User manual

Analog input converter

LAN/RS485

NANO Analog Input POE

Soft >= 0.9

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Thank you very much for choosing our product. Please carefully read this user manual as it contains most appropriate ways of dealing with this device, taking into account the basic principles of safety and maintenance. Please also keep the user guide that you can use it during subsequent use.

Manufacturer Liability!

The manufacturer is not liable for any damage caused by improper or incompatible use of this device, as well for any faults to the device resulting from improper use.

Table of contents

1 Preliminary information

Before using the module please read the user manual carefully and follow the instructions contained within!

Description of visual symbols used in this user manual:

This symbol is responsible for reviewing the appropriate place in the user instructions, warnings and important information. Failure to follow warnings could cause injury or damage to the module.

Important information and guidelines.

Following this guidelines makes the use of the module easier.

Attention: The appearance of the screen shots shown in this manual may differ slightly from the actual work with the module. The differences may relate to the size and font type and size of symbols. There are no differences in the content of the information.

2 The purpose of the device

The Nano Analog PoE device is used to transmit the measured current or voltage across the LAN. The measured value is available through the embedded website and via HTTP GET, Modbus TCP, SNMP and MQTT protocols. An additional RS485 port enables communication via the Modbus RTU protocol. The device can send an exceeded value to other Inveo modules, causing eg remote activation of the relay.

3 Warranty and liability of the manufacturer

The manufacturer provides a 2-year warranty on the module. The manufacturer also provides post-warranty service for 10 years from the date of the introducing the module on the market. The warranty covers all defects in material and workmanship.

The manufacturer undertakes to comply with the contract of guarantee, if the following conditions are met:

- All repairs, alterations, extensions and device calibrations are performed by the manufacturer or authorized service,
- supply network installation meets applicable standards in this regard,
- device is operated in accordance with the recommendations outlined in this manual,
- device is used as intended.

The manufacturer assumes no responsibility for consequences resulting from improper installation, improper use of the module, not following this manual and the repairs of the module by individuals without permission.

This device doesn’t contain serviceable parts. The repairs can be done only by manufacturers approved repair service.

4 Safety guidelines

The module has been constructed using modern electronic components, according to the latest trends in the global electronics.
In particular, much emphasis was placed on ensuring optimum safety and reliability of control.
The device has a housing with high quality plastic.

4.1 Power supply

The device is designed to supply 10-24V DC and PoE IEEE 802.3af.

4.2 Storage, working environment and transportation

The controller elements should be stored in closed rooms,
in which the atmosphere is free of vapors and caustic agents and:

- the temperature is kept between -30 ° C and + 60 ° C,
- humidity range: 25% to 90% (unacceptable condensation)

The device is designed to work in the following conditions:

- ambient temperature from -10 ° C to + 55 ° C,
- relative humidity from 30% to 75%,

4.3 Installation and use of the module

The module should be used following the guidelines shown in next part of the user manual.

4.4 Utilisation of the module

When it becomes necessary to liquidate the device (e.g. after the time of use), please contact the manufacturer or its representative, who are obliged to respond appropriately, e.g. collecting the module from the user. You can also ask the companies involved in utilization and / or liquidation of electrical or computer equipment. Under no circumstances should you place the device along with other garbage.

5 Module construction

5.1 General features

The general view of the Nano Analog PoE module is shown below.

General appearance of the module

The module supports the following types of sensors:
- sensors with voltage output 0-5V
- sensors with voltage output 0-10V
- sensors with current output 4-20mA
- sensors with current output 0-20mA.

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

Communication with the module is done via LAN and RS485 (Modbus RTU)

The following communication options are available:

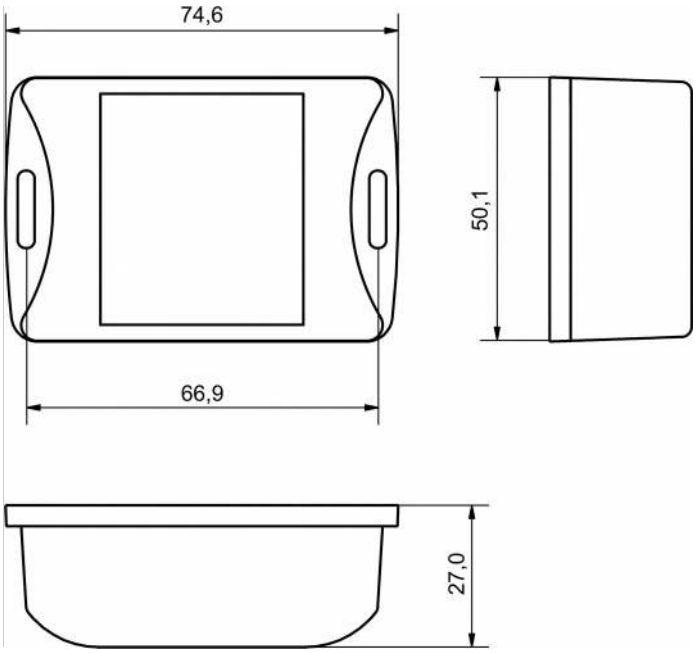
- embedded web server, using a standard internet browser (preferred browsers are MOZILLA FIREFOX, OPERA, CHROME),
- windows / linux command line programs
- HTTP protocol
- Modbus TCP protocol
- Modbus RTU protocol
- SNMP protocol
- own application via TCP protocol (shared protocol)
- MQTT to Inveo server protocol

The module is equipped with an LED display on which the currently measured value is displayed.

