

**Intelligent single channel temperature transducer with Ethernet connection  
P8511**

**Intelligent four channel temperature transducer with Ethernet connection  
P8541**

**Intelligent temperature meter with Ethernet connection  
P8510**

**Instruction manual**

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# 1. Introduction

The P8511 transducer is designed to measure temperature through the single external DS 18B20 sensor. The P8541 transducer is designed to measure temperature through the four external DS 18B20 sensors. Sensors are connected through the cinch connector. The P8510 measures temperature through the internal DS 18B20 sensor. The communication with meter is over Ethernet.

## 2. General safety rules

The following summary is designed to prevent injury hazards or device damage. Operate the instrument in accordance with this manual to prevent electric trauma.

**Service should be performed by a qualified person only.**

Precautions against injury or fire

**Use a safety ac/dc adapter.** Use only an adapter with the power voltage recommended by its manufacturer and which is approved by proper standards. Check that the adapter has undamaged cables and cover.

**Connect and disconnect correctly.** Do not connect and disconnect a LAN cable or lead-in cables if the device is under electric voltage.

**Do not use the instrument without the cover.**

Do not use the instrument, if it does not work correctly. If the instrument seems not to work correctly, have it checked by a qualified service person.

**Do not use the instrument in an explosive environment.**

**Please read instruction manual before the first device connection.**

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COMET System, Ltd makes constant development and improvement of all its products. That is why reserves the right to make any technical changes on the device/product without previous notice.

This document is only for P85xx sensors with firmware version 4-5-1.19 or higher. For latest firmware see web page: [www.cometsystem.cz](http://www.cometsystem.cz).

### 3. General description

The P8510, P8511, P8541 devices are designed for measurement of temperature in °C or °F. It is possible to read values from PC through the Ethernet connection. The following formats are supported:

- www pages with user-design possibility
- Modbus protocol
- SNMPv1 protocol
- SOAP

The instrument may send a warning message to several defined points if the measured value gets out of adjusted limits. There are the following possible ways to deliver the warning report:

- to send an e-mail to maximum of three e-mail addresses
- to send a SNMP trap to maximum of three IP addresses
- to display an alarm state on the device www page
- to send a message to Syslog server

Alarm limits may be set via T<sub>SENSOR</sub> program, Modbus or Telnet protocols. The alarm state may be read via the device www pages, Modbus or the SNMPv1 protocol. If channel isn't wired, it is possible to turn off measured channel.

### 4. Preparation to operation

In order to be able to use all the features of the device it is necessary to do some settings by means of a PC. It is necessary to connect a temperature probe before use. A recommended probe is DSTR161/C (eventually DSTGL40/C).

#### 4.1. What is needed to operate instruments

- ac/dc adapter 5V, 250mA (or PoE splitter PWL-P50)
- RJ-45 LAN connection
- free IP address in your network
- for P8511 one temperature probe; for P8541 device max. four temperature probes with DS 18B20 sensor

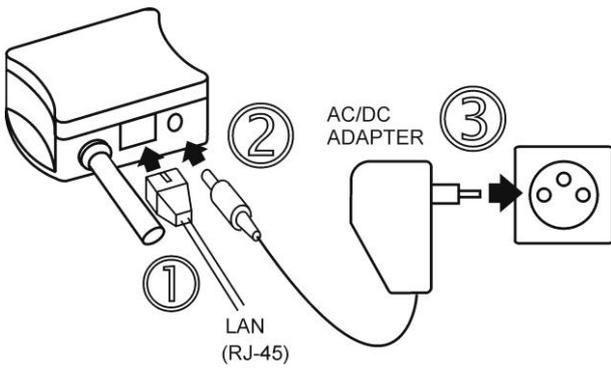
**Contact network administrator to get free IP address.**

**Warning!** Safety reception of warning messages (e-mail, trap) depends on actual accessibility of required network services. It is recommended to protect device against the unauthorized access to device settings and connection of cables.

