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

Type of operation: continuous

APPLICATION

- For 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 the temperature and pressure determined by heat sink resistance
- In non-certified design for general temperature measurement
- In certified design as rated gauge **TCS 311/92-1239** for business measurement of steam (e.g. in combination with evaluation devices INMAT 51, INMAT 66)
- Design with converter
  - o To convert signal of the resistance sensor to unified output signal 4 to 20 mA or digital signal (converter with HART protocol)
  - o In explosive environment pursuant to the type of the converter EExi (refer to enclosed converter manual)

The sensors with converter are rated products pursuant to the Act No. 22/1997 Coll. and Compliance Certificate **EC-11261P** is issued for them.

DESCRIPTION

The sensor consists of a replaceable measuring insert with flange and terminal board or installed two-wire converter (insulated or non-insulated, even in design EExi) and protective armature consisting of the head and adapter with screw joint for the connection of the sensor into the heat sink selected by the customer. The head is provided with a lid and sealing outlet for the connection wiring. The measuring insert is formed with a stem tube, into which the measuring resistor with internal wiring is placed and it is electrically insulated from the jacket of the stem tube.
The sensor with converter is supplied from an external source. The installed converter is set-up 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 is designed pursuant to ČSN EN 61010-1 as an electrical equipment of protection class III for the application in networks with the category of overvoltage in the installation II and pollution grade 2, the follow-up (evaluation) device shall comply with Article 6.3 hereof.

Measuring range:

Type 112 60	-70 to 400 °C
Type 112 61, 112 61/P	-70 to 600 °C

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

Electrical strength pursuant to ČSN EN 61010-1, Article 6.8.4: 500 V eff (only measuring insert without converter or design with insulated converter)

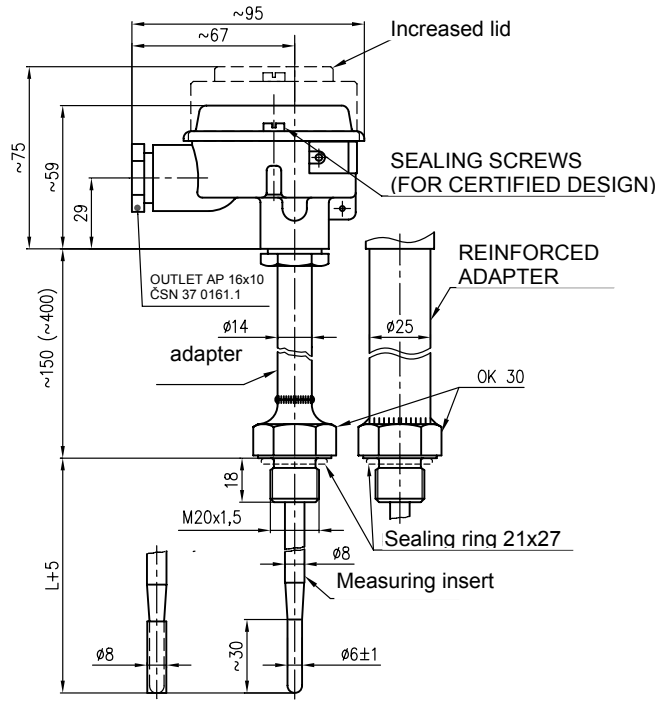
Electrical insulation resistance pursuant to ČSN IEC 751, Article 4.2.1:
min. 100 MΩ, at 15 to 35°C, max. 80 % relative humidity

Power supply of converter:
from source SELV, e.g. INAP 16, INAP 30, INAP 31 or INAP 901

Other data of converter: refer to the enclosed manual

Coverage pursuant to ČSN EN 60529:
IP 65

Operation position:
discretionary, the outlet shall not be situated upwards



LIMITING BUSH FOR HEAT SINK BORE ∅ 9

REDUCED STEM FOR HEAT SINK BORE ∅ 9 / 6.2

Sensor weight:

with adapter 150	L 160	approx. 0.50 kg
	L 250	0.52 kg
	L 400	0.56 kg
	L 630	0.61 kg
with adapter 400	L 160	approx. 0.85 kg
with reinforced adapter 400	L 160	approx. 1.00 kg

