



# User manual Input reading module

## NANO IN



Soft >= 1.0

**INVEO s.c.**  
ul. Rzemieślnicza 21  
43-340 Kozy  
tel: +48 33 444 65 87  
[www.inveo.com.pl](http://www.inveo.com.pl)  
[info@inveo.com.pl](mailto:info@inveo.com.pl)

## **Dear Customer!**

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.**

**Contents:**

- 1 PRELIMINARY INFORMATION.....4**
- 2 DEVICE DESCRIPTION .....5**
- 3 WARRANTY AND LIABILITY OF THE MANUFACTURER .....5**
- 4 SAFETY GUIDELINES .....6**
  - 4.1 POWER SUPPLY.....6
  - 4.2 STORAGE, WORKING ENVIRONMENT AND TRANSPORTATION.....6
  - 4.3 INSTALLATION AND USE OF THE MODULE.....6
  - 4.4 UTILISATION OF THE MODULE.....6
- 5 MODULE DESCRIPTION.....7**
  - 5.1 GENERAL FEATURES.....7
  - 5.2 TECHNICAL SPECIFICATION.....7
  - 5.3 MODULE INPUT/OUTPUT TERMINAL DESCRIPTION.....8
  - 5.4 BINARY OPTO-ISOLATED INPUTS – CONNECTIONS.....8
- 6 MODULE CONFIGURATION.....9**
  - 6.1 CHANGING THE PC SETTING FOR MODULE CONFIGURATION.....9
  - 6.2 CONFIGURATION OF THE MODULE MODULE THROUGH WEB BROWSER.....10
  - 6.3 INPUT READOUT.....11
  - 6.4 ACCESS CONFIGURATION.....12
  - 6.5 SNMP CONFIGURATION.....13
  - 6.6 MANAGING THE MODULE USING WINDOWS COMMAND LINE SOFTWARE.....14
  - 6.7 MANAGING THE MODULE USING LINUX COMMAND LINE SOFTWARE.....15
  - 6.8 MANAGING THE MODULE USING MODBUS TCP.....16
  - 6.9 COMMUNICATION WITH MODULE USING HTTP.....17
  - 6.10 COMMUNICATION PROTOCOL DESCRIPTION.....18
  - 6.11 COMMUNICATION WITH MODULE FROM OUTSIDE NETWORK .....19
- 7 DHCP.....20**
- 8 RESTORING FACTORY DEFAULTS .....20**
- 9 FIRMWARE UPDATE.....21**
- NOTES.....22**

## 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 Device description

---

The NANO IN device is used to read state of the input through LAN network. The readout can be done using www website, network protocols or software supplied by manufacturer.

## 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 module power supply must be in range of 10-24V AC or DC.

The power to module is delivered via POE adapter (Power Over Ethernet).

### 4.2 Storage, working environment and transportation

The module has to be used in closed environments free from fumes and corrosive atmosphere.

Environmental conditions for storage:

- Temperature: + 5°C to +45°C,
- Relative humidity: <75%,
- Atmospheric pressure: 700 – 1060hPa.

Environmental conditions for use:

- Temperature: +10°C to +30°C,
- Relative humidity: 30% to 75%,
- Atmospheric pressure: 700 to 1060hPa.

Recommended conditions for transportation:

- Temperature: -10°C to +45°C,
- Relative humidity: 20 to 95%,
- Atmospheric pressure 700 to 1060hPa.

### 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, i.e., 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 description

---

### 5.1 General features

Overall view of the module is shown on the picture below.



**NANO IN**

Module input can work as a pulse counter

There are several ways to communicate with the module:

- using built in WWW server via any web browser,
- MODBUS TCP protocol,
- SNMP protocol,
- HTTP protocol,
- User application – communication protocol available for user

NANO module is equipped with two LEDs indication power and input status.

