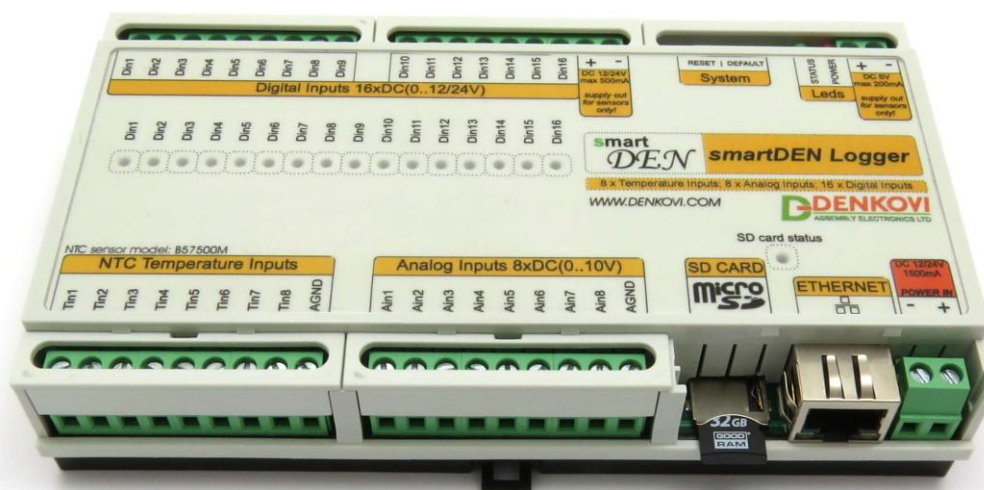


SmartDEN Logger

Web enabled Data Logger

User Manual
Date: 12 Dec 2016

For firmware version: v1.21 / Dec 2016



Document Revision History

Version	Date	Comments
1.00	2016/12/12	The initial release

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1. Features

SmartDEN Logger is a general purpose Ethernet/SD-Card data logger that can be used in a wide range of remote monitoring, measurement and data-acquisition applications. Thank to its multi-channel design (16 digital, 8 analog and 8 thermistor inputs) this device can log simultaneously a variety of measurements, for example temperature, humidity, light, pressure, voltage etc. In addition to continuous data recording to a SD card, the current measurements can be downloaded (uploaded) from (to) remote IP host in XML/JSON format. The Web interface allows users to configure the **SmartDEN Logger**, monitor current measurements and access logged files for download or graphical visualization.

Inputs:

- 16 digital inputs with ON/OFF LED;
- 8 analog inputs 0-10V DC;
- 8 temperature inputs for NTC thermistors type [B57500M](#);

Data Storage:

- Type: removable microSD;
- SD card formats: FAT16, FAT32;
- SD card sizes: 4GB, 8GB, 16GB, 32GB;
- Log file format: CSV;
- Configurable logging period (min. 1 sec);
- Configurable log file size (100 KB to 1 MB);

Communication:

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

Web Interface:

- Configuration of system and recording parameters;
- Access current measurements;
- Download logged data in Comma-separated-values (CSV) format;
- Graphical visualization of logged data;
- Secure login authorization;
- Access protection (by IP and MAC address);

TCP/IP Services:

- HTTP client: Automatically upload (POST) current data to a HTTP server in XML/JSON format;
- HTTP server: Access (GET) current measurements in XML/JSON format, download log files in CSV format;

Power Supply:

- Supply voltage 10..28V DC;
- Additional source voltage 5V DC is provided for an easy sensors supply;

Physical and Environment:

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

2. Application examples

With versatile support for multiple digital, analog and temperature sensors, Web interface, TCP/IP client/server services and long term recording period **SmartDEN Logger** can be used in applications as SCADA, environmental, industrial and various other types of monitoring systems, as well as stand-alone logging device.

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

2.1. Remote sensors monitoring

This mode of the **SmartDEN Logger** allows monitoring up to 32 different sensors in real time by a Web browser (Fig. 1). Various kinds of sensors for temperature, humidity, distance, light and so on can be connected to the device.

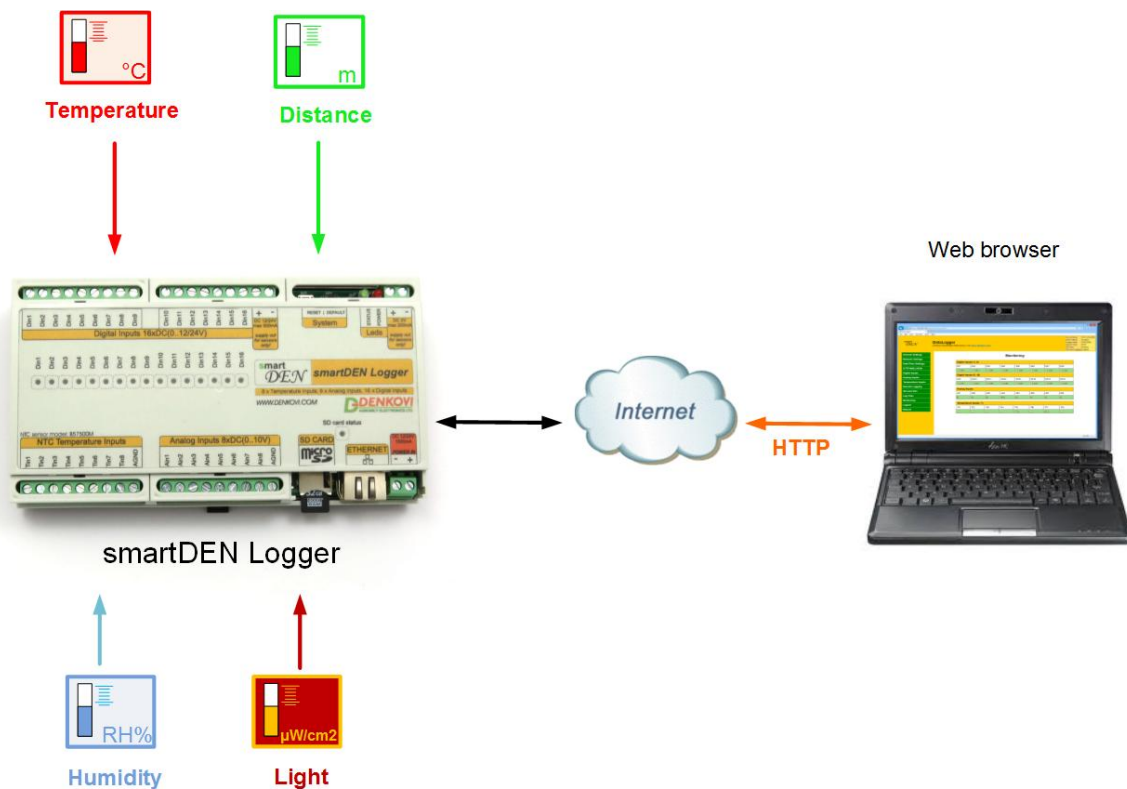


Figure 1. Remote sensors monitoring

2.2. Upload (POST) current data to a HTTP server

In this mode **SmartDEN Logger** acts as HTTP client that send automatically (at predefined intervals) current measurements to a HTTP server in XML/JSON format. This is appropriate for organizing alert and logging systems, where the devices don't need to be polled constantly (Fig. 2).

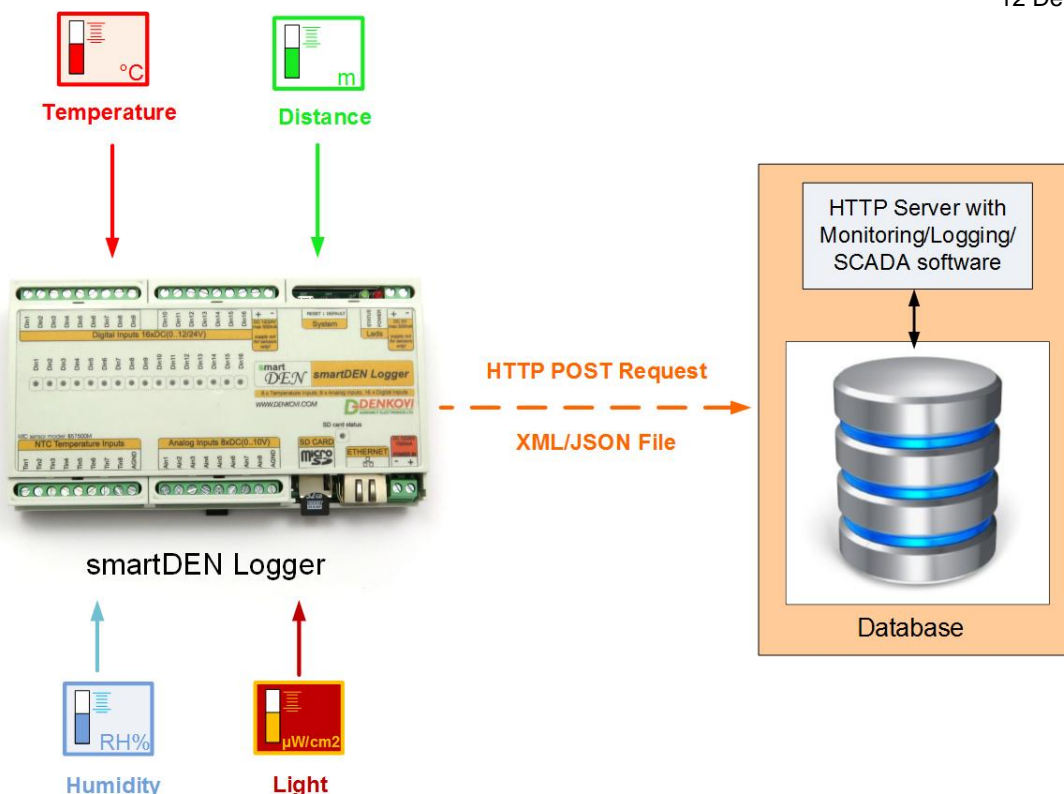


Figure 2. Alert and data log example system

2.3. Download (GET) current data by a HTTP client application

A custom HTTP client application can retrieve the current measurements using GET requests to [current_state.xml](#) or [current_state.json](#) files (Fig. 3). Additional level of security for this mode can be set by encrypting the password and/or filtering the client's IP/MAC addresses.

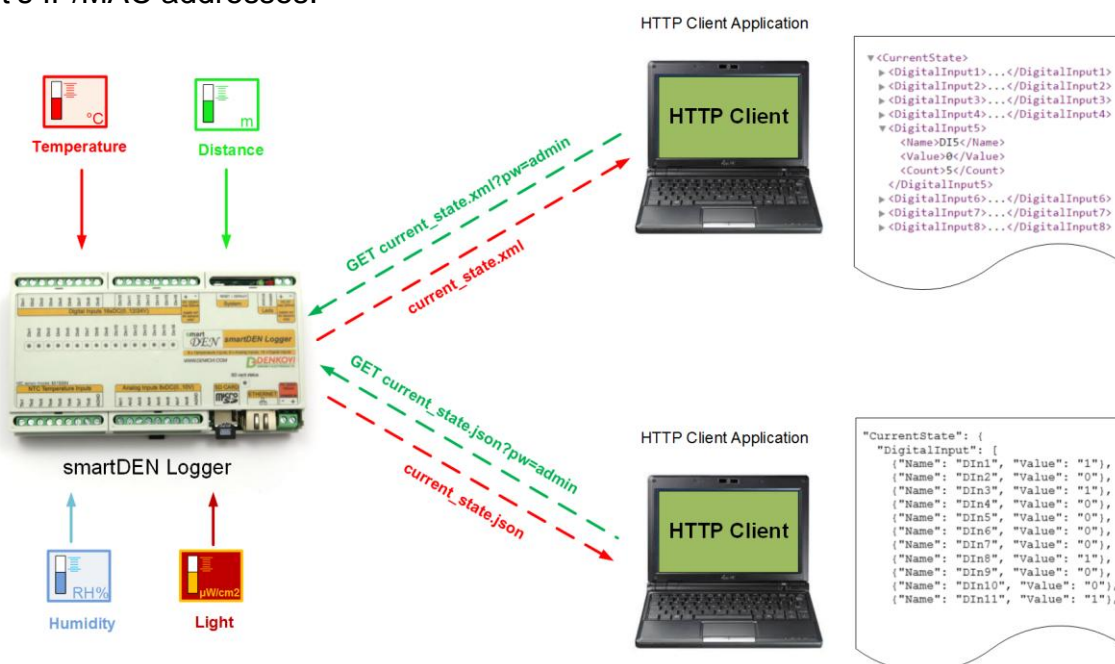


Figure 3. Use of HTTP client to access the current data

2.4. Access log files by a Web browser/HTTP client application

Log files can be explored by a Web browser or custom HTTP client application (Fig. 4). Once downloaded, logged data is ready to import into common spreadsheet tools such as Microsoft Excel, Google Sheets, LibreOffice Calc etc. for further analysis and processing. With a Web browser, a graph of logged data by interest can be displayed before downloading.

