

Thermoelectric temperature sensor Ex d (Ex t) to thermowell DIN without converter or with converter type series 330 **PRODUCT MANUAL** 

type 333

FOR DESIGN WITH CONVERTER A MANUAL IS ENCLOSED TO THE RELEVANT CONVERTER FOR DESIGN WITH CONVERTER AND DISPLAY A MANUAL IS ENCLOSED TO THE RELEVANT CONVERTER AND DISPLAY

#### APPLICATION

- For exact remote measurement of temperature of steady and running liquids (gases and fluids), for which the properties of the thermowell of the sensor selected by the customer are suitable; measurement may be realized up to temperature (max. 450°C) and pressure determined by thermowell resistance.
- For environment with explosive gaseous atmosphere according to EN 60079-10-1 and explosive atmospheres with combustible dust according to EN 60079-10-2
  - The sensor may be installed in the thermowell located in zone 0 (20), in zone 1(21) or zone 2(22); thermowell for zone 0 shall comply with the requirements of EN 60079-26 (refer to Figure 6)
  - Other parts of the sensor (screw-joint, adapter, 0 connecting head) may be located in zone 1(21) or zone 2(22)
  - Sensor without converter or converter with Ex ia 0 version, when connected to Ex ia circuit according to EN 60079-25 in zone 0, 1, 2, 20, 21 and 22
- In a set with control or diagnostic systems for process monitoring
- In design with converter for transfer of thermoelectric sensor signal to unified output signal 4 to 20 mA or digital signal (converter with HART protocol)
- In design with display to display the value of the measured value
- For the environment, where mechanical resistance is required pursuant to EN 60068-2-6 (class AH2) and seismic capability of the electrical equipment of the safety system of the nuclear power stations pursuant to IEC 980 (MVZ level SL-2)

The sensors are rated products pursuant to the Directive 2014/34/EU, 2014/30/EU of the European Parliament and the Council and Declaration of Conformity EU-233000 is issued for them.

#### DESCRIPTION

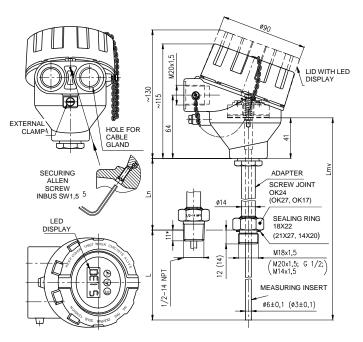
The sensor consists of a replaceable measuring insert with a flange and a ceramic terminal board or an installed two-wire converter (insulated or non-insulated, even in design Ex ia) and a protective armature consisting of a head and an adapter with a screw-joint for connecting the sensor to the thermowell 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 gland for the connecting wiring. The cable gland (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 removing the lid of the head, which is fixed, after being tightened, with a pin against spontaneous releasing. The sensor is provided with an external terminal and an internal terminal on the head for the connection of the grounding wire or wire 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 thermoelectric voltage of the sensor in dependence on the change of temperature of the measured environment is used.

Connection thread	Screw joint	Thread length [mm]	Sealing ring	Measuring insert Ø [mm]
M14x1,5	OK17	12	14x20	3±0,1
M18x1,5	OK24	12	18x22	
M20x1,5	OK27	14	21x27	6±0,1
G <sup>1</sup> / <sub>2</sub>	01/27	14	21827	



- nominal length L
- $L_{n}$ length of adapter
- L<sub>mv</sub> length of measuring insert
- 11 standard length of screwing in

## TECHNICAL DATA

The sensor design is based on DIN 43772. The sensor is designed pursuant to EN 61140 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 EN 61010-1; the follow-up (evaluation) device shall comply with Article 6.3 of the said standard.

#### Measuring range:

Min. length of adapter $L_n$ [mm]	Measuring range [°C]
125	-70 to 450 *)
65	-70 to 250

\*)The upper limit of the range of measurement is limited by resistance of material of the used thermowell but it may not exceed 450°C.

If it is ensured in a suitable way that the surface temperature of the 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 range of measurement may also be higher (max. 1150°C for thermocouple K, max. 800°C for thermocouple J). Example of installation - refer to Figure 4.

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

#### Design for explosive atmospheres:

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

- 🖾 II 2 G Ex db IIC T1...T6 Gb
- (Meaning of designation refer to figure 5)
- Dust-tight closure pursuant to EN 60079-0 and EN 60079-31:
  - 🖾 II 2 D Ex tb IIIC T=T media Db
- (Meaning of designation refer to figure 5) Intrinsically safe version with converter:

according to built-in converter

Electric strength pursuant to EN 61010-1, Article 6.8.3: 500 V eff (only measuring insert without converter or design with insulated converter)

Electric insulation resistance pursuant to EN 61515, Article 5.3.2.4:

min. 1000 MΩ, at ambient temperature 20±15°C and max. 80% relative humidity, test voltage 500 V DC 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 Display: LED display to loop 4-20mA

other date refer to enclosed manual

Ingress protection pursuant to EN 60529

# IP 68, 1m, 30 min

Operation position:

discretionary; the outlet shall not be situated upwards **Type of operation:** continuous

#### Sensor weight:

With ball head (Al alloy), adapter 135 mm, measuring insertØ6 and nominal length 250 mmapprox. 0.93 kg

## Applied materials:

Stem tube of measuring	for thermocouple of type "J"	Steel 1.4541
insert	for thermocouple of type "K"	INCONEL 600
Adapter		Steel 1.4541
HEAD		Aluminium alloy painted with polyester paint
		Steel 1.4401
Sealing of lid o	f head and gland	Oil-resistant rubber
Head terminals	of terminal board	Brass with Ni surface
Connecting iter	ms of sensor	Stainless steel

#### **OPERATION CONDITIONS**

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

#### Ambient temperature for head and outlet of the sensor:

- for design without converter  $-50 \text{ °C} \le \text{Ta} \le 85 \text{ °C}$
- for design with converter pursuant to the type of converter (refer to the enclosed converter manual) max. -50 °C ≤ Ta ≤ 75 °C
   for design with converter and display pursuant to the type
- of converter and display pursuant to the type of converter and display (refer to the enclosed converter and display manual) max -50 °C ≤ Ta ≤ 75 °C

#### Maximum surface temperature of the sensor:

it complies with maximum temperature of measured medium

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

Temperat	Maximum	Maximum
ure class	surface	temperature of measured
	temperature	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 EN 61241-14:

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

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

#### 

(Ex)

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 effects of external thermal sources.

