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
- **Temp-485-Pt100 "Cable"** version
- **Temp-485-Pt100 "FROST"** version
- **Temp-485-Pt100 "Head"** version
- **Temp-485-Pt100 "DIN"** version
- **Temp-485-2xPt100 "DIN"** version
- **Pt100** sensor, 2m cable **"PT30"**

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
  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
  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
  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
  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
  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.
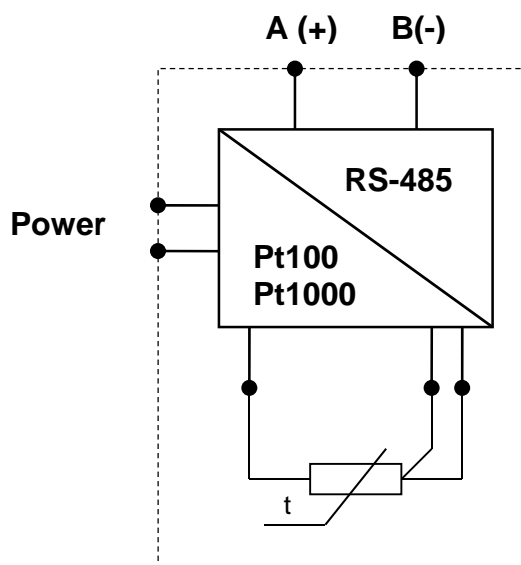
Temp-485-Pt100, version: **Box**
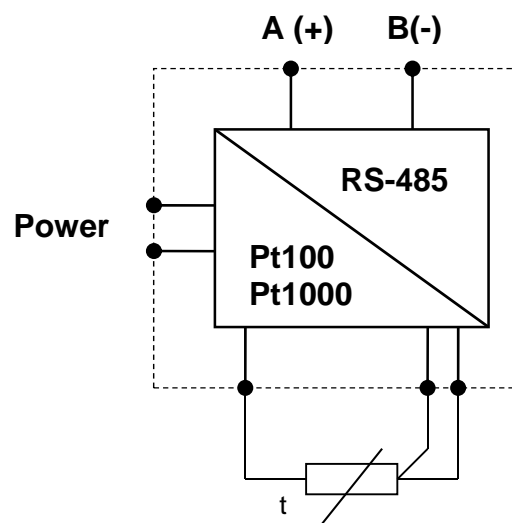
Temp-485-Pt100, version **Cable**, **Head** a **DIN**

Basic features

- Temperature range -55°C to +640°C

- Accuracy: ± 0,2°C
  (± 0,3°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	58 x 165 x 35 mm
Protection type (connection block box):	IP65
Protection type (connection block):	IP10
Operating temperature:	**-25 to + 80°C**

Sensor type	Pt100/A
- input signal:	range: **-30 - 200 °C**
- sensor connection:	2-wire
- accuracy:	**± (0.25 + 0.002t) [°C]**

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

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

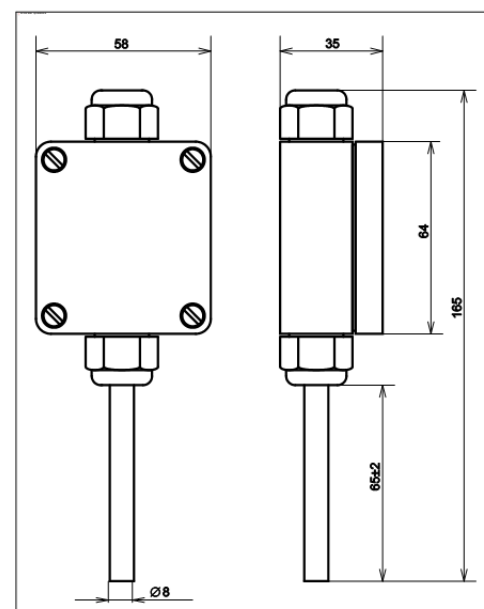|	
Power voltage:	**8...28V DC** (polarity inversion protection)
- power consumption (measurement):	typ. 2 mA
- power consumption (RS-485 transmit):	typ. 60 mA
- wire connection:	terminals CUU 2,5 mm^2

