Inveo Sp. z o.o.

Nano Analog Input

Instruction Manual

Overview

Warning

This manual applies only to the firmware version v0.9 onwards. Inveo does not guarantee that the information contained in this document applies to previous firmware revisions.



Purpose of the device

The Nano Analog Input PoE has been designed to forward measured current or voltage values via LAN. This enables real time monitoring of those parameters.
The readings are available via the built-in www page, HTTP GET, Modbus TCP, SNMP and MQTT protocols, allowing for flexible integration with various systems.

Additionally, the RS485 port allows for communication using Modbus RTU, further enhancing the device's communication abilities.

The device can send the condition of an exceeded threshold to other Inveo modules, allowing for remote control of other devices depending on the measured parameters, such as activation of relays.

Changelog

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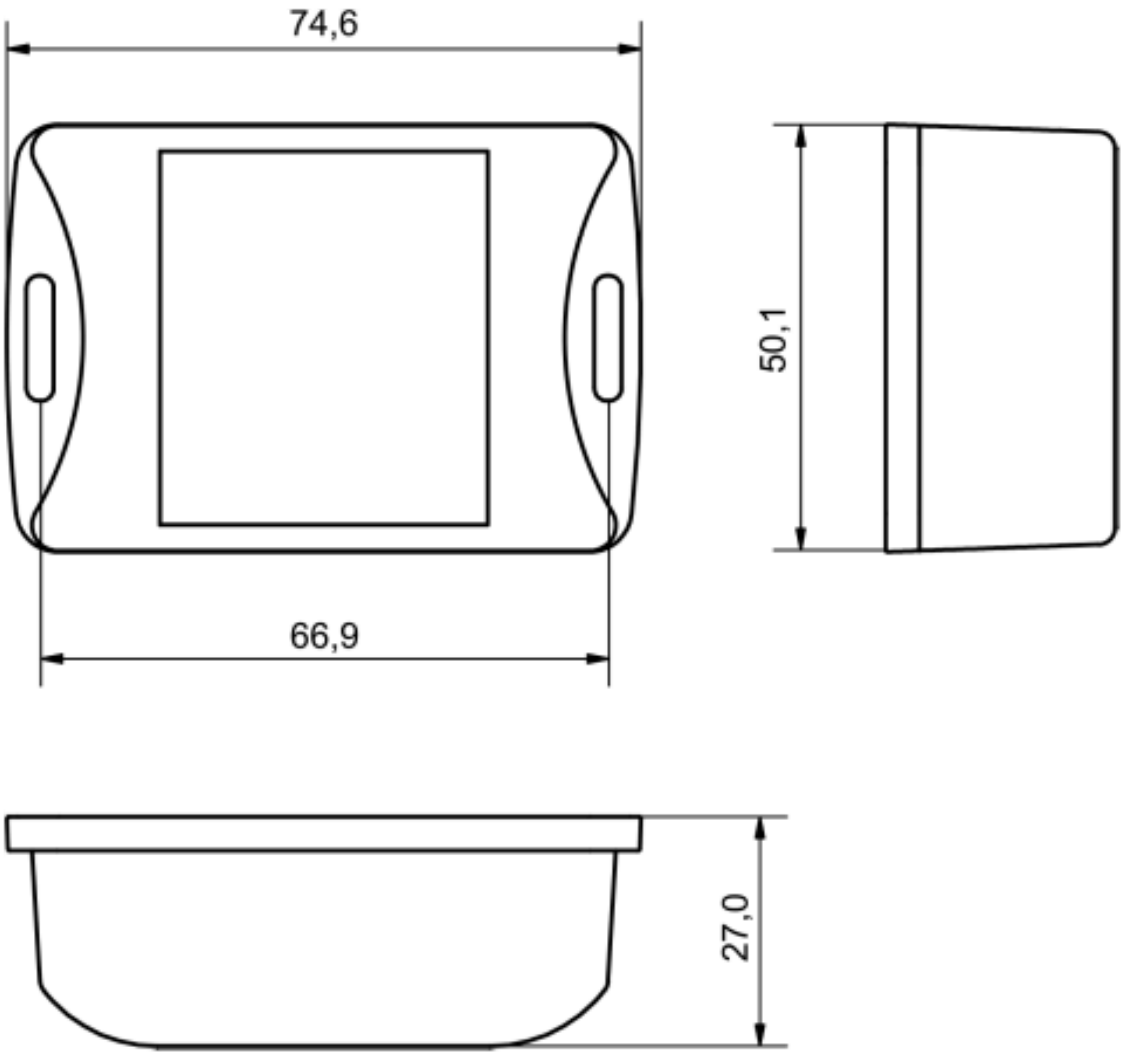
Device construction

Technical characteristics

Parameter	Details
Power supply	Two power supply methods are available: **10-24V DC:** with a 3,5mm pluggable terminal block **PoE:** 33-57V PoE IEEE 802.3af
Power consumption	1,5W
Inputs	2 analogue inputs Current or voltage inputs Software-configured **Measurement frequency:** 4 Hz **Converter resolution:** 17 bit
Current input parameters	**Measurement range:** 0-20mA or 4-20mA **Maximum input current:** 25mA **Input impedance:** 1R **Measurement error:** <0,8%
Voltage input parameters	**Measurement range:** 0-5V or 0-10V **Maximum input voltage:** 12V **Input impedance:** 60k **Measurement error:** <0,5%
Communication	**Ethernet** 10Mbps Half Duplex, RJ45 **1 RS485 port**, Modbus RTU **Transmission speed:** 1200, 2400, 4800, 9600, 19200, 38400, 57600bps **Parity:** None, Odd, Even, Mark, Space, 2 Stops
Enclosure ingress protection	IP30
Weight	ca. 67g (2,4oz)

Dimensions



Information

All dimensions are in millimeters.

General characteristics



The module supports the following sensors:

- Sensors with 0-5V voltage output,
- Sensors with 0-10V voltage output,
- Sensors with 4-20mA current output,
- Sensors with 0-20mA current output.

The user can configure the processing method of measured value by using the value conversion function (mathematical function), setting the sensor range and unit.

Communication with the module is carried out via LAN and RS485 (Modbus RTU).

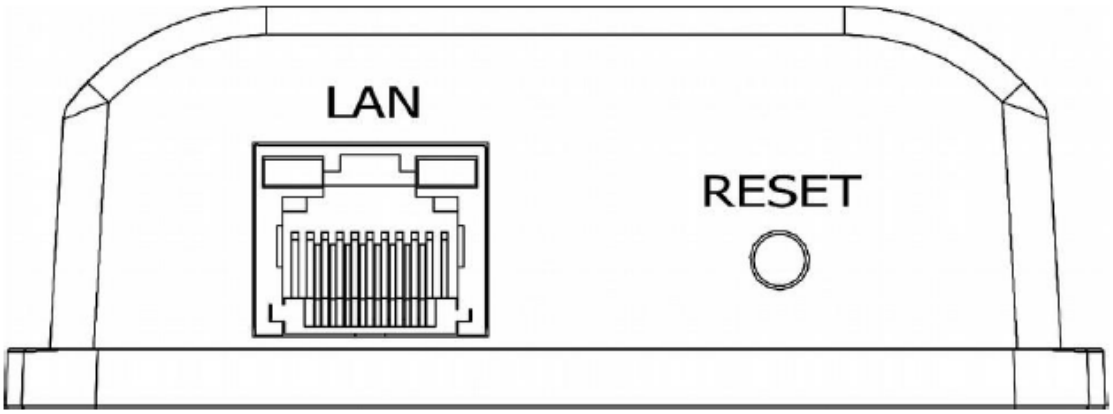
The following communication options are available:

- Built-in WWW server, available from a standard web browser (Mozilla Firefox, Opera, Google Chrome are the preferred browsers),
- Windows/Linux command line programs,
- HTTP GET,
- Modbus TCP,
- Modbus RTU,
- SNMP,
- Own application via TCP (shared protocol),

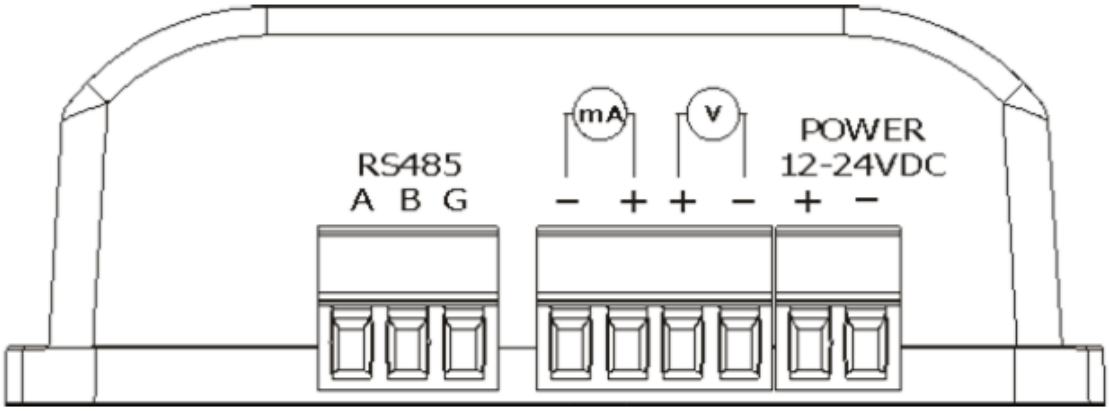
- Inveo MQTT protocol.

