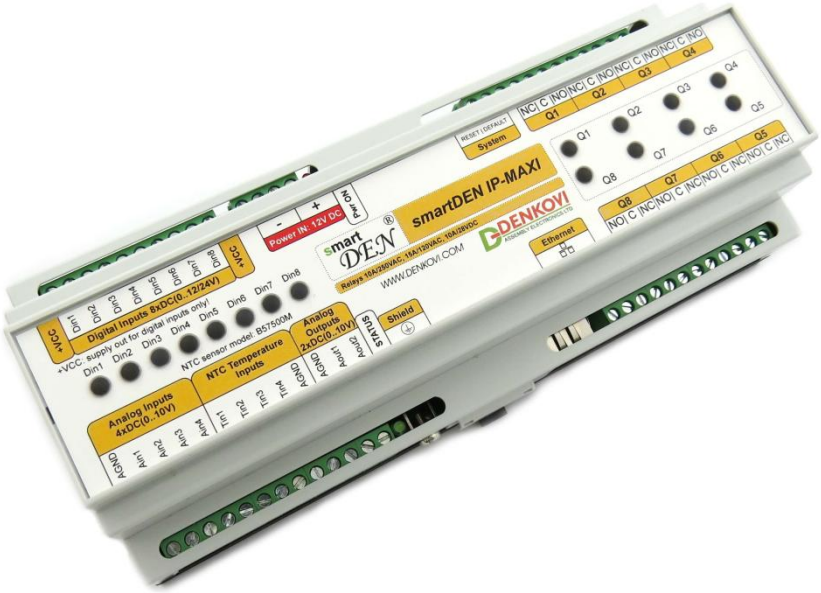
smartDEN IP-Maxi

Web enabled IP Controller

User Manual
Date: 09 March 2018

For firmware version: v1.24 / March 2018



Document Revision History

Version	Date	Comments
1.00	2018/03/09	The initial release

Trademark Notices

Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Apple, Mac, Mac OS, Mac OS logo are either trademarks or registered trademarks of Apple Computer Inc. in the United States and/or other countries.

smartDEN is registered trademark of Denkovi Assembly Electronics LTD in European Union.

Other product names and company names described in this document are trademarks or registered trademarks.

Content

1. Features

smartDEN IP-Maxi is an Ethernet module (IP controller) that can be used in a wide range of remote monitoring, control, measurement and data-acquisition applications. Thank to its multi-channel design (8 digital inputs, 4 analog inputs, 4 temperature inputs, 8 SPDT relays and 2 analog outputs) this device can perform simultaneously a variety of measurement and control functions. The Web interface allows users to configure the **smartDEN IP-Maxi**, as well as to monitor/control input/output channels. **smartDEN IP-Maxi** provides both SNMP and XML/JSON interface for integration with third-party developed applications.

A list of **smartDEN IP-Maxi** features includes:

Communication:

- Fully compatible with 10/100/1000 Base-T networks, Auto-MDIX;
- Protocols: TCP/IP, HTTP, DHCP, DNS, SNTP, SNMP, ICMP (ping);

Inputs:

- 8 digital inputs with On/Off LED (input voltage range: 0-12V DC / 0-24V DC);
- 8 counters (32 bit) attached to digital inputs;
- 4 analog inputs (input voltage range: 0-10V DC);
- 4 temperature inputs for sensors NTC thermistors type B57500M;
- Linearization (scaling) for the analog inputs;
- Programmable temperature units: Celsius/Fahrenheit;
- Configurable filters for the digital/analog inputs;

Outputs:

- 8 SPDT relays (with NO and NC contacts);
- 2 analog outputs: 0-10V DC (10 bit resolution);
- Single pulse feature for the relay outputs;

Web Interface:

- Configuration of system parameters;
- Outputs control, access current measurements;
- Secure login authorization;
- Access protection (by IP and MAC address);

TCP/IP Services:

- HTTP server:
  - Read (GET) current input/output values in XML/JSON format;
  - Set outputs along with GET request parameters;
- Encrypted login can be used to access XML/JSON values;

SNMP:

- SNMPv2c operations: get, get-next, get-bulk, set;
- SNMPv2 trap notifications (triggered by threshold events or periodically);

Standalone Mode:

- Single digital input can be configured to control several relays;
- Single or differential analog input can be configured to control several relays;
- Week schedule table for switching relays ON/OFF at specific time without computer (up to 30 events);

- Real time clock (can sync up with network time servers);

Power Supply:

- Supply voltage: 12V DC or 24V DC (selectable during purchase);
- Additional source voltage 12V DC or 24V DC provided to power input sensors;
- Power supply protection against reverse polarity;

Physical and Environment:

- Working temperature range: 0 to 70°C;
- DIN rail standard housing.

2. Application examples

The following examples show some basic applications of **smartDEN IP-Maxi**. The examples are only conceptual and additional equipment/connections can be required in actual implementations.

2.1. Electrical appliances remote control applications

smartDEN IP-Maxi can be used to control remotely electrical appliances (Fig. 2.1). Up to 8 electrical devices connected to Relays can be controlled independently. Various integration protocols (SNMP, HTTP/XML/JSON, Web-browser access) can be used by any modern device to control the appliances from all over the world.

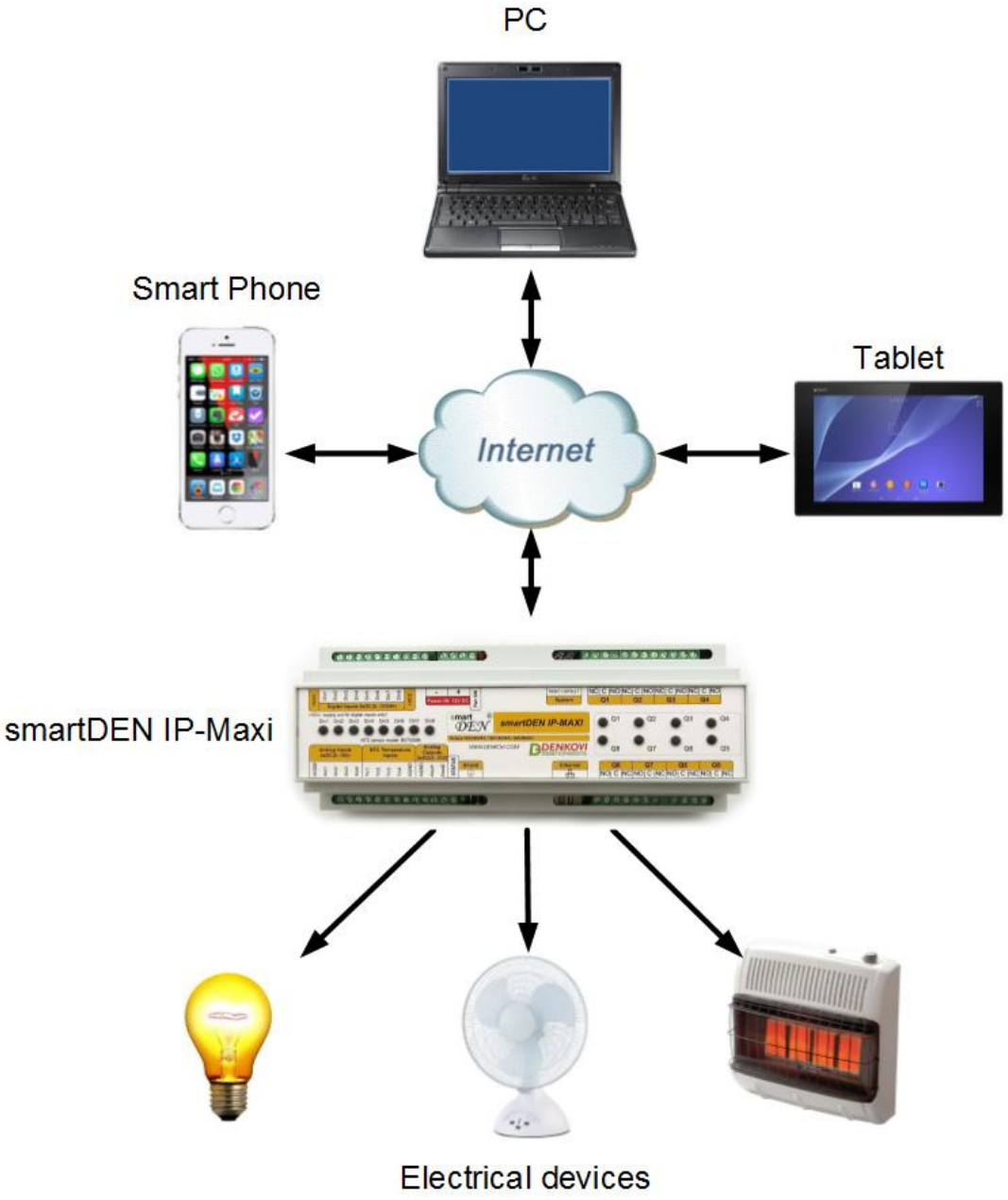


Figure 2.1. Controlling electrical appliances remotely

2.2. Monitoring and logging applications

smartDEN IP-Maxi can be used to build monitoring and logging systems. Up to 8 various kinds of sensors for temperature, humidity, distance, light etc. can be connected to the Analog Inputs of the device (Fig. 2.2). Provided SNMP and HTTP/XML/JSON APIs allow for easy integration with third-party applications.

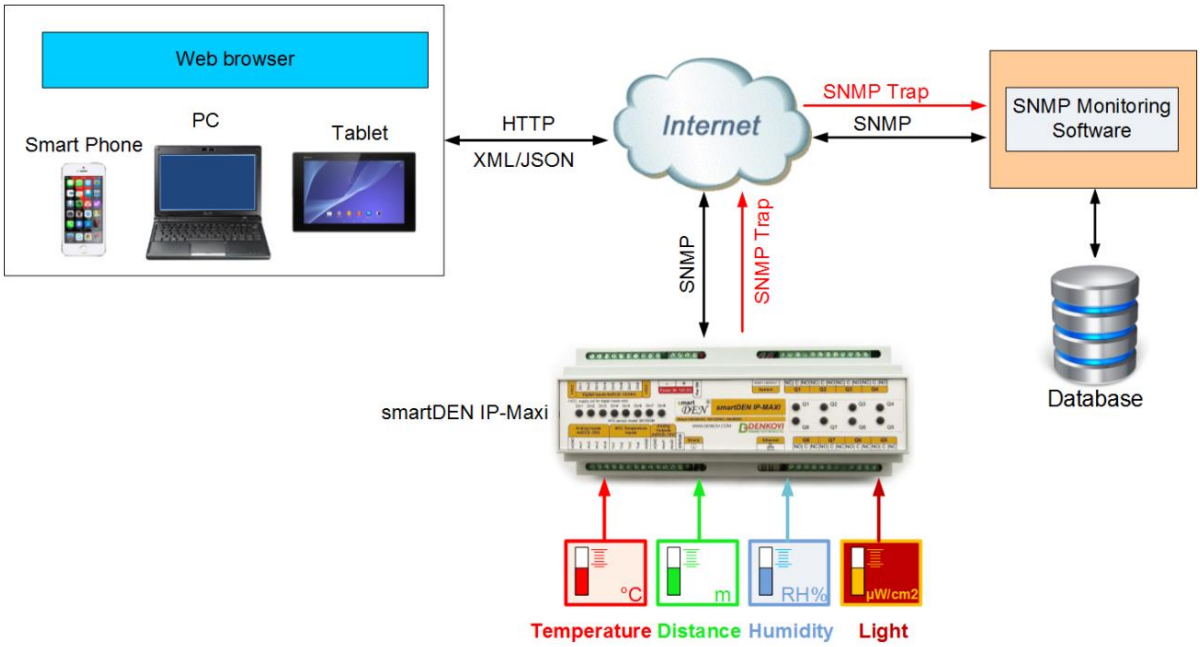


Figure 2.2. Remote sensors monitoring

2.3. Standalone applications with sensors and electrical devices

Once configured, **smartDEN IP-Maxi** can be used in standalone control applications. For example, the events from Digital Inputs or threshold conditions of single/differential Analog Inputs can be configured to control various devices connected to Relay outputs (Fig. 2.3). In addition, a Week Schedule table for switching Relays On/Off at specific time can be specified.

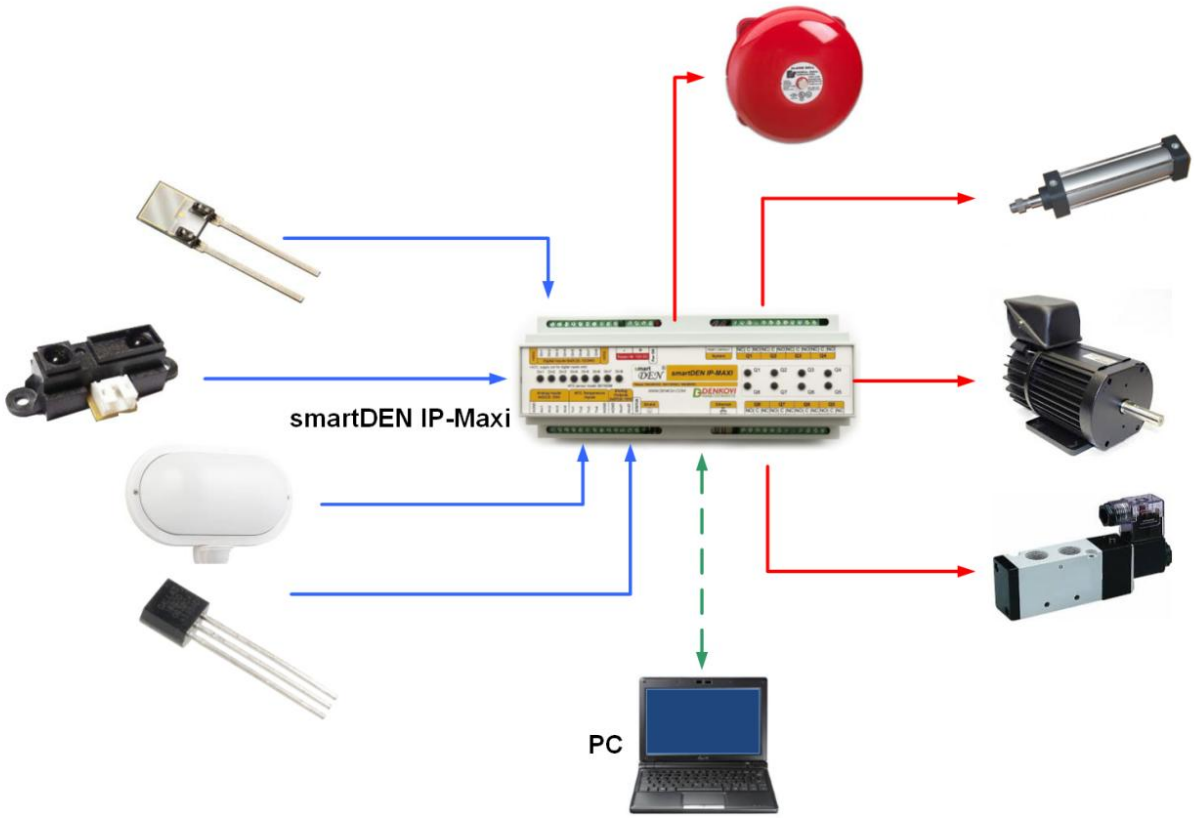


Figure 2.3. Standalone control of electrical devices

2.4. Events counter

smartDEN IP-Maxi provides 8 x 32-bit Counters (from 0 up to 2^{32}-1) attached to the Digital Inputs that can be used to count various events - for example detect when a person enters in a shop through the door (Fig. 2.4). Upon detecting the specified edge/level condition **smartDEN IP-Maxi** increments the corresponding Counter. With suitable software and database one could easily organize a simple monitoring and statistic system.

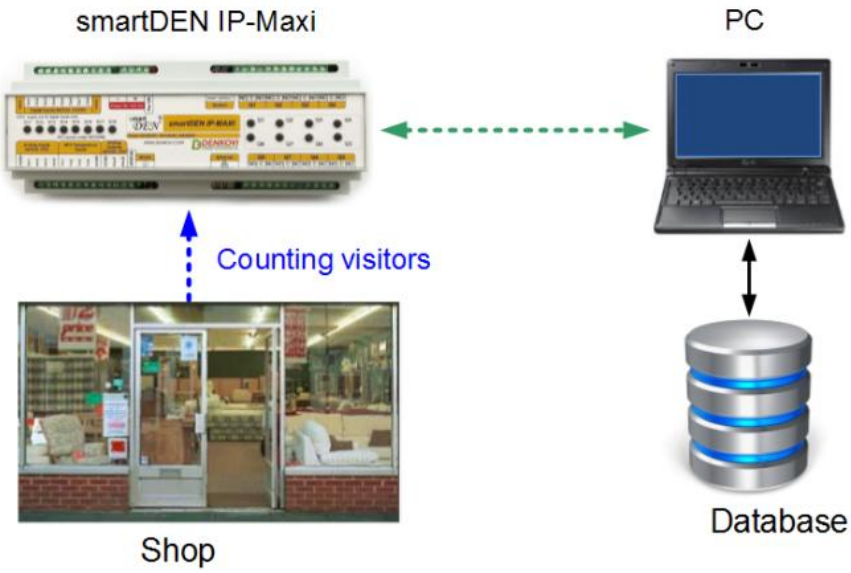


Figure 2.4. Counting visitors in a shop

2.5. Web based thermo-regulator

Each Relay can be set to work in Regulator mode where it can be controlled only from an Analog Input. The controller can be configured to switch different Relays upon the value of single/differential Analog Input (one input can control many Relays). For example, one Relay can be set for heating, another for cooling and etc. (Fig. 2.5). All the process may be monitored online and this makes **smartDEN IP-Maxi** suitable for building standalone Web enabled thermo-regulators.

