NS312 EC3 Gas Multi

Analog and Digital Electrochemical Gas Sensor

- 1-3 Electrochemical Sensors
- 0-10V Analog Outputs
- RS485 Digital Output
- Wi-Fi HTTPS/MQTT
- 5-60V DC Supply 3W
- 4 Wire Screw Terminals

Overview

The NS312 EC3 Gas Multi sensor is an advanced low voltage multi gas sensor. It features up to 3 installed solid polymer electrode gas sensor modules. Connect the sensor output signal to an RS485 transceiver of a controller, gateway, or data acquisition unit. Or provision for an existing Wi-Fi network for wireless connectivity.

Operation

The NS312 continuously gathers data from its environment, processes it, and transmits it via wired or wireless communication channels. This multifaceted functionality enables a wide range of applications in building automation, environmental monitoring, and occupancy management. Several gas modules are available.

Gases:

- VOC 10ppm
- VOC 200ppm
- Ozone 5ppm
- Formaldehyde 5ppm
- Arsine 1ppm
- Carbon Monoxide 1000ppm

- Hydrogen Sulfide 100ppm
- Oxygen 25%
- Nitrogen Dioxide 100ppm
- Ammonia 100ppm
- Phosphine 20ppm
- Hydrogen 1000ppm

Data Communication and Control:

- **RS485 Digital Output:** The sensor transmits data via an RS485 interface, allowing for wired integration with building management systems (BMS), controllers, gateways, or data acquisition units.

- **Wi-Fi Connectivity:** The sensor supports Wi-Fi connectivity, enabling wireless data transmission via HTTPS or MQTT protocols. This allows for remote monitoring and control over a network.

- **0-10V Programmable Input/Output:** The sensor features a 0-10V programmable input/output, enabling it to control external devices or receive analog signals from other sensors.

- **12V DC Output:** The device provides a 12V DC output, that can be used to power other low voltage devices.

Power Supply:

- The sensor operates on a 5-60V DC power supply, providing flexibility for various installation environments.

- 4 wire screw terminals provide the electrical connections.

Specifications

Sensor modules detect specific gas species. They feature a small form factor allowing up to 3 modules installed in a single device. The solid polymer electrode is stable with a fast response over a wide temperature range. Typical performance is achieved at 20C and 50% RH and 1 atm atmospheric pressure with a reasonable flow rate. The device compensates for temperature change, but best results are achieved at constant temperature. Operate in clean air to avoid sensor fouling.

Part Number	Description	Range (ppm)	Accuracy (ppm)	Resolution (ppm)	Warm Up Time (s)	Response Time (s)	Operating Lifetime *	Storage Life
NS312-VOC-10	VOC	10	0.2	0.01	60	10 to 30s	Up to 3yr	12mo
NS312-VOC-200	VOC	200	1	0.1	60	10 to 30s	Up to 3yr	12mo
NS312-O3-5	Ozone	5	0.05	0.01	60	20 to 60s	Up to 2yr	12mo
NS312-HCHO-5	Formaldehyde	5	0.05	0.01	60	20 to 120s	Up to 3yr	12mo
NS312-ASH3-1	Arsine	1	0.01	0.01	60	10 to 30s	Up to 2yr	12mo
NS312-CO-1000	Carbon Monoxide	1000	2	1	60	10 to 30s	Up to 5yr	12mo
NS312-H2S-100	Hydrogen Sulfide	100	1	0.1	60	10 to 30s	Up to 3yr	12mo
NS312-O2-25	Oxygen	25%	0.5%	0.1%	900	5 to 10s	Up to 5yr	12mo
NS312-NO2-100	Nitrogen Dioxide	100	1	0.1	60	10 to 30s	Up to 3yr	12mo
NS312-NH3-100	Ammonia	100	1	0.1	300	100 to 300s	Up to 3yr	6mo
NS312-PH3-20	Phosphine	20	0.1	0.1	60	10 to 30s	Up to 3yr	12mo
NS312-H2-1000	Hydrogen	1000	2	1	60	10 to 30s	Up to 5yr	12mo

* Clean Air

Operating Temperature	-10C to +50C
Operating Humidity	15 to 95% RH
Storage Temperature	0C to 20C