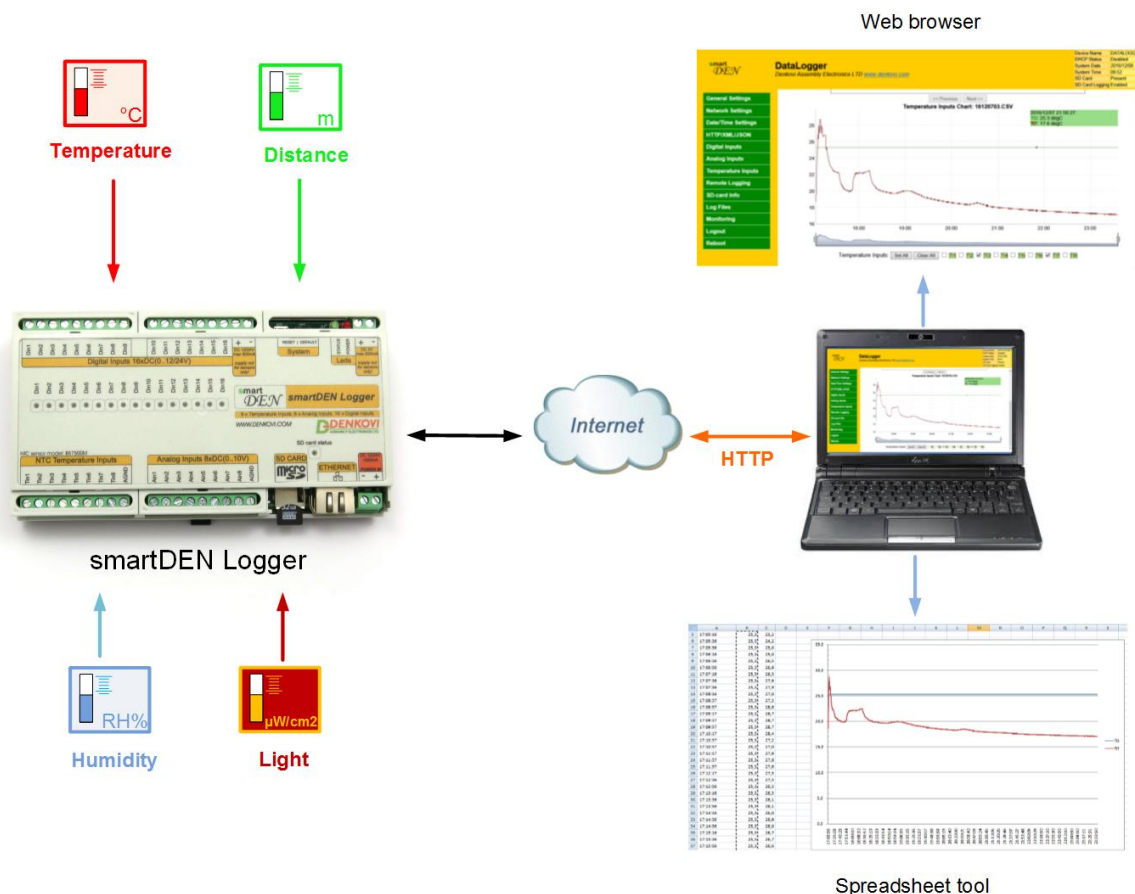


Figure 4. Access to the logged data

3. Technical parameters

Table 1. Physical parameters

Parameter	Value
Size (L / W / H), mm	157 / 89 / 31
Weight, g	205
Operating temperature, °C	0 to 70

Table 2. System parameters

Parameter	Value
Power supply voltage, VDC	10... 28 ± 5%
Maximum current consumption, mA	1500
Protection against reverse polarity	Yes
Hardware Real Time Clock (RTC)	Yes
Default settings button	Yes
Reset button	Yes

Table 3. SD Card

Parameter	Value
SD Card type	microSD
Compatible SD card formats	FAT16, FAT32
Compatible SD card sizes	4GB, 8GB, 16GB, 32GB
Log file format	CSV
Logging period, sec	1 to 30000
Log file size, KB	100 to 1024

Table 4. Analog Inputs

Parameter	Value
Analog inputs number	8
Analog inputs full scale voltage range, VDC	0 up to 10
Analog inputs absolute maximum non-destructive voltage, VDC	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

*Stand-alone mode

**Communication takes place

Table 5. Digital Inputs

Parameter	Value
Digital inputs number	16
Digital inputs voltage range, VDC	0 up to 30
Input switching threshold from 0 to 1, VDC	>7.6
Input switching threshold from 0 to 1, mA	>3.2
Input switching threshold from 1 to 0, VDC	<4.5
Input switching threshold from 1 to 0, mA	<1.8
Supported sensor output type	PNP
Input type	Resistive with Schmitt trigger
Sample period, ms	Min: 25*
	Max: 300**
Protection against reverse polarity	Yes

*Stand-alone mode

**Communication takes place

Table 6. Temperature Inputs

Parameter	Value
NTC inputs number	8
Sensor type	B57500M
Sensor working temperature range	From -55 to +155°C
Accuracy	±0.5°C
Sample period, ms	Min: 25*
	Max: 300**

*Stand-alone mode

**Communication takes place

Table 7. Network

Parameter	Value
DHCP	Yes
DNS	Yes
NTP	Yes
ICMP	Yes
Network parameters	IP/Mask/Default gateway
MAC lock (protection)	Yes
Secure HTTP/XML/JSON access	Yes
Web server for configuration/access	Yes

4. Connectors, ports and LED indicators

A top view picture with the device connectors, ports and LED indicators is shown in Fig. 5.

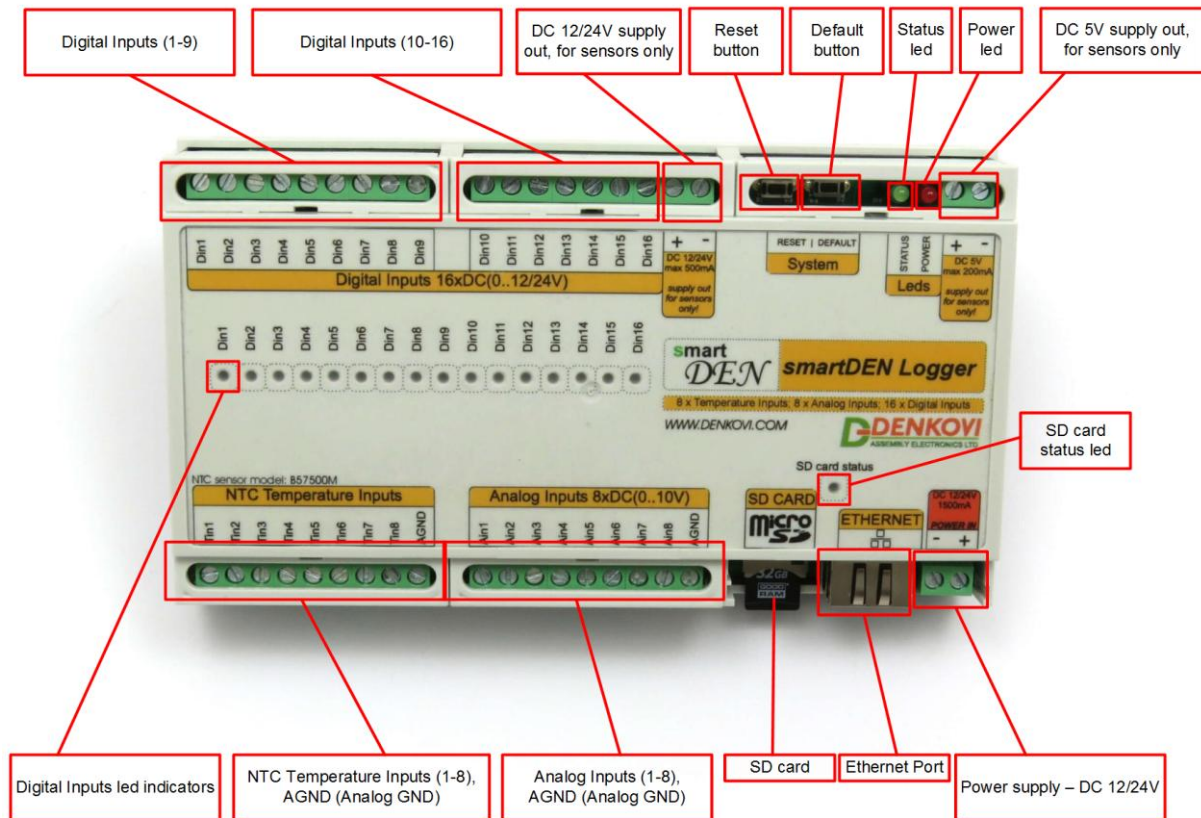


Figure 5. Device overview

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

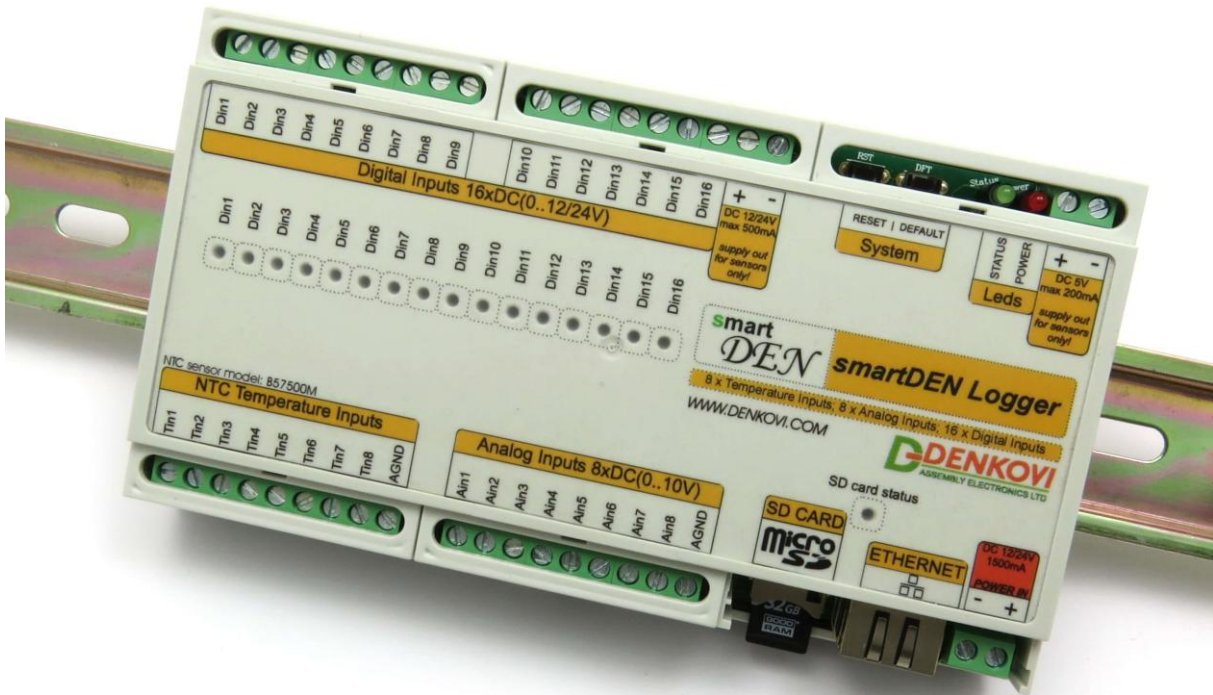


Figure 6. Mounting the device to DIN rail

SmartDEN Logger can be mounted to a standard (35 mm by 7.55 mm) DIN rail. 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.

5.2. Power supply



Figure 7. SmartDEN Logger power supply

SmartDEN Logger must be powered with voltage either **12VDC** or **24VDC** stabilized and filtered. 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.