#### **Relative ambient humidity:**

- 10 to 100 % with condensation, with upper limit of water content 29 g H<sub>2</sub>O/kg of dry air
- For design with converter pursuant to type of converter (refer to enclosed converter manual)
- For design with converter and display
- (refer to enclosed converter and display manual)

Atmospheric pressure: 70 to 106 kPa

#### Vibrations:

Sensor	with conv	verter	without converter					
Nominal longth [ [mm]	110,	200,	110,	200,				
Nominal length L [mm]	140, 170	260	140, 170	260				
Frequency range [Hz]		10 to	500					
Drift amplitude [mm]	0.2	0.15	0.5	0.2				
Acceleration amplitude [ms <sup>-2</sup> ]	29.4	19.6	68.7	39.2				

#### Maximum speed of flow of liquids:

pursuant to the parameters of the thermowell used by the customer

#### METROLOGICAL DATA

Sensing probe: measuring thermocouple J (Fe-CuNi) or K (NiCr-NiAl) pursuant to EN 60584-1, Ø 6 or Ø 3 mm, tolerance class 2 or 1, single with insulated measuring end or double with independent measuring end Output signal

of analogue converter (linear with thermoelectric voltage): 4 to 20 mA

of programmable 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 the 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 EN 60751 in whirling water for measuring insert  $\emptyset$  6 mm (characteristic value): without thermowell (independent measuring insert)

	-	
	$\tau_{0.5}$	5.5 s
with thermowells pursuant to DIN 437	772, shape	9 4
(L = 110, 140, 170)	$\tau_{0.5}$	85 s
	$\tau_{0.9}$	250 s
with thermowells pursuant to DIN 437	772, shape	9 4
(L = 200, 260)	$\tau_{0.5}$	53 s
	$\tau_{0.9}$	115 s
Temperature response time pursua	ant to EN 6	0751 in wh

**Temperature response time** pursuant to EN 60751 in whirling water for measuring insert  $\emptyset$  3 mm (characteristic value): Without thermowell (independent meas. insert)

5. 1110011	
$\tau_{0.5}$	2 s
$\tau_{0.9}$	4 s

#### DESIGNATION:

Data of head label

- Trademark of the manufacturer
- Made in Czech Republic
- Type of thermoelectric sensor / tolerance class
- Measuring range or set-up converter range
- Product ordering number
- Ingress protection
- Serial number
- Output signal 4 to 20 mA (design with converter)
- Ambient temperature
  - Designation of non-explosiveness:
    - 🖾 II 2 G Ex db IIC T1...T6 Gb
      - II 2 D Ex to IIIC T=T media Db
      - EU-Type Examination Certificate number
- Designation of non-explosiveness and EU-Type Examination Certificate number (for design with converter Ex ia)
  - CE mark 1026

#### Data on label of measuring insert

- Trade mark
- Sensor type / tolerance class
- Serial number
- Data on converter label
- Trademark
- Sensor type
- Pre-set temperature range
- Designation of non-explosiveness and EU-Type Examination Certificate number for design with converter Ex ia
- CE mark with identification number of the notified person (for design with converter Ex ia)

#### Data on display

- Trademark
- CE mark

#### DELIVERY

Unless agreed otherwise with the customer, each delivery includes

- Delivery note
- Sensor pursuant to the purchase order
- Sealing ring
  - Cu 18x22x1.5 (ČSN 02 9310.2) for connecting thread M18x1.5,
    - 21x27 TPD 62-014-91 for connecting thread M20x1.5 and G <sup>1</sup>/<sub>2</sub>
    - 14x20 TPD 62-0114-91 for connecting thread M14x1.5
  - (for thread 1/2-14NPT, the sealing ring is not delivered) Allen key 1.5 mm
- Separately ordered accessories; pursuant to the catalogue of, type 991:
  - Suitable thermowells and nipples
  - Suitable cable gland. An instruction sheet is delivered with each cable gland
- Optional accessories to the sensor with programmable converter
  - Configuration (parameterization) programme pursuant to the required converter
  - Communication modem (for serial port RS 232C) pursuant to the required converter
  - Accompanying technical documentation in Czech
- Product manual
  - Product quality and completeness certificate, which also serves as the warranty certificate
    - EU Declaration of Conformity

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

- Calibration sheet (for uncertified calibrated design)
- Test report about the seismic and the vibration qualification
- Copy of EU-Type Examination Certificate pursuant to the Directive No 2014/34/EU for fixed closure and dust-tight closure
- Copy of EU-Type Examination Certificate pursuant to the Directive No 2014/34/EU for design with converter Ex ia

#### CERTIFICATION

- Non-explosiveness Ex ia, EU-Type Examination Certificate pursuant to the Directive 2014/34/EU
- FTZÚ 08 ATEX 0199X with supplementary No. 1 and 2
   Non-explosiveness Ex ia, EU-Type Examination Certificate pursuant to the 2014/34/EU (pursuant to the
- Certificate pursuant to the 2014/34/EU (pursuant to the type of the converter and display)

## CALIBRATION

It is realized pursuant to TPM 3322-94 and in compliance with EN 60584-1 and, 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.

## 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 EN 60721-3-2 (i.e. by airplanes and trucks, in premises that are ventilated and protected against atmospheric conditions).

## STORAGE

The products may be stored on conditions corresponding to the set of combinations of classes IE 12 pursuant to EN 60721-3-1, but with ambient temperature from -20 to 70 °C (i.e. in places without control of temperature and humidity, with danger of occurrence of condensation, dropping 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

Indicators of reliability in operation conditions and ambient conditions specified herein

- Medium time of operation between failures 96 000 hours (inf. value)

Expected service life 10 years

#### ORDERING TEMPERATURE SENSORS The purchase order shall specify

- Name
- Product ordering number
- Additional requirements for sensor design pursuant to Table 2
- Request for other documentation pursuant to Table 2
- Measuring range
- If calibration is required and in what temperature points
- If the delivery of a thermowell and a nipple pursuant to the type 991 is required for the sensor as accessories
- If the delivery of gland for output cable pursuant to the type 991 is required for the sensor as accessories
- If optional accessories to the sensor with programmable converter is required
- Request for other documentation according to Article DELIVERY
- Other (special) requirements
- Number of pieces

Behind the ordering number specified pursuant to the above mentioned table, 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:

Thermoelectric temperature sensor Ex d (Ex t) to thermowell DIN Without converter 333 410 111 K2/JI/Q4

Calibration points 250, 350 and 450°C

Range -70 to 450°C

6 pcs

Special requirement:

Thermoelectric temperature sensor Ex d (Ex t) to thermowell DIN With converter 333 910 211 J2/HCF Nominal length L = 380 mm, range 0 to 300°C

6 pcs

## TABLE 1 - DESIGN OF TEMPERATURE SENSORS Ex d (Ex t)TO THERMOWELL DIN - TYPE 333

		SPE		ATIONS	5					-	1	OR	-	-	_	_	-		<del></del>
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4	410				135	[mm	]	585		6									
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110		/					215		1		-								
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					00		_				- 2								-
	260		Ln	ո [mm]		L <sub>mv</sub> <u>365</u> [mm] 515			5	-		-						_	
	410					[[[[[[	1	515		6	_								
	Other (	min. 75)	*)							9									
		135mm	(125m								1								
ength of adapter 65 mm *) max. –70 to 250°C								2											
		Other	*)**)	(min. 6	5 mm)						9								
Thermowell m	aterial	without t	hermo	well	,							0							
		M18 x 1							1				1						
		M20 x 1					6.	± 0,1	F		+	+	2		1				
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		1/2-14N	<u>0/1</u>	6mm		_	6:	± 0,1				_	5		1				
Other *)		*)										9							
Head of sensor with			y painte	d with b		M20x							1						
hread for gland			1/2-14NPT							2									
		-	atant ata	M20x1.5									3						
Ex d (Ex t) Corrosion-resistant ste				stant ste	ei 1.440	// ·	1/2-1	4NPT						4					
Tube of meas	urina	Ø6 ± 0,1											1		1				
insert [mm]	5	Ø3 ± 0,1	(only	with con	nectina	thread I	M14 >	x 1.5)					4		3				
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	volta	ge						•		-									
				TH 200	)	•										1		/TH200	
				TH 200		•		•				1					/TH200X		
<b>A</b>	Prog	rammable	<b>`</b>	IPAQ-F		•						-						/IPAQH	
Converter		r output s		IPAQ-F		•		•				-						/IPAQHX	
(design of		temperatu			Q-HLP			-								-		/MINIPAQ	
thermocouple		temperate		IPAQ C												-		/C300	_
measuring						•										-			
ends: single				IPAQ C		•		•	Program	nmab	le							/C300X	
thermocouple				TH 300		•			ran		-		<u> </u>			1	1	/TH300	
isolated end)				TH 300		•		•		3-						1	1	/TH300X	
	Prog	rammable	;	MESO-		•						L		L			1	/MESOH	
		HART pro		MESO	HX	•		٠								1	1	/MESOHX	
		r output s		248 HA		•			1						1	1	1	/248HANA	
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 Standard design
 Standard design

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

 \*\*)
 In case of adapter length below 125 mm (minimum 65 mm), the temperature range is decreased to -70 to 250 °C.

#### TABLE 2 - ADDITIONAL REQUIREMENT FOR DESIGN OF TEMPERATURE SENSORS Ex d (Ex t) TO **THERMOWELL, TYPE 333**

	SPECIFICATIONS		C	ODE		
CALIBRATION	NUMBER OF CALIBRATION POINTS	CALIBRATION RANGE				
Colibration by TBM 2242.04		0 to 800 °C	/Q4			
Calibration by TPM 3342-94, define calibration points	3	0 to 1100 °C	/Q42			
denne calibration points	Other	0 to 1100 °C	/Q9			
<b>REQUIREMENT FOR OTHER</b>	DOCUMENTATION	USE				
EU Declaration of Conformity		for design with converter		/EU		
Copy of EU-Type Examination Certificate acc to the 2014/34/EU (ATEX)		for converter and display Ex ia		/Exi		
Declaration of Conformity with purchase order 2.1 pursuant to EN 10204						

Specify the code behind ordering number. Define calibration points for codes Q4, Q42 a Q9.

#### ORDERING ACCESSORIES

#### The purchase order shall specify:

- Name
- Ordering number
- Number of pieces

## EXAMPLE OF PURCHASE ORDER

#### Standard design:

- Welding thermowell pursuant to DIN shape 4 991 DIN 407244 1.
- 20 pcs Direct nipple for welding thermowell shape 4 2. 991 NVD4 D24 51
  - 20 pcs
- 3. Cable gland 991 VM 612
  - 5 pcs

## Special request:

Nipple 991 NVD4 D24 99 material 1.5415 6 pcs

#### TABLE 3 - OVERVIEW OF DESIGNS AND ORDERING OF WELDING THERMOWELLS PURSUANT TO DIN, SHAPE 4 (4F) PURSUANT TO DIN 43772, TYPE 991 (ordered separately)

