

User manual

Nano RFID



Nano RFID PoE



Soft >= 0.37

Dear Customer!

Thank you very much for choosing our product. Before its use, please read these instructions carefully. Here you find the most appropriate ways of dealing with this device, the basic principles of safety and maintenance. Please, also keep the user manual so that you can read it during later use.

Attention!

The manufacturer is not liable for any damage caused by improper use of the device which differ from its intended purpose, or improper handling, as well as a fault of driver resulting from improper use.

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1 Preliminary information

Before starting work with the device, read The User manual and follow the instructions contained therein!

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 device



Important information and guidelines



Following this guidelines makes the use of the device easier

Attention: The screenshots in this manual can be dissimilar from actual images at the time of the device purchase. Due to continuous development of the devices software, some of the functions may differ from these in the manual. The manufacturer claims no responsibility for any undesirable effects (misunderstanding) caused by changes of the software.

2 Application of the device

The Nano RFID device is used to read RFID Unique tags. The device is prepared for an integration with other systems by way of of Modbus TCP, HTTP client / server, SNMP protocols.

3 Warranty and liability of the manufacturer



The manufacturer provides a 2-year warranty on the device. The manufacturer also provides post-warranty service for 10 years from the date of the introducing the device 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,
- the device is operated in accordance with the recommendations outlined in this manual,
- the device is used as intended.

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



This device doesn't contain serviceable parts.

4 Safety guidelines

The device has been designed and built 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 a high-quality plastic.

4.1 Storage, work and transport conditions

The device has to be stored in enclosed rooms which are free of caustic vapors and substances and also meet the requirements:

- surrounding temperature from -30°C to +60°C,
- humidity from 25 to 90%,
- atmospheric pressure from 700 to 1060hPa.

The device working conditions:

- surrounding temperature from -10°C to +55°C,
- relative humidity from 30% to 75%,
- atmospheric pressure from 700 to 1060hPa.

Recommended transport conditions:

- surrounding temperature from -40°C to +85°C,
- relative humidity from 5% to 95%,
- atmospheric pressure from 700 to 1060hPa.

4.2 Installation and use of the device

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

4.3 Decommissioning of the device

When it becomes necessary to recycle the device (for instance, to decommission the device from service), please contact the manufacturer or its representative, who are obliged to respond, appropriately, i.e. collecting the device from the user. You can also ask the companies involved in recycling of electrical or computer equipment. Under no circumstances should you place the device along with other waste material.

5 Construction of the device

5.1 Nano RFID PoE

Technical data:

Power supply:

PoE: 33-57V POE IEEE 802.3af,
DC: 10-24VDC (screw terminals 3,5mm),
Power consumption: max 1,5W.

Transponders:

Tag readout standards: UNIQUE ; 125kHz,
Tag reading distance: up to 8cm.

Inputs:

Number of inputs: 1,
Input type: opto-isolator, dry contact (NO) ,
Maximum input voltage: 24V.

Outputs:

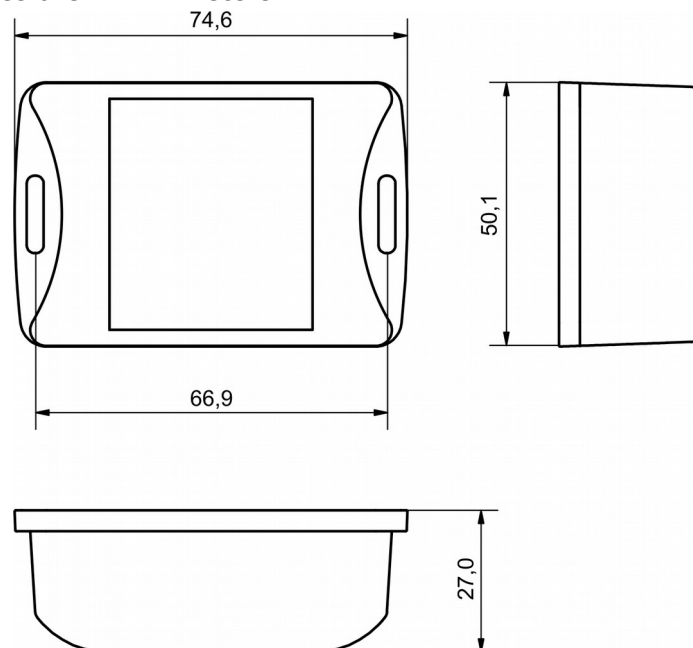
Number of outputs: 1,
Output type: relay NO,
Maximum relays current load: 1A @ 30VDC.