- ❗ Please keep the polarity and supply voltage range!
- ❗ **SmartDEN Logger** does not accept AC supply voltage. It is highly recommended to check the power supply source parameters before supply the module.
- ❗ 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

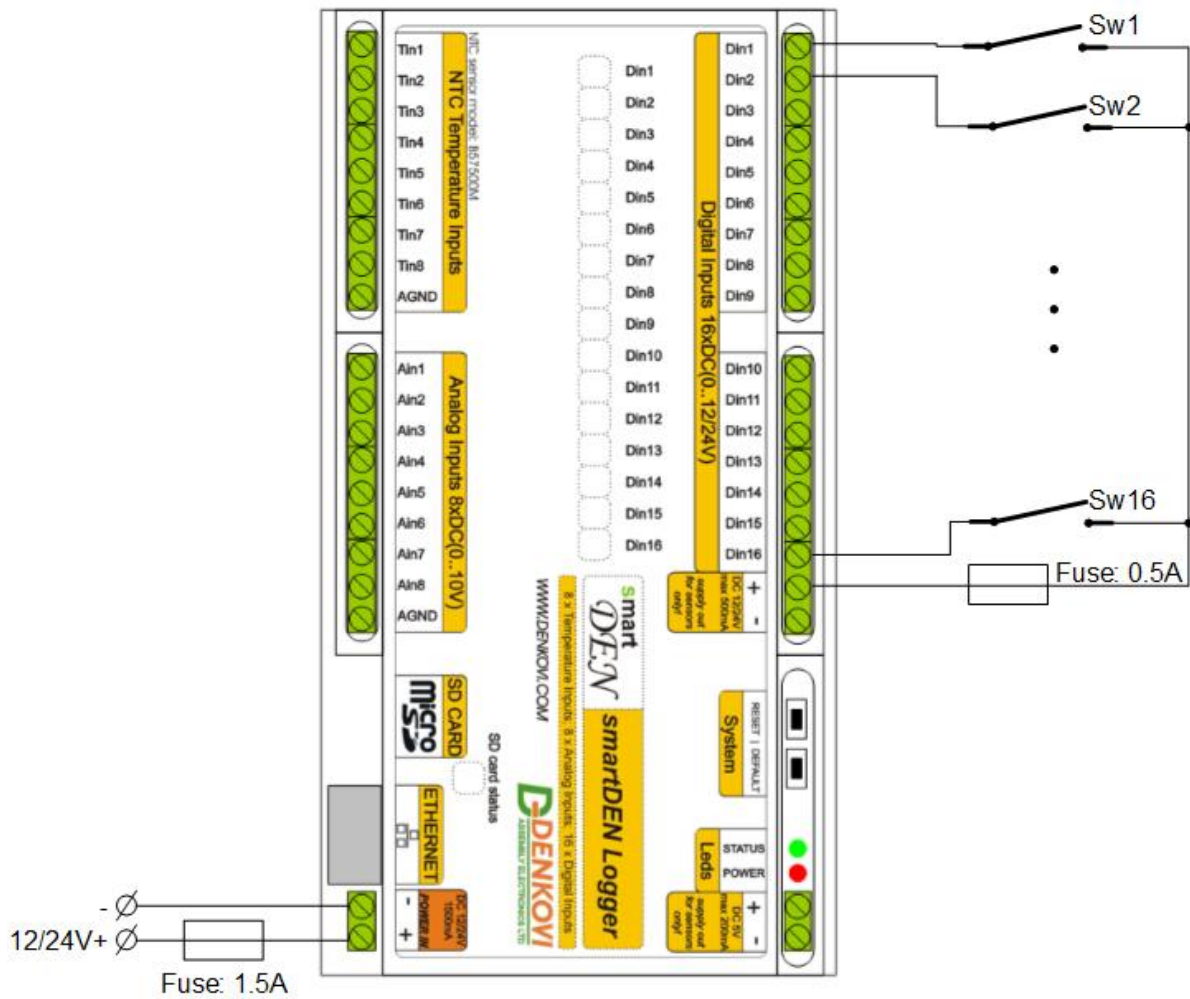


Figure 8. Connecting SPST NO output (dry contact) sensors, switches, buttons, door sensors and so on to the digital inputs

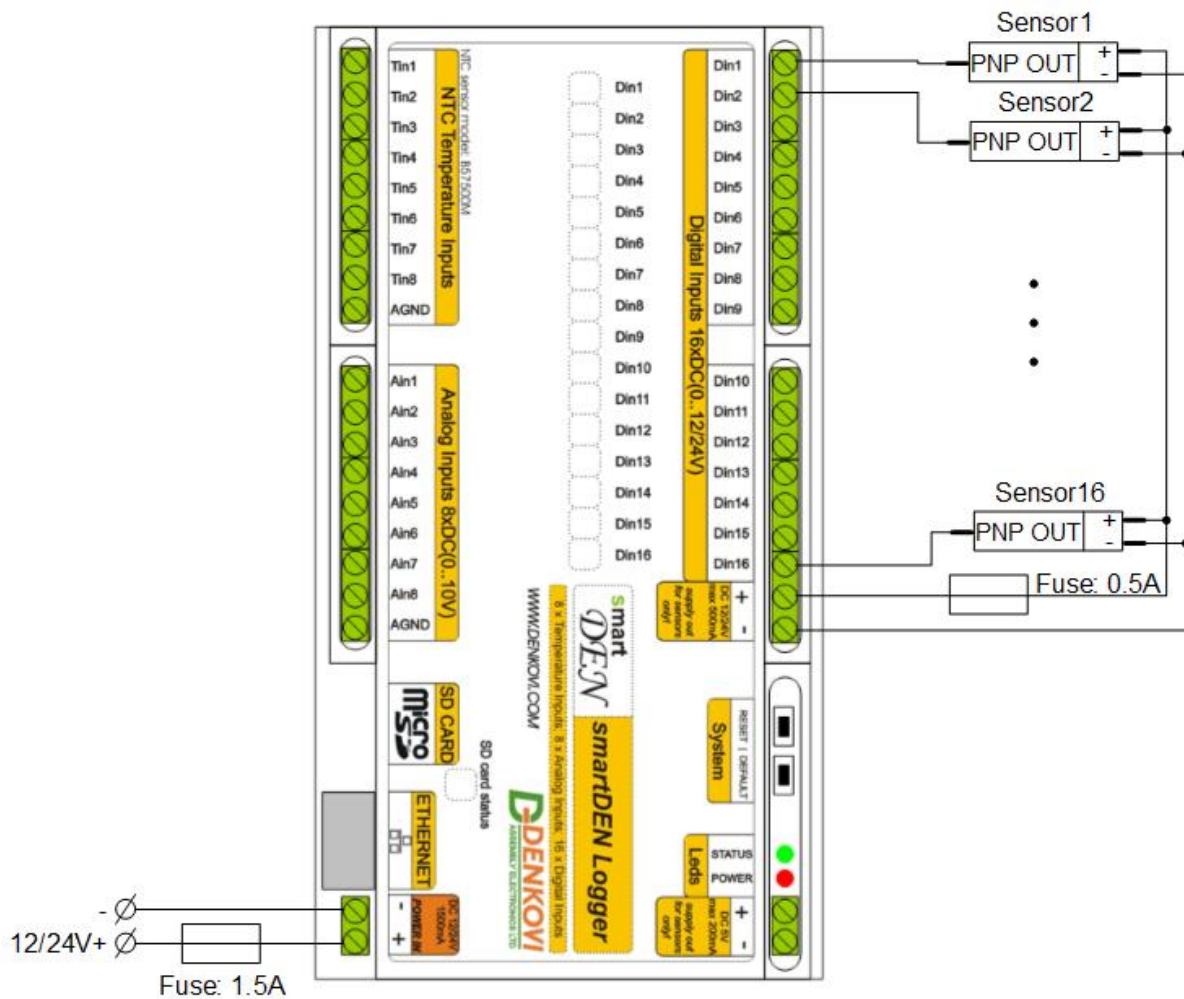


Figure 9. Connecting PNP output digital sensors requiring supply voltage 12/24V DC to the digital inputs

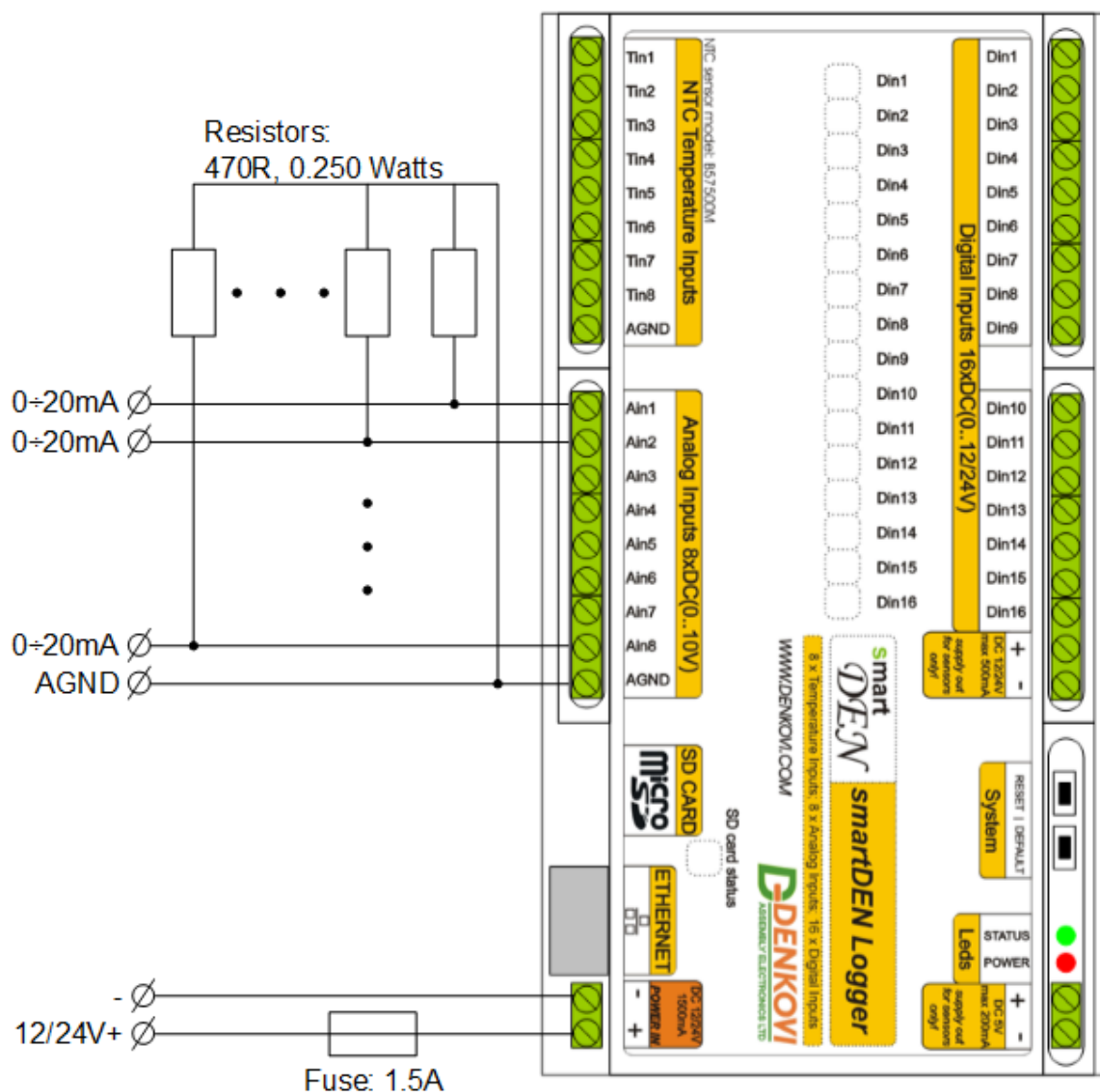


Figure 10. Connecting 0-20mA output analog sensors to the analog inputs

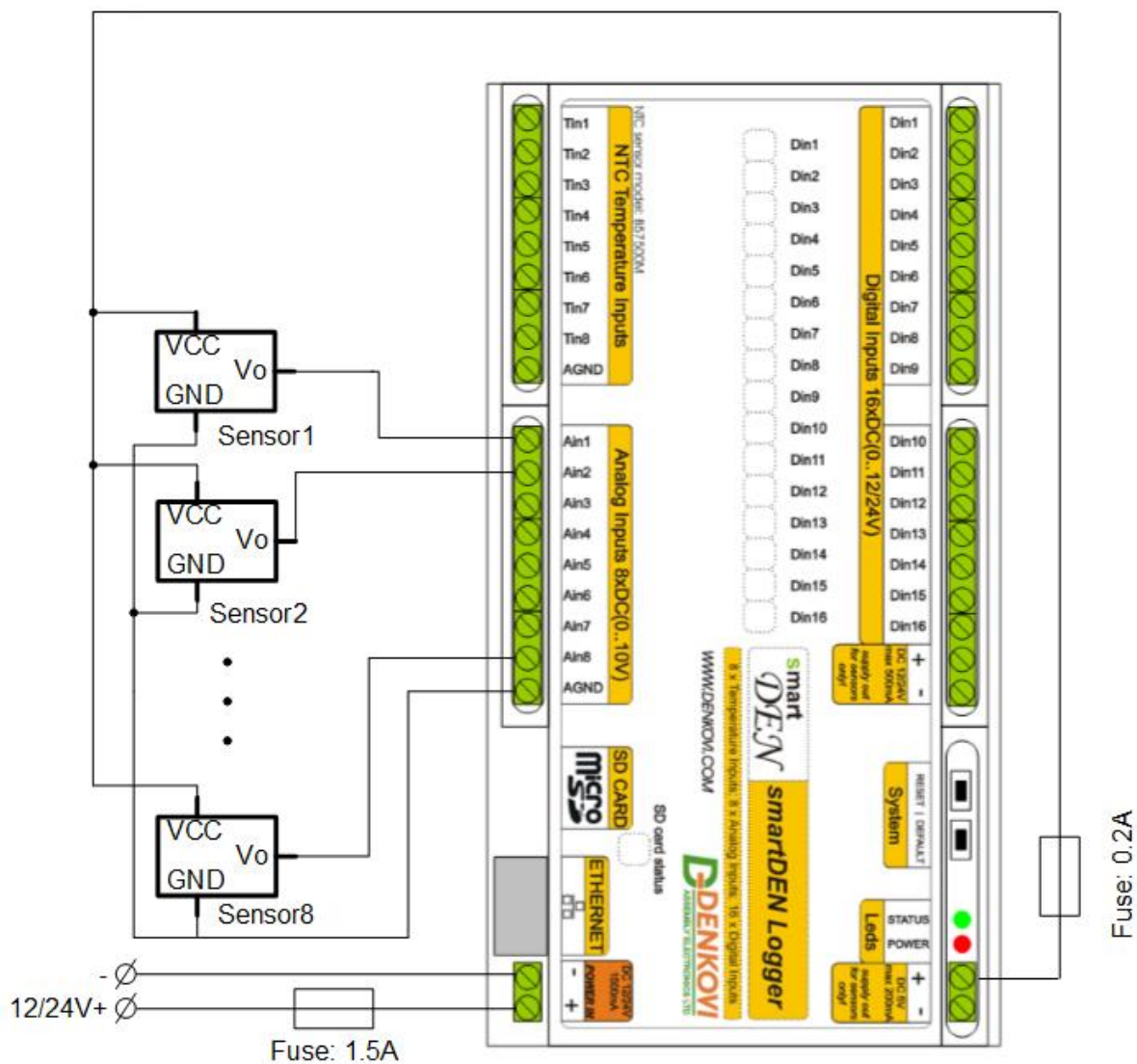


Figure 11. Connecting analog sensors with output from 0 up to 10V DC to the analog inputs requiring power supply voltage 5V DC

