parts of the sensor (screw union, adapter, connecting head) may be located in zone 1(21) or zone 2(22)
 - o In case of using the converter Ex ia or connection into circuit Ex ia, the sensor may be used in zone 0 (20)
- In a set with control or diagnostic systems for process monitoring
- In design with converter for transfer of resistance sensor signal to unified output signal 4 to 20 mA or digital signal (converter with HART protocol)

The sensors are rated products pursuant to the Act No. 22/1997 Coll. and Declaration of Conformity **EC-233000** is issued for them.

DESCRIPTION

The sensor consists of a replaceable measuring insert with flange and ceramic terminal board or installed two-wire converter (insulated or non-insulated, even in design Ex i) and protective armature consisting of a head and an adapter with a screw union for the connection of the sensor into the heat sink selected by the customer. The head with measuring insert and outlet form a fixed closure Ex d. It is provided with a lid, which can be screwed, and a cable outlet for the connecting wiring. The cable outlet (pursuant to the required diameter of the cable) forms optional accessories to the sensor. The terminal board (of the converter) of the sensor is accessible after unscrewing the lid of the head, which is fixed, after being tightened, with a pin against spontaneous releasing. The sensor is provided with an external clamp on the head for the connection of the grounding wire or wires for mutual interconnection.

The sensor with converter is supplied from an external source. The installed converter is pre-set to the required range at the sensor manufacturer.

To measure temperature, a defined change of sensor resistance in dependence on the change of temperature of the measured environment is used.

TECHNICAL DATA

The sensor dimensions are based on the original ČSN 25 8301. The sensor is designed pursuant to ČSN EN 61140 ed.2 as an electric equipment of protection class III for the application in networks with category of overvoltage in installation II and pollution grade 2 pursuant to ČSN EN 61010-1; the follow-up (evaluation) device shall comply with Article 6.3 of the said standard.

Measuring range:

Sensor with standard adapter $L_n = 135$ mm
-70 to 450 °C

Sensor with shortened adapter $L_n \text{ min} = 65$ mm
-70 to 250 °C

The upper limit of the measuring range is limited by resistance of the material of the heat sink; however, it may not exceed 450°C.

If it is ensured with a suitable way of installation that the surface temperature of a part of the sensor located in the dangerous area does not exceed the temperature of the required temperature class (T1...T6), the upper limit of the measurement range may be even higher (. 600°C). Example of installation – refer to figure 6.

Measuring range of the sensor with converter is established by the range of the selected converter.



L - Nominal length

L_n - Length of adapter

L_{mv} - Length of measuring insert

Fixed closure pursuant to ČSN EN 60079-0 and ČSN EN 60079-1

and **dust-tight closure** pursuant to ČSN EN 50281-1-1:

Ex II 1/2 GD Ex d IIC T1...T6 T=T media

(meaning of designation refer to figure 5)

Electric strength pursuant to ČSN EN 61010-1, Article 6.8.4: 500 V eff

(only measuring insert without converter or design with insulated converter)

Electric insulation resistance pursuant to ČSN IEC 751, Article 4.2.1:

min. 100 M Ω , at 15 to 35°C, max. 80 % rel. humidity

Power supply of converter:

DC 24 V from source SELV, e.g. INAP 16 and INAP 901

Other data of converter: refer to the enclosed manual pursuant to ČSN EN 60529:

IP 68

Operation position:

discretionary; the outlet shall not be situated upwards

Type of operation: continuous

Sensor weight:

with adapter 135 mm 0.93 kg

Applied materials:

Stem tube of measuring insert steel 1.4541

Adapter steel 1.4541

Head aluminium alloy painted with blue epoxy colour

Internal wiring Cu

Head terminals of the terminal board brass with Ni surface

Connecting elements of the sensor stainless steel

CERTIFICATION

- Non-explosiveness Ex II 1/2 GD Ex d IIC T1...T6 T=T media
EC Type Examination Certificate pursuant to the Decree of the Government 23/2003 Coll. FTZÚ 06 ATEX 0118X, Annex No. 1
- Non-explosiveness Ex i, EC Type Examination Certificate pursuant to the Decree of the Government 23/2003 Coll. (pursuant to the type of converter)

OPERATION CONDITIONS

The environment is defined by the group of parameters and their severity grades IE 36 pursuant to ČSN EN 60721-3-3 and the following operation conditions.

Ambient temperature for head and outlet of the sensor:

- 50 °C ≤ Ta ≤ 85 °C
- for design with converter pursuant to the type of converter (refer to the enclosed converter manual)
- for design with converter and display
- 20 °C ≤ Ta ≤ 70 °C

Maximum surface temperature of the sensor:

it complies with maximum temperature of the measured medium

Maximum surface temperature for equipment operating in the environment with a threat of explosion of gases, steam and mist pursuant to ČSN EN 60079-0 and temperature class of the sensor are determined in dependency on the temperature of measured medium pursuant to the following table:

Temperature class	Maximum surface temperature	Maximum temperature of measured medium
T6	85°C	80°C
T5	100°C	95°C
T4	135°C	130°C
T3	200°C	195°C
T2	300°C	290°C
T1	450°C	440°C

Maximum permitted surface temperature for the equipment operating in the environment with a threat of explosion of dust pursuant to ČSN EN 61241-14:

- a) Temperature limitation due to occurrence of stirred dust:
 $T_{max} = 2/3 T_{ci}$
 where T_{ci} is the temperature of ignition of stirred dust
- b) Temperature limitation due to occurrence of layers of dust to 5mm thickness:
 $T_{max} = T_{5mm} - 75 °C$
 where T_{5mm} is the temperature of ignition of dust layer 5mm thick
- c) Dust layers over 5 mm – refer to ČSN EN 61241-14

Maximum permitted surface temperature is defined by the lower value of the values specified above.