5.2 Technical data

Power supply: 10-24VDC or PoE IEEE 802.3af
Power consumption: max 1,5W

Weight: 60g
Distensions: height: 27 mm; width: 74.6 mm; length: 50.1 mm



Port Ethernet

Speed 10Mb/s
PoE compatible with the standard IEEE802.3af

Port RS485

Supported protocol: Modbus RTU
Transmission speed: 1200,2400,4800,9600,19200,38400,57600 bps
Parity: None, Odd, Even, Mark, Space, 2 Stops

Input

1 analog input configured with a jumper (voltage / current) and programmatically
Frequency of measurement: 4Hz
Transducer resolution: 17 bit

Input parameters in current mode:

Measurement range: 0-20mA or 4-20mA
Maximum input current: 25mA
Input impedance: 200R
Measurement error: <0,8%

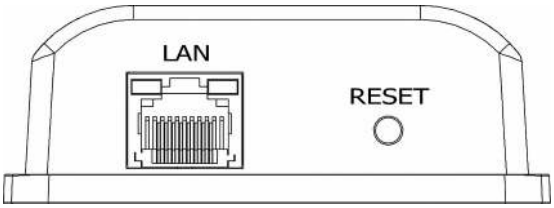
Input parameters in voltage mode:

Measurement range: 0-5V lub 0-10V
Maximum input voltage: 12V
Input impedance: 60k
Measurement error: <0,5%

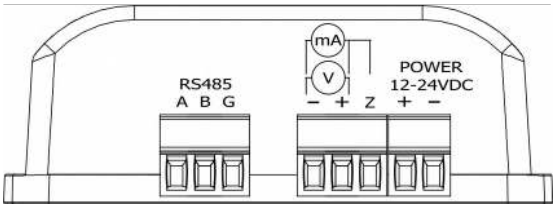
5.3 Description of the module connectors

The module is equipped with the following connectors:

- **LAN** – connection of LAN and power PoE IEEE 802.3af
- **RESET** – a switch to enabling the DHCP, schecking the current IP address and restoring the module to the factory settings.

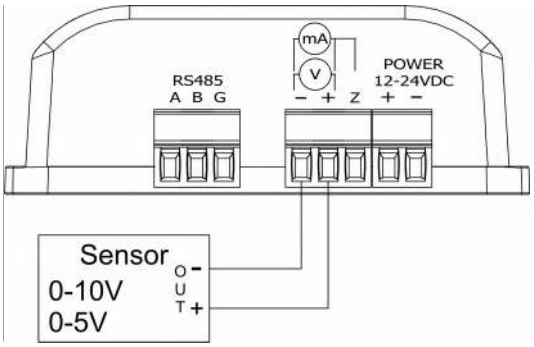


- **SENSOR –** disconnectable screw connection for sensor connection
- **RS485** – MODBUS RTU communication connection
- **POWER –** power connection. An additional power connection used in the event of a PoE power failure. Power supply voltage 12-24VDC.

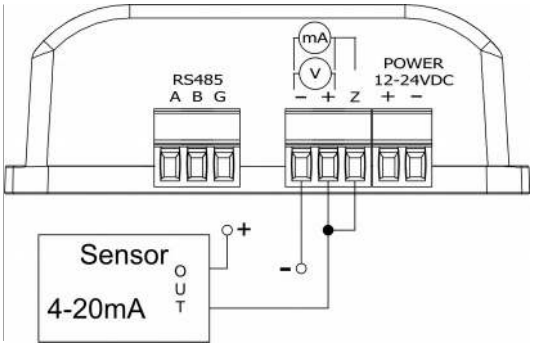


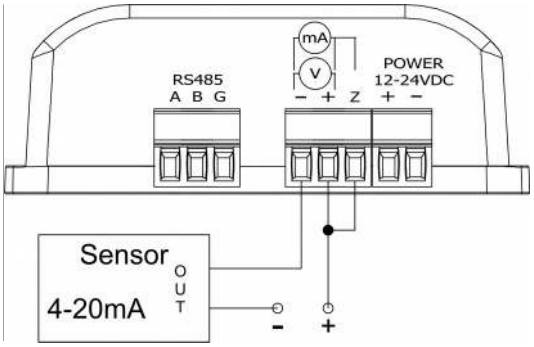
5.4 Sensor connecting schematics

Voltage output sensors (0-10V or 0-5V)



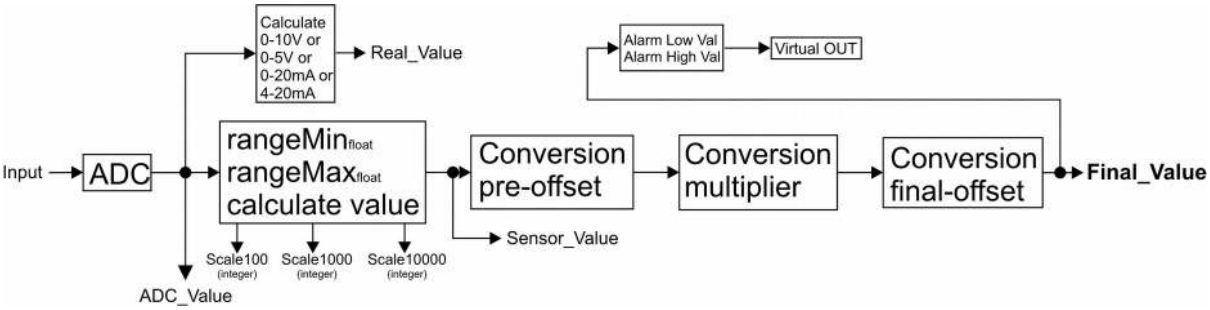
Current output sensor (0-20mA or 4-20mA)





6 Sensor signal conversion flow

Signal flow from Sensor is shown below.



Current or Voltage input signal (Input) is converted by Analog to Digital Converter (ADC). Value from ADC is available via **ADC_Value** variable.

Real_Value is measured value given in sensor unit (V or mA). Is the same value like measured by multimeter.

The **rangeMin and rangeMax** values are sensor measure range. The **rangeMin** is physical value of sensor for minimal measured range, i.e. -50ºC for 4mA or 0V. The **rangeMax** is physical value of sensor for maximal measured range, i.e. 200ºC for 20mA. This parameters are given for calculate real value from sensor and is accesible by **Sensor_Value** variable.

Example:
Application use the thermometer sensor with current output 4-20mA and measured range from -50ºC to 100ºC. The rangeMin is set to -50 and rangeMax is set to 100.
The **Sensor_Value** variable show -50 for 4mA and 100 for 20mA. The remaining values in the range will be interpolated.

For better matching results for a given application, the user has a linear function:
Final_Value=a(Sensor_Value+c)*b
It can be used for scale output or add/substract offset to measured value.

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

The Conversion_* variables are real values (with sign and optional fraction part).
The use of conversions, for example, allows subtraction from the measured value of -10, multiplication by 0.01 (i.e. dividing by 100) to obtain a usable quantity in the final application.
The **Final_Value** is presented on display LED.

