

Temp-485-Pt100

*A temperature sensor (Pt100 or Pt1000)
communicating over the RS-485 bus
with a simple communication
protocol*



- **Temp-485-Pt100 “Box”** version [600 113]
- **Temp-485-Pt100 “Cable”** version [600 114]
- **Temp-485-Pt100 “Head”** version [600 110]
- **Temp-485-Pt100 “DIN”** version [600 111]
- **Temp-485-2xPt100 “DIN”** version [600 112]
- **Pt100** sensor, 2m cable **“PT30”** [600 115]

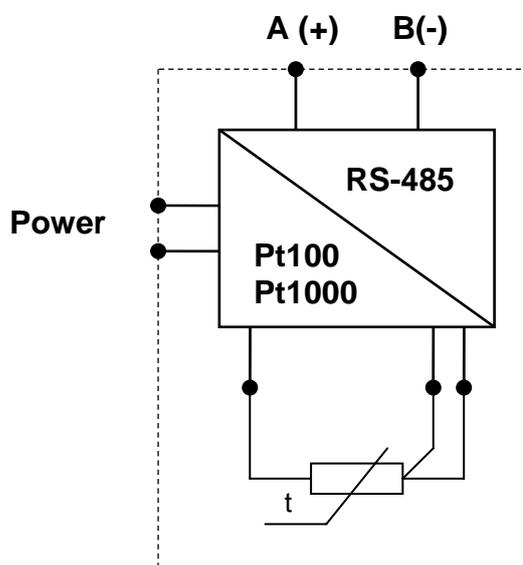
Device description

Temp-485-Pt100 and **Temp-485-2xPt100** devices are thermometers communicating over the RS-485 bus. These thermometers use the Pt100 temperature sensor. The device is manufactured in several versions, which have identical functionality:

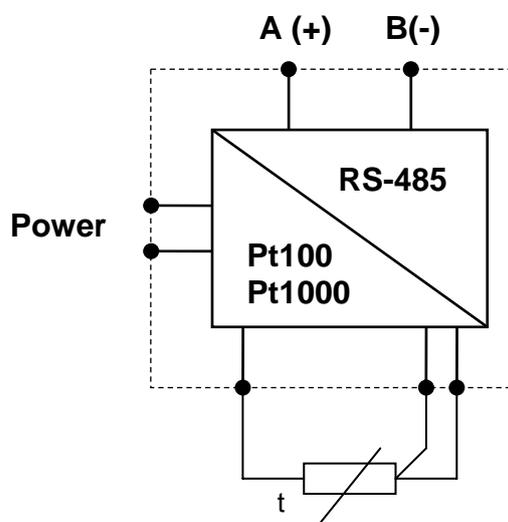
- **Temp-485-Pt100** the “**Box**” version [600 113]
A box for wall mounting which includes the RS-485 converter and a temperature sensor Pt100/A. This temperature sensor is in the measuring metal rod, which is lead out of the box. The box has an IP65 protection.
- **Temp-485-Pt100** the “**Cable**” version [600 114]
A box for wall mounting which includes the RS-485 converter and a temperature sensor Pt100/A. The sensor is connected to a 2m long cable, which is included in the supply.
- **Temp-485-Pt100** the “**Head**” version [600 110]
The “Head” version is a converter between the outside temperature sensor and a RS-485 bus, designed to be mounted in the unified “B” thermometer head. You need to connect a Pt100 platinum temperature sensor, which is not part of the shipment. You can use a 2- or 3-wire connection.
- **Temp-485-Pt100** the “**DIN**” version [600 111]
The „DIN” is a converter between the outside temperature sensor and a RS-485 bus. The converter is designed to be mounted on a DIN molding.
You need to connect a Pt100 platinum temperature sensor, which is not part of the shipment. You can use a 2- or 3-wire connection.
- **Temp-485-2xPt100** the “**DIN**” version [600 112]
This unit is identical with the Temp-485-Pt100 „DIN” version, but you can connect two Pt100 sensors.