LAN:

Ethernet 1x10Mbps, RJ45

Dimensions:

All dimension values are in millimeters.



General view



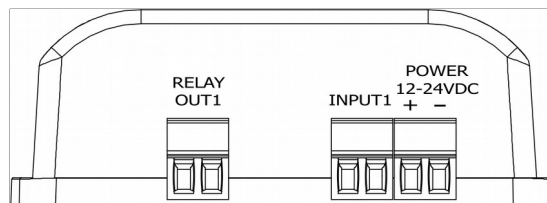
Indicators and connectors:

The device is equipped with LED two diodes:

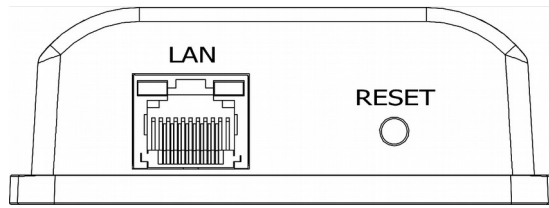


- **POWER LED** - the device power supply status,
- **TAG LED** - optical indications for read out tags.

The Nano RFID PoE is equipped with screw terminal connectors.



- **POWER** - power connector. Power supply 10-24VDC or PoE 802.3af,
- **INPUT1** - dry contact NO input. The input status is available via the MODBUS TCP or HTTP Get protocol,
- **RELAY OUT1** - relay NO output. Switching on/off relay and reading its status are available via the Modbus TCP or HTTP Get protocol,



- **LAN** – LAN connection socket,
- **RESET** – reset button. Its necessary for enable DHCP and restore factory settings.

5.2 Nano RFID

Technical data:

Power supply:

Passive PoE: 12-24VDC,
Power consumption: max 1,5W.

Transponders:

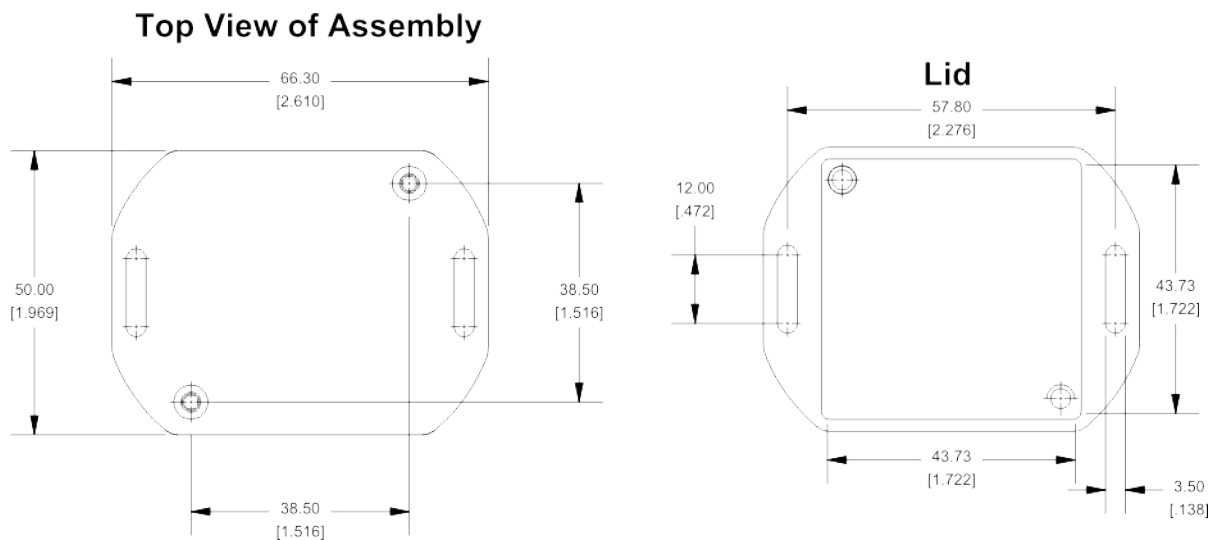
Tag readout standards: UNIQUE ; 125kHz,
Tag reading distance: up to 8cm.

LAN:

Ethernet 1x10Mbps, RJ45

Dimensions:

All dimension values are in millimeters.