WARNING

The user shall guarantee that the maximum surface temperature of any part of the sensor does not exceed the temperatures of ignition of any gas, steam or dust, which can occur, due to external thermal effects.



Vibrations:

Sensor	with converter			without converter		
	100, 160	250, 400	630	100, 160	250, 400	630
Nominal length L [mm]						
Frequency range [Hz]	10 to 500					
Drift amplitude [mm]	0.2	0.15	0.075	0.5	0.2	0.075
Acceleration amplitude [ms ⁻²]	29.4	19.6	9.8	68.7	39.2	9.8

Relative ambient humidity:

10 to 100 % with condensation, with upper limit of water content 29 g H₂O/kg of dry air

Atmospheric pressure: 70 to 106 kPa

Maximum speed of flow of liquids:

pursuant to parameters of heat sink used by the customer

METROLOGICAL DATA

Probe: measuring resistor Pt 100 in connection pursuant to the scheme and table of designs, α = 0.00385 [K⁻¹], tolerance class A or B pursuant to ČSN IEC 751

Internal wiring resistance at 20 °C: 0.1 /m

Calculated resistance value of internal wiring of the design without converter is specified on the label of the measuring insert.

Maximum current load of measuring resistor: 3 mA

Recommended measuring current: 1 mA

Output signal of the converter (linear with measured temperature):

4 to 20 mA (+ digital for HART protocol)

Calibration depth of immersion of the measuring insert of the sensor

for temperature points within range -70 to 250°C:

200 mm (min. 160 mm)

for temperature points above 250°C:

300 mm (min. 260 mm)

The distance of flange of the measuring insert from the level of medium in the calibration bath shall be at least 40 mm at temperatures to 250°C and min. 70 mm at temperatures above 250°C.

Temperature response time pursuant to ČSN IEC 751 in whirling water (characteristic value):

without heat sink (separate measuring insert)	0.5	4.3 s
with heat sinks 991100....991110....991120... and 991130... (L = 160)	0.5	85 s
	0.9	250 s
with heat sinks 991100....991110....991120... and 991130... (L = 250, 400, 630)	0.5	53 s
	0.9	155 s
with heat sink 991150...(L = 160)	0.5	80 s
	0.9	235 s
with heat sink 991170...(L = 160)	0.5	36 s
	0.9	100 s

DESIGNATION :

Data on label of head

- Trademark of the manufacturer
- Made in Czech Republic
- Type of resistance sensor, nominal value R₀ / tolerance class / configuration of wires of internal wiring *)
- Measuring range or set-up converter range
- Product ordering number
- Ingress Protection
- Manufacturing number
- Output signal 4 to 20 mA (design with converter)
- Ambient temperature
- Mark of non-explosiveness:
 ⓧ II 1/2 GD Ex d IIC T1...T6 T=T media and number of the EC Certificate of type test
- Designation of non-explosiveness and No. of EC Type Examination Certificate (for design with converter Ex i)
- CE mark 1026
- CE mark with identification number of notified person (for design with converter Ex i)

*) Configuration of wires of internal wiring is not specified for the converter

Data on label of measuring insert

- Trade mark
- Sensor type, nominal value R₀ / tolerance class / Configuration of wires of internal wiring *)
- Manufacturing number
- Resistance value of internal wiring (for design without converter)

*) Configuration of wires of internal wiring is not specified for the converter

Data on label of converter

- Sensor type
- Pre-set temperature range

DELIVERY

Unless agreed otherwise with the customer, each delivery includes

- Delivery note
- Sensor pursuant to the purchase order
- Sealing ring 21x27 TPD 62-014-91
- Allen key 1.5 mm
- Suitable cable outlet ordered separately pursuant to the catalogue of accessories, type 991. An instruction sheet is delivered with each cable outlet
- Suitable heat sinks and weld-on pieces ordered separately pursuant to the catalogue of accessories, type 991
- Optional accessories to the sensor with programmable converter
 - o Configuration (parameterization) programme pursuant to the required converter
 - o Communication modem (for serial port RS 232C) pursuant to the required converter
- Accompanying technical documentation in Czech
 - o Product quality and completeness certificate, which also serves as the warranty certificate
 - o EC Declaration of Conformity
 - o Calibration sheet (for uncertified calibrated design)
 - o Product manual

If it is established in the purchase contract or agreed otherwise, the following documentation can be also delivered with the product

- Copy of the Inspection Certificate 3.1 for material of stem tube and heat sink with the casting number
- Copy of the EC Type Examination Certificate pursuant to the Decree of the Government 23/2003 Coll. for fixed closure
- Copy of the EC Type Examination Certificate pursuant to the Decree of the Government 23/2003 Coll. for design with converter Ex i