The measured temperature is transmitted over a simple text protocol in °C. You can connect up to 31 sensors on a 4-wire bus (two wires for the RS-485 bus, two wires for sensor’s powering). The sensors can be powered from a independent power source and you can use only the 2 RS-485 wires. The RS-485 bus line can be up to 1200m long. The temperature sensors do not include a terminal resistor.

The thermometer uses a standard Pt100 platinum sensor. The sensor is either a part of the device (the „Box” version), or it can be connected using two or three wires.



Temp-485-Pt100, version: Box



Temp-485-Pt100, version Cable, Head a DIN

Basic features

- Temperature range -55°C to +640°C
- Accuracy: $\pm 0,2^{\circ}\text{C}$
($\pm 0,3^{\circ}\text{C}$ if the „Head” and „DIN” version isn't calibrated with the specific sensor).
- Every sensor is tested and calibrated
- Sensor type (Pt100 or Pt1000) auto detection
- The Pt100 can be connected with 2 or 3 wires.
- Can be used in industrial premises
- RS-485 communication
- A simple communication protocol, software selectable RS-485 address
- You can connect two Pt100 sensors to one DIN unit (Temp-485-2xPt100)
- RS-485 communication is compatible with our SNMP thermometer - Poseidon

Applications

- Wide temperature measuring systems
- Industrial measurements and regulations
- Measuring temperature in storage, manufacturing and industrial premises
- After interfacing with the Poseidon device – measuring in technological premises and transferring the data over Ethernet

Temp-485-Pt100 “Box” version

The box version includes the Temp-485-Pt100 “Head” version together with the Pt100/A temperature sensor in one plastic box. This temperature sensor is in the measuring metal rod, which is lead out of the box.

The Temp-485-Pt100 „Box” version is designed for wall mounting; you can use the two mounting holes.

Box dimensions

Box dimensions	58 x 165 x 35 mm
Protection type (connection block box):	IP68
Protection type (connection block):	IP10
Operating temperature:	-25...+ 80°C

Sensor type

Sensor type	Pt100/A
- input signal:	range: -30 .. 200 °C
- sensor connection:	2-wire
- accuracy:	+/-0,2°C

Communication line

Communication line	RS 485
- output, communication:	ASCII (9600Bd 8N1)
- resolution:	0,01°C
- measurement frequency:	1/810 ms
- addressing:	SW, defined by commands over RS-485
- line termination:	none, outside termination

Power voltage:

Power voltage:	8...28V DC (polarity inversion protection)
- power consumption (measurement):	typ. 2 mA
- power consumption (RS-485 transmit):	typ. 60 mA

- wire connection:	terminals CUU 2,5 mm ²
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Certifications:

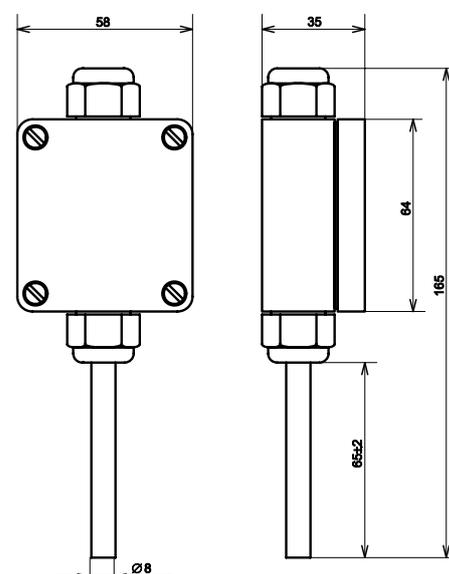
- Basic certification:	EN 770
- EMC certification:	EN 61326-1
- Security certification:	EN 61010-1

Temp-485-Pt100 “Cable” version [900 754]

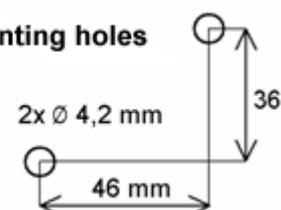
This version uses identical box, with only one cable grommet. The sensor is connected using a 2-wire cable (Pt30) – included in the supply.



Note: Pin description can be found in the Temp-485-Pt100 “Head” version description below.



Mounting holes



Temp-485-Pt100 “Head” version

Temp-485-Pt100 “Head” version is a converter designed for mounting in the unified thermometer head.