General view

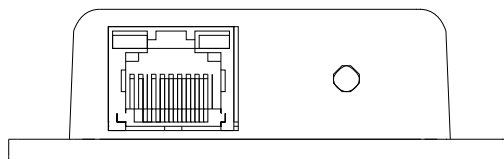


Indicators and connectors:

The device is equipped with LED two diodes:



- **POWER LED** - the device power supply status,
- **TAG LED** - optical indications for read out tags.



- **LAN** – LAN connection socket,
- **RESET** – *reset button. Its necessary for enable DHCP and restore factory settings.*

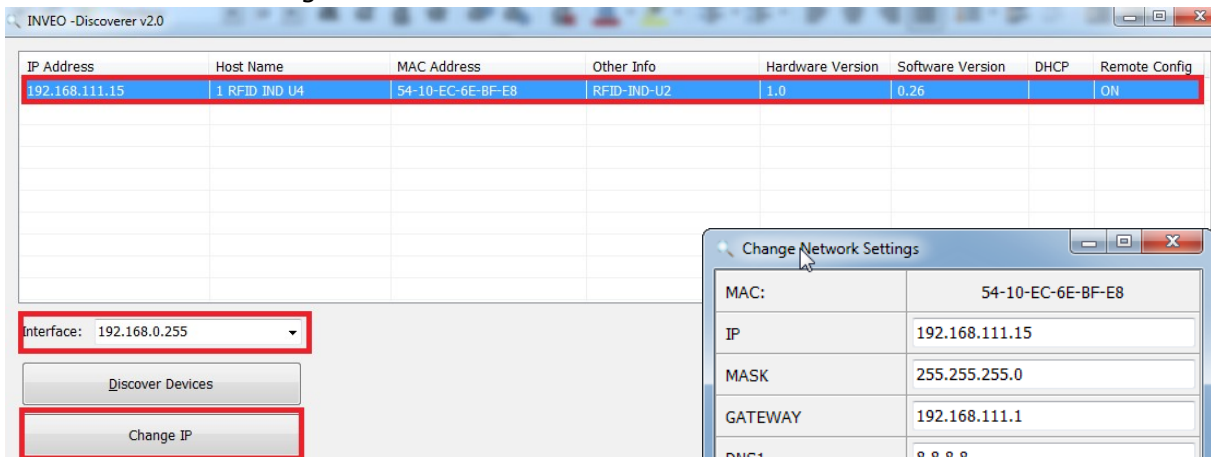
6 Configuration of the device

The device when used for first time needs to be configured.

There are two methods to do so. The network configuration can be easily changed by Inveo "Discoverer" (<http://inveo.com.pl/discoverer/>) software:

6.1 Changing the device's IP address by Discoverer application.

When the "Discoverer" is opened and the relevant device is found, choose Interface list box and click on Change IP button.

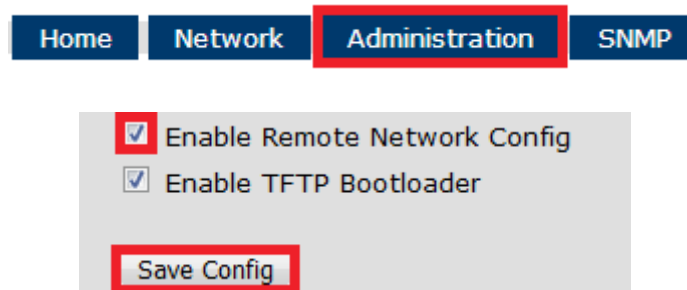


In a new opened dialog box, settings such as IP address, MASK, GATEWAY, DNS1/DNS2 and the Host name can be changed.

Please save correct settings by choosing **Change** button.

If Remote Config is disabled (enabled by default), it is necessary to configure the device by changing the computer's subnet (chapter 6.2).

To enable the remote configuration it is necessary to enter tabs **Administration** and check mark **Enable Remote Network Config**



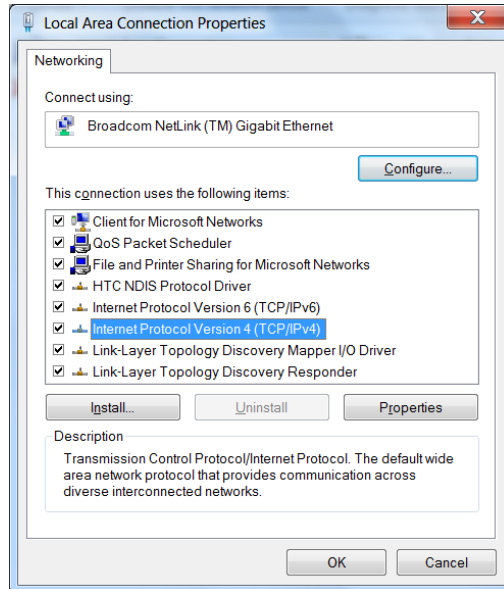
Save the setup by selecting **Save Config** button.