TABLE 1 - DESIGN OF TEMPERATURE SENSORS EX d TO HEAT SINK ČSN TYPE 243

SPECIFICATIONS					ORDERING NUMBER													
					243	x	x	0	x	x	x	x	x	x	/xxxxxx	/xxx		
Nominal length L [mm]	100	Length of adapter L _n [mm]	135	Length of measuring insert L _{mv} [mm]	280	1	1	0										
	160				340	2												
	250				430	3												
	400				580	4												
	630				810	5												
	Other (min. 75 *)					9												
Nominal length L [mm]	100	Length of adapter L _n [mm]	65	Length of measuring insert L _{mv} [mm]	210	1	2	0										
	160				270	2												
	250				360	3												
	400				510	4												
	630				740	5												
	Other (min. 75 *)					9												
Length of adapter	135 mm				1													
	65 mm max. -70 to 250°C				2													
	Other *)** (min. 65 mm)				9													
Connecting thread	M20 x 1.5							2										
	G1/2							3										
Sensor head with thread for outlet (Ex d)	M20x1.5								1									
	1/2-14NPT								2									
Design of measuring end	Ø 6 mm									1								
	Ø 8 mm (with limiting bush)									2								
Measuring resistor (probe)	Pt100										1							
Tolerance class	A max. -70 to 300°C														A			
	B														B			
Terminal board connection	single - four-wire (1xPt100/ /4)															/J4		
	double - two-wire (2xPt100/B/2)														B	/D2		
	double - three-wire (2xPt100/ /3)															/D3		
Converter type		Galvanic separation		Ex	Range [°C]													
Analogue	INPAL 420				-50 to 50											/07		
					-30 to 70											/55		
					0 to 50											/15		
					0 to 100											/18		
					0 to 150											/19		
					0 to 200											/20		
					0 to 250											/21		
					0 to 400	1										/23		
	APAQ-HRF				Adjustable range										/HRF			
	APAQ-HRFX			•											/HRFX			
Programmable	TH 100				Programmable range											/TH100		
	TH 100-ex			•												/TH100X		
	TH 200			•												/TH200		
	TH 200-ex			•												/TH200X		
	IPAQ-H			•												/IPAQH		
	IPAQ-HX			•												/IPAQHx		
HART protocol	MINIPAQ-HLP														/MINIPAQ			
	TH 300			•											/TH300			
	TH 300-ex			•											/TH300X			
	MESO-H			•											/MESOH			
	MESO-HX			•											/MESOHx			
	248 HA NA			•											/248HANA			
	248 HA I1			•											/248HA1X			
	644 HA NA			•											/644HANA			
644 HA I1			•											/644HA1X				
Other *)															/99			
Without converter (for converter installation by customer)																/00		
LED display to loop 4-20 mA (only with converter INPAL 420, APAQ-HRF, TH 100, MINIPAQ-HLP)																		
LED display																		
standard design																		

*) Only as a special requirement after an agreement with the manufacturer

**) In case of adapter length below 135 mm (minimum 65 mm), the temperature range is decreased to -70 to 250 °C.

ORDERING TEMPERATURE SENSORS

The purchase order shall specify

- Name
- Product ordering number
- Measuring range
- If calibration is required and in what temperature points
- If the delivery of heat sink and weld-on piece pursuant to the type 991 is required for the sensor as accessories
- If the delivery of outlet for output cable pursuant to the type 991 is required for the sensor as accessories
To ensure firm and dust-tight closure, only the certified cable outlet II 2 GD Ex d IIC with Ingress Protection IP 68 shall be used (refer to ordering numbers of outlets, type 991 or other similar outlet).
- If optional accessories to the sensor with programmable converter is required
- Other (special) requirements
- Number of pieces

Behind the ordering number specified pursuant to the table 1, the customer shall identify the required range of measured temperature (i.e. lower and upper temperature limits in °C) and, as the case may be, other non-standard required parameters for converter configuration (e.g. indication of sensor tripping, dampening, required designation - tagging etc.).

PURCHASE ORDER EXAMPLE

Standard design:

Resistance temperature sensor Ex d to heat sink ČSN without converter
243 410 211 1B/J4
Range -50 to 50°C
6 pcs

Special requirement:

Resistance temperature sensor Ex d to heat sink ČSN with converter
243 910 311 1B/18
Nominal length L 380 mm
Connecting thread G1/2
Range 0 to 100°C
6 pcs

ORDERING HEAT SINKS, WELD-ON PIECES AND OUTLETS

The purchase order shall specify:

- Name
- Product ordering number
- Number of pieces

PURCHASE ORDER EXAMPLE

Standard design:

Screwing cylindrical heat sink, non-reduced
991 1000 33
20 pcs

Special requirement:

Welding cylindrical heat sink, non-reduced
991 1200 24
Nominal length L = 380 mm
10 pcs

ORDERING NUMBERS OF WELD-ON PIECES, type 991

- Direct weld-on piece - 991 NVP4 M27 13 (material 11 353.0)
- 991 NVP4 M27 72 (material 1.4541)
- Angular weld-on piece - 991 NVS4 M27 13 (material 11 353.0)
- 991 NVS4 M27 72 (material 1.4541)