Example:

The Sensor_Value value from the distance sensor is 2654 cm. This distance is overvalued by 10 cm, additionally in the application it is required that the value is given in inches. To obtain such a result, the coefficients must be set:
Conversion_pre-offset = -10
Conversion_multiplier = 0.394 (1 / 2.54 = 0.394)
Conversion_final-offset = 0

With such coefficients, the Final_Value value will be corrected for error and reported in inches.

The Scale10000, Scale1000 and Scale100 values are proportional to Real_Value in the given range. For example, at the current input for 4mA Scale10000 = 0, and for 20mA Scale10000 = 10000.

All resulting values (variables) are available via ModbusTCP, ModbusRTU, HTTP XML and others.

7 Configuration of the device

If using the module for the first time it is needed to configure it as shown below

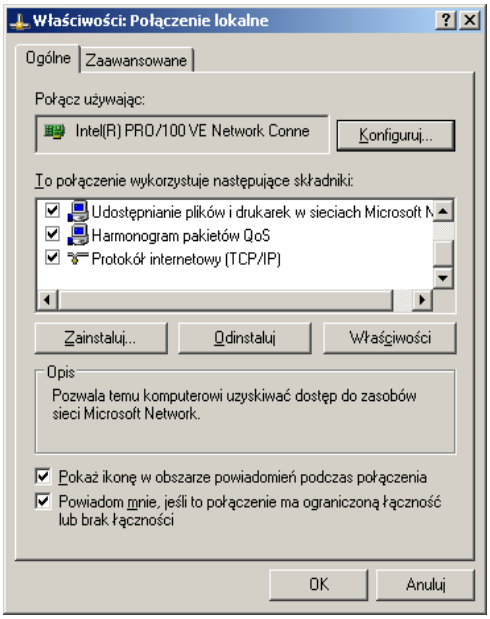
7.1 Quick network configuration by Inveo Discoverer

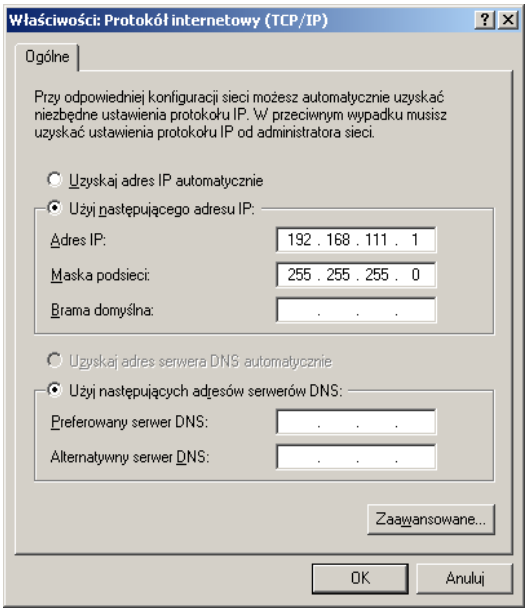
Inveo Discoverer from version 2.0 allows to configure the network settings of Inveo devices without having to change the subnet of the computer.
The program can be downloaded from the website http://inveo.com.pl/download

The program automatically detects connected devices on the network and allows you to give them the appropriate addresses or enable DHCP.

7.2 Changing the PC setting for module configuration.

After connecting the module to the network there is a need to change the PC setting. In order to do that navigate to: Start->Control Panel->Network connections.
Then right click on the current network connection and click „Properties”.
The configuration screen as shown on left below should be visible on the screen



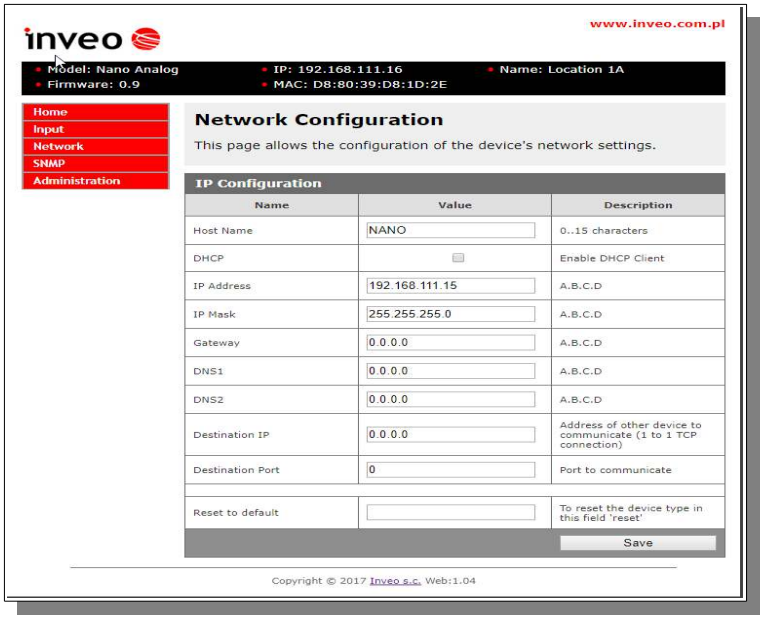


Tick the box „Use the following IP address” and enter:
IP address: **192.168.111.1**
Subnet mask: **255.255.255.0**
The rest of the setting can be left blank.
Press OK to accept the changes.
Launch the web browser and enter the address: **192.168.111.15.**

Default username and password: admin / admin00

7.3 Changing the network settings

The configuration of the Nano Analog network is available in the **Network** tab.