6.2 Changing the PC's subnet address

After the device is connected to a network, a subnet address of a PC which is connected the same network has to be changed.

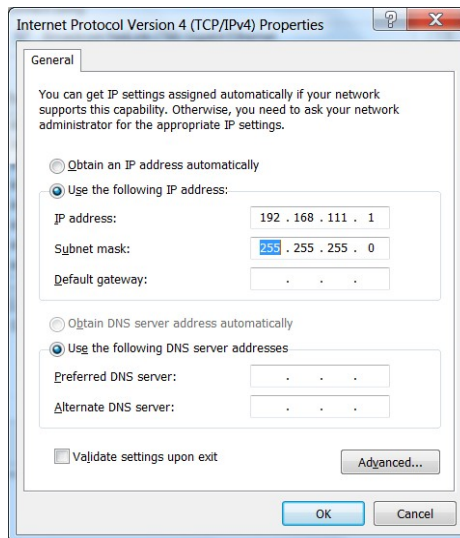
To do so, go to the PC's MS Windows network configuration: **Start->Control panel ->Network and Sharing Center->Network and Internet->Network Connections**, then choose the related controller and right click on „Properties“.

After selecting this option configuration window will show up:



Changing network settings in MS WINDOWS

Next choose "Internet Protocol (TCP/IP)", double click on it and enter following settings:



Illustrative TCP/IP protocol settings

After saving changes by clicking OK, open a web browser and enter in the address line: **192.168.111.15**. Next change the following: ("**Default user name / password**" to admin/admin00))

In the **Network** tab it is possible to change LAN parameters.

inveo Inveo Nano RFID Reader SV:0.35

Home **Network** Administration SNMP

Network Configuration

This page allows the configuration of the device's network settings.

MAC Address:	54:10:EC:6E:BF:80
Host Name:	NANO RFID
	<input type="checkbox"/> Enable DHCP
IP Address:	192.168.111.15
Gateway:	192.168.111.1
Subnet Mask:	255.255.255.0
Primary DNS:	8.8.8.8
Secondary DNS:	8.8.4.4
HTTP Srv Addr:	
HTTP Srv Port:	0
HTTP Resource:	\

Save Config

To set up the network settings of the device, use the following fields:

- **MAC Address** – read only,
- **Host Name** – NETBIOS name,
- **Enable DHCP** – checking this box force use of the address assigned by the DHCP server,
- **IP Address** – the IP address of the device (at this address, the device will be visible on the network),
- **Gateway** – network gateway,
- **Subnet Mask** – IP subnet mask,
- **Primary DNS, Secondary DNS** – DNS servers addresses,

- **HTTP Srv IP:** – server IP (mode: „Control only by HTTP Client“),
- **HTTP Srv Port:** – the server's listening port,
- **HTTP Resource:** – resource file for the reader's reference e.g. /somefile.php.

After all changes, select **Save Config**.

6.3 Communications protocols and administration

The Administration settings allow for changing access password and to enable/disable particular services in the device.

inveo Inveo Nano RFID Reader SV:0.35

Home Network **Administration** SNMP

Administration

This page allows the configuration of the device's access settings.

Current Password:
New Password:
Re-type Password:

Enable MODBUS TCP Protocol
 Enable SNMP
 Control only by HTTP GET
 Control only by HTTP Client

Enable Remote Network Config
 Enable TFTP Bootloader

Admin Password change

To change an administrator password, in **Current Password** value field write a current password. Next in appropriate value field **New Password** write your new password and confirm it at **Re-type Password** value field. The password can be blanked by leaving new password value field empty.

Services configuration

The device allows to choose suitable services. To do that, a value of corresponding service has to be check marked and then activated by **Save** button.

Enable MODBUS TCP Protocol – enables access using MODBUS TCP protocol,

Enable SNMP - enables access using SNMP protocol,

Control only by HTTP GET – the reader's HTTP Server work's mode is selected

Control only by HTTP Client – the reader's HTTP Client work's mode is selected

Enable Remote Network Config – remote network configuration is selected (for Discoverer application)

Enable TFTP Bootloader – enables a bootloader mode.

Attention:

TFTP Bootloader and **Remote Network Config** ought to be disabled during normal work operation. It should be enabled for a firmware update only.

