



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

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 are suitable; measurement may be realized up to the temperature determined by heat sink resistance and nominal pressure PN 63
- As pressure equipment of category III pursuant to the Decree of the Government 26/2003 Coll. (compliance assessment module B+D)
- In design with converter
 - o To transfer signal of the thermoelectric sensor to unified output signal 4 to 20 mA or signal digital (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 Declaration of Conformity **EC 113240** and **EC-11324P** 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. The protective armature is formed by a head and a heat sink. The heat sink with an adapter is provided with connecting screw joint for the connection of the sensor into the weld-on piece of the piping or technological equipment. The head is provided with a cover and a sealing outlet for the connection wiring.

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 thermoelectric voltage of the thermocouple in dependence on the change of temperature of the measured environment is used.

TECHNICAL DATA

The sensor is designed pursuant to ČSN EN 61140 ed.2 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 pursuant to ČSN EN 61010-1, the follow-up (evaluation) device shall comply with Article 6.3 of the said standard.

Measuring range:

Measuring range [°C]	Heat sink material	Nominal pressure pursuant to ČSN 13 0010
0 to 550	15 128	PN 63
-200 to 600	1.4541	

Measuring range of the sensor with converter is specified 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 EN 61515: min. 1000 M , at ambient temperature 20 ±15 °C and max. 80 % relative humidity

Power supply of converter:

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

Other data of converter: refer to the enclosed manual

Ingress protection pursuant to ČSN EN 60529: IP 65

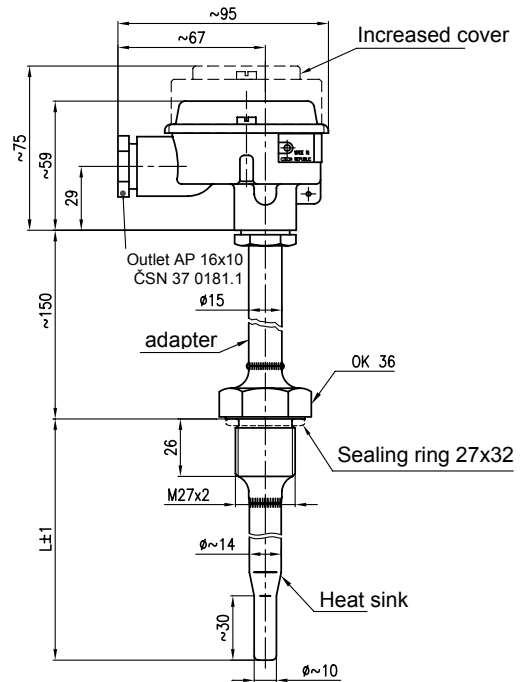
Operation position:

discretionary, the outlet shall not be situated upwards

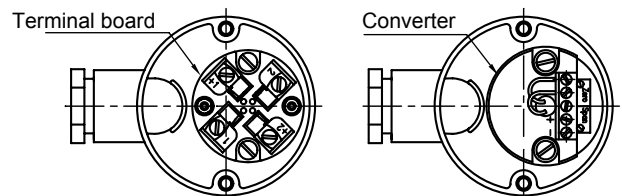
Type of operation: continuous

Sensor weight:

L 100	0.70 kg
L 160	0.75 kg
L 250	0.80 kg
L 400	0.95 kg
L 630	1.20 kg



VIEW INTO SENSOR HEAD



Applied materials:

- Jacket of measuring insert INCONEL 600
- Adapter steel class 11 galvanized
- Head chromated aluminium alloy painted with aluminium paint
- Head clamps of the terminal board brass with Ni surface
- Heat sink with connecting screw joint steel 1.4541 or 15 128

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:

max. 150 °C

for design with converter pursuant to the converter type (refer to the enclosed manual)

Relative ambient humidity:

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

Atmospheric pressure: 70 to 106 kPa

Maximum speed of flow of liquids:

Nominal length L [mm]	100	160	250	400	630
Water steam and air [m/s]	50	25	8	2.5	1

Water [m/s]	5	3	3	1.5	0.2
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VIBRATIONS	WITHOUT CONVERTER					WITH CONVERTER				
Nominal length L[mm]	100	160	250	400	630	100	160	250	400	630
Frequency range [Hz]	10 to 500									
Drift amplitude s_a [mm]	0.5	0.35	0.35	0.2	0.15	0.2	0.2	0.2	0.15	0.075
Acceleration amplitude a_a [$m \cdot s^{-2}$]	68.6	49.0	49.0	29.4	19.6	29.4	29.4	29.4	19.6	9.8

CERTIFICATION

113 24

- Pressure equipment pursuant to the Decree of the Government 26/2003 Coll., EC-Type Examination Certificate SZÚ Brno