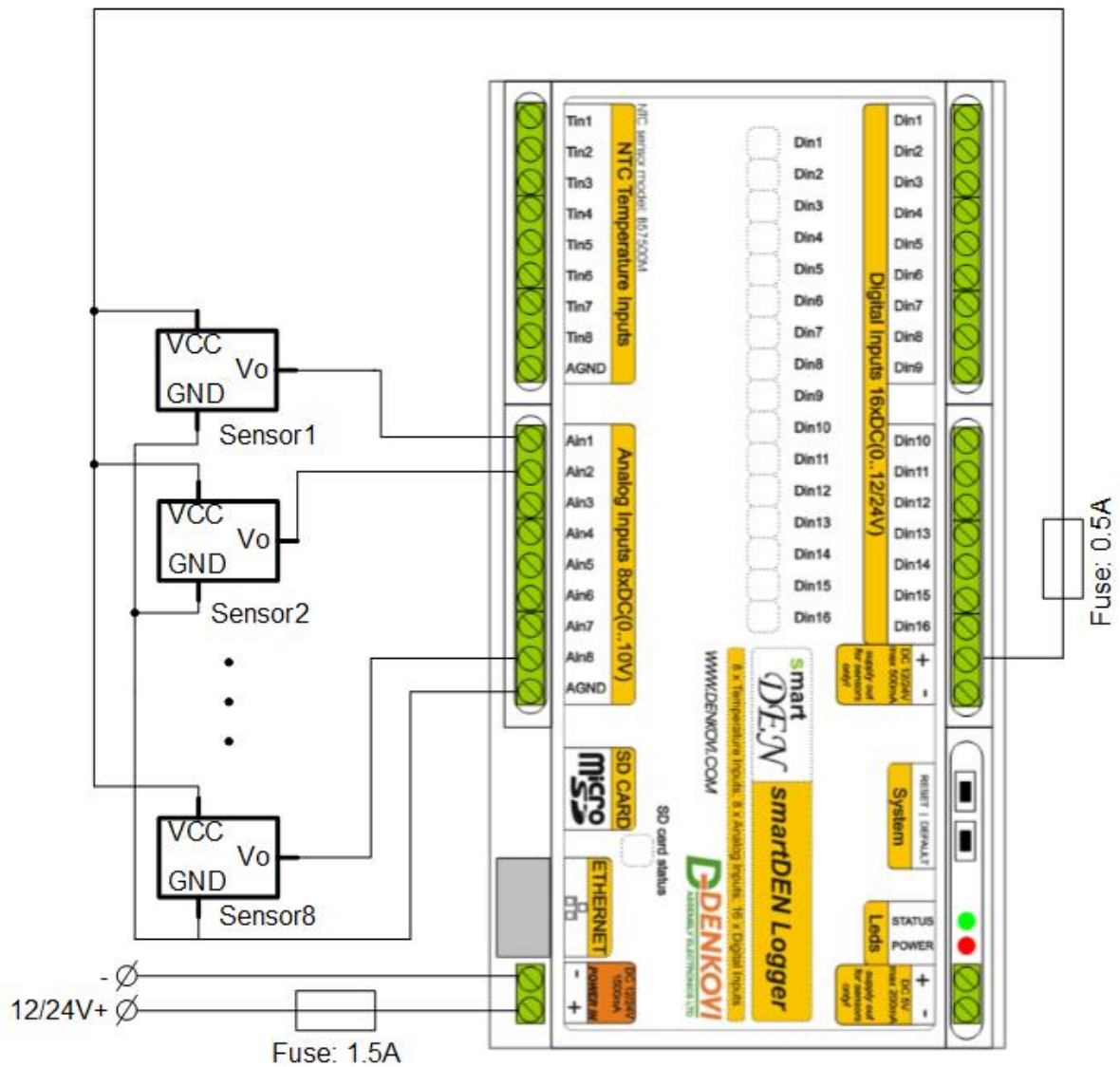


Figure 12. Connecting analog sensors with output from 0 up to 10V DC to the analog inputs requiring power supply voltage 12/24V DC

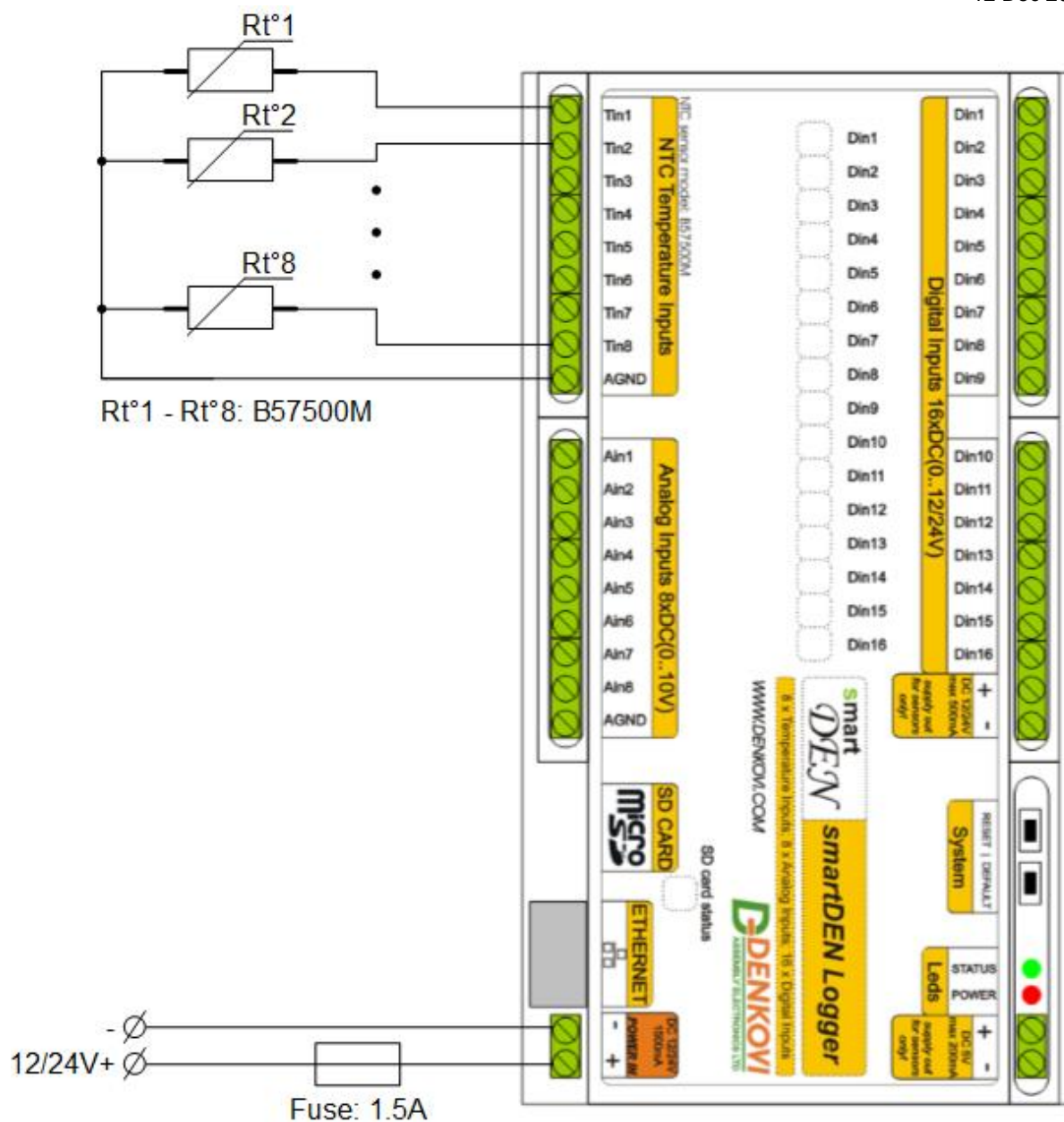


Figure 13. Connecting NTC sensors type B57500M to analog inputs

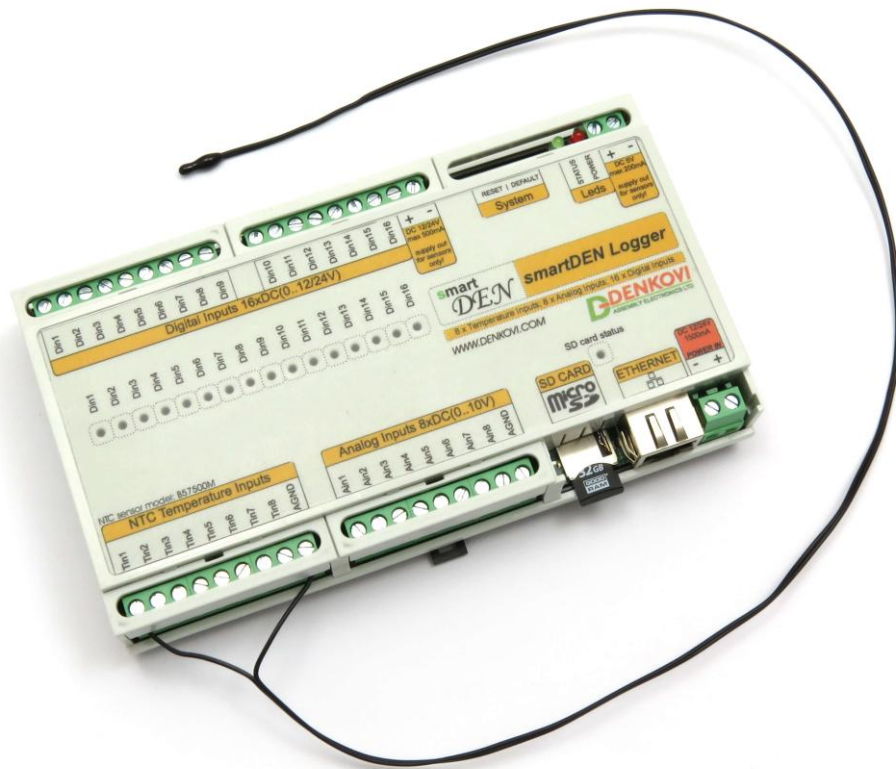


Figure 14. Temperature sensor connected to Tin1

5.4. Network connection

SmartDEN Logger supports AUTO-MDIX so either "crossover" or "straight-through" network cable can be used.