Product Features and Installation

The product is a small plastic enclosure that can be wall or ceiling mounted. The back mounting plate is removable. Separate the front housing from the back mounting plate. Then use screws or adhesive to secure the plate to the ceiling or wall surface. Reattach the front housing to the back mounting plate. The two pieces snap together without extra screws.
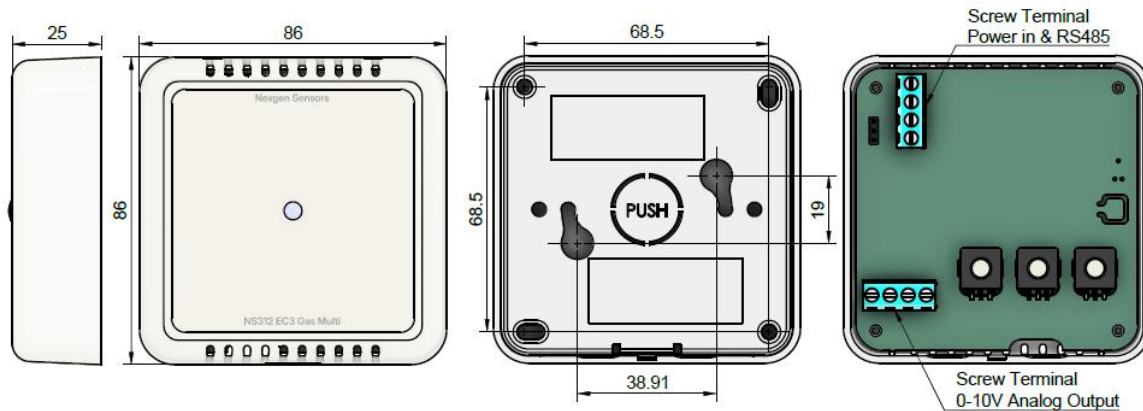
*1 Product Dimensions and Features*

Sensitivity, Output Mode and Type

The sensitivity for each type is described in previous sections:

- Volatile Organic Compounds   VOC ppm
- Ozone   O3 ppm
- Formaldehyde   HCHO ppm
- Arsine   ASH3 ppm
- Carbon Monoxide   CO ppm
- Hydrogen Sulfide   H2S ppm
- Oxygen   O3 %
- Nitrogen Dioxide   NO2 ppm
- Ammonia   NH3 ppm
- Phosphine   PH3 ppm
- Hydrogen   H2 ppm

The output mode is digital

- RS485 115200 Baud
- Jumper 120Ohm terminator if required
- 10 second message period
- ASCII message, sensor, serial number, key-value pairs comma separated, carriage return line feed:

```
sensor NS312,hostname ns-72a0b0,message_id 1,VOC 1 ppm,O3 0 ppm,CO 0 ppm\r\n
```
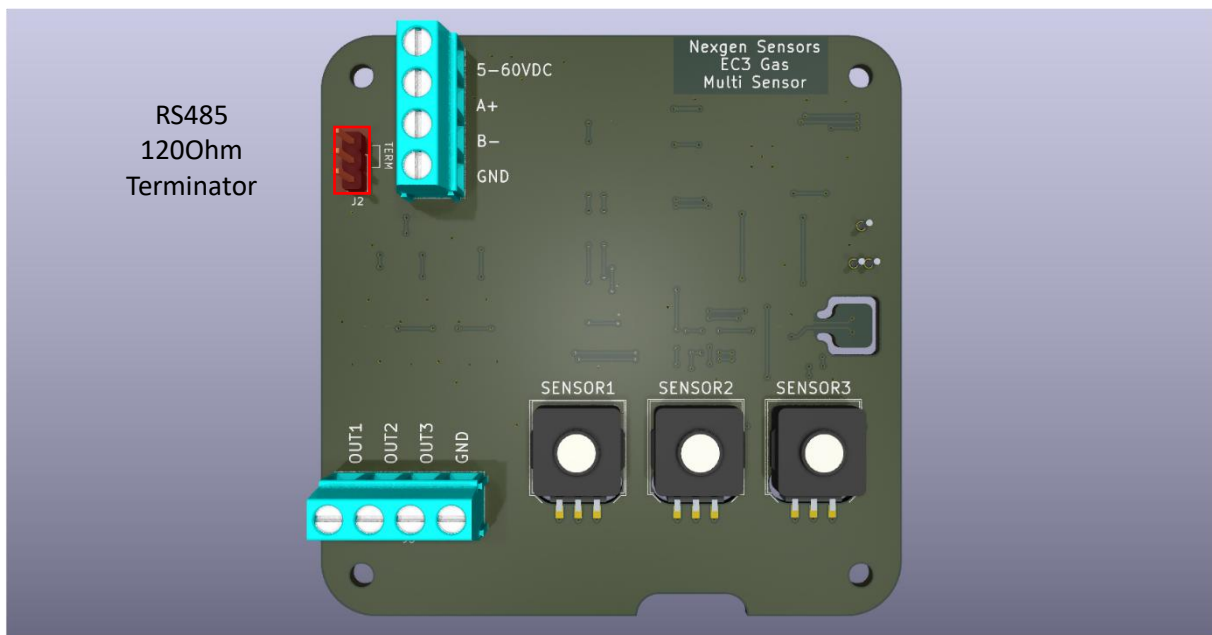