Shape 4pursuant to DINWithout flangePN 250Shape 4Fpursuant to DINWithout flange *) **)PN 250Internal bore [mm] $\emptyset$ 3,5 $\emptyset$ 7Internal bore [mm] $\emptyset$ 3,5Internal thread $M14x1,5$ Internal thread $M14x1,5$ <t< th=""><th></th><th>ORD</th><th>ERIN</th><th>IG N</th><th>UME</th><th>BER</th><th></th><th></th></t<>						ORD	ERIN	IG N	UME	BER			
9									х	х	х	х	х
	pursuant to DIN	Without flan	nge	PI			4	0					
Shape 4F	43772	With flange	*) **)					4	F				
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		ø 7											
	,		-		ø 3,5	5				3	1		
Internal			24	Internal bo	re								
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unoda		thermowell	26	[]	01					· '			
											5		
	-				-	-							
	-	- - L1 [mm]						_					
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				L2 [mm]				_					
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								_					
			2/5		40	5							
					55	0						9	1
	1.7555											-	2
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Material				Maximun	<u> </u>								4
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	nermowe 1 4003 *) ****)						_					<u> </u>	6
II	· · · · ·	*) ***)	[°C]								<u> </u>	7	
			, ,										8
	, ,					-							9
	Shape 4 Shape 4F Internal bor Internal thread Nominal length of thermowell L [mm] Material of thermowe	Shape 4 Shape 4F         pursuant to DIN 43772           Internal bore [mm]           Internal thread         M14x1,5 M18×1.5 M20×1.5 G 1/2           Internal thread         M14x1,5 M18×1.5 M20×1.5 G 1/2           1/2 - 14 NPT           1/2 - 14 NPT           110           140           10           140           10           140           170           200           200           200           260           410           Other (max. 410) *)           1.7335 ***)           1.7380 ***)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.4541 ****)           1.450 *) ***)           1.400 *) ****) <td>Shape 4 Shape 4F         pursuant to DIN 43772         Without flar With flange Ø 3,5 Ø 7           Internal bore [mm]         Ø 3,5 Ø 7           Internal thread         M14x1,5 M18×1.5 M18×1.5         Internal Ø 0f thermowell           Internal thread         110 140         Internal Ø 0f thermowell           110         140           12 - 14 NPT         Internal Ø 0f           140         110           140         140           170         200           200         200           410         Other (max. 410) *)           1.7335 ***)         1.4541 *****)           1.4541 *****)         1.4541 *****)           1.4515 *) ***)         1.4593 *) ****)           1.4903 *) ****)         A105, C22.8 or 1.0460 (P250GH)</td> <td>SPECIFICATIONS           Shape 4 Shape 4F         pursuant to DIN 43772         Without flange With flange *) **)           Internal bore [mm]</td> <td>SPECIFICATIONS           Shape 4         pursuant to DIN         Without flange         Pf           Shape 4F         pursuant to DIN         Without flange         Pf           Shape 4F         43772         With flange *) **)         Pf           Internal bore [mm]</td> <td>SPECIFICATIONS           Shape 4 Shape 4F         pursuant to DIN 43772         Without flange With flange *) **)         PN 250           Internal bore [mm]</td> <td>SPECIFICATIONS         991           Shape 4 Shape 4F         pursuant to DIN 43772         Without flange With flange *) **)         PN 250           Internal bore [mm]         Ø 3,5 Ø 7         Ø 3,5         Ø           Internal thread         M14x1,5 M18×1.5 G 1/2         Internal 0 of G 1/2         Internal thermowell         Ø 3,5         Ø           1/2 - 14 NPT         Internal 1/2 - 14 NPT         Internal 0 f thermowell         Internal 260         Internal 65         Internal 265         Internal 105         Internal 133         Internal 105         Internal 135         Internal 135         Internal 105         Internal 135         Internal 105         Internal 140         Internal 125         Internal 125         Internal 125         Internal 195         Internal 195</td> <td>SPECIFICATIONS         ORD           Shape 4         pursuant to DIN         Without flange         PN 250         991         DIN           Shape 4F         43772         Without flange *) **)               991         DIN           Internal thread         43772         <math>\emptyset</math> 3,5</td> <td>SPECIFICATIONS         ORDERIN           Shape 4         pursuant to DIN         Without flange         PN 250         4           Shape 4F         43772         With flange *) **)         4         4           Internal bore [mm]         <math>\emptyset</math> 3,5         4         4           Internal thread         <math>M14x1,5</math>         Internal <math>\emptyset</math> of thermowell         26         18         1           Internal thread         <math>110</math> <math>0</math> of thermowell         26         105         1           Nominal length of thermowell         200         <math>110</math> <math>65</math>         133         165         1           200         200         <math>200</math> <math>275</math>         195         1         1         1           260         172         125         195         1</td> <td>SPECIFICATIONS         ORDERING N           Shape 4         pursuant to DIN         Without flange         PN 250         4         0           Shape 4F         43772         Without flange *) **)         4         7           Internal bore [mm]</td> <td>SPECIFICATIONS         ORDERING UME           Shape 4         pursuant to DIN         Without flange         PN 250         4         0           Shape 4F         43772         Without flange ') **)         4         F         4         F           Internal bore [mm]</td> <td>SPECIFICATIONS         ORDERING NUMBER           Shape 4         pursuant to DIN         Without flange         PN 250         4         0         0           Shape 4F         43772         Without flange*) **)         4         0         4         0         4         0         6         1<!--</td--><td>SPECIFICATIONS         ORDERING NUMBER           Shape 4         pursuant to DIN 43772         Without flange         PN 250         4         0         2           Shape 4F         43772         With flange *) **)         4         0         4         0         6           Internal bore [mm]         <math>\frac{93,5}{g}</math>         -         4         7         -         -           Internal thread         <math>\frac{M14x1,5}{M18x1.5}</math>         Internal <math>\frac{18}{24}</math>         Internal bore [mm]         <math>\frac{g3,5}{g}</math>         -         3         1           M14x1,5         Internal thread         <math>\frac{24}{66}</math>         Internal bore [mm]         <math>\frac{g3,5}{g}</math>         -         3         1           M14x1,5         Internal thread         <math>\frac{24}{24}</math>         Internal bore [mm]         <math>\frac{g3,5}{g}</math>         -         3         1           M20x1.5         10         6         135         -         -         2         -           110         16         133         65         -         105         -         2         3           1400         200         L1 [mm]         125         125         165         -         4         0         5           200         200&lt;</td></td>	Shape 4 Shape 4F         pursuant to DIN 43772         Without flar With flange Ø 3,5 Ø 7           Internal bore [mm]         Ø 3,5 Ø 7           Internal thread         M14x1,5 M18×1.5 M18×1.5         Internal Ø 0f thermowell           Internal thread         110 140         Internal Ø 0f thermowell           110         140           12 - 14 NPT         Internal Ø 0f           140         110           140         140           170         200           200         200           410         Other (max. 410) *)           1.7335 ***)         1.4541 *****)           1.4541 *****)         1.4541 *****)           1.4515 *) ***)         1.4593 *) ****)           1.4903 *) ****)         A105, C22.8 or 1.0460 (P250GH)	SPECIFICATIONS           Shape 4 Shape 4F         pursuant to DIN 43772         Without flange With flange *) **)           Internal bore [mm]	SPECIFICATIONS           Shape 4         pursuant to DIN         Without flange         Pf           Shape 4F         pursuant to DIN         Without flange         Pf           Shape 4F         43772         With flange *) **)         Pf           Internal bore [mm]	SPECIFICATIONS           Shape 4 Shape 4F         pursuant to DIN 43772         Without flange With flange *) **)         PN 250           Internal bore [mm]	SPECIFICATIONS         991           Shape 4 Shape 4F         pursuant to DIN 43772         Without flange With flange *) **)         PN 250           Internal bore [mm]         Ø 3,5 Ø 7         Ø 3,5         Ø           Internal thread         M14x1,5 M18×1.5 G 1/2         Internal 0 of G 1/2         Internal thermowell         Ø 3,5         Ø           1/2 - 14 NPT         Internal 1/2 - 14 NPT         Internal 0 f thermowell         Internal 260         Internal 65         Internal 265         Internal 105         Internal 133         Internal 105         Internal 135         Internal 135         Internal 105         Internal 135         Internal 105         Internal 140         Internal 125         Internal 125         Internal 125         Internal 195         Internal 195	SPECIFICATIONS         ORD           Shape 4         pursuant to DIN         Without flange         PN 250         991         DIN           Shape 4F         43772         Without flange *) **)               991         DIN           Internal thread         43772 $\emptyset$ 3,5	SPECIFICATIONS         ORDERIN           Shape 4         pursuant to DIN         Without flange         PN 250         4           Shape 4F         43772         With flange *) **)         4         4           Internal bore [mm] $\emptyset$ 3,5         4         4           Internal thread $M14x1,5$ Internal $\emptyset$ of thermowell         26         18         1           Internal thread $110$ $0$ of thermowell         26         105         1           Nominal length of thermowell         200 $110$ $65$ 133         165         1           200         200 $200$ $275$ 195         1         1         1           260         172         125         195         1	SPECIFICATIONS         ORDERING N           Shape 4         pursuant to DIN         Without flange         PN 250         4         0           Shape 4F         43772         Without flange *) **)         4         7           Internal bore [mm]	SPECIFICATIONS         ORDERING UME           Shape 4         pursuant to DIN         Without flange         PN 250         4         0           Shape 4F         43772         Without flange ') **)         4         F         4         F           Internal bore [mm]	SPECIFICATIONS         ORDERING NUMBER           Shape 4         pursuant to DIN         Without flange         PN 250         4         0         0           Shape 4F         43772         Without flange*) **)         4         0         4         0         4         0         6         1 </td <td>SPECIFICATIONS         ORDERING NUMBER           Shape 4         pursuant to DIN 43772         Without flange         PN 250         4         0         2           Shape 4F         43772         With flange *) **)         4         0         4         0         6           Internal bore [mm]         <math>\frac{93,5}{g}</math>         -         4         7         -         -           Internal thread         <math>\frac{M14x1,5}{M18x1.5}</math>         Internal <math>\frac{18}{24}</math>         Internal bore [mm]         <math>\frac{g3,5}{g}</math>         -         3         1           M14x1,5         Internal thread         <math>\frac{24}{66}</math>         Internal bore [mm]         <math>\frac{g3,5}{g}</math>         -         3         1           M14x1,5         Internal thread         <math>\frac{24}{24}</math>         Internal bore [mm]         <math>\frac{g3,5}{g}</math>         -         3         1           M20x1.5         10         6         135         -         -         2         -           110         16         133         65         -         105         -         2         3           1400         200         L1 [mm]         125         125         165         -         4         0         5           200         200&lt;</td>	SPECIFICATIONS         ORDERING NUMBER           Shape 4         pursuant to DIN 43772         Without flange         PN 250         4         0         2           Shape 4F         43772         With flange *) **)         4         0         4         0         6           Internal bore [mm] $\frac{93,5}{g}$ -         4         7         -         -           Internal thread $\frac{M14x1,5}{M18x1.5}$ Internal $\frac{18}{24}$ Internal bore [mm] $\frac{g3,5}{g}$ -         3         1           M14x1,5         Internal thread $\frac{24}{66}$ Internal bore [mm] $\frac{g3,5}{g}$ -         3         1           M14x1,5         Internal thread $\frac{24}{24}$ Internal bore [mm] $\frac{g3,5}{g}$ -         3         1           M20x1.5         10         6         135         -         -         2         -           110         16         133         65         -         105         -         2         3           1400         200         L1 [mm]         125         125         165         -         4         0         5           200         200<