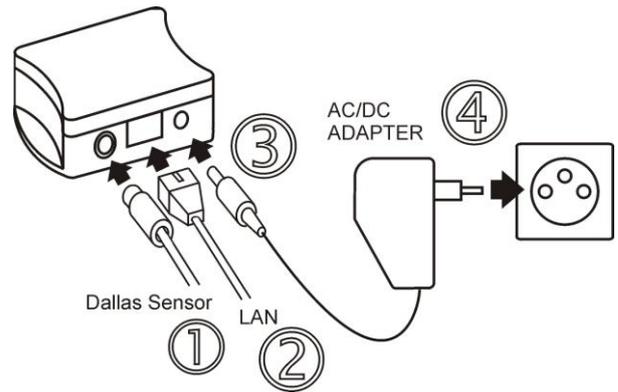
#### 4.2. Procedure of instrument connection

- connect the Ethernet connector
- connect the power (switch output to 5V if PoE splitter is using)
- configure the device by means of a PC – in the first run connect probes to device and with the settings program assign probes to desired channels. (not for P8510)

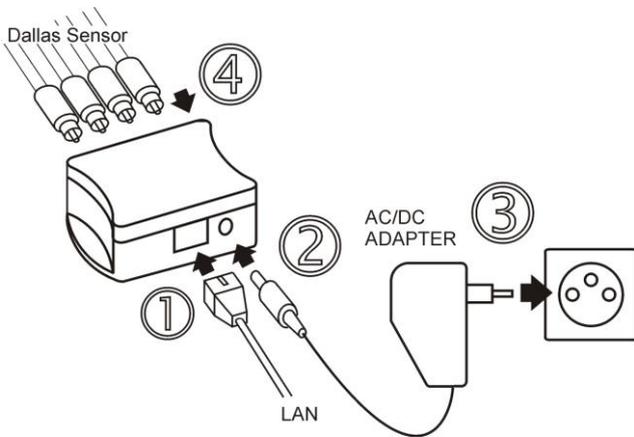
### Procedure of P8510 connection



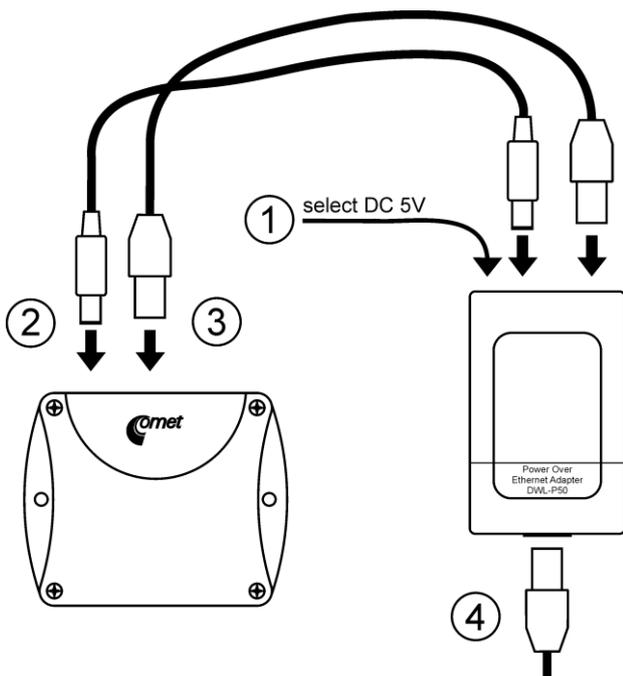
### Procedure of P8511 connection



### Procedure of P8541 connection

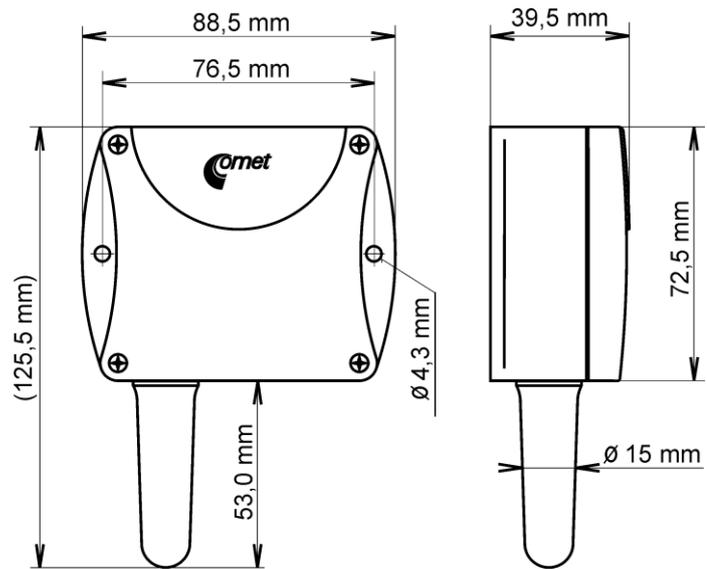


### Connect via PoE splitter DWL-P500

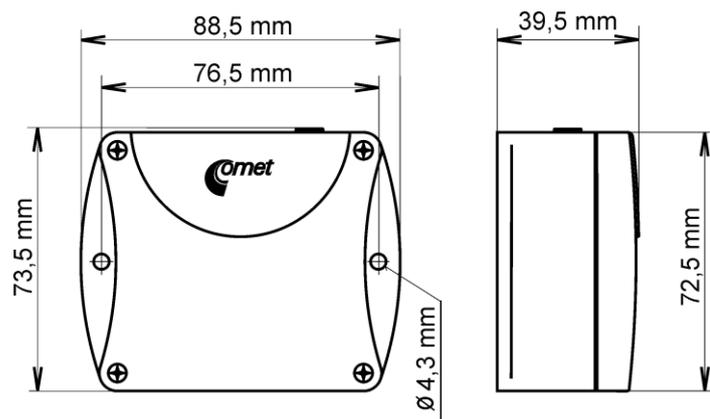


## 5. Dimensions

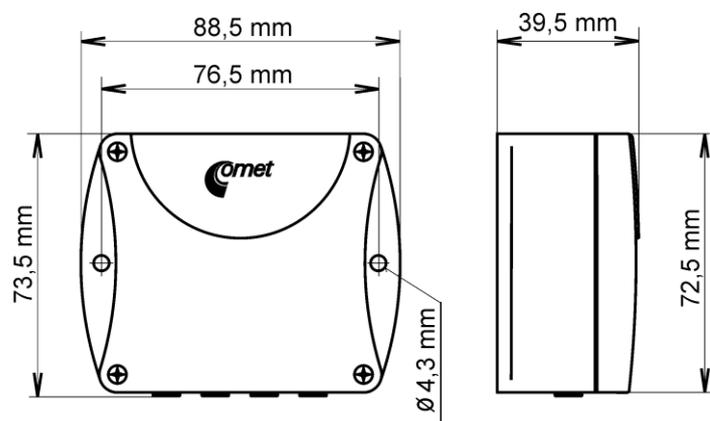
### Temperature meter P8510



### Temperature transducer P8511



### Temperature transducer P8541



## 6. Installation

It is necessary to assign a new suitable IP address to the device at the first connection to it in order to prevent collisions with already existing network IP addresses, and make the address conform with the local habits. If installing several new devices, connect them to the network one after another! If a suitable IP address is not known, contact your network administrator and ask him for the following:

IP address:	_____.	_____.	_____.	_____.
IP gate address:	_____.	_____.	_____.	_____.
Network mask:	_____.	_____.	_____.	_____.

The IP gate address and the network mask need not be specified if the device will be operated only in a local network. If you set the IP address to one which is already used in the network the device will not work correctly and collisions in the network will appear. It is possible to set the IP address by DHCP server- set the device IP address to 0.0.0.0

The IP address of each device is set by the manufacturer to 192.168.1.213.

### 6.1. Installation procedure

- run the `Tsensor` program (default sensor IP address is 192.168.1.213)
- set a new IP address of device
- assign for temperature probes device channels (in P8511 only one channel)
- configure the device in accordance with your requirements (alarm settings, sending of e-mail, traps...)
- store the settings

See more details about use of the Setup in chapter *Setting of device - Setup*

## 7. Checking operation

After connecting power supply and Ethernet cable the LED on the Ethernet connector is switched ON. Measured values are available through the http protocol, SNMPv1 protocol, Modbus or SOAP (if enabled).

If the measured value exceeds the measuring range of the temperature probe or the temperature probe is not connected correctly “Error 1” reading appears (numeric format is 9999). If the channel is disabled, instead current measured value on www pages will be displayed “OFF”.