Used materials:

stem tube of measuring insert	steel 1.4541
adapter	steel class 11 galvanized
head	chromated aluminium alloy painted with aluminium paint
internal wiring	
type 112 60	Ag
type 112 61, 112 61/P	special alloy
head clamps of the terminal board	brass with Ni surface

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 sensor head:
for design without converter max. 150 °C for design with converter pursuant to the type of the converter (refer to the enclosed manual)

Relative ambient humidity:
10 to 100 % with condensation, with upper limit of water content 29 g H_2O/kg of dry air

Atmospheric pressure: 70 to 106 kPa

Maximum speed of flow of liquids:
according to parameters of the heat sink selected by the customers

VIBRATIONS

Sensors		with limiting bush and heat sinks 991100..., 991120... and 991150...							with reduced stem and heat sink 991170...			
Nominal length L [mm]		160	250	400	630	160			160			
Adapter [mm]		150				400	reinforced		150	400	reinforced	
							150	400			150	400
Design without converter	Frequency range [Hz]	10 to 500										
	Drift amplitude [mm]	0.2	0.2	0.15	0.15	0.075	0.2	0.075	0.35	0.075	0.5	0.15
	Acceleration amplitude [ms^{-2}]	29.4	39.2	29.4	19.6	9.8	49.0	9.8	49.0	9.8	68.6	9.8
Design with converter	Frequency range [Hz]	10 to 500										
	Drift amplitude [mm]	0.2	0.15	0.15	0.075	0.075	0.2	0.075	0.2	0.075	0.2	0.075
	Acceleration amplitude [ms^{-2}]	29.4	19.6	19.6	9.8	9.8	29.4	9.8	29.4	9.8	29.4	9.8

METROLOGICAL DATA

Sensor: measuring resistor Pt 100 single or double in connection pursuant to scheme and Table of design, $\alpha = 0.00385\ [K^{-1}]$, tolerance class B (or A only for 4-wire) pursuant to ČSN IEC 751

Internal wiring resistance at 20 °C

type 112 60 Ag 0.053 Ω/m ± 10 %

type 112 61, 112 61/P spec. alloy 2.45 Ω/m ± 5 %

Measured value of internal wiring resistance is identified on the label of the measuring insert in case of the design without converter.

Maximum current load of measuring resistor: 5 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: 200 mm

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

without heat sink (indep. meas. insert) $\tau_{0.5}$ 4.3 s

with heat sinks 991100..., 991110..., 991120... and 991130... (L = 160) $\tau_{0.5}$ 85 s; $\tau_{0.9}$ 250 s

with heat sinks 991100..., 991110..., 991120... and 991130... (L = 250, 400, 630) $\tau_{0.5}$ 53 s; $\tau_{0.9}$ 155 s

with heat sink 991150... (L = 160) $\tau_{0.5}$ 80 s; $\tau_{0.9}$ 235 s

with heat sink 991170... (L = 160) $\tau_{0.5}$ 36 s; $\tau_{0.9}$ 100 s

DESIGNATION:

Data on head label

- Trade mark of the manufacturer
- Made in Czech Republic
- Type of resistance sensor, nominal value R_0 / tolerance class / configuration of internal wiring wires *)
- Measuring range or set-up converter range
- Product ordering number
- Coverage
- Mark and decision number about gauge type approval in CMI (for certified design)
- Production time code, for certified design manufacturing number
- Output signal 4 to 20 mA (design with converter)
- Mark of non-explosiveness and No. of the EC Certificate of type test (design with converter EExi)

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

Data on the measuring insert label

- Trade mark
- Sensor type, nominal value R_0 / tolerance class / configuration of internal wiring wires *)
- Production time code; manufacturing number for certified design
- Resistance value of internal wiring (for design without converter)

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

Data on stripe connected on the terminal board of the measuring insert (for certified design)

- Official mark of certification

Data on converter label

- Sensor type
- Set-up temperature range

Data on sensor head (for design with converter)

- Mark CE or mark CE with identification number of the notified person (for converter EExi)