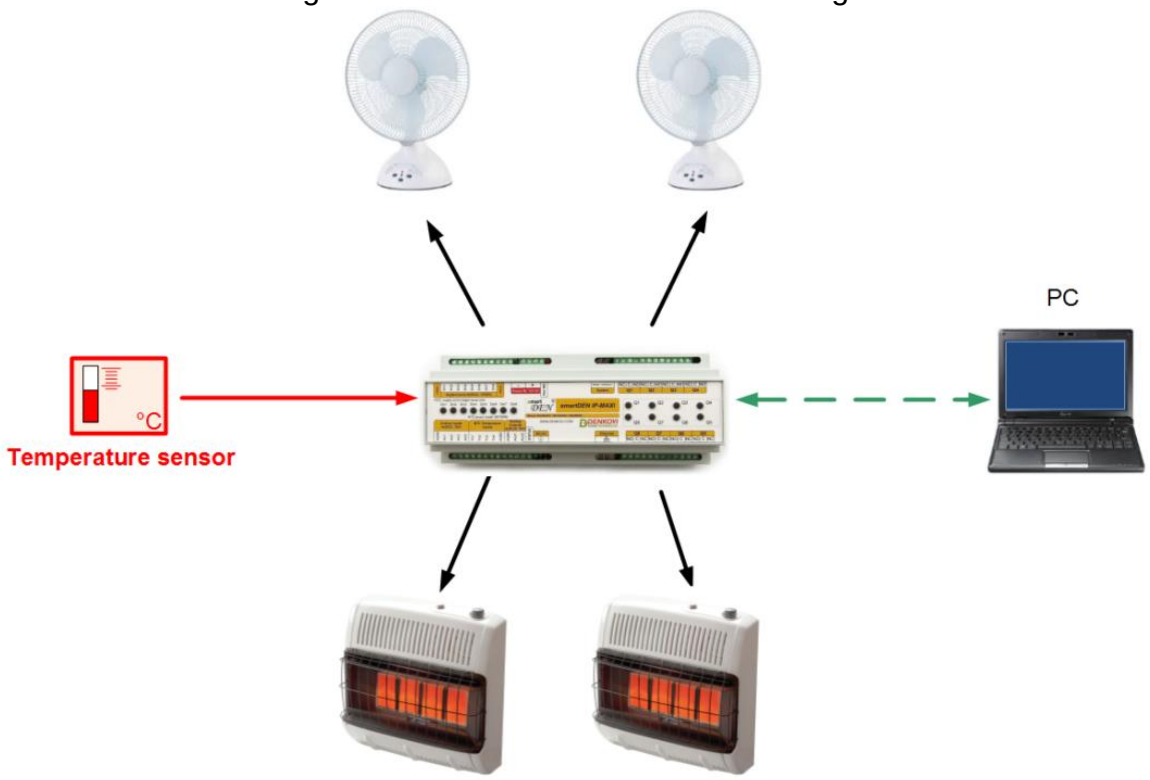


Figure 2.5. Web based thermo-regulator

Another possible application for **smartDEN IP-Maxi** is differential thermo-regulator very useful in cases when solar hot water panel must be monitored and controlled based on two temperature sensors values. The first sensor monitors the temperature of the panel water and the second monitors the temperature from the boiler water. If the boiler water is cooler than the panel water, the valve is opened and the hot water from the panel comes in to the boiler.

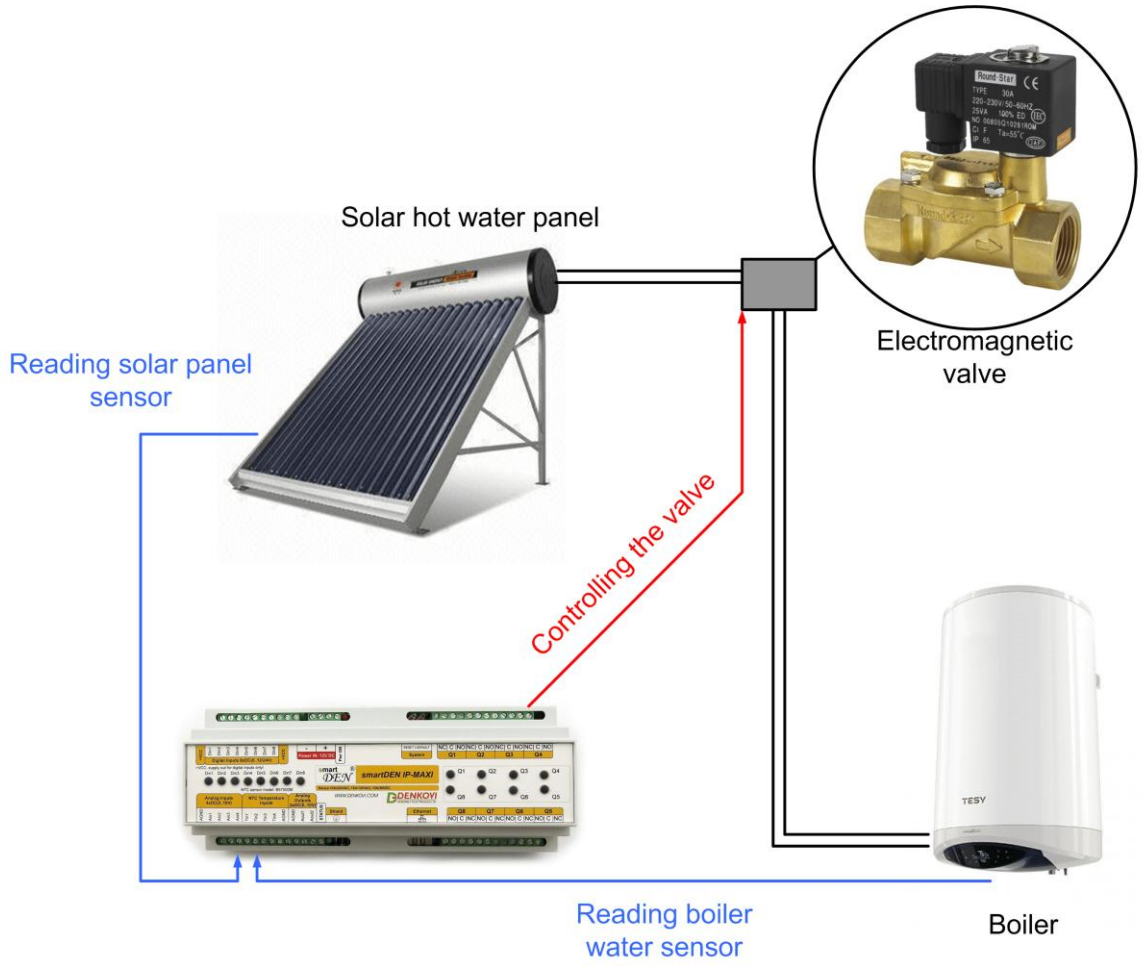


Figure 2.6. Differential thermo-regulator

2.6. Home automation

smartDEN IP-Maxi can be used in a variety of home automation tasks:

- Climate: heating, ventilation and air conditioning;
- Lighting: switching On/Off the electric lights in the house;
- Shading: opening and closing the blinds and curtains;
- Security: monitoring and control of central locking, doors and windows, etc.

A number of flexible control schemes can be set up, for example:

- Use of Regulator mode of the Relays for opening and closing the blinds and curtains depending on the level of the outside sunlight;
- Use of Pulse mode of the Relays for controlling garage doors, windows, roofs and for any other application where a certain period of time should be maintained, etc.;
- Use of integrated Week Schedule features to switch On/Off appliances up to 30 times per day in a standalone mode;
- Use of “many inputs to one relay” controlling mode – each Relay can be paired simultaneously with a Digital Input (button, switch...), Analog Input (sensor for temperature, humidity, distance, light...), Week Schedule command, as well can be controlled remotely (browser, SNMP, HTTP/XML/JSON).

Figure 2.7. smartDEN IP-Maxi can be used in home automation systems

2.7. Irrigation systems

Other applications of **smartDEN IP-Maxi** include irrigation systems. Two different modes can be combined:

- Start and stop the irrigation at specific times using the Week Schedule features;
- Start and stop the irrigation depending on humidity level by applying a control loop including a humidity or rain sensor and solenoid valve controlled by a Relay.

Figure 2.8. smartDEN IP-Maxi can be used in home irrigation systems

3. Technical parameters

Table 3.1. Physical parameters

Parameter	Value
Size (L / W / H), mm	210 x 85 x 58
Weight, g	420
Operating temperature, °C	0 to 70

Table 3.2. System parameters

Parameter	Value
Power supply voltage, V DC	12 or 24 (depends on the model) ±2
Maximum current consumption, mA	450 at 12V, 300 at 24V
Protection against reverse polarity	Yes
Hardware Real Time Clock (RTC)	Yes
Default settings restore button	Yes
Reset button	Yes

Table 3.3. Digital inputs

Parameter	Value
Digital inputs number	8
Digital inputs voltage range, V DC	0 up to 30
Input switching threshold from 0 to 1, V DC	> 7.6
Input switching threshold from 0 to 1, mA	> 3.2
Input switching threshold from 1 to 0, V DC	< 4.5
Input switching threshold from 1 to 0, mA	< 1.8
Supported sensor output type	PNP
Input type	Resistive with Schmitt trigger
Protection against reverse polarity	Yes

Table 3.4. Counters

Parameter		Value
Counters number		8
Max. pulses frequency	Digital Inputs 1, 2, 3	1 ..10 Hz (See point 7.9)
	Digital Inputs 4, 5, 6, 7	9 kHz
	Digital Input 8	40 kHz

Table 3.5. Analog inputs

Parameter	Value
Analog inputs number	4
Analog inputs full scale voltage range, V DC	0 up to 10
Analog inputs absolute maximum non-destructive voltage, V DC	24
Analog inputs resolution, bits	10
Value of LSB, mV	~10
Input impedance, KΩ	1330
Sample period, ms	Min: 25*
	Max: 300**
Protection against reverse polarity	Yes

*No communication (HTTP, SNMP) is taking place with the module
**Intensive communication (HTTP, SNMP) with the module

Table 3.6. Temperature inputs

Parameter	Value
NTC inputs number	4
Sensor type	B57500M
Units	Celsius/Fahrenheit
Sensor working temperature range	-55°C/-67°F to +155°C/311°F
Accuracy	±0.5°C / 0.9°F
Sample period, ms	Min: 25*
	Max: 300**

*No communication (HTTP, SNMP) is taking place with the module
**Intensive communication (HTTP, SNMP) with the module

Table 3.7. Relays

Parameter		Value
Relays number		8
Max. Voltage		250V AC
Max. switchable current	Voltage=250V AC	10A
	Voltage=125V AC	15A
	Voltage=28V DC	10A

Table 3.8. Analog outputs

Parameter	Value
Analog outputs number	2
Output voltage	0 to 10V DC

Table 3.9. Network/protocols

Parameter	Value
Network parameters	IP/Mask/Default gateway
MAC lock (protection)	Yes
DHCP	Yes
DNS	Yes
ICMP	Yes
SNMP	SNMPv2c
SMTP traps format	SNMPv2
Web server for configuration/access	Yes
Secure HTTP/XML/JSON access	Yes

4. Connectors, ports and led indicators

A picture with the **smartDEN IP-Maxi** connectors, ports and led indicators is shown in Fig. 4.1.

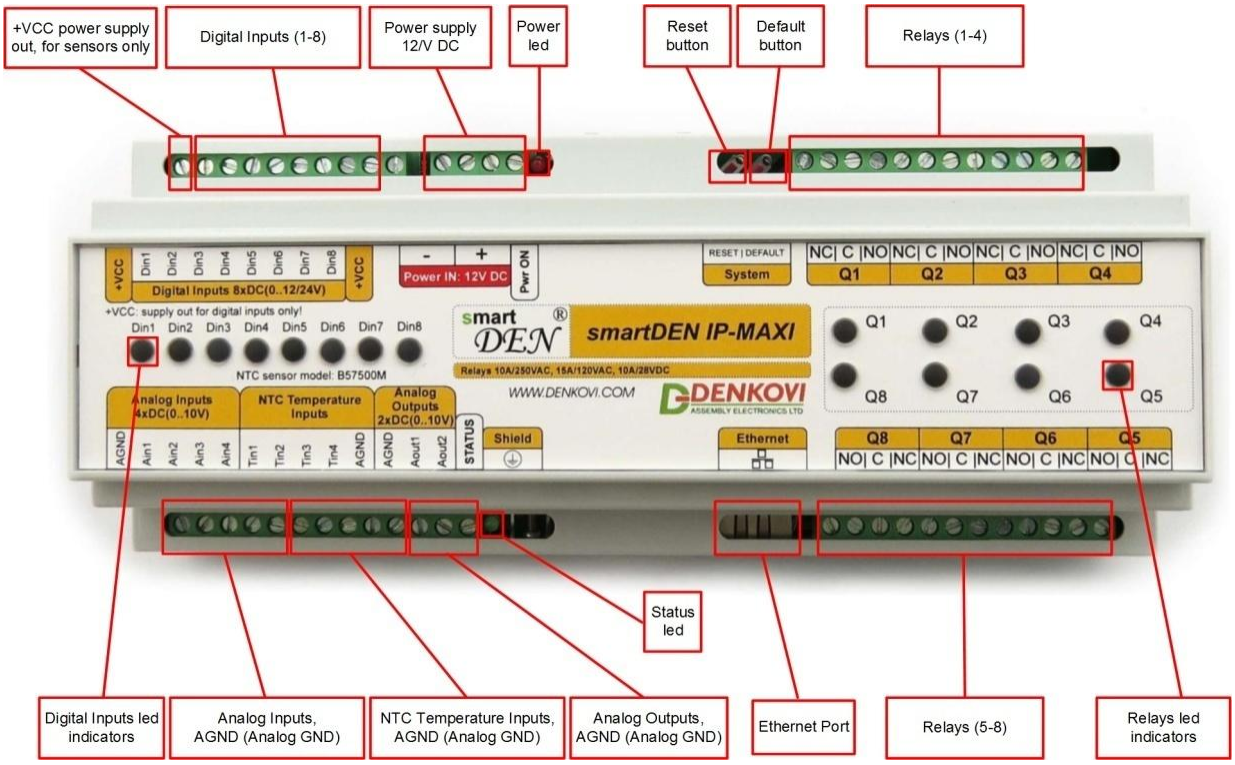


Figure 4.1. Device overview

5. Installation

- This device must be installed by qualified personnel;
- This device must not be installed directly outdoors;
- Installation consists of mounting the device, connecting to an IP network, connecting sensors, providing power and configuring via a web browser.

5.1. Box mounting

smartDEN IP-Maxi can be mounted to a standard (35 mm by 7.55 mm) DIN rail (Fig. 5.1). Attach the module to the DIN rail by hooking the hook on the back of the enclosure to the DIN rail and then snap the bottom hook into place.

Figure 5.1. Mounting the device to a DIN rail

5.2. Power supply

smartDEN IP-Maxi must be powered with 12V DC stabilized and filtered voltage. After power on, the power led must be on and STATUS indicator must start blinking in 5 seconds which means the module is running normally (Fig. 5.2).

Figure 5.2. smartDEN IP-Maxi power supply

- Please keep the polarity and the power supply voltage range!
- **smartDEN IP-Maxi** does not accept AC power supply voltage. It is highly recommended to check the power supply source parameters before the module is powered on.
- The power supply equipment shall be resistant to short circuit and overload in secondary circuit.
- When in use, do not place the equipment so that it is difficult to disconnect the device from the power supply.

5.3. Connecting inputs

Fig. 5.3 shows the typical connection of dry contact sensors, switches, buttons, door sensors etc. to the Digital Inputs.

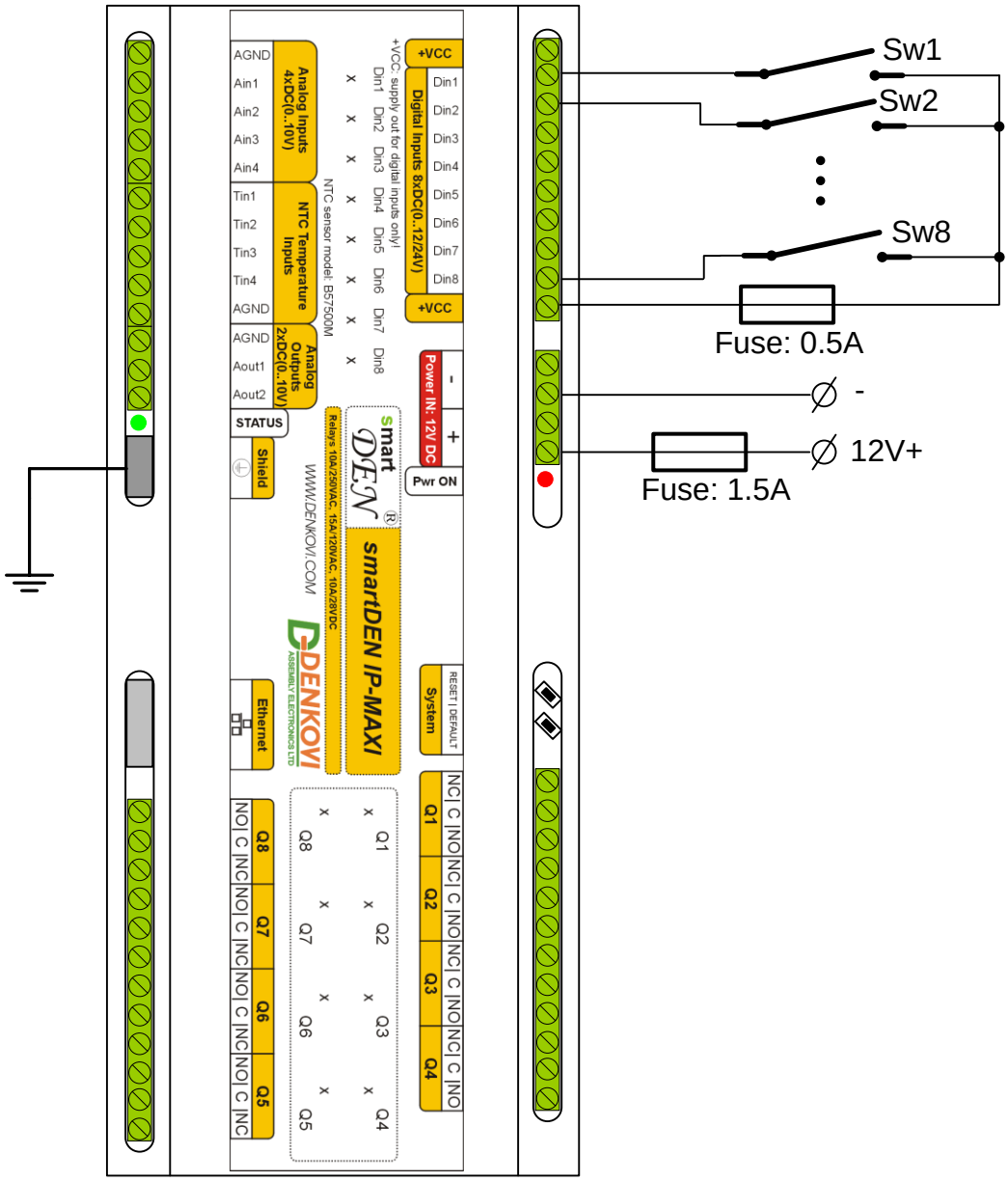


Figure 5.3. Connecting SPST NO output (dry contact) sensors, switches, buttons, door sensors etc. to the Digital Inputs

When connecting sensors with PNP output they can be powered from the additional internal 12V DC power source (Fig. 5.4).