## 8. Description of device functions

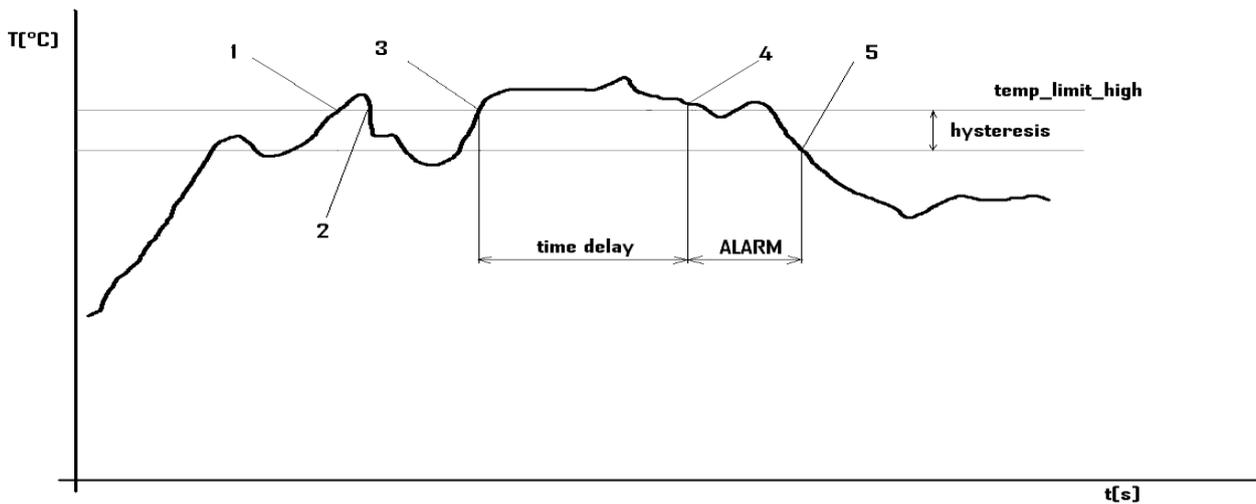
Information provided by the device can be read by following protocols: http, SNMPv1, Modbus. Device allows to send SOAP messages to selected web server. To communicate via SNMPv1, Modbus and SOAP protocols it is necessary to have appropriate software installed on the computer. Such software is not included in the delivery.

The following part describes functions and features of the device.

### 8.1. Alarms

It is possible to set an upper limit, lower limit, hysteresis and time delay (0-65535 s) to each measured channel. Figure shows a temperature curve with some specified upper limit (`temp_limit_high`) and hysteresis. At point 1 temperature exceeds the limit. From that moment a time delay is counted (`time_delay`) after which an alarm is set. Because at point 2 the

temperature dropped below the limit value (`temp_limit_limit`) before the time delay expired, alarm was not set.



*temperature curve*

At point 3 the temperature again exceeded the limit, and because it did not drop below the limit value (`temp_limit_high`) before the time delay ended, the alarm was set at point 4. On this moment the alarm e-mails and traps are sent, if they are enabled, and the alarm flag is set (the flag is set when the alarm is active and reset when inactive). The state of the flag can be found on the www pages or via Modbus or the information console. The alarm lasted to point 5, where the temperature dropped below the limit value given by the adjusted hysteresis (`temp_limit_high - hysteresis`).

An alarm report is always sent immediately after an alarm appears. Alarm reports aren't resent. In case of power disconnection or a reset of the device (e.g. by modification of configuration) a new alarm evaluation is performed and new alarm reports are sent again, if any.

It is possible to set the alarm parameters via setting program or telnet. Detailed description of setting can be found in chapters informing about particular services.

## 8.2. Modbus

The device contains support for the Modbus protocol to communicate with control systems. The device uses Modbus TCP protocol. The port is set to 502. The Modbus address of the device is always set to 1. Access to port can be disabled in the Setup. Maximal number of client transaction is set to 1.

### Supported Modbus commands:

Command	Code	Description
Read multiple register(s)	0x03	Reads 16 bit register(s)
Write multiple register(s)	0x10	Writes 16 bit register(s)