2 Sensitivity and Output Mode Adjustment and Measurement Type

Usage and Wiring

Connect the sensor to an existing controller, gateway, or data acquisition unit (DAQ). Provide a DC supply of 5-60V with at least 3W. Use appropriate wires or cabling. Conductors can be solid or stranded 14-26 AWG. Secure the conductors to the 4 pins of the screw terminals.

5-60VDC   Positive Supply, connect to 5-60V 3W

A+   RS485 A data signal

B-   RS485 B data signal

GND   Negative Supply and signal return, connect to ground or common

Multiple sensors can be wired in parallel. Identify each sensor by serial number. Associate the serial number to the installation location of the sensor. This is useful for extending the sensing range or observing a larger area.
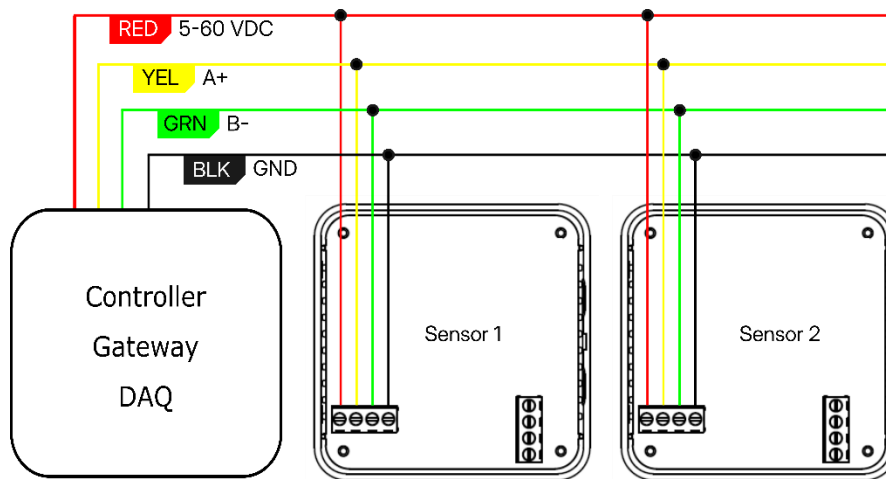
3 Sensor Wiring Diagram

Alternatively, the sensors can operate independently rather than connected to an external controller or gateway. And Wi-Fi connectivity can be used instead of a wired RS485 network. In this example the sensors connect to a local Wi-Fi access point for communication. They are powered by a simple external power supply. Additionally, external data acquisition can be connected to the analog outputs.