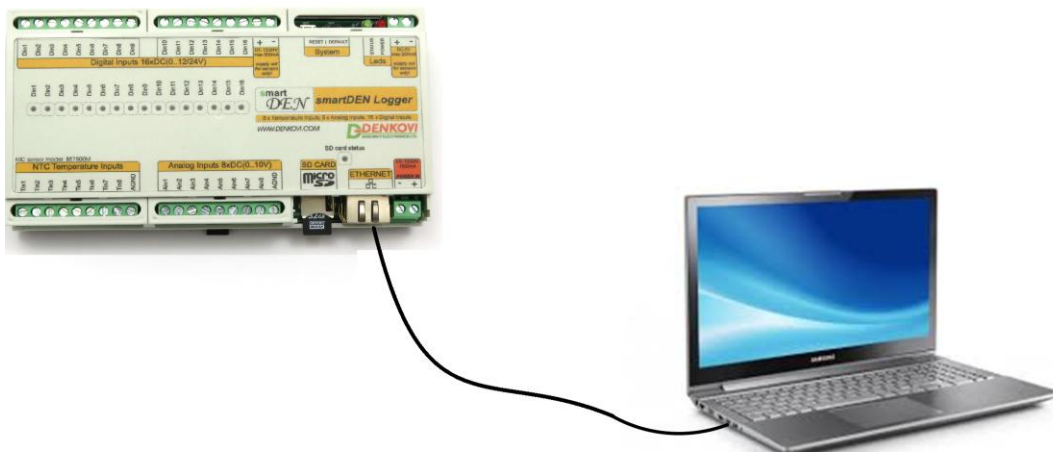


Figure 15. Connecting SmartDEN Logger to a computer directly

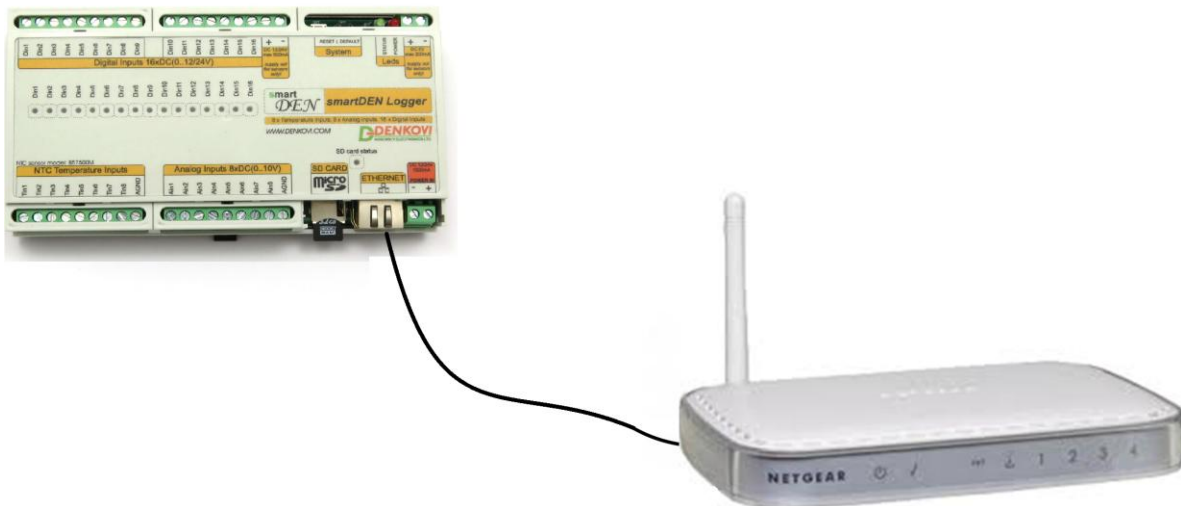


Figure 16. Connecting **SmartDEN Logger** to a wireless router

5.5. Communication setup

SmartDEN Logger is shipped 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**

The first step is to establish communications between **SmartDEN Logger** and the configuration PC. The recommended connection for this first-time configuration of the device is that shown in Fig. 15.

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**:

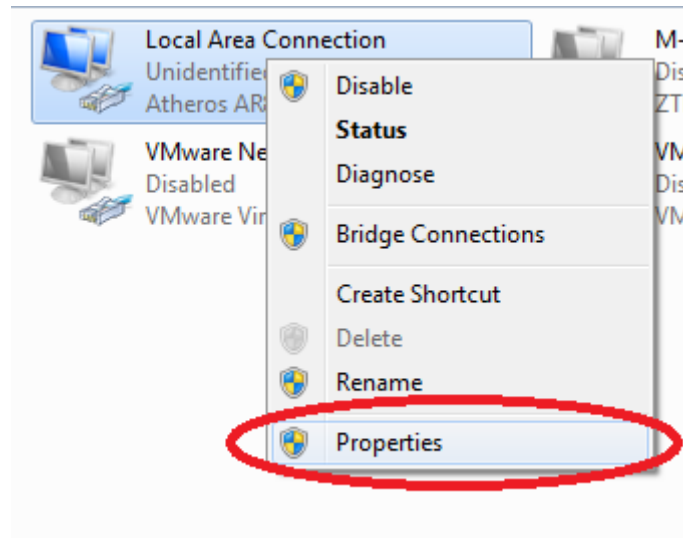


Figure 17. LAN card properties

The next step is to enter into IPv4 properties.

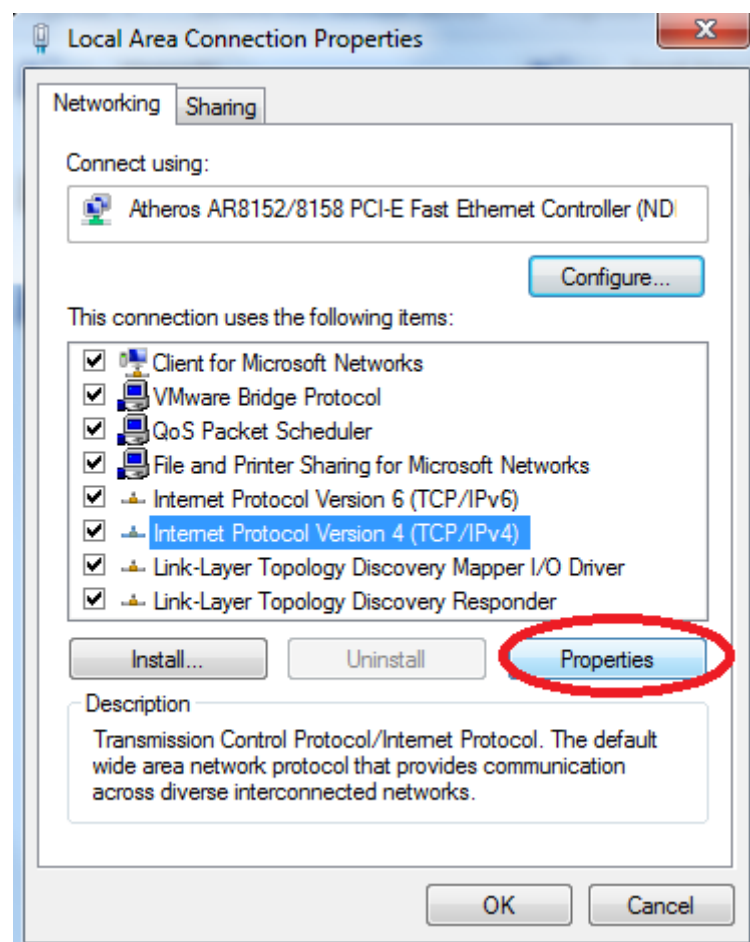


Figure 18. Enter into IPv4 properties section

Set the IP address of your PC to be in the same network as **SmartDEN Logger**.

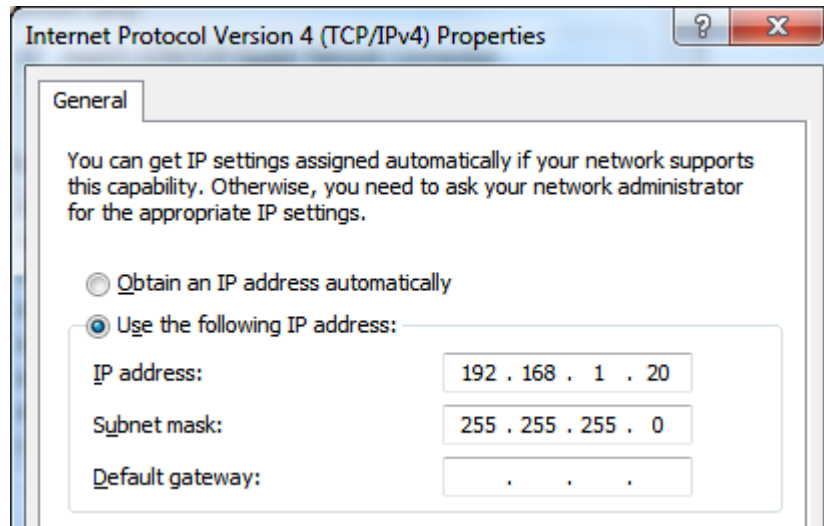


Figure 19. Set the IP address

Finally, in the address bar of your Web browser enter the IP address of the **SmartDEN Logger** and press Enter, or select 'Go':



Figure 20. Open the device in a browser

If the network settings are O'K, the login page should appear:

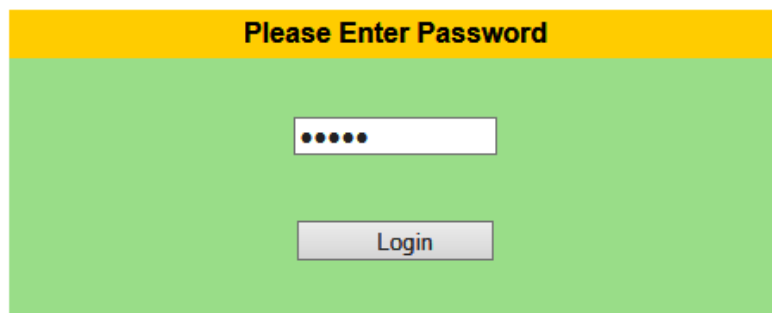


Figure 21. Login page



SmartDEN Logger modules connected locally can be easily scanned and found via the tool [Denkovi Finder](#) as well (Fig. 22)

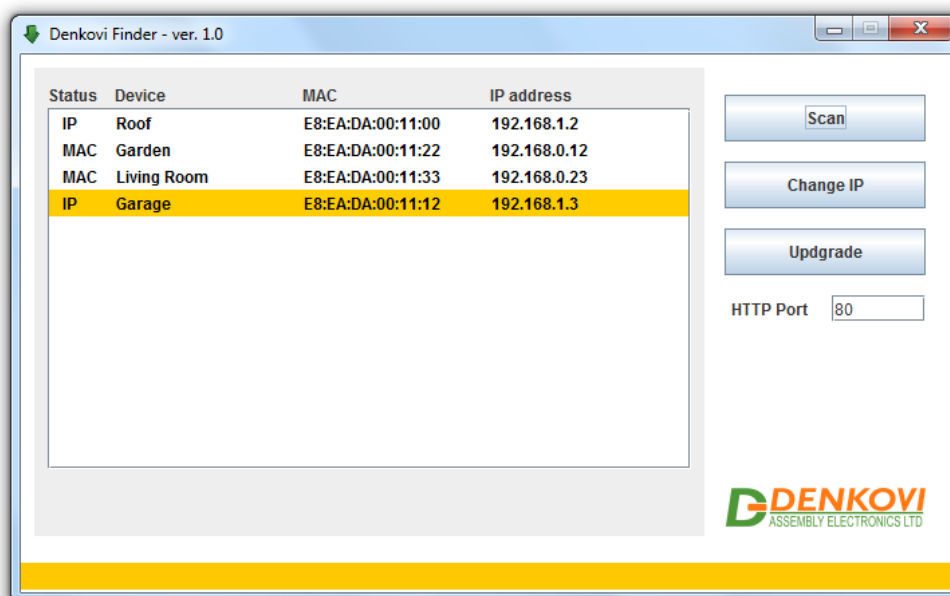


Figure 22. Denkovi Finder utility

6. Default settings

6.1. Table with default settings

The **SmartDEN Logger** module is shipped with default (factory) settings shown in Table 8. The default settings can be reloaded, if necessary (see [point 6.2](#)).

Table 8. Default settings

Settings group	Parameter (according Web pages)	Value
General Settings	Device Name	LOGGER
	Password	admin
	SD Card Logging	Enabled
	SD Card Logging Period, sec	20
	SD Card Log File Size, KB	500
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 (yyyy/mm/dd)	Current
	Day of Week	Current
	Time (hh:mm)	Current
	Time Zone	GMT
	Time Server	pool.ntp.org
	Server Port	123
	Synchronization Period, min	30
Digital Inputs	Description	DI<n>, where <n> = 1..16
Analog Inputs	Description	AI<n>, where <n> = 1..8
Temp. Inputs	Description	TI<n>, where <n> = 1..8
Remote Logging	Enabled	No
	HTTP Server Address / Path	0.0.0.0 / current_state.xml
	Server Port	80
	Format	XML
	Logging Period, sec	5
	Server Response Timeout, sec	2

6.2. Steps for loading 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. 23);
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 default settings.