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

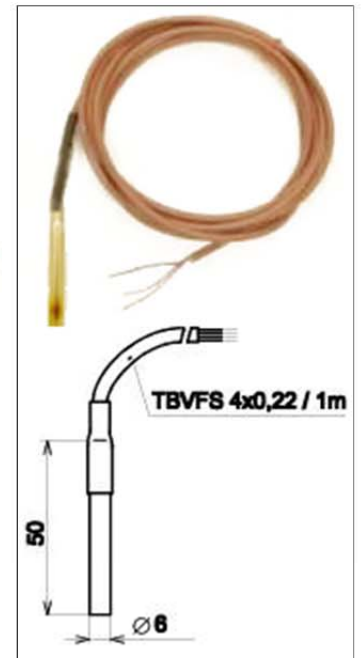**Mounting holes**

2x Ø 4,2 mm   36

46 mm

Temp-485-Pt100 "Cable" version

This version uses identical box, with only one cable grommet.
The sensor is connected using a 2-wire cable (PT30) – included in the supply.

Temp-485-Pt100 "Frost"

Temperature sensor for very low temperatures. The probe in a stainless steel housing measures temperatures from -190°C to +200°C (-310°F to +392°F), accuracy ±0.2°C (Pt100).

The RS-485 converter is built into a wall-mountable, IP67 box. Operating temperature is -25°C to +80°C (-13°F to +176°F).

Typical applications include temperature measurement in the pharmaceutical industry or freezing plants.

- **Environment**: Indoor or outdoor use – IP67, wall mount
- **Supplied probe**: External Pt100 sensor for low temperatures (stainless steel housing, 2m cable)
- **Temperature range of the supplied probe:** -190°C to +200°C (-310°F to +392°F) / 2m
- **Accuracy**: $\pm (0.36 + 0.005t)$ [°C]

- **Operating temperature**: The converter works from -25 to +80°C (-13 to +158°F)
- **Interface**: RS-485, terminals
- **Compatible with**: Poseidon 2250
- **Power supply**: From the Poseidon (12V), or 8..28VDC

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   ∅ 42mm / height: 29 mm

Protection type (connection block box): IP65
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: < ± 0,1°C
- error of measurement: 0,03% from the range
- current consumption (measuremement):   <0,6 mA

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!**

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
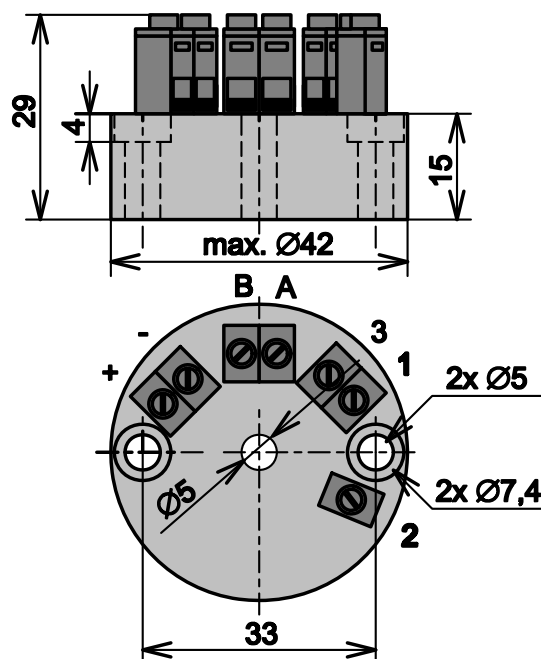- line termination: none, outside termination

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).

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
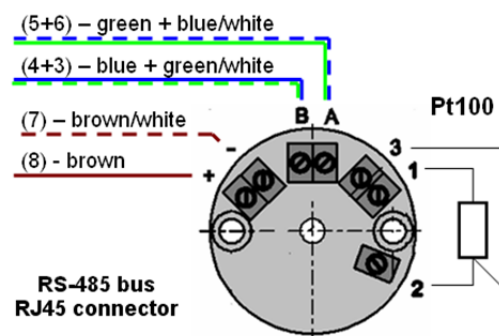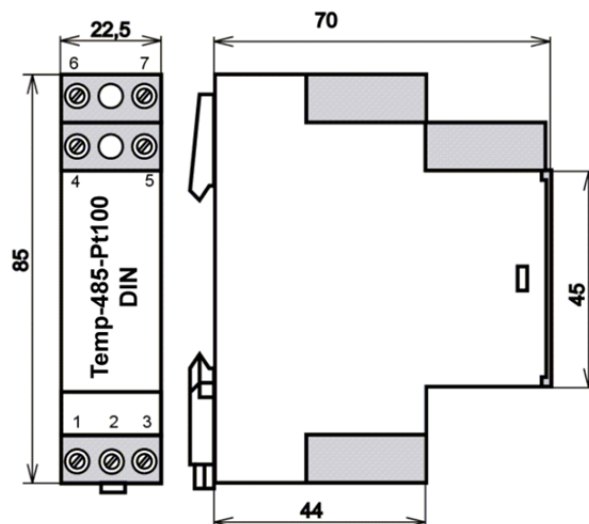

Pt100 wiring:

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.