CERTIFICATION

112 61

- Type approval of rage gauge TCS 311/92-1239

112 61/P

- Non-explosiveness EExi, EC Certificate of type test pursuant to the Decree of the Government 23/2003 Coll. (according to the converter type)

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
- Suitable heat sink and weld-on piece 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 Compliance Certificate (for converter EExi)
  - o Calibration sheet (for non-certified calibrated design)
  - o Product manual

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

- Copy of the Inspection Certificate 3.1.B for the stem tube and heat sink material with the casting number
- EC Compliance Certificate for design with converter
- Copy of EC Certificate of type test pursuant to the Decree of the Government 23/2003 Coll. for design with converter EExi
- For certified design
  - o Confirmation about rated gauge certification
  - o Copy of decision about gauge type approval in CMI

PACKING

Both the 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 converters 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 conditions).

STORAGE

The sensors may be stored on conditions corresponding to the set of combinations of classes IE 11 pursuant to ČSN EN 60721-3-1 (i.e. in places with uninterrupted temperature

control from 5 to 40 °C and with humidity from 5 to 85%, 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.)

ORDERING OF TEMPERATURE SENSORS

The purchase order shall include

- Name
- Product ordering number
- Measuring range (for another range)
- If calibration is required and in what temperature points
- If calibration in temperatures below zero (negative temperatures) is required
- If delivery of heat sink and weld-on piece pursuant to type 991 is required for the sensor as accessories
- If optional accessories to the sensor with programmable converter are required
- Other (special) requests
- Number of pieces

PURCHASE ORDER EXAMPLE

Standard design:

Resistance temperature sensor to heat sink, with increased mechanical resistance
112 615 712 - 6 pcs

Special requirement:

Resistance temperature sensor to heat sink with increased mechanical resistance
112 610 712, tolerance class A - 6 pcs

ORDERING HEAT SINKS AND WELD-ON PIECES

The purchase order shall include:

- Name
- Product ordering number
- Number of pieces

PURCHASE ORDER EXAMPLE

Standard design:

Cylindrical heat sink screwing, non-reduced
991 1000 33 20 pcs
Weld-on piece, direct - 991 NVP4 M27 13 – 20 pcs

Special requirement:

Cylindrical heat sink welding, non-reduced
91 1200 14 10 pcs
Heat sink material 1.4571, nominal length L = 400 mm

Ordering number of weld-on pieces, type 991
Weld-on piece, direct - 991 NVP4 M27 13 (material 11 353.0)
- 991 NVP4 M27 72 (material 1.4541)
Weld-on piece, angular- 991 NVS4 M27 13 (material 11 353.0)
- 991 NVS4 M27 72 (material 1.4541)

DESIGN OF TEMPERATURE SENSORS TO HEAT SINK TO 400 °C, TYPE 112 60 - NON-CERTIFIED

SPECIFICATION			ORDERING NUMBER				
			112 60	5	x	x	x
Measuring resistor pursuant to ČSN IEC 751, tolerance class B		Pt 100/B/2			7		
		2 x Pt 100/B/2			8		
Design of measuring end	with adapter 150 mm	with reduced stem				1	
		with limiting bush				2	
	with reinforced adapter 150 mm	with reduced stem				3	
		with limiting bush				4	
	nominal length L [mm]	100 *)					1
		160					2
		250					3
		400					4
		630					5
		Other, max. 3000 mm *)					9