As a special requirement after an agreement with the manufacturer

\*) \*\*) \*\*\*) Design of flange (shape, PN, DN and material) pursuant to the requirement of the customer

Thermowells of these materials cannot be used for zone 0

Surface treatment of thermowells: preservation with grease - oil

For zone 0, it is necessary to use a thermowell from corrosion resistant steel (pursuant to EN 60079-26)

\*\*\*\*) thermowells of these materials are suitable for contact with food

#### TABLE 4 – ACCESSORIES - OVERVIEW OF DESIGNS RECOMMENDED SCREW-IN THERMOWELLS SHAPE 6 PURSUANT TO DIN 43772, TYPE 991 (order separately)

		SPECIFICATIO					ORDE	RING	G NU	JMB	ER		
		SPECIFICATION	N			991	DIN	6	X	X	x	X	х
	thermowell p	ursuant to DIN 43772	PN 250				6						
				G1/2					1				
				G1					2				
	external three	ad		M27x2					3				
				G3/4					4				
				M20x1.5					6				
	internal bore	[mm]		Ø7						7			
				M18x1.5						2			
Cone	internal threa	ad	M20x1.5/							3			
screw-in				G 1/2/						4			
thermowell		110		105								1	
	Nominal	140		135								2	
	length of	170		165								3	
	thermowell	200	L1 [mm]	195							4		
	L [mm]	260		255								6	
	= []	410		405								7	
		other (maximum 1200) *)										9	
			1.4541 ***)	maximum	580								3
	Material of th	ermowell	1.4571 ***)	operation	400								4
			other *) **)	temperature [°C]									9

\*) \*\*) \*\*\*) upon a special requirement after an agreement with the manufacturer for zone 0, it is necessary to use a thermowell from corrosion resistant steel (pursuant to EN 60079-26)

thermowells of these materials are suitable for contact with food

#### TABLE 5 - ACCESSORIES - OVERVIEW OF DESIGNS RECOMMENDED SCREW-IN THERMOWELLS SHAPE 7 PURSUANT TO DIN 43772, TYPE 991 (order separately)

SPECIFICATION						ORDE	RINC	G NU	JMB	ORDERING NUMBER							
								Κ	х	х	X	х	х				
	Shape 7 purs	uant to DIN 43772		PN 250				Κ									
	Internal bore	mm]		Ø 7					7								
				½ - 14 NPT						5							
	External fixing	thread		¾ - 14 NPT						7							
		lineau		1- 11,5 NPT						8							
				other *)						9							
				M18 ×1.5							2						
	Internal thread	d for sensor		½ - 14 NPT							5						
				other *)							9						
		110		105								1					
	Nominal	140		135								2					
Cone	length of	170		165								3					
screw-in	thermowell	200	L1 [mm]	195							4						
thermowell	L [mm]	260 *)		255							6						
		410 *)		405								7					
		Other (maximum 1200) *)			550							9					
		1.7555 ) )		-	550							<b></b>	1				
		1.7300 ) )		_	580							<b></b>	2				
		1.4541 ****) 1.4571 ****)			580 400							<b>—</b>	3				
	Material of thermowell	1.5415 *) **)		maximum	400 530							<b></b>	4				
		1.4903 *) ***)		operation temperature [°C]	620								5 6				
		A105, C22.8 or 1.0460 (P250			425			<u> </u>					6 7				
		1.4404 *) ***)			425 550								8				
		Other *)			550								0 9				
		/											9				