ORDERING NUMBERS OF OUTLETS, type 991

- Outlet M 20 x 1.5 (with clamp against cable pull-out)
for cable Ø4 8.5mm VM 408
for cable Ø 6 12mm VM 612
for cable Ø 8.5 16mm VM 816
(the set consists of the outlet itself, cable clamp and sealing under outlet 20x24)
- Outlet 1/2–14NPT (with clamp against cable pull-out)
for cable Ø 4 8.5mm VK 408
for cable Ø 6 12mm VK 612
for cable Ø 8.5 15.5mm VK 815
(the set consists of the outlet itself and cable clamp)

TABLE 2 - HEAT SINKS RECOMMENDED FOR ASSEMBLY OF TEMPERATURE SENSORS TO HEAT SINK - TYPE 991

SPECIFICATIONS					ORDERING NUMBER			
					991	xxxx	x	x
Cylindrical heat sink	PN 160	Screwing	Non-reduced (ON 02 7210)	L = line / thread M27x2 / sensor thread M20x1.5 / bore Ø9mm		1000		
			Reduced	L = line / thread M27x2 / sensor thread M20x1.5 / bore Ø9/Ø6.2mm		1100		
	Welding	Non-reduced (ON 02 7212)	L = line / sensor thread M20x1.5 / bore Ø9mm		1200			
		Reduced	L = line / sensor thread M20x1.5 / bore Ø9 / Ø6.2mm		1300			
Conical heat sink	PN 250	Bore Ø9	For high speeds of flow (ON 02 7215)	only L = 160 / thread M33x2 / M20x1.5 / bore Ø9mm		1500		
		Bore Ø6.2	For high parameters of operation liquid (ON 02 7217)	only L = 160 / thread M33x2 / M20x1.5 / bore Ø9 / Ø6.2mm		1700		
Material of immersion part of heat sink	For zone 1 and 2		15 128.5		Maximum operation temperature	550°C		2
	For zone 0, 1 and 2		1.4541			550°C (650°C) ***		3
	Pursuant to heat sink material ****)		1.4571 **)			500°C		4
			Other *)			Pursuant to heat sink material		9
Nominal length L [mm]	100	L1 [mm]	101	L2 [mm]	79			1
	160		161		139			2
	250		251		229			3
	400		401		379			4
	630		631		610			5
	Other *)							9

*) Only as a special request after an agreement with the manufacturer
 **) Only for heat sinks with codes 1000, 1100, 1200 and 1300
 ***) Maximum operation temperature 650°C only for heat sinks with code 1700
 ****) For zone 0(20), corrosion resistant heat sink shall be used (pursuant to ČSN EN 60079-26)

PACKING

Both sensors and accessories are delivered in a packing ensuring resistance to the impact of thermal effects and mechanical effects pursuant to controlled packing regulations.

TRANSPORT

The sensors may be transported on conditions corresponding to the set of combinations of classes IE 21 pursuant to ČSN EN 60721-3-2 (i.e. by airplanes and trucks, in premises that are ventilated and protected against atmospheric effects).

STORAGE

The sensors may be stored on conditions corresponding to the set of combinations of classes IE 12 pursuant to ČSN EN 60721-3-1, but with ambient temperature from -20 to 70 °C (i.e. in places where temperature and humidity are not regulated, with a threat of occurrence of condensation, dripping water and formation of ice, without a special threat of an attack with biological agents, with vibrations of small significance and not situated close to sources of dust and sand).

RELIABILITY

Reliability indicators in operation conditions and ambient conditions specified herein

- Mean time of operation between failures 96 000 hours
(inf. value)
- Expected service life 10 years

CALIBRATION

It is realized pursuant to TPM 3342-94 and in compliance with ČSN IEC 751, usually in three temperature points evenly distributed within the operation range of the sensor or in the points according to the requirement of the customer. Calibration sheets with measured data are issued for calibrated sensors.

INSTALLATION AND CONNECTION

SENSOR INSTALLATION

Install the sensors by screwing into the relevant heat sink screwed into the weld-on piece on the piping (technological equipment) or welded into the piping wall. Before the installation, put on the enclosed sealing ring in advance. During the installation, torque of 70 Nm is recommended.


A proposal of securing the heat sink of the temperature sensors Ex d for nominal lengths exceeding 630 m is in figure 1; examples of installation of direct and angular weld-on pieces are in figure 2.

With respect to maintaining metrological properties and the longest possible service life, it is not recommended to install the sensors in places with high turbulence of the medium, which is caused e.g. by a rapid transition from a small diameter of the piping to a larger one (when failing to comply with the required shape and dimensions of diffuser behind the flow meter), etc. Recommended distance of the temperature sensor from the installation flange of the flow meter is min. 1 m.




WARNING

The temperature sensor is only certified as design with fixed closure Ex d as a set with a heat sink.

Distance of the fixed closure  II 1/2 GD Ex d IIC from close structures or between the suspensions shall be at least 40 mm.



INSTALLATION OF CABLE OUTLET

To secure the fixed and dust-tight closure, only the certified cable outlet  II 2 GD Ex d IIC with Ingress protection IP 68 shall be used (refer to accessories 991 or another similar outlet). It shall be tightened in the sensor head in the prescribed way.