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

DESIGN OF TEMPERATURE SENSORS TO HEAT SINK TO 600 °C, TYPE 112 61 - NON-CERTIFIED

SPECIFICATION			ORDERING NUMBER				
			112 61	5	x	x	x
Measuring resistor pursuant to ČSN IEC 751, tolerance class B or A *)		Pt 100/ /4 **)			7		
		2 x Pt 100/B/2			8		
Design of measuring end	with adapter 150 mm	with reduced stem				1	
		with limiting bush				2	
	with adapter 400 mm only nominal length L= 160 mm	with reduced stem				3	
		with limiting bush				4	
	with reinforced adapter 150 mm	with reduced stem				5	2
		with limiting bush				6	2
	with reinforced adapter 400 mm only nominal length L= 160 mm	with reduced stem				7	2
		with limiting bush				8	2
	nominal length L [mm]	100 *)					1
		160					2
		250					3
		400					4
		630					5
		Other, max. 3000 mm*)					9
Measuring resistor pursuant to ČSN IEC 751, tolerance class B		Pt 100/B/4C			7		
Design of measuring end	with adapter 150 mm	with reduced stem				1	
		with limiting bush				2	
	with adapter 400 mm only nominal length L= 160 mm	with reduced stem				3	
		with limiting bush				4	
	with reinforced adapter 150 mm	with reduced stem				5	6
		with limiting bush				6	6
	with reinforced adapter 400 mm only nominal length L= 160 mm	with reduced stem				7	6
		with limiting bush				8	6
	nominal length L [mm]	160					6
		250					7
		400					8
		630 or other, max. 3000 mm*)					9

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

**) tolerance class A only in four-wire connection

DESIGN OF TEMPERATURE SENSORS TO HEAT SINK TO 600 °C, TYPE 112 61 - CERTIFIED

SPECIFICATION			ORDERING NUMBER				
			112 61	0	x	x	x
Measuring resistor pursuant to ČSN IEC 751, tolerance class B or A *)		Pt 100/ /4			7		
Design of measuring end	with adapter 150 mm	with reduced stem				1	
		with limiting bush				2	
	nominal length L [mm]	100 *)					1
		160					2
		250					3
		400					4
		630					5
		Other, max. 3000 mm *)					
Measuring resistor pursuant to ČSN IEC 751, tolerance class B		Pt 100/B/4C			7		
Design of measuring end	with adapter 150 mm	with reduced stem				1	
		with limiting bush				2	
	nominal length L [mm]	160					6
		250					7
		400					8
		630					9

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

DESIGN OF TEMPERATURE SENSORS TO HEAT SINK TO 600 °C WITH CONVERTER, TYPE 112 61/P - NON-CERTIFIED

SPECIFICATION			ORDERING NUMBER						
			112 61	9	x	x	x	/xxxx	
Measuring resistor pursuant to ČSN IEC 751, tolerance class B or A *)		Pt 100/B			B				
		Pt 100/A *)			A				
Design of measuring end	with adapter 150 mm	with reduced stem				1			
		with limiting bush				2			
	with adapter 400 mm only nominal length L= 160 mm	with reduced stem				3			
		with limiting bush				4			
	with reinforced adapter 150 mm	with reduced stem				5	2		
		with limiting bush				6	2		
	with reinforced adapter 400 mm only nominal length L= 160 mm	with reduced stem				7	2		
		with limiting bush				8	2		
	nominal length L [mm]	100 *)					1		
		160					2		
		250					3		
		400					4		
		630					5		
		Other, max. 3000 mm*)					9		

Converter type		Galvanic separation	Increased lid	EExia	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					/23
					other *)					/99
	APAQ-HRF				adjustable range					/HRF
	APAQ-HRFX *)			●						/HRFX
Programmable	TK-L		●		programmable range					/TKL
	TK-L-ex *)		●	●						/TKLX
	TK	●	●							/TK
	TK-ex *)	●	●	●						/TKX
	IPAQ-H	●	●							/IPAQH
	IPAQ-HX *)	●	●	●						/IPAQHX
	MINIPAQ-H		●							/MINIPAQ
HART protocol	TK-H	●	●							/TKH
	TK-H-ex *)	●	●	●						/TKHX
	MESO-H	●	●							/MESOH
	MESO-HX *)	●	●	●						/MESOHX

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

Note: As a default, the sensors are delivered with converter INPAL 420 and specified standard ranges. If another range is requested, the converter APAQ-HRF is used as a default. The required measuring range for converters APAQ and programmable converters shall be specified in the purchase order in wording. Minimum range of measured temperature shall be entered pursuant to the parameters of the converter. The lower limit of the temperature range is –70°C, while the upper limit of the range is 600°C.

