



Efento Gateway

User manual

V 1.1

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Overview

Efento Gateway is a network device that sends the data from Efento sensors to Efento Cloud or any other cloud platform / server. Efento Gateway can receive and forward to a cloud platform data from up to 128 wireless sensors. Device is equipped with a large memory which stores up to 500 000 measurements from the assigned sensors. If there are any connectivity issues, it will automatically resend the missing data.

Efento Gateway supports many security features, including communication encryption: both between sensors and gateway (AES128) and gateway and server (TLS / SSL), proxy server and custom HTTP headers authorisation.

The device may be powered by USB power supply (5V, 1A) or by PoE (802.3af). Efento Gateway sends the sensor data over REST protocol (HTTPS or HTTP). The range of Efento Gateway is up to 100 meters in the open space and 20 – 30 m in the buildings, depending on the building type (thickness and material of the walls, etc.).

Efento gateway can be configured by the user via a web browser or a free mobile application.

Technical data

| | |
|-------------------------------|---|
| WIRELESS COMMUNICATION | Communication: Bluetooth Low Energy (BLE) Encryption: AES128 Radio frequency: 2,4 GHz Power: 2,5 mW (4 dBm) Range: up to 100 m (LOS) Transmission frequency: 1 s |
| LAN | Standard: IEEE 802.3, IEEE 802.3u Ethernet interface: RJ45 socket, support for PoE 802.3af (802.3at Type 1) |
| SUPPORTED PROTOCOLS | HTTP, HTTPS, REST |
| WORKING CONDITIONS | Working conditions: 0 – 40°C, 10 – 90% RH Indoor use only |
| POWER | Power: Mini USB or PoE Power adapter: MiniUSB 230V AC, 5V DC / 1.0 A Power over Ethernet (PoE) 802.3af (802.3at Type 1) |
| DIMENSIONS | Size: 110 x 80 x 25 mm Weight: 105 g |

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Configuration

Efento Gateway can be configured through a web browser or by a free mobile application for Android. To access the full configuration of the device, use the web browser. Mobile application allows users to configure only the key settings of the gateway, to quickly connect it to Efento Cloud or other cloud platforms.

Before starting the configuration power up the device (either by PoE or USB power supply). If you want to configure the device with the mobile application, connect it to the network switch / router. If you prefer to configure Efento Gateway via a web browser, connect the Ethernet cable to your computer.

Mobile application

You can configure Efento Gateway to work with Efento Cloud through [Efento mobile application](#) for Android. Launch the mobile application and sign it to your Efento Cloud account and from the main application menu select *Organisation settings* -> *Add sensors* -> *Bluetooth Low Energy*, press “Add gateway” button and follow the instructions on the screen.

In order to configure the gateway to work with a third party platform / server using the mobile application from the main menu, select the *Nearby devices*. Press the button on the back of the Efento Gateway twice (the button must be pressed with a pin). The gateway will switch to configuration mode, indicated by a fast flashing blue LED on the gateway’s front panel. The gateway will appear in the list of available devices in Efento mobile application. Select it from the list and key in the password that is on the Gateway enclosure (the default password is *admin*). The application will connect to the gateway and you will have access to all the settings.

Using Efento mobile application you can configure:

- Network settings (DHCP, IP, gateway address, subnet mask, DNS, NTP),
- Address and port of the server, to which the data is sent
- Organization token (http header used when the device sends the data to Efento Cloud)
- Encryption keys enabling Gateway to send data from encrypted sensors