The device is equipped with a 7-segment LED display, on which the current measured value is shown.

Module connectors description



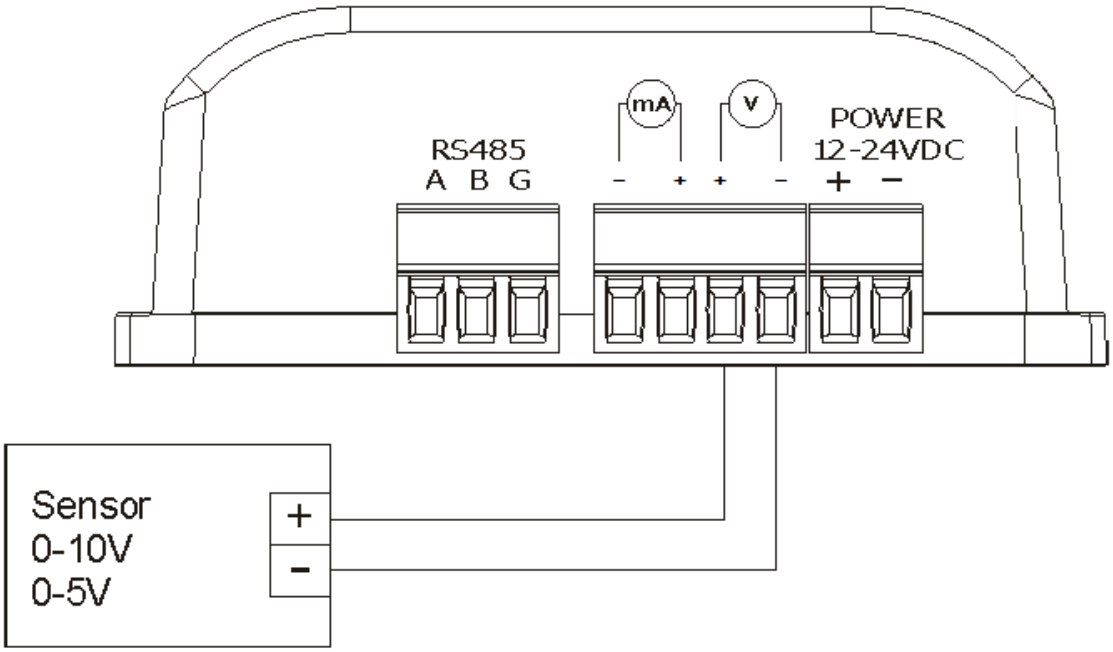
- **LAN** – LAN and PoE IEEE 802.3af,
- **RESET** – Button used to enable DHCP, check the current IP address and restore the module to factory settings.



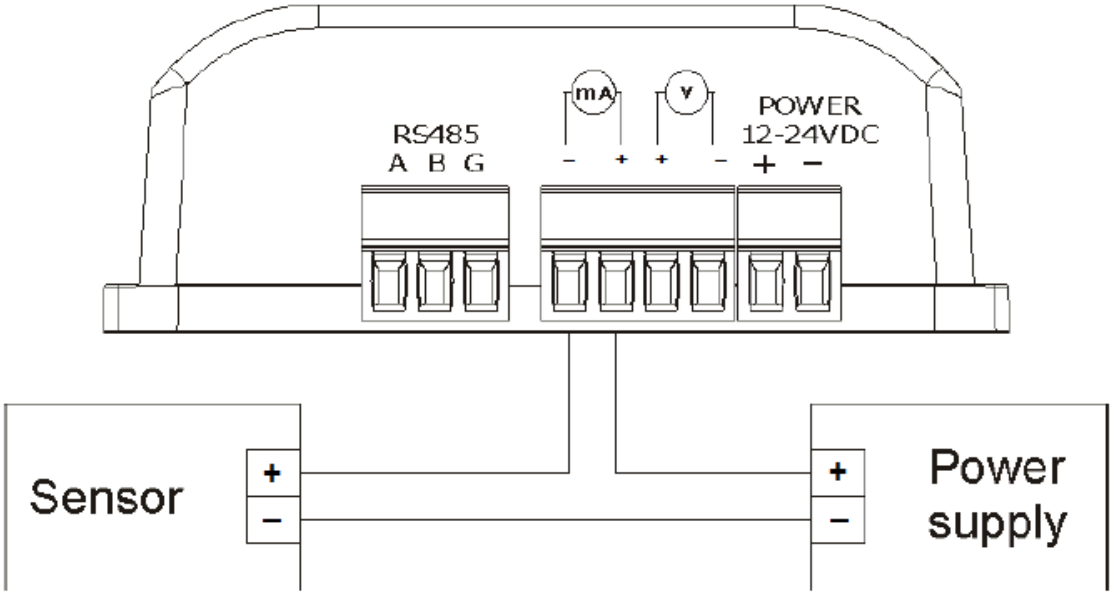
- **mA** / **V** – Sensor connector (voltage/current),
- **RS485** – Modbus RTU communication connector,
- **POWER** – Additional power connector when PoE is unavailable. Power supply voltage: 12-24V DC.

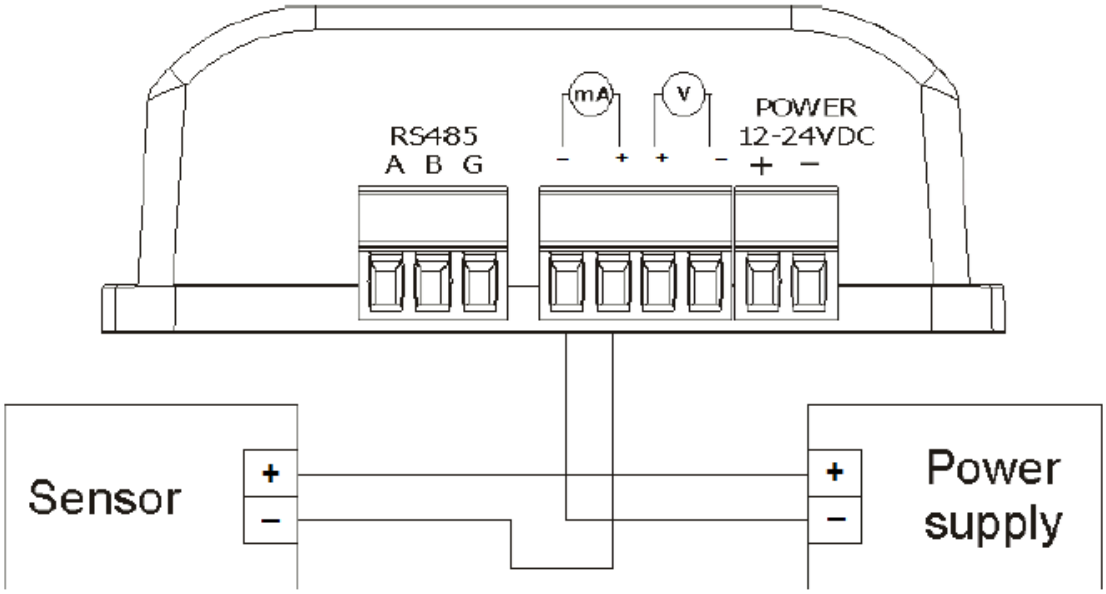
Sensor connection diagrams

Sensor with a voltage output:



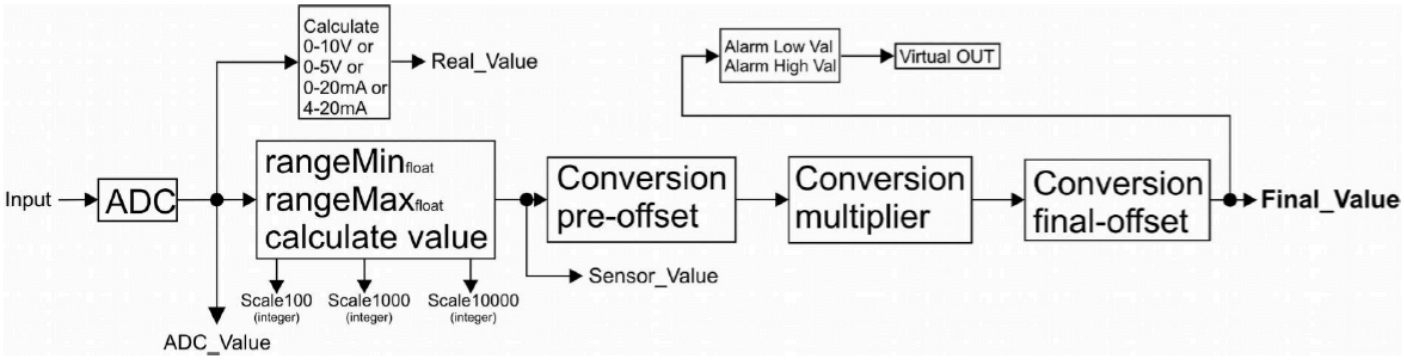
Sensor with a current output:





Input signal processing

Signal flow in the device is presented on the following diagram.



