



# Turbine resistance temperature sensor with cable outlet, with high mechanical resistance Type 112 67

## PRODUCT MANUAL

### APPLICATION

- For remote measuring of turbine bearing temperature and for other similar applications, where the sensor is installed in the bore hole of the device being measured (the collet does not have a sealing ring)
- 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)

### DESCRIPTION

The measuring resistor with the inner wiring is inserted into the stem tube with a screw fitting with a collet and nut and it is electrically insulated from the stem tube housing. The outlet cable is buried with insulation substance. The screw fitting with collet enables to change the change of submersion. The sensor cannot be disassembled.

To measure the temperature we use the defined change of sensor resistance in dependence of change of temperature in the environment being measures.

### TECHNICAL DATA

The sensor is performed in accordance to EN 61140 as the electrical device of protection class III for the utilization in the supply mains of installation overvoltage category II and a contamination degree 2 in accordance to EN 61010-1. The downstream device (evaluating) must conform to Art. 6.3 of this standard.

**Measuring range:** -70 up to 180 °C

**Electric strength** pursuant to EN 61010-1 Article 6.8.3:  
500 V ef

**Electrical insulation resistance** in accordance to EN 60751,  
min. 100 MΩ, by 15 up to 35°C, max. 80 % relative humidity, min 100 V DC

**Protection** in accordance to EN 60529: IP 65  
**Operation position:** discretionary

**Sensor weight:**  
For L = 45 up to 80 approx. 0, 50 kg  
For L = 80 up to 140 approx 0, 75 kg

**Type of operation:** continuous

#### Material used:

Stem tube of measuring element steel 1.4541  
Cable outlet Cu veins with silicone insulation, outside insulation – silicon

### OPERATION CONDITIONS

Environment defined by the group of parameters and their degree of severity IE 36 in accordance to EN 60721-3-3 and the operation conditions as follows:

**Temperature at the outlet of cable from sensor:**  
Permanently -55 up to 180 °C

**Relative humidity of external environment:**  
10 up to 100 % with condensation, with the upper limit of water content 29 g H<sub>2</sub>O/kg of dry air

**Atmospheric pressure:** 70 up to 106 kPa

**Vibrations:**  
Frequency range 10 up to 55 Hz  
Deflection amplitude 0, 35 mm  
Acceleration amplitude 49, 0 ms<sup>-2</sup>

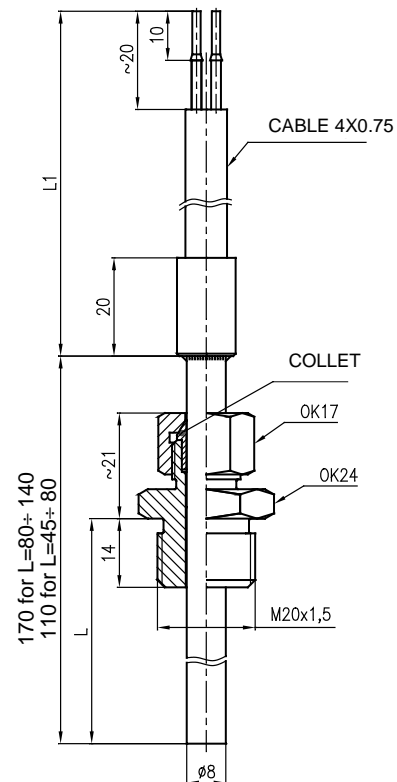
### METROLOGICAL DATA

**Sensing probe:** measuring resistor Pt 100 single or double in the connection in accordance to connection diagram and table of versions  $\alpha = 0, 00385 [K^{-1}]$ , toleration class B or A (only for 4-wire in accordance to EN 60751).