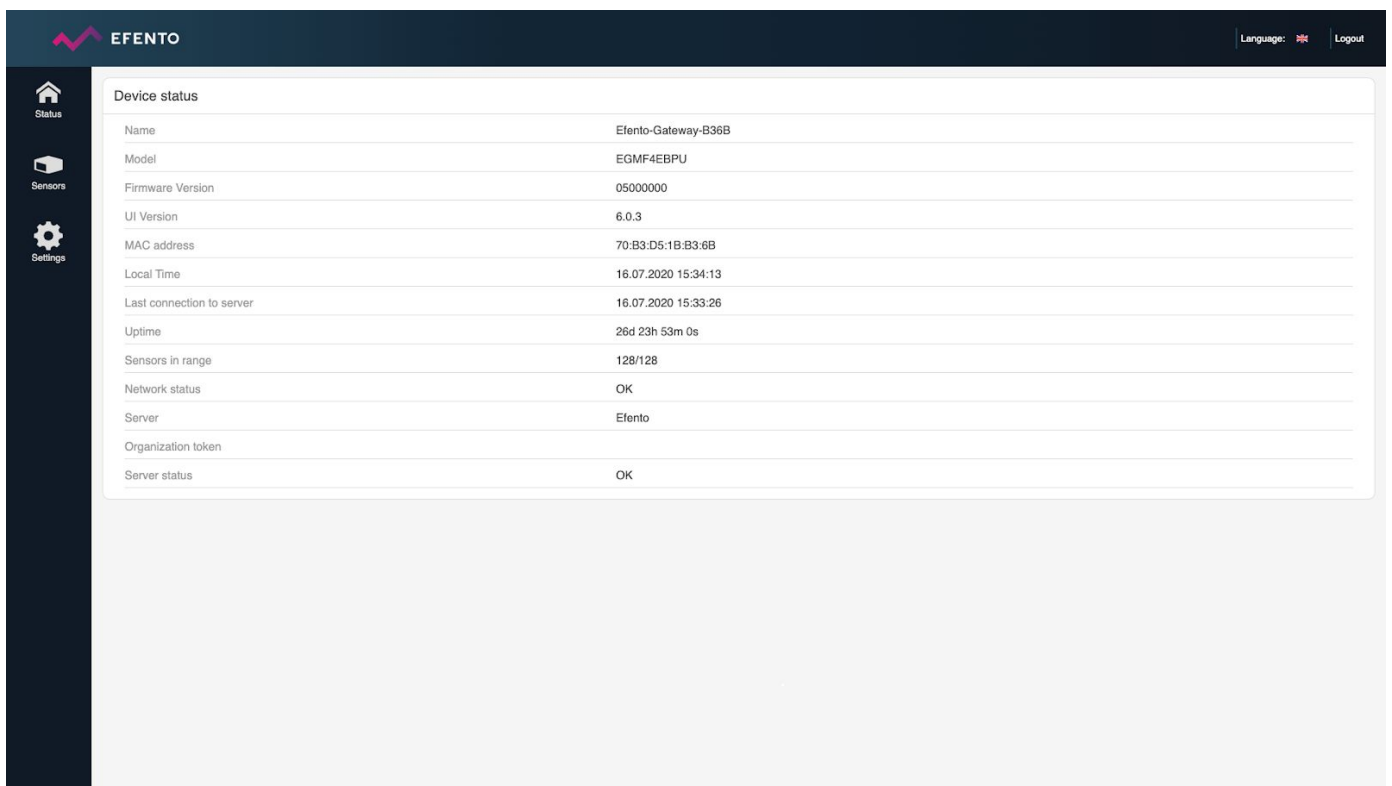
Quickly press the button twice to switch Efento Gateway to configuration mode

Web browser

Connect Efento Gateway to your computer and change computer's IP address to an address from subnet 192.168.120.0/24 (e.g. 192.168.120.2, subnet mask 255.255.255.0) and set it on the network card, to which Efento Gateway is connected. Open an Internet browser on your computer and go to address 192.168.120.89 (default Efento Gateway IP address). Log in to the configuration panel of Efento Gateway (default password: *admin*).

Status

Status tab provides you with the information about the operations of your Efento Gateway. This information may be useful when diagnosing a problem or reporting a bug to the Efento support team.









| Device status | |
|---------------------------|---------------------|
| Name | Efento-Gateway-B36B |
| Model | EGMF4EBPU |
| Firmware Version | 05000000 |
| UI Version | 6.0.3 |
| MAC address | 70:B3:D5:1B:B3:6B |
| Local Time | 16.07.2020 15:34:13 |
| Last connection to server | 16.07.2020 15:33:26 |
| Uptime | 26d 23h 53m 0s |
| Sensors in range | 128/128 |
| Network status | OK |
| Server | Efento |
| Organization token | |
| Server status | OK |