You need to connect a Pt100 temperature sensor which is not part of the shipment. The converter uses a RS-485 to communicate with a supervisor. The communication speed is 9600 Bd with 8N1 parameters.

The converter can be used in industrial premises.

Box dimensions \varnothing 42mm / height: 29 mm

Protection type (connection block box): IP68

Protection type (connection block): IP10

Converter operating temperature -25...+ 80°C

- sensor type: Pt100 or Pt1000

- input signal: Pt100 (IEC 751)
range: **-55 .. 640 °C**

- sensor connection: 3- or 2-wire

- max. wire calibrated resistance: < 20 Ω /1 wire

- wire resistance influence: < \pm 0,1°C

- error of measurement: 0,03% from range

- current consumption (measurement): <0,6 mA

Communication line RS 485

- output, communication: ASCII (9600Bd 8N1)

- resolution: 0,01°C

- measurement frequency: 1/810 ms

- digital filter FIR 1. class

- addressing: SW, by RS-485

- line termination: none, outside termination

Power voltage 8...28V DC

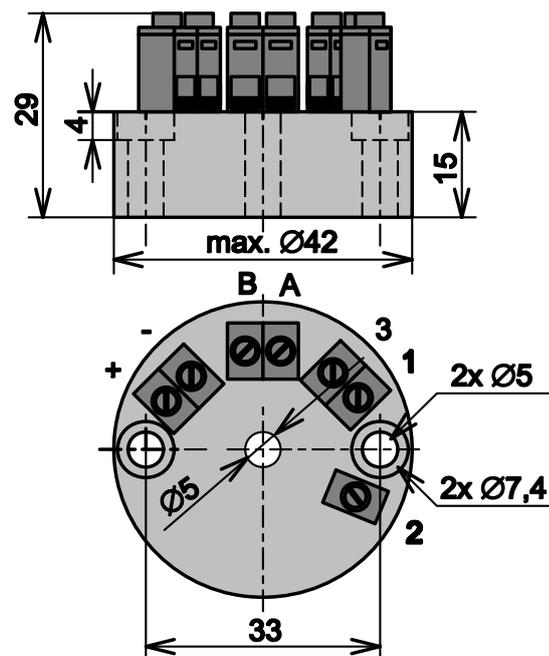
(polarity protection)

- power consumption: typ. 2 mA, typ. 60 mA
when transmitting

- wire connection terminal: CUU 2,5 mm²

Certifications:

- Basic certification: EN 770
- EMC certification: EN 61326-1
- Security certification: EN 61010-1



A: RS-485 A (+)

B: RS-485 B (-)

+: power 8...28 V DC

-: power (GND)

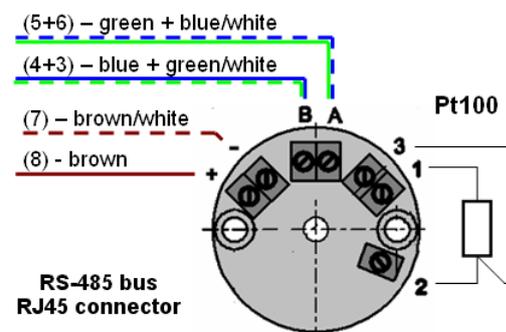
1: Pt100 sensor (typ. Red wire)

2: Pt100 sensor (typ. White wire)

3: Pt100 sensor (typ. Black wire)
compensation input for the
Pt100 sensor – if you use the
2-wire connection, you need
to **connect this to pin 2!**

Note

You need to connect Pin 3 with pin 2 either on the side of the converter (2 wire, not compensated) or on the Pt100 sensor (3 wire connection, compensated).



