



APPLICATION

- For remote measurement of temperature of steady and running liquids (gases and fluids), for which 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)
- For environment requiring seismic resistance from 1 Hz to 33 Hz, acceleration 3g, protocol ČKD Blansko
- In non-certified design for general temperature measurement
- In certified design as a rated gauge **TCS 311/92-1139** for business measurement of steam (e.g. in combination with evaluation units INMAT 51, INMAT 66)

The sensors are rated products pursuant to the Act No. 22/1997 Coll. and the following Declaration of Conformity **EC-112820** is issued for them.

DESCRIPTION

The sensor consists of a replaceable measuring insert and protective armature consisting of a head and a heat sink with an adapter and screw joint for the connection of the sensor into the weld-on piece of the piping (technological equipment). The heat sink of the sensor is made with respect to a very high mechanical resistance. The head is provided with a cover and a sealing outlet for the connecting wiring. The measuring insert consists of a stem tube terminated with a flange with a terminal board. Into the steam tube, a measuring resistor with internal wiring is inserted and it is electrically insulated from the jacket of the stem tube.

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 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	Internal wiring
0 to 400	12 022	PN 63	Ag
-70 to 400	1.4541		
0 to 550	15 128		Special alloy
-70 to 600	1.4541		

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

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

Ingress protection pursuant to ČSN EN 60529: IP 65

Sensor weight:
 L 160 approx. 0.75 kg
 L 250 0.85 kg
 L 400 0.95 kg
 L 630 1.15 kg

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

Type of operation: continuous

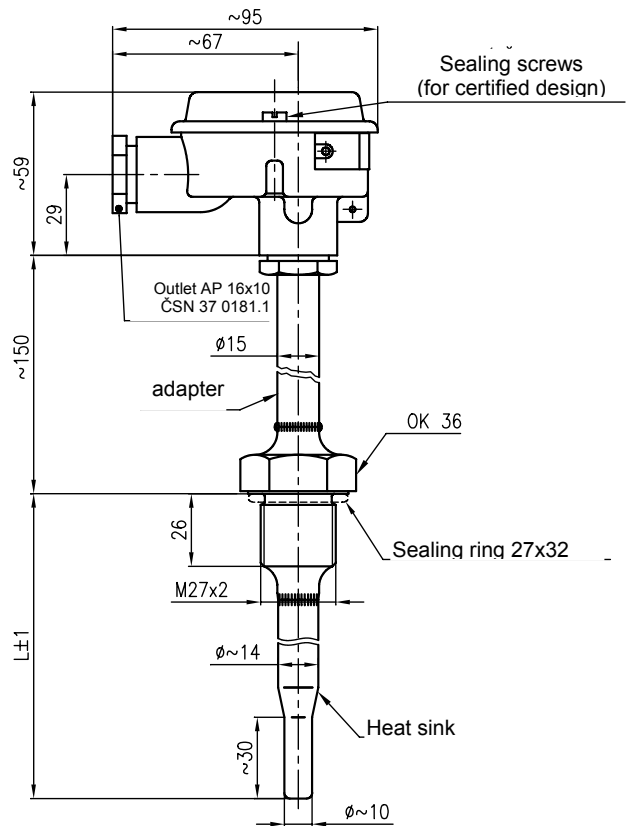
Applied materials:

Steam tube of measuring insert steel 1.4541
 Heat sink steel 1.4541 or 15 128 galvanized
 Adapter steel class 11 galvanized

Head chromated aluminium alloy and painted with aluminium varnish
 Head clamps of 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:
 max. 150 °C

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:

Maximum speed of flow [m/s]	Nominal length [mm]			
	160	250	400	630
Water steam and air	25	8	2.5	1
Water	3	3	1.5	0.2

Vibrations:

Internal wiring	Ag	Spec. alloy	Ag or special alloy		
	160	160	250	400	630
Nominal length [mm]	160	160	250	400	630
Frequency range [Hz]	10 to 500				
Drift amplitude [mm]	0.4	0.5	0.35	0.2	0.15
Acceleration amplitude [ms ⁻²]	58.0	68.6	49.0	29.4	19.6

METROLOGICAL DATA

Sensing probe: Measuring resistor Pt 100 single or double pursuant to the connection scheme and table of designs

$\alpha = 0.00385 \text{ [K}^{-1}\text{]}$, tolerance class B (or A only for 4-wire) pursuant to ČSN IEC 751

Internal wiring resistance at 20 °C:

Ag	0.053	/m ± 10 %
Special alloy	2.45	/m ± 5%

The measured resistance value of the internal wiring is specified on the label of the measuring insert.