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!**

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 mm^2

4B: RS-485 B (-)
5A: RS-485 A (+)

6-: power (GND)
7+: power 8…28 V DC

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

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		**Communication line**	RS 485
- input signal:	Pt100 (IEC 751),		- output, communication	ASCII (9600Bd 8N1)
- Temperature range:	**–55…640 °C**		- 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:	address defined 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

(5+6) – green + blue/white
RS-485 bus RJ45 connector
(8) - brown
(7) – brown/white
(4+3) – blue + green/white

Pt100 wiring:

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

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
- mounting:	DIN molding, 35 mm
- protection type (connection block box):	IP40
- protection type (connection block):	IP10

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

Wire connection	terminals CUU 2,5 mm^2

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

1, **2**: first Pt100 sensor
    3: compensation wire for the 3-wire connection.

4, **5**: second Pt100 sensor
    6: compensation wire for the 3-wire connection.

7B: RS-485 B (-)
8A: RS-485 A (+)

9-: power (GND)
10+: power 8…28 V DC

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

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

Certifications:

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

Communication line	RS 485
- output, communication	ASCII (9600Bd 8N1)
- resolution:	0,01°C
- measurement frequency:	1/810 ms
- digital filter	FIR 1. class
- addressing:	software address by RS-485
- line termination:	none, outside termination

Pt100 wiring:

1: white
2: red
3: blue
black not connected
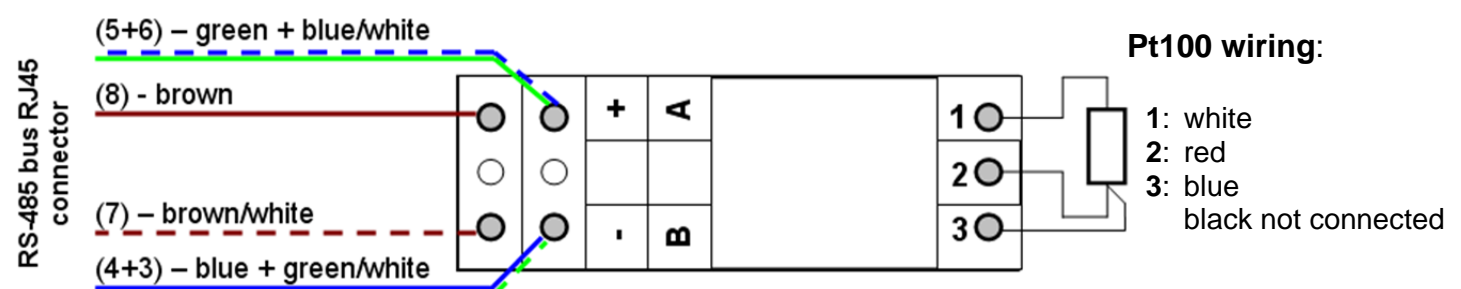
Setting sensor address