## Modbus registers of the device<sup>1</sup>:

Address	Address hex	Variable	Type	R/W
40000	0x9c40	channel 1 temperature	Int*10	R
40001	0x9c41	ch 1 alarm status	Ascii	R
40002	0x9c42	ch 1 upper limit	Int*10	R/W
40003	0x9c43	ch 1 lower limit	Int*10	R/W
40004	0x9c44	ch 1 hysteresis	Int*10	R/W
40005	0x9c45	ch 1 alarm delay	uInt	R/W
40006	0x9c46	ch 2 temperature	Int*10	R
40007	0x9c47	ch 2 alarm status	Ascii	R
40008	0x9c48	ch 2 upper limit	Int*10	R/W
40009	0x9c49	ch 2 lower limit	Int*10	R/W
40010	0x9c4a	ch 2 hysteresis	Int*10	R/W
40011	0x9c4b	ch 2 alarm delay	uInt	R/W
40012	0x9c4c	ch 3 temperature	Int*10	R
40013	0x9c4d	ch 3 alarm status	Ascii	R
40014	0x9c4e	ch 3 upper limit	Int*10	R/W
40015	0x9c4f	ch 3 lower limit	Int*10	R/W
40016	0x9c50	ch 3 hysteresis	Int*10	R/W
40017	0x9c51	ch 3 alarm delay	uInt	R/W
40018	0x9c52	ch 4 temperature	Int*10	R
40019	0x9c53	ch 4 alarm status	Ascii	R
40020	0x9c54	ch 4 upper limit	Int*10	R/W
40021	0x9c55	ch 4 lower limit	Int*10	R/W
40022	0x9c56	ch 4 hysteresis	Int*10	R/W
40023	0x9c57	ch 4 alarm delay	uInt	R/W

### Legend:

r	read only register
w	register is designed for write
Int*10	register is in format of integer*10 – 16 bits.
uInt	register is at range of 0-65535
Ascii	character

### Alarm states can have the following values:

no	no alarm
lo	value is lower than adjusted limit
hi	value is higher than adjusted limit

## 8.3. SMTP

In case of exceeding adjusted limits of measured values the device can send e-mails to maximum of three addresses. Maximum length of an e-mail address is 55 characters. It is necessary to set your SMTP server address for correct function of e-mail sending. Procedure how to set SMTP is described in chapter *Setting of device - Setup*.

If limits of several measured values are exceeded a special alarm e-mail is sent for each alarm state. Dummy address `sensor@[device IP address]` is displayed as a sender of the e-mail.

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<sup>1</sup> Address could be taller by 1 in depend on used Modbus library

It is not possible to reply to this address. In the Subject field of the message the sentence Alarm [Description of the device]<sup>2</sup> is displayed or Test message [Description of the device] in the case of sending a test e-mail. SMTP authentication is not supported.

The description of the device is preset to the string P8510 sensor, P8511 sensor or P8541 sensor depending on the device model.

## 8.4. SNMPv1

By means of the SNMPv1 protocol it is possible to find currently measured values and parameters concerning alarms. In case of alarm activation, warning message (a trap) can be sent to specified addresses. By means of the SNMPv1 protocol it is also possible to display history of last 600 measured values.

For read the device communicates via port 161. Traps are sent via port 162. Sending of traps can be disabled in the Setup.

### The following traps sent:

- 0/0 reset of the device
- 1/0 testing trap
- 1/1 communication error with Sntp server
- 1/3 communication error with SOAP server
- 6/3 report on a measured value being outside of the limits or a return of the measured value to the limits

Used mib tables are P85xx.mib and RFC-1213.mib. The path to device is:

iso.org.dod.internet.private.enterprises.comet.products.P85xx

MIB tables are available at www pages <http://www.cometsystem.cz> or on the installation CD.. Password for a read operation is set by the manufacturer to public and may be changed in the setup.

### History

By means of the SNMPv1 protocol it is possible to display history of the last 600 measured values, stored in adjusted time interval. This interval is set in the 10 – 65535 s range. If a value has not been measured yet or an error was detected the value is 9999. The history is erased after each restart of the device.

## 8.5. WWW

The device supports display of measured values, adjusted limits and alarm states on its www pages.

Measured value is in graph displayed by green color, error or not yet measured values are displayed as grey broken line. Upper (lower) alarm value is in graph displayed as red (blue) line. If all values are over upper (lower) limit, the alarm line will be in the bottom (top) graph part displayed. It is possible export history to CSV file (comma or dot decimal separator).

User can change web design. Details to this action are in separated document, which can be found on [www.cometsystem.cz](http://www.cometsystem.cz). The factory default web design can be changed in depend on firmware version.

The web address is the same like the device IP.