Status tab

- Name, model, firmware version, UI version, MAC address: data used to identify the device along with its name, MAC address and software version.
- Local time: time set on the device
- Last connection to server: timestamp of the last communication with the server. If device has not communicated with server yet, the value will be empty
- Uptime: time since the last reset of the device
- Sensors in range: number of sensors in the range of Efento Gateway. Maximum number of sensors supported by one gateway is 128
- Network status: value indicates the status of the network communication. If the value is "OK", device is able to connect to the Internet

- Server: Information about the server to which the data is sent. If the value is “Efento”, it means the the gateway sends the data to Efento Cloud
- Organisation token: value of the http token used to assign the gateway to an organisation in Efento Cloud
- Server status: status of the communication with the server. If the value is “OK”, the device is able to communicate with the configured server

Sensors

In the Sensors tab you can display all the sensors in the range of Efento Gateway. Along with the serial number of the sensor you can see its name, status, current measurements, signal strength, measurement period, time stamp of the last communication, information if the sensor measurements are buffered in the gateway’s memory (in case of the connectivity problems, gateway will automatically resend the missing measurements), and actions icons (remove, edit). Above the table there is search window, which allows you to find a sensor by its name and filter buttons (     ) that allow you to filter out sensors by their status (downloading the data from the sensor's memory, ok, lost, low battery, issue, encrypted).

| Serial number | Status | Values | Signal | Period | Latest measurement | Saving |
|-------------------------------|--------|-----------|---------|--------|------------------------|--------|
| Efento Sensor 282C0240005E | ✓ | 22.9 [°C] | -64 dBm | 3m | 17:33:00 16.07.2020 | Yes |
| Efento Sensor 282C0240029E | ✓ | 22.8 [°C] | -63 dBm | 3m | 17:30:00 16.07.2020 | Yes |
| Efento Sensor 282C0240029F | ✓ | 22.9 [°C] | -76 dBm | 3m | 17:30:00 16.07.2020 | No |
| Efento Sensor 282C02400330 | ✓ | 22.8 [°C] | -67 dBm | 3m | 17:33:00 16.07.2020 | No |
| Efento Sensor 282C02400536 | ✓ | 23 [°C] | -61 dBm | 3m | 17:30:00 16.07.2020 | No |
| Efento Sensor 282C02400641 | ✓ | 23.3 [°C] | -37 dBm | 3m | 17:30:00 16.07.2020 | No |
| Efento Sensor 282C02400797 | ✓ | 23.7 [°C] | -46 dBm | 3m | 17:30:00 16.07.2020 | No |
| Efento Sensor 282C0240084B | ✓ | 22.9 [°C] | -46 dBm | 3m | 17:30:00 16.07.2020 | No |
| Efento Sensor 282C024008D5 | ✓ | 23.4 [°C] | -58 dBm | 3m | 17:30:00 16.07.2020 | No |
| Efento Sensor 282C02400909 | ✓ | 23.3 [°C] | -59 dBm | 3m | 17:33:00 16.07.2020 | No |
| Efento Sensor 282C02400933 | ✓ | 23.1 [°C] | -64 dBm | 3m | 17:30:00 16.07.2020 | No |
| Efento Sensor 282C024009A9 | ✓ | 23.2 [°C] | -53 dBm | 3m | 17:33:00 16.07.2020 | No |
| Efento Sensor 282C024009F5 | ✓ | 23.2 [°C] | -54 dBm | 3m | 17:33:00 16.07.2020 | No |

“Sensors” tab

If Efento Gateway is configured to work with Efento Cloud, it can automatically synchronise the measurements between its memory and Efento Cloud. The measurements taken by a sensor are saved and buffered in the gateway's memory. In that case, the sensor is marked in blue. If you click on the sensor, you can see the measurements on a chart, table or export them as a txt or csv file. If you want to integrate the

