

FUSION™ SATELLITE Quick Start

FreeWave Edge for Modbus and Fusion Satellite



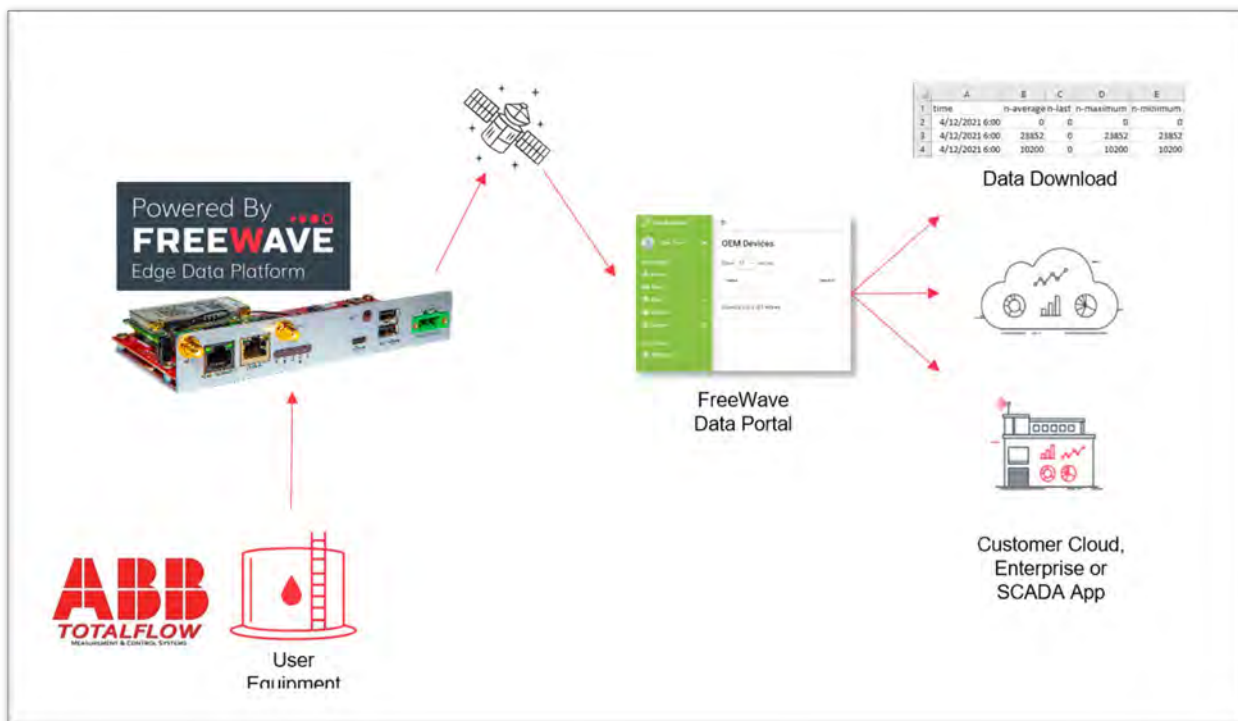
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Overview

The Fusion Satellite with support for FreeWave Edge & Modbus allows you to automatically publish your industrial equipment data from any location to your SCADA system.

FreeWave provides a cloud portal to make it easy to download the satellite data and automatically move the data to your Enterprise, Cloud, or SCADA system.



YOU WILL NEED

1. A computer running Windows with an available USB port and USB-C cable
2. A Fusion Satellite with FreeWave Edge Software
3. A Modbus Device

PURCHASES REQUIRED

1. Fusion Satellite
 - a. Includes FreeWave Edge & Modbus
 - b. Includes FreeWave Cloud Portal

Purpose Of This Guide

This guide will walk you through the end-to-end data flow for connecting a Modbus Device to Fusion Satellite and retrieving your data from the FreeWave Cloud Portal.