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<sup>2</sup> [Description of the device] can be entered in the Setup

**Example:** The device has an IP address 192.168.1.213. Enter `http://192.168.1.213` to the browser address field and confirm it with the Enter key. If your setup enables display of www pages, page will be displayed.

WWW pages have adjustable automatic refresh interval. The manufacturer sets it to 60 seconds. The value can be modified in the setup in a range of 10–65535s.

If the device has www pages display disabled, message “ACCESS DENIED” will be adjusted.

## 8.6. SNTP

The device allows time synchronization with SNTP server. The time synchronization is set to one per day. If the time synchronization failed in next three hours, SNTP trap and e-mail will be sent.

## 8.7. Syslog

Device allow send messages to selected syslog server. Events are described bellow.

Event	Text
device restart	Device restart
test message	Testing message
alarm occured	Alarm ...
SNTP coonection error	NTP connection error
write to device via modbus, SNMP	Settings changed
change firmware	Firmware uploaded
alarm is down	Clearing ...
SOAP server communication error	SOAP connection error

## 8.8. SOAP

Device allows sending of SOAP messages with measured values to user defined remote web server in preset time intervals 10-65535 s. If the web server is not responding in the whole delay interval, device sends trap 1/3 and tries to send next measured data. The file with XML schema is on [www.cometsystem.cz/schemas/soapP85xx\\_v2.xsd](http://www.cometsystem.cz/schemas/soapP85xx_v2.xsd).

### How to configure sending SOAP messages example:

There is SOAP service at address <http://my.hosting.com/soap/server.php> where the transducer shall send SOAP messages each 10s. IP address of the server my.hosting.cz is 111.222.250.110. Then sending SOAP messages needs to be set like this:

<b>SOAP enable:</b>	Yes
<b>Target web page:</b>	<code>muj.hosting.cz/soap/server.php</code>
<b>SOAP server IP address:</b>	<code>111.222.250.110</code>
<b>Source port:</b>	<code>8080</code>
<b>Destination port:</b>	<code>80 (http servers standardly listens at this port)</code>
<b>Sending interval:</b>	<code>10</code>

## 9. Setting of device - Setup

The Setup is designed for managing device settings. Setting is performed by means of `Tsensor` program, or telnet. Setting thru the telnet is described in separated document on <http://www.cometsystem.cz>. Access to the Setup can be protected by a password. The `TSensor` program you can find on <http://www.cometsystem.cz> or on the installation CD.

### Setting of the device:

Run the `TSensor` program and follow the program instructions. In the next chapter setting options will be described.

## 9.1. Communications setup card

### 9.1.1.Global settings

Contact your network administrator to get the correct values of the IP address, mask, gateway. Entering incorrect values can cause the device be not found in the network or other complications!

**Sensor IP:** setting of the IP address of the device.

**Get IP from DHCP server:** Set the IP address to 0.0.0.0. DHCP server on the network will provide the unit with an IP address, gateway address, and subnet mask when the unit boots up. If you do not change the DHCP name, and you are using an IP of 0.0.0.0, then the DHCP name will default to CXXXXXX (XXXXXX are the last 6 digits of the MAC address shown on the label on the bottom/side of the unit).

For example, if the MAC address is 00-20-4A-12-34-56, then the default DHCP name is C123456. You can change the DHCP name by specifying the last octet of the IP address. When you use this method, the DHCP name will be LXYYY where YY is what you chose for the last octet of the IP address. If the IP address you specify is 0.0.0.12, then the DHCP name will be LTX12. This method will only work with 2 digit numbers (0-99).

**Gate IP:** setting of the internet gateway. The value need not be entered if the device will operate only in a local network.

**Netmask:** setting of the network mask of your network.

Example:

Mask	No. of bits
255.255.255.252	2
255.255.255.0	8
255.128.0.0	23

**Configuration password:** change of the access password for telnet.

**Sensor name:** The description of the device (it is possible to change it if needed). This description is displayed on WWW pages and in subjects of sent e-mails. Its maximum length is 32 characters.

**MTU size:** (maximum transmission unit) – maximal packet size. Default setting is 1400, range is from 1400 to 512. If you have some troubles with connection, try reducing the MTU size.

### 9.1.2.E-mail settings - SMTP configuration

**Sending warning e-mail:** Enabling of sending warning e-mails after alarm activation.

**SMTP IP:** setting of an IP address of the SMTP server. Correct setting is required for the device to be able to send e-mails. Contact your network administrator to get the correct address.