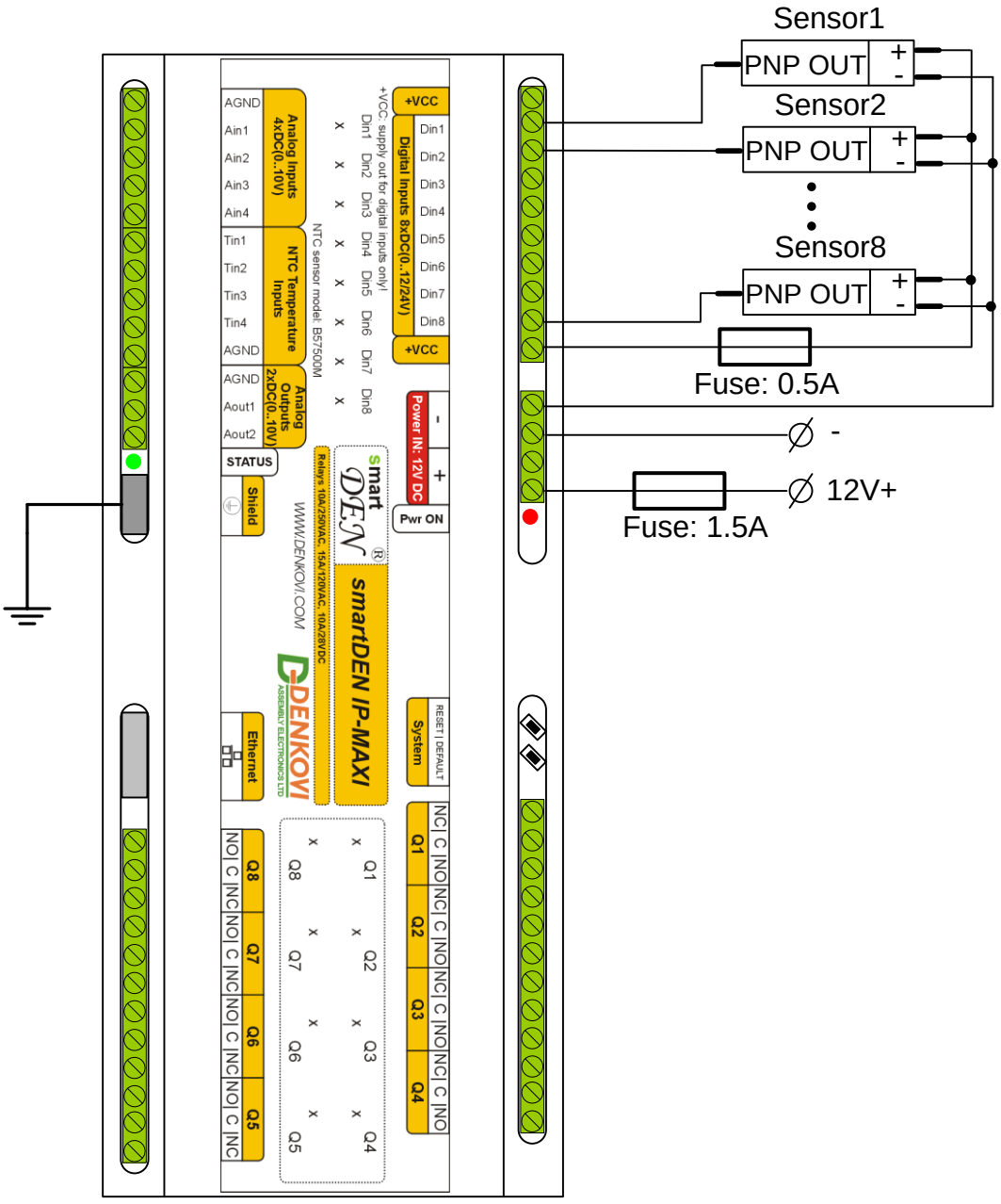


Figure 5.4. Connecting PNP output digital sensors requiring power supply voltage 12V DC to the Digital Inputs

Sensors with 0-20 mA output can be connected to the Analog Inputs as shown in Fig. 5.5.

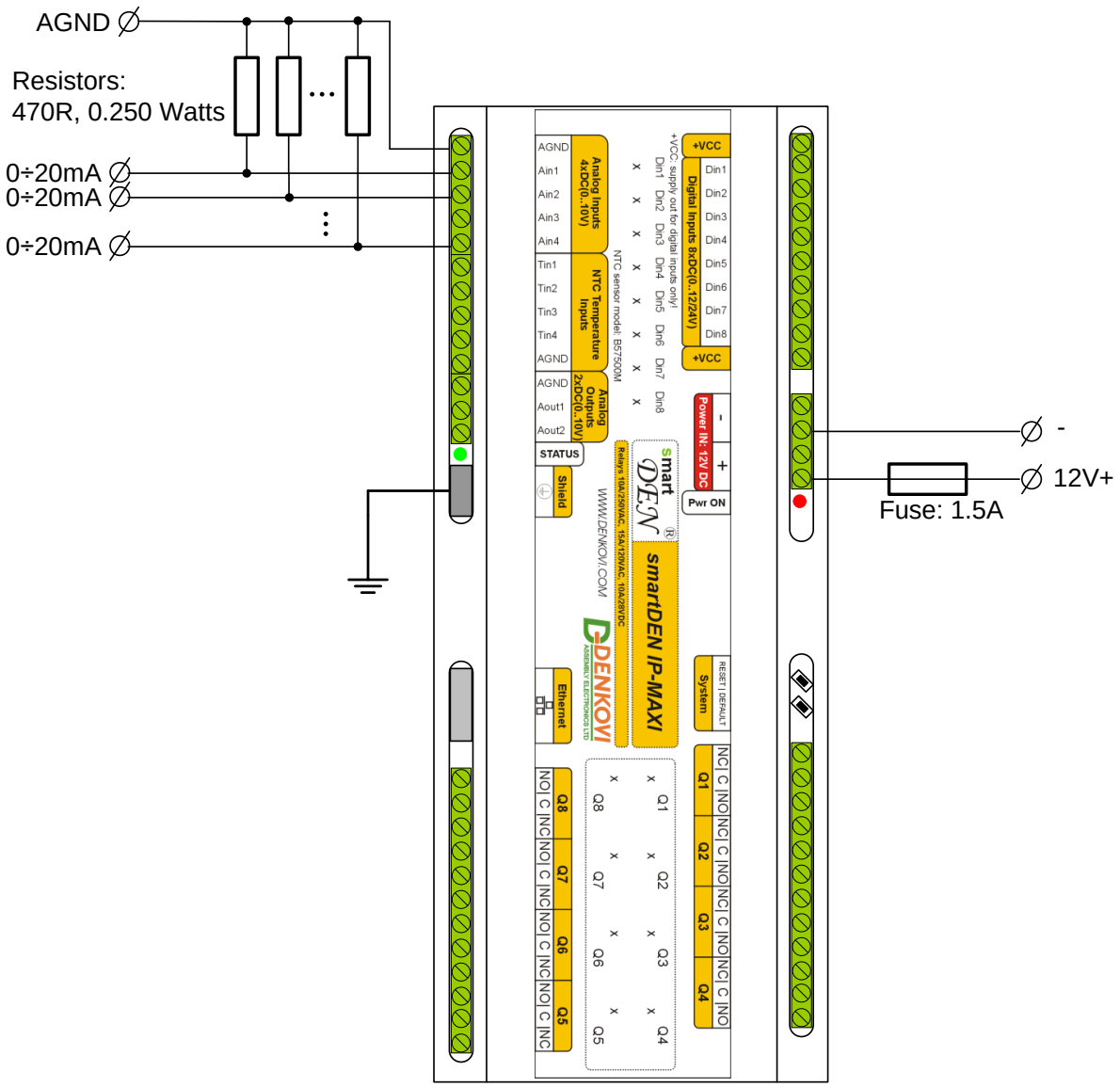


Figure 5.5. Connecting 0-20 mA output sensors to the Analog Inputs

Fig. 5.6 shows the connection of analog sensors with output from 0 up to 10V DC to the Analog Inputs.

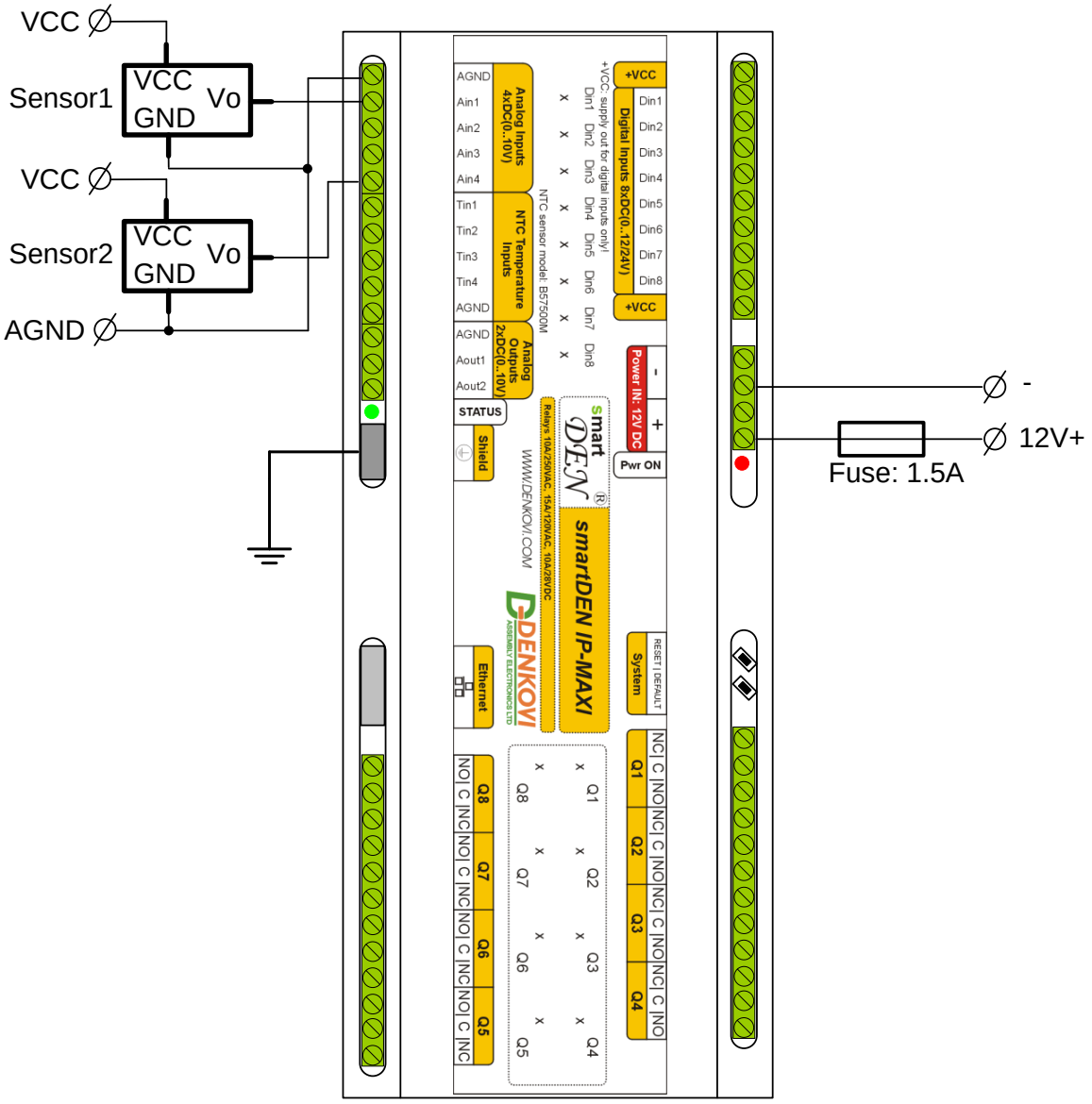


Figure 5.6. Connecting analog sensors with output from 0 up to 10V DC to the Analog Inputs

NTC thermistors type B57500M can be connected to the Temperature Inputs (Fig. 5.7).

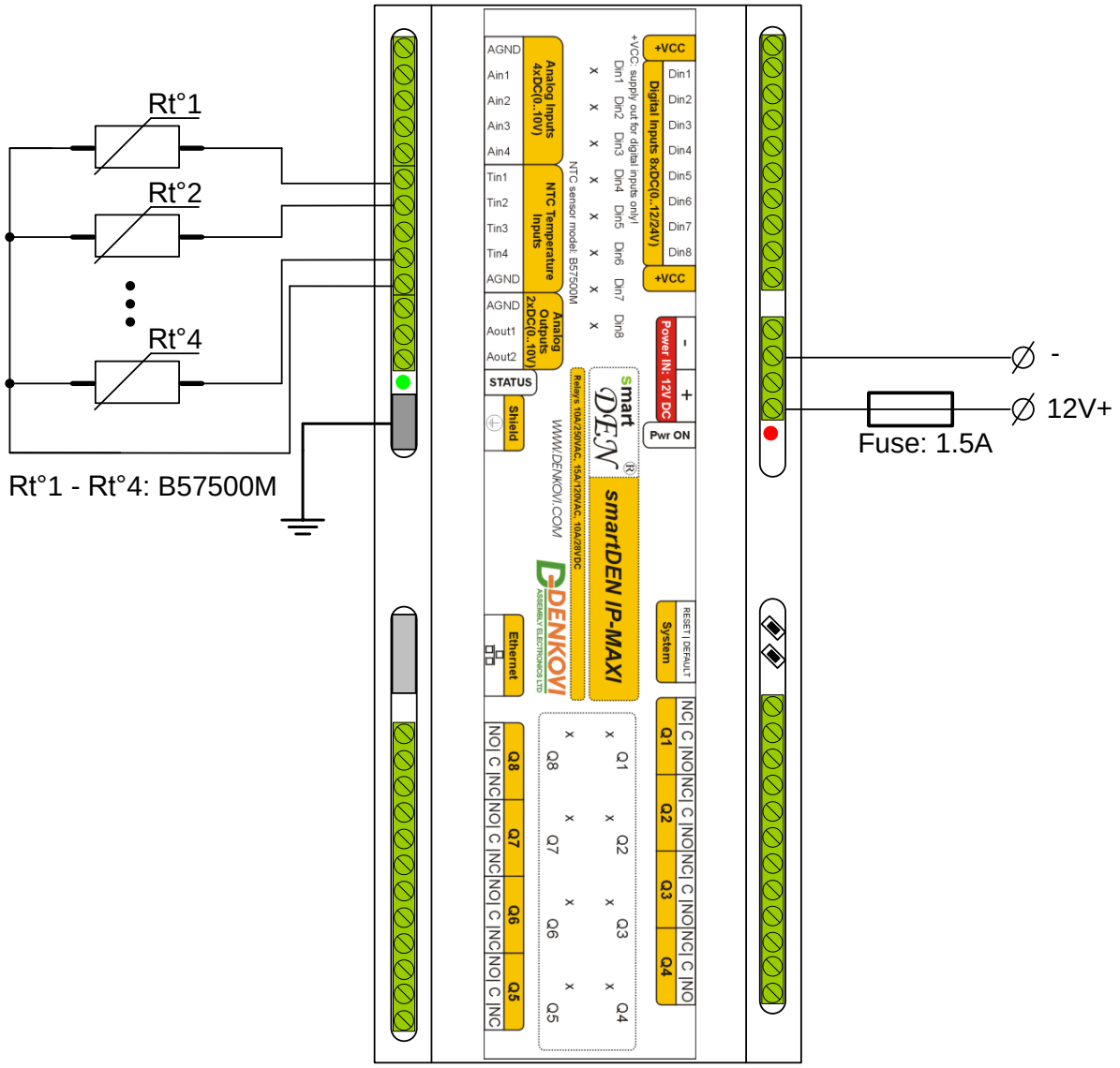


Figure 5.7. Connecting NTC sensors type B57500M to the Temperature Inputs

Below is shown example connection how to control load with relays (lamp).