The following fields are used to change the network settings of the module:

Host Name – NETBIOS name
Enable DHCP – Selecting this field forces the use of the address assigned by the DHCP server,
IP Address – IP address of the module (at this address the module will be visible in the network),
Gateway – gateway,
Subnet Mask – IP subnet mask,
Primary DNS, Secondary DNS – DNS server addresses,

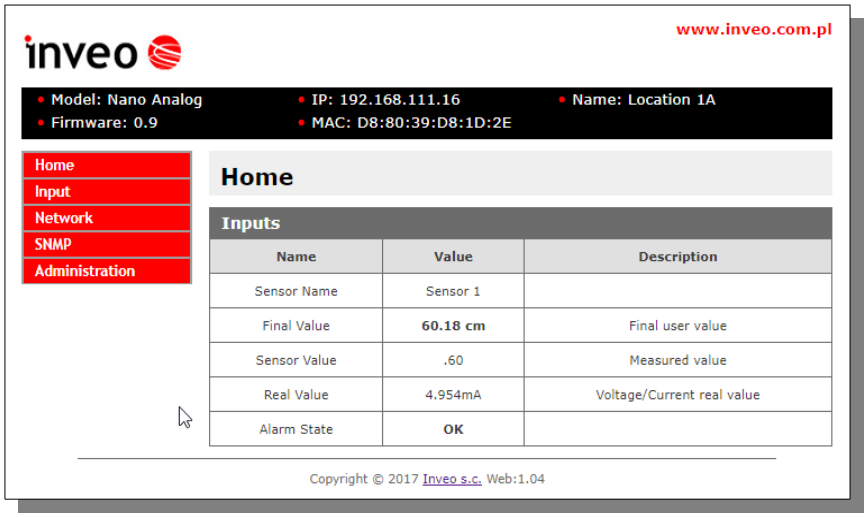
Destination IP – address of the module to which the device can connect (optional),
Destination Port – the port on which the remote module to which the device can connect is listening.

The field **Reset to default** is used to bring the module to factory settings.

*After making changes, click the **Save** button*.

7.4 Sensor measurement information

Current data from the sensor is displayed in the **Home** tab
.



The meaning of individual variables is described in the chapter *Sensor signal conversion flow*.

The field **Sensor Name** is the name of the sensor edited in the **Input** tab.
Alarm State informs about exceeding set thresholds.

7.5 Administration and services settings

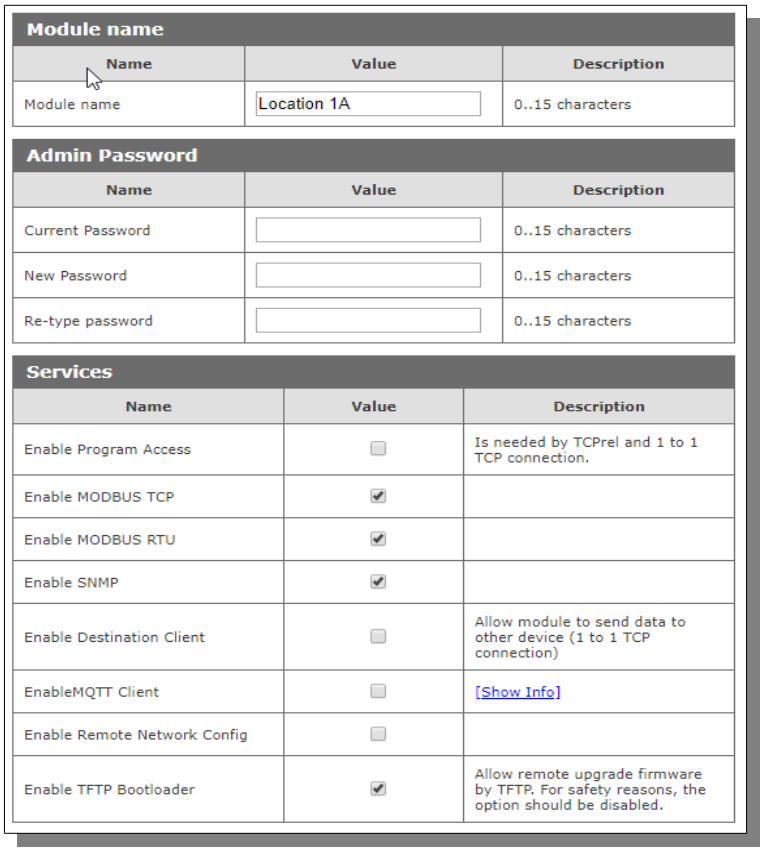
Administration menu allows to configure the services to be active on the device and to change the access password.

Changing the password

The access password is set in the fields **Admin Password**.
The current password is required (Current Password) and entering a new password twice (New Password i Re-type password). Setting a New Password field blank will disable the password request.

Name of the module

Name of the module is set in the field **Module Name**. This name is displayed in the top bar of the page and available for other services.



Module name

Name	Value	Description
Module name	Location 1A	0..15 characters

Admin Password

Name	Value	Description
Current Password		0..15 characters
New Password		0..15 characters
Re-type password		0..15 characters

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.

Services settings

The device allows to choose what services are to be available. Selecting the check box next to the service name activates the selected service.

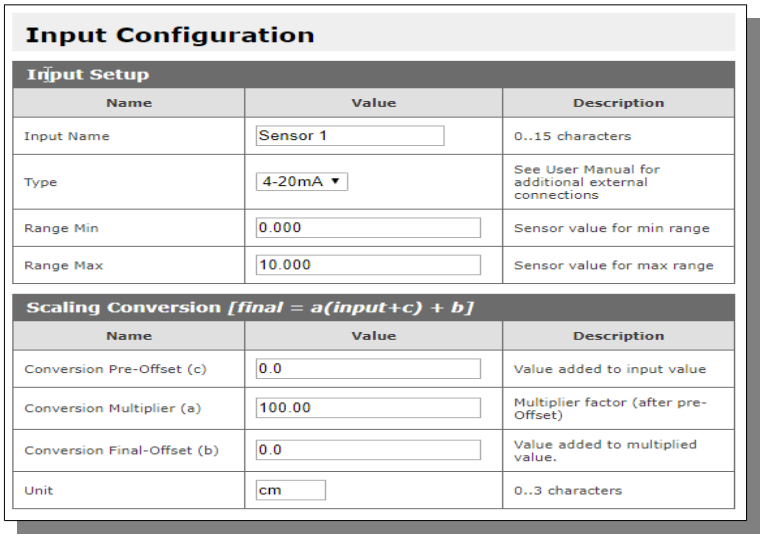
Enable Program Access – a service of access by a computer program (Windows, Linux) and TCP / IP protocol operating on port 9761
Enable MODBUS TCP – enabling Modbus TCP server,
Enable MODBUS TCP – enabling Modbus RTU (RS485)server,

Enable SNMP- enabling SNMP protocol supporting,
Enable Destination Client – connecting to a remote host service
Enable MQTT Inveo – a service that sends data to the INVEO MQTT cloud,
Enable Remote Network Config – a service of remote change of network settings by the INVEO DISCOVERER program
Enable TFTP Bootloader – enabling a bootloader.