Torque of outlet body:

- | | | |
|----|------------------------------------|-----------|
| a) | for outlet with thread 1/2 - 14NPT | 25 – 30Nm |
| b) | for outlet with thread M20x1.5 | 30 – 35Nm |

Installation of the cable in the outlet, its sealing and securing against pull-out shall be realized pursuant to the instruction sheet of the outlet supplier.



WARNING

Do not use other sealing rings in the outlet than the original ones delivered by the manufacturer. Do not change artificially the outer diameter of the cable e.g. by winding it around with electrical insulating tapes.

ELECTRICAL CONNECTION

The electrical connection may be only realized by qualified workers pursuant to § 5 of the Decree 50/1978 Coll.

The sensor installation in conditions with explosive gaseous atmosphere shall comply with the requirements of ČSN EN 60079-14 ed. 2.

The sensor installation in conditions with flammable dust shall comply with the requirements of ČSN EN 61241-14.

The terminal board of the sensor (converter) is accessible after unscrewing the lid of the head.

Connect the evaluation devices to the sensor with a non-armoured cable with double insulation (internal wires with Cu core with cross-section 0.5 to 1.5 mm²). Seal the cable in the outlet by prescribed tightening of the closing nut pursuant to instruction sheet of the outlet. Then secure it with clamp against pull-out.



WARNING

Do not use independent wires without jacket for electrical connection. To ensure the ingress protection grade in the outlet, the connecting cable shall have circular cross-section. Temperature resistance of the cable shall comply with the ambient temperature!

The cable insulation shall have chemical and mechanical resistances in compliance with the conditions, in which the cable will be installed. It is recommended supporting the cable along its length between the sensor and the follow-up device. In the environment with interfering signals, use shielded cable in the power supply circuit. Shielding may be only grounded (earthed) in one point. The cable should not be placed together with power cables.

In case of the sensor with HART protocol converter, the maximum length of wiring is defined by the arrangement of wires of the connecting cable. The total length of wiring may be up to 1500 m. It requires a twisted two-wire with shared shielding with the diameter of the cross section min. 0.5 mm². HART communicator is connected to the supply loop of the sensor with converter pursuant to 3.

To achieve reliable communication, resistor 250 shall be introduced in the circuit of the output loop.



WARNING

Programmable converter may not be connected to a computer or a HART communicator if the converter is located in explosive environment.



WARNING for sensor with converter Ex i

Ex i parameters shall be complied with pursuant to the enclosed converter manual.

To ensure safety, a spark-safe source shall be always used pursuant to the converter manual, e.g. INAP 901 ordering number 901 000 101.

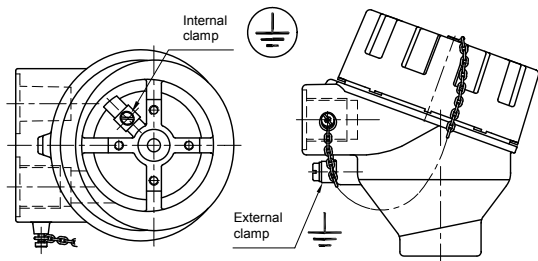
Surface temperature of the converter may not exceed maximum surface temperature for that particular temperature class.



For the installations in dangerous areas, mutual connection is required (bringing to the same potential). To achieve it, clamps on the sensor head can be used.

The sensor need not be connected to the system of mutual connection independently if it is installed firmly and has metal interconnection with the structural parts or the piping, which is connected to the system of mutual connection.

SENSOR HEAD WITH CLAMPS




Maximum cross-section of wire for connection to external and internal clamps:

Internal clamp: stranded wire 1.5 mm², full wire 2.5 mm²
 External clamp: stranded wire 4.0 mm², full wire 6.0 mm²
 If stranded wires are used for the interconnection, they shall be protected against fraying with pressing hollow.

CLOSING HEAD OF FIXED CLOSURE Ex d

After electrical connection of the sensor, the lid of the head shall be fully tightened by hand, then released slightly to ensure matching with the closest groove against the securing pit and fixed by this screw against releasing. If the lid of the sensor is not tightened and secured with the above mentioned screw, the sensor does not comply with the requirements of fixed closure Ex d.


WARNING:  **Electric supply of the sensor may not be connected before closing the fixed closure!**

COMMISSIONING


After the sensor installation, including closing the fixed closure and connection of the follow-up (evaluation) device to the supply voltage (and the settlement period of the converter), the equipment is prepared for operation.

OPERATION AND MAINTENANCE

The sensor does not require any operation and maintenance.

WARNING  **Any intervention into the sensor and its structure will result in a change of properties and can result in an explosion!**

SENSOR UNINSTALLATION

WARNING  **Temperature sensor is in design Ex and must be disconnected from the power supply source before opening the lid of the head and releasing the cable outlet in the explosive environment!**

Then release the securing screw of the lid with ALLEN key 1.5 mm (a part of accessories). The terminal board of the sensor (converter) is accessible after unscrewing the lid of the head. Measuring insert of the sensor can be replaced and is uninstalled from the head after disconnecting the cable by releasing two screws. Before a complete uninstallation of the sensor, the wire for mutual interconnection shall be released from the external terminal on the sensor. Disconnect the connecting cable from the terminal board, then release it from the clamp on the outlet and from closing nut of the outlet. Unscrew the sensor from the heat sink; torque for releasing is approx. 70 Nm. While releasing the screw union of the sensor, the heat sink may never be released.