### 5.2 Technical specification:

Power supply voltage: 10-24VDC (POE)

Power consumption: 1.5 W

*Opto-isolated inputs:*

*Input voltage: 10-24V*

*Counter max value: 4 294 967 296*

*Max input frequency: 1000Hz*

*LAN: Ethernet 1x10Mbps, RJ45*

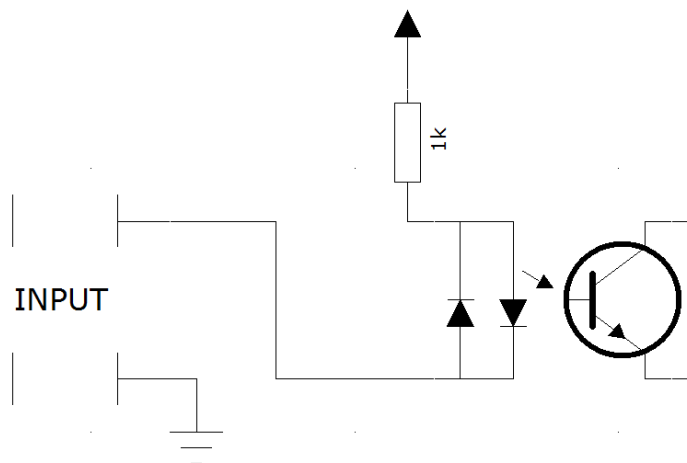
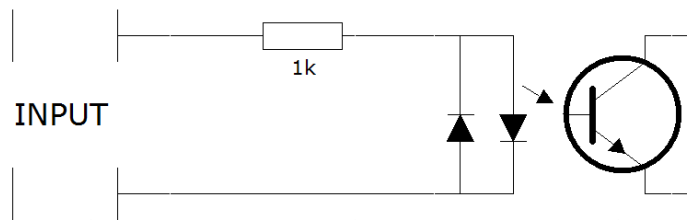
### 5.3 Module input/output terminal description

Module **NANO IN** has two connection terminals:

- RJ45 socket – LAN network and POE
- Screw terminal – input

### 5.4 Binary opto-isolated inputs – connections

Typical binary input connection is shown below. When placing order customer can choose option with pre-polarised transistor diode or without pre-polarisation.



**Binary input – connection schematic.**

The opto-isolated input is designed to accommodate input voltages between 10 and 24 V.



## 6 Module configuration

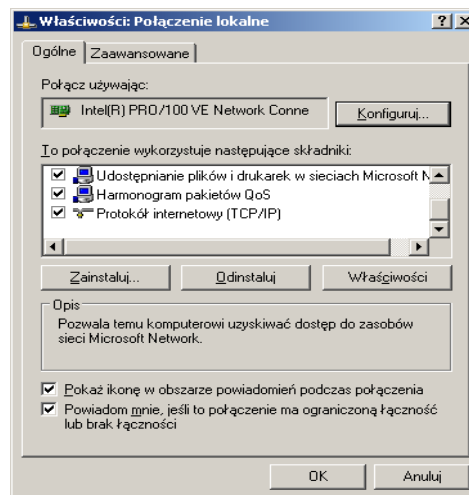
If using the module for the first time it is needed to configure it as shown below

### 6.1 Changing the PC setting for module configuration.

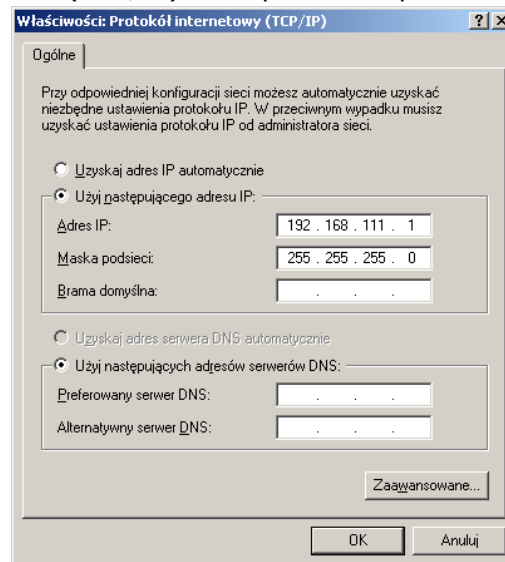
After connecting the module to the network there is a need to change the PC setting. In order to do that navigate to: Start->Control Panel->Network connections.