Maximum current load of measuring resistance: 5 mA

Recommended measuring current: 1 mA

Calibration depth of immersion: 200 mm

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

0.5	29 s
0.9	95 s

DESIGNATION:**Data on head label**

- Trademark of the manufacturer
- Made in Czech Republic
- Type of resistance sensor, nominal value R_0 / tolerance class / configuration of wires of internal wiring
- Measuring range
- Product ordering number
- Ingress protection
- Mark and number of gauge type approval decision in ČMI (for certified design)
- Production time code; manufacturing number for certified design

Data on label of measuring insert

- Trademark of the manufacturer
- Type of sensor, nominal value R_0 / tolerance class / configuration of wires of internal wiring
- Production time code; manufacturing number for certified design
- Resistance value of internal wiring

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

- Official certification mark

Data on sensor head

- Mark CE 1015

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

CERTIFICATION

- Pressure equipment pursuant to the Decree of the Government 26/2003 Coll., EC-Type Examination Certificate SZU Brno
- Type approval of rated gauge TCS 311/92-1139

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 pieces ordered independently from the catalogue of accessories, type 991;
- Accompanying technical documentation in Czech
 - o Product quality and completeness certificate, which also serves as the warranty certificate
 - o EC Declaration of Conformity
 - o Calibration sheet for uncertified calibrated design
 - o Product manual

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

- Copy of the Inspection Certificate 3.1 for 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 protocol of test results for certification of seismic capability pursuant to ČSN IEC 980
- For certified design
 - o Confirmation about rated gauge certification
 - o Copy of gauge type approval decision in ČMI

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 11/1K3 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).

ORDERING OF TEMPERATURE SENSORS

The purchase order shall specify

- Name
- Product ordering number
- If calibration is required and in what temperature points
- If certification in temperatures below zero (negative temperatures) is required
- If the delivery of weld-on pieces pursuant to the type 991 is required for the sensor as accessories
- Other (special) requirements
- Number of pieces or pairs

PURCHASE ORDER EXAMPLE**Standard design:**

Resistance temperature sensor with heat sink, with very high mechanical resistance 112 826 732 - 6 pcs

We request a confirmation about rated gauge certification to be delivered with the sensors

Special requirement:

Resistance temperature sensor with heat sink, with very high mechanical resistance 112 821 731, tolerance class A – 6 pcs

ORDERING WELD-ON PIECES

The purchase order shall specify

- Name
- Ordering number of the weld-on piece
- 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)

DESIGN OF TEMPERATURE SENSORS WITH HEAT SINK TO 400 °C - NOT CERTIFIED

SPECIFICATIONS		ORDERING NUMBER				
		112 82	6	x	x	x
Measuring resistor pursuant to ČSN IEC 751, tolerance class B	Pt 100/B/2			1		
	2 x Pt 100/B/2			2		
Heat sink material	12 022				1	
	1.4541				3	
Design of measuring end	100 *)					0
	160					1
	250					2
	400					3
	630					4
	Other, max. 1000 mm *)					

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

DESIGN OF TEMPERATURE SENSORS WITH HEAT SINK TO 600 °C - CERTIFIED

SPECIFICATIONS		ORDERING NUMBER				
		112 82	1	x	x	x
Measuring resistor pursuant to ČSN IEC 751, tolerance class B or A *)	Pt 100/ /4			7		
	Pt 100/B/4C			8		
Heat sink material	15 128				2	
	1.4541				3	
Design of measuring end	100 *)					0
	160					1
	250					2
	400					3
	630					4
	Other, max. 1000 mm *)					

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

DESIGN OF TEMPERATURE SENSORS WITH HEAT SINK TO 600 °C - NOT CERTIFIED

SPECIFICATIONS		ORDERING NUMBER				
		112 82	6	x	x	x
Measuring resistor pursuant to ČSN IEC 751, tolerance class B or A *) **)	2x Pt 100/B/2			6		
	Pt 100/ /4			7		
	Pt 100/B/4C			8		
Heat sink material	15 128				2	
	1.4541				3	
Design of measuring end	100 *)					0
	160					1
	250					2
	400					3
	630					4
	Other, max. 1000 mm*)					

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

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

CERTIFICATION pursuant to THE ACT 505/1990 Coll.

The sensors are certified pursuant to TPM 3342-94. Certified sensors are provided with a label with an official certification mark. 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.

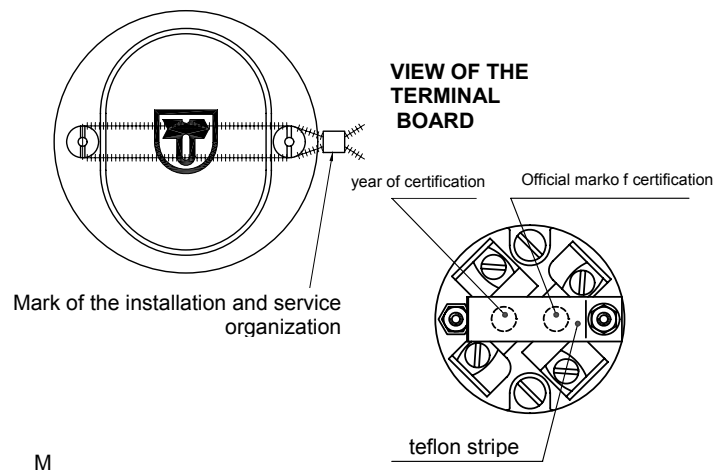
The purchase order shall specify:

- Number of the delivery note that was delivered with the sensor
- Product ordering number *)
- Manufacturing number *)

*) Data can be found 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.