HEAT SINKS RECOMMENDED FOR ASSEMBLY OF TEMPERATURE SENSORS TO HEAT SINK, TYPE 991

SPECIFICATION								ORDERING NUMBER			
								991	xxxx	x	x
Cylindrical heat sink	PN 160	screwing type	non-reduced (ON 02 7210)	L = line / thread M27x2 / sensor thread M20x1.5 / bore Ø 9 mm					1000		
			reduced	L = line / thread M27x2 / sensor thread M20x1.5 / bore Ø 9 / Ø 6.2 mm					1100		
		welding type	non-reduced (ON 02 7212)	L = line / sensor thread M20x1.5 / bore Ø 9 mm					1200		
			reduced	L = line / sensor thread M20x1.5 / bore Ø 9 / Ø 6.2 mm					1300		
Conical heat sink	PN 250	bore Ø9	for high speed of flow (ON 02 7215)	only L = 160 / thread M33x2 / M20x1.5 / bore Ø 9 mm					1500		
		bore Ø6.2	for high parameters of operation liquid (ON 02 7217)	only L = 160 / thread M33x2 / M20x1.5 / bore Ø 9 / Ø 6.2 mm					1700		
Material of immersion part of heat sink	15 128.5			maximum operation temperature	550°C					2	
	1.4541				550°C (650°C)***					3	
	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 requirement 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

CERTIFICATION PURSUANT TO THE ACT 505/1990 Coll.

The sensors are certified pursuant to TPM 3342-94. Certified sensors are provided with a tag with the official mark of the certification. The label is attached to the ceramic terminal board of the measuring insert. Upon request of the customer, a confirmation about rated gauge certification may be issued for a certified sensor later on.
The purchase order shall specify:
- Number of the delivery note, which was supplied with the sensor
- Product ordering number *)
- Manufacturing number *)

*) Data is provided on the device label
The manufacturer performs follow-up certification pursuant to the Act 505/1990 Coll. on metrology, as amended. Follow-up certification shall be ordered with the AMS department of ZPA N. Paka a.s.

CALIBRATION

Calibration may be performed for the sensors, which are not used as parts of rated gauges (i.e. they are not certified). It is realized pursuant to TPM 3342-94 and in compliance with ČSN IEC 751, usually in three temperature points spread 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. Examples of installation of direct and angular weld-on pieces are provided 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). Recommended distance of the temperature sensor from the installation flange of the flow meter is min. 1 m.

ELECTRICAL CONNECTION

The electrical connection may be only realized by qualified workers pursuant to § 5 of the Decree 50/1978 Coll.
The terminal board of the sensor (converter) is accessible after the removal of the lid of the head that is connected with two screws.
Connect the evaluation devices to the sensor with a cable with a double insulation (internal wires with Cu core with the cross section 0.5 to 2.5 mm^2). Seal the cable outlet of the sensor properly. In the environment with interfering signals, use shielded cables in the supply circuit. If it is not possible to exclude influencing the measurement, ground the wiring.

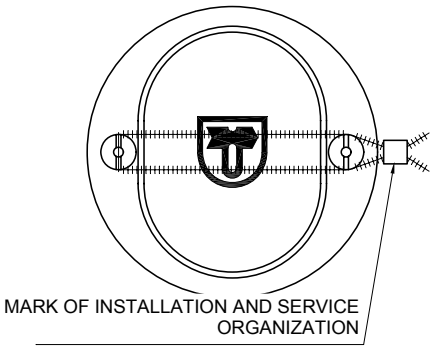
WARNING for sensor with converter EExi

EExi 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.If the converter is installed in a dangerous zone, the sensor shall be grounded electrostatically usually with the use of metal grounded piping.Programmable converter may not be connected to a computer or a HART communicator, if the converter is located in explosive environment.

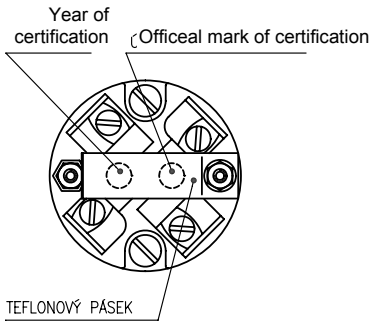
INSTALLATION OF RATED GAUGE

The installation, commissioning and service maintenance of rated gauges pursuant to the Act 505/1990 Coll., on metrology, may only be realized by a person, who is a bearer of a valid Authorization for installation and maintenance of rated gauges issued e.g. in ZPA Nová Paka a.s. After the installation, the certified sensors shall be provided with a mark of the installation and service organization by an authorized worker of the installation and service organization.