Sensor voltage or current (input signal) is processed by and A/D converter (ADC). From now on, the signal is processed digitally.
The signal from the ADC is available as **ADC_Value**.

Real_Value is the measured current or voltage value in specified sensor unit (V or mA). It will be the same as if it was measured with a multimeter.

rangeMin and **rangeMax** parameters are the measurement range of the sensor for extreme measurement values. Those values are used for calculation of the actual value.

Input signal considering the range is available as **Sensor_Value**.
For example, if a thermometer with a 4-20mA current output and a measuring range of -50°C do 100°C is connected to the input, entering those values to **rangeMin** and **rangeMax** will substitute them to **Sensor_Value**: 4mA for -50°C and 20mA for 100°C. Other values within the range will be interpolated.

Additionally, the linear function **Final_Value=a(Sensor_Value+c)*b** for final calculation of **Sensor_Value** is available for the user. It can be used, for example, to scale the measured value or add an offset.

The calculation is done using this formula:

Final_Value = Conversion_multiplier * (Sensor_Value + Conversion_pre-offset) + Conversion_final-offset

The conversion variables are real numbers (signed, fractional, integral, etc.).
Utilizing conversion, it's possible to eg. subtract -10 from the measurement, multiply it by 0.01 (i.e. divide by 100) to achieve a value usable in final application. The **Final_Value** is visible on the device's LED display.

Example

Sensor_Value from a distance sensor is 2654 cm. The distance is inflated by 10 cm, moreover, the application requires that the value is in inches. To achieve this, the coefficients should be set as follows:
Conversion_pre-offset = -10
Conversion_multiplier = 0.394 (1 / 2.54 = 0.394)
Conversion_final-offset = 0
Using these coefficients, the Final_Value will be corrected for error and in inches.

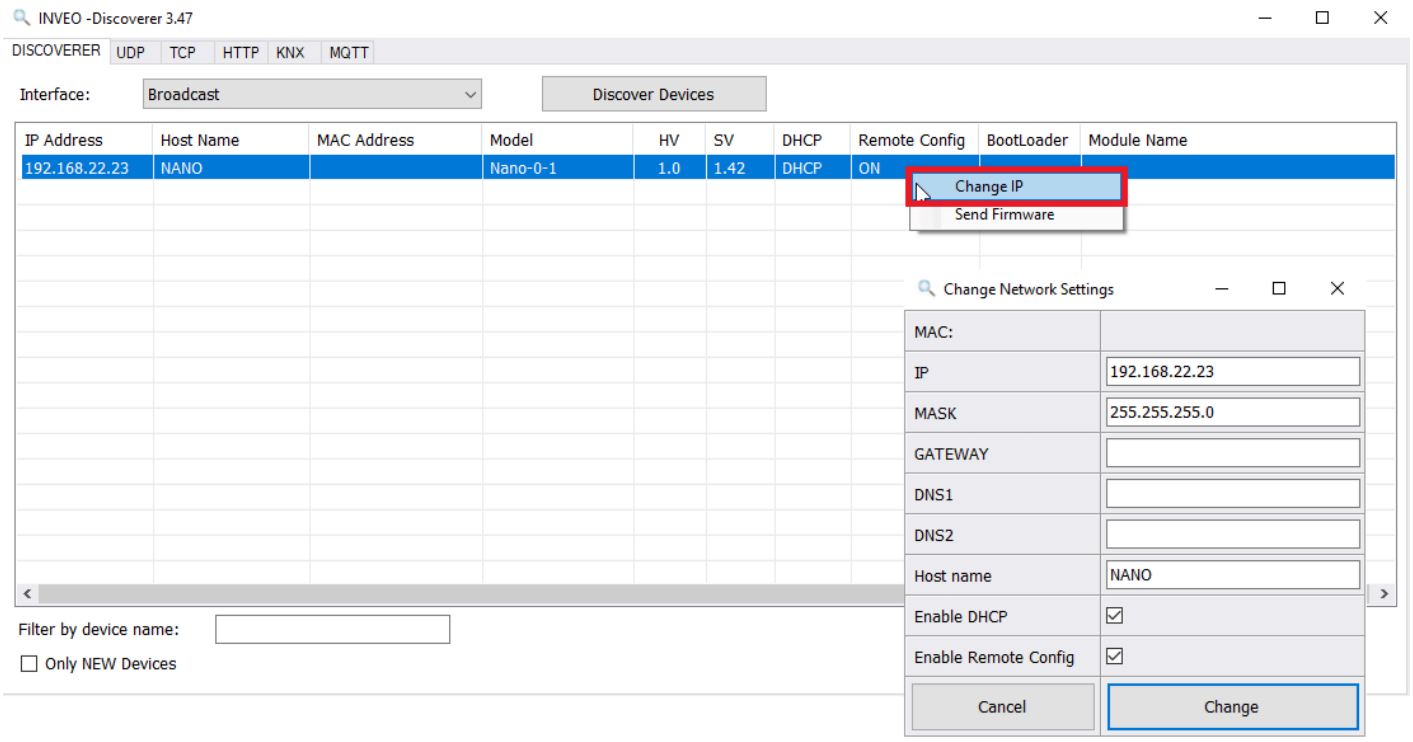
Scale10000, **Scale1000** and **Scale100** values are proportional to **Real_Value** in a given range. For example Scale10000 for 4mA = 0, for 20mA = 10000.

All result values are available via Modbus TCP, RTU, HTTP XML and others.

Network configuration

> **Warning**
>
> **After the initial power-up, it's needed to configure the device. It can be done in two ways, the simplest method is to use the Inveo Discoverer programme.**

Changing the device's IP address - Discoverer programme



After running the **Discoverer** programme and searching for the appropriate device:

1. Right-click the device,
2. Click the **Change** button.

After the dialogue window is opened you can:

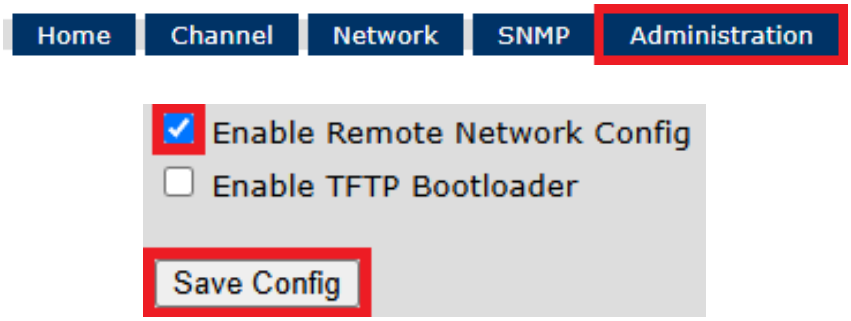
- Set the IP address, mask, gateway, DNS1/DNS2.
- Change the Host name.

> **Note**
>
> **The device will be configured after the Change button is pressed.**

If **Remote Config** is disabled (enabled by default), the device needs to be configured by changing the computer's subnet:

To enable remote configuration:

1. Go to the **Administration** tab,
2. Select **Enable Remote Config**.



> **Tip**
>
> **After making changes, apply them using the Save button**

Changing the computer's subnet address for configuration

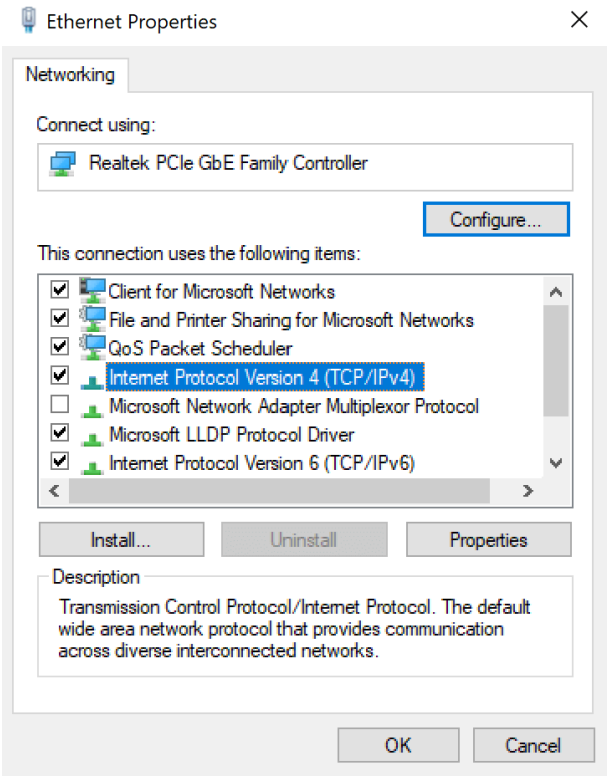
During configuration without **Discoverer** programme, it's needed to change the subnet address of the computer on the same network.