TYPE OF SECURING THE COVER OF THE SENSOR



M

CALIBRATION

The calibration may be realized for 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 evenly distributed within the operation range of the sensor or in the points according to the requirement of the customer. Calibration sheets with measured data are issued for calibrated sensors.

INSTALLATION AND CONNECTION

SENSOR INSTALLATION

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)

INSTALLATION OF RATED GAUGE

The installation, commissioning and service maintenance of rated gauges pursuant to the Act No. 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, certified sensors shall be provided with a mark of the installation and service organization by an authorized worker of the installation and service organization.

COMMISSIONING

After the sensor installation and connection of the follow-up (evaluation) device to the supply voltage, the equipment is prepared for operation.

OPERATION AND MAINTENANCE

The sensor does not require any operation and maintenance.

With respect to rated gauges, the required period for follow-up certification shall be complied with in the period identified by the Regulation of the Ministry of Industry and Trade 345/2002 Coll. The replacement and connection of the certified sensors shall be performed by a worker of the installation or service organization, who shall seal the sensor again afterwards.

The official mark may only be violated by a worker of AMS. If the official mark has been violated or removed, the certification of the gauge is terminated.

SPARE PARTS

Spare parts shall be delivered by the manufacturer.

Relevant measuring inserts, heat sinks or head can be ordered pursuant to the offered price list of spare parts.

The inserts in the tolerance class A are only delivered at 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

Examples of application of weld-on pieces are specified in figure 2.

With respect to maintaining metrological properties and the longest possible service life, it is not recommended to install the sensors in places with high turbulence of the medium, which is caused e.g. by a rapid transition from a small diameter of the piping to a larger one (when failing to comply with the required shape and dimensions of diffuser behind the flow meter), etc. Recommended distance of the temperature sensor from the installation flange of the flow meter is min. 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 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 a double insulation with outer diameter from 5 to 12 mm, (internal wires with Cu core 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.

VIEW INTO SENSOR HEAD

receiving of the product by the customer, unless established otherwise in the contract. Rejection of defects shall be enforced in writing at the manufacturer within the warranty period. The rejecting side shall identify the product name, ordering and manufacturing numbers, date of issue and number of the delivery note, clear description of the occurring defect and the subject of the claim. If the rejecting side is invited to send the device for repair, it shall do so in the original package of the manufacturer and/or in another package ensuring safe transport.

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

REPAIRS

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

DISABLING AND LIQUIDATION

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

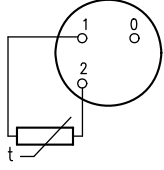
The product and its package do not include any parts that could impact the environment.

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.

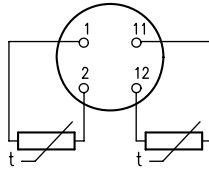
The manufacturer realizes free return withdrawal of marked electrical equipment (from 13.8.2005) from the consumer and points out the danger connected with their illegal disposal. The package of the sensor can be recycled completely. Metal parts of the products are recycled, non-recyclable plastic materials and electrical waste shall be disposed of in compliance with the aforesaid Act.

Figure 1 - CONNECTION SCHEME OF Temperature SENSORS

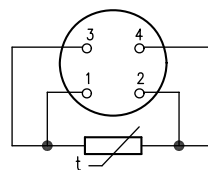
with single measuring resistor
in two-wire connection
(Pt 100/B/2)



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



with single measuring resistor
in four-wire connection
(Pt 100/ I4)



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

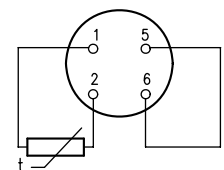
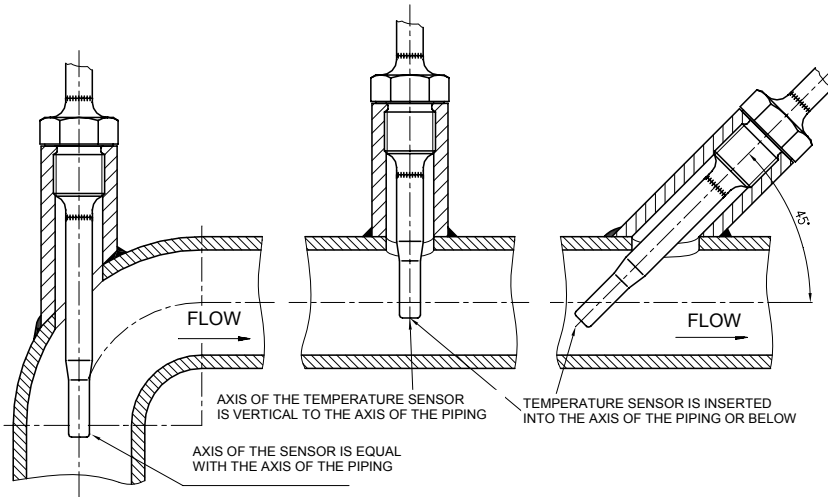


Figure 2 - Examples of installation of direct and angular weld-on pieces pursuant to ČSN EN 1434-2



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.

July 2006



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