TYPE OF SECURING SENSOR LID



VIEW OF TERMINAL BOARD



COMMISSIONING

After the sensor installation 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.
In case or rated gauges, the prescribed time for follow-up certification shall be complied with within the intervals identified by the Decree of the Ministry of Industry and Trade 345/2002 Coll. The replacement and connection of sensors to be certified shall be performed by an authorized worker of the installation or service organization, who shall seal the sensors again.
The official mark on the measuring insert may only be violated by a worker of AMS. If the official mark is damaged or removed, validity of the gauge certification is terminated.

SPARE PARTS

Spare parts shall be delivered by the manufacturer.
Relevant measuring inserts, adapters or head can be ordered pursuant to the offered price list of spare parts.
Inserts in the tolerance class A are only delivered on the basis of a special requirement.

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. The 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 No. 106/2005 Coll.
Both 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 selected salvage of electrical waste), may be disposed of to the 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 by 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 - VIEW INTO SENSOR HEAD

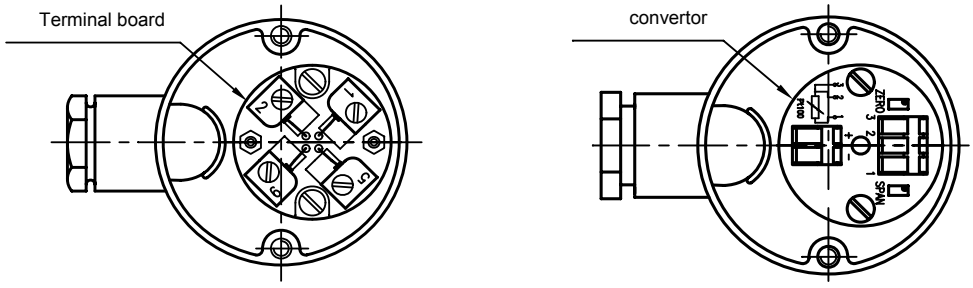
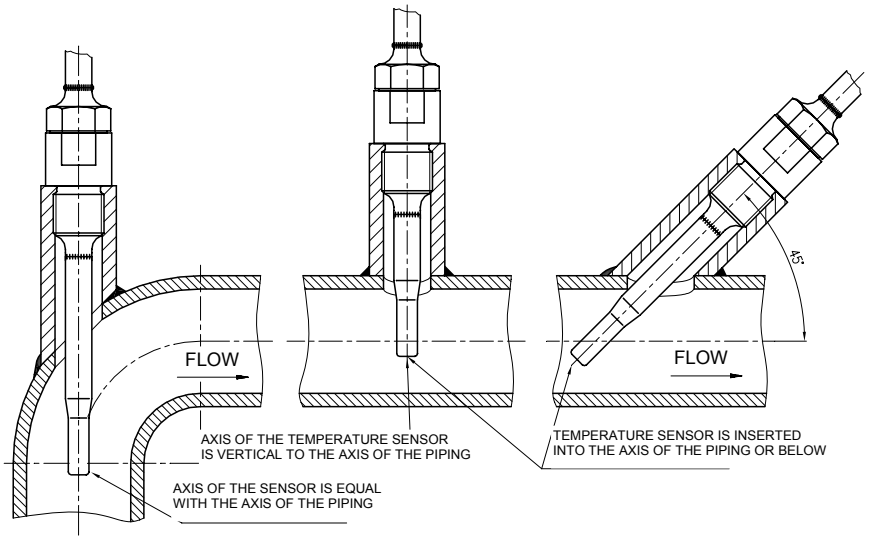