**Recipient 1-3:** e-mail addresses of warning e-mail recipients.

**Send test e-mail:** In case of confirmation a test e-mail is sent to the specified addresses.

**Default e-mail sender:** allow change the mail from box.

### 9.1.3.SNMP - Trap configuration

**Traps sending enable:** enabling/disabling of sending SNMP traps.

**Password for read:** setting of the password for access to SNMP protocol.

**Password for write:** setting of the password for write to SNMP .

**Trap IP 1-3:** the IP address of recipients of SNMP traps.

**Send test trap:** Sends a test trap of type 1/0 to the specified IP addresses.

### 9.1.4.WWW - www settings

**Enabled:** enables the display of www pages

**Refresh:** interval for automatic page refresh. Range 10–65535 s.

### 9.1.5.Modbus - Modbus configuration

The device provides access to measured values by means of the Modbus. The port is set to 502. Changing the Modbus port through the telnet is possible.

**Enabled:** enables the access to the device

**Port:** Modbus port.

### 9.1.6.SNTP - time settings

**SNTP enabled:** SNTP synchronization enabled

**SNTP IP:** IP of SNTP server (from administrator)

**UTC+:** time shift in minutes

### 9.1.7.History - history storage interval

**Storage time:** storing interval to history table

## 9.2. Communications setup card I

### 9.2.1.SOAP - sending data to server settings

This function allows to send measured data to remote web server in defined interval

**Enabled:** SOAP sending enabled

**Target SOAP server IP address:** remote web server IP address

**Target web page:** path to web page, where device send the message

**Source port:** device source port

**Destination port:** web server port

**Sending interval:** sending interval to web server

### 9.2.2.Syslog - sending messages to syslog server

**Enabled:** sending message to syslog server enabled

**SysLog IP address:** syslog server IP address

**Send syslog message:** send test message to syslog server

## 9.3. Configuration card

### 9.3.1.Alarm settings

Setting of alarms. This submenu contains:

- setting of upper temperature limit
- setting of lower temperature limit
- setting of temperature hysteresis
- setting of temperature time delay

### 9.3.2. Probes to channels assign

Button Search probes appear connected probes to table. User can change the channel name. Press left mouse button and move mouse to desired position to assign probe to channel.

### 9.3.3. Factory defaults - setting from the manufacturer

This selection sets the Setup items to the following values:

- sets SMTP server address to 0.0.0.0
- erases addresses of e-mail recipients
- sets standard e-mail sender
- disables sending of e-mails
- erases addresses of SNMP traps recipients
- restore SNMP password to public
- disables sending of traps
- enables display of www pages
- sets refresh time of www pages to 60 seconds
- enables access via Modbus port 502
- sets history logging interval to 60 s
- clear SOAP server IP address
- sets SOAP destination port to 80, source port to 8080
- clear destination web page, sets sending interval to 10 s
- disable SOAP message sending
- setting of alarms: upper temperature limit: 80 °C, lower temperature limit -30°C, temperature hysteresis 1 °C, alarm time delay: 30 s
- set device name to P8541-Sensor, P8511-Sensor, or P8511-Sensor depend on sensor type

### 9.3.4. Save changes

Saves modifications to the memory and resets the device.

## 10. What to do when...

### 10.1. I forgot the IP address of the device

IP address is set to the value 192.168.1.213 by the manufacturer. If you changed it and forgot the new IP address, run the TSensor program and press the “Find...” button. In a new window all sensors will be show.

### 10.2. It is not possible to connect to the device from a LAN

#### In the “Find device” window is only IP and MAC address displayed

The next information is displayed as N/A. This problem will be occurred, when the device IP is set to another LAN.

In TSensor program choose “Find device/Change IP address”. Follow the program instruction.

#### The sensor IP address in Find device window is not displayed

In TSensor program select “Find device/Help my device Wasn't found!”. Follow the program instruction.

#### Finding the MAC address

The MAC address is a unique address of a device which is necessary to be known e.g. in case when there are several devices connected to the network. MAC address is on device label.

### **It is not possible to find meter after manual MAC enter**

In TSensor program select “Find device/Help my device Wasn’t found”. In this select “Set IP to ARP only”. To “Device MAC address” enter the meter MAC address (e.g. 00-20-4A-84-F0-80) and press the “Set IP” button.