113 24/P

- Pressure equipment pursuant to the Decree of the Government 26/2003 Coll., EC-Type Examination Certificate SZÚ Brno
- Non-explosiveness EExi, EC-Type Examination Certificate pursuant to the Decree of the Government 23/2003 Coll. (pursuant to the converter type)

METROLOGICAL DATA

Sensing probe: Measuring thermocouple J (Fe-CuNi) or K (NiCr-NiAl) pursuant to ČSN EN 60584-1, tolerance class 2 pursuant to ČSN IEC 584-2
Double with insulated or non-insulated measuring connection for design without converter
Single with insulated measuring connection for design with converter

Output signal

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

Programmable converter (linear with measured temperature):
4 to 20 mA (+ digital for HART protocol)

Calibration depth of immersion: 100 mm

Temperature response time pursuant to ČSN IEC 751 in whirling water (characteristic value) without converter: with converter

Insulated:	13 s	17 s
0.9	42	45 s
Non-insulated:	4 s	
0.9	15 s	

DESIGNATION

Data on head label

- Trademark of the manufacturer
- Made in Czech Republic
- Type of sensor / tolerance class
- Measuring range or adjusted converter range
- Product ordering number
- Ingress protection
- Production time code
- Output signal 4 to 20 mA (design with converter)
- Designation of non-explosiveness and EC-Type Examination Certificate No. (design with converter EExi)

Data on aluminium label of measuring insert:

- Trademark of the manufacturer
- Type of thermoelectric sensor
- Tolerance class
- Time code

Data on connection screw joint of the heat sink:

- Material of immersion part of the heat sink
- Nominal pressure
- Control mark about performed pressure test

Data on sensor head:

- CE 1015
- CE with identification number of notified person (for converter EExi)

DELIVERY

Unless agreed otherwise with the customer, each delivery includes:

- Delivery note
- Sensor pursuant to the purchase order
- Sealing ring Cu 27x32x1.5 (ČSN 02 9310.2)

- Suitable 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 Declaration of Conformity
 - o Calibration sheet (for 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 for the heat sink material with the casting number
- Copy of EC-Type Examination Certificate pursuant to the Decree of the Government 26/2003 Coll.
- Copy of EC-Type Examination Certificate pursuant to Decree of the Government 23/2003 Coll. for design with converter EExi

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 conditions).

STORAGE

The sensors may be stored on conditions corresponding to the set of combinations of classes IE 11/1K3 pursuant to ČSN EN 60721-3-1 (i.e. in places with temperature from -5 to 45 °C and humidity from 5 to 95%, 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).

CALIBRATION

It is performed pursuant to TPM 3322-94 and in compliance with ČSN EN 584, usually in three temperature points evenly distributed within the operation range of the sensor or in the points pursuant to the requirement of the customer. A calibration sheet with measured data is issued for calibrated sensors.

ORDERING TEMPERATURE SENSORS

The purchase order shall specify

- Name
- Product ordering number
- Measuring range (only for design with converter)
- If calibration is required and in what temperature points
- If the delivery of weld-on piece pursuant to the type 991 is required for the sensor as accessories
- If optional accessories to the sensor with programmable converter are required
- Other (special) requirements
- Number of pieces or pairs

PURCHASE ORDER EXAMPLE

Standard design:

Thermoelectric temperature sensor with heat sink

with high mechanical resistance
without converter
113 245 832 - 10 pcs

with high mechanical resistance
with converter
nominal length 800, range 300 to 600 °C
113 249 839/MINIPAQ - 6 pcs

Special requirement:
Thermoelectric temperature sensor with heat sink

DESIGN OF TEMPERATURE SENSORS WITH HEAT SINK WITHOUT CONVERTER, TYPE 113 24

SPECIFICATIONS		ORDERING NUMBER				
		113 24	x	x	x	x
Double jacketed thermoelectric couple 4.5 mm pursuant to ČSN EN 60584-1 tolerance class 2 (pursuant to ČSN IEC 584-2)	J (Fe-CuNi)		5			
	K (NiCr-NiAl) *)		8			
Design	with non-insulated measuring connections			5		
	with insulated measuring connections			8		
Heat sink material	15 128 (1.7715)				2	
	1.4541 (17 248)				3	
Nominal length [mm]	100					1
	160					2
	250					3
	400					4
	630 *)					5
	Other *)					9