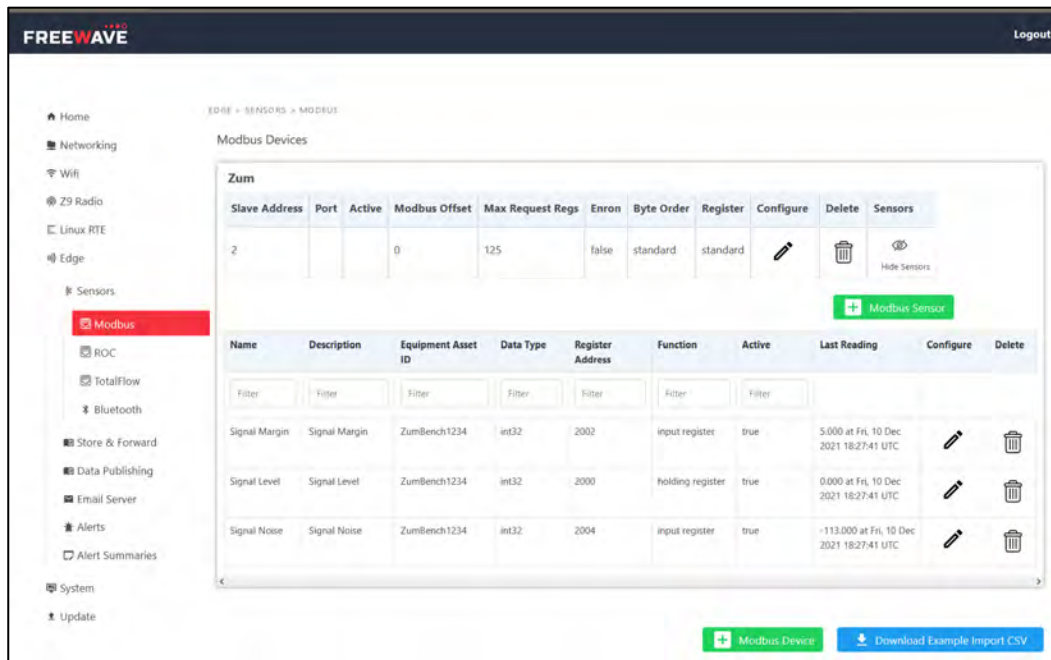
This guide assumes you have a deployed and connected Fusion Satellite device.

For the Fusion Satellite Quick Start Guide - <https://www.freewave.com/getting-started-with-fusion/>

Configure FreeWave Edge Polling

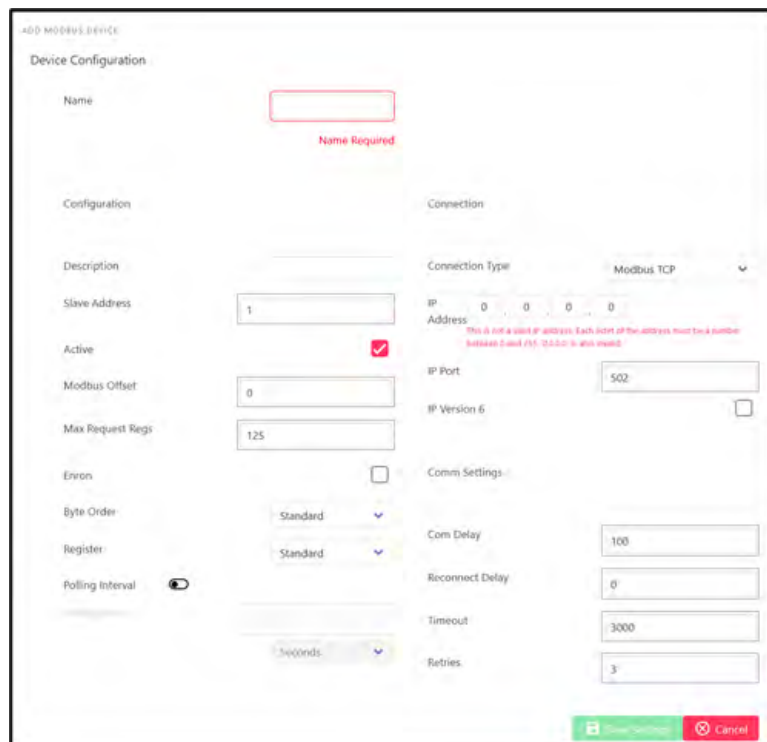
All Protocol Drivers in FreeWave Edge are separated into a “Device” which typically represents each PLC or Flow Computer or RTU or other industrial field equipment.