12VDC   Positive Output Supply, 12V/100mA for external devices

AN_OUT   0-10V Analog Output, drive up to 25mA

GND   Negative Supply and signal return, connect to ground or common
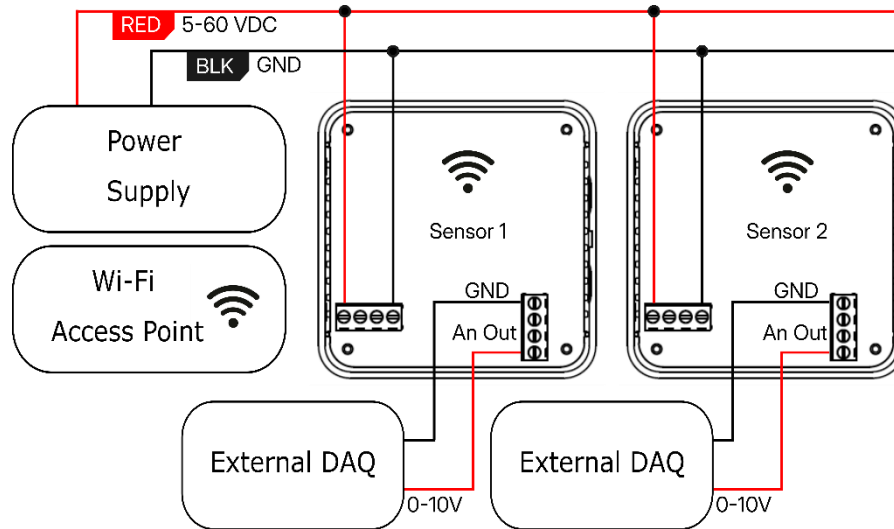
Figure 4 Wireless Network and Programable Analog I/O Usage

WiFi Setup

Provision the WiFi credentials for wireless usage. Use the Web UI hosted by the device. Start by connecting to the device's access point (AP). The SSID is the device hostname. For example "ns-72a0b0". You can use the QR codes on the device for quick access.

Figure 5 Device QR Codes

1. Follow the WiFi code to connect to the access point (AP).
2. Then follow the Setup Code or otherwise browse to 192.168.4.1/setup.html.
3. Enter your local WiFi SSID and password.
4. Click Connect
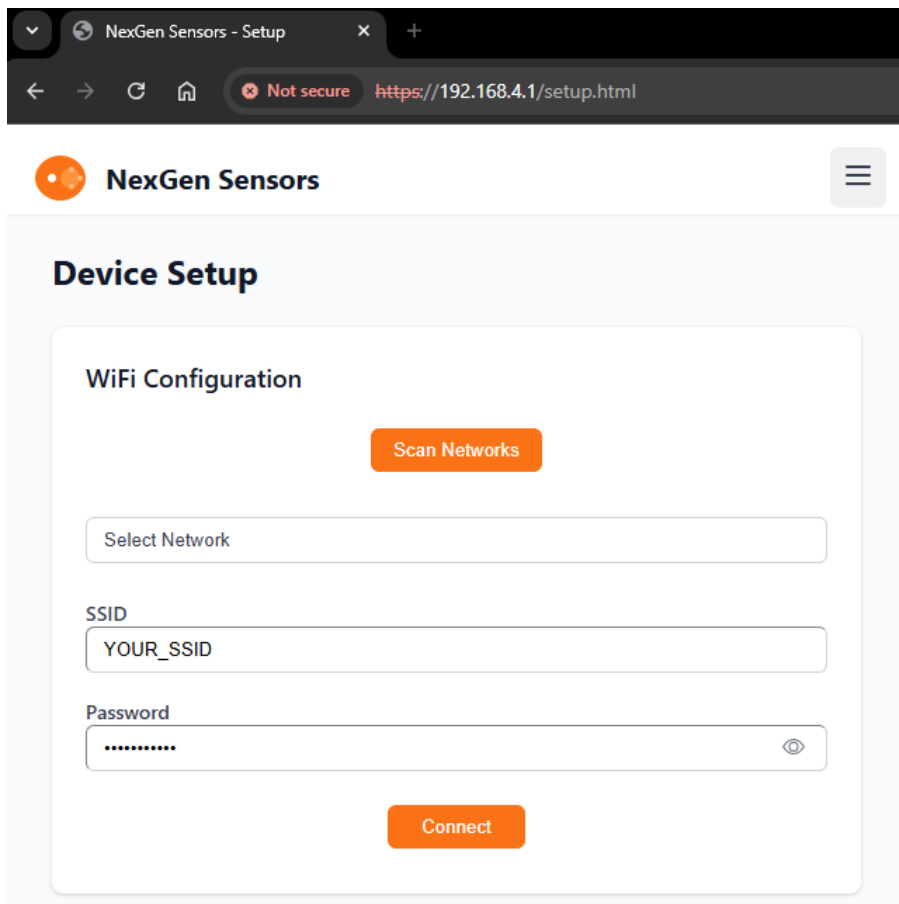
Figure 6 Web UI WiFi Setup

View the device status to verify your local WiFi is connected. Also verify the device internet is connected. Internet connectivity is necessary to access the data remotely. For local access internet is not required.