Pt100 wiring:

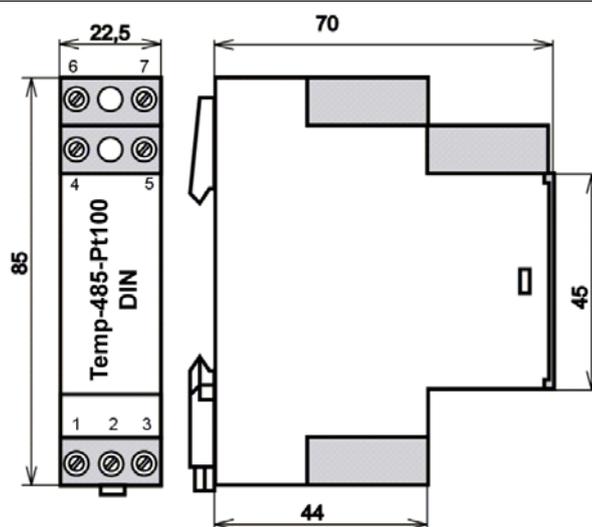
- 1:** white
- 2:** red
- 3:** blue
- black not connected

Temp-485-Pt100 “DIN” version

The „DIN” version is a temperature converter between an outside temperature sensor and the RS-485 bus. The converter can be mounted on a DIN molding.

You need to connect a Pt100 temperature sensor which is not part of the shipment. The converter uses a RS-485 to communicate with a supervisor. The communication speed is 9600 Bd with 8N1 parameters.

The converter can be used in industrial premises.



Box dimensions 22,5 x 85 x 70 mm

- mounting:

molding 35 mm

- protection type (box): IP40

- protection type (connection block): IP10

Converter operating temperature: -25...+ 80°C

Wire connection: terminals, CUU 2,5 mm²

Power voltage: 8...28V DC

- power consumption (measurement): typ. 2 mA

- power consumption (RS-485 transmit): typ. 60 mA

DIN

- 1: Pt100 sensor (typ. Red wire)
 2: Pt100 sensor (typ. White wire)
 3: Pt100 sensor (typ. Black wire) compensation input for the Pt100 sensor – if you use the 2-wire connection, you need to **connect this to pin 2!**

4B: RS-485 B (-)

5A: RS-485 A (+)

6-: power (GND)

7+: power 8...28 V DC

Note: You need to connect Pin 3 with pin 2 either on the side of the converter (2 wire connection, not compensated) or on the side of the sensor (3 wire connection, compensated).

Sensor type Pt100 or Pt1000
 - input signal: Pt100 (IEC 751),
 - Temperature range: -55...640 °C

- sensor connection: 3- or 2-wire
 - max. wire calibrated resistance: < 20 Ω /1 wire
 - wire resistance influence: ± 0,1°C
 - error of measurement: 0,03% form range
 - current consumption (measure): <0,6 mA

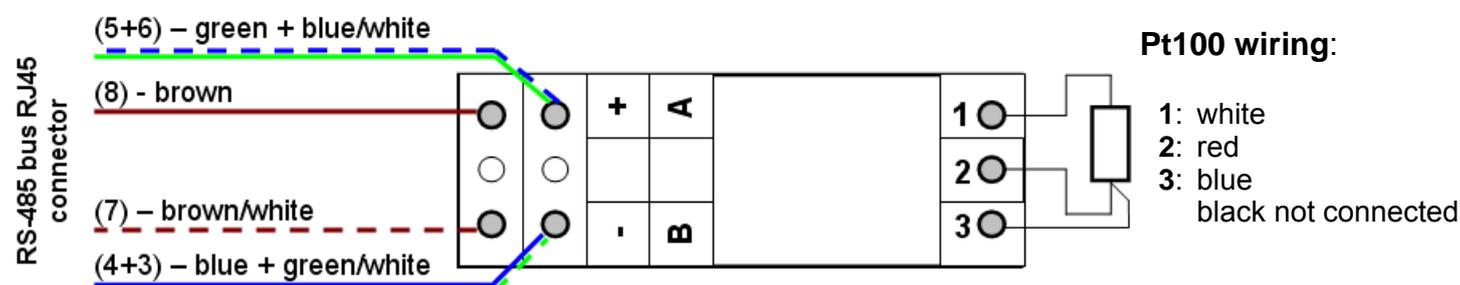
Communication line RS 485
 - output, communication: ASCII (9600Bd 8N1)
 - resolution: 0,01°C

- measurement frequency: 1/810 ms
 - digital filter: FIR 1. class

- addressing: address defined by RS-485
 - line termination: none, outside termination

Certifications:

- Basic certification: EN 770
- EMC certification: EN 61326-1
- Security certification: EN 61010-1



Temp-485-2xPt100

The “Temp-485-2xPt100” version is a temperature converter between two outside temperature sensors and the RS-485 bus. The converter can be mounted on a DIN molding.