Under each Device are the “Sensors” also known as Tags or Registers associated with that device.



Add Modbus Device

1. Go to the Protocol Tab for Edge > Sensors > Protocol.
Add a Device using the “Add Device” button
2. Enter the IP Address and connection details for your device
3. Make sure to set your polling interval for your device. All tags or sensors created under this device will use this same polling interval.



Add Modbus Registers

1. To add tags manually, under each Device, use the "Add Sensor" button to add the relevant sensor & register details for each of your Sensors/Registers/Tags
2. Use the "Last Readings Column" and the "Refresh Last Readings" button to ensure that the Edge software is correctly reading from your device

ADD MODBUS SENSOR

Sensor Configuration

Name

Name Required

Equipment Asset ID

Description

Register Address

Data Type

Function

Active

OPERATION NOTE: Once you are seeing correct "Last Readings" on the Sensors tab, that indicates that data is being received and is stored in the database and is ready for Store & Forward.

- Home
- Networking
- Wifi
- Z9 Radio
- Linux RTE
- Edge
- Sensors
- Store & Forward

EDGE > SENSORS

All Sensors

Sensor Name	Equipment Asset ID	Last Reading
<input type="text" value="Filter"/>		
Metairie\Pressure	Bench1234	101.575 at Mon, 28 Feb 2022 23:30:48 UTC
Metairie\Diff Pressure	Bench1234	52.476 at Mon, 28 Feb 2022 23:30:48 UTC
Metairie\Flowrate	Bench1234	40085.490 at Mon, 28 Feb 2022 23:30:48 UTC

Configure Satellite Store & Forward

1. Go to the "Store & Forward" Tab

2. Choose Your Store & Forward Interval

The default data plan supports a 1 Hour Interval.

3. Choose Your Sensors to Include

- Use the checkboxes to select the most important data you want included in your data payloads.
- The green "Message Size" bar shows how many bytes in each message are used, or if the total data size will go to more than 1 message.

Operation Note: Make sure to take a note or screenshot of the Satellite Store & Forward Page with the Sensor IDs, Sensor Names, and Asset IDs. The Cloud Data Exports will only include Sensor ID numbers at this time.