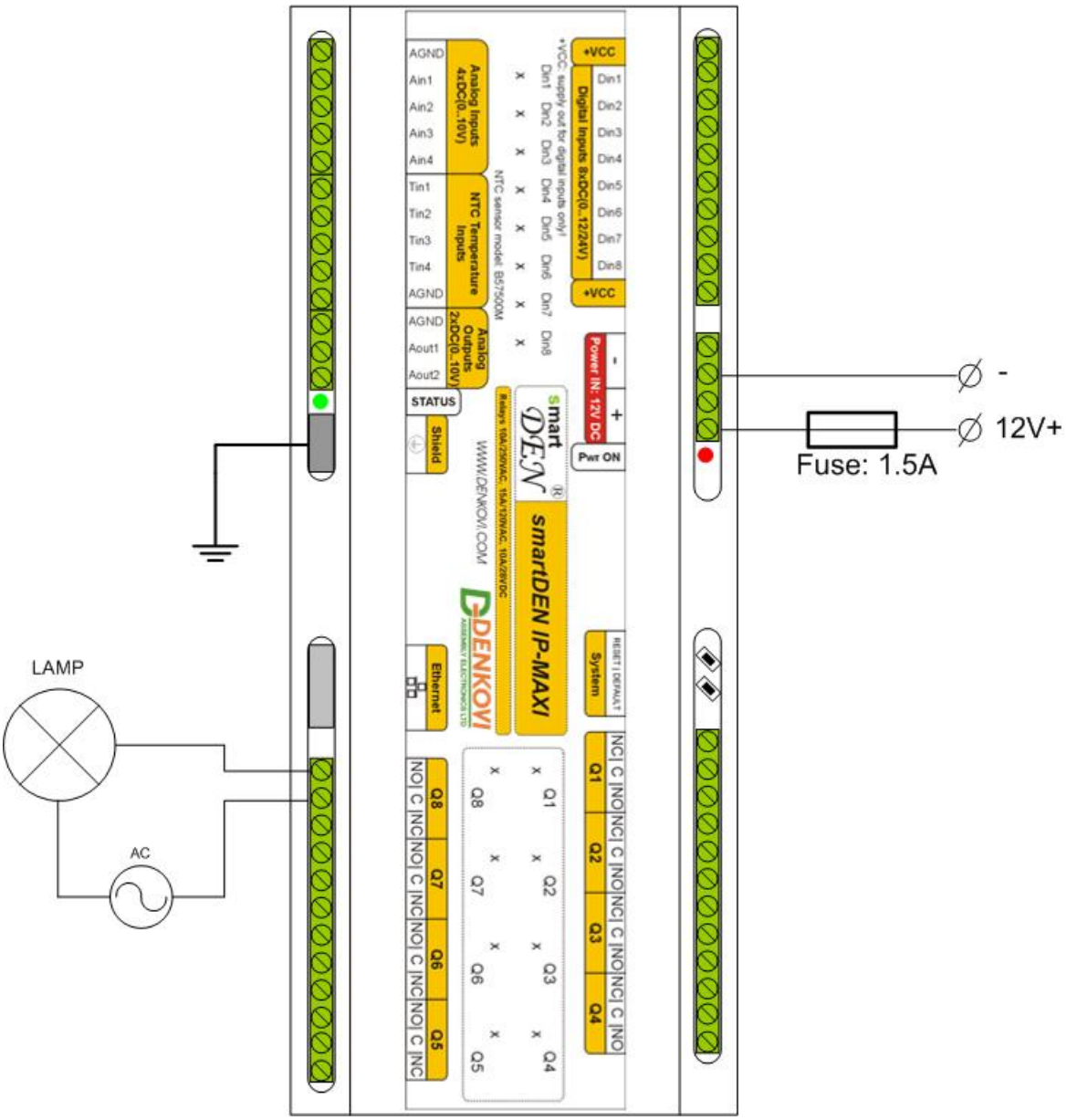


Figure 5.8. Connecting lamp to relay

The analog outputs (0-10V) can be used for dimming led lights as well. Please note that a separate dimmer could be necessary.

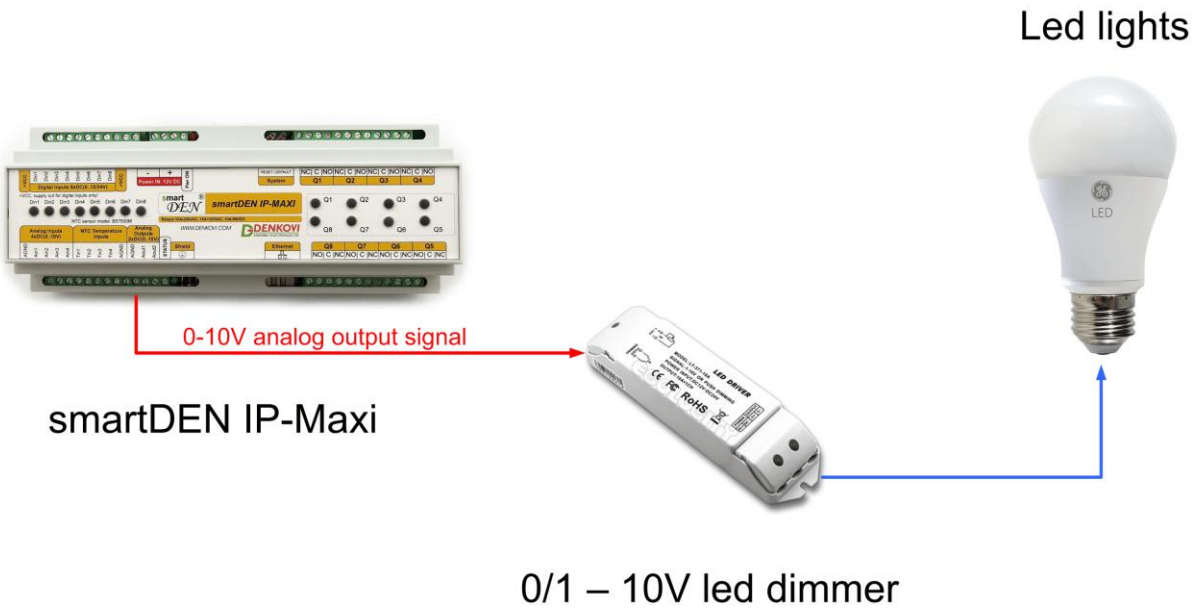


Figure 5.9. Controlling led lights with analog outputs

5.4. Network connection

smartDEN IP-Maxi supports AUTO-MDIX so either "crossover" or "straight-through" network cable can be used (Fig. 5.8, 5.9).

Figure 5.10. Direct connection of **smartDEN IP-Maxi** to a computer

Figure 5.11. Connecting **smartDEN IP-Maxi** to a wireless router

5.5. Communication setup

smartDEN IP-Maxi ships with the following default parameters:

- IP address: 192.168.1.100
- Subnet mask: 255.255.255.0
- Gateway: 192.168.1.1
- Web password: admin

Initially it is recommended to connect the module directly to the computer.

Next you have to change your PC's IP address.

You can google how to change you computer IP settings or just visit this web page: http://www.howtochangeipaddress.com/changeip.php

For Windows 7 OS for example you can do that in the following way:
Navigate to Control Panel -> Network and Internet -> View network and status tasks -> Change adapter settings

Then just select the local area connection with right click and select Properties (Fig. 5.11):

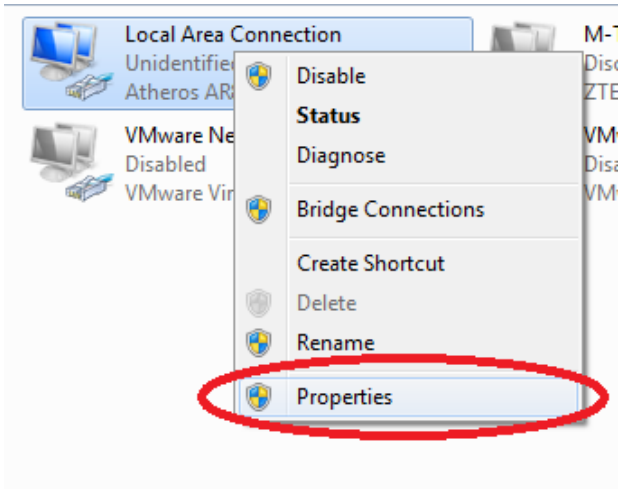


Figure 5.12. LAN card properties

The next step is to modify the IPv4 properties (Fig. 5.12).

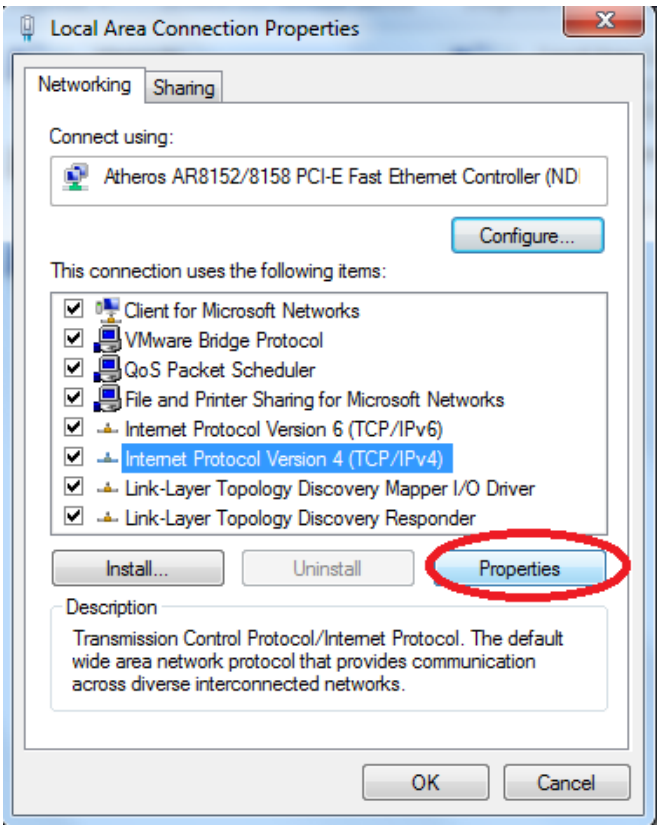


Figure 5.13. IPv4 properties section

Set the IP address of your PC to be in the same network as **smartDEN IP-Maxi** (Fig. 5.13).

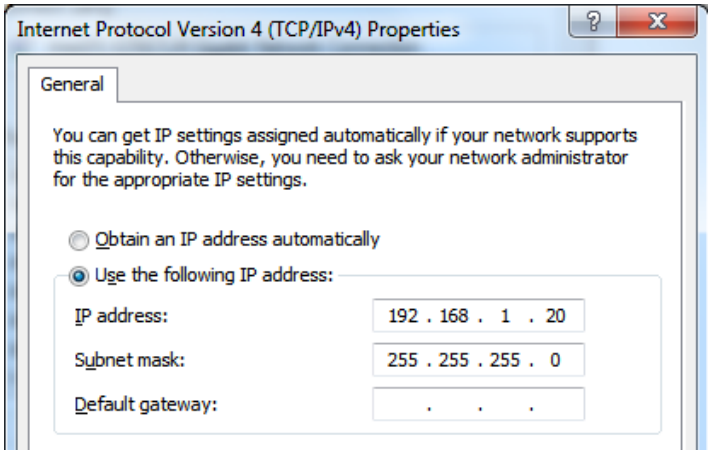


Figure 5.14. Set the IP address

Finally, in the address bar of your Web-browser enter the IP address of the **smartDEN IP-Maxi** and press Enter, or select 'Go' (Fig. 5.14).

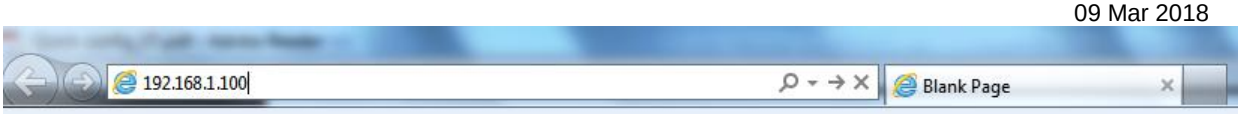


Figure 5.15. Open the device in a browser

If the network settings are O'K, the login page should appear (Fig. 5.15).

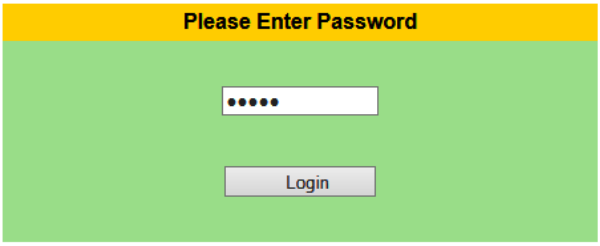


Figure 5.16. Login page

smartDEN IP-Maxi modules connected locally can be easily scanned and found via the Denkovi Finder tool as well (Fig. 5.16).

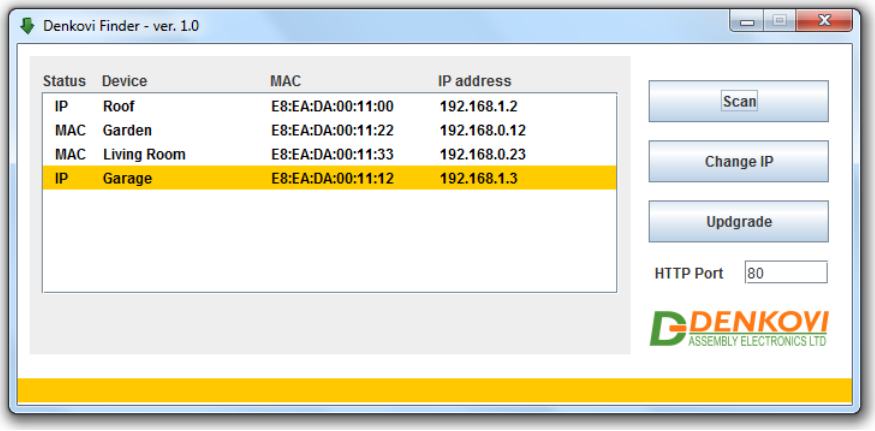


Figure 5.17. Denkovi Finder utility

6. Default settings

6.1. Table with default settings

The **smartDEN IP-Maxi** module is shipped with default (factory) settings shown in Table 6.1. The default settings can be reloaded, if necessary (see point 6.2).

Table 6.1. Default settings

Settings group	Parameter (according to Web pages)	Value
General Settings	Device Name	SMARTDEN_IPMAXI
	Password	admin
	Temperature Scale	Celsius
	Analog Inputs Filter, sec	0
	Relays Filter, ms	0
	Save Outputs	Disabled
	Monitoring Timeout, sec	3
	Max. Monitoring Errors	5
Network Settings	DHCP	Disabled
	IP Address	192.168.1.100
	Gateway	192.168.1.1
	Subnet Mask	255.255.255.0
	Primary DNS	192.168.1.1
	Secondary DNS	0.0.0.0
Date/Time Settings	Date (dd/mm/yyyy)	Current
	Day of Week	Current
	Time (hh:mm)	Current
	Time Zone	GMT
	Auto Synchronization	Enabled
	Time Server	pool.ntp.org
	Server Port	123
	Synchronization Period, min	30
HTTP/XML/JSON Settings	HTTP Port	80
	Access IP Address	192.168.1.0
	Access Mask	0.0.0.0
	Access MAC Address	00:00:00:00:00:00
	Session Timeout, min	3
	Enable Access	Enabled
	Encrypt Password	Disabled

	Multiple Access	Enabled
SNMP Agent	Enable SNMP	Enabled
	SNMP Port	161
	Read-only Community1	public
	Read-only Community2	read
	Read-write Community1	private
	Read-write Community2	write
SNMP Traps	Enable	Disabled
	Trap Receiver IP Address	0.0.0.0
	Trap Receiver Port	162
	Trap Community	
	Trap Sending	Level Triggered
Digital Inputs	Description	DIN<n>, where <n> = 1..8
	Counter	0
	Filter (ms)	0
	SNMP Trap	Disabled
	SNMP Trap Value	(0) Off
Analog Inputs	Description (In1 to In4)	AIN<n>, where <n> = 1..4
	Description (In5 to In8)	TIN<n>, where <n> = 1..4
	Min (In1 to In4)	0.0
	Max (In1 to In4)	10.0
	Min (In5 to In8)	-55
	Max (In5 to In8)	155
	Label (In1 to In4)	Volt
	Label (In5 to In8)	degC
	Trap Low Threshold	0
	Trap High Threshold	0
	SNMP Trap	Disabled
Relays	Description	REL<n>, where <n> = 1..8
	Working Mode	Multiple
	DI No	0
	DI Mode	Normal
	AI+ No	0
	AI- No	0
	AI Threshold 1	0
	AI Threshold 2	0
	Pulse, ms (x100)	0
	Disable Week Schedule	No

	Use Filter	No
Analog Outputs	Description	AOUT<n>, where <n> = 1..2
	Units	0

6.2. Steps for loading the default settings

When necessary, the factory (default settings) may be applied so the module parameters will be returned back to those pointed out in **6.1** of the current document.

To return the settings to their factory default values next steps take place:

1. Turn Off the power supply of the device;
2. Press and hold the DEFAULT button (Fig. 6.1);
3. Turn On the power supply of the device;
4. Wait until STATUS LED indicator become On (approximately after 10 sec);
5. Release the DEFAULT button;
6. The device is restarted and configured with the default settings.

Figure 6.1. Loading the default settings

7. Web access

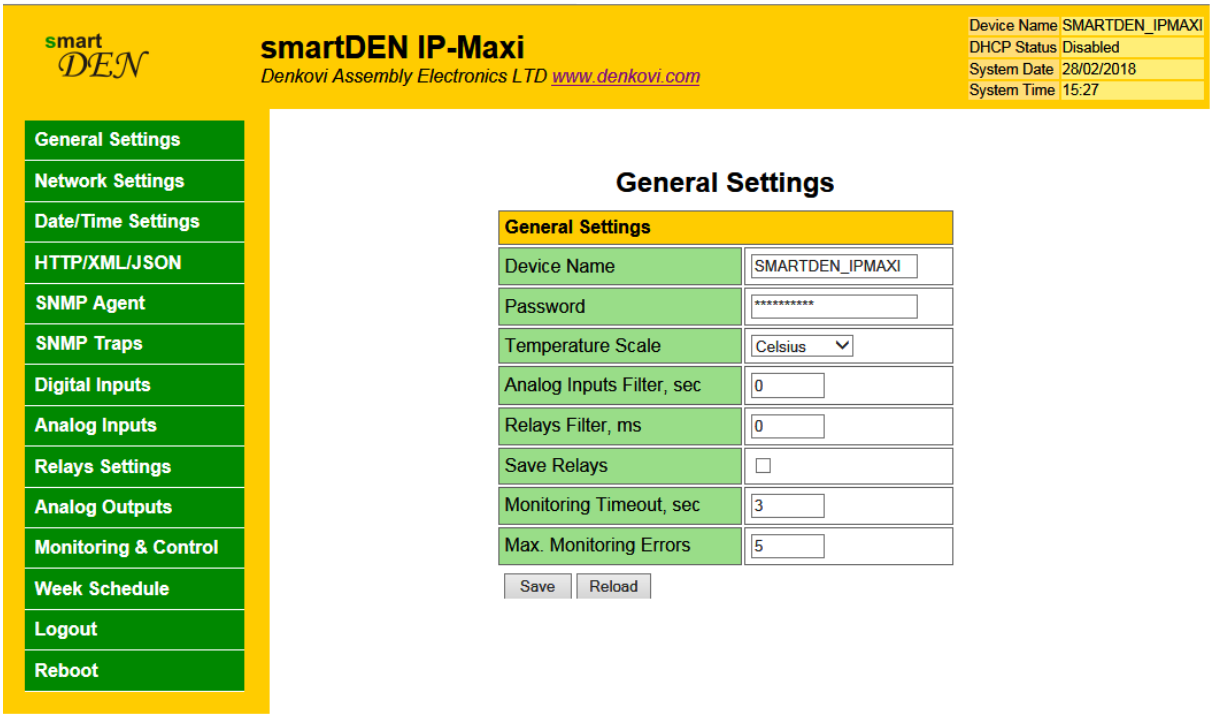


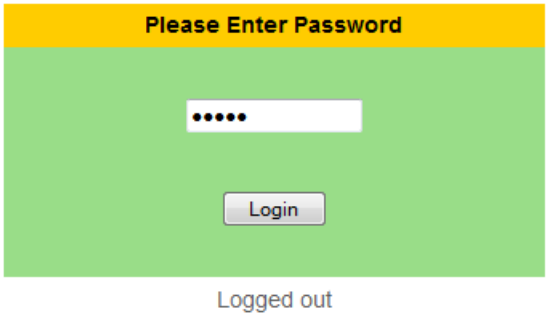
Figure 7.1. Web access

To access the setup pages, start a web browser (Internet Explorer, Chrome, Mozilla Firefox or similar), and enter the **smartDEN IP-Maxi** IP address, for example: http://192.168.1.100.