\*) \*\*) \*\*\*) \*\*\*\*)

upon a special requirement after an agreement with the manufacturer surface treatment of thermowells: preservation with grease – oil for zone 0, it is necessary to use a thermowell from corrosion resistant steel (pursuant to EN 60079-26)

thermowells of these materials are suitable for contact with food

TABLE 6 - ACCESSORIES - OVERVIEW OF DESIGNS RECOMMENDED NIPPLES FOR WELDING THERMOWELLS, TYPE 991 (order separately)

SPECIFICATION								
SPECIFICATION						x	XXX	XX
Direct nipple					NVD	4		
Internal bore	Ø 24	DN	250				D24	
[mm]	Ø 26	FIN					D26	
	15 128.5 **)		550					51
	1.4541		550					72
	1.5415 *) **)		530					50
Material	1.4903 *)		620					71
	A105, C22.8 or 1.0460 (P250GH) *) **)		425					20
	1.4404 *)	[0]	550					73
	Other *)							99
	Internal bore [mm]	Internal bore         Ø 24           [mm]         Ø 26           15 128.5 **)         1.4541           1.5415 *) **)         1.4903 *)           A105, C22.8 or 1.0460 (P250GH) *) **)         1.4404 *)	Direct nipple         Ø 24         PN           [mm]         Ø 26         PN           15 128.5 **)         1.4541         maximum operation temperature [°C]           1.4903 *)         1.4903 *)         [**)         [**]	Direct nipple         Ø 24         PN         250           [mm]         Ø 26         PN         250           Internal bore [mm]         I5 128.5 **)         550         550           1.4541         550         530         620           1.4903 *)         A105, C22.8 or 1.0460 (P250GH) *) **)         [°C]         425           1.4404 *)         550         550	SPECIFICATION         991           Direct nipple          991           Internal bore [mm]         Ø 26         PN         250           15 128.5 **)         1.4541         550         550           1.4541         1.5415 *) **)         550         530           1.4903 *)         A105, C22.8 or 1.0460 (P250GH) *) **)         [°C]         250           1.4404 *)         550         550         550	SPECIFICATION         991         xxx           Direct nipple         NVD         NVD           Internal bore [mm]         Ø 26         PN         250           15 128.5 **)         1.4541         550         -           1.4541         550         530         -           1.4903 *)         A105, C22.8 or 1.0460 (P250GH) *) **)         1°Cl         425         -           1.4404 *)         550         -         -         -	SPECIFICATION         991         xxx         x           Direct nipple         0/24         NVD         4           Internal bore [mm]         0/26         PN         250         -         -           15 128.5 **)         1.4541         550         -         -         -           1.4541         1.4541         550         -         -         -           1.4545 *) **)         1.4540         -         530         -         -           Material         1.4903 *)         A105, C22.8 or 1.0460 (P250GH) *) **)         [°C]         620         -         -           1.4404 *)         -         -         -         -         -         -	Bit Material $\emptyset$ 24         NVD         4           Internal bore [mm] $\emptyset$ 24         PN         250

upon a special requirement after an agreement with the manufacturer

) \*\*) surface treatment of nipples: preservation with grease - oil

#### TABLE 7 - ACCESSORIES - OVERVIEW OF DESIGNS RECOMMENDED NIPPLES FOR SCREW-IN THERMOWELLS, TYPE 991 (order separately)

			SPECIFIC				OF	DERIN	g nu	MBER	
			SPECIFIC	ATION			991	ХХХ	х	XXX	ХХ
	Direct nipple	e						NVP			
	Oblique (ch	amfer 45°)						NVS			
		M20×1,5	for omb	ed sealing ring					4	M20	
		G 1/2		0 0		40			'	G12	
		M20×1,5	without	embed for sealing		40			2	M20	
	Internal	G 1/2	ring		– PN				2	G12	
	bore	M27×2			FIN	160				M27	
	2010	G 3/4							4	G34	
Nipple for		3/4 – 14 NP	Т							N34	
screw-in		G1								G01	
thermowells		Other *)								999	
pursuant to						300 (only PN 40)				M20	
DIN 43772		1.0308								G12	
shape 6 a 7		or 1.0122		preservation with						M27	13
										G34	
		4 0577		grease - oil	maximum	100				N34	45
	Material	1.0577	surface	0	operation	400				G01	15
			treatment		temperature					M27	
		15 128.5			[°C]	550				G34	51
										N34	=0
		1.4541		-		550					72
		Other *)		pursuant to		pursuant to					99
	<u> </u>	,		material ent with the manufa		material					

#### TABLE 8 - OVERVIEW OF DESIGNS AND ORDERING OF CABLE GLANDS Ex d (Ex t) BRASS - TYPE 991

SPECIFICATION										ring nu	mber
	SI EGHICATION										
Gland	Ex d (Ex t	) brass	Cable clam	np (clampin	g module)			For cable $\emptyset$			
Size	Wre	ench	Size	Dime	nsion	Thread	Thread Torque of gland body				
Size	Α	В	Size	С	Ds		body	[mm]			
No. 4	OK 17		No. 4	5	20			4,5-8.5		VM	458
No. 5	OK 19		No. 5	5	22	M20×1.5	30 - 35 Nm	7-11		VM	711
No. 6	OK 24	OK 24	No. 6	6	27.5			10-16		VM	016
No. 4	OK 17	UK 24	No. 4	5	20			4,5-8.5		VK	458
No. 5	OK 19		No. 5	5	22	22 1/2-14 NPT 25 - 30 Nm	25 - 30 Nm	7-11		VK	711
No. 6	OK 24		No. 6	6	27.5			10-15.5		VK	015

#### TABLE 9 - OVERVIEW OF DESIGNS AND ORDERING OF CABLE GLANDS Ex d (Ex t) BRASS - TYPE 991 These glands will be delivered until stocks sell out

	SPECIFICATION										mber
											XXX
Gland	Exd(Ext	) brass	Cable clam	ıp (clampin	g module)			<b>F</b> 11 <i>A</i>			
Size	Wre	ench	Cizo	Dimen		Thread	Torque of gland body	For cable Ø			
Size	Α	В	Size	С	Ds		body	[mm]			
No. 5	OK 19	OK 24	No. 5	5	22	1/2-14 NPT	25 - 30 Nm	6-12		VM	612