SPARE PARTS

Spare parts shall be delivered by the manufacturer. Relevant measuring inserts can be ordered pursuant to the

following table:

SPECIFICATION	ORDERING NUMBER					
	MV240	/x xx /	x	x	x	/xxxx
Length of measuring insert [mm]		pu rs ua nt to ta b. 1				
Design of measuring end	Ø6mm			1		
	Ø8mm (with limiting bush)			2		
Probe	Pt100			1		
Tolerance class	A					A
	B					B
Connection of terminal board or converter	Pt100/ /4					/J4
	2xPt100/B/2					/D2
	2xPt100/ /3					/D3
	converter pursuant to tab. 1					/converter

EXAMPLE OF PURCHASE ORDER OF MEASURING INSERT

Resistance measuring insert without converter
 240 /430/ 11B/J4 - 6 pcs

WARRANTY

Pursuant to § 429 of the Commercial Code and the provisions of § 620 (2) of the Civil Code, the manufacturer warrants for technical and operation parameters of the product specified in the manual. The warranty period is 24 months from the receiving of the product by the customer, unless established otherwise in the contract. Rejection of defects shall be enforced in writing at the manufacturer within the warranty period. The rejecting side shall identify the product name, ordering and manufacturing numbers, date of issue and number of the delivery note, clear description of the occurring defect and the subject of the claim. If the rejecting side is invited to send the device for repair, it shall do so in the original package of the manufacturer and/or in another package ensuring safe transport.

The warranty shall not apply to defects caused by unauthorized intervention into the device, its forced mechanical damage or failure to comply with operation conditions of the product and the product manual.

REPAIRS

The sensors shall be repaired by the manufacturer. They shall be sent for repair in the original or equal package without accessories.

DISABLING AND LIQUIDATION

They shall be realized in compliance with the Waste Act 106/2005 Coll. The product and its package do not include any parts that could impact the environment.

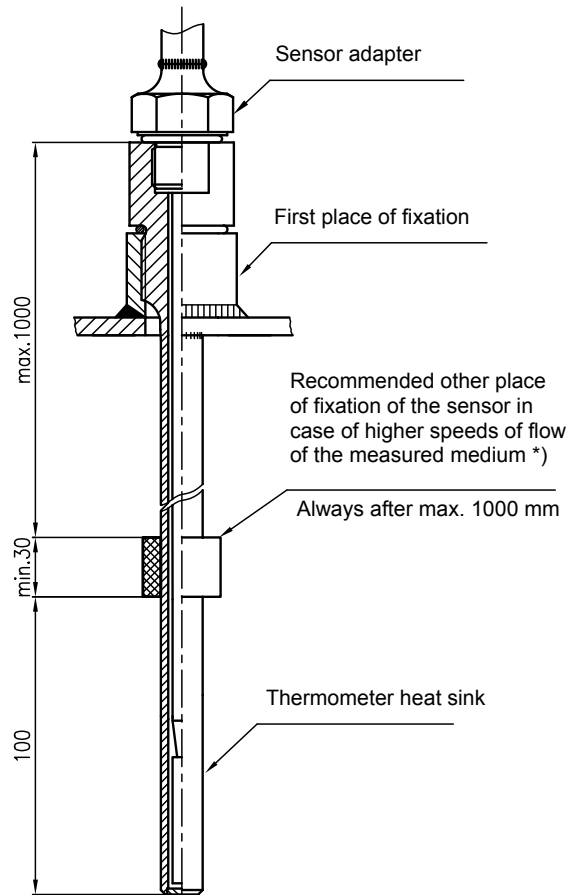
The products that are withdrawn from operation, including their packages (with the exception of products marked as electrical equipment for the purposes of return withdrawal and separate salvage of electrical waste), may be disposed of to sorted or unsorted waste pursuant to the type of waste.

The manufacturer realizes free return withdrawal of marked electrical equipment (from 13.8.2005) from the consumer and points out the danger connected with their illegal disposal.

The package of the sensor can be recycled completely. Metal parts of the products are recycled, non-recyclable plastic materials and electrical waste shall be disposed of in compliance with the aforesaid Act.