FIGURE 2 - EXAMPLES OF INSTALLATION OF DIRECT AND ANGULAR WELD-ON PIECES PURSUANT TO ČSN EN 1434-2



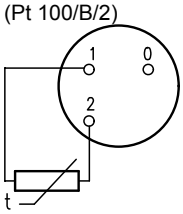
WARNING

- **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**

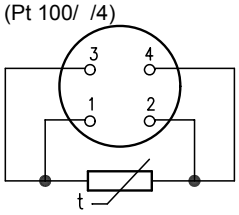
FIGURE 3 - SCHEME OF CONNECTION OF TEMPERATURE SENSORS

without converter

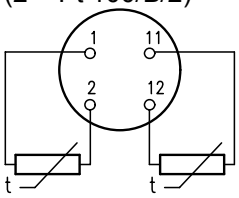
with single measuring resistor
in two-wire connection
(Pt 100/B/2)



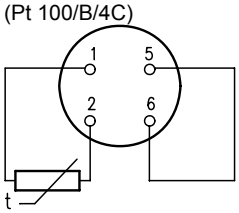
with single measuring resistor
in four-wire connection
(Pt 100/ /4)



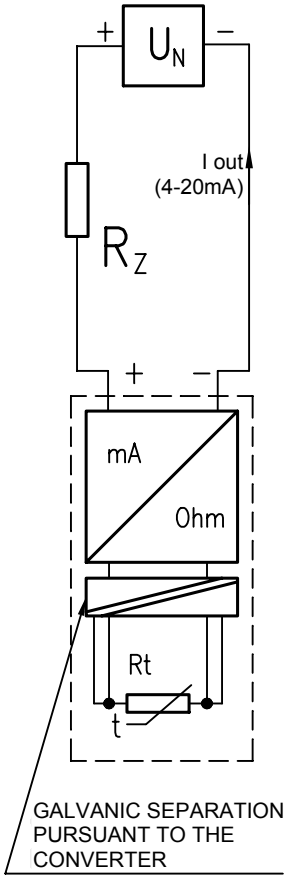
with double measuring resistor
in two-wire connection
(2 × Pt 100/B/2)



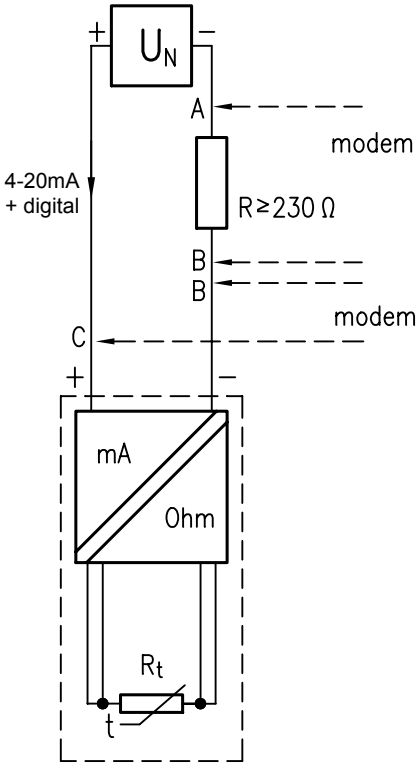
with single measuring resistance
in connection with auxiliary loop
(Pt 100/B/4C)



with converter

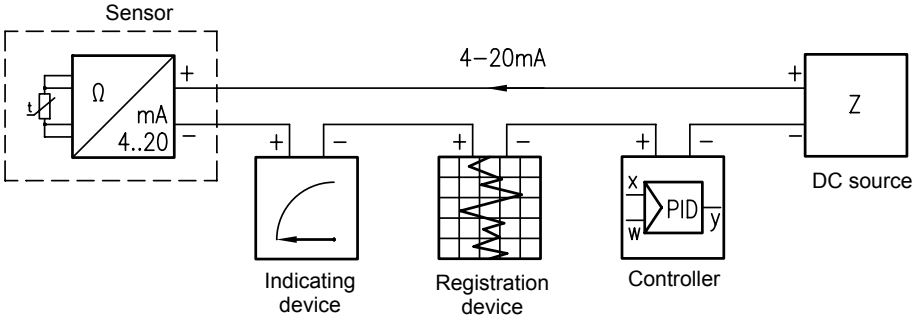


with converter with HART protocol



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

FIGURE 4 - EXAMPLE OF OPERATION CONNECTION
temperature sensors with converter in loop 4 - 20 mA



April 2005

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