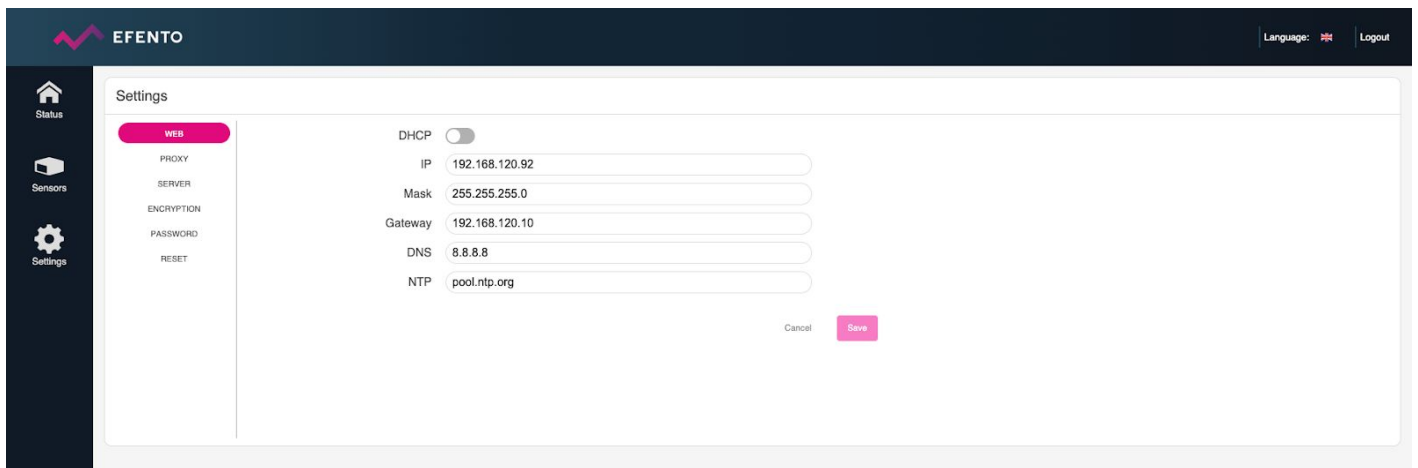
gateway to your solution or to set it to send the data to another cloud platform, you can enable the data buffering feature (described in further parts of the manual).

Settings

Network settings

In the network settings tab you can configure the gateway to allow it to connect to the Internet and send the data to Efento Cloud or any other cloud platform / server.

Efento Gateway supports DHCP. If you set the toggle switch next to DHCP to “ON”, all the network settings of Efento Gateway will be automatically set by the router (Do not forget to turn on the DHCP on the router!). The second option is to manually set all the network parameters (IP address of the Efento Gateway, IP address of network gateway, subnet mask, DNS address). Moreover, you need to set the address of the NTP server, to allow Efento Gateway to pull the time settings from it. You can leave the default settings of the NTP server (pool.ntp.org) or set another server depending on your network requirements.



Network settings tab

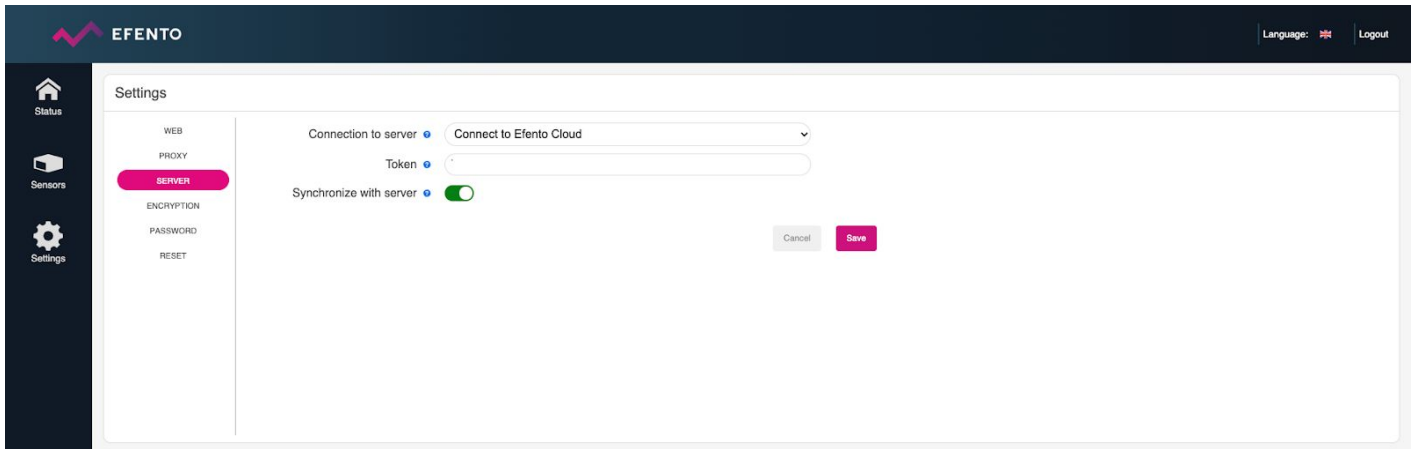
Server settings

In the server settings tab, you can configure the server communication parameters. Efento Gateway can send the data to Efento Cloud or any other server / cloud platform over REST API.