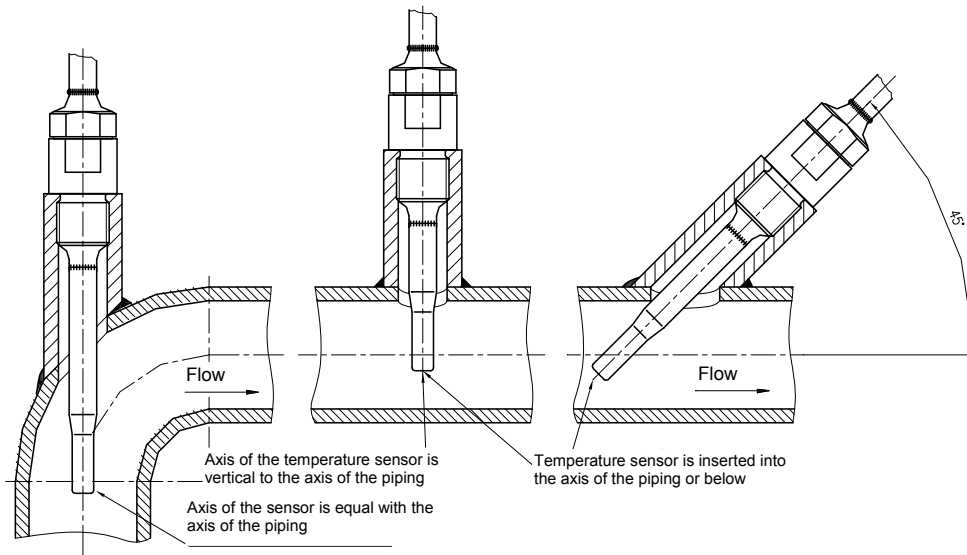
FIGURE 1 - PROPOSAL OF SECURING HEAT SINK OF TEMPERATURE SENSORS Ex d

(for nominal lengths exceeding 630 mm)
 Prescribed heat sinks of type 991 (pursuant to ON 02 7210, ON 02 7212, ON 02 7215 or ON 02 7217) shall be used.



*) In case of flow of the measured medium, the heat sinks are stressed with dynamic effects of the flowing medium and this stress depends on the speed of flow, physical properties of the measured medium and immersion length of the heat sink. If the occurrence of such dynamic effects can be expected, it is recommended to realize further fixation of the sensor heat sink pursuant to the above mentioned proposal.

FIGURE 2 - EXAMPLES OF INSTALLATION OF DIRECT AND ANGULAR WELD-ON PIECES PURSUANT TO ČSN EN 1434-2

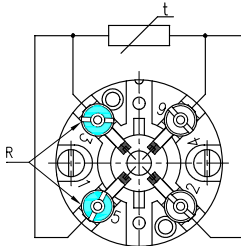


WARNING

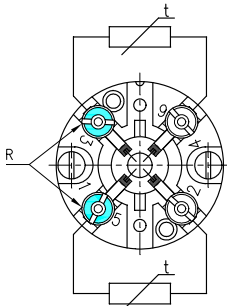
- When using the sensor with an angular weld-on piece, locate the sensor with heat sink at an angle against the direction of flow.
- The sensor may not touch the opposite side of the piping.
- It is also advantageous to use the temperature sensors in the piping elbow. In such a case, locate the sensor with the heat sink against the direction of flow so that the measured medium flows around evenly

FIGURE 3 - SCHEME OF CONNECTION OF TEMPERATURE SENSORS
without converter with converter

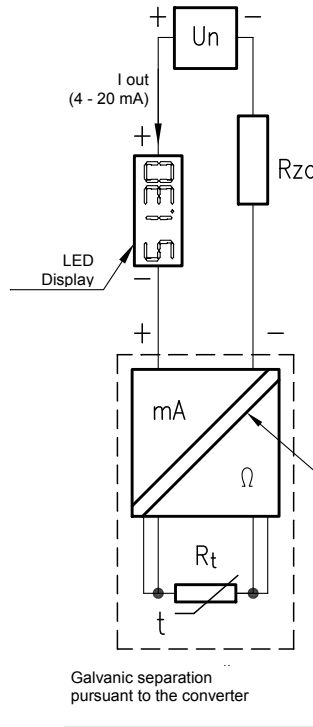
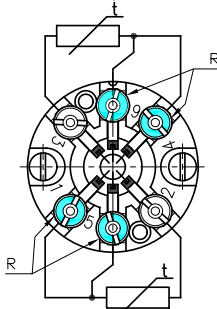
with single measuring resistor in four-wire connection (Pt 100/ 4)



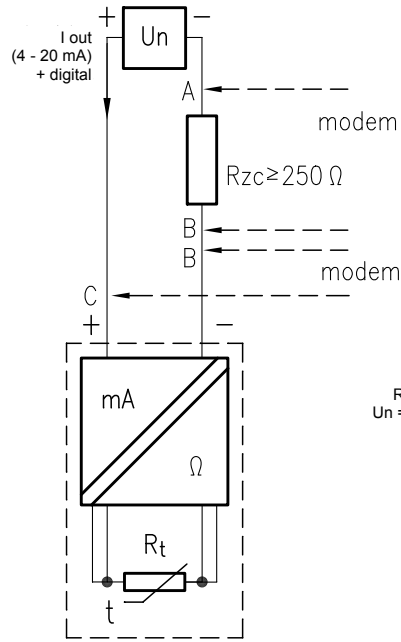
with double measuring resistor in two-wire connection (2 × Pt 100/B/2)



with two-wire measuring resistor in three-wire connection (2 × Pt 100/ 3)



with converter with HART protocol



R_{zc} = Total load resistance
 U_n = Supply voltage of source

A-B and B-C options of connection of the control unit (HART modem, HART communicator)