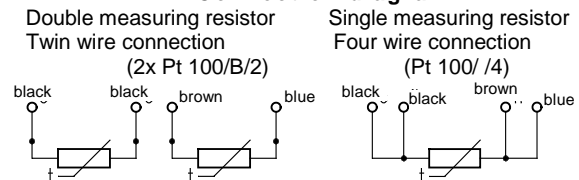
**Internal wiring resistance** at 20 °C  
2 x 0, 75 mm<sup>2</sup> 0,056 Ω/m

**Maximum current loading of measuring resistor:** 5 mA

**Measuring current recommended:** 1 mA



### Connection diagram



**Submersion calibration depth:** 100 mm  
**Temperature time response** in accordance to EN 6051 in whirling water (characteristic value):  
 $\tau_{0,5}$  13 s  
 $\tau_{0,9}$  33 s

### DESIGNATION

#### Data on sensor screw fitting

- Manufacturer trade marks
- Type of resistance, nominal value  $R_0$  / toleration class / configuration of wires if the inner wiring
- Product order number
- Protection
- time code or serial number (serial number for calibrated design and for design with tolerance class A)
- Maximum operation temperature

### DELIVERY

Each delivery shall contain if it's not otherwise agreed with the customer:

- Delivery note
- The sensor according to the order, outlet cable is twisted into a bundle and is ensured against the unrolling.
- Accompanying technical documentation in Czech language:
  - o Product manual
  - o Certificate of quality and completeness of the product, which also serves as the warranty certificate

If it is stipulated in the purchase contract or it is not otherwise agreed the product can be delivered with the additional documentation:

- o Copy of inspection certificate 3.1 for the stem tube material with heat number
- o Test report about the seismic and the vibration qualification
- o Calibration sheet (for uncertified calibrated design)

**PACKING**

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 11/1K3 pursuant to 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.)

**RELIABILITY**

Indicators of reliability in operation conditions and conditions of the environment specified in this manual

- mean time of operation between failures 96 000 hours (information value)
- expected service life 10 years

**ORDERING**

The purchase order shall specify

- name
- product ordering number
- if is required calibration and in what temperature points
- other (special) requirements
- number of pieces

**PURCHASE ORDER EXAMPLE**

**Standard design:**

Turbine resistance temperature sensor with cable outlet, with high mechanical resistance  
112 675 814  
15 pieces

**Special requirement:**

Turbine resistance temperature sensor with cable outlet, with high mechanical resistance 112 212 149  
112 675 629  
cable length 8 m  
6 pieces

**DESIGN OF TEMPERATURE SENSORS**

SPECIFICATION		ORDER NUMBER				
		112 67	5	x	x	x
Measuring resistor accordance to EN 60751 Toleration class B or A **)	Pt 100/ /4			6		
	2x Pt 100/B/2			8		
Measuring resistor	Other *)			9		
Nominal length L [mm]	od 45 do 80				1	
	od 45 do 140				2	
Length of cable outlet L1 [m]	2,5					3
	4					4
	6,3					5
	10					6
	16					7
	Other *)					9

\*) only as a special requirement after an agreement with the manufacturer  
\*\*) measuring resistor in tolerance class A only in four-wire connection

**CALIBRATION**

It is realized pursuant to TPM 3342-94 and in compliance with EN 60751, usually in three temperature points evenly distributed in the operation range of the sensor or in the points according to the requirement of the customer. Calibration sheet with measured data is issued for calibrated sensors.

**INSTALLATION AND CONNECTION**

Fix the sensors by screwing the screw fitting into the bore hole of turbine bearing or the nipple of technological equipment in case of other applications. Operation position of sensors is discretionary; don't situate the outlet cable in the direction upwards and reduce the load of it. Submersion of sensor can be set up in range of 45 - 80 mm and 80-140 mm. Secure the collet by removing the nut.

The electrical connection may be only realized by qualified workers.



**WARNING**

**Cable of sensor must be protected against the effect of oil products and organic solvents!**



**COMMISSIONING**

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

**OPERATION AND MAINTENANCE**

The sensor doesn't require any special manipulation or maintenance.

**SPARE PARTS**

Design of sensor doesn't require spare parts deliveries.

**REPAIRS**

It is impossible to disassemble the sensor and therefore it is not being repaired.

**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.

## 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.

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