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

DESIGN OF TEMPERATURE SENSORS WITH HEAT SINK AND CONVERTER, TYPE 113 24/P

SPECIFICATIONS		ORDERING NUMBER					
		113 24	9	x	x	x	/xxxx
Single jacketed thermoelectric couple with insulated measuring connection 4.5 mm pursuant to ČSN EN 60584-1 tolerance class 2 (pursuant to ČSN IEC 584-2)	J (Fe-CuNi)			5			
	K (NiCr-NiAl)			8			
Heat sink material	15 128 (1.7715)				2		
	1.4541 (17 248)				3		
Nominal length L	100					1	
	160					2	
	250					3	
	400					4	
	630					5	
	Other *)					9	
Converter type		Galvanic separation	Increased cover	EExia	Range [°C]		
Analogue output signal, linear with thermoelectric voltage	APAQ-HCF				Adjustable range		/HCF
	APAQ-HCFX			•			/HCFX
Programmable output signal, linear with temperature	TH 200	•	•		Programmable range		/TH200
	TH200-ex	•	•	•			/TH200X
	IPAQ-H	•	•				/IPAQH
	IPAQ-HX	•	•	•			/IPAQHX
	MINIPAQ-HLP	•	•				/MINIPAQ
HART protocol output signal linear with temperature	TH 300	•	•		Programmable range		/TH300
	TH 300-ex	•	•	•			/TH300X
	MESO-H	•	•				/MESOH
	MESO-HX	•	•	•			/MESOHX
	248 HA NA	•	•				/248HANA
248 HA I1	•	•	•		/248HA11X		
Without converter (for converter installation by customer)	OTHER *)		•				/99
		•	•				/00

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

Note: As a default, the sensors are delivered with converter APAQ-HCF. Specify the required measuring range in the purchase order in wording. Minimum range of measured temperature shall be entered pursuant to the parameters of the converter.

The maximum temperature range is established by the heat sink material.

ORDERING WELD-ON PIECES

The purchase order shall specify:

- Name
- Product ordering number
- Number of pieces

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)

**INSTALLATION AND CONNECTION
SENSOR INSTALLATION**

On the heat sink of the sensor, put on the enclosed sealing ring and connect the sensor by screwing it into the weld-on piece on the piping (technological equipment). During the installation, torque of 100 Nm is recommended.

Recommended application of weld-on pieces:

- Direct weld-on piece
 - for piping DN 65 to DN 250
(perpendicular installation)

- Angular weld-on piece
 - for piping \leq DN 50
(angular installation or installation in bend)

Examples of application of weld-on pieces are specified in figure 1.

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. 1m.

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 cover of the head that is connected with two screws.

Connect the evaluation devices to the sensor with a cable with double insulation with outer diameter from 5 to 12 mm, internal wires with Cu core (the sensor with converter) or compensation wiring (the sensor without converter) with the cross section 0.5 to 2.5 mm². 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.

Ground (earth) the shielding in one place only!

The cable should not be placed together with power cables.

It is recommended supporting the cable along the length between the sensor and the follow-up cable.



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 through a metal grounded piping.

The programmable converter may not be connected to the computer or HART communicator if the converter is located in the conditions with a threat of explosion.

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.

RELIABILITY

Reliability indicator in operation conditions and conditions of the environment specified herein.

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

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.

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

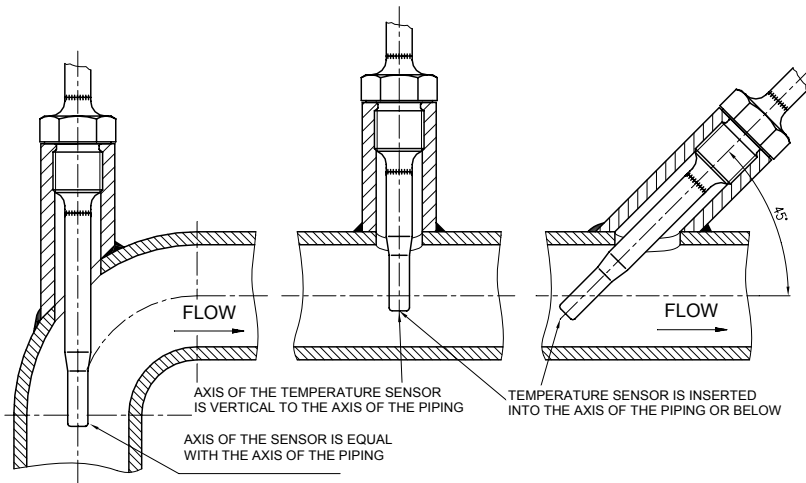
They shall be realized in compliance with the Waste Act No. 106/2005 Coll.