Note: TFTP Bootloader should be disabled during normal operation. Enable just before updating the software.

7.6 Configuration of the analog input

The **Input** tab is to configure the input type and signal conversion method.
Before configuring, it is recommended to read the chapter Sensor signal conversion flow



Input Name is the name of the sensor(not the device) given by the user.
The input type is set in the field **Type**. The options are:

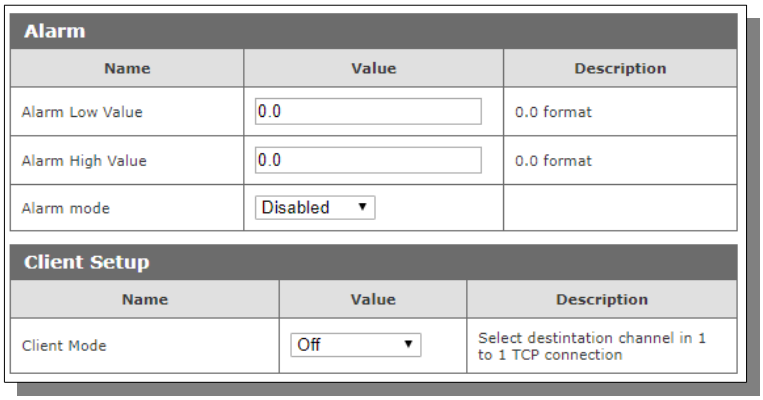
- 4-20mA
- 0-20mA
- 0-5V
- 0-10V

Attention! For current input it is required to add a jumper on the sensor connector as shown in the drawing in chapter *Description of the module connectors*.

Range Min and **Range Max** determine the range of the sensor for the input measuring range.
The **Conversion...** fields set the conversion parameters of the measured value (Sensor_Value) to final value (Final_Value). Conversion process is described in chapter Sensor signal conversion flow.
The **Unit** field allows adding a unit to the final value of the measured signal.

7.7 Setting the alarms

The device can compare the measured value with the thresholds set by the user. Detection of value violation is treated as an alarm. The alarm status is available as virtual input and for most protocols.



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

- **Disabled –** the alarm disabled
- **Low –** the alarm is active if the measured value is smaller than the value set in the field **Alarm Low Value**.
- **High –** the alarm is active if the measured value is higher than the value set in the field **Alarm High Value**.
- **Low + High –** the alarm is active if the measured value is higher than the value in the field **Alarm High Value** or lower than the value in the field **Alarm Low Value**.

The occurrence of an alarm condition is signaled on the homepage of the module, and the LED display on the device flashes.

During the alarm, the virtual output 1 is activated in the status.xml resource (**<on>00000001</on>**)

http://192.168.111.15/status.xml

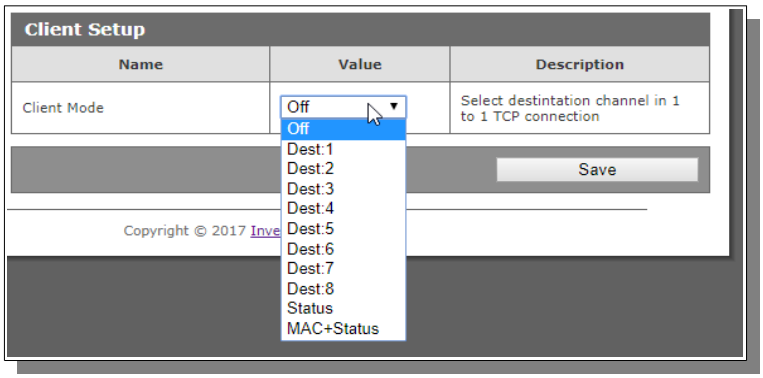
```
<response>
<prod_name>Nano-AN</prod_name>
<sv>0.9</sv>
<mac>D8:80:39:D8:1D:2E</mac>
<on>00000001</on>
<valFinal>2.49</valFinal>
<unitFinal>m</unitFinal>
<valSensor>2.49</valSensor>
<unitSensor>mA</unitSensor>
<inputType>0</inputType>
<valScale10000>2338</valScale10000>
<valScale1000>233</valScale1000>
<valScale100>23</valScale100>
```

```
<iu>7.735</iu>
</response>
```

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

7.8 TCP / IP communication

The Nano Analog PoE module has the ability to send the measured value and alarm state to another module or to the server using the TCP protocol. This means that when an alarm occurs, a message will be sent to another device that can react, for example, by activating a relay. The IP address of the device to which information is to be sent should be set in the tab **Network** Destination IP, Destination Port.
The message is sent each time the alarm condition is changed and additionally every 5 seconds.



In the field **Client mode** in the Administration tab, user can choose the format of the frame:

- **Off –** sending frames disabled
- **Dest: 1..8 –** sending TCP frames in **format #1** (compatible with INVEO devices)
- **Status –** sending TCP frames in **format #2**
- **MAC + Status –** sending TCP frames in **format #3**

7.9 TCP frames formats (Destination Client)

Format #1
The frame in the format #1 is sent in binary form.
An example TCP frame sent with active alarm and **Dest:5** set

SOF	CMD	CH	F_ID	ALARM	!ALARM	Val0 (LSB)	Val1	Val2	Val3 (MSB)	CRC
0x0F	0x01	**0x04**	0xFF	**0x01**	0xFE	**0x0F**	0x00	**0x01**	**0x57**	0x79

An example TCP frame sent with inactive alarm and **Dest:5** set

SOF	CMD	CH	F_ID	ALARM	!ALARM	Val0 (LSB)	Val1	Val2	Val3 (MSB)	CRC
0x0F	0x01	**0x04**	0xFF	**0x00**	0xFF	**0x0F**	0x00	**0x01**	**0x57**	0x79

Values Val0-Val3 is a 32-byte Final_Val value multiplied with * 1000.

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

Format #2
The frame in the format #2 is sent as a string (STRING).

<ALARM>[SPACE]<Final_Val>

- **ALARM** – value 1 means an alarm is active, 0 means an alarm is inactive
- **Final_Val** – Final_Val value

Value in HEX						STRING
30	20	33	39	2E	35	0 39.5

Format #3
The frame in the format #3 is sent as a string (STRING).