FIGURE 4 - EXAMPLE OF OPERATION CONNECTION OF TEMPERATURE SENSOR WITH CONVERTER IN LOOP 4 - 20 mA

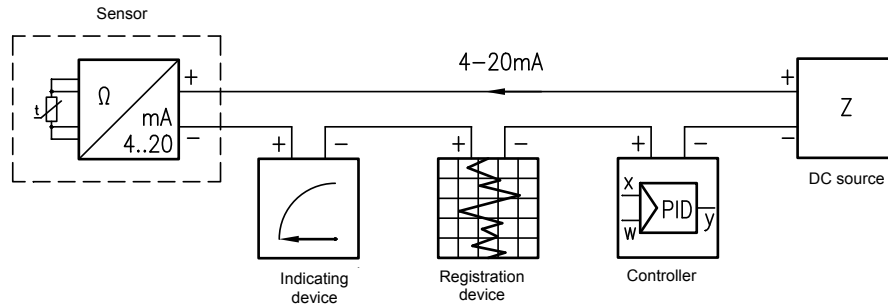


FIGURE 5 MARK OF NON-EXPLOSIVENESS

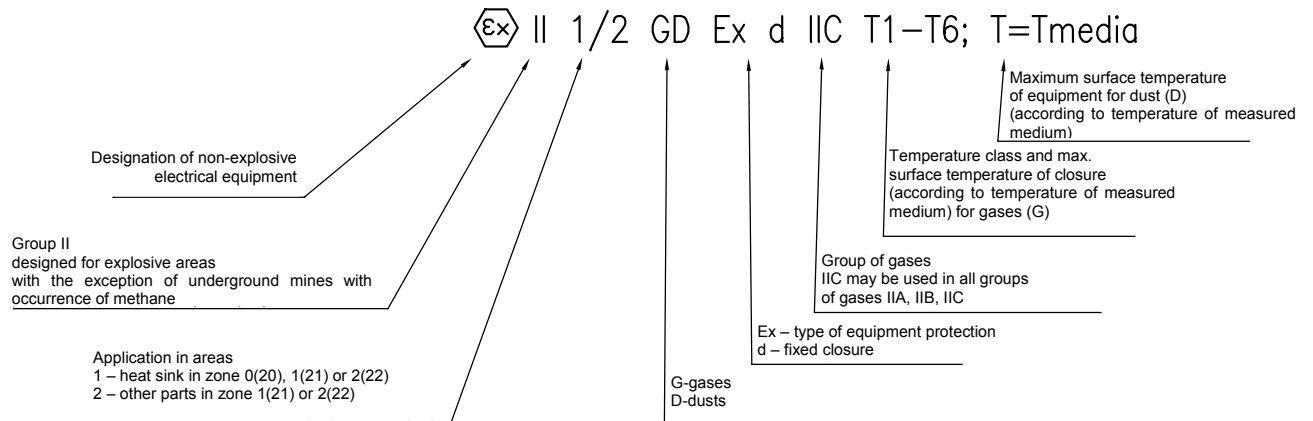
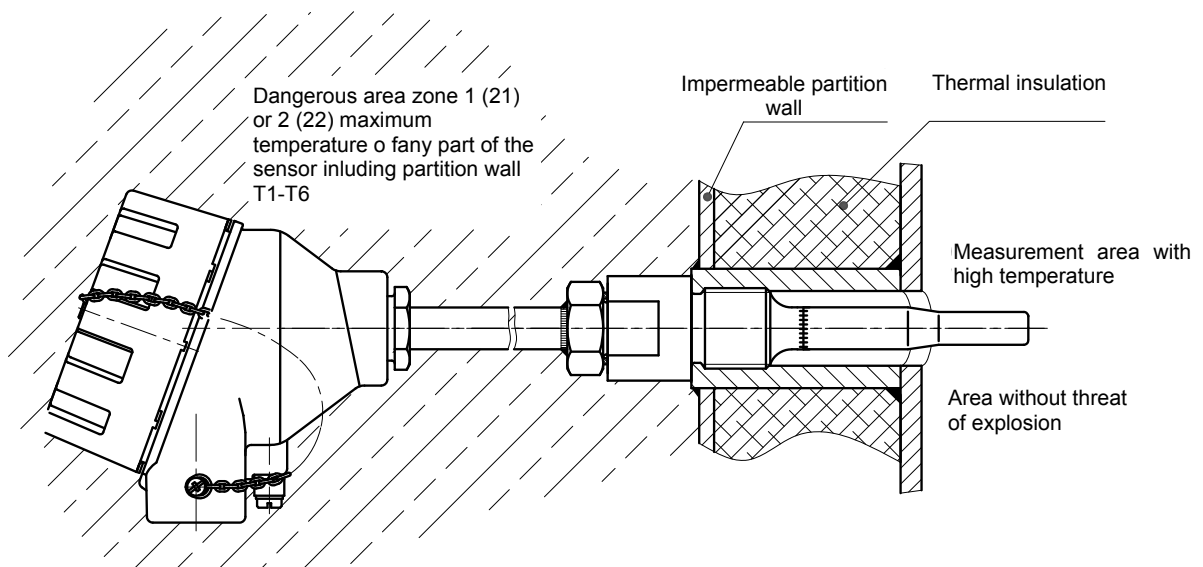


FIGURE 6 - EXAMPLE OF INSTALLATION OF TEMPERATURE SENSORS Ex d TO HEAT SINK ČSN
(in case a higher limit of the measurement range is required than the required temperature class)



January 2008
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