EXTERNAL FIXING THREAD OF		SEALING RING		
TEMPERATURE SENSORS	DIMENSION [mm] Ød x ØD x t	MATERIAL	NUMBER	ORDERING NUMBER
M14 x 1,5	14x20x2	copper thermally insulating insert		991 TK 14
M18 x 1,5	18x22x1,5	copper	1 Pcs	991 TK 18
M20 x 1,5 G1/2	- 21×27x2	copper thermally insulating insert		991 TK 21
1/2-14NPT	-	-	-	-

The sealing ring is supplied to each sensor by default, only for the sensor with internal thread 1/2-14NPT the sealing ring is not supplied. The sealing ring can also be ordered separately using ordering number

#### INSTALLATION AND CONNECTION

## SENSOR INSTALLATION

Install the sensors by screwing into the relevant thermowell screwed into the nipple on the piping (technological equipment) or welded into the piping wall. Before the installation, put on the enclosed sealing ring in advance (for thread 1/2-14NPT, the sealing ring is not used). During the installation, torque of 70 Nm is recommended for thread M18 x 1,5, G1/2 and M20 x 1,5, torgue of 50 Nm for thread M14 x 1,5 and torque 40 Nm for thread 1/2-14NPT it is.

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 may be install to the thermowell located in the zone 0 (20), zone 1 (1) or zone 2 (22), thermowell for zone 0 must be in accordance with the EN 60079-26. (See figure 2).

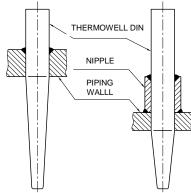
The other parts of the sensor (fitting, adapter, connecting head) may be located in zone 1 (21) or zone 2 (22).

When installing sensor in the thermowell located in zone 20, a pre-fuse with the following parameters must be used in the converter encoder circuit: Ceramic, quick break (F), short circuit resistance 1500A (H), e.g. ceramic tube fuse Ø5 x 20 mm, F100mA.

Distance of the fixed closure Ex d IIC from close structures or between the closures shall be at least 40 mm.

The temperature sensor with a paint finish must be installed in an explosive atmosphere with dust so as to avoid the occurrence of creep discharges

#### **EXAMPLES OF INSTALLATION OF THERMOWELLS DIN**



#### INSTALLATION OF CABLE GLAND

Only a certified cable gland shall be used to secure the fixed closure (dust-tight closure) Ex d IIC (Ex tb IIIC) with IP 68 protection (see accessories type 991 or another similar gland). For temperature sensors with converter, a barrier cable gland must be used in zone 1 of the IIC gas gauge, or an Ex ia converter.

The gland 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.

The sensor installation in conditions with explosive gaseous atmosphere or flammable dust shall comply with the requirements of EN 60079-14.

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 cable with double insulation; internal wires with Cu core (sensor with converter) or compensation wiring (sensor without converter) 0.5 to 1.5 mm<sup>2</sup>. Sensors without converter connect with unarmoured shielded compensation or double insulated thermocouple wiring with cross section 0.5 to 1.5 mm<sup>2</sup> and outer diameter according to cable gland.

Seal the cable in the gland by prescribed tightening of the closing nut pursuant to instruction sheet of the gland Then secure it with clamp against pull-out.

# WARNING

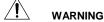
The connecting cable must have a casing of thermoplastic, thermoset or elastomeric materials. The cable must be circular and compact, the filler or shell

#### must be extruded and the filler material, if used, must be non-absorbent. The length of the connecting cable must be at least min. 3 m. 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 mm<sup>2</sup>. The HART communicator is connected to the power supply loop of the sensor with converter pursuant to Figure 2.

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

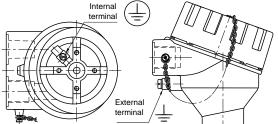


Programmable converter may not be connected to a computer or a HART communicator if the converter is located in explosive environment.

The surface temperature of the converter must not exceed the maximum surface temperature for a given temperature class. For installation in a dangerous area, a connection is required (placing on the same potential). You can use the terminals on the sensor head to do this.

The sensor need not be connected separately to the interconnection system if it is firmly attached and metallically connected to the components or piping that is connected to the interconnection system.

#### SENSOR HEAD WITH TERMINALS



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

Internal terminal: stranded wire 1.5 mm<sup>2</sup>, full wire 2.5 mm<sup>2</sup> External terminal: stranded wire 4.0 mm<sup>2</sup>, full wire 6.0 mm<sup>2</sup> If stranded wires are used for the interconnection, they shall be protected against fraying with a 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 pin and fixed with 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: Power supply of the sensor may not be connected before closing the fixed closure!

#### SENSOR INSTALLATION WITHOUT CONVERTER AND SENSOR WITH CONVERTER Ex ia TO ZONE 0 (20)





WARNING: The user is responsible for ensuring that during operation in zone 0 is between the sensor head from an aluminium alloy and other equipment preclude any risk of ignition due to impact and friction.

The sensor without converter can be used, in case of the installation pursuant to EN 60079-11, Art. 5.7 in the intrinsically safe circuit Ex ia according to EN 60079-25), as a simple equipment. For simple equipment, the maximum temperature can be determined from the value of the  $P_0$  of the follower and the temperature class is determined.

Sensor with converter Ex ia can be used while adhering to the Ex ia parameters of the converter shall be complied with pursuant to the enclosed converter manual.

In intrinsically safe circuits, only insulated cables that are capable of withstanding an electrical strength test with a voltage equal to twice the voltage in the intrinsically safe circuit or 500 V eff (DC 750 V) must be used, with a larger value being taken.

When installing intrinsically safe circuits, including cables, do not exceed the maximum allowable inductance, capacity or ratio LiR and surface temperature. Permissible values are determined from the documentation of the connecting device or label. Place follow-up equipment out of the danger area. An intrinsically safe source approved for supplying intrinsically safe devices in accordance with EN 60079-11 must always be used.

The shield of the intrinsically safe circuit cable must be grounded in the same place as the intrinsically safe circuit, the connection must be outside the dangerous area.

If the intrinsically safe circuit is isolated from the ground, the shield must be connected in one place to the protective interconnection system. This can be using the terminals on the sensor head.

#### 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.

#### ∕!∖ WARNING

After installation must be require initial inspection equipment and installations according to EN 60079-17

#### **OPERATION AND MAINTENANCE**

The sensor does not require any operation, maintenance and follow-up periodical revisions or permanent supervision of expert staff shall be carried out pursuant to EN 60079-17.