Sending data to Efento Cloud

If you want to set up your gateway to send the data to the Efento Cloud platform, in the “Connection to server” field select “Connect to Efento Cloud”. Key in the Cloud Token in the “Token” field and all the measurements sent by the gateway will be assigned to your organisation on the Efento Cloud platform. In order to check the Cloud Token assigned to your organisation log in to Efento Cloud click on the organisation name in the upper right corner and select “Organisation Token”. Copy the value and paste it in the “Token” field in your gateway. From now on, gateway will send all the measurements from sensors in its range to your organisation in Efento Cloud.

If the “Synchronize with server” toggle is set to “ON” the gateway will automatically synchronise the measurements taken by sensors with Efento Cloud. If there are any disturbances in the communication, gateway will resend the missing measurements to the Cloud. For instance, if a sensor was out of gateway’s range for some time, gateway will download the data from its memory and send it to the cloud once the connection is reestablished. If the gateway was not able to send the data due to Internet connection issues, it will also resend it once the connection is reestablished.



Key in the Organisation Token to assign your gateway to Efento Cloud account

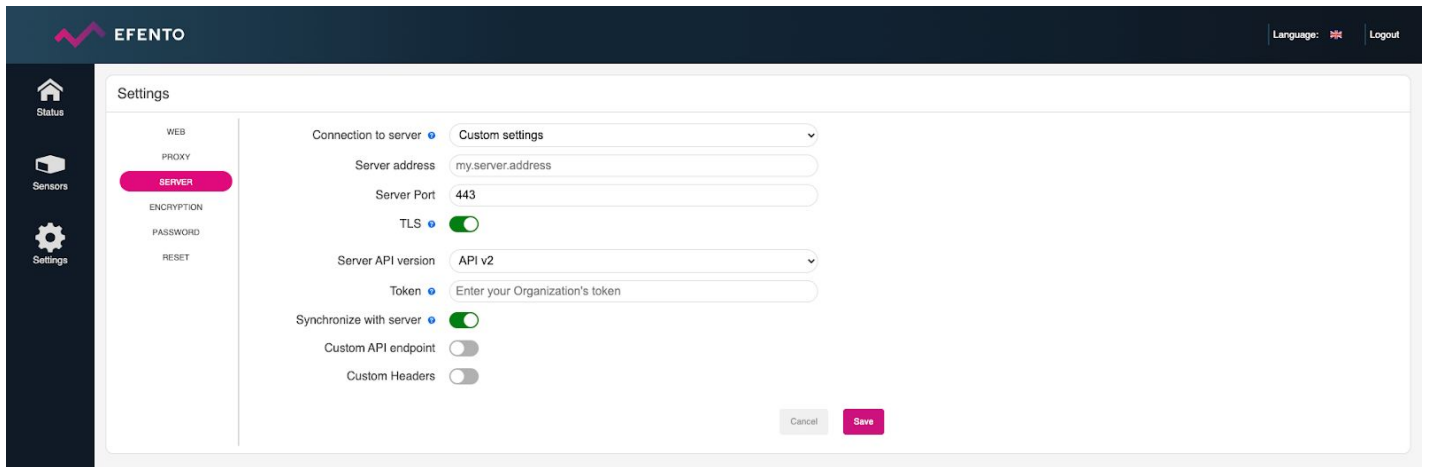
If you do not want the gateway to automatically synchronise the measurements with Efento Cloud or you want it to synchronise only the measurements from the selected sensors, set the “Synchronise with server” toggle to “OFF”. Go to the “Sensors” tab and select measurements from which sensors should be synchronised with the server by manually setting the toggles in the “Saving” column to “ON”.