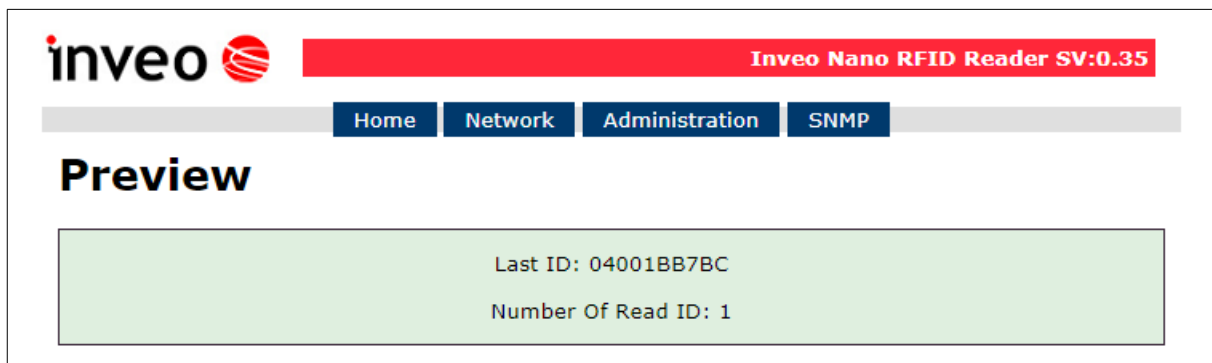
7 The device functions

7.1 Communication with the reader

User can choose from the following options to access the code readout from a RFID tag:

- through built-in web server, using a standard web browser (preferred browsers are MOZILLA FIREFOX, OPERA, CHROME),
- HTTP server mode,
- HTTP client mode,
- Modbus TCP,
- SNMP.

7.2 Inbuilt www site



The reader status can be found again at **Home** tab in the reader's menu (default – 192.168.111.15).

- **SV: 0.35** – software version
- **Last ID: 04001BB7BC** – last tag readout in HEX format,
- **Number Of Read ID: 1** – number of read IDs since the reader's reset.



Note:

If readout at a last ID shows 04001BB7BC (**LOCK!**) it indicates blocking of further tags reading until **releaseId** (HTTP GET) command is sent or in case of Modbus, value "0" has to be sent to 1004 Single Coil address.

7.3 Integration with user's software

The Nano RFID reader may be used with a customer's own software, in server mode (by choosing **Administration → Control only by HTTP GET**) or in client mode (by choosing **Administration → Control only by HTTP Client**).

Server work mode (HTTP Server):

In this mode external host (client) connects to the reader and controls it by HTTP protocol GET method. The client has to read status.xml periodically and after suitable XML tags are decoded, (individual tags are explained in the chapter 7.4) it may send back data and commands. The resource file status.xml let a user read all required information, which can be entered to a database (e.g. the reader's mac address, inputs outputs status, card ID). After the data processing the client is able to send back data which is required for interaction with a user of the reader. The client can send information to the reader which may control the accept/reject sounds, the LED diodes blinking, a lock's bolt release, as well as displaying text on the reader display. In this mode, every time a tag is read the reader blocks reading ability until the client triggers releaseId=1 function.

Client work mode (HTTP Client):

In this mode the reader may be compared to an Internet browser. The client's page (The reader's) sends a request to server and waits for answer. The server - the page which shares data - waits for requests, then processes them and sends a response back.

The reader connects with the server automatically and sends a tag's readout to the server resource by HTTP GET. In response the server may send a XML file with commands which specify type and status of the reader's indicator system, e.g. the LED diodes status, the sounds indicators and the like.

In this mode an advantage is that, immediately after the card readout the reader automatically sends request to the server or the controlling application.

This mode allows easy integration with PHP, Node JS, MySQL and the like servers.