Device Status

Hostname: ns-72a0b0
WiFi Connected: yes
Internet Connected: yes
AP Connected: yes
MQTT Connected: no

Restart   Reload
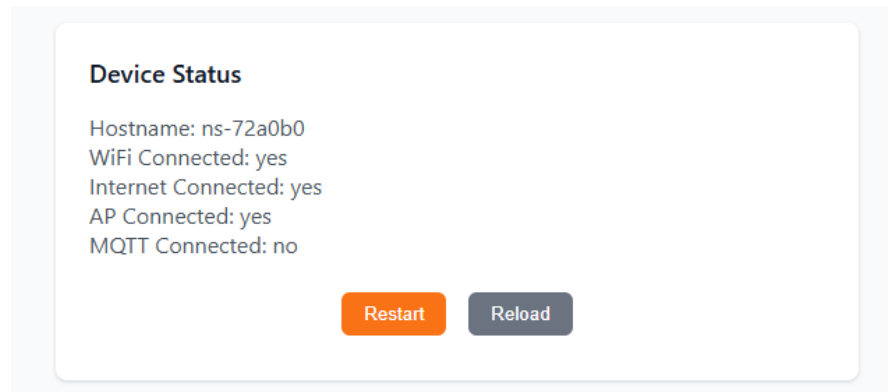
Figure 7 Device Status WiFi and Internet Connected

For normal operation do not connect to the device's access point. This is indicated in the status "AP Connected: yes". Click the Restart button to disconnect from the device's access point.

Device Status

Please wait, redirecting to ns-72a0b0 in 20 seconds ...

Restart   Reload
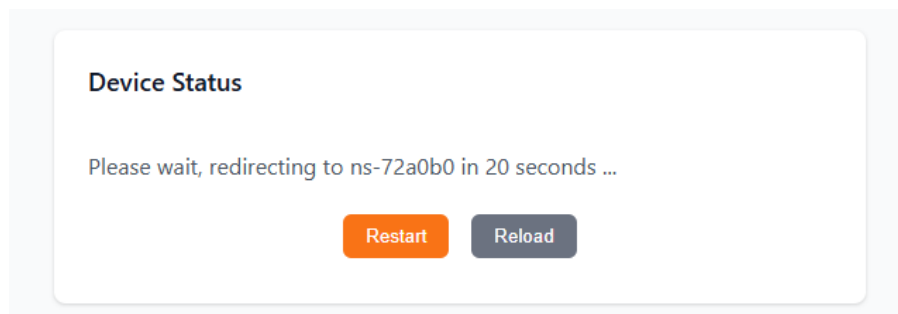
Figure 8 Device status restarting.