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

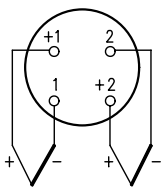


WARNING

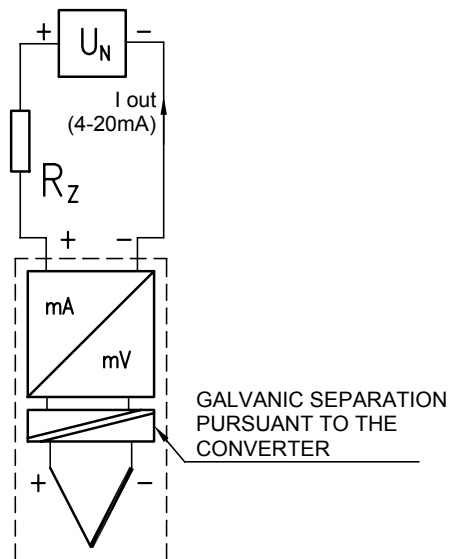
- When using the sensor with an angular weld-on piece, locate the sensor with heat sink at an angle against the direction of flow.
- The sensor may not touch the opposite side of the piping. It is also advantageous to use the temperature sensors in the piping elbow. In such a case, locate the sensor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

FIGURE 2 CONNECTION SCHEME

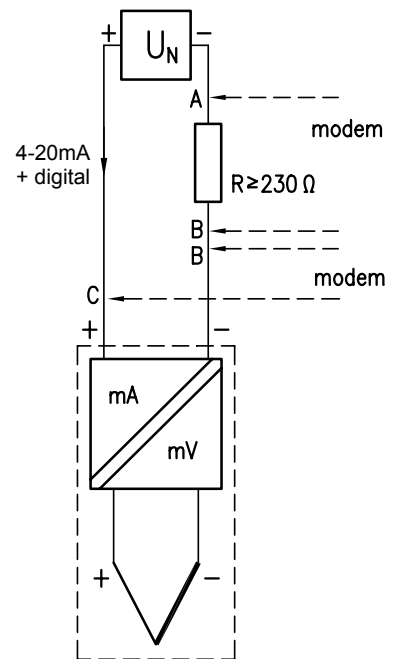
without converter



with converter



with converter with HART protocol



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

Figure 3 DESIGN OF MEASURING ENDS OF JACKETED THERMOCOUPLES (schematic display)

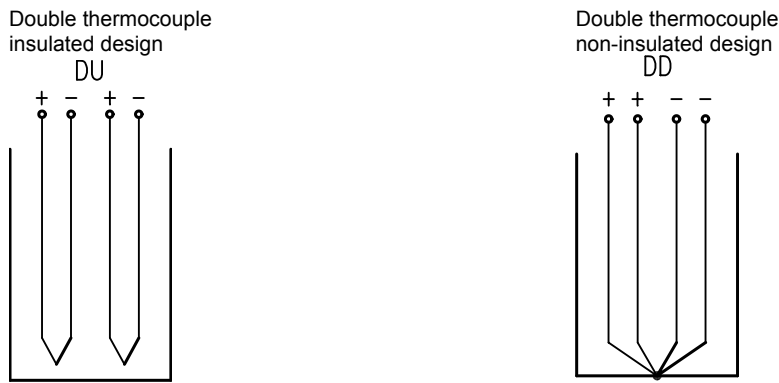
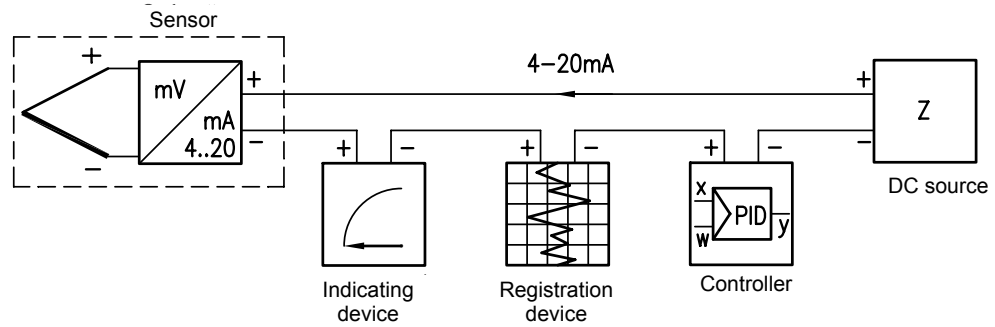


FIGURE 4 - EXAMPLE OF OPERATION CONNECTION OF THE TEMPERATURE SENSOR WITH CONVERTER IN LOOP 4 - 20 mA



MMG Műszerszerviz Kft.
 1036 Budapest, Dereglye u. 1.,
 Tel/fax: 204-2252, Tel:203-7443
 Web: www.mmg.hu, E-mail: info@mmg.hu