7.4 Viewing the reader status by HTTP GET

The RFID reader can be controlled by HTTP protocol. To view the reader's current status user may refer to the resource file by entering in an Internet browser address line e.g. - <http://192.168.111.15/status.xml>

It shows the resource file with basic information in XML format:

```
<status>
<netbios>NANO RFID</netbios>
<mac>00:00:00:00:00:00</mac>
<id>8500c2b4a8</id>
<newId>0</newId>
<cnt>1</cnt>
<resetFlag>1</resetFlag>
<enable>1</enable>
<httpClientStatus>0</httpClientStatus>
<out>0</out>
<in>1</in>
</status>
```

Section	Description
<netbios>NANO RFID</netbios>	The reader's name
<mac>00:00:00:00:00:00</mac>	The reader's MAC address
<id>8500c2b4a8</id>	The last RFID tag's readout in hexadecimal system
<newId>0</newId>	In the Control only by HTTP GET mode , only 1 – a new RFID tag has been read 0 – a new RFID tag hasn't been read
<cnt>1</cnt>	Number of RFID tags readouts since the reader's reset
<enable>1</enable>	1 – radio module has been switched on 0 – radio module has been switched off
<resetFlag>1</resetFlag>	1 – reset took place
<httpClientStatus>0</httpClientStatus>	Current status of TCP connection in Control only by HTTP Client mode 1 – the server has been connected – open socket 2 – data from the server has been received 3 – connection has ended 100 – lost connection with server
<out>0</out>*	Current status of relay output.
<in>1</in>*	Current status of input.

* Nano RFID PoE only

7.5 Control by HTTP GET protocol

Controlling the reader in **Control only by HTTP Client mode** mode involves sending proper command by HTTP protocol:

http://192.168.111.15/status.xml?			
No	Command	Name	Description
1	enable	Enable RFID	Switches on RFID reader's antenna http://192.168.111.15/status.xml?enable=1 Switches off RFID reader's antenna http://192.168.111.15/status.xml?enable=0
2	resetFlag	Reset Flag	When the reader is switched on or reset, the flag is set to 1 Reset Flag deletion http://192.168.111.15/status.xml?resetFlag=0
3	releaseId	Release ID	Deletes read flag and awaits for RFID tag to draw near http://192.168.111.15/status.xml?releaseId=1
4	led	Led control	Switches on the LED diode indicator led=TimeOn,TimeOff,Cnt TimeOn*0,1 second, TimeOff*0,1 second http://192.168.111.15/status.xml?led=5,3,4 Switches on the LED for 0,5 second, switches off for 0,3 second and repeats sequence 4 times
5	buzz*	Buzzer control	Activation of the buzzer buzz=TimeOn,TimeOff,Cnt TimeOn*0,1 second, TimeOff*0,1 second http://192.168.111.15/status.xml?buzz=5,3,4 Switches on the buzzer for 0,5 second, switches off for 0,3 second and repeats sequence 4 times Controls the sound tone indicator Generates the sound tone REJECT http://192.168.111.15/status.xml?buzz=r Generates the sound tone ACCEPT http://192.168.111.15/status.xml?buzz=a
6	out*	Output Control	Controls relay output out=1 – switch on relay out=0 – switch off relay http://192.168.111.15/status.xml?out=1

* Nano RFID PoE only

7.6 Controlling by HTTP protocol in client mode

To control the reader by HTTP protocol in client mode the option **Control only by HTTP Client** in **Administration** tab needs to be selected.

When the **Control only by HTTP Client** option is selected, an address for a data transfer has to be configured. For this the table in **Network** → **HTTP Client Configuration** tab is used.

The screenshot shows the 'Network Configuration' page of the Inveo Nano RFID Reader. The 'Network' tab is active. The configuration form contains the following fields:

- MAC Address: 54:10:EC:6E:BF:80
- Host Name: NANO RFID
- Enable DHCP
- IP Address: 192.168.111.15
- Gateway: 192.168.111.1
- Subnet Mask: 255.255.255.0
- Primary DNS: 8.8.8.8
- Secondary DNS: 8.8.4.4
- HTTP Srv Addr: (highlighted)
- HTTP Srv Port: 0 (highlighted)
- HTTP Resource: \ (highlighted)

A 'Save Config' button is located at the bottom of the form.

Lp	Nazwa	Opis
1	HTTP Srv Add	The server's IP address the reader will use to send data
2	HTTP Srv Port	The server's listening port
3	HTTP Resource	Resource file for the reader's reference e.g. /somefile.php

The reader, after a valid RFID tag readout sends data to the server relevant resource file in the format: mac=123456789012&id=1314151617 e.g.

<http://192.168.111.99/rfid.php?mac=123456789012&id=1314151617>

*After changing of input state, the RFID reader sends a data as follows:

mac=123456789012&in=0 **OR** mac=123456789012&in=1 depends on input status.

For example, it is possible to save data in a MySQL database or save it to a file (with RFID TAG number, MAC address and time of readout).

The server can do nothing or respond as an XML resource with the appropriate tags.