After the device restarts, the page will redirect to hostname.local for example "https://ns-72a0b0.local/".
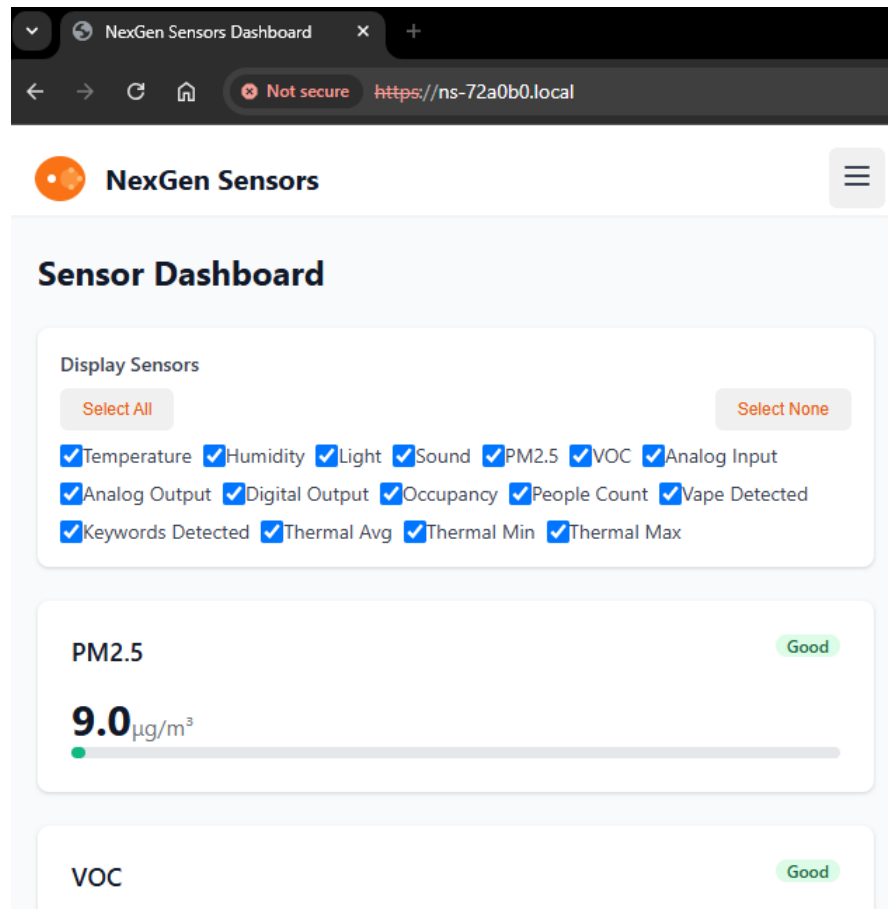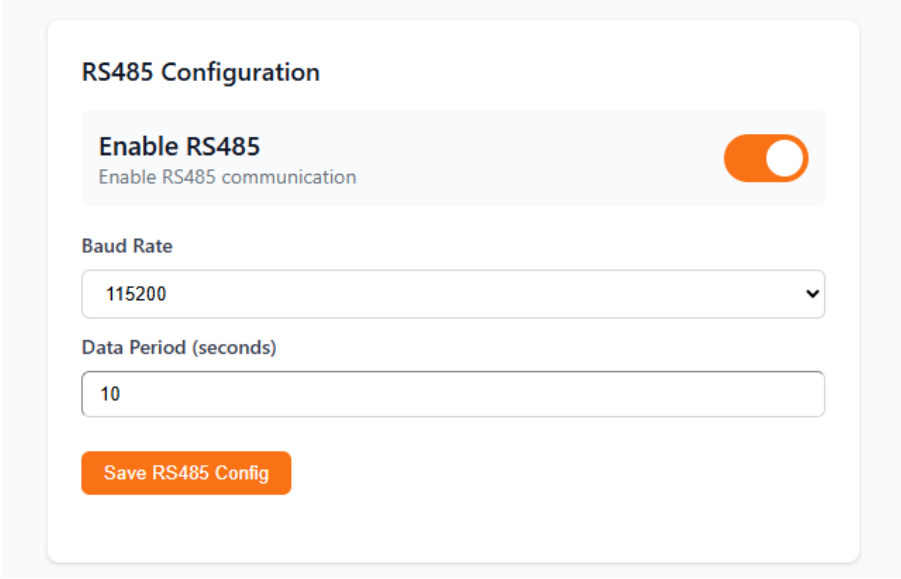
Figure 9 Web UI Dashboard at hostname.local

RS485 Configuration

The device default data communication is via RS485. The baud rate is fixed at 115200. The default data period is 10 seconds. This can be adjusted by changing the period in the Web UI Setup. The RS485 data can also be disabled in not needed. Click Save button after making changes.
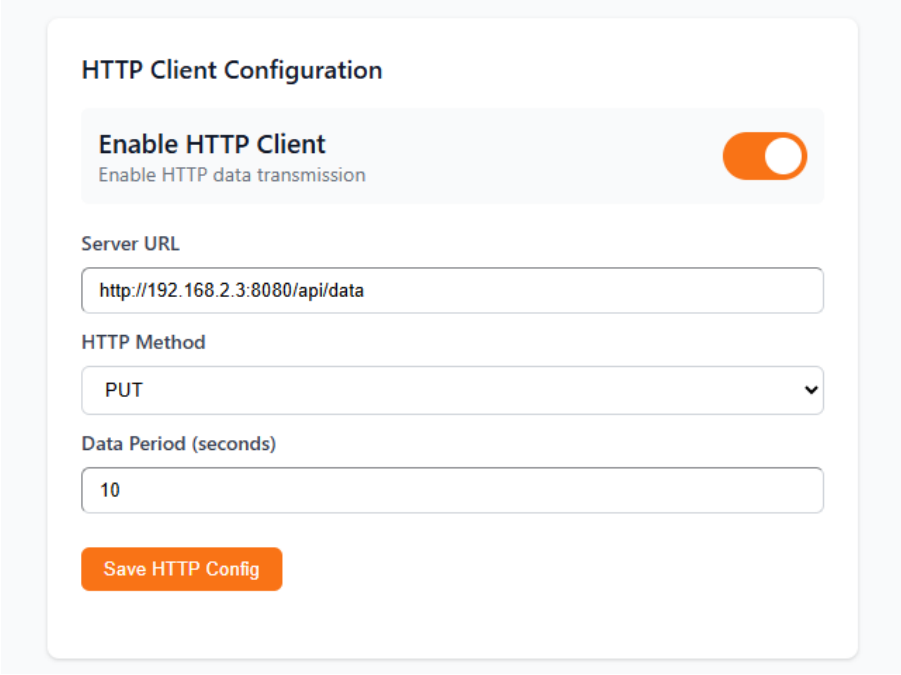
Figure 10 Web UI Setup RS485 Configuration