#### ∕!` WARNING

(Ex) Any intervention into the sensor and its structure will result in a change of properties and can result in an explosion!

#### SENSOR UNINSTALLATION

#### ∕!∖ WARNING

Warning: Temperature sensor is in design Ex and must be disconnected from the supply source before opening the lid of the head and releasing the cable gland in the explosive environment!

Release the securing screw of the lid by 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 or the internal terminal on the head of 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 thermowell; torque for releasing is approx. 70 Nm for thread M18 x 1,5, G1/2 a M20 x 1,5, approx. 50 Nm for thread M14 x 1,5 and approx.40 Nm for thread 1/2-14NPT. While releasing the screw-joint of the sensor, the thermowell 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:

#### EXAMPLE OF PURCHASE ORDER OF MEASURING INSERT

Thermoelectric measuring insert without converter MV330 /375/ 1K2/JI 6 pcs

	ICATIONS	(	ORDER	IN	g n	UM	IBER
SPECIF	MV330	/xxx/	х	х	X	/xxxx	
Length of measuring insert [mm]			Pursuant to tab. 1				-
ø measuring	6 ± 0,1			1			
insert [mm]	3 ± 0,1			3			
Sensing	Thermocouple <b>K</b>				к		
probe	Thermocouple J				J		
Accuracy	1					1	
class	2					2	
Connection of the terminal	Single thermocouple, insulated end						/JI
board and design of measuring ends of thermo- couple or converter	Double thermocouple, independent end						/DU
Converter pu	rsuant to tab. 1						/converter

To order the certified measuring inserts, specify the code according to Table 2 - Additional requirements - behind the ordering number.

The measuring inserts are marked according to Article DESIGNATION. Designation is completed with the ordering number.

Each delivery includes

- Delivery note
- Measuring insert pursuant to the purchase order
- Optional accessories to the measuring insert with a programmable converter
  - Configuration program according to the required converter
  - Communication modem (for serial port RS 232C) 0 according to the required converter
  - Accompanying technical documentation in Czech
  - Product manual 0
  - Product quality and completeness certificate, which 0 also serves as the warranty certificate
  - EU Declaration of Conformity
  - (for design with converter Ex ia)

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

- Calibration sheet (for calibrated design)
- EU Declaration of Conformity (for design with converter)
- Copy of EU-Type Examination Certificate pursuant to the Directive No 2014/34/EU for design with converter Ex ia

#### WARRANTY

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

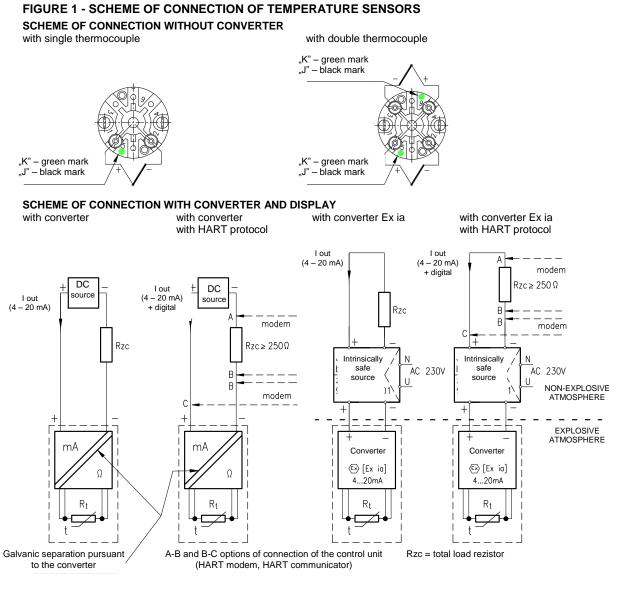
The sensors shall be repaired by the manufacturer. They shall be sent for repair in the original or equal package without accessories.

#### DISABLING AND LIQUIDATION

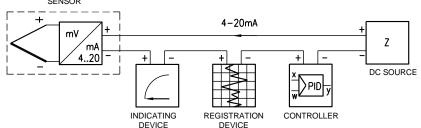
The product and its package do not include any parts that could impact the environment.

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 accordance with applicable legislation.



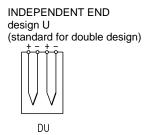




## FIGURE 3 - DESIGN OF MEASURING ENDS OF JACKETED THERMOCOUPLES (SCHEMATIC ILLUSTRATION)

INSULATED END design I (standard for single design)





# FIGURE 4 – EXAMPLE OF INSTALLATION OF TEMPERATURE SENSORS Ex d TO THERMOWELL DIN (for cases when a higher upper limit of the measurement range is required than the required temperature class)

DANGEROUS AREA IMPERMEABLE ZONE 1 (21) OR 2 (22) MAXIMUM TEMPERATURE THERMAL INSULATION PARTITION WALL IN ANY PART OF THE SENSOR INCLUDING PARTITION WALL T1-T6 MEASUREMENT AREA WITH HIGH TEMPERATURE AREA WITHOUT DANGER OF EXPLOSION FIGURE 5 – MARK OF NON-EXPLOSIVENESS G Ex db IIC T1 ... T6 Gb 2 Ex tb IIIC 2 D T = T media Db Gb - high level of protection for equipment in zones 1 and 2 Db - high level of protection for equipment in zones 21 and 22 T1 ... T6 - The temperature class of equipment into an explosive gaseous autosphere T = T media – max. surface temperature of equipment into an explosive atmosphere with dust Gas group IIC - typically hydrogen - can be used in groups of gases IIA and IIB Dust Group IIIC - conductive dust - can be used in dust groups IIIA and IIIB Type of protection Ex d - Fixed closure for use in area zones 1 or 2 Type of protection Ex tb - Dust Ignition Containment for use in area Zone 21 or 22 G – Gas Type of explosive atmosphere -D - Dust Equipment group 2 - for use in areas Zone 1, 2, 21 or 22 The sensor can be mounted thermowell located in the zone 0, 1, 2, 20, 21 a 22, thermowell for zone 0 must be in accordance with EN 60079-26 (See figure 3) Equipment group II - for use in explosive atmospheres or explosive atmospheres with dust other than mines with methane occurrence

#### FIGURE 6 - THERMOWELL FOR TEMPERATURE SENSOR Ex d FOR ZONE 0 (pursuant to EN 60079-26)

The thermowell, which is used in the function of the partition wall between the zones 1 or 2 and zone 0, shall be made of corrosion-resistant metal and with wall thickness t  $\geq$  1 mm.