To access the computer's network configuration, do one of the following:

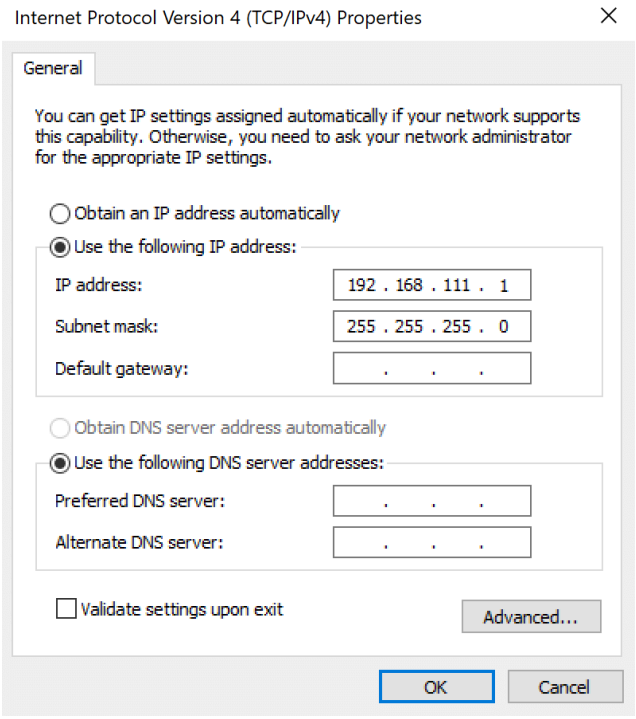
- Press **Win + R**, type in `ncpa.cpl`, and then press **Enter**.
- Alternatively, go to: **Start** → **Control Panel** → **Network and Internet** → **Network and sharing center** → **Change adapter settings**.

Then:

1. Select the network connection.
2. Right-click it and select **Properties**.
3. After selecting this option, network connection configuration screen will appear.



Select **Internet protocol version 4 (TCP/IPv4)** and type in the following parameters:

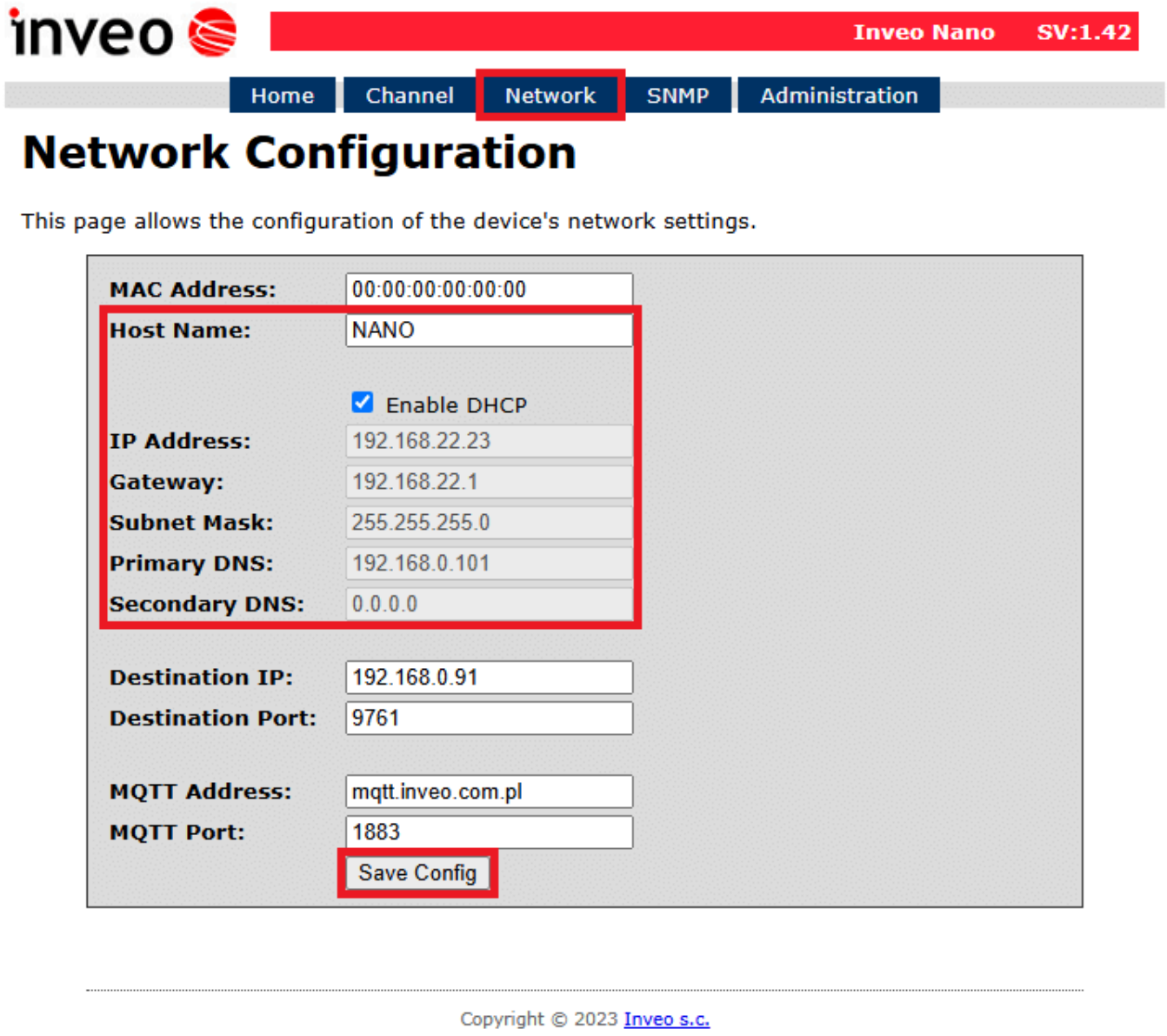


Note

After applying the configuration with OK, start a web browser and type in the following address: 192.168.111.15. (Default user and password: admin/admin00)

Network settings configuration

The **Network** tab allows the user to change LAN settings.



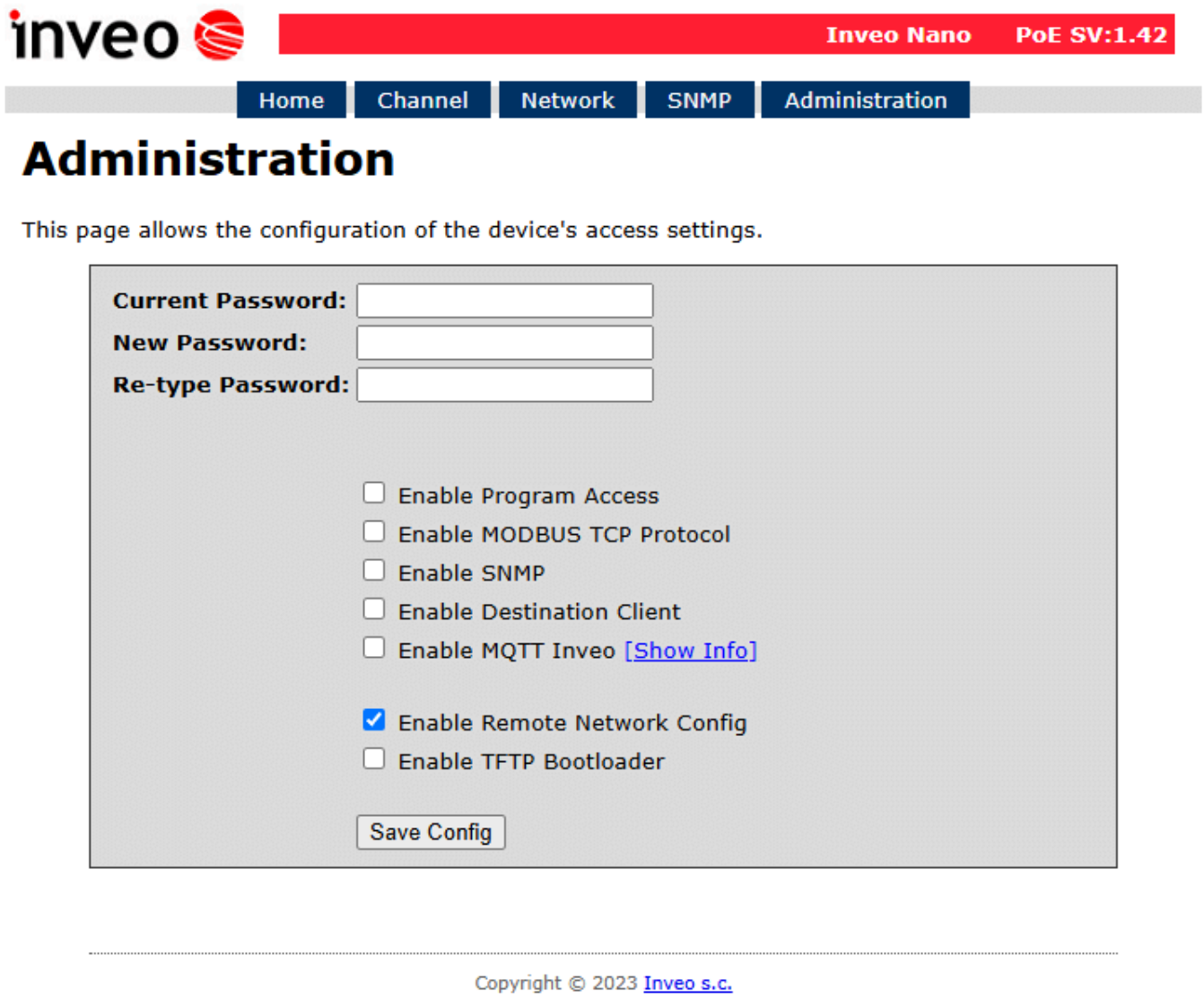
- **Host Name** – NetBios name,
- **DHCP** – Enable the DHCP client; selecting this option forces the use of DHCP assigned IP address,
- **IP Address** – Module IP address,
- **Gateway** – Network gateway,
- **Subnet Mask** – IP subnet mask,
- **DNS1, DNS2** – DNS addresses,
- **Destination IP** – IP address of the module, the input state should be routed to when using M2M communication,
- **Destination Port** – Port, on which the remote device is listening.