| Serial number | Status | Values | Signal | Period | Latest measurement | Saving |
|-------------------------------|--------|-----------|---------|--------|------------------------|--------|
| Efento Sensor 282C0240005E | ✓ | 23.6 [°C] | -58 dBm | 3m | 11:00:00 27.07.2020 | ON |
| Efento Sensor 282C0240029E | ✓ | 23.3 [°C] | -74 dBm | 3m | 11:00:00 27.07.2020 | ON |
| Efento Sensor 282C0240029F | ✓ | 23.4 [°C] | -61 dBm | 3m | 11:03:00 27.07.2020 | OFF |
| Efento Sensor 282C02400330 | ✓ | 23.3 [°C] | -67 dBm | 3m | 11:00:00 27.07.2020 | OFF |

You can manually select which sensors should synchronise the data with Efento Cloud

Sending data to a custom server

You can set Efento Gateway to send the data to a custom server. Efento Gateway will send the data over http / https (REST API - POST). In order to set the gateway to work with a custom server, in the “Connection to server” field select “Custom settings”. Fill in the server address (either domain or IP) in the “Server address” field. If you want Efento Gateway to send the data to a custom endpoint, Set the “Custom API endpoint” toggle to “ON” and key in the endpoint. Otherwise, the gateway will send the data to “/api/v2/measurements”.



Efento Gateway can send the data to any server / cloud platform

Efento Gateway allows you to choose, if the communication should be encrypted (TLS) or not. If you want the Gateway to send the data without encryption (http), switch the “TLS” toggle to “OFF”. If Efento Gateway should send the encrypted data (https), set the “TLS” toggle to “ON”. Depending on the server settings and communication type, select the port number, which supports the selected communication type. In the majority of cases, encrypted communication (https) is on port 443, not encrypted communication (http) takes place on port 80 or 8080. These settings however depend on your server and should be consulted with server’s administrators.

If the “Synchronize with server” toggle is set to “ON” the gateway will automatically synchronise the measurements taken by sensors with the server. If there are any disturbances in the communication, gateway will resend the missing measurements to the server. For instance, if a sensor was out of gateway’s range for some time, gateway will download the data from its memory and send it to the server once the connection is reestablished. If the gateway was not able to send the data due to Internet connection issues, it will also resend it once the connection is reestablished. If you do not want the gateway to automatically synchronise the measurements with the server or you want it to synchronise only the measurements from the selected sensors, set the “Synchronise with server” toggle to “OFF”. Go to the “Sensors” tab and select measurements from which sensors should be synchronised with the server by manually setting the toggles in the “Saving” column to “ON”.

By default, Efento Gateway sends the value from the “Token” field in http header. The default http headers look like this:

```
Content-Type: application/json
charset=UTF-8
X-API-Token: <value of the "Token" field>
```

If you want to, you can set the gateway to use custom headers. In order to do that, set the “custom headers” toggle to “ON” and add the header name(s) and its value(s). You can add up to five custom headers. Headers will be sent in the same order as on the headers list. “Content-Type” and “charset” headers are always added to the headers section.

Custom Headers

| | Header | Value | Action |
|---------|-------------------------------------|------------------------------------|---|
| Headers | Token | sdffsWED34sdfFG6wddV3 | |
| | <input type="text" value="Header"/> | <input type="text" value="Value"/> | <input type="button" value="Add header"/> |

You can add up to five custom headers

For instance, if you added a header named "Token" with value "sdffsWED34sdfFG6wddV3", the headers sent by Efento Gateway will look like this:

```
Content-Type: application/json
charset=UTF-8
Token: sdffsWED34sdfFG6wddV3
```



Please note, that the messages sent by the server to the gateway may **not contain more than ten headers**. Any value above that, will be treated as wrong value and gateway will not accept this message.