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

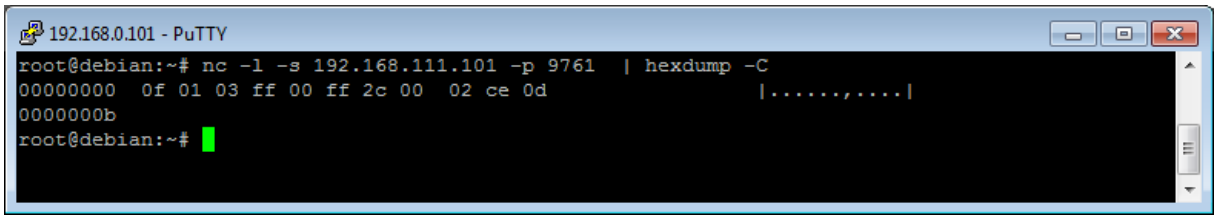
- **MAC** – network address of the module
- **ALARM** – value 1 means an alarm is active, 0 means an alarm is inactive
- **Final_Val** – Final_Val value

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

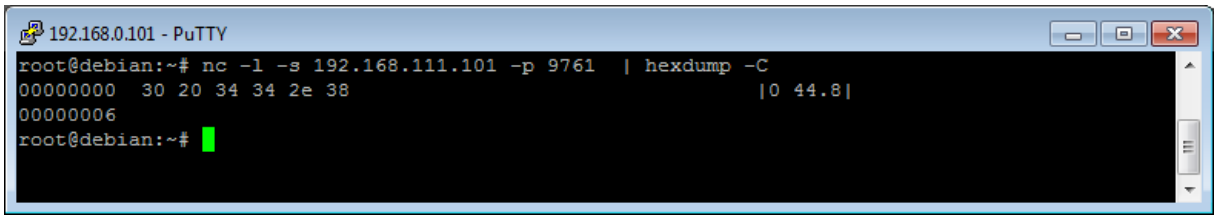
The TCP frame can be supported with your own software.

An example of using the netcat command for Linux:

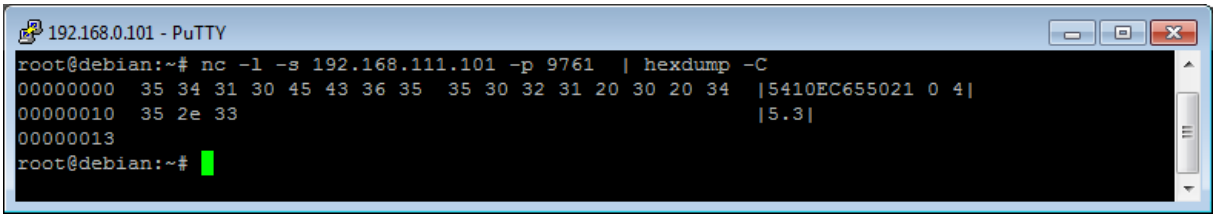
Format #1



Format #2



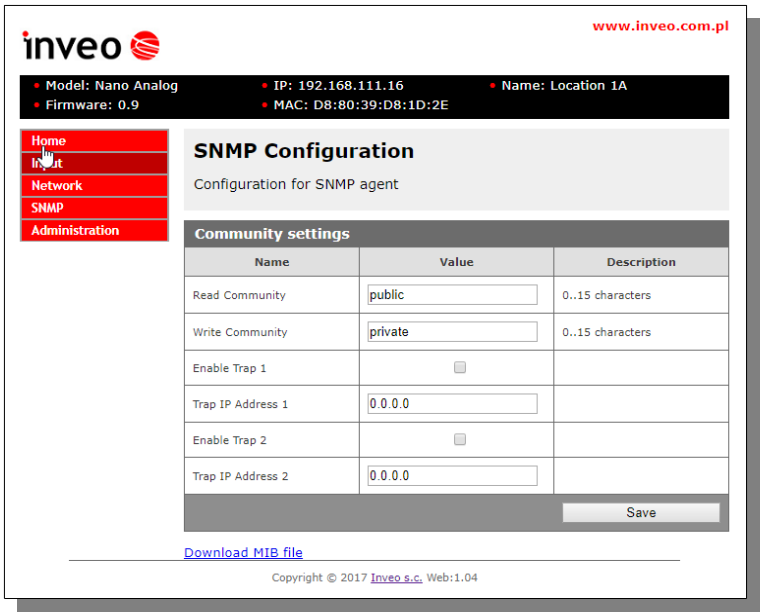
Format #3



7.10 SNMP configuration

The module is equipped with an SNMP v2c server.
To enable this feature go to Administration tab-> Enable SNMP.

The SNMP protocol allows to read the current value.
The MIB file describing the structure can be downloaded the SNMP tab.



The basic parameters that can be read from the Nano Analog PoE module can be found in the table:

Name	Format	OID
Final_Val	**STRING**	.1.3.6.1.4.1.42814.14.3.5.1.0
Final_Val (integer part)	**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 active	**INTEGER**	.1.3.6.1.4.1.42814.14.3.1.1.0

Module can send TRAP messages after alarm activation. Destination address should be entered in **Trap IP Address 1** and **Trap IP Address 2**. fields.

7.11 Managing the module using Windows command line software

The module's input status can be read from the Windows command line.
Windows syntax:TCPRel.exe [Parameters]

Parameter	Description
-in=1	The number of the input being read
-host=[HOST]	The IP address of the module
-port=[PORT]	Module port
-analog	Reading values from the sensor

Examples:

Reading the current value, the module has an address: 192.168.111.15 and listens on port 9761:

```
TCPRel -in=1 -host=192.168.111.15 -port=9761 -analog
```

7.12 Linux control program

The module's input status can be read from the command line of the Linux system.
Syntax: ./TcpRel.exe [Parameters]

Parameter	Description
-i 1	The number of the input being read
-h [HOST]	The IP address of the module
-p [PORT]	Module port
-a	Reading the current value

Examples:

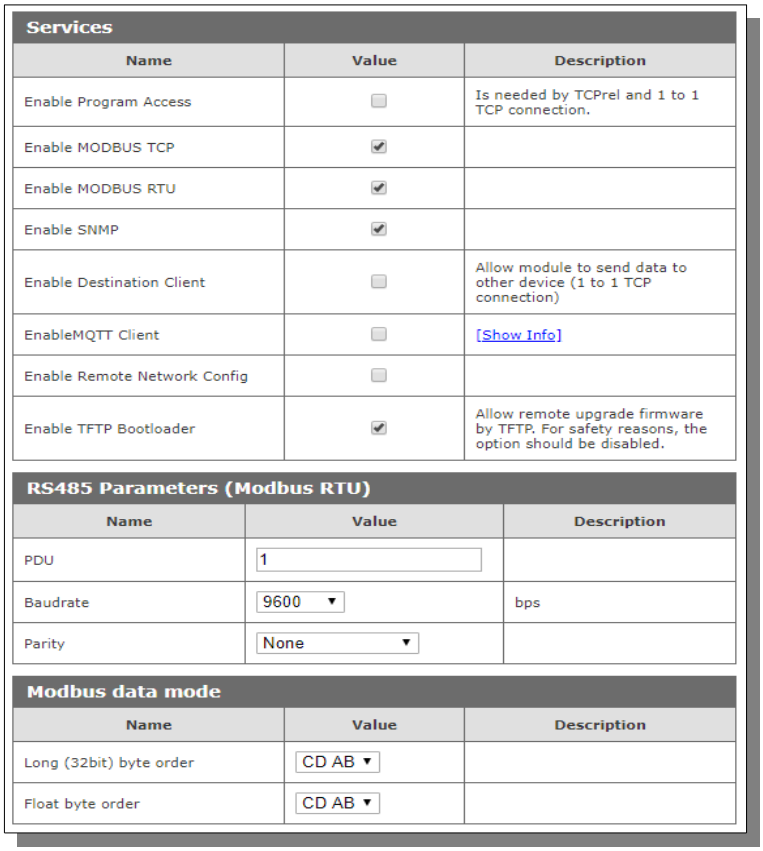
Reading the current value, the module has an address: 192.168.111.15 and listens on port 9761:

```
./tcprel -i 1 -h 192.168.111.15 -p 9761 -a
```

7.13 Communication via the MODBUS protocol

The device supports Modbus RTU and Modbus TCP protocols.
The Modbus TCP server is available over LAN and listens on port 502.
Modbus RTU is available via the RS485 port.
The Modbus RTU and Modbus TCP protocols can be used simultaneously.

The Modbus configuration is available via 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 ▾	

Enabling Modbus protocols is marked in the Enable Modbus TCP and / or Enable Modbus RTU fields.

Configuration of RS485 port

The options are:
PDU – the device address
Baudrate - transmission speed setting :1200, 2400, 4800, 9600, 19200, 38400, 57600 bps

Parity: None, Odd, Even, Mark, Space, 2 Stops

Order of bytes for the Long and Float types

To enable working with less standard Modbus master devices, the module has been configured with a 32-bit value representation method.

32-bit values are read as 2 consecutive registers (HoldingRegisters) which are 16 bit.
Each 16-bit register consists of 2 bytes.
Devices existing on the market interpret such 4-byte numbers in different ways.
Sometimes it is necessary to convert the order of bytes to a 32-bit value.

Nano Analog allows 4 conversion modes (that is all possible) separately for Long (integer) and Float (floating point) values.

For example, for Long, a decimal number
512002 has a hexadecimal value 00 07 D0 02

Representation of the number in different formats will look as follows

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 common modes are AB CD and CD AB.

Supported Modbus functions

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 Register

Register number	Name	Mode: R-read W-write	Description
1	Alarm	R	Alarm flag (1-alarm, 0-no alarm)

Holding Registers

Register number	Name	Mode: R-read W-write	Description
Integer value 16 bit			
1	Final_value	R	The final value, the decimal part
2	Final_value x 10	R	The final value *10
3	Real_Value x1000	R	The measured value from the input (0-20mA, 0-10V) x1000
4	Scale10000	R	The input signal, scaled to a value 0-10000
5	Scale1000	R	The input signal, scaled to a value 0-1000
6	Scale100	R	The input signal, scaled to a value 0-100
Long values (32 bit)			
10	ADC_Value	R	Value from the ADC
11			
12	Final_Value x1000	R	The final value * 1000
13			
14	Sensor_Value x1000	R	Value from the sensor * 1000
15			
16	Real_Value x1000	R	The measured value from the input (0-20mA, 0-10V) x1000
17			
Float value (32 bit)			
10	ADC_Value	R	Value from the ADC
11			
12	Final_Value *1000	R	The final value * 1000
13			
14	Sensor_Value *1000	R	Value from the sensor * 1000
15			
16	Real_Value x1000	R	The measured value from the input (0-20mA, 0-10V) x1000
17			

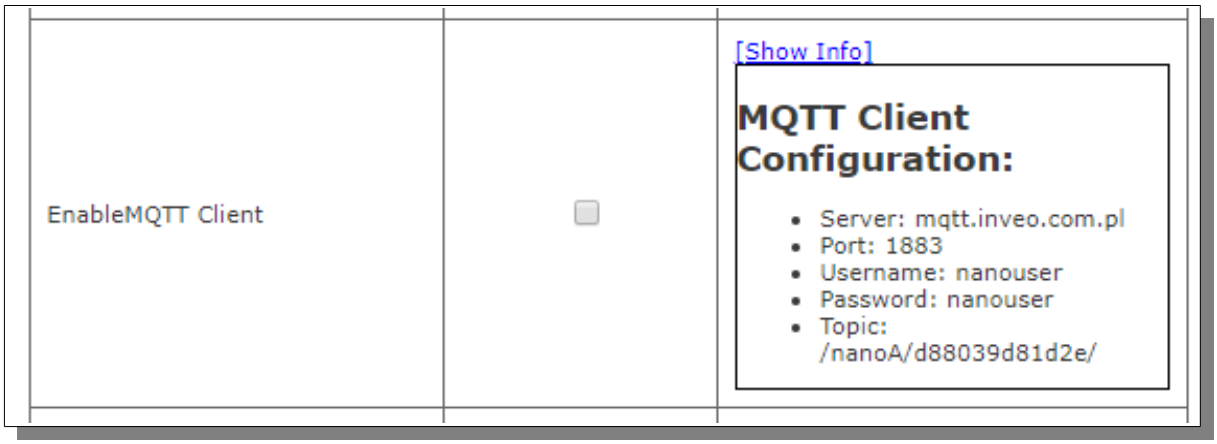
7.14 Communication via the MQTT Inveo protocol

If the MQTT Inveo service has been enabled in the **Administration** menu, the module sends to mqtt.inveo.com.pl server the value of measured value every 1 minute and additionally at each change.