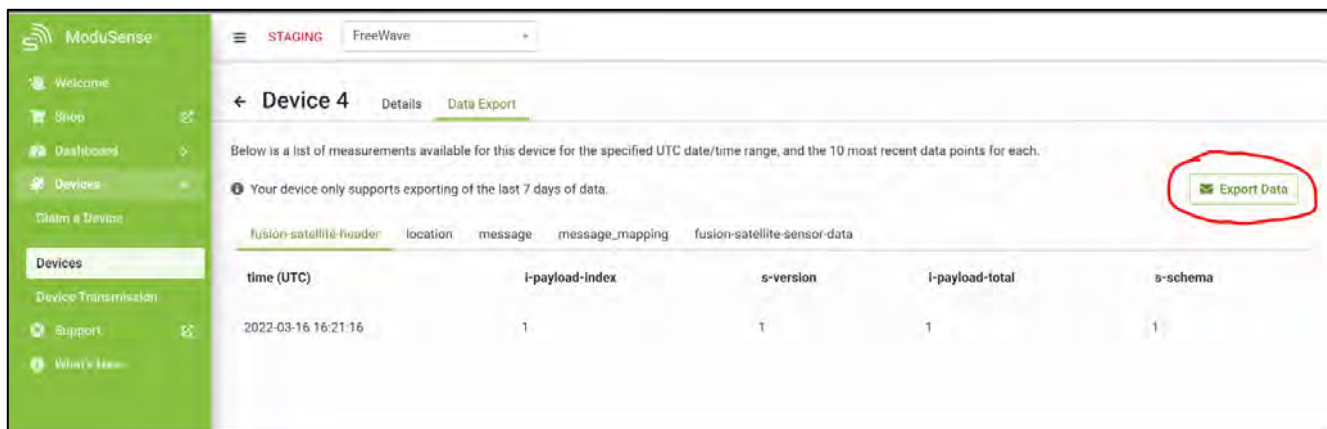
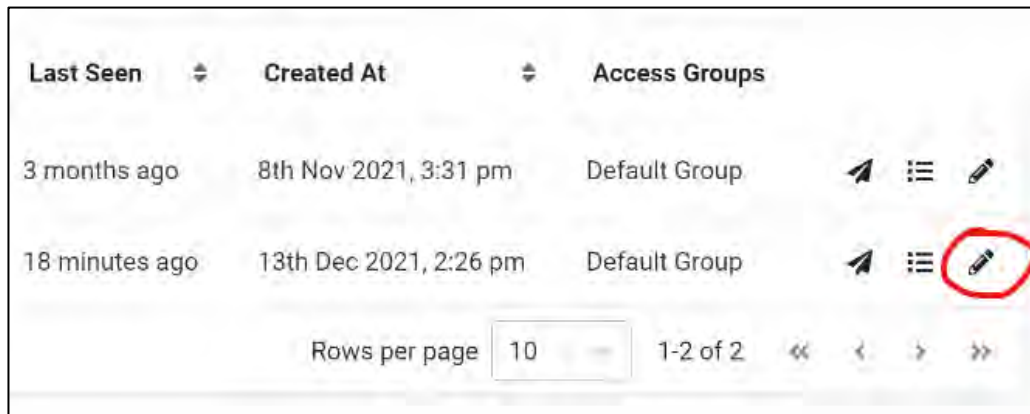
Publish Location
 Latitude & Longitude
 Altitude
 Speed
 Direction

Message & Payload Size
 16 of 184 Bytes in 1 Message(s)
 Message Size: 16

	ID	Name	Device Asset Id	Data Type	Size
<input type="checkbox"/>	1	Metairie\Pressure	Bench1234	float32	4
<input type="checkbox"/>	2	Metairie\Diff Pressure	Bench1234	float32	4
<input type="checkbox"/>	3	Metairie\Flowrate	Bench1234	float32	4
<input type="checkbox"/>	4	Zum\Signal Level	ZumBench1234	int16	2
<input type="checkbox"/>	5	Zum\Signal Noise	ZumBench1234	int16	2
<input type="checkbox"/>	6	Zum\Signal Margin	ZumBench1234	int32	4

Download Your Data from the Cloud

1. On the Device List in the FreeWave Provided cloud portal at portal.modusense.com
2. Click the "Edit" button and "Data Export" tab
3. You can view a snapshot of the most recent messages on the page.
4. Click the Export button to select the data you wish to export
5. The Excel file with your selected data will be e-mailed to your account (check your spam folders if necessary)



	A	B	C	D	E	F	G
1	time	n-average	n-last	n-maximum	n-minimum	s-index	uuid
2	4/12/2021 6:00	0	0	0	0	9	41939986-abab-4c7f-b520-4f89b814785c
3	4/12/2021 6:00	23852	0	23852	23852	8	41939986-abab-4c7f-b520-4f89b814785c
4	4/12/2021 6:00	10200	0	10200	10200	14	41939986-abab-4c7f-b520-4f89b814785c

Automatically Send Data to SCADA

Your external Cloud, Enterprise, or SCADA server can receive new data via the Cloud REST API or Webhooks

REST API is a Request/Response paradigm and is useful for retrieving data history in batches