API

Efento gateway supports two API versions "API v1" and "API v2". API v1 is deprecated and should no longer be used. API v2 specification:

| | |
|-----------------|---|
| ENDPOINT | /api/v2/measurements <i>(if user set other endpoint in "Custom API endpoint" field, measurements will be sent to that endpoint)</i> |
| METHOD | POST |
| HEADERS | Content-Type: application/json charset=UTF-8 X-API-Token: <i><value of the "Token" field></i> <i>(if user set other headers in "Custom headers" section, user's custom headers will be added to the headers)</i> |

Http request body contains measurements in a JSON. One message can contain multiple measurements from one sensor (e.g. if the gateway reestablished the Internet connection and it resends the data) or measurements from multiple sensors - if there are few sensors in gateway's range, gateway will send data from multiple sensors in one message.

```

{
  "measurements" : [
    {
      "serial" : [string], // serial number of the sensor
      "response_handle":[number], // sensor ID in response (optional)
      "battery" : [string], // battery level: ok/low
      "signal" : [number], // RSSI
      "measured_at" : [string], // UTC date
      "measurement_interval" : [number], // measurement interval in seconds
      "next_measurement_at" : [string], // next connection date
      "params" : [
        {
          "channel" : [number], // sensor channel number: 1/2/3
          "type" : [string], // temperature / humidity / pressure / pressure_diff / open-close
          "value" : [string]
        }
      ]
    }
  ]
}

```

Examples of the messages sent by Efento Gateway to the server:

```

{
  "measurements" : [
    {
      "serial" : "282C024FFFB1",
      "response_handle": 1,
      "battery" : "ok",
      "signal" : -70,
      "measured_at" : "2018-10-12 15:28:21",
      "measurement_interval" : 180,
      "next_measurement_at" : "2018-10-12 18:28:21",
      "params" : [
        { "channel" : 1, "type" : "temperature", "value" : 6 }
      ]
    },
    {
      "serial" : "282C024FFFB2",
      "response_handle": 2,
      "battery" : "ok",
      "signal" : -70,
      "measured_at" : "2018-10-12 15:28:21",
      "measurement_interval" : 180,
      "next_measurement_at" : "2018-10-12 18:58:21",
      "params" : [
        { "channel" : 1, "type" : "temperature", "value" : 12},

```

```

        { "channel" : 2, "type" : "humidity", "value" : 51}
    ]
},
{
    "serial" : "282C024FFFB3",
    "response_handle": 3,
    "battery" : "ok",
    "signal" : -70,
    "measured_at" : "2018-10-12 15:28:21",
    "measurement_interval" : 180,
    "next_measurement_at" : "2018-10-12 20:28:21",
    "params" : [
        { "channel" : 1, "type" : "temperature", "value" : 50},
        { "channel" : 2, "type" : "humidity", "value" : 30},
        { "channel" : 3, "type" : "pressure_diff", "value" : 21 }
    ]
},
{
    "serial" : "282C024FFFB4",
    "response_handle": 4,
    "battery" : "ok",
    "signal" : -70,
    "measured_at" : "2018-10-12 15:28:21",
    "measurement_interval" : 180,
    "next_measurement_at" : "2018-10-12 16:28:21",
    "params" : [
        { "channel" : 1, "type" : "open-close", "value" : "open"},
        { "channel" : 2, "type" : "open-close", "value" : "closed"},
        { "channel" : 3, "type" : "open-close", "value" : "closed"}
    ]
}
]
}

```

Server should always answer with **“201 Created”** to a message sent by Efento Gateway. Otherwise, the gateway will consider the message as not received by the server and will resend it in a loop. Moreover, the server should include in the message body the list of the IDs of accepted sensors along with the information, if the gateway should synchronize the measurements of these sensors with the server (ID of each sensor is sent by the gateway in the JSON in the **“response_handle”** field. Response body:

```

{
  "Y": [number], // IDs of sensors, which should be synchronised with the server
  "N": [number] // IDs of sensors, which should NOT be synchronised with the server
}

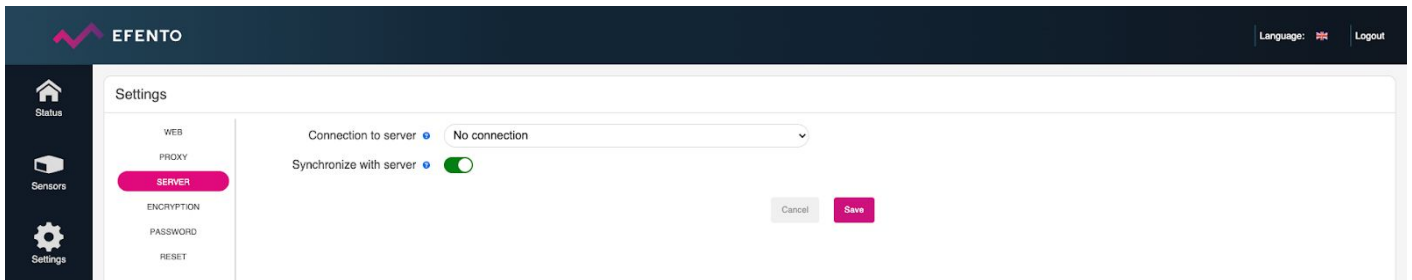
```