Tip

After making changes, apply them using the Save button

Security and services configuration

In **Administration**, active device services and access password can be selected and/or changed.



Changing the password:

To change the password, enter the **Current Password**. Next, type in the new password into the **New Password** and **Re-type Password** fields. Apply the changes with **Save Config**. If you want to remove the password altogether, leave **New Password** empty.

> **Information**
>
> **The maximum password length is 15 characters.**

Services settings:

The device allows selection of services that should be available. To activate the service, select the field next to its name.

- **Enable Program Access** – Enable access by external programs (Windows, Linux) and TCP/IP on port 9761,
- **Enable Modbus TCP Protocol**
- **Enable SNMP**
- **Enable Destination Client** – Forwarding of the input/output states to other modules,
- **Enable MQTT Inveo** – Activate MQTT protocol,
- **Enable Remote Network Config** – (Discoverer programme),
- **Enable TFTP Bootloader**.

> ⚠ **Warning**
>
> **TFTP Bootloader and Remote Network Config should be disabled during normal operation. The settings should only be enabled before firmware update.**

Communication with a module from an external network

If the module is located in a different LAN, port forwarding is required. Depending on the communication method utilized, contact with the network administrator and forwarding of certain ports is needed.

WWW webpage and HTTP protocol:

- TCP port 80

Computer programme or own application:

- TCP port 9761

Modbus TCP:

- TCP port 502

SNMP protocol:

- UDP port 161

Checking the IP address

To check the current device IP address (Nano PoE only):

1. Press and hold the **RESET** button. The screen will display the four groups of an IP address in sequence: eg. 192 168 111 15..
2. After the full address is displayed, release the **RESET** button.

DHCP

To enable or disable DHCP support:

1. Press and hold the **RESET** button for a time between 5 and 10 seconds.

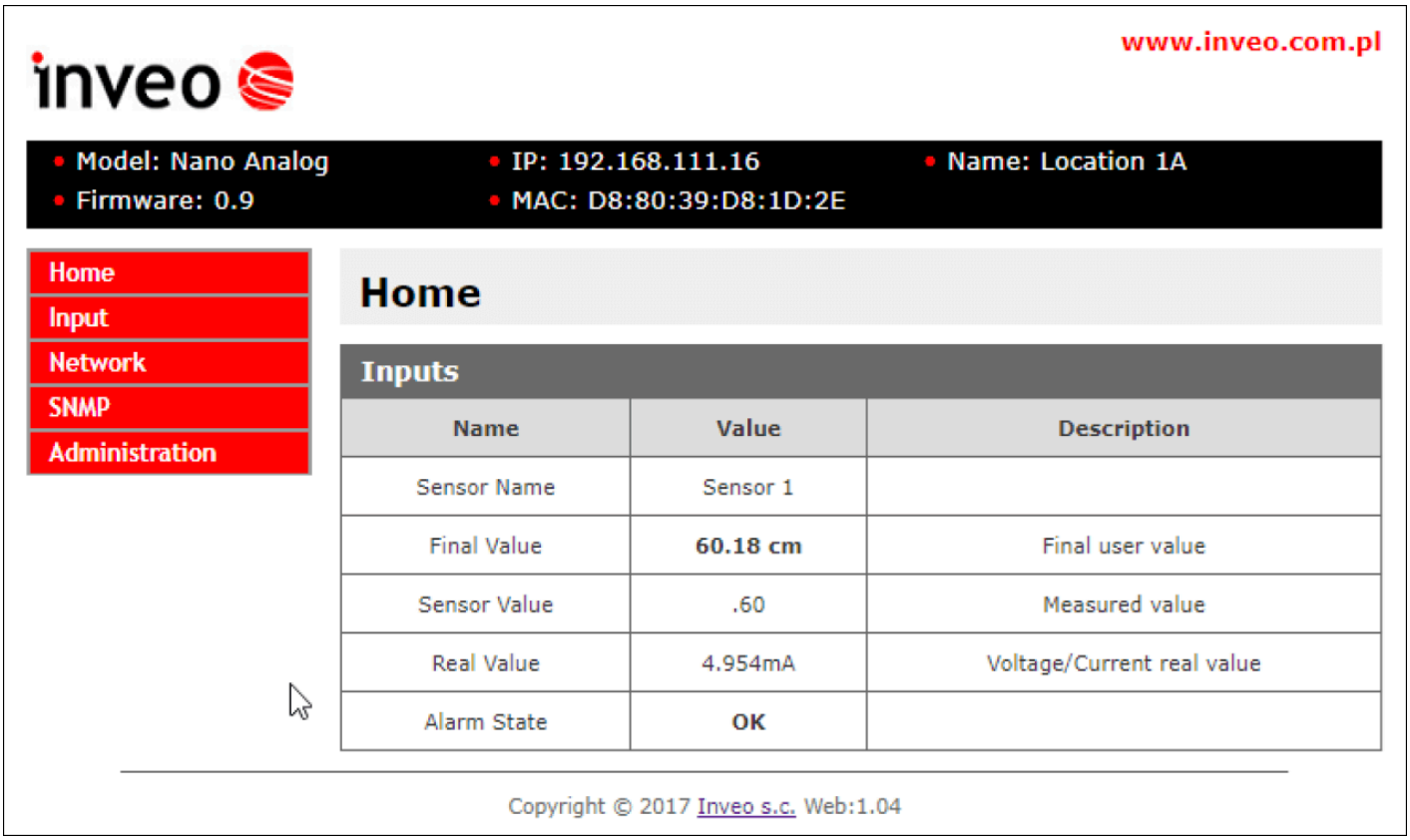
2. The LED will blink about 2 times per second (Nano), the display will show `dhcp` (Nano PoE).
3. Release the **RESET** button.
4. The current DHCP status will be displayed: **On** (enabled) or **Off** (disabled).

DHCP can also be enabled or disabled in the network settings. Access the **Network** tab or use the Discoverer programme.

Device functions

Device status

In the **Home** tab, the current sensor data is displayed.



The **Sensor Name** can be assigned in the **Input** tab.
Alarm State indicates that a specified alarm threshold has been exceeded.

Analogue input configuration

The input type and signal conversion method can be set in the **Input** tab. It is recommended to consult the chapter **Input signal processing** before configuring.

Input Configuration

Input Setup

Name	Value	Description
Input Name	Sensor 1	0..15 characters
Type	4-20mA ▾	See User Manual for additional external connections
Range Min	0.000	Sensor value for min range
Range Max	10.000	Sensor value for max range

Scaling Conversion *[final = a(input+c) + b]*

Name	Value	Description
Conversion Pre-Offset (c)	0.0	Value added to input value
Conversion Multiplier (a)	100.00	Multiplier factor (after pre-Offset)
Conversion Final-Offset (b)	0.0	Value added to multiplied value.
Unit	cm	0..3 characters

- **Input Name** – Sensor name (not device name) assigned by the user,
- The input type can be selected in the **Type** field. The following options are available:
  - 4-20mA,
  - 0-20mA,
  - 0-5V,
  - 0-10V.
- **Range Min** and **Range Max** specify the sensor range for the input's measurement range,
- **Conversion** fields define parameters of the **Sensor_Value** conversion function to the **Final_Value**,
- The **Unit** field allows to add a unit to the final value of the measured signal.

Alarms

The device can compare the measured value with the thresholds set by the user. Exceeding of a value is treated as an alarm. The alarm state is available as a virtual input for the majority of communication protocols.

Alarm

Name	Value	Description
Alarm Low Value	0.0	0.0 format
Alarm High Value	0.0	0.0 format
Alarm mode	Disabled ▼	

Client Setup

Name	Value	Description
Client Mode	Off ▼	Select destintation channel in 1 to 1 TCP connection

The alarm can be configured for the following conditions (**Alarm Mode**):

- **Off** – Alarm disabled,
- **Low** – Alarm is activated when the measured temperature is lower than **Alarm Low**,
- **High** – Alarm is activated when the measured temperature is higher than **Alarm High**,
- **Low or High** – Alarm is activated when the measured temperature exceeds the value in **Alarm High** or drops below **Alarm Low**.

Presence of an alarm state is indicated by blinking of the LED display and activation of virtual output 1 (`<on>00000001</on>`) in the `status.xml` `http://192.168.111.15/status.xml` resource.

```
<response>
    <prod_name>Nano-AN</prod_name>
    <sv>0.9</sv>
    <mac>00:00:00:00:00:00</mac>
    <on>00000001</on>
    <valFinal>2.49</valFinal>
    <unitFinal>m</unitFinal>
    <valSensor>2.49</valSensor>
    <unitSensor>mA</unitSensor>
    <inputType>0</inputType>
    <valScale10000>2338</valScale10000>
    <valScale1000>233</valScale1000>
    <valScale100>23</valScale100>
    <iu>7.735</iu>
</response>
```

If SNMP service has been configured, the module can send a TRAP to a specified IP address.