Figure 7.2. Open the device in a browser

Note: You will need to have **JavaScript** enabled in your browser.

7.1. Login



Logged out

Figure 7.3. Login page

Enter the password and click Login button or press Enter (Fig. 7.3). This will bring you to the **smartDEN IP-Maxi** main configuration page, which contains details of the

current firmware version/build date and provides a link to the documentation page (Fig. 7.4).

Note: The default password is admin (passwords are case sensitive).

Note: When the password is entered, it is transmitted across the network in encrypted form, so eavesdropping on the data transmission will not reveal the password.

Note: In order to prevent setup/control conflicts, at any given moment, only one user can be logged in.

smartDEN IP-Maxi Info	
smartDEN IP-Maxi Version	v1.24
Build Date	Feb 28 2018 00:08:00
Documentation	User Manual

Figure 7.4. Version/Build Date info

7.2. Menu

The main menu (Fig. 7.5) consists of the following items, located in the left window frame:

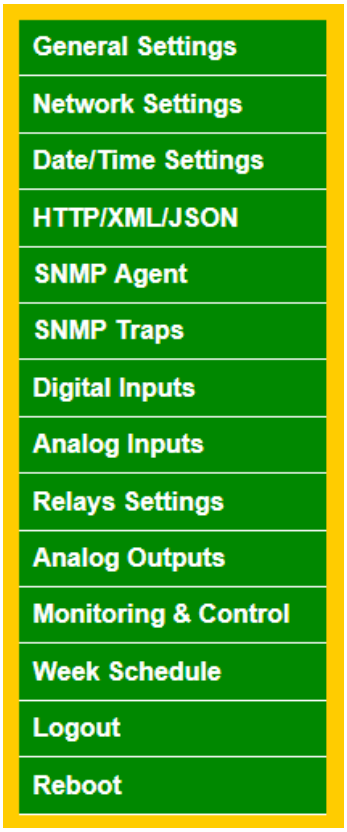


Figure 7.5. Navigation menu

7.3. General settings

General settings page is show in Fig. 7.6.

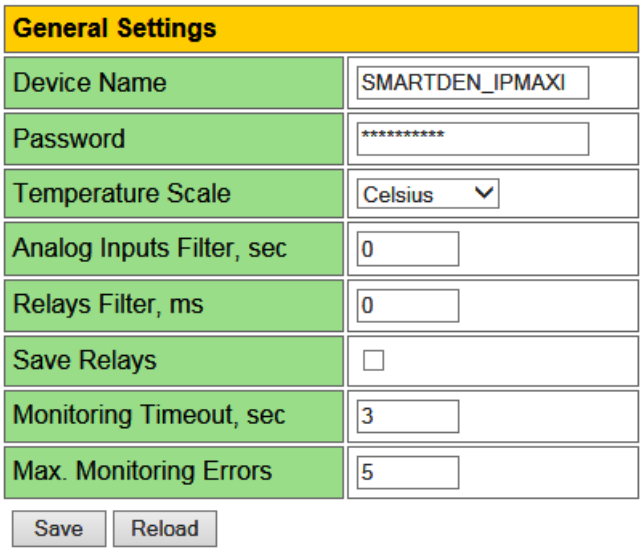


Figure 7.6. General settings

- **Device Name** - the name of the module (max 15 symbols). Every module can have different name in your network so they can be distinguished;
- Password - the password used for logging into the web admin and XML/JSON operation (max. 10 chars);

When typed, the password in this screen is not hidden. Only in this case, when the password is being changed, it is transmitted across the network "in the open". Therefore, set passwords in a secure environment where you can make sure that no one is "eavesdropping". Subsequent transmissions of the password to "login" onto the device are encrypted and "safe".

- **Temperature Scale** – Celsius / Fahrenheit;
- **Analog Inputs Filter, sec** – analog inputs filter constant. The range is from 0 up to 30 sec. The filter is disabled when its value is set to 0;

This parameter sets a low pass software filter that removes the short-term fluctuations from the input signal and reduces the effect of occasional spikes. Note that the higher filter constants give a slower response to changes.

- **Relays Filter, ms** – relays filter constant. The range is from 0 up to 9999 milliseconds. Zero value disables the filter;

In real applications, switching external loads can produce spikes and noise transients that may disturb the Analog Inputs measurement. To avoid the processing of “false” Analog Inputs measurements during these transients the parameter Relays Filter can be set to appropriate value. When a Relay changes its state, during the defined period Analog Input measurements will be ignored. The filter can be enabled or disabled individually for each relay by Use **Filter** option in Relays Settings page.

- **Save Outputs** - when checked, each time a Relay or Analog Output value is changed, it will be saved in non-volatile memory (EEPROM), so after reboot/restart it will be restored;

This option should be used with care in dynamic systems because of restriction in maximum write cycles of the EEPROM (usually 100 000 write/erase cycles).

- **Monitoring Timeout, sec** - the connection timeout for the Web-browser;
- **Max. Monitoring Errors** – the number of successive timeouts before the connection error is reported by the Web-browser;
- **Save button** - once you have changed the settings as required, click this button.

7.4. Network settings

The page shown in Fig. 7.7 lets you configure the network settings of **smartDEN IP-Maxi** module.

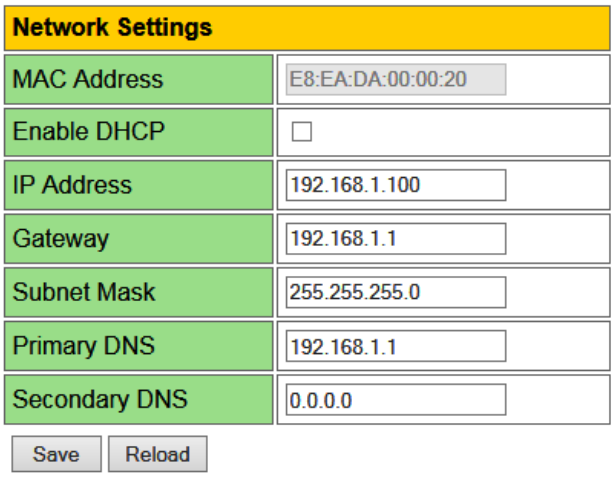


Figure 7.7. Network settings

- **Enable DHCP** - this option allows DHCP to be enabled or disabled. If DHCP is set to Enabled, the Network page must be saved and **smartDEN IP-Maxi** must be rebooted before obtaining an IP address;
- **IP address** - this is the IP address of the **smartDEN IP-Maxi**. It has to be manually assigned only if DHCP is disabled. With DHCP enabled, this field displays the currently assigned address;
- **Gateway** - this specifies the IP address of the gateway router. It is used for accessing public SNTP servers for automatic time synchronization;
- **Subnet Mask** - this is the subnet mask for the network on which the **smartDEN IP-Maxi** is installed;
- **Primary DNS** - primary DNS (Domain Name Service) address;
- **Secondary DNS** - secondary DNS address;
- **Save button** - once you have changed the settings as required, click this button.

You have to reboot the device for these settings to apply.

7.5. Date/Time Settings

This page lets you adjust the date/time and set the SNTP (Simple Network Time Protocol) server for auto synchronization (Fig. 7.8).

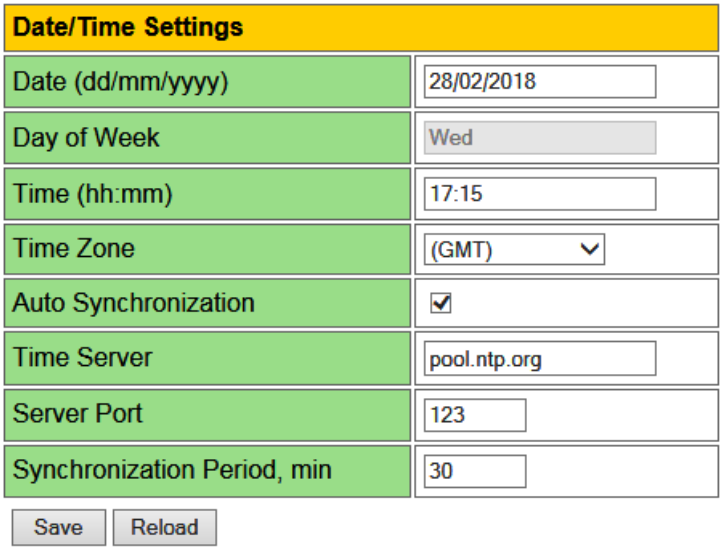


Figure 7.8. Date/Time settings

- **Date (dd/mm/yyyy)** - the current date in specified format;
- **Time (hh:mm)** - the current time in 24-hour format;
- **Time Zone** - select the time zone for your geographic location;
- **Auto Synchronization** - this option enables or disables automatic synchronization with the SNTP server with period specified by Synchronization Period;
- **Time Sever** - the SNTP server, used for synchronizing the time automatically;
- **Server Port** - the SNTP server port;
- **Synchronization Period, min** - the period in which automatic synchronization will take place, if enabled;
- **Save button** - once you have changed the settings as needed, click this button. These settings apply immediately and do not require a reboot.

7.6. HTTP/XML/JSON

These settings let you configure the HTTP and XML/JSON access parameters of **smartDEN IP-Maxi** (Fig. 7.9).

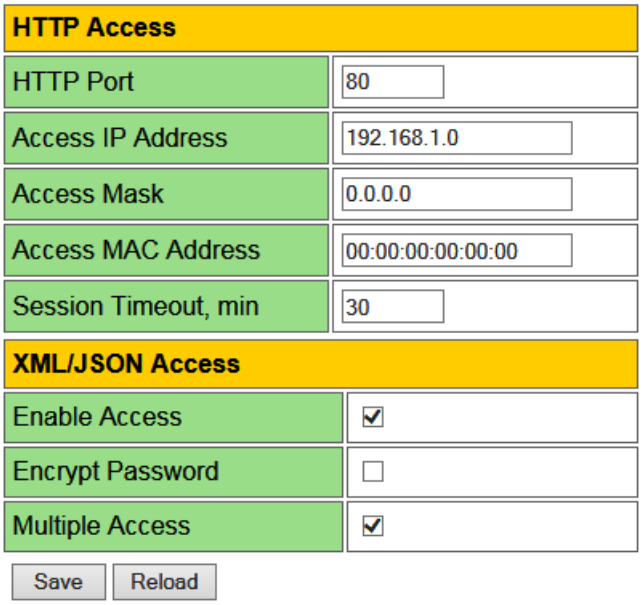


Figure 7.9. HTTP/XML/JSON settings

- **HTTP Port** - port on which the integrated Web server listens for HTTP requests (default port is 80). You have to reboot the device for a new port setting to apply;
- **Access IP Address/Access Mask** - these fields can be used to restrict the HTTP/XML/JSON access by specifying the IP address and subnet mask of the HTTP client;
- **Access MAC Address** - this field can be used to restrict the HTTP/XML/JSON access by specifying the MAC address of the HTTP client;
- **Session Timeout, min** - specifies the timeout period for the HTTP/XML/JSON sessions in minutes;
- **Enable Access** - this option enables or disables the XML/JSON access;
- **Encrypt Password** - when the XML/JSON access is enabled, this option adds additional security level by encrypting the login password;
- **Multiple Access** - this option enables simultaneous XML/JSON access from several HTTP clients;
- **Save button** - once you have changed the settings as required, click this button.

Note: If there is no traffic between the Web-browser/HTTP client and the **smartDEN IP-Maxi** for time, specified by Session Timeout parameter, the session "times out" and a new login is required.

Note: When Encrypt Password mode is enabled, the Multiple Access option is not taken into account, so at any given moment, only one user can be logged-in.

Note: When **Multiple Access** mode is enabled, any XML/JSON request will always reset the current HTTP session.

Note: When **Multiple Access** mode is disabled, whether **Encrypt Password** is enabled or not, it is possible to access the module via XML/JSON only after login for the specified session timeout.

- You have to reboot the device for these settings to apply.
- It is highly recommended to log out from the web server after finishing the parameters setup.
- If you don't want to restrict the HTTP/XML/JSON access by IP address, set the **Access Mask** to 0.0.0.0.
- If you don't want to restrict the HTTP/XML/JSON access by MAC address, set the MAC Address to 00:00:00:00:00:00.
- Setting the **Access Mask** to 255.255.255.255 allows the HTTP/XML/JSON access only from the exactly specified Access IP Address.
- You can allow the HTTP/XML/JSON access to a range of IP addresses by setting an appropriate value for **Access Mask**. For example setting the **Access IP Address** to 192.168.1.0 and **Access Mask** to 255.255.255.0 allows the access from IP addresses in range from 192.168.1.0 to 192.168.1.255.

7.7. SNMP Agent

These settings let you configure the SNMPv2c (Simple Network Management Protocol) access parameters to the **smartDEN IP-Maxi** (Fig. 7.10).

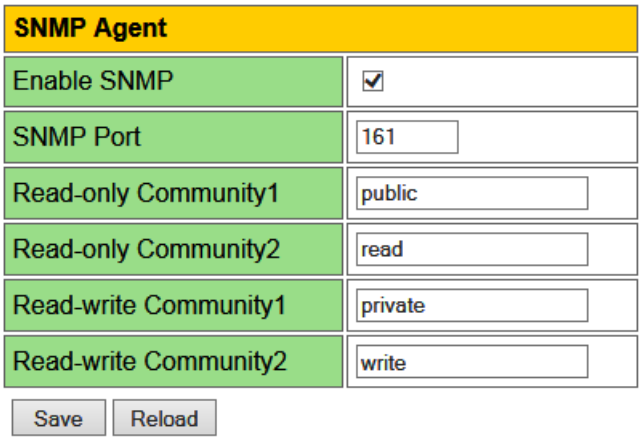


Figure 7.10. SNMP agent configuration

- **Enable SNMP** - this option enables or disables SNMP access;
- **SNMP Port** - UDP port number the SNMP agent receives requests on (default port is 161);
- **Read-only Community1/2** - community strings for client's authentication, used in read operations;

- **Read-write Community1/2** - community strings for client's authentication, used in read/write operations;
- **Save button** - once you have changed the settings as required, click this button.

You have to reboot the device for these settings to apply.

7.8. SNMP Traps

smartDEN IP-Maxi can be configured to send SNMPv2 trap notifications triggered by Digital/Analog Input conditions (Fig. 7.11).

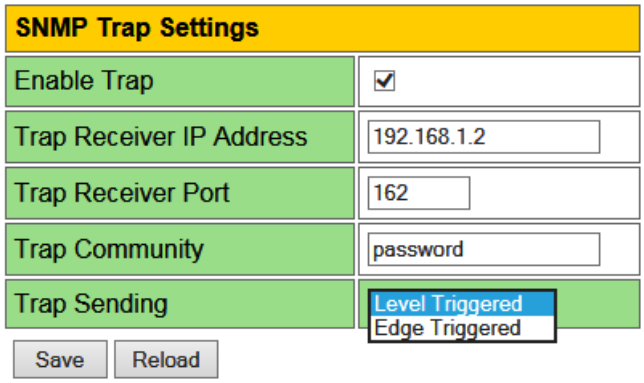


Figure 7.11. SNMP Trap settings

- **Enable Trap** - enables or disables sending of traps to the server;
- **Trap Receiver IP Address** - the IP address of the trap server;
- **Trap Receiver Port** - determines the UDP port the trap message will be sent to;
- **Trap Community** - the trap community string;
- **Trap Sending** - determines if the traps will be sent by level or by edge conditions.

With the **Level Triggered** option the trap message will be sent every 5 seconds when the trap condition is met. This mode is preferred in cases where the UDP trap messages are not guaranteed to be received by the trap server.

With the **Edge Triggered** option the trap message will be sent upon input event only once.

If the traps are enabled, so called "cold trap" message indicating **smartDEN IP-Maxi** is started will be send on power-on or reboot.

You have to reboot the device for these settings to apply.

7.9. Digital Inputs

Digital Inputs settings page is shown in Fig. 7.12.

Digital Input	Description	Counter	Filter (ms)	SNMP Trap	SNMP Trap Value
Input 1	DIN1	12	0	☑	0 (Off) / 1 (On) / 2 (Both)
Input 2	DIN2	3	50	☑	
Input 3	DIN3	32872	0	☑	1 (On)
Input 4	DIN4	0	0	☐	0 (Off)
Input 5	DIN5	4	0	☐	0 (Off)
Input 6	DIN6	0	0	☐	1 (On)
Input 7	DIN7	0	0	☐	0 (Off)
Input 8	DIN8	0	0	☐	0 (Off)

Save Reload

Figure 7.12. Digital Inputs settings

- **Description** - identification string of the input (max. 7 chars);

This description will appear in XML/JSON files, as well as in the Monitoring & Control page.