Application configuration - MQTT client:

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

After click [Show Info] the settings for the MQTT client will be displayed:



There are many applications on Android, IOS or PC that can display data sent by the module.

7.15 Communication with module using HTTP.

Modules are able to download data using the HTTP GET protocol.

- **status.xml** – the resource containing basic information about the module
- **value.txt** – the final value (Final_Value) presented in text form

To read the current state of the module, refer to a resource in an Internet browser, e.g. http://192.168.111.15/status.xml

The module in the XML file will return all relevant information:

```
<response>
<prod_name>Nano-AN</prod_name>
<sv>0.9</sv>
<mac>D8:80:39:D8:1D:2E</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>
```

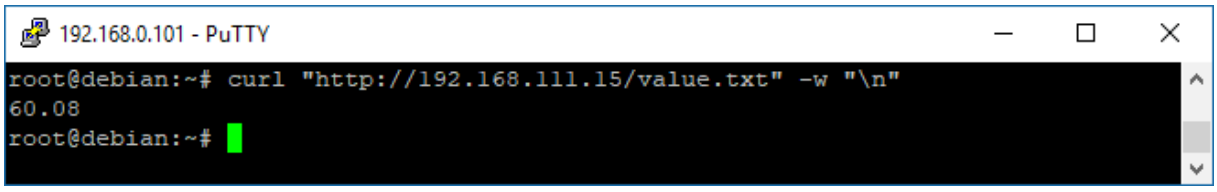
Section	Description
<prod_name>Nano-AN</prod_name>	Type of the module
<sv>0.9</sv>	The program version
<on>00000000</on>	Status of virtual outputs: - 00000001 means exceeding the value (alarm)
<valFinal>61.01</valFinal>	The final value of the measurement (Final_Value)
<unitFinal>cm</unitFinal>	Unit
<valSensor>.61</valSensor>	The value measured from the sensor (Sensor_Value)
<unitSensor>mA</unitSensor>	Unit of measurement
<inputType>0</inputType>	Type of the input 0:4-20mA, 1:0-20mA, 2:0-10V, 3:0-5V
<valScale10000>610</valScale10000>	Value measured on a scale 0-10000
<valScale1000>610</valScale1000>	Value measured on a scale 0-1000
<valScale100>610</valScale100>	Value measured on a scale 0-100
<iu>4.968</iu>	The measured value of current or voltage (Real_Value)
<mac>54:10:EC:65:50:21</mac>	The network address of the module

Example of reading the measured value with the CURL command

Access to resources **status.xml** and **value.txt** does not require authorization.

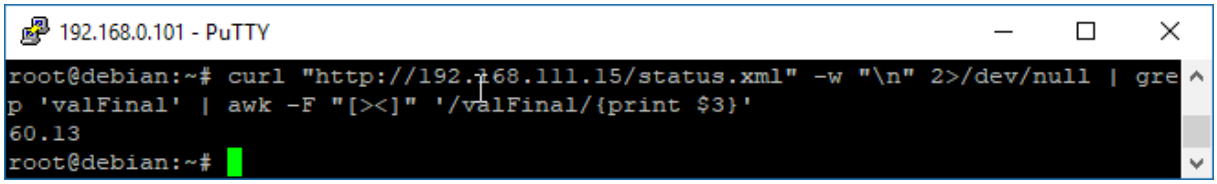
Reading values from the value.txt resource:

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



Reading the Final_Value value from the status.xml file

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



7.16 Description of the communication protocol

Nano Analog communication data frame

	No. of the byte	1	2	3	4	5	6	7	8	9	10	11	
	Name of the byte	SOF	CMD	CHANNEL	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	CRC	RETURNS
The name of the command													
Reading Final_Value		15	13	0	x	x	x	x	x	x	X	CRC	4byes + CRC

The module normally listens on TCP port 9761.

Sample frames:

Odczytanie aktualnej wartości z modułu Nano Analog.

SOF	CMD	CH	D1	D2	D3	D4	D5	D6	D7	CRC
0x0F	0x0D	0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x1C

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

The command will return 4 bytes (Final_Value*1000) + CRC (sum of the previous 4 bytes)

7.17 Communication with the module from the external network

If the module is in a different LAN network than the computer connecting to it, port forwarding is required.
Depending on the communication method used with the module, it is necessary to contact the Network Administrator and port forwarding:

Support via website and HTTP protocol:
- port TCP 80

Service by a computer program or by your own application:
- port TCP 9761

Support via MODBUS TCP:
- port TCP 502

Support via SNMP protocol:
- port UDP 161

8 Checking the IP address

To check the current IP address of the device:

1. Press and hold the reset button until the display shows the four parts of the IP number, e.g.
   192
   168
   111
   15
2. Release the reset button.

9 DHCP

To enable/disable DHCP service:

1. Press and hold RESET button until the display shows: dhcP
2. Release the reset button.
3. Depending on the current DHCP setting, the message will be displayed -on or -oFF

It is also possible to enable DHCP in the network configuration in the Network tab or through Discoverer.

10 Restoring factory defaults

In order to restore the module to its factory defaults:

1. Press and hold reset button until the display shows: rSt
2. Release the reset button.

With factory defaults restored the module settings are as follows:

- IP address : 192.168.111.15
- IP mask : 255.255.255.0
- DHCP: enabled
- User name : admin
- Password: admin00

11 Firmware update

The module has the ability to update the firmware. The firmware is supplied as a file with .bin extension.

Note! Improper use of the update feature may damage the module. Make sure that undisturbed power is connected to the module for duration of programming.

To perform the programming operation, go to the Windows command line (Start-> Run-> type 'cmd' and confirm with Enter).

Then navigate to the directory where the file resides and enter the command

tftp -i <module_*ip_adress*> **PUT** filename*.bin*

where: < module_*ip_adress* > is the IP address of the module
filename.bin – is the firmware supplied by Inveo s.c.

The programming takes about 1 minute and it's confirmed by "File Transferred" message.

Notes