Example of the http response sent to the gateway:

```
{
  "Y": [1, 2, 3],
  "N": [4]
}
```

Standalone mode

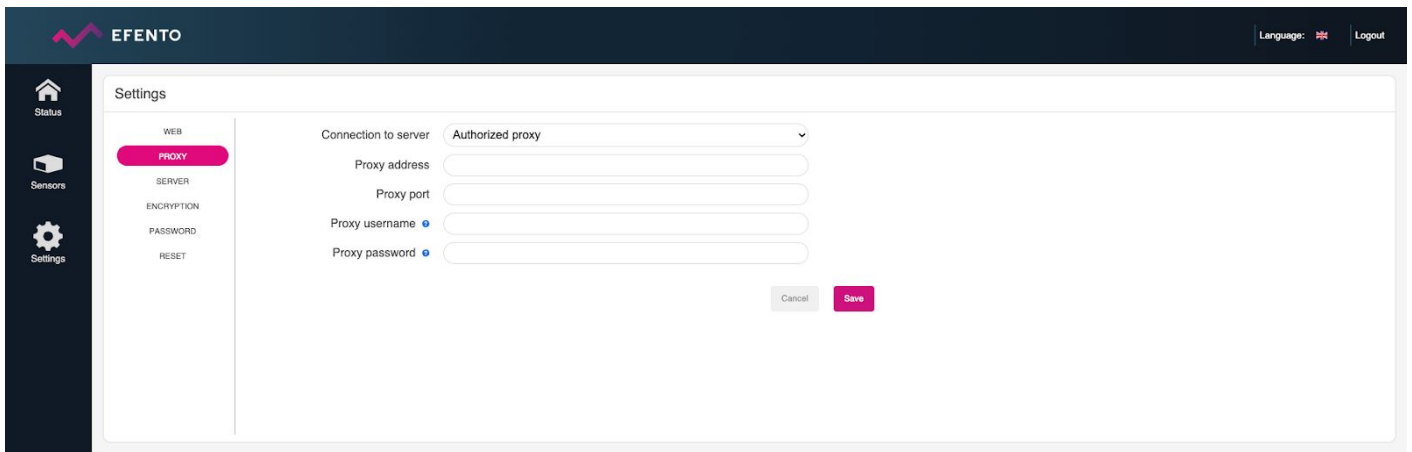
In the standalone mode Efento Gateway saves all the measurements in its memory but does not send the data to the server. Users can log in to the gateway through a web browser, access the measurements and export the data in the form of a csv file. To set the gateway to the standalone mode set the “Connection to server” field to “No connection”.



Efento Gateway can work in a standalone mode

Proxy

Efento Gateway can connect to Efento Cloud or a third party server through a proxy server. Efento Cloud supports both anonymous and non-anonymous proxy servers. To configure proxy settings go to “Proxy” tab, select proxy type, type in server address and port. If you selected a non-anonymous server, key in login credentials.



Proxy settings

Encryption

Communication between Efento sensors and Efento Gateway can be encrypted with a key set by the user. If the communication is encrypted, devices which do not have the encryption key added, will not be able to decode the transmission and read the sensor's measurements. You can add up to five encryption keys to Efento Gateway. Once a key is added, the gateway will be able to decrypt and read the measurements from

all the sensors, which use the same encryption key (you can set the key on the sensors with Efento mobile app).

Password

In the “Password” tab you can change the gateway password. To change the password, type in the new password twice and the old password. **We strongly recommend changing the password during the gateway configuration!**

Reset

In the “Reset” tab, you can:

- Restart the gateway - the device will switch off and on again. It will not restore the default settings
- Reset the gateway - the device will restore factory default settings. All the configuration changes will be lost and you will need to configure the device again