- **Counter** – the value of 32-bit counter attached to the input. The **Counter** is incremented on rising (On), falling (Off), or both edges depending on the **SNMP Trap Value**. The **Counter** is cyclic and its value can be set or cleared by the user. The range for this parameters is from 0 up to 2^{32}-1 (4294967295);
- **Filter (ms)** - the input may be adjusted to work with a digital filter. It is valid for counting, SNMP trap notifications, as well as input visualization. The range for this parameter is from 0 up to 200 milliseconds. The filter is disabled when its value is set to 0;
- **SNMP Trap** - determines if the Digital Input will send trap notifications or not;
- **SNMP Trap Value** - this parameter determines the condition to increment the counter and to send a SNMP trap notification:
  - *0 (Off)* – the **Counter** is incremented on the falling edge (1 -> 0). With **SNMP Trap** enabled and **Trap Sending**="Edge Triggered" the falling edge triggers a trap message (Fig. 7.13). With **SNMP Trap** enabled and **Trap Sending**="Level Triggered" the trap message is sent while the Digital Input is low (0) in intervals of 5 seconds (Fig. 7.14).

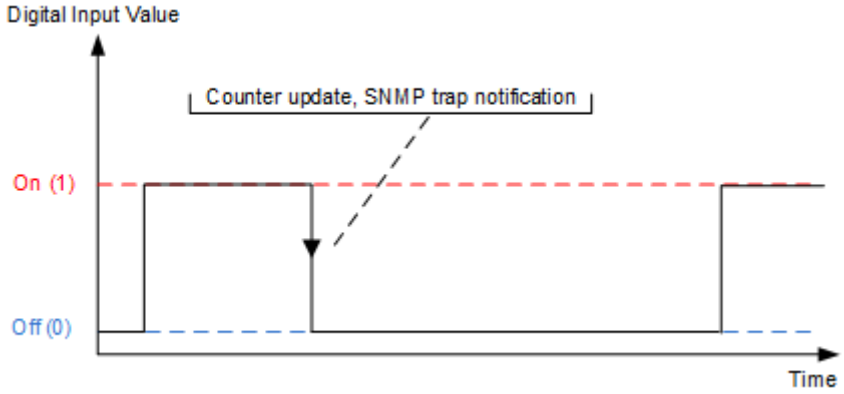


Figure 7.13. SNMP Trap Value="0 (Off)", **Trap Sending**="Edge Triggered"

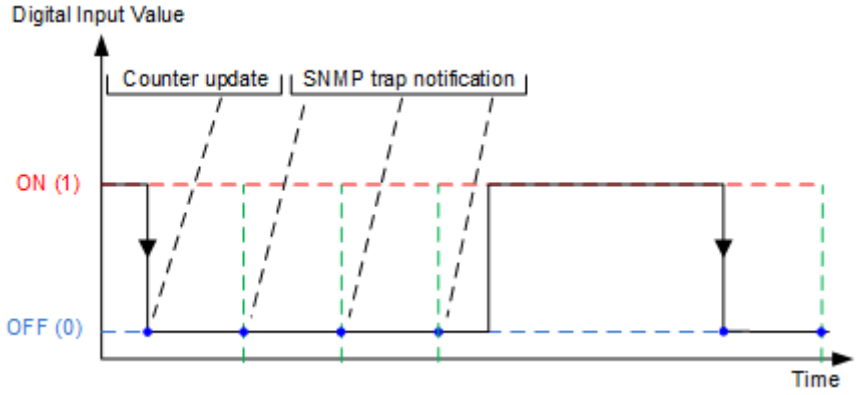


Figure 7.14. SNMP Trap Value="0 (Off)", **Trap Sending**="Level Triggered"

- *1 (On)* – the **Counter** is incremented on the rising edge (0 -> 1). With **SNMP Trap** enabled and **Trap Sending**="Edge Triggered" the rising edge triggers a trap message (Fig. 7.15). With **SNMP Trap** enabled and **Trap Sending**="Level Triggered" the trap message is sent while the Digital Input is high (1) in intervals of 5 seconds (Fig. 7.16).

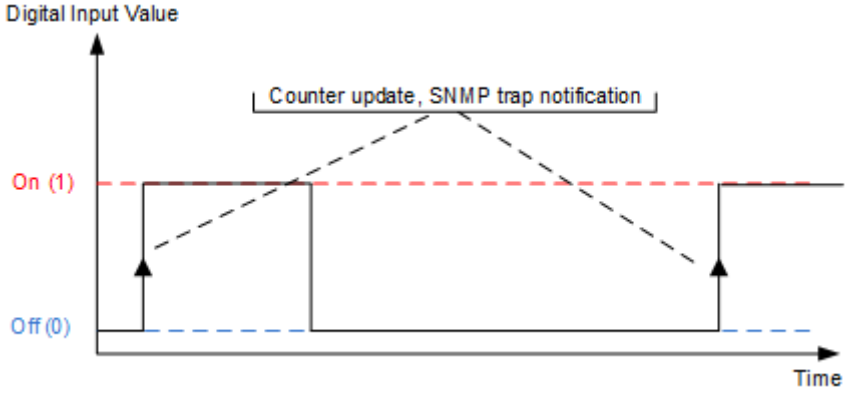


Figure 7.15. **SNMP Trap Value**="1 (On)", **Trap Sending**="Edge Triggered"

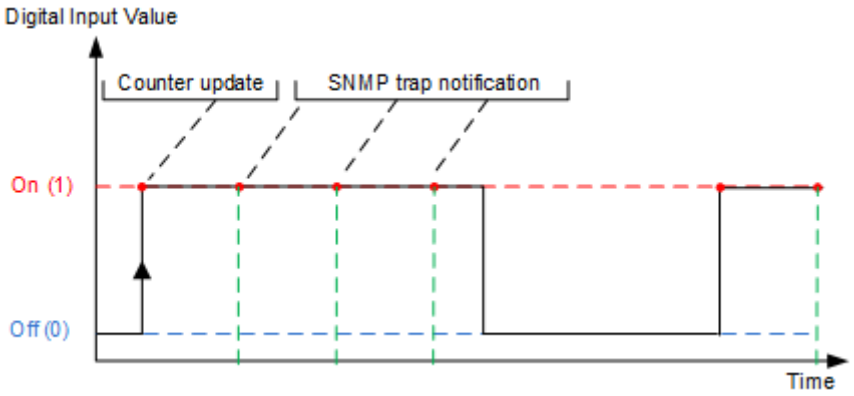


Figure 7.16. SNMP Trap Value="1 (On)", **Trap Sending**="Level Triggered"

- *2 (Both)* – **Counter** update takes place on each Digital Input state change (both falling and rising edges). With **SNMP Trap** enabled and **Trap Sending**="Edge Triggered" both edges trigger a trap message (Fig. 7.17). With **SNMP Trap** enabled and **Trap Sending**="Level Triggered" the trap message is sent in intervals of 5 seconds regardless of the Digital Input state (Fig. 7.18).

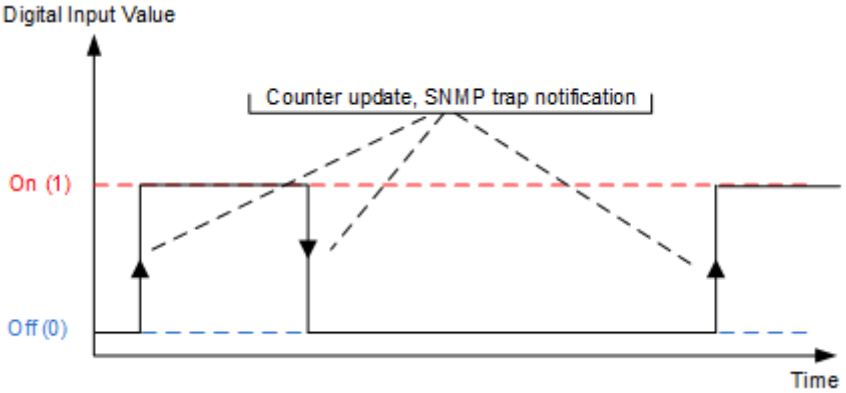


Figure 7.17. **SNMP Trap Value**="2 (Both)", **Trap Sending**="Edge Triggered"

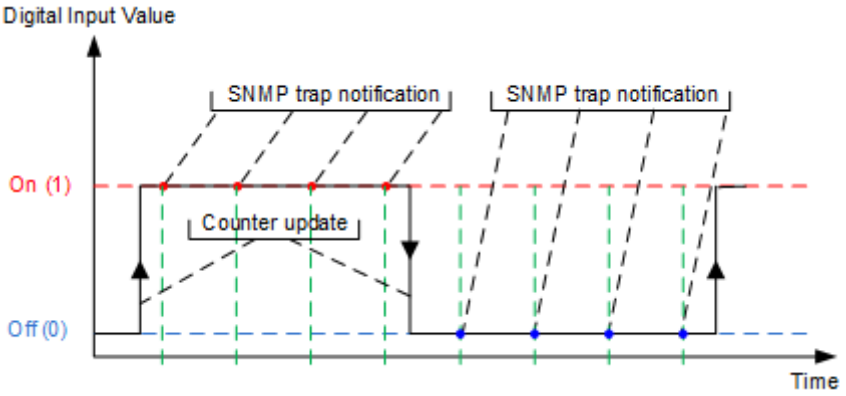


Figure 7.18. **SNMP Trap Value**="2 (Both)", **Trap Sending**="Level Triggered"

- **Save button** - once you have changed the settings as required, click this button.

Inputs/Counters 1, 2 and 3

These counters are implemented in software but not in hardware. Due to this there are some considerations which must be taken in mind when working with them:

- When the **Filter** is disabled (set to 0) and no requests are sent to the controller (no HTTP, SNMP, logged out from web server) but just counting pulses, it is possible to achieve frequency about 10 Hz or this is 50 ms On and 50 ms Off. This is the recommend state for counting pulses;
- When the **Filter** is disabled (set to 0) but there is active web session and the monitoring page is opened, then it is possible to count pulses with frequency about 1 Hz or this is 500 ms On and 500 ms Off;
- When the Filter is enabled the actual frequency depends also on the filter constant.
- At the moment the module is saving the configuration in the EEPROM some count pulses may be missed due to the blocking time which may be several seconds.

Inputs/Counters 4, 5, 6 and 7

- When the **Filter** is disabled (set to 0) it is possible to count pulses with frequency up to 50 Hz. Note that it is not appropriate at high frequencies to configure these inputs to send traps or to control Relays.
- When the Filter is enabled, these inputs work in the same mode as Inputs/Counters 1, 2 and 3.

Input/Counter 8

- When the **Filter** is disabled (set to 0) Digital Input 8 works with frequency up to 1 KHz. In this mode the Counter is incremented on the rising edge regardless of **SNMP Trap Value**. Note that it is not appropriate at high frequencies to configure this input to send traps or to control Relays.
- When the **Filter** is enabled, Digital Input 8 works in the same mode as Inputs/Counters 1, 2 and 3.

7.10. Analog Inputs

Analog Inputs settings page is shown in Fig. 7.19. Input 1 to Input 4 are used to measure voltage in range 0-10VDC. Input 5 to Input 8 are used to measure temperature from 10K NTC sensors B57500M (with range temperature range -55°C/-67°F to +155°C/311°F).

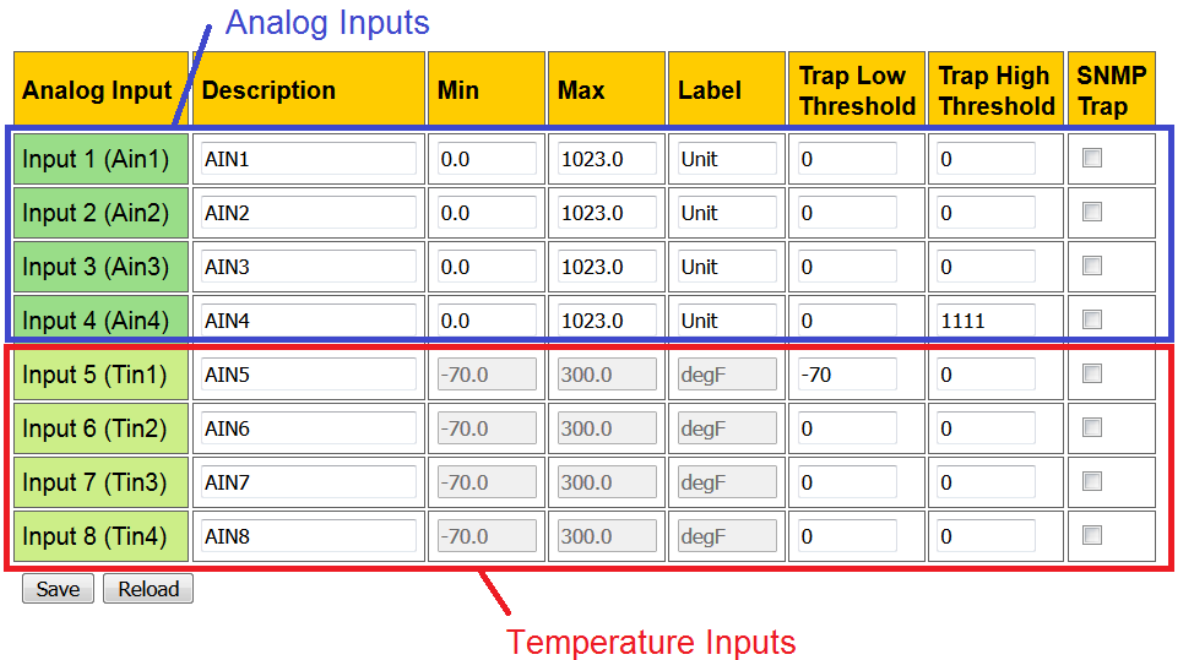


Figure 7.19. Analog Inputs settings

- **Description** - identification string of the input (max. 7 chars);
  This description will appear in XML/JSON files, as well as in the Monitoring & Control page.
- **Min** - the measured value used for scaling corresponding to Analog Input value = 0:
  - For Input 1 to Input 4 range is from -9999.9 to +9999.9;
  - For Input 5 to Input 8 range is from -70.0 to +300.0 degF or -55.0 to +150.0 degC;
- **Max** - the measured value used for scaling corresponding to Analog Input value = 1023:
  - For Input 1 to Input 4 range is from -9999.9 to +9999.9;
  - For Input 5 to Input 8 range is from -70.0 to +300.0 degF or -55.0 to +150.0 degC;
- **Label** - the label for the measured value, for example: mA, Kg, Volt ...(max. 4 chars), available for editing only for Input 1 to Input 4. For inputs 5 to 8, it is fixed (degC or degF);
- **Low Threshold** - the low threshold for the measured value:
  - For Input 1 to Input 4 range is from -9999.9 to +9999.9;
  - For Input 5 to Input 8 range is from -70.0 to +300.0 degF or -55.0 to +150.0 degC;
- **High Threshold** - the high threshold for the measured value:
  - For Input 1 to Input 4 range is from -9999.9 to +9999.9;

- For Input 5 to Input 8 range is from -70.0 to +300.0 degF or -55.0 to +150.0 degC;

- **SNMP Trap** - determines if the Analog Input will send SNMP trap notifications or not;
  - If **Traps Sending** parameter from web page SNMP Traps Settings is set to "Level Triggered" and the Analog Input measured value is less or equal than **Low Threshold** or greater or equal than **High Threshold** traps will be sent in intervals of 5 seconds (Fig. 7.20);

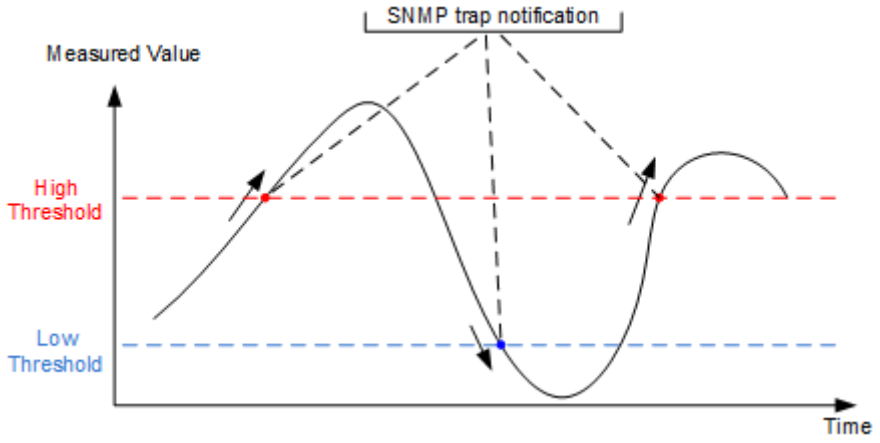


Figure 7.20. Sending traps with Traps Sending=Level Triggered

  - If **Traps Sending** parameter from web page SNMP Traps Settings is set to "Edge Triggered" a single trap is sent when measured value crosses over the **High Threshold** or below the **Low Threshold** values (Fig. 7.21).

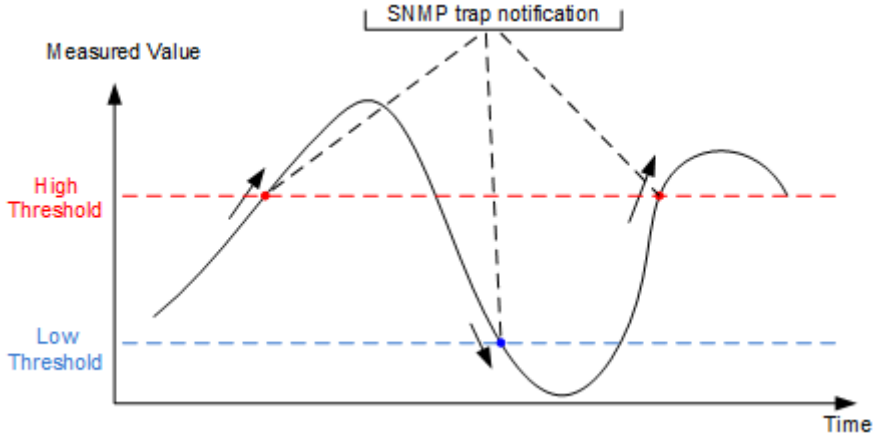


Figure 7.21. Sending traps with Traps Sending=Edge Triggered

In addition, Analog Input trap notifications will be sent in the following cases:
- When the parameter **Low Threshold** is changed and the Analog Input measured value is less or equal than the new value of **Low Threshold**;
- When the parameter **High Threshold** is changed and the Analog Input measured value is greater or equal than the new value of **High Threshold**.