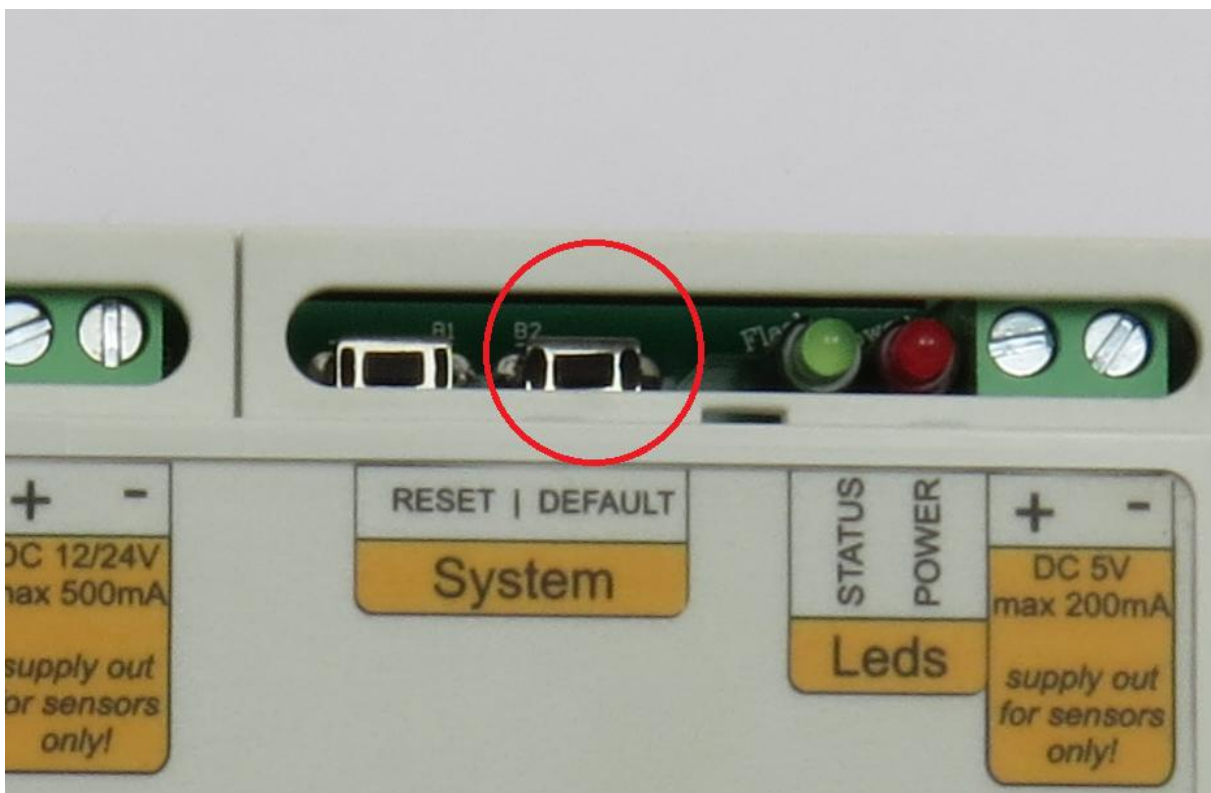


Figure 23. Loading the default settings

7. Web access

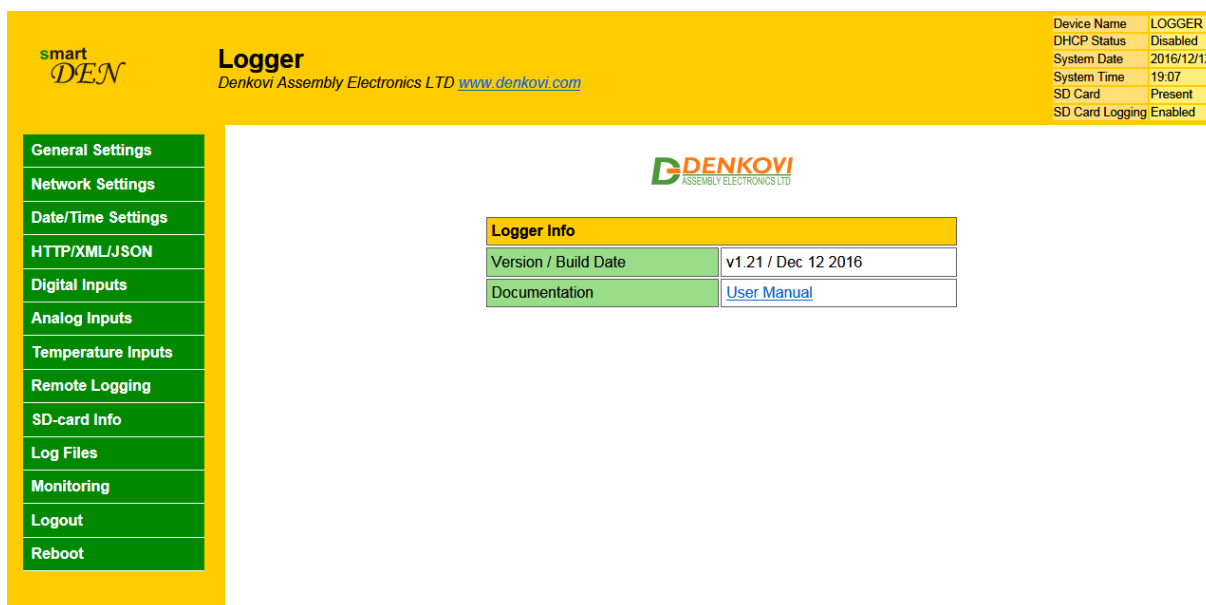


Figure 24. Web access

To access the setup pages, start a web browser (Internet Explorer, Mozilla Firefox or similar), and enter the **SmartDEN Logger** IP address, for example: <http://192.168.1.100>.



Figure 25. Open the device in a browser

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

7.1. Login

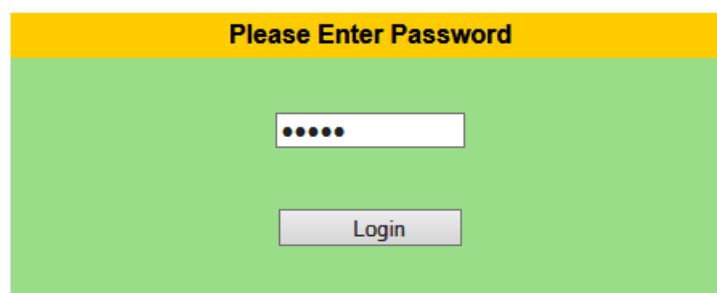


Figure 26. Login page

Enter the password and click "Login" button or press Enter. This will bring you to the **SmartDEN Logger** main configuration page which contains details of the current firmware version/build date and provides a link to documentation page (Fig. 27).

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.

Logger Info	
Version / Build Date	v1.21 / Dec 12 2016
Documentation	User Manual

Figure 27. Version/Build Date info

7.2. Menu

The main menu (Fig. 28) consists of the following items, located in the left window frame:

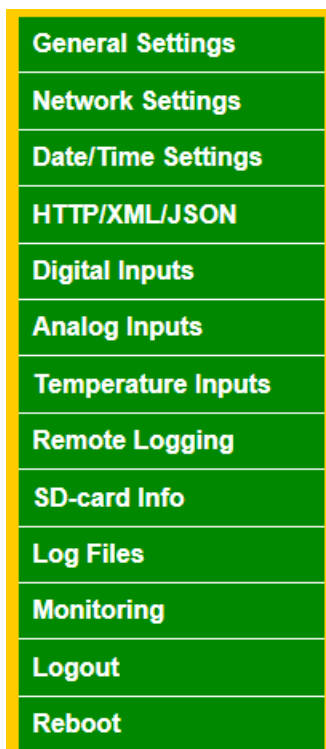


Figure 28. Navigation menu


7.3. General settings

General Settings


General Settings	
Device Name	LOGGER
Password	*****
SD Card Logging Enable	<input checked="" type="checkbox"/>
SD Card Logging Period, sec	20
SD Card Log File Size, KB	500

Figure 29. General settings

- **Device Name** - the name of the module (max 15 symbols). Each 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 operations (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".

- **SD Card Logging Enable** – this checkbox enables/disables the recording of measured data to the SD card;
- **SD Card Logging Period, sec** – the time interval between two recordings of current measurements;
- **SD Card Log File Size, KB** - after the current log file reaches the defined size, it is closed and a new file is created.

 The longer logging period, the longer single log file time range;
The bigger log file size, the slower chart loading;
The smaller log file size, the bigger log files number stored on the SD card.

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

7.4. Network settings

Network Configuration

Network Configuration	
MAC Address	E8:EA:DA:00:00:01
Enable DHCP	<input type="checkbox"/>
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

Figure 30. Network settings

This menu lets you configure the network settings of **SmartDEN Logger** device:

- **Enable DHCP** - this option allows DHCP to be enabled or disabled. When DHCP is set to Enabled, the Network page must be saved and **SmartDEN Logger** must be rebooted before obtaining an IP address;
- **IP address** - this is the IP address of the **SmartDEN Logger**. It needs 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 time servers for automatic time synchronization;
- **Subnet Mask** - this is the subnet mask of the network on which the **SmartDEN Logger** 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. HTTP/XML/JSON

HTTP/XML/JSON

HTTP Access	
HTTP Port	<input type="text" value="80"/>
Access IP Address	<input type="text" value="192.168.1.0"/>
Access Mask	<input type="text" value="0.0.0.0"/>
Access MAC Address	<input type="text" value="00:00:00:00:00:00"/>
Session Timeout, min	<input type="text" value="30"/>
XML/JSON Access	
Enable Access	<input checked="" type="checkbox"/>
Encrypt Password	<input type="checkbox"/>
Multiple Access	<input checked="" type="checkbox"/>

Figure 31. HTTP/XML/JSON access

These settings let you configure the HTTP and XML/JSON access parameters of SmartDEN Logger:







- **HTTP Port** - port on which the 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 HTTP/ XML/JSON sessions in minutes;
- **Enable Access** - this option enables or disables XML/JSON access to the SmartDEN Logger;
- **Encrypt Password** - when XML/JSON access is enabled, this option adds additional security level by encrypting the login password;
- **Multiple Access** - this option enables simultaneous 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 Logger 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 and, 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 from 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.

7.6. Remote logging

Remote Logging

Remote Logging	
Enable	<input checked="" type="checkbox"/>
HTTP Server Address / Path	192.168.1.20 / current_state.xml
Server Port	6020
Format	XML JSON
Logging Period, sec	5
Server Response Timeout, sec	2

Figure 32. Remote logging

SmartDEN Logger can send periodically HTTP POST messages containing current measurements in XML or JSON format. In this mode the **SmartDEN Logger** works as HTTP client and sends messages to a HTTP server located on some remote host. Parameters are:

- **Enable** - activate this mode;
- **HTTP Server Address** - the remote HTTP server IP address or domain name (max 22 chars);
- **HTTP Server Path** - the remote path after the HTTP Server Address (max 22 chars);
- **Server Port** - the remote HTTP server listening port;
- **Format** – XML or JSON;
- **Logging period, sec** - the time interval between two sequential POST requests during the logging (from 1 to 250 seconds);
- **Server Response Timeout, sec** - the timeout for the server response (from 1 to 250 seconds).




The timeout period must be less than the logging period.

7.7. Digital Inputs

Digital Inputs

Input	Description
Input 1	DI1
Input 2	DI2
Input 3	DI3
Input 4	DI4
Input 5	DI5
Input 6	DI6
Input 7	DI7
Input 8	DI8
Input 9	DI9
Input 10	DI10
Input 11	DI11
Input 12	DI12
Input 13	DI13
Input 14	DI14
Input 15	DI15
Input 16	DI16

Figure 33. Digital Inputs description


- **Description** - digital input identification string (max 7 chars);
 This description will appear in XML/JSON files, as well as in Monitoring page.
- **Save button** - once you have changed the settings as required, click this button.

7.8. Analog Inputs

Analog Inputs

Input	Description
Input 1	AI1
Input 2	AI2
Input 3	AI3
Input 4	AI4
Input 5	AI5
Input 6	AI6
Input 7	AI7
Input 8	AI8

Figure 34. Analog Inputs description


- **Description** - analog input identification string (max 7 chars);
 This description will appear in XML/JSON files, as well as in Monitoring page.
- **Save button** - once you have changed the settings as required, click this button.

7.9. Temperature Inputs

Temperature Inputs

Input	Description
Input 1	<input type="text" value="T11"/>
Input 2	<input type="text" value="T12"/>
Input 3	<input type="text" value="T13"/>
Input 4	<input type="text" value="T14"/>
Input 5	<input type="text" value="T15"/>
Input 6	<input type="text" value="T16"/>
Input 7	<input type="text" value="T17"/>
Input 8	<input type="text" value="T18"/>

Figure 35. Temperature Inputs description

- **Description** - temperature input identification string (max 7 chars);
 This description will appear in XML/JSON files, as well as in Monitoring page.
- **Save button** - once you have changed the settings as required, click this button.

7.10. SD-card Info

SD-card Info

SD-card Info
Disk format: FAT32
Sector size: 512
Sectors per cluster: 64
Total clusters: 235968
Total disk size: 7168 MB
Last error: 0

Figure 36. SD-card info page

7.11. Log Files

This page provides graphical view and downloading of log files (Fig. 37). When loaded, the files from the current day are listed. Then new periods can be set or all files can be explored.