Then right click on the current network connection and click „Properties”.

The configuration screen as shown below should be visible on the screen:



Choose the „Internet Protocol (TCP/IP)” and press „Properties”:



TCP/IP example settings

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.

## 6.2 Configuration of the module through web browser

Start the web browser and enter the following address into address bar:

**192.168.111.15.**

**The default user name is „admin“ with password „admin00“**

The screenshot shows a web browser window with the address bar containing '192.168.111.15/protect/config.htm'. The page title is 'Inveo Nano In SV:1.0'. The navigation menu includes 'Home', 'Channel', 'Network', 'SNMP', and 'Administration'. The main heading is 'Network Configuration'. Below the heading, there is a description: 'This page allows the configuration of the device's network settings.' The configuration form includes the following fields and options:

|                   |  |
|-------------------|--|
| MAC Address:      | 00:04:A3:9F:78:B9                          |
| Host Name:        | NANO                                       |
|                   | <input type="checkbox"/> Enable DHCP       |
| IP Address:       | 192.168.111.15                             |
| Gateway:          | 0.0.0.0                                    |
| Subnet Mask:      | 255.255.255.0                              |
| Primary DNS:      | 0.0.0.0                                    |
| Secondary DNS:    | 0.0.0.0                                    |
| Destination IP:   | 0.0.0.0                                    |
| Destination Port: | 0  |
|                   | <input type="button" value="Save Config"/> |

Copyright © 2013 [Inveo s.c.](#)

### Network connection setup

There are several fields used to configure the module network settings:

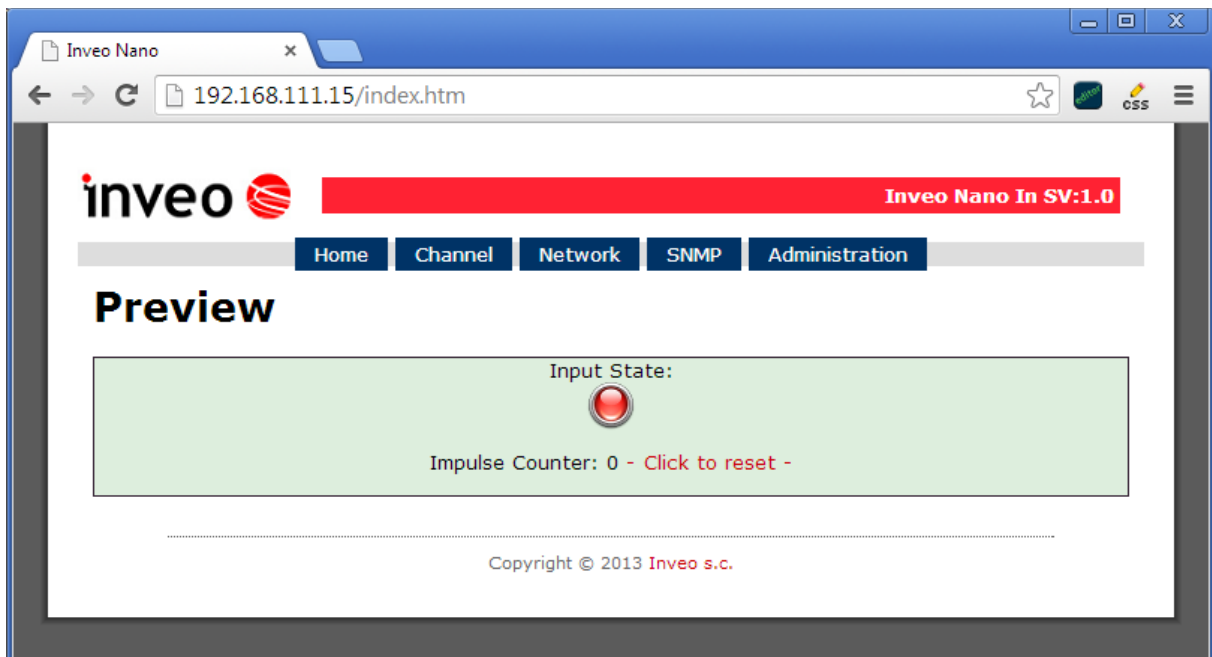
- MAC Address – MAC address of the module,
- Host Name – NETBIOS host name of the module,
- Enable DHCP – When this box is ticked the module will get its address from DHCP server,
- IP Address – IP address of the module – when configured manually,
- Gateway – Network gateway,