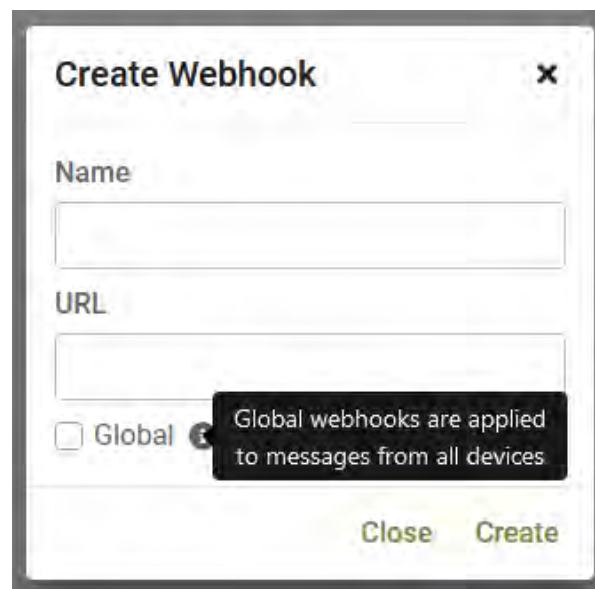
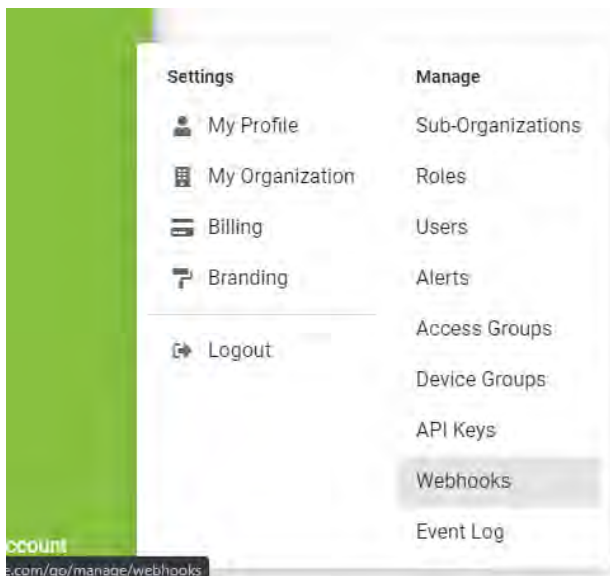
Webhook is a Push or Event-Based paradigm and is useful for immediate publishes of new data.

If your cloud, SCADA, or enterprise apps needs the new data as soon as it is published, we recommend using Webhooks.

There are many web development tools such as <https://webhook.site>, which can be used for testing webhooks before integrating into your own application.

Account Setup

Webhooks can be setup in the portal by clicking your profile in the bottom left and navigating from there.



Webhook Usage

You will create a webhook in your SCADA system that will be configured to receive data from the cloud.

Every time new satellite data is available, it will be pushed to the webhook you created within your SCADA system and assigned to your account or device in the FreeWave portal. Webhooks can be assigned either globally to all devices in your account or to only certain devices.

All webhooks are sent from the outgoing IP address 103.14.216.238.

All messages are sent as Json and will have the user-agent ms-consumer. Requests will accept encoding gzip.

A webserver that is receiving these messages should return a 200 OK as a response once a message is received. If a 200 is not received the message will be placed onto the queue and retried after a delay. This delay will increase on repeated failure up to a maximum of 1 week, where the message will then be dropped.

Data Format

```
{
  "type": "decoded",
  "data": {
    "deviceId": "00000000-0000-0000-0000-000000000000",
    "measurements": [
      {
        "data": {
          "i-voltage": 4000
        },
        "name": "battery"
      },
      {
        "data": {
          "n-value": 521.206771
        },
        "name": "temperature"
      },
      {
        "data": {
          "b-charging": true,
          "b-fault": false,
          "i-voltage": 18340
        },
        "name": "charge"
      },
      {
        "data": {
          "b-motion": false,
          "b-pulse": false,
          "n-x-axis": 0,
          "n-y-axis": 1,
          "n-z-axis": 0
        },
        "name": "accelerometer"
      },
      {
        "data": {
          "i-altitude": 23,
          "i-uncertainty": 10,
          "n-latitude": -41.838875,
          "n-longitude": 171.7799
        },
      },
    ]
  }
}
```