Destination Client (M2M)

Inveo devices shuch as LanTick, Nano Temperature Sensor, Nano Digital Input, Nano Relay Output etc. can send the data to a server or other module equipped with outputs using TCP or UDP. Thanks to this, the remote module can receive sensor readings, react to channel activation and activate/deactivate relay outputs in real-time if an alarm occurs. The messages are sent after each change of state and every 5 seconds.

Configuration for receiving modules (target devices):

Step 1: Enable the service In **Administration**, select **Enable Program access** and **Save config**.

Configuration for messaging modules (output status):

Step 1: Enable Destination Client

In **Administration**, select **Enable Destination Client** and **Save config** to activate the service.

Step 2: Network settings

In the **Network** tab, fill in the fields:

- **Destination IP** – Target device or server IP address,
- **Destination Port** – Port, on which the remote device is listening. 9761 by default.

Step 3: In the **Input** tab, select which output in the remote device will be activated or what information will be sent to the server the moment an alarm condition occurs.

The following options are available:

- **Off**
- **Dest: 1..8** – Sending TCP frames in format #1
  This format is compatible with other Inveo devices, which allows the module to control relay outputs in another module equipped with them when an alarm is activated and deactivate them after normal operation is resumed. For example, this can be used to control a fan or a heating element,
- **Status** – Sending TCP frames in format #2,
- **MAC+Status** – Sending TCP frames in format #3.

Client Setup

Name	Value	Description
Client Mode	Dest:1 ▾	Select destintation channel in 1 to 1 TCP connection

TCP frames format (Destination Client)

Format 1:

The format #1 frame is sent in decimal form. Example TCP frame sent while an alarm is active and Dest:5 is set:

SOF	CMD	CH	F_ID	ALARM	!ALARM	Val0 (LSB)	Val1
0x0F	0x01	0x04	0xFF	0x01	0xFE	0x0F	0x00

Example TCP frame sent while an alarm is inactive and Dest:5 is set:

SOF	CMD	CH	F_ID	ALARM	!ALARM	Val0 (LSB)	Val1
0x0F	0x01	0x04	0xFF	0x00	0xFF	0x0F	0x00

Val0-Val3 values are the 32-bit **Final_Val** value multiplied * 1000.

Calculating CRC:

```
CRC = (BYTE) SUM (SOF+CMD+CH+F_ID+ALARM+!ALARM+Val0 (LSB)+Val1+Val2+Val3 (MSB))
```

Format 2:

The format #2 frame is sent in the form of a character string.

```
<ALARM>[SPACE]<Final_Val>
```

- **ALARM** – 01 - alarm active, 00 - alarm inactive,
- **Final_Val**.

HEX value	STRING
30 20 33 39 2E 35	0 39.5

Format 3:

The format #3 frame is sent in the form of a character string.

```
<MAC>[SPACE]<ALARM>[SPACE]<Final_Val>
```

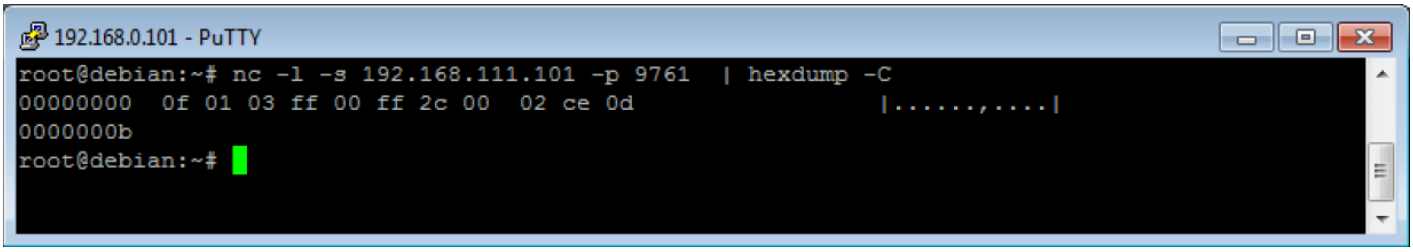
- **MAC** – Module MAC address,
- **ALARM** – 01 - alarm active, 00 - alarm inactive,
- **Final_Val**.

HEX value	STRING
35 34 31 30 45 43 36 35 35 30 32 31 20 30 20 34 36 2E 39	5410EC655021 0 46.9

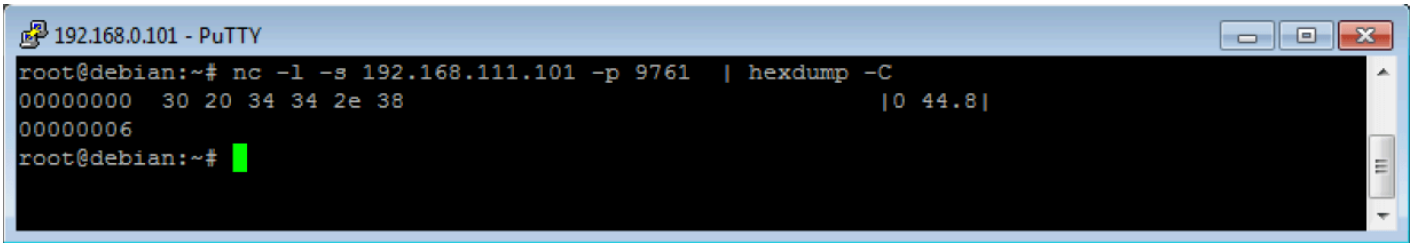
The TCP frame can be handled by own software.

Example of using the netcat command for Linux:

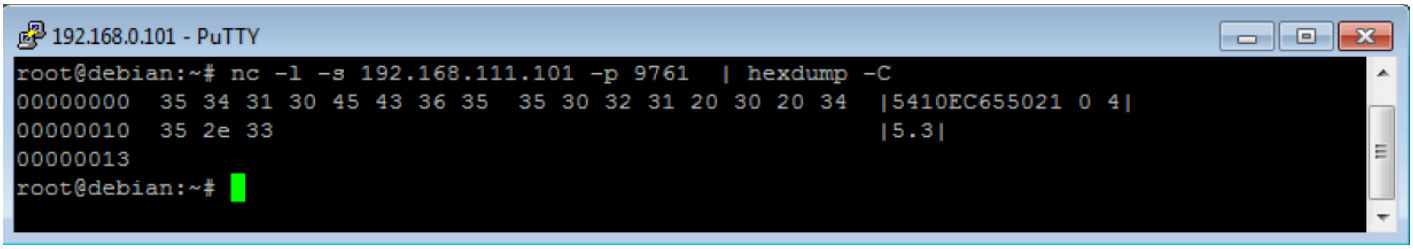
Format 1:



Format 2:



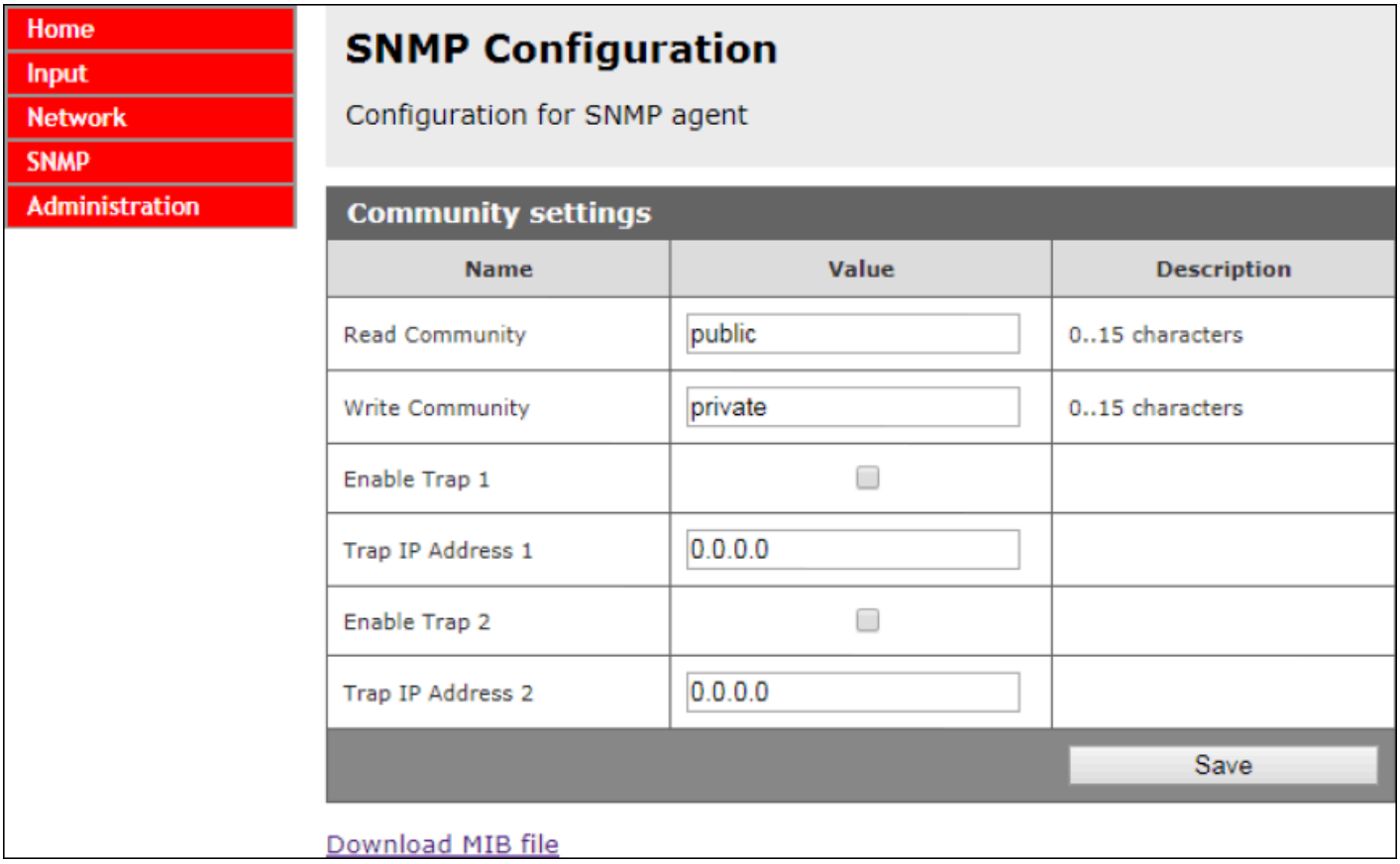
Format 3:



SNMP configuration

Nano Temperature Sensor is equipped with an SNMP v2c server, making remote readout of input state possible. To **Enable SNMP**, go to the **Administration** tab.

Configuration options are located in the **SNMP** tab:



SNMP allows readout of module parameters. To use this function, download the MIB file (describing the data structure) first. To do that, right-click **Download MIB file** and select **Save link as**. Import the downloaded MIB file into the MIB Browser programme.

The basic parameters that can be read from the module are displayed in the following table:

Name	Format	OID
Final_Val	STRING	.1.3.6.1.4.1.42814.14.3.5.1.0
Final_Val (integer)	INTEGER	.1.3.6.1.4.1.42814.14.3.5.2.0
Final_Val x10	INTEGER	.1.3.6.1.4.1.42814.14.3.5.3.0
Alarm inactive	INTEGER	.1.3.6.1.4.1.42814.14.3.1.1.0

The module also has the ability to send TRAP notifications if the temperature exceeds a certain threshold. To configure the destination addresses for those notifications, input them into **Trap IP Address 1** and **Trap IP Address**

2.

Windows command line control programme

When controlling the module from the command line, the cURL program can be used. First, enable **Program Access** in the **Administration** tab.

Example

Read input state, module IP address 192.168.0.231:
Access to `stat.php` requires authentication. In this case, we precede the command with `-u login:password`. `curl -u admin:admin00 http://192.168.0.231/stat.php`

In response, the device will send the following information:

```
<response>
    <prod_name>Nano-AN</prod_name>
    <sv>0.9</sv>
    <mac>00:00:00:00:00:00</mac>
    <on>00000001</on>
    <valFinal>61.01</valFinal>
    <unitFinal>cm</unitFinal>
    <valSensor>.61</valSensor>
    <unitSensor>mA</unitSensor>
    <inputType>0</inputType>
    <valScale10000>610</valScale10000>
    <valScale1000>61</valScale1000>
    <valScale100>6</valScale100>
    <iu>4.968</iu>
</response>
```

Section	Description
`<prod_name>`	Module type
`<sv>`	Firmware version
`<mac>`	Module's MAC address
`<on>`	Virtual outputs state: 00000001 indicates an alarm
`<valFinal>`	**Final_Value** of the measurement
`<unitFinal>`	Measurement unit
`<valSensor>`	Value measured from the sensor (Sensor_Value)
`<unitSensor>`	Measurement unit
`<inputType>`	Input type 0:4-20mA, 1:0-20mA, 2:0-10V, 3:0-5V
`<valScale10000>`	Measured value on the scale of 0-10000
`<valScale1000>`	Measured value on the scale of 0-1000

`<valScale100>`	Measured value on the scale of 0-100
`<iu>`	Measured current or voltage value (Real_Value)

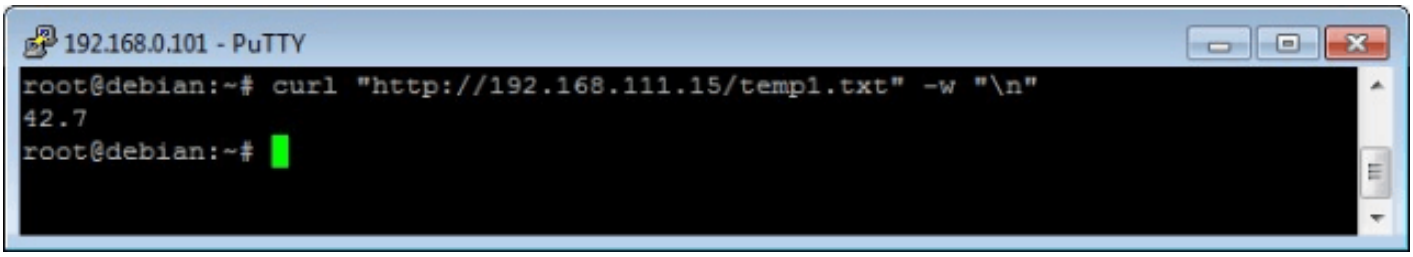
Linux control programme

cURL can be used in Linux:

Tip

Access to `stat.php` requires authentication.
Access to `status.xml` does not require authentication.

```
curl "http://192.168.111.15/temp1.txt" -w "\n"
```



Communication with the module via Modbus protocol

The device supports Modbus RTU and Modbus TCP protocols. The Modbus TCP server is available via LAN an listens on port 502. Modbus RTU is available via RS485.

Modbus configuration is available in the **Administration** tab:

Services

Name	Value	Description
Enable Program Access	☐	Is needed by TCPrel and 1 to 1 TCP connection.
Enable MODBUS TCP	☑	
Enable MODBUS RTU	☑	
Enable SNMP	☑	
Enable Destination Client	☐	Allow module to send data to other device (1 to 1 TCP connection)
EnableMQTT Client	☐	[Show Info]
Enable Remote Network Config	☐	
Enable TFTP Bootloader	☑	Allow remote upgrade firmware by TFTP. For safety reasons, the option should be disabled.

RS485 Parameters (Modbus RTU)

Name	Value	Description
PDU	1	
Baudrate	9600 ▾	bps
Parity	None ▾	

Modbus data mode

Name	Value	Description
Long (32bit) byte order	CD AB ▾	
Float byte order	CD AB ▾	

To activate Modbus, select **Enable Modbus TCP** or **Enable Modbus RTU**.

RS485 port configuration:

- **PDU** – Address of the device,
- **Baudrate** – Transmission speed selection: 1200, 2400, 4800, 9600, 19200, 38400, 57600 bps,
- **Parity** – Parity: None, Odd, Even, Mark, Space, 2 Stops.

Byte order for Long and Float

To ensure compatibility with non-standard Modbus Master devices, the module is equipped with 32-bit value representation options.
The 32-bit values are read as 2 subsequent 16-bit Holding Registers. Each 16-bit register consists of 2 bytes.
Devices on the market interpret those 4-byte numbers in different ways.
Sometimes it is needed to change the order of bytes of a 32-bit value.
Nano Analog has all possible 4 modes, separate for Long (integral) and Floar (floating-point) values.

For example, for a Long value, the decimal number 512002 is 00 07 D0 02 in HEX.

Representation of the number in various formats will look like this:

Order	**A**	**B**	**C**	**D**	**HoldingRegister**	**HoldingRegister + 1**
AB CD	00	07	D2	02	0007	D202
CD AB	D2	02	07	00	D202	0700
DC BA	02	D2	00	07	02D2	0007
BA DC	07	00	02	D2	0700	02D2

The most commonly used modes are AB CD and CD AB.

The device supports the following Modbus functions:

- 0x01 Read Coils
- 0x03 Read Holding Register
- 0x06 Write Single Register
- 0x0F Write Multiple Coils
- 0x10 Write Multiple Registers

Coils addressing

Address	**Name**	**R/W**	**Description**
1	Alarm	R	Alarm flag (1 – alarm, 0 – no alarm)

Holding Registers addressing

16-bit integral values:

Address	Name	R/W	Description
1	Final_value	R	Final value, decimal part
2	Final_value x 10	R	Final value x10
3	Real_Value x1000	R	Measured input value (0-20mA, 0-10V) x1000
4	Scale10000	R	Input signal scaled to 0-10000
5	Scale1000	R	Input signal scaled to 0-1000
6	Scale100	R	Input signal scaled to 0-100

Long values (32-bit):

Address	Name	R/W	Description
10 ÷ 11	ADC_Value	R	Value from the converter
12 ÷ 13	Final_Value x1000	R	Final value x1000
14 ÷ 15	Sensor_Value x1000	R	Sensor value x 1000
16 ÷ 17	Real_Value x1000	R	Measured input value (0-20mA, 0-10V) x1000

Float values (32-bit):

Address	Name	R/W	Description
10 ÷ 11	ADC_Value	R	Value from the converter
12 ÷ 13	Final_Value x1000	R	Final value x1000
14 ÷ 15	Sensor_Value x1000	R	Sensor value x1000
16 ÷ 17	Real_Value x1000	R	Measured input value (0-20mA, 0-10V) x1000

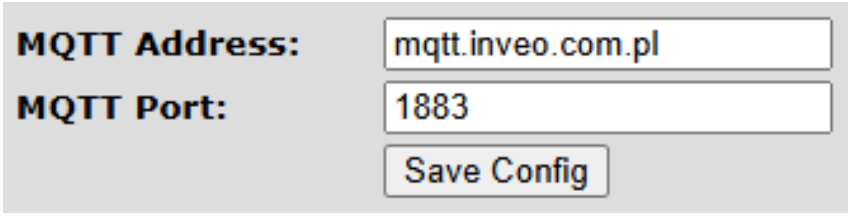
MQTT Inveo protocol communication

The device supports MQTT protocol. Data from the device is sent to the server every minute and after each value change. The data is not encrypted. The user subscribes the device data after connecting with the broker. The amount of users that can receive the data from a single device is unlimited.