Log Files 1-7 of 7

☐ All Files
☒ Files From To

Download File	Size	Plot Chart	Select
16120600.CSV	512018	DI AI Temperature	<input type="checkbox"/>
16120601.CSV	512018	DI AI Temperature	<input type="checkbox"/>
16120602.CSV	485141	DI AI Temperature	<input type="checkbox"/>
16120603.CSV	482488	DI AI Temperature	<input type="checkbox"/>
16120604.CSV	87039	DI AI Temperature	<input type="checkbox"/>
16120605.CSV	73058	DI AI Temperature	<input type="checkbox"/>
16120606.CSV	207815	DI AI Temperature	<input type="checkbox"/>

Links to graphical view

Links for download the file

Figure 37. SD-card info page

The **Plot Chart** sections contain links to graphical representation of logged data, grouped by channel type (Fig. 38).

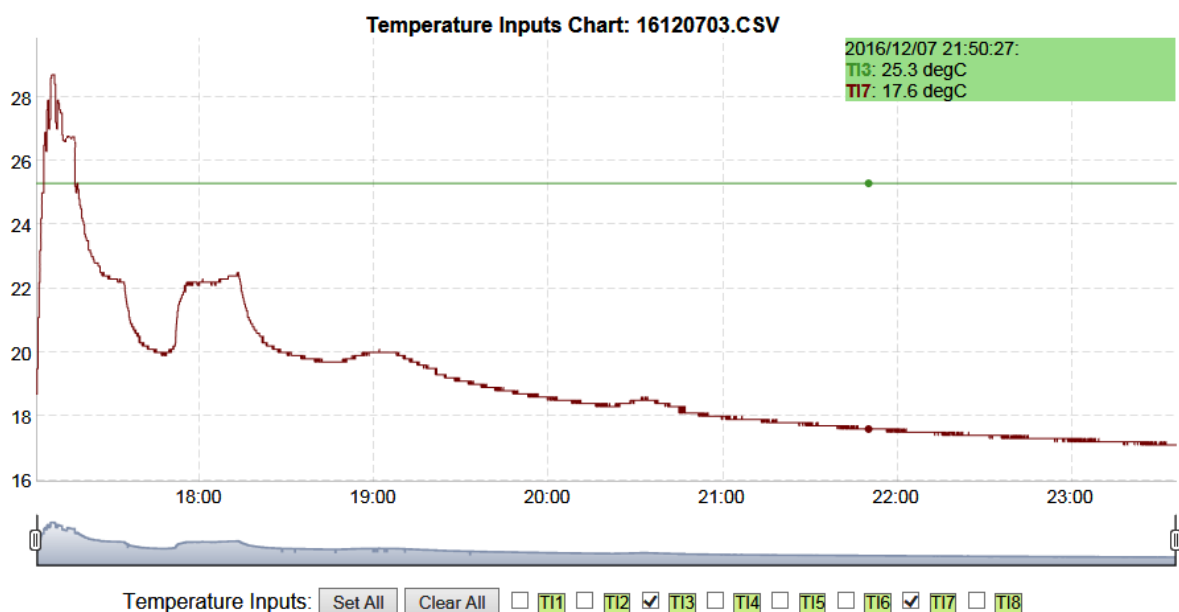


Figure 38. Graphical view of logged data

7.12. Monitoring

Monitoring

Digital Inputs (1..8)							
DIn1	DI2	DI3	DI4	DI5	DI6	DI7	DI8
0 (Off)	0 (Off)	0 (Off)	0 (Off)	0 (Off)	0 (Off)	0 (Off)	0 (Off)
Digital Inputs (9..16)							
DI9	DI10	DI11	DI12	DI13	DI14	DI15	DI16
0 (Off)	0 (Off)	0 (Off)	0 (Off)	0 (Off)	0 (Off)	0 (Off)	0 (Off)
Analog Inputs							
AI1	AI2	AI3	AI4	AI5	AI6	AI7	AI8
0	0	0	505	0	0	0	0
Temperature Inputs, °C							
TI1	TI2	TI3	TI4	TI5	TI6	TI7	TI8
—	—	25.3	—	—	—	19.8	—

Figure 36. Monitoring page

7.13. Logout

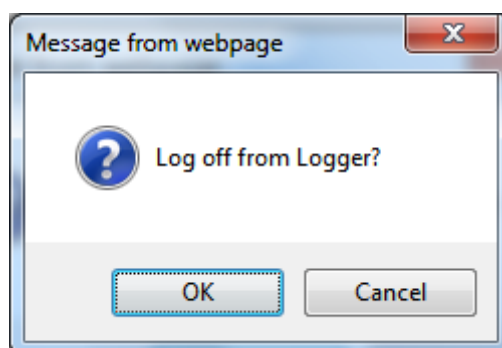


Figure 37. Log off

7.14. Reboot

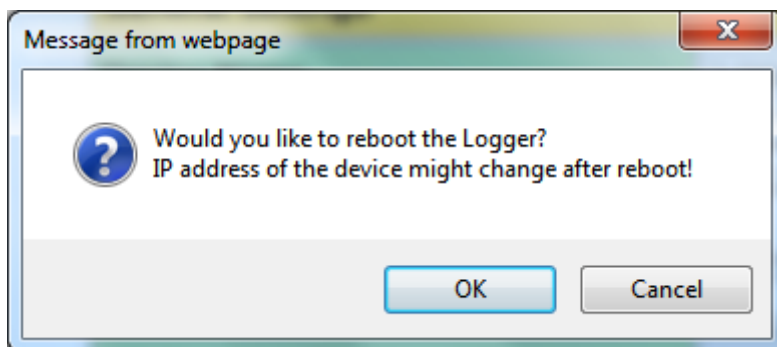


Figure 38. Reboot

8. HTTP server

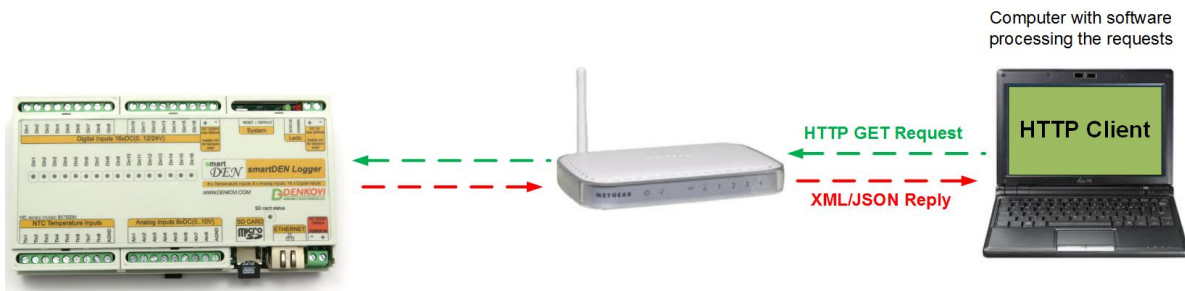


Figure 39. SmartDEN Logger working as HTTP server

This operation mode allows custom applications to obtain current measurements of **SmartDEN Logger** without using a Web-browser. The custom application acts as a HTTP client, sending HTTP GET requests to the **SmartDEN Logger**. To receive the current state of the **SmartDEN Logger**, the application requests the page [current_state.xml](http://192.168.1.100/current_state.xml) / [current_state.json](http://192.168.1.100/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 [7.5](#)).

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

8.1. XML access

8.1.1. XML login (encrypted password)

In this mode a two-step login sequence is provided as a protection against unauthorized access.

The first time the custom application requests the page [current_state.xml](http://192.168.1.100/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](http://192.168.1.100/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>
  </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 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 Logger** for time, specified by **Session Timeout** parameter, the session "times out" and a new login is required.

8.1.3. Retrieving XML current state

After successful login the custom application can obtain the **SmartDEN Logger** current state by a request to the page [current_state.xml](#). The reply contains page in XML format (Fig. 40).

```

▼<CurrentState>
  ▼<DigitalInput1>
    <Name>DIn1</Name>
    <Value>1</Value>
  </DigitalInput1>
  ▶<DigitalInput2>...</DigitalInput2>
  ▶<DigitalInput3>...</DigitalInput3>
  ▶<DigitalInput4>...</DigitalInput4>
  ▶<DigitalInput5>...</DigitalInput5>
  ▶<DigitalInput6>...</DigitalInput6>
  ▶<DigitalInput7>...</DigitalInput7>
  ▶<DigitalInput8>...</DigitalInput8>
  ▶<DigitalInput9>...</DigitalInput9>
  ▶<DigitalInput10>...</DigitalInput10>
  ▶<DigitalInput11>...</DigitalInput11>
  ▶<DigitalInput12>...</DigitalInput12>
  ▶<DigitalInput13>...</DigitalInput13>
  ▶<DigitalInput14>...</DigitalInput14>
  ▶<DigitalInput15>...</DigitalInput15>
  ▶<DigitalInput16>...</DigitalInput16>
  ▼<AnalogInput1>
    <Name>AI1</Name>
    <Value>249</Value>
  </AnalogInput1>
  ▶<AnalogInput2>...</AnalogInput2>
  ▶<AnalogInput3>...</AnalogInput3>
  ▶<AnalogInput4>...</AnalogInput4>
  ▶<AnalogInput5>...</AnalogInput5>
  ▶<AnalogInput6>...</AnalogInput6>
  ▶<AnalogInput7>...</AnalogInput7>
  ▶<AnalogInput8>...</AnalogInput8>
  ▼<TemperatureInput1>
    <Name>TI1</Name>
    <Value>25.3</Value>
  </TemperatureInput1>
  ▶<TemperatureInput2>...</TemperatureInput2>
  ▶<TemperatureInput3>...</TemperatureInput3>
  ▶<TemperatureInput4>...</TemperatureInput4>
  ▶<TemperatureInput5>...</TemperatureInput5>
  ▶<TemperatureInput6>...</TemperatureInput6>
  ▶<TemperatureInput7>...</TemperatureInput7>
  ▶<TemperatureInput8>...</TemperatureInput8>
  ▼<Device>
    <Name>DATALOGGER</Name>
    <MAC>E8:EA:DA:00:00:01</MAC>
  </Device>
</CurrentState>

```

Figure 40. XML file with current measurements

8.2. JSON access

8.2.1. JSON login (encrypted password)

The encrypted login sequence is similar to 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 Logger** for time, specified by **Session Timeout** parameter, the session "times out" and a new login is required.

8.2.3. Retrieving JSON current state

When logged, the custom application can get current measurements by a request to the page [current_state.json](#). The reply contains page in JSON format:

```

{
  "CurrentState": {
    "DigitalInput": [
      {"Name": "DI1", "Value": "1"},
      {"Name": "DI2", "Value": "0"},
      {"Name": "DI3", "Value": "0"},
      {"Name": "DI4", "Value": "0"},
      {"Name": "DI5", "Value": "0"},
      {"Name": "DI6", "Value": "0"},
      {"Name": "DI7", "Value": "1"},
      {"Name": "DI8", "Value": "0"},
      {"Name": "DI9", "Value": "0"},
      {"Name": "DI10", "Value": "0"},
      {"Name": "DI11", "Value": "0"},
      {"Name": "DI12", "Value": "1"},
      {"Name": "DI13", "Value": "0"},
      {"Name": "DI14", "Value": "0"},
      {"Name": "DI15", "Value": "0"},
      {"Name": "DI16", "Value": "0"}
    ],
    "AnalogInput": [
      {"Name": "AI1", "Value": "249"},
      {"Name": "AI2", "Value": "190"},
      {"Name": "AI3", "Value": "13"},
      {"Name": "AI4", "Value": "505"},
      {"Name": "AI5", "Value": "1011"},
      {"Name": "AI6", "Value": "35"},
      {"Name": "AI7", "Value": "33"},
      {"Name": "AI8", "Value": "561"}
    ],
    "TemperatureInput": [
      {"Name": "TI1", "Value": "25.1"},
      {"Name": "TI2", "Value": "14.2"},
      {"Name": "TI3", "Value": "25.3"},
      {"Name": "TI4", "Value": "17.3"},
      {"Name": "TI5", "Value": "37.9"},
      {"Name": "TI6", "Value": "18.0"},
      {"Name": "TI7", "Value": "19.1"},
      {"Name": "TI8", "Value": "29.9"}
    ],
    "Device": {
      "Name": "DATALOGGER",
      "MAC": "E8:EA:DA:00:00:01"
    }
  }
}

```

Figure 41. JSON file with current measurements

8.3. Multiple XML/JSON access

With **Multiple Access** option selected (see [7.5](#)) the password should be passed as 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. Access to log files

To retrieve the log files, custom application should request the [log_files.xml](#) page along with the encrypted/non-encrypted password in the same manner as [current_state.xml](#):

```
http://192.168.1.100/log_files.xml?pw=admin
```

As a result a list of all log files will be returned:

```
<LogFiles>  
<file>16111008.CSV</file>  
<file>16111200.CSV</file>  
<file>16111201.CSV</file>  
<file>16111202.CSV</file>  
<file>16111203.CSV</file>  
<file>16111204.CSV</file>  
<file>16111205.CSV</file>  
<file>16111206.CSV</file>  
<file>16111207.CSV</file>  
<file>16111208.CSV</file>  
<file>16111209.CSV</file>  
<file>1611120A.CSV</file>  
...  
</LogFiles>
```

Then each file can be downloaded using its name as request (no password required):

```
http://192.168.1.100/16111008.CSV
```

9. HTTP client

9.1. Remote logging mode

Remote logging mode (push notifications mode) is designed in order to help solving cases like remote monitoring and Internet/Ethernet logging. The **SmartDEN Logger** acts as HTTP client and sends periodically HTTP POST messages in XML/JSON format to the HTTP server.