- Subnet Mask – Subnet mask of the module,
- Primary DNS, Secondary DNS – DNS servers addresses,
- Destination IP – Network address of the server that the module will connect to - optional,
- Destination Port – Network port of the server that the module can connect to.

After changing the configuration press the „*Save Config*” button.

### 6.3 *Input readout.*

Visualisation of input state is shown below.



**Binary input status**

**Input State** icon show actual state of the input (red – inactive, green – active).

**Impulse Counter** impulses counted .

**Click to reset** – reset impulse counter

## 6.4 Access configuration

Web site used to configure the access to the module is shown below.

These settings allow for changing the access password and to enable/disable particular services.

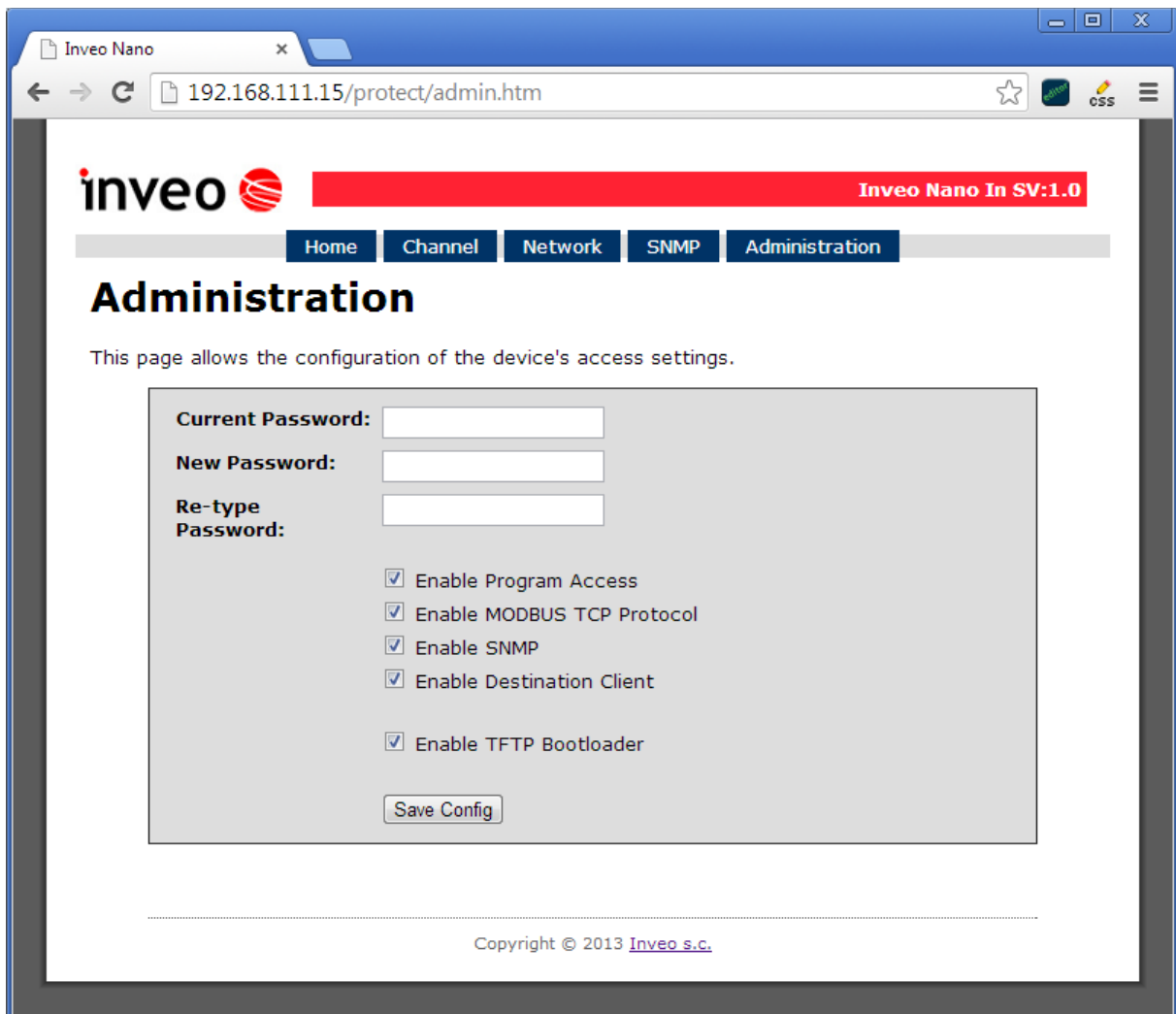


Fig 1: Admin settings.

### Changing the password

Enter old password into *Current Password* field.

Enter new password into *New Password* field and into *Re-type Password* field then press „Save Config” to save new passwords.

### Enabling/disabling particular service

*This function enables/disables different services. By enabling the tick box next to a service user can turn it on or off.*

### Module Access configuration

- *Enable user password – enables/disables requirement for user password*
- *Enable admin password – enables/disables requirement for admin password*

- *Enable Program Access* – enables/disables the connection to the module via PC software – Windows or Linux OS.
- *Enable MODBUS TCP Protocol* – enables/disables access using MODBUS TCP protocol.
- *Enable SNMP* – enables/disables access using SNMP protocol.
- *Enable Destination client* – enables/disables access using mode of operation „customer“.
- *Enable TFTP bootloader* – enables/disables 10 second bootloader mode after module reboot