Appendix

Advanced Configuration Notes

Claim Your Device In Cloud Portal

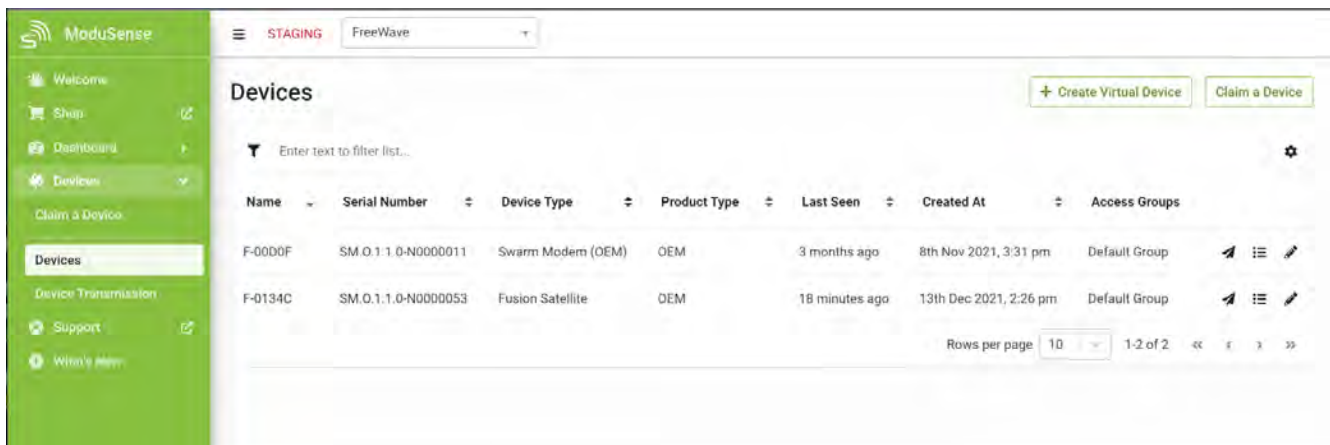
As part of the Fusion Satellite Quick Start Guide, you should have created your Portal Account and Claimed Your Device. If you haven't, that is required before downloading your data.

To do this you need to register and log on to your account in the FreeWave Data Portal at portal.modusense.com

Once logged in, you can use the 'Claim a Device' function to adopt the Gateway. To do this you will need the unique, one-time Claim Token – found on the card included in the box.

Once a message has been sent from the Fusion device to the satellite, it will be relayed to the cloud and appear under your account in the data portal. To view it, login to the portal, find your device under "Devices".

You should see a "Last Seen" field that represents when your device last sent a message from the satellite



Product Type	Last Seen	Created At
OEM	3 months ago	8th Nov 2021, 3:31 pm
OEM	18 minutes ago	13th Dec 2021, 2:26 pm

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! Important! Data Plan Note

If you choose an Interval greater than once per hour, you will receive multiple warnings that you will exceed 750 messages per month (which is the max allowed for 1 data plan).

If you have purchased more data plans/stacked plans (up to 4) you can do figure the math and select a faster Store & Forward interval for your deployment scenario. In all cases, the system will still send messages at the interval you choose, and you are responsible for any overage charges.

Example: 30 Minute Interval

The screenshot shows a configuration interface with three tabs: 'Minutes', 'Hourly', and 'Daily'. The 'Minutes' tab is selected. Below the tabs is a text input field containing '30' and a label 'minute(s)'. Below this is a label 'Max messages per month 1488'. At the bottom, there is a red warning triangle icon followed by the text 'More than 750 Messages per Month!'.

Example: Max Tags for 1 Data Plan with 1 Hr Interval

You can Double or Triple your Sensors by reducing message interval to 2 or 3 hours, or by stacking data plans

Selected Datasets	Max Float32 Tags in 1 Message
All Statistics, All GPS	12 Tags
All Statistics, No GPS	13 Tags
Last Readings, All GPS	32 Tags
Last Readings, No GPS	36 Tags

! Important! Data Storage Note

The FreeWave provided cloud portal by default will save data for the last seven (7) days. Please download, or connect your enterprise system, to store and save the data in your own system.

For FreeWave custom dashboards for your operation, which include longer data storage time periods, please contact your FreeWave Sales Representative.

Other Useful Links

FreeWave Getting Started: <https://www.freewave.com/getting-started-with-fusion/>



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