The measured value for the Analog Inputs (0-10V) is calculated in the

following way:

$$MeasuredValue = Min + \frac{Max - Min}{1024} . ADCValue$$

7.11. Relays Settings

Relays settings page is shown in Fig. 7.22.

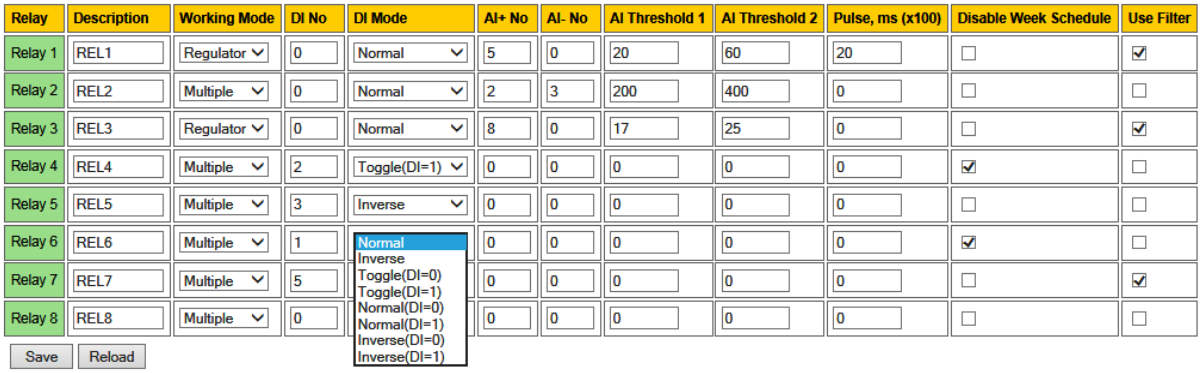


Figure 7.22. Relays settings

- **Description** - identification string of the relay (max 7 chars);

This description will appear in XML/JSON files, as well as in the Monitoring & Control page.

- **Working Mode** - determines the way the Relay is controlled:
  - *Regulator* - in this mode the Relay can be controlled only by an Analog Input. This mode is designed for cases where the input value depends on the output reaction (like thermo-regulator for example). In this mode the parameters DI No, DI Mode and Pulse are not taken in mind. Also in this mode it is not possible to control the Relay via SNMP, Web browser or HTTP/XML/JSON protocol.
  - *Multiple* - in this mode the Relay can be controlled by Analog Inputs, Digital Inputs, Week Schedule or manually (via Web browser, SNMP, HTTP/XML/JSON). This mode is designed for cases where the input event does not depend on the output reaction (for example controlling lamp depending on the sunlight);
- **DI No** – if set to non-zero (1 to 8) this is the number of the Digital Input which is "attached" to the Relay.

The Relay can be controlled by a Digital Input only in Multiple mode.

- **DI Mode** – one of eight level/edge control modes can be selected:
  - *Normal* - the Relay state is On when the Digital Input state is 1 (On) and Off when the Digital Input state is 0 (Off);
  - *Inverse* - the Relay state is On when the Digital Input state is 0 (Off) and Off when the Digital Input state is 1 (On);
  - *Toggle(DI=0)* - a falling edge (1 -> 0) of the Digital Input toggles the Relay state between On and Off;
  - *Toggle(DI=1)* - a rising edge (0 -> 1) of the Digital Input toggles the Relay state between On and Off;

- *Normal(DI=0)* - a falling edge (1 -> 0) of the Digital Input switches the Relay Off;
- *Normal(DI=1)* - a rising edge (0 -> 1) of the Digital Input switches the Relay On;
- *Inverse(DI=0)* - a falling edge (1 -> 0) of the Digital Input switches the Relay On;
- *Inverse(DI=1)* - a rising edge (0 -> 1) of the Digital Input switches the Relay Off.

- **AI+ No** - the number of the Analog Input (1 to 8) which is "attached" to this Relay. If AI- No is set to zero, this is the single-ended input, otherwise – the (+) lead of the differential input.
- **AI- No** – if set to non-zero (1 to 8), this is the (-) lead of the differential input;

If **AI+ No** is non-zero and **AI- No** is zero, the Relay is controlled by the **AI+ No** measured value.

If both **AI+ No** and **AI- No** are non-zero, the Relay is controlled by the difference of **AI+ No** and **AI- No** measured values.

If **AI+ No** is zero, the Relay is not controlled by the Analog Input (in this case the **AI- No** is not relevant).

- **AI Threshold 1** - the first level for controlling the Relay (range: from -9999 to +9999);
- **AI Threshold 2** - the second level for controlling the Relay (range: from -9999 to +9999);

The Relay can be controlled in “normal” (Fig. 7.23) or “inverse” (Fig. 7.24) mode depending on the Analog Input threshold values.

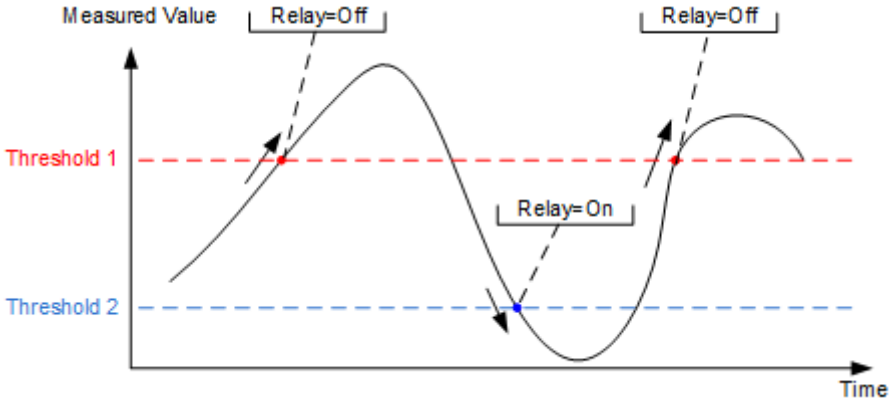


Figure 7.23. Normal mode: AI Threshold 1 > AI Threshold 2

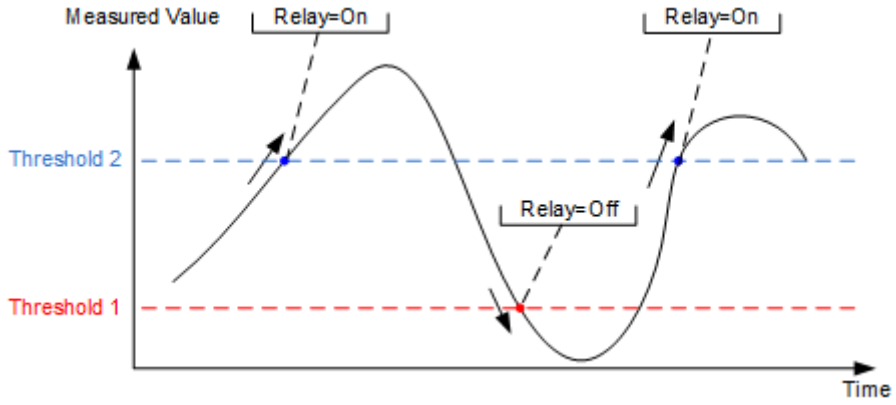


Figure 7.24. Inverse mode: AI Threshold 1 < AI Threshold 2

- **Pulse, ms (x100)** – if set to non-zero, the Relay operates in pulse mode. The pulse duration is set in tenths of second (for example value of 20 means 2 seconds). The range is from 0 and 65535 (0 disables the pulse mode). When enabled, each time the Relay is switched On, it will generate a single pulse with specified duration.

The Relay can generate pulses only if it's Working Mode=Multiple.

The Relay can be switched On/Off by "attached" Digital or Analog Input, SNMP or HTTP/XML/JSON command, Week Schedule, and manually from Web Monitoring & Control page.

At any time the pulse is active the Relay can be switched back Off by "attached" Digital or Analog Input, SNMP or HTTP/XML/JSON command, Week Schedule, and manually from Web Monitoring & Control page.

- **Disable Week Schedule** - enables/disables globally the week schedule control for this Relay. This means the Relay may be in the schedule, but if this flag is checked, then it won't be activated by the schedule.

7.12. Analog Outputs

Analog Output	Description	Units (0..1023)
Output 1	AOUT1	392
Output 2	AOUT2	810

Save Reload

Figure 7.25. Analog Outputs page

- **Description** - identification string (max 7 chars);

This description will appear in XML/JSON files, as well as in the Monitoring & Control page.

- Units (0..1023) – Analog Output value (0 to 1023 corresponds to a linear scale of 0V DC to 10V DC).

7.13. Monitoring & Control

This page is used to monitor the states of the Digital and Analog Inputs as well as to switch On/Off the Relays and set the values of Analog Outputs (Fig. 7.26).

A relay can be switched On/Off from the Monitoring & Control page only if it's **Working Mode**="Multiple".

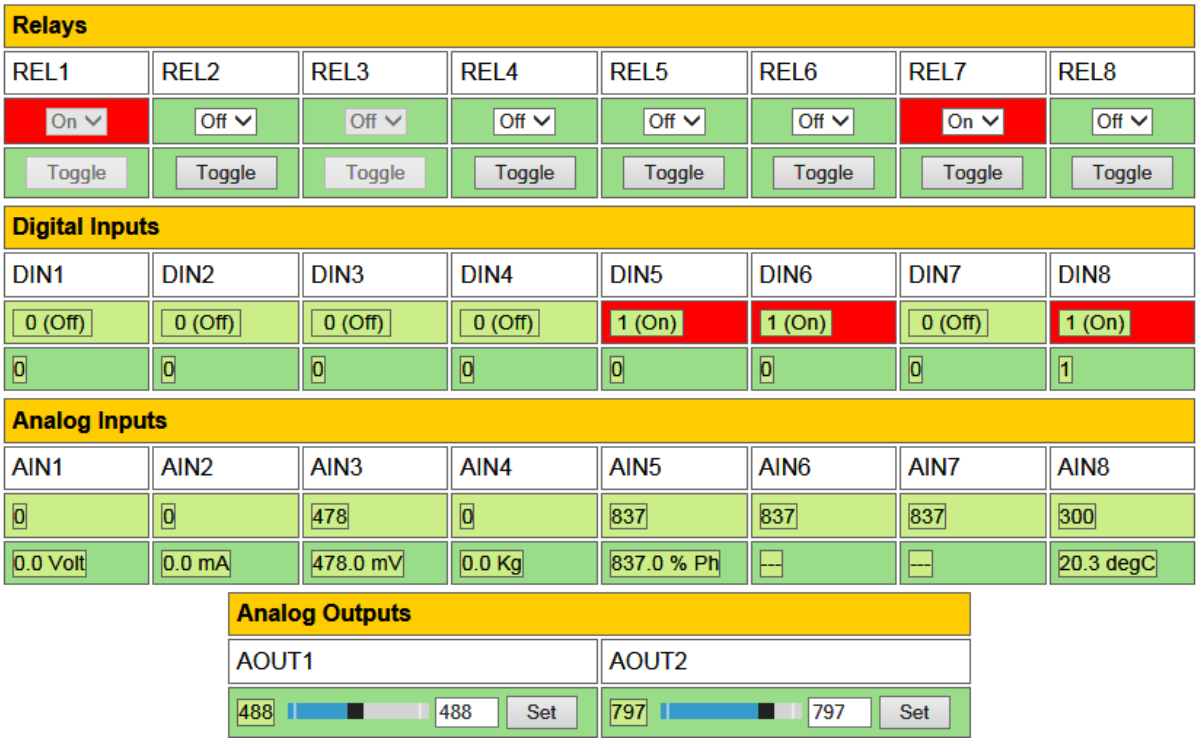


Figure 7.26. Monitoring & Control page

7.14. Week Schedule

This page configures the Week Schedule table for switching Relays On/Off at specific times. You can add up to 30 items to the list. The top table of this page allows you to define a new item, while the bottom table shows the already defined list (Fig. 7.27).

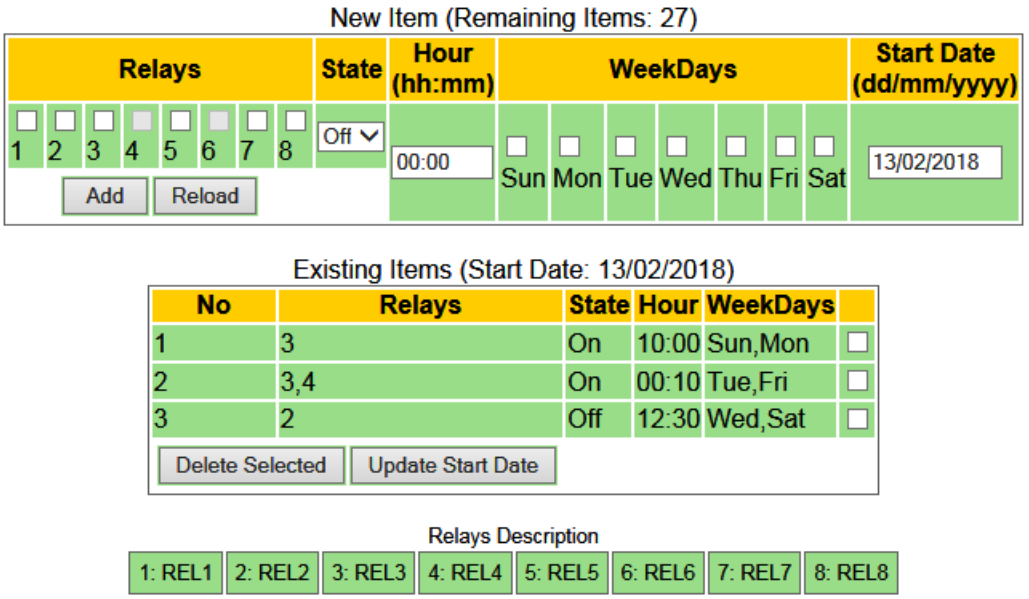


Figure 7.27. Week Schedule page

- **Relays** - select a group of Relays that should be switched;
- **State** - define the state (On/Off) for the selected group of relays;
- **Hour** - time the group of relays will be switched at;
- **WeekDays** - select the days the defined switching should take place;
- **Start Date (dd/mm/yyyy)** - the start date for the Week Schedule.

Once you have defined a new item, click Add. This item will be added as a new row in a Week Schedule table.

This feature allows you to turn specific Relays On/Off upon certain date and time or weekday without the need of LAN connection between the computer and the module.

A Relay can be included in Week Schedule only if it's **Working Mode=**"Multiple".

To delete an item, select it in **Existing Items table** and click the Delete Selected button.

To set a new start date, click **Update Start Date button**.

The module has back-up supply source for the RTC in order to keep the current date/time for several days during power off.

7.15. Logout

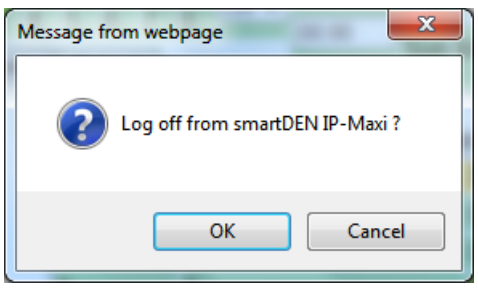


Figure 7.28. Log off

7.16. Reboot

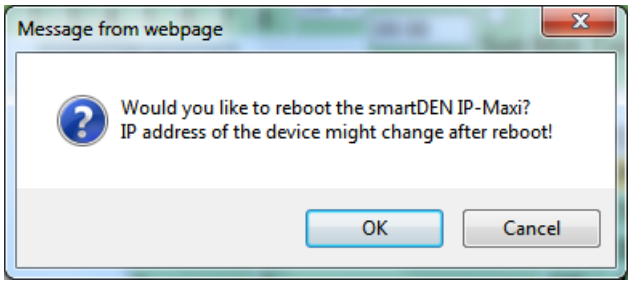


Figure 7.21. Reboot

8. HTTP XML/JSON operation

This operation mode allows custom applications to control the **smartDEN IP-Maxi** without using a Web-browser. The custom application acts as a HTTP client, sending HTTP GET requests to the **smartDEN IP-Maxi** (Fig. 8.1). As a reply the **smartDEN IP-Maxi** returns data as either JSON or XML file for parsing and/or processing by the custom application.

Figure 8.1. smartDEN IP-Maxi working as a HTTP server

To receive the current state of the **smartDEN IP-Maxi,** the application requests the page **current_state.xml** / **current_state.json**, for example:

http://192.168.1.100/current_state.xml
http://192.168.1.100/current_state.json

In order to use this mode, XML/JSON access should be enabled (see 7.6).

The XML/JSON login process differs depending on the selected Encrypt Password option.

8.1. XML access

8.1.1. XML login (encrypted password)

This mode can be used to prevent unauthorized access to **smartDEN IP-Maxi**. When selected, a two-step login sequence is performed as a protection against unauthorized access.

The first time the custom application requests the page **current_state.xml**, a random login key is issued in the reply. Next the custom application uses this key to encrypt the password. The encrypted password is sent as a parameter with the next request to the page **current_state.xml**.

Bellow is an example of login process:

Step 1:

Request
http://192.168.1.100/current_state.xml
Reply (login required):

```
<CurrentState>
    <LoginKey>65156</LoginKey>
</CurrentState>
```

Step 2:

Request (password is sent as a parameter)
http://192.168.1.100/current_state.xml?pw=28237099263eabfd88626124a822c64c
Reply (password is O'K, login accepted):

```
<CurrentState>
    <DigitalInput1>
        <Name>DIn1</Name>
        <Value>1</Value>
        <Count>12</Count>
    </DigitalInput1>
...
</CurrentState>
```

Password encryption algorithm to be implemented in custom application is available upon request.

8.1.2. XML login (non-encrypted password)

In this mode the password is passed as non-encrypted parameter with the request:

http://192.168.1.100/current_state.xml?pw=admin

Getting the <LoginKey> in the answer in this mode means that the provided password is wrong or the login session has been expired.

If there is no data traffic between the custom application and the **smartDEN IP-Maxi** for time, specified by Session Timeout parameter, the session "times out" and a new login is required.