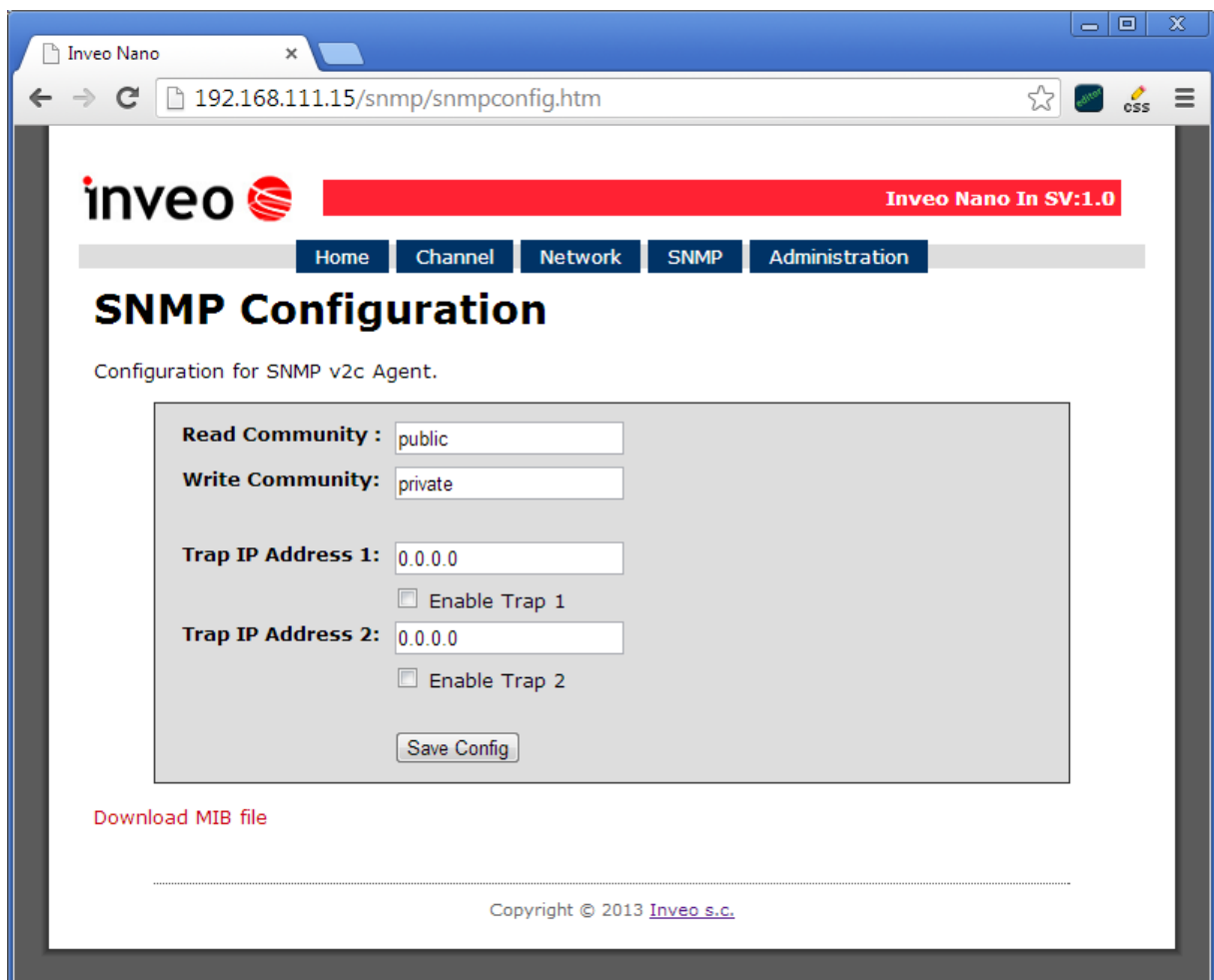
### 6.5 SNMP configuration

The module is equipped with an SNMP v2c server.

To enable this feature go to Administration tab-> Enable SNMP.

SNMP protocol enables user to retrieve and set the output status and to read state of inputs and counters.

The MIB file describing the structure can be downloaded the SNMP tab.



NANO IN module can send TRAP messages after input activation. Destination address should be entered in Trap IP address field.

## 6.6 Managing the module using windows command line software

The module can be operated using windows command line software – the software is delivered with the module.

Syntax is as follows:

: TCPRel.exe [Parameters]

| Parameter                         | Description                              |
|-----------------------------------|--|
| <b>-in=1</b>                      | Input number                             |
| <b>-host=[HOST]</b>               | Module IP address                        |
| <b>-port=[PORT]</b>               | Module Port number                       |
| <b>-writecounter=0-4228250625</b> | Set counter                              |
| <b>-readcounter</b>               | Read counter                             |
| <b>-verb</b>                      | Enabled display of additional info       |
| <b>-stat</b>                      | Displays current state of inputs/outputs |

### Examples:

Read input state module address 192.168.111.15 listening on port 9761:

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

Reset counter :

```
TCPRel -host=192.168.111.15 -port=9761 -in=1 -writecounter=0
```

Set counter 1 to value of 123:

```
TCPRel -host=192.168.111.15 -port=9761 -in=1 -writecounter=123
```

Read state of counter 1:

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

## 6.7 Managing the module using Linux command line software

The module can be configured using Linux command line software – the software is delivered with the module.