You need to connect a Pt100 temperature sensor which is not part of the shipment. The converter uses a RS-485 to communicate with a supervisor. The communication speed is 9600 Bd with 8N1 parameters. The converter can be used in industrial premises.

There are 2 temperature sensors connected to this device, and two RS485 addresses on the communication protocol. But it's still one device only, so you can assign new address with using “T#<new address>” command. You can define only first sensor's address in this way (upper case - for example „A”). The second sensor address is on the lower case character address (for example „a”). Both addresses are assigned at once, with the capital letter.



Box dimensions

	22,5 x 85 x 70 mm	1, 2: first Pt100 sensor
- mounting:	DIN molding, 35 mm	3: compensation wire for the 3-wire connection.
- protection type (connection block box):	IP40	4, 5: second Pt100 sensor
- protection type (connection block):	IP10	6: compensation wire for the 3-wire connection.
Converter operating temperature:	-25...+ 80°C	

Wire connection

	terminals CUU 2,5 mm ²	7B: RS-485 B (-)
		8A: RS-485 A (+)
Power voltage:	8...28V DC	9-: power (GND)
- power consumption (measurement):	typ. 2 mA	10+: power 8...28 V DC
- power consumption (RS-485 transmit):	typ. 60 mA	

Note

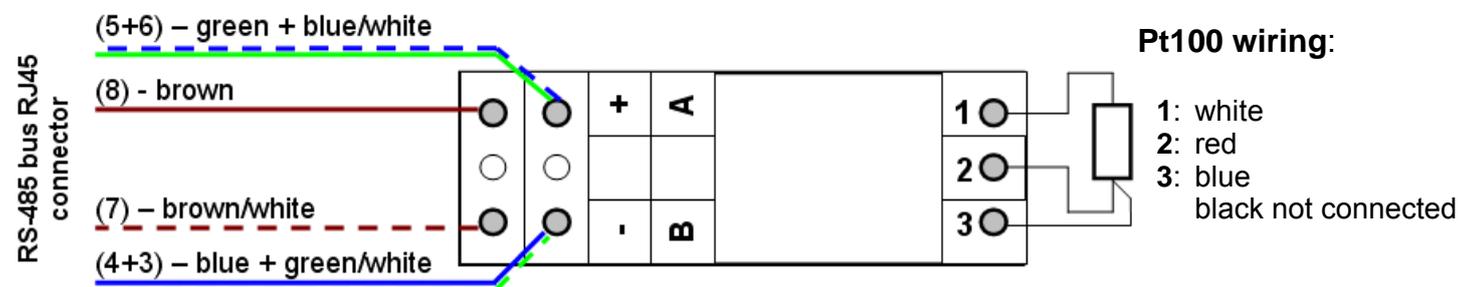
the compensation pin must be connected with pin 2 or 5 on the converter or sensor side.

Sensor type

- input signal:	Pt100 or Pt1000	Communication line	RS 485
- Temperature range:	Pt100 (IEC 751), -55...640 °C	- output, communication	ASCII (9600Bd 8N1)
		- resolution:	0,01°C
- sensor connection:	3- or 2-wire	- measurement frequency:	1/810 ms
- max. wire calibrated resistance:	< 20 Ω /1 wire	- digital filter	FIR 1. class
- wire resistance influence:	± 0,1°C		
- error of measurement:	0,03% form range	- addressing:	software address by RS-485
- current consumption (measure):	<0,6 mA	- line termination:	none, outside termination

Certifications:

- Basic certification:	EN 770
- EMC certification:	EN 61326-1
- Security certification:	EN 61010-1