In addition to the default Inveo MQTT broker, the user can specify their own MQTT server for measured value monitoring purposes.

Configuration:

Firstly, **Enable MQTT Inveo** in **Administration**. In the **Network** tab, MQTT broker address and port can be configured:



Application configuration – MQTT client:

- **Address:** mqtt.inveo.com.pl
- **Port:** 1883
- **User name:** nanouser
- **User password:** nanouser
- **Topic:** `/nanoA/<MAC>`

Clicking **[Show Info]** will display the MQTT client information:

EnableMQTT Client	☐	[Show Info] **MQTT Client Configuration:** • Server: mqtt.inveo.com.pl • Port: 1883 • Username: nanouser • Password: nanouser • Topic: /nanoA/d88039d81d2e/

Many Android/IOS applications support MQTT, enabling the user to receive the data on their telephone (eg. MQTT dash) and PC (MQTT explorer).

HTTP control

The modules can download data via HTTP GET.

- `status.xml` – Resource containing basic information about the module,
- `value.txt` – **Final_Value** presented in text form.

To read the current module status, recall the `http://192.168.111.15/status.xml` resource.

The module will display all important information in the form of an XML file:

```
<response>
    <prod_name>Nano-AN</prod_name>
    <sv>0.9</sv>
    <mac>00:00:00:00:00:00</mac>
    <on>00000001</on>
    <valFinal>61.01</valFinal>
    <unitFinal>cm</unitFinal>
    <valSensor>.61</valSensor>
    <unitSensor>mA</unitSensor>
    <inputType>0</inputType>
    <valScale10000>610</valScale10000>
    <valScale1000>61</valScale1000>
    <valScale100>6</valScale100>
    <iu>4.968</iu>
</response>
```

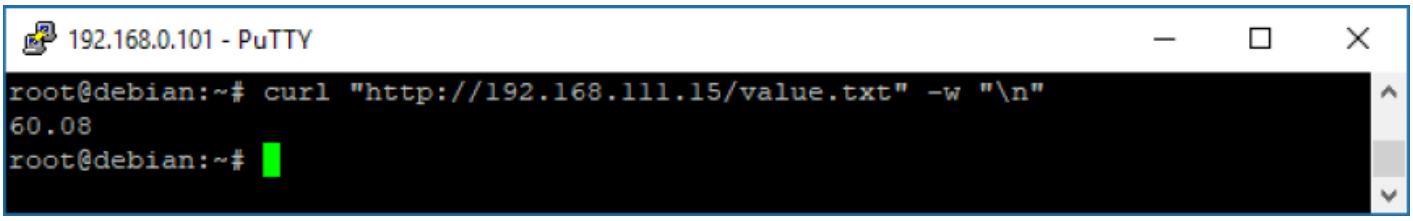
Section	Description
`<prod_name>`	Module type
`<sv>`	Firmware version
`<mac>`	Module's MAC address

`<on>`	Virtual outputs state: 00000001 indicates an alarm
`<valFinal>`	**Final_Value** of the measurement
`<unitFinal>`	Measurement unit
`<valSensor>`	Value measured from the sensor (Sensor_Value)
`<unitSensor>`	Measurement unit
`<inputType>`	Input type 0:4-20mA, 1:0-20mA, 2:0-10V, 3:0-5V
`<valScale10000>`	Measured value on the scale of 0-10000
`<valScale1000>`	Measured value on the scale of 0-1000
`<valScale100>`	Measured value on the scale of 0-100
`<iu>`	Measured current or voltage value (Real_Value)

Example of reading data using the CURL command

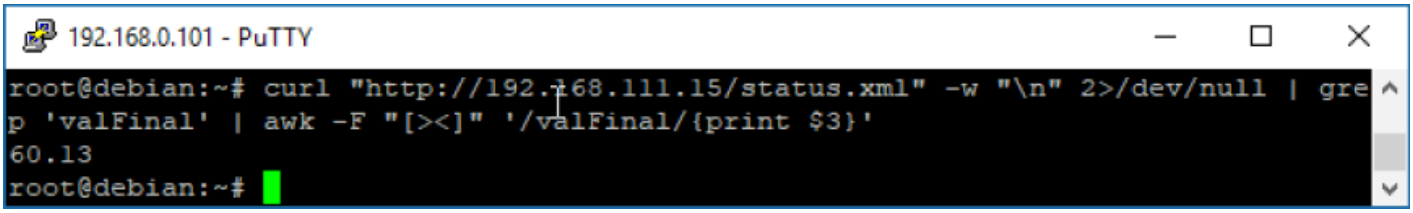
Access to `status.xml` and `value.txt` does not require authentication. Reading values from `value.txt`:

```
curl "http://192.168.111.15/value.txt" -w "\n"
```



Reading Final_Value from `status.xml`:

```
curl "http://192.168.111.15/status.xml" -w "\n" 2>/dev/null | grep 'valFinal' | awk -F "[><]" '/valFinal/{print $3}'
```



TCP communication protocol description

Nano Analog data frame:

Command name	**Byte No.**	**1**	**2**	**3**	**4**	**5**	**6**
	Byte name	SOF	CMD	Channel	Data1	Data2	Data
Temperature readout	dec	15	13	0	X	X	X
	hex	0x0F	0x0D	0x00	X	X	X

The module listens on TCP port 9761 by default.

Read current value from Nano Analog:

SOF	**CMD**	**CH**	**D1**	**D2**	**D3**	**D4**	**D5**
0x0F	0x0D	0x00	0x00	0x00	0x00	0x00	0x00

```
CRC = (BYTE) SUM (SOF+CMD+CH+D1..D7)
```

The request will return 4 bytes (current reading) and CRC (sum of 4 previous bytes).

Factory settings

Restoring factory settings

To restore the factory settings:

- Power up the device,
- Press the **RESET** button for a time period between 10 and 15 seconds,
- The **TAG** LED will start flashing about 4 times a second (Nano, Nano RFID PoE), `rSt` will appear on the display (Nano In/Out/Temp PoE),
- Release the **RESET** button.

Once the above steps have been completed, the device will be set to the following parameters:

- **IP address:** 192.168.111.15
- **IP mask:** 255.255.255.0
- **User:** admin
- **Password:** admin00

Warranty and manufacturer's liability

> **Warning**
>
> **The manufacturer provides a two-year warranty for the device and post-warranty service for a period of 10 years from the date of introduction of the device to the market. The warranty covers all material and production defects.**

The manufacturer undertakes to respect the warranty agreement, if the following conditions are met:

- All repairs, changes, expansions and device calibrations are carried out by the manufacturer or an authorized service center,
- The power supply system meets the applicable standards,
- The device is operated in accordance with the suggestions presented in this manual,
- The device is operated in accordance with its intended purpose.

The manufacturer assumes no responsibility for consequences resulting from improper installation, improper use of the device, failure to comply with the instruction manual, and repairs made by unauthorized personnel.

> **Warning**
>
> **The device contains no user serviceable parts inside.**

Storage, operation and transport conditions

The device should be stored in enclosed rooms, where the atmosphere is free from vapours and corrosive substances:

- Environment temperature from -30°C to +60°C (-22°F - 140°F),
- Humidity from 25% to 90% (condensation unacceptable),
- Atmospheric pressure from 700 to 1060 hPa.

The device is intended to operate in the following conditions:

- Environment temperature from -10°C do +55°C (14°F - 131°F),
- Humidity from 30% to 75%,
- Atmospheric pressure from 700 to 1060 hPa.

Recommended transport conditions:

- Environment temperature from -40°C do +85°C (-40°F - 185°F),
- Humidity from 5% to 95%,
- Atmospheric pressure from 700 to 1060 hPa.

Installation and device operation:

- The module should be operated in accordance with recommendations provided later in this manual.

Disposal and decommissioning

In an event the device needs to be decommissioned (eg. after its intended life period is surpassed), it is recommended to contact the manufacturer or his representative, who are responsible to respond appropriately, i.e., to collect the device from the user. The user can alternatively contact companies specializing in electronic device or computer equipment disposal and/or decommissioning. Under no condition should the device be placed with other waste.