No	Command	Name	Description
1	<led>		Switches on the LED diode indicator led=TimeOn,TimeOff,Cnt TimeOn*0,1 second, TimeOff*0,1 second= 5,3,4 Switches on the LED for 0,5 second, switches off for 0,3 second and repeats sequence 4 times
2	<buzz>		Activation of the buzzer buzz=TimeOn,TimeOff,Cnt TimeOn*0,1 second, TimeOff*0,1 second= 5,3,4 Switches on the buzzer for 0,5 second, switches off for 0,3 second and repeats sequence 4 times Controls the sound tone indicator a- Generates the sound tone ACCEPT* r- Generates the sound tone REJECT*
3	<out>*		Output control: 1 – enable 0 – disable Tx – enable output for x*0,1 seconds

* Nano RFID PoE only

The XML file may consist of e.g. fields (in the following example the code brings out activation of the sound indicator and switch on LED):

```
<buzz>10,0,1</buzz>
<led>10,0,1</led>
```

The XML file syntax is not checked. It is searched for data inside known tags only.

An example of code for php server:

```
<?php
if($_GET["id"]) // module send id and MAC - $_GET["mac"]
{
    $user_allowed = 1; // it could be returned from DB

    if($user_allowed==1)
    {
        echo "<buzz>10,0,1</buzz>";
        echo "<led>10,0,1</led>";
    }
    else {
        echo "<buzz>5,5,4</buzz>"; // different signal
        echo "<led>5,5,4</led>";
    }
}
?>
```

7.7 Modbus TCP

The reader supports following functions of Modbus TCP:

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

Lp	Adres	Typ	R/W	Opis
1	1000	Holding Reg	R	Card ID/UID/CSN [0]
2	1001	Holding Reg	R	Card ID/UID/CSN [1]
3	1002	Holding Reg	R	Card ID/UID/CSN [2]
4	1003	Holding Reg	R	Card ID/UID/CSN [3]
5	1004	Holding Reg	R	Card ID/UID/CSN [4]
6	1005	Holding Reg	R	A device model
7	1006	Holding Reg	R	Software version
8	1007	Holding Reg	R	Hardware version
9	1000	Single Coil	R	Status of output*
10	1001	Single Coil	R	Status of input*
11	1002	Single Coil	R	Stand-by
12	1003	Single Coil	R	Stand-by
13	1004	Single Coil	R/W	Readout flag Read: 1 – a new transponder has been read Write: 0 – setting to zero of a readout flag
14	1005	Single Coil	R/W	Reset status Read: 1 – the reader has been reset (e.g. because power cut) Write: 1 – forced reset of the reader 0 – setting to 0 of a restart flag
15	1010	Single Coil	R/W	Status/set up of output * Read: 1-relay enabled 0-relay disabled Write: 1-switches on the output relay 0-switches off the output relay
16	1011	Single Coil	W	1-Accept sound *
17	1012	Single Coil	W	1-Reject sound *
18	1013	Single Coil	R/W	Controlling LED diode: Read: 1- LED enabled 0- LED disabled Write: 1- switches on the LED 0- switches off the LED

* Nano RFID PoE only

When a tag has been read, value 1 is written in Single Coil 1004 register- a new tag is found. Next readout of a new transponder is possible when readout flag is set to zero (Zero is written to 1004 Single Coil).

7.8 SNMP

The reader is fitted with a SNMP v2c server. This function can be enabled by **Administration** → **Enable SNMP**.