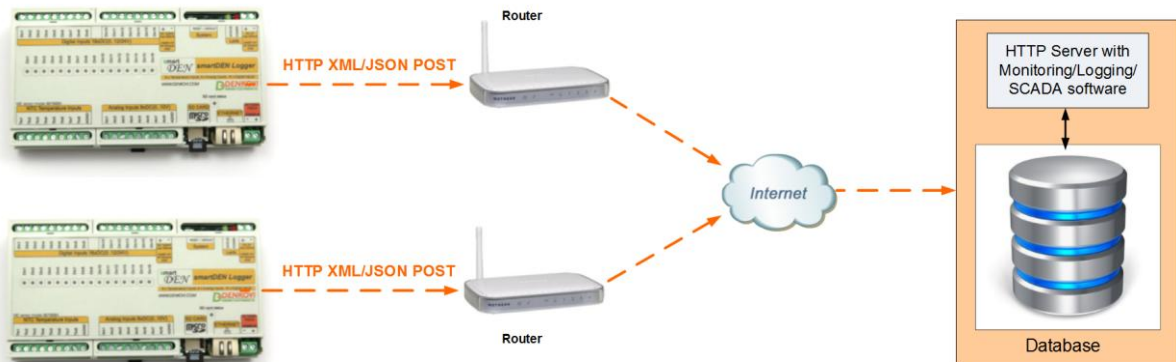


Figure 42. Remote logging mode



For details about **Remote Logging** mode configuration see [7.6](#).

9.1.1. HTTP POST header (XML)

Bellow is shown the header of example POST message sent by **SmartDEN Logger** with XML format selected:

```

POST /current_state.xml HTTP/1.0
Host: 192.168.1.20
Content-Type: text/xml; charset=UTF-8
Content-Length: 2513
Connection: close
  
```

Here current_state.xml is actually the **HTTP Server Path** from the page **Remote Logging**, and 192.168.1.20 is the **HTTP Server Address**.

9.1.2. HTTP POST body (XML)

The body is actually the posted XML file content. Example body content is shown below:

```

<?xml version='1.0' encoding='UTF-8'?>
<CurrentState>
<DigitalInput1><Name>DI1</Name><Value>1</Value></DigitalInput1>
<DigitalInput2><Name>DI2</Name><Value>0</Value></DigitalInput2>
<DigitalInput3><Name>DI3</Name><Value>1</Value></DigitalInput3>
<DigitalInput4><Name>DI4</Name><Value>0</Value></DigitalInput4>
<DigitalInput5><Name>DI5</Name><Value>0</Value></DigitalInput5>
  
```

```
<DigitalInput6><Name>DI6</Name><Value>0</Value></DigitalInput6>
<DigitalInput7><Name>DI7</Name><Value>0</Value></DigitalInput7>
<DigitalInput8><Name>DI8</Name><Value>0</Value></DigitalInput8>
<DigitalInput9><Name>DI9</Name><Value>0</Value></DigitalInput9>
<DigitalInput10><Name>DI10</Name><Value>1</Value></DigitalInput10>
<DigitalInput11><Name>DI11</Name><Value>0</Value></DigitalInput11>
<DigitalInput12><Name>DI12</Name><Value>0</Value></DigitalInput12>
<DigitalInput13><Name>DI13</Name><Value>0</Value></DigitalInput13>
<DigitalInput14><Name>DI14</Name><Value>0</Value></DigitalInput14>
<DigitalInput15><Name>DI15</Name><Value>1</Value></DigitalInput15>
<DigitalInput16><Name>DI16</Name><Value>0</Value></DigitalInput16>
<AnalogInput1><Name>AI1</Name><Value>143</Value></AnalogInput1>
<AnalogInput2><Name>AI2</Name><Value>12</Value></AnalogInput2>
<AnalogInput3><Name>AI3</Name><Value>0</Value></AnalogInput3>
<AnalogInput4><Name>AI4</Name><Value>505</Value></AnalogInput4>
<AnalogInput5><Name>AI5</Name><Value>0</Value></AnalogInput5>
<AnalogInput6><Name>AI6</Name><Value>0</Value></AnalogInput6>
<AnalogInput7><Name>AI7</Name><Value>1021</Value></AnalogInput7>
<AnalogInput8><Name>AI8</Name><Value>0</Value></AnalogInput8>
<TemperatureInput1><Name>TI1</Name><Value>27.3</Value></TemperatureInput1>
<TemperatureInput2> <Name>TI2</Name><Value>---</Value></TemperatureInput2>
<TemperatureInput3> <Name>TI3</Name><Value>25.3</Value></TemperatureInput3>
<TemperatureInput4><Name>TI4</Name><Value>---</Value></TemperatureInput4>
<TemperatureInput5><Name>TI5</Name><Value>---</Value></TemperatureInput5>
<TemperatureInput6><Name>TI6</Name><Value>12.3</Value></TemperatureInput6>
<TemperatureInput7><Name>TI7</Name><Value>18.7</Value></TemperatureInput7>
<TemperatureInput8><Name>TI8</Name><Value>19.1</Value></TemperatureInput8>
<Device>
  <Name>LOGGER  </Name>
  <MAC>E8:EA:DA:00:00:01</MAC>
</Device>
</CurrentState>
```

9.1.3. HTTP POST header (JSON)

Here is an example of the header when JSON format is selected:

```
POST /current_state.json HTTP/1.0
Host: 192.168.1.20
Content-Type: application/json; charset=UTF-8
Content-Length: 1079
Connection: close
```

Thus [current_state.json](#) corresponds to the **HTTP Server Path** from the page **Remote Logging**, and [192.168.1.20](#) is the **HTTP Server Address**.

9.1.4. HTTP POST body (JSON)

Example JSON body content is shown below:

```
{
  "CurrentState":{
```

```

"DigitalInput":[
  {"Name":"DI1","Value":"0"},
  {"Name":"DI2","Value":"0"},
  {"Name":"DI3","Value":"0"},
  {"Name":"DI4","Value":"0"},
  {"Name":"DI5","Value":"0"},
  {"Name":"DI6","Value":"0"},
  {"Name":"DI7","Value":"0"},
  {"Name":"DI8","Value":"0"},
  {"Name":"DI9","Value":"0"},
  {"Name":"DI10","Value":"0"},
  {"Name":"DI11","Value":"0"},
  {"Name":"DI12","Value":"0"},
  {"Name":"DI13","Value":"0"},
  {"Name":"DI14","Value":"0"},
  {"Name":"DI15","Value":"0"},
  {"Name":"DI16","Value":"0"}
],
"AnalogInput":[
  {"Name":"AI1","Value":"0"},
  {"Name":"AI2","Value":"0"},
  {"Name":"AI3","Value":"0"},
  {"Name":"AI4","Value":"505"},
  {"Name":"AI5","Value":"0"},
  {"Name":"AI6","Value":"0"},
  {"Name":"AI7","Value":"0"},
  {"Name":"AI8","Value":"0"}
],
"TemperatureInput":[
  {"Name":"TI1","Value":"17.2"},
  {"Name":"TI2","Value":"11.8"},
  {"Name":"TI3","Value":"---"},
  {"Name":"TI4","Value":"---"},
  {"Name":"TI5","Value":"19.2"},
  {"Name":"TI6","Value":"---"},
  {"Name":"TI7","Value":"18.1"},
  {"Name":"TI8","Value":"---"}
],
"Device":{
  "Name":"LOGGER  ",
  "MAC":"E8:EA:DA:00:00:01"
}
}
}

```

10. SD card

The SD card **must be formatted** in advance in FAT16 or FAT32. It is recommended to use a dedicated formatter tool instead of formatting utilities

provided with operating systems. An example of such tool for Windows and Mac OS is [SD Card Formatter 4.0](#).

SmartDEN Logger has a SD card status LED light on the top side of the device which indicates the SD card condition. The following table shows what the SD-LED states mean.

Table 9. SD card LED states

LED status	Meaning
Blinking	SD card is not inserted
OFF	SD card is inserted and working properly
ON	SD card not recognized or error detected



The code of last error can be checked up in SD-card Info page ([7.10](#)).



The SD card can be inserted at any time.



When SD card has to be removed or the device switched OFF, in order not to compromise the data integrity the following procedure should take place:

1. Press and hold the DEFAULT button;
2. Wait until SD-LED indicator become ON;
3. The SD card can be removed or the device switched OFF.

11. Log files format

The format of CSV file name is [YYMMDDNN.CSV](#), where [YY](#) is the year, [MM](#) is the month, [DD](#) is the date the file was created, and [NN](#) is the serial number of the file for the day (N = 0..9, A..Z).

Each file begins with a header:

Date_Time,DI1,DI2,...,DI16,AI1,AI2,...,AI8,TI1,TI2,...,TI8
--

In the exemplary row of the file the values correspond to columns in the header:

2016/08/06 18:35:35,1,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,2,504,0,0,0,0,17.2,0,25.1,0,0,0

12. Security considerations

The **SmartDEN Logger** runs a special firmware and do not have a general-purpose operating system. There are no extraneous IP services found on general-purpose operating systems (e.g. fingerd, tcp_wrapper, etc.) that can possibly be exploited by an unauthorized agent. In particular, the **SmartDEN Logger** does not run protocols such as Telnet and FTP which may have the potential for security breach.

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 the 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 (see [7.5](#)).

13. Mechanical drawing

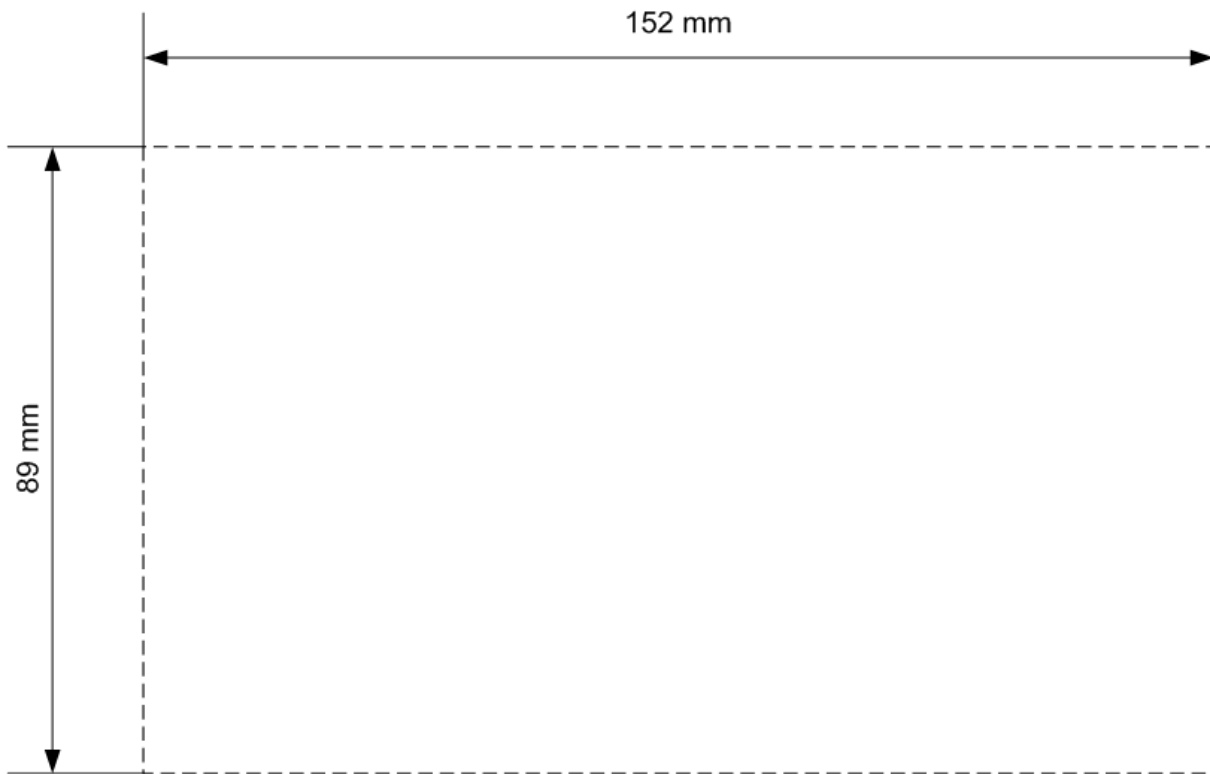


Figure 43. Device size