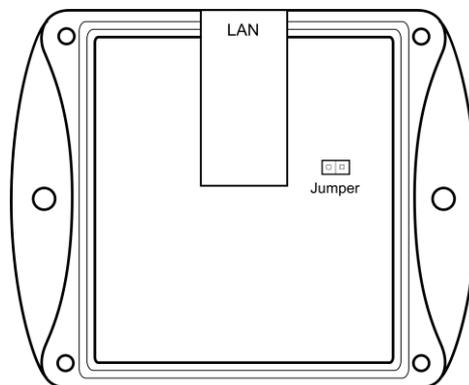
Open telnet to the IP address you assigned to the device MAC address by running a telnet command `telnet [IP_address_assigned_to_MAC_address] 9999` and confirm with the Enter key. Choose 0 - Global Settings, set the meters IP address, clear the gate IP, no. of net mask set to 0. Press the Enter key, until you are not back into a menu. Press - 9 Save and Exit. The connection will be closed. Now you can connect to meter by the TSensor program.

### **10.3. There is an Error 1**

- check if a temperature probe is connected or if the temperature probe is not at a temperature outside the measuring range
- check the integrity of the probe cable

### **10.4. Forgotten password to the setup**

- disconnect the power
- unscrew upper lid of the device case
- close the jumper and connect the power.
- keep jumper closed for 10 s then remove jumper. The password will be erased
- close the device



*jumper placing*

## **11. Preventive maintenance**

Do not subject the device to mechanical stress.  
Recommended calibration interval is 2 years.

## 12. Technical specification

### 12.1. Technical parameters

**Power voltage:** from 4.9 to 6.1 Vdc, coaxial connector, diameter 5x2.1 mm, positive pole in middle

**Usage:** approximately 1 W

**Measuring interval:** 2 s

**Communication with computer:** Ethernet connection (RJ-45 connector)

**Protection:** IP30 - case with electronics

**EMC:** Devices conform in accordance with EN 61326-1 these norms:

<b>Radiation:</b>	EN 55022	class B
<b>Immunity:</b>	EN 61000-4-2	levels 4/8 kV, class A
	EN 61000-4-3	intensity of electromagnetic field 3 V/m, class A
	EN 61000-4-4	levels 1/0.5 kV, class A
	EN 61000-4-6	intensity of electromagnetic field 3 V/m, class A

**Temperature measuring range:** **P8510** -30 to +80 °C

**P8511, P8541**-55 to +80 °C (depends on used probe)

**Temperature resolution:** 0.1 °C

#### P8511, P8541

**Recommended probe:** DSTR161/C (DSTGL40/C), maximum cable length is 10 m.

**Accuracy with DSTR161/C (DSTGL40/C) probe:** ±0.5 °C in measuring range from -10 to +80 °C, outside this range ±2.0 °C

**Response time:** with DSTR161/C probe  $t_{90} < 190$  s

with DSTGL40/C probe  $t_{90} < 160$  s

**Cinch connection:** pin DQ DS18B20 to cinch center, VDO and GND connect to connector case.

#### P8510

**Accuracy:** ±0.8 °C

### 12.2. Operating conditions

**Operating temperature and humidity range:** electronics: -30 to +80 °C, 0 to 100 % RH (not condensing)

**Operating temperature of DSTR161/C (DSTGL40/C) recommended probe:** -40 to +80 °C

**Outer characteristics in accordance with Czech National Standard 33-2000-3:** Normal environment with the specifications: AE1, AN1, AR1, BE1

**Working position:** **P8511, P8541:** arbitrary

**P8510:** with sensor cover downwards. When mounting the temperature meter to 19" rack with universal holder MP046 (optional accessory) then sensor cover can be placed horizontally.

**Installation of the instrument:** by means of two holes at the bottom part

**Limits on conditions (the device without a probe):** temperature -40 to +80 °C, humidity 0 to 100 % RH not condensing

**Dimensions:** see dimensions drawing

**Weight:** approximately P8510 130 g, P8511 125 g, P8541 135 g

**Material of the case:** ABS

**Liquidation:** Device itself (after its life) is necessary to liquidate ecologically!

### **12.3. Technical support and service**

Technical support is provided by distributor of this device. Contact is in included warranty certificate.