HTTP Client Configuration

The HTTP Client can be enabled to send data to a server using either PUT or POST methods. Use the Web UI Setup to set the Server URL. This should be the endpoint at which the data can be received. Specify the method either PUT or POST. And set the data period. This is a synchronous feature for data logging. Click save after making changes.
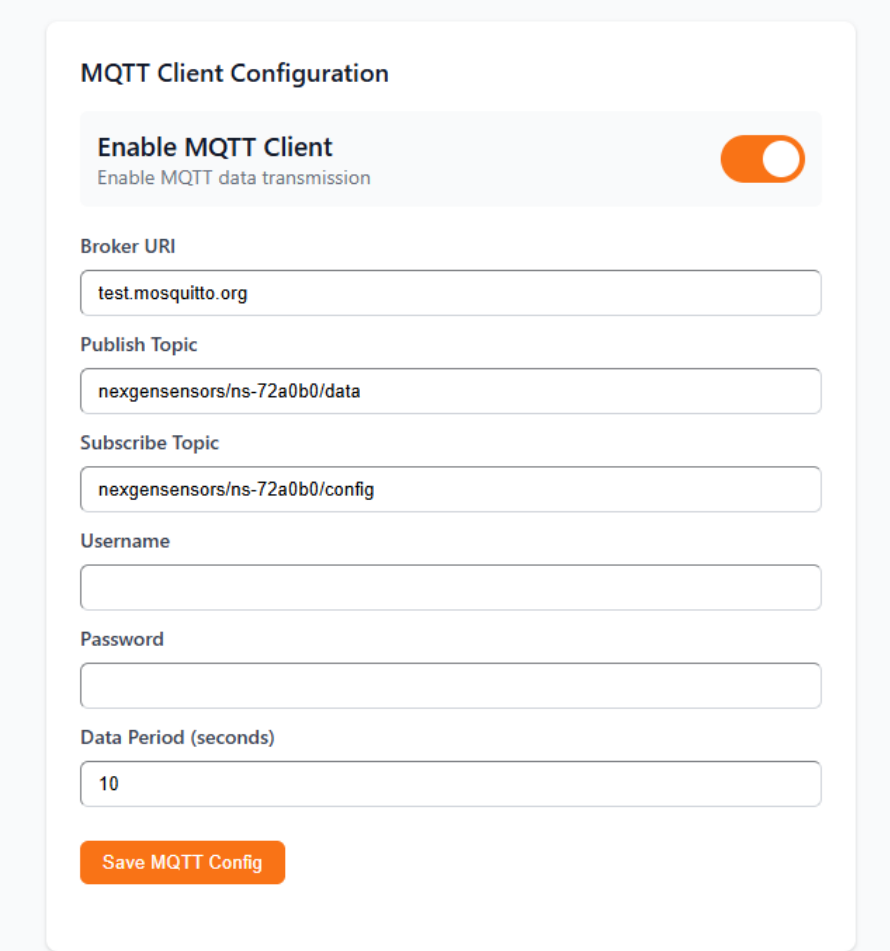
Figure 11 Web UI Setup HTTP Client Configuration

MQTT Client Configuration

The MQTT Client can be enabled to send data to a MQTT broker. Use the Web UI Setup to set the Broker URI and the topic at which the data is published. Username and Password credentials are optional. Leave blank if no authorization is necessary. Finally, set the data period and click Save.

Figure 12 Web UI Setup MQTT Client Configuration