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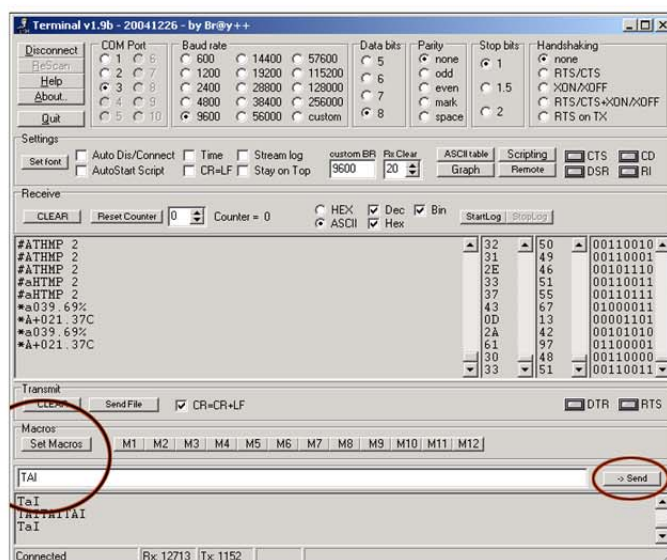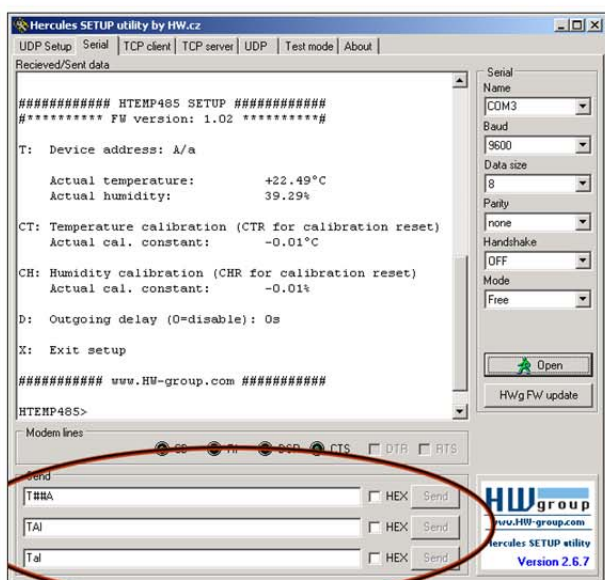
Communication protocol
The sensor works in question – answer mode. The response time is max. 20ms.

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<addrres>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	Pt100/A
- metal rod length	50 mm
- sensor diameter	6 mm (+ insulation)
- protection type	IP67
- housing	stainless steel EN17248 (DIN 1.4300 or ASTM 302)
Connecting cable	typically 2m
- cable type:	$4 \times 0{,}22mm^2$ teflon insulation, metal covering, silicone sleeve
- temperature range:	−55 to 200°C
- cable ends	not-insulated, tin-plated
- coloring	white + black, red + blue (wires marked with „+" are connected)
- Accuracy:	±(0.15+0.002t) [°C]

Certifications:

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

Some basic parameters

Pt100/A accuracy	$\Delta t = \pm(0.15 + 0{,}002 \times |t|)$ [°C]
Pt100/B accuracy	$\Delta t = \pm(0{,}30 + 0{,}005 \times |t|)$ [°C]
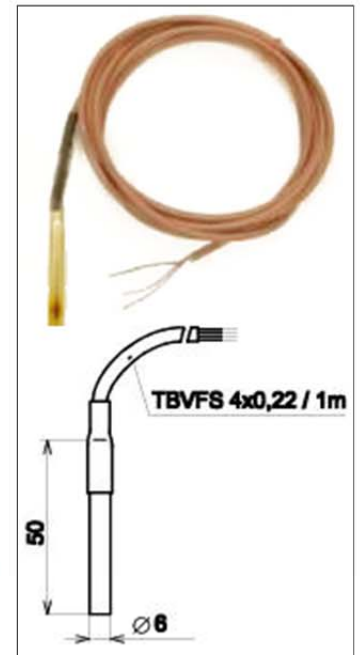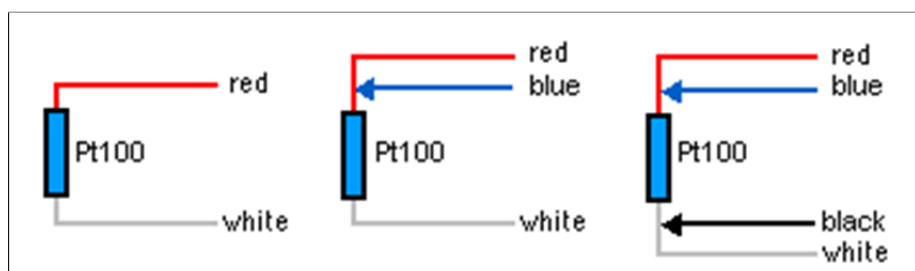
- If you need longer wires (more than 2 meters), choose wires with bigger diameter for more accurate measurement.

- 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.

Contact us

HW group s.r.o

Rumunska 26 / 122
Prague 2, 120 00
Czech Republic

Tel. +420 222 511 918

Fax. +420 222 513 833

http://www.HW-group.com