Syntax is as follows:

```
./TcpRel.exe [Parameters]
```

| Parameter              | Description                        |
|------------------------|------------------------------------|
| <b>-i 1</b>            | Input number                       |
| <b>-h [HOST]</b>       | Module IP address                  |
| <b>-p [PORT]</b>       | Module Port number                 |
| <b>-w 0-4228250625</b> | Set counter                        |
| <b>-r</b>              | Read counter                       |
| <b>-l</b>              | Enabled display of additional info |

### Examples:

Read input state module address 192.168.111.15 listening on port 9761:

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

Reset counter :

```
./tcprel -h 192.168.111.15 -p 9761 -i 1 -w 0
```

Set counter 1 to value of 123:

```
./tcprel -h 192.168.111.15 -p 9761 -i 1 -w 123
```

Read state of counter 1:

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

## 6.8 Managing the module using MODBUS TCP

MODBUS TCP protocol is listening on port 502.

The module supports following functions of MODBUS protocol:

- 0x01 Read Coils,
- 0x03 Read Holding Register,
- 0x05 Write Single Coil,
- 0x06 Write Single Register,
- 0x0F Write Multiple Coils,
- 0x10 Write Multiple Registers.

The registers description is shown in tables 2 and 3.

### MODBUS TCP - Holding Registers.

| Register | Name      | Mode:<br>R-read<br>W-write | Description                        |
|----------|-----------|----------------------------|------------------------------------|
| 4003     | Counter1H | R/W                        | Counter 1 – Higher byte of counter |
| 4004     | Counter1L | R/W                        | Counter 1 – Lower byte of counter  |

### MODBUS TCP - Coils

| Register | Name | Mode:<br>R- read<br>W-write | Description   |
|----------|------|-----------------------------|---------------|
| 1000     | On1  | R                           | Input 1 state |



## 6.9 Communication with module using HTTP.

NANO IN modules can be controlled using HTTP. To read current state of the module inputs/outputs access this address - <http://192.168.111.15/stat.php> - in web browser.

XML file consist all of the information:

```
<response>
<prod_name>PE-0-1</prod_name>
<out>00000000</out>
<on>00000000</on>
<in>00000000</in>
<counter1>10</counter1>
<temp1>0.0</temp1>
</response>
```

| Section                       | Description  |
|-------------------------------|--|
| <prod_name>PE-0-1</prod_name> | Type of module<br>In this case NANO IN.            |
| <out>00000000</out>           | Output state (enabled/disabled).<br>N/A in NANO IN |
| <on>00000000</on>             | Output state - N/A in NANO IN                      |
| <in>00000000</in>             | Input state (Active/Inactive)                      |
| <counter1>10</counter1>       | Counter inputs<br>Input IN1 counted 10 impulses.   |
| <temp1>0.0</temp1>            | Temperature sensor reading<br>N/A in NANO IN       |

Example:

Set counter 1 to 500

<http://192.168.111.15/stat.php?cnt=1,500>

Reset Counter1

<http://192.168.111.15/stat.php?cnt=1,0>

## 6.10 Communication protocol description

| Byte                    | 1   | 2   | 3   | 4   | 5            | 6        | 7        | 8         | 9         | 10              | 11  |          |  |
|-------------------------|-----|-----|-----|---|--------------|----------|----------|-----------|-----------|-----------------|-----|----------|--|
| Name                    | SOF | CMD | CH  | Data 1                                    | Data 2       | Data 3   | Data 4   | Data 5    | Data 6    | Data 7          | CRC | Return   |  |
| Command                 |     |     |     |   |              |          |          |           |           |                 |     |          |  |
| Set output              | 15  | 1   | 0-7 | Mode [1-3]*                               | ON/OFF [0,1] | TON LSB* | TON MSB* | TOFF LSB* | TOFF MSB* | Restart state** | CRC | ON or NO |  |
| Read channel parameters | 15  | 2   | 0-7 | x   | x            | x        | x        | x         | x         | x               | CRC |          |  |
| Set counter             | 15  | 10  | 0-7 | [0:7]                                     | [8:15]       | [16:23]  | [24:31]  |           |           |                 | CRC |          |  |
| Read counter            | 15  | 11  | 0-7 | [0:7]                                     | [8:15]       | [16:23]  | [24:31]  |           |           |                 | CRC |          |  |
| WWW control             | 15  | 99  | x   | 1 -status<br>0x55 - off<br>all other - on | x            | x        | x        | x         | x         | x               | CRC | ON or NO |  |
| Read channels           | 15  | 100 | x   | x   | x            | x        | x        | x         | x         | x               | CRC | CH7-CH0  | Chx - 2 bytes;<br>1 output state<br>2 coil state |
| Read channel name       | 15  | 101 | 0-7 | x   | x            | x        | x        | x         | x         | x               | CRC | String   |  |
| Read device name        | 15  | 200 | x   | x   | x            | x        | x        | x         | x         | x               | CRC | String   |  |

\*only Lantick and PE-2-1

\*\* only Lantick

\*\*\* - Reading parameters returns:

| SOF | CMD | Ch  | Data 1                  | Data 2      | Data 3     | Data 4     | Data 5      | Data 6      | Data 7        | CRC |
|-----|-----|-----|-------------------------|-------------|------------|------------|-------------|-------------|---------------|-----|
| 15  | 2   | 0-7 | Mode[1-3],<br>100-input | ON/OFF[0,1] | TON<br>LSB | TON<br>MSB | TOFF<br>LSB | TOFF<br>MSB | Restart state | CRC |

| Description | Value    | State   |
|-------------|----------|---------|
| ON/OFF      | 0        | off     |
|             | 1        | on      |
| MODE        | 1        | static  |
|             | 2        | toggle  |
|             | 3        | 1-pulse |
| CRC         | Byte sum |         |

As default modules are listening on port 9761

Frame examples:

Enabling output 1 in static mode

| SOF | CMD | CH | Data 1 | Data 2 | Data 3 | Data 4 | Data 5 | Data 6 | Data 7 | CRC |
|-----|-----|----|--------|--------|--------|--------|--------|--------|--------|-----|
| 15  | 1   | 0  | 0      | 1      | 1      | 0      | 0      | 0      | 0      | 18  |

Set counter 2 to 100

| SOF | CMD | CH | Data 1 | Data 2 | Data 3 | Data 4 | Data 5 | Data 6 | Data 7 | CRC |
|-----|-----|----|--------|--------|--------|--------|--------|--------|--------|-----|
| 15  | 10  | 1  | 100    | 0      | 0      | 0      | 0      | 0      | 0      | 132 |

### **6.11 Communication with module from outside network**

If the module is in the LAN network different than PC that connects to it, the redirection of ports is necessary.

Depending on the form of communication different ports need to be redirected:

#### **Using web interface:**

- port TCP/IP 80

#### **Computer software or customer application:**

- 1 port TCP/IP 9761

#### **Using MODBUS TCP protocol:**

- port TCP/IP 502

#### **Using SNMP protocol:**

- port UDP 161

## **7 DHCP**

---

To enable/disable DHCP:

1. Press and hold RESET button for 5-10 seconds
2. Green LED will start flashing 2 times a second
3. Release RESET button

## **8 Restoring factory defaults**

---

In order to restore the module to its factory defaults, press and hold the reset button for at least 10-15 seconds. The green LED will start flashing 4 times a second.

With factory defaults restored, the module settings are as follows:

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

## 9 Firmware update

---

The module has the ability to update the firmware. The firmware is supplied as a file with .hex 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 <module_ip_adress> PUT filename.hex
```

where: < module\_ip\_adress > is the IP address of the module  
*filename.hex* – is the firmware supplied by Inveo s.c.

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

## Notes

A series of horizontal dotted lines for writing notes.