8.1.3. Retrieving current state in XML format

After successful login the custom application can obtain the **smartDEN IP-Maxi** current state by request to the **current_state.xml** page. The reply contains a page in XML format (Fig. 8.2).

```
▼<CurrentState>
  ▼<DigitalInput1>
     <Name>DIN1</Name>
     <Value>0</Value>
     <Count>12</Count>
   </DigitalInput1>
  ▶<DigitalInput2>...</DigitalInput2>
  ▶<DigitalInput3>...</DigitalInput3>
  ▶<DigitalInput4>...</DigitalInput4>
  ▶<DigitalInput5>...</DigitalInput5>
  ▶<DigitalInput6>...</DigitalInput6>
  ▶<DigitalInput7>...</DigitalInput7>
  ▶<DigitalInput8>...</DigitalInput8>
  ▼<AnalogInput1>
     <Name>AIN1</Name>
     <Value>299</Value>
     <Measure>20.5 degC</Measure>
   </AnalogInput1>
  ▶<AnalogInput2>...</AnalogInput2>
  ▶<AnalogInput3>...</AnalogInput3>
  ▶<AnalogInput4>...</AnalogInput4>
  ▶<AnalogInput5>...</AnalogInput5>
  ▶<AnalogInput6>...</AnalogInput6>
  ▶<AnalogInput7>...</AnalogInput7>
  ▶<AnalogInput8>...</AnalogInput8>
  ▼<Relay1>
     <Name>REL1</Name>
     <Value>1</Value>
   </Relay1>
  ▶<Relay2>...</Relay2>
  ▶<Relay3>...</Relay3>
  ▶<Relay4>...</Relay4>
  ▶<Relay5>...</Relay5>
  ▶<Relay6>...</Relay6>
  ▶<Relay7>...</Relay7>
  ▶<Relay8>...</Relay8>
  ▼<AnalogOutput1>
     <Name>AOUT1</Name>
     <Value>488</Value>
   </AnalogOutput1>
  ▶<AnalogOutput2>...</AnalogOutput2>
  ▼<Device>
     <Name>SMARTDEN_IPMAXI</Name>
     <MAC>E8:EA:DA:00:00:20</MAC>
     <sysUpTime>4 days, 8 hours, 2 mins</sysUpTime>
   </Device>
 </CurrentState>
```

Figure 8.2. XML file with current values

8.2. JSON access

8.2.1. JSON login (encrypted password)

The encrypted login sequence is similar to those for the XML access:

Step 1:

Request
http://192.168.1.100/current_state.json
Reply (login required):

```
{
 "CurrentState": { "LoginKey": "65156" }
}
```

Step 2:

Request (password is sent as a parameter)
http://192.168.1.100/current_state.json?pw=28237099263eabfd88626124a822c64c
Reply (password is O'K, login accepted):

```
{
 "CurrentState": {
    "DigitalInput": [
          {"Name": "DIn1", "Value": "1"},
   …
}
```

Password encryption algorithm to be implemented in custom application is available upon request.

8.2.2. JSON login (non-encrypted password)

The password should be passed as non-encrypted parameter with the request:

http://192.168.1.100/current_state.json?pw=admin

Getting the "LoginKey" in the answer means only that the provided password is wrong or the login session has been expired.

If there is no data traffic between the custom application and the **smartDEN IP-Maxi** for time, specified by Session Timeout parameter, the session "times out" and a new login is required.

8.2.3. Retrieving current state in JSON format

When logged, the custom application can get current measurements requesting the **current_state.json** page. The reply contains a page in JSON format (Fig. 8.3).

```
{
  "CurrentState": {
    "DigitalInput": [
      {"Name": "DIN1", "Value": "0", "Count": "12"},
      {"Name": "DIN2", "Value": "0", "Count": "34"},
      {"Name": "DIN3", "Value": "0", "Count": "1"},
      {"Name": "DIN4", "Value": "0", "Count": "0"},
      {"Name": "DIN5", "Value": "1", "Count": "1"},
      {"Name": "DIN6", "Value": "1", "Count": "1"},
      {"Name": "DIN7", "Value": "0", "Count": "0"},
      {"Name": "DIN8", "Value": "1", "Count": "2"}
    ],
    "AnalogInput": [
      {"Name": "AIN1", "Value": "0", "Measure": "0.0 Volt"},
      {"Name": "AIN2", "Value": "0", "Measure": "0.0 mA"},
      {"Name": "AIN3", "Value": "478", "Measure": "478.0 mV"},
      {"Name": "AIN4", "Value": "0", "Measure": "0.0 Kg"},
      {"Name": "AIN5", "Value": "837", "Measure": "837.0 % Ph"},
      {"Name": "AIN6", "Value": "838", "Measure": "---"},
      {"Name": "AIN7", "Value": "837", "Measure": "---"},
      {"Name": "AIN8", "Value": "298", "Measure": "20.6 degC"}
    ],
    "Relay": [
      {"Name": "REL1", "Value": "1"},
      {"Name": "REL2", "Value": "0"},
      {"Name": "REL3", "Value": "0"},
      {"Name": "REL4", "Value": "0"},
      {"Name": "REL5", "Value": "0"},
      {"Name": "REL6", "Value": "0"},
      {"Name": "REL7", "Value": "1"},
      {"Name": "REL8", "Value": "0"}
    ],
    "AnalogOutput": [
      {"Name": "AOUT1", "Value": "488"},
      {"Name": "AOUT2", "Value": "809"}
    ],
    "Device": {
      "Name": "SMARTDEN_IPMAXI",
      "MAC": "E8:EA:DA:00:00:20",
      "sysUpTime": "2 days, 4 hours, 11 mins",
    }
  }
}
```


Figure 8.3. JSON file with current values

8.3. Multiple XML/JSON access

With **Multiple Access** option selected (see 7.6) the password should be passed as a non-encrypted parameter with each request:

http://192.168.1.100/current_state.xml?pw=admin
http://192.168.1.100/current_state.json?pw=admin

Multiple Access is not allowed when **Encrypt Password** option is enabled.

8.4. Parameters

After a login the custom application can also control the **smartDEN IP-Maxi** by sending parameters (name/value pairs) with the HTTP GET request.

Valid parameters and values are shown in Table 8.1.

Table 8.1. HTTP GET parameters

Name	Value	Description
Relay**i** (i=1..8)	0	Switch the Relay Off
	1	Switch the Relay On
	2	Toggle the Relay state
SetAll	0.. 65535	Switch Relays On/Off
Count**i** (i=1..8)	0.. 4294967295	Set Counter value
Pulse**i** (i=1..8)	0.. 65535	Generate pulse
AnalogOutput**i** (i=1..2)	0..1023	Set Analog Output units
pw	password	Required at login

Multiple name/value pairs separated by the ampersand ('&') can be passed with a single request, for example:

http://192.168.1.100/current_state.xml?pw=admin&Relay1=1&Pulse5=20&AnalogOutput1=10

The overall length of name/value pairs is limited to 100. If this limit is exceeded, the request fails with the "**414 Request-URI Too Long: Buffer overflow**" status code.

9. SNMP

9.1. SNMP Agent

smartDEN IP-Maxi supports SNMPv2c protocol - operations get, get-next, get-bulk, set. The provided SNMP commands are described in the **smartDEN IP-Maxi** MIB file. Most of the parameters can be read/configured by SNMP. Two community strings are used: **Read-only** for reading and **Read-write** for setting new values of the parameters. The description of the parameters, grouped by their functions is given in the next tables. Note that to obtain a valid OID number 'x' symbol should be replaced by prefix **.1.3.6.1.4.1.42505**.

9.1.1. Product

Table 9.1. Product

OID	Description	Access	Syntax
x.8.1.1.0	Device Name	R/W	DisplayString (SIZE(0..14))
x.8.1.2.0	Firmware version	R	DisplayString
x.8.1.3.0	Firmware build date	R	DisplayString

9.1.2. Setup

Table 9.2. Digital Inputs

Start OID	End OID	Description	Access	Syntax
x. 8.2.1.1.2.0	x. 8.2.1.1.2.7	Digital Input Description	R/W	DisplayString (SIZE(0..7))
x. 8.2.1.1.3.0	x. 8.2.1.1.3.7	Digital Input Counter	R/W	Counter32 (0..4294967295)
x. 8.2.1.1.4.0	x. 8.2.1.1.4.7	Digital Input Filter, ms	R/W	Integer (0..200)
x. 8.2.1.1.5.0	x. 8.2.1.1.5.7	Digital Input Trap Enable Flag	R/W	Integer { No(0), Yes(1) }
x. 8.2.1.1.6.0	x. 8.2.1.1.6.7	Digital Input Trap Value	R/W	Integer { Off(0), On(1), Both(2) }
x. 8.2.1.1.7.0	x. 8.2.1.1.7.7	Digital Input State	R	Integer { Off(0), On(1) }

Table 9.3. Analog Inputs

Start OID	End OID	Description	Access	Syntax
x. 8.2.2.1.2.0	x. 8.2.2.1.2.7	Analog Input Description	R/W	DisplayString (SIZE(0..7))
x. 8.2.2.1.3.0	x. 8.2.2.1.3.7	Analog Input Trap LowThreshold	R/W	Integer (-9999..9999)
x. 8.2.2.1.4.0	x. 8.2.2.1.4.7	Analog Input Trap HighThreshold	R/W	Integer (-9999..9999)
x. 8.2.2.1.5.0	x. 8.2.2.1.5.7	Analog Input Trap Enable Flag	R/W	Integer { No(0), Yes(1) }
x. 8.2.2.1.6.0	x. 8.2.2.1.6.7	Analog Input ADC Value	R	Integer (0..1023)
x. 8.2.2.1.7.0	x. 8.2.2.1.7.7	Analog Input Min Value	R/W	DisplayString (SIZE(0..7))
x. 8.2.2.1.8.0	x. 8.2.2.1.8.7	Analog Input Max Value	R/W	DisplayString (SIZE(0..7))
x. 8.2.2.1.9.0	x. 8.2.2.1.9.7	Analog Input Label	R/W	DisplayString (SIZE(0..3))
x. 8.2.2.1.10.0	x. 8.2.2.1.10.7	Analog Input Measured Value	R	DisplayString

Table 9.4. Relays

Start OID	End OID	Description	Access	Syntax
x. 8.2.3.1.2.0	x. 8.2.3.1.2.7	Relay Description	R/W	DisplayString (SIZE(0..7))
x. 8.2.3.1.3.0	x. 8.2.3.1.3.7	Relay Working Mode	R/W	Integer {Multiple(0),Regulator(1)}
x. 8.2.3.1.4.0	x. 8.2.3.1.4.7	Relay ← Digital Input No	R/W	Integer (0..8)
x. 8.2.3.1.5.0	x. 8.2.3.1.5.7	Relay ← Digital Input Mode	R/W	Integer (0..7)
x. 8.2.3.1.6.0	x. 8.2.3.1.6.7	Relay ← Analog Input (+) No	R/W	Integer (0..8)
x. 8.2.3.1.7.0	x. 8.2.3.1.7.7	Relay ← Analog Input (-) No	R/W	Integer (0..8)
x. 8.2.3.1.8.0	x. 8.2.3.1.8.7	Relay ← Analog Threshold 1	R/W	Integer (-9999..9999)
x. 8.2.3.1.9.0	x. 8.2.3.1.9.7	Relay ← Analog Threshold 2	R/W	Integer (-9999..9999)
x. 8.2.3.1.10.0	x. 8.2.3.1.10.7	Relay Disable Week Schedule	R/W	Integer { No(0), Yes(1) }
x. 8.2.3.1.11.0	x. 8.2.3.1.11.7	Relay Set Pulse Period	R/W	Integer32 (0..65535)
x. 8.2.3.1.12.0	x. 8.2.3.1.12.7	Relay Start Pulse	R/W	Integer32 (0..65535)
x. 8.2.3.1.13.0	x. 8.2.3.1.13.7	Relay State	R/W	Integer {Off(0), On(1), Toggle(2)}
x. 8.2.3.1.14.0	x. 8.2.3.1.14.7	Relay Use Filter	R/W	Integer { No(0), Yes(1) }
x. 8.2.3.1.15.0	x. 8.2.3.1.15.7	Relay Filter, ms	R/W	Integer (0..9999)

Table 9.5. Analog Outputs

Start OID	End OID	Description	Access	Syntax
x. 8.2.4.1.2.0	x. 8.2.4.1.2.1	Analog Output Description	R/W	DisplayString (SIZE(0..7))
x. 8.2.4.1.3.0	x. 8.2.4.1.3.1	Analog Output Units	R/W	Integer (0..1023)

9.1.3. Control

Table 9.6. Control

OID	Description	Access	Syntax
x.8.3.1.0	TemperatureScale	R/W	Integer {Celsius(0), Fahrenheit(1) }
x.8.3.2.0	AnalogInputFilter	R/W	Integer (0..30)
x.8.3.3.0	RelayFilter	R/W	Integer (0..9999)
x.8.3.4.0	Digital Inputs State	R	Integer (0..255)
x.8.3.5.0	Relays State	R/W	Integer (0..255)
x.8.3.6.0	System Date (dd/mm/yyyy)	R/W	DisplayString
x.8.3.7.0	System Time (hh:mm)	R/W	DisplayString
x.8.3.8.0	Reboot smartDEN IP-Maxi	R/W	Integer (0..255)
x.8.3.9.0	sysUpTime	R	TimeTicks

To reboot the device via SNMP, set the Reboot value to the ASCII code of the first char of your Web password. For example, if this is the char 'a', the code in decimal is 97.

9.1.4. Traps

Table 9.7. Traps

OID	Description	Access	Syntax
x.8.4.1.0	Trap Enable Flag	R/W	Integer { No(0),Yes(1) }
x.8.4.2.0	Trap Receiver IP Address	R/W	IpAddress
x.8.4.3.0	Trap Receiver Port	R/W	Integer32 (0..65535)
x.8.4.4.0	Community in Sending Trap	R/W	DisplayString (SIZE (0..7))
x.8.4.5.0	Trap Sending Mode	R/W	Integer { Level(0), Edge(1) }
x.8.4.6.0	System UpTime	R	TimeTicks

9.1.5. Week Schedule

Table 9.8. Week Schedule Start Date

OID	Description	Access	Syntax
x.8.5.1.0	Week Schedule Start Date	R/W	DisplayString

Table 9.9. Week Schedule Rows

Start OID	End OID	Description	Access	Syntax
x. 8.5.2.1.2.0	x. 8.5.2.1.2.29	Row Enable Flag	R/W	Integer { No(0),Yes(1) }
x. 8.5.2.1.3.0	x. 8.5.2.1.3.29	Relays Code	R/W	Integer (0..255)
x. 8.5.2.1.4.0	x. 8.5.2.1.4.29	Relays State	R/W	Integer { Off(0), On(1) }
x. 8.5.2.1.5.0	x. 8.5.2.1.5.29	Hour (hh:mm)	R/W	DisplayString
x. 8.5.2.1.6.0	x. 8.5.2.1.6.29	Week Days Code	R/W	Integer (0..127)

9.2. SNMP Traps

Each of the inputs can be individually configured to send trap notifications when an event is triggered.

- With **Level Triggered** option selected the trap message will be sent every 5 seconds when the trap condition is met.
- With **Edge Triggered** option selected the trap message will be sent upon input event only once.
- If the traps are enabled, so called "cold trap" message indicating **smartDEN IP-Maxi** is started will be send on power-on or reboot.

10. Security considerations

The **smartDEN IP-Maxi** runs a special firmware and do not use a general-purpose operating system. There are no extraneous IP services found on general-purpose operating systems (e.g. Telnet, FTP, Finger, etc.) that can be particularly vulnerable.

Web-browser access

A challenge-response authentication is used in login process. When the password is entered, it is transmitted across the network in encrypted form, so eavesdropping on the data transmission will not reveal the password. Subsequent transmissions of the password to "login" onto the device are encrypted and "safe". The only case when the password is transmitted across the network "in the open", is when it is being changed and submitted in General Setting form. Therefore, you must set passwords in a secure environment where you can make sure that no one is "eavesdropping".

XML/JSON operation

A challenge-response authentication can be used in login process. The password can be transmitted by custom application across the network in encrypted form.

Web and XML/JSON access can be restricted by IP Address (range of IP Addresses) or by MAC Address.

11. Mechanical drawing

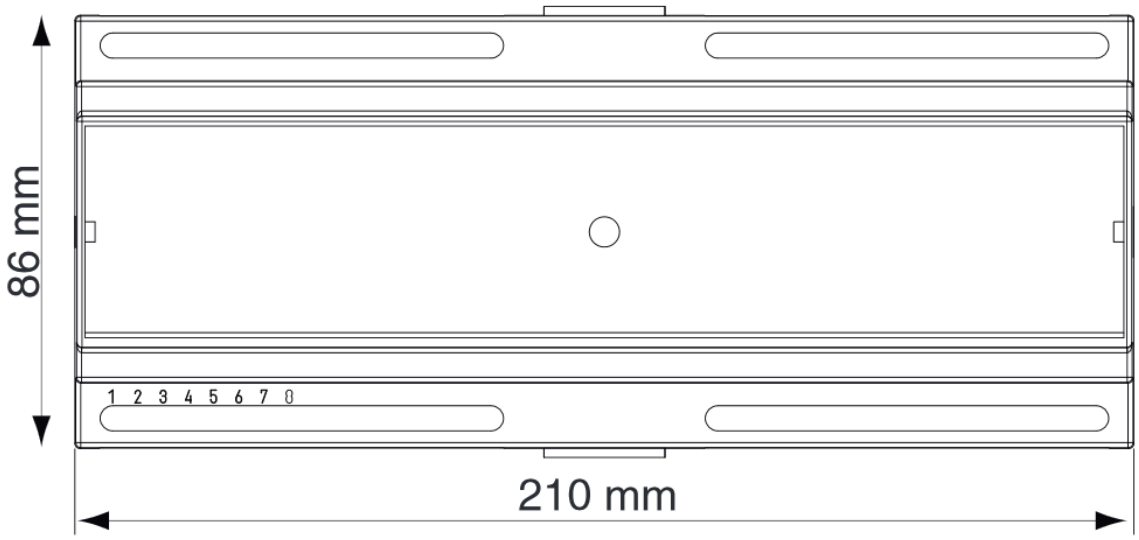


Figure 11.1. Device dimensions