Setting sensor address

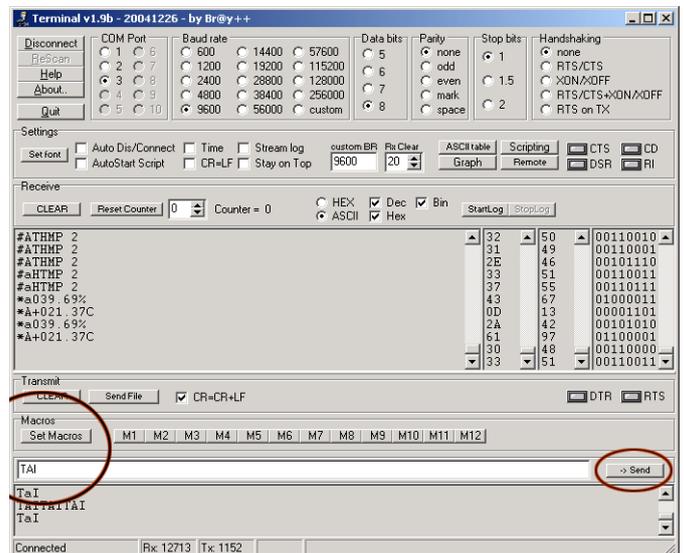
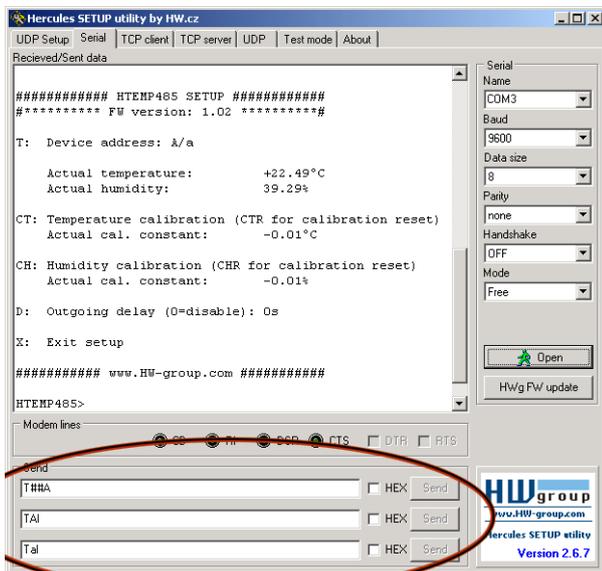
The RS-485 address must be unique and can be chosen using the „**T#<address>**“ command. This command can be used only if there is one sensor connected on the RS-485 line.

The command must be sent as a sequence of characters, with max. 1s delay between characters.

If you have a double sensor, the address is assigned to both sensors at once. The first sensor gets the capital letter address, the second sensor has a lowercase letter address.

Notes

- If you set the address using the „T#A” macro containing the „#” character, you need to double this character, because it is often used for inserting decimal value.



Communication protocol

The sensor works in question – answer mode. The response time is max. 20ms.

Communication bus RS-485
 Address range “A” .. “Z” (except „T”) and “a” ..”z” (25 + 26 addresses)

Communication..... ASCII, described below
 Response times..... max. 20 ms per command

Speed.....9600 baud
 Data bits 8
 Parity none
 Stop bits..... 1

Temperature reading

Function	Command syntax	Example
temperature request	T<address>I	TAI
answer from sensor (all OK)	* <address><temp><CR>	*A+025.51C
answer from sensor (error)	* <address>Err<CR>	*AErr

<address> is a character from „A” to „Z” and „a” .. „z”, except „T”,

<CR> is a 0xD or 13 dec character – line end

<temp> has two decimal places *A+025.55C

Device identification

Function	Command syntax	Example
device type request	T<address>?	TA?
answer from sensor (all OK)	* <address><Identification><cr>	*ATemp-485-Pt100

<Identification> a „Temp-485-Pt100” or „Temp-485-Pt1000” string

Sensor type detection is automatic, the identification is for user information only.

Sensor address setup

You must have only one unit connected to a RS-485 bus, or you will change all your unit's addresses! You must send the whole command within 3 seconds (be careful when typing on a keyboard).

Warning: The address will be changed, only if it's first received command after power-up.