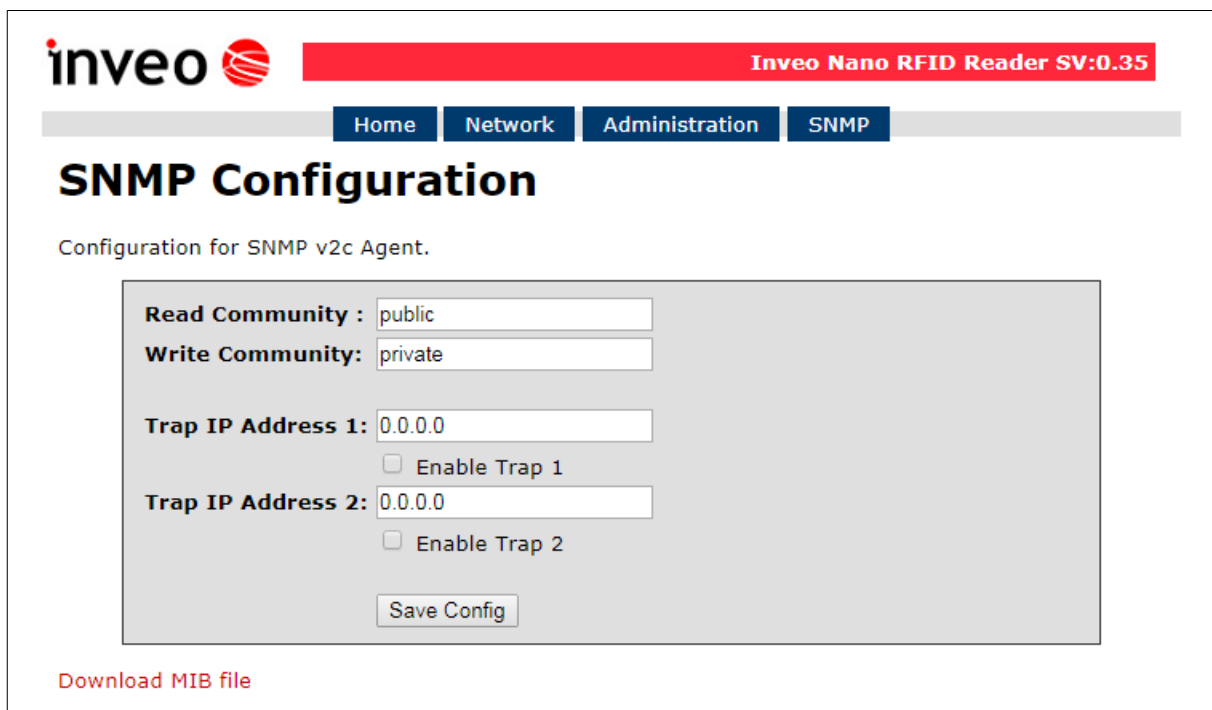
SNMP protocol facilitates inputs retrieving, setting up outputs status and retrieving ID number of the read tag.

MIB file which describes the structure is available for download in the SNMP tab under **Download MIB file** name.

The module allows sending TRAP messages after the correct reading of the RFID tag. The destination address is entered in the Trap IP Address x field.

Where:

x= 1, 2



The screenshot displays the web interface for the Inveo Nano RFID Reader. At the top left is the 'inveo' logo. A red banner at the top right indicates the version: 'Inveo Nano RFID Reader SV:0.35'. Below the banner is a navigation menu with buttons for 'Home', 'Network', 'Administration', and 'SNMP'. The 'SNMP' button is highlighted. The main heading is 'SNMP Configuration'. Below this, it says 'Configuration for SNMP v2c Agent.' The configuration area contains several fields: 'Read Community' with the value 'public', 'Write Community' with the value 'private', 'Trap IP Address 1' with the value '0.0.0.0', and 'Trap IP Address 2' with the value '0.0.0.0'. There are checkboxes for 'Enable Trap 1' and 'Enable Trap 2', both of which are currently unchecked. A 'Save Config' button is located at the bottom of the configuration area. Below the configuration area, there is a red link labeled 'Download MIB file'.

8 Communication with the device from external network

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

Depending on the method of communication the network administrator ought to make changes, as different ports need to be redirected:

Using web interface:

- port TCP/UDP/IP 80

Using MODBUS TCP protocol:

- port TCP/IP 502

Using SNMP protocol:

- port UDP 161

9 DHCP

To enable/disable DHCP service:

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

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

10 Restoring factory defaults

To reset the device to factory settings:

1. Turn on the device.
2. Press and hold RESET button for 10 to 15 seconds.
3. Release the button.

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

11 Firmware update

The device has the ability to update the firmware. The software update program is provided as a *.bin file.

Warning! Incorrect use of the update feature may damage the reader. Make sure that undisturbed power is provided to the device for duration of programming.

To update the software:

- check the **Enable TFTP Bootloader** option, which is located in the Administration tab,
- run the Windows command line (Start-> Run enter 'cmd' and confirm with the Enter key),
- go to the directory where the .bin file is located
- enter the command:

```
tftp -i <address_ip_of the reader> PUT file.bin
```

where: <address_ip_of the reader> is the IP Address of the reader
file.bin – the file with the update program

Programming takes 1-2 minutes. End of programming confirms the message 'File Transferred'.

For correct functioning of the reader, after the update operation the „**Enable TFTP Bootloader**“ option has to be switched off.

Step-by-step instruction for firmware updates is available at www.inveo.com.pl.

The latest instructions and software are available on the site www.inveo.com.pl.