Function	Command syntax	Example
Address change	T#<new address>	T#A
answer from sensor	*<new address>OK<CR>	*AOK

<address> is a character from „A” to „Z” and „a” .. „z”, except „T”
 <cr> is a 0xD or 13 dec character – line end

Note: When you set the **Temp-485-2xPt100** device, you only need to setup one address; the other sensor will get the lowercase letter of the address you assigned.

Reading one sensor in the line

The „\$” is used as a common address, so all the sensors will reply. This is the way to determine a sensor address if you have only one sensor connected.

Function	Command syntax	Example
temperature request	T\$I	T\$I
answer from sensor	*<address><temp><CR>	*A+025.51C

<CR> is a 0xD or 13 dec character – line end
 <temp> is in the *A+025.55C format

Temperature sensor Pt100 – type PT30

A Pt100 temperature sensor device is recommended to be used with the above thermometers. This temperature sensor is in the measuring metal rod and connected with a 4-wire cable.

The sensor can be bind to the measured system in any suitable way.

Sensor

- metal rod length
- sensor diameter
- housing

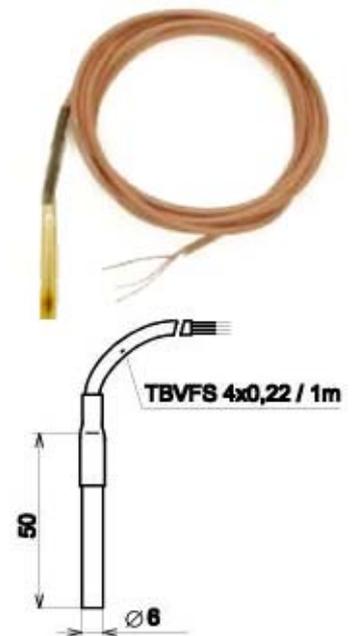
Pt100/A
50 mm
6 mm (+ insulation)
stainless steel ČSN 17.248
(DIN 1.4300 or ASTM 302)

Connecting cable

- cable type:
- temperature range:
- cable ends
- coloring

typically 2m
4 x 0,22mm² teflon insulation, metal covering, silicone sleeve
-55 to 200°C
not-insulated, tin-plated

white + black, red + blue
(wires marked with „+” are connected)



Certifications:

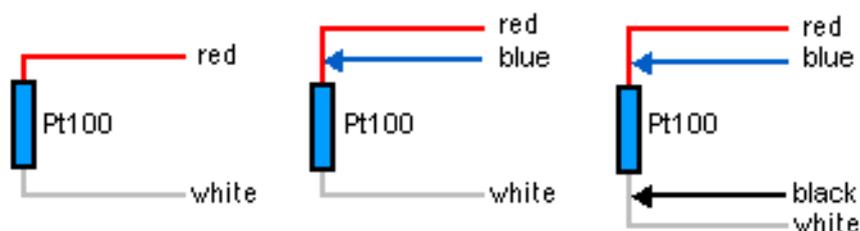
- Basic certification: EN 771
- EMC certification: EN 61326-1
- Security certification: EN 61010-1

Some basic parameters

Pt100/A accuracy
Pt100/B accuracy

$$\Delta t = \pm(0,15 + 0,002 \times |t|) [^{\circ}\text{C}]$$

$$\Delta t = \pm(0,30 + 0,005 \times |t|) [^{\circ}\text{C}]$$



- If you need longer wires (more than 2 meters), choose wires with bigger diameter for more accurate measurement.
- If you are using a 3-wire connection, you must use three identical wires to connect the sensor.

Application tips

- **Is it better to choose Pt100 or Pt1000?**
The Pt100 sensor consumes more current, so we recommend it for industrial usage, if you need to connect the sensor using thin wires, choose the Pt1000.
- **Which cables can I use?**
For sensors cabling, the most economical solution is using a twisted pair (TP) cable, which is used for wiring computer networks.
- **2- or 3-wire connection**
We recommend using a 3-wire connection if the Pt-100 sensor is farther than 50cm from the converter (**the „Head” and „DIN” versions**). This will compensate the wire resistance influence. You must use 3 identical wires for the measurement to be accurate.

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