ERBESSD INSTRUMENTS®

# Phantom System Setup Guide

## Version 4

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# About Erbessd Instruments Phantom®

## What are Phantoms?

Phantoms are a versatile line of machine health monitoring products. There are **Phantom sensors** for monitoring vibration, speed, temperature or current. There are also Phantom sensors capable of wirelessly transmitting data from 2vPP sensors, 4-20mA process sensors and 0-10V process sensors. Phantoms transmit their data via secure, encrypted Bluetooth Low Energy (BLE) 5.0 transmission to Wi-Fi or Ethernet-networked **Phantom Gateways**. The Gateway then delivers the sensor data to the Phantom system database, which can reside on Erbessd's EI-Analytic cloud-hosted database service, a third-party cloud database, or locally on a network server or PC.

Erbessd Instruments systems and data are protected by a comprehensive Information Security program. For details please visit the Erbessd website at: https://www.erbessd-instruments.com/data-security-and-it-security-statement/

## Phantom Vibration Sensor Specifications

### Gen 3 Expert Triaxial Sensors

Released in January 2023, the third generation of Expert vibration sensors feature an IP69 product rating, and easy-to-replace CR2477 batteries. Two models are available, the **EPH-V10E** is a *High Sensitivity* sensor with a frequency range from 0.5 Hz to 4kHz; the **EPH-V11E** is a *High Range* sensor with a frequency range of 10 Hz to 10K Hz.

| | |
|---|---|
| Sensor Type | Triaxial MEMS Accelerometer |
| Dynamic Range(V10E) | 2/4/8g Selectable |
| Dynamic Range(V11E) | 8/16/32g Selectable |
| Sensor Accuracy | ± 3dB |
| Freq Range (V10E) | 0.5Hz–4kHz (x,y), 1.8kHz (z) |
| Noise Floor (V10E) | 130µg/√Hz |
| Freq Range (V11E) | 10Hz–10kHz (x,y), 5.1kHz (z) |
| Noise Floor (V11E) | 630µg/√Hz |
| Sample Rate | 25600 samples per second* |
| Internal Temperature Accuracy | ±5°C |
| Operating Temperature Range | -40 to 80°C (-40 to 176°F) |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 47 x 33mm (1.85 x 1.3in) |
| Weight | 185grams (6.5oz) |
| Battery Type | 3V Lithium CR2477 |
| Battery Life | 65,000 Recordings** |
| Transmission Type | Encrypted 2.4 GHz BLE 5.0 |
| Range to Gateway | 200m, Line of sight*** |
| Product Rating | IP69 |

* The sampling rate is selectable – see table in the next section.

** Battery life is directly affected by temperature, frequency of alarms, and other factors independent of user settings.

*** Ideal environment, with no competing signals or obstructions, using Long Range scanning mode. Regular mode range is 100 meters.



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## ATEX Triaxial Sensor

Two ATEX sensors are available, the **EPH-V15** *High Sensitivity* and the **EPH-V16** *High Range* models. The battery in the ATEX sensor is not replaceable.

| | |
|---|---|
| Sensor Type | Triaxial MEMS Accelerometer |
| Dynamic Range(V15) | 2/4/8g Selectable |
| Dynamic Range(V16) | 8/16/32g Selectable |
| Sensor Accuracy | ± 3dB |
| Freq Range (V15) | 0.5Hz–4kHz (x,y), 2.5kHz (z) |
| Noise Floor (V15) | 120µg/√Hz (x,y), 200µg/√Hz (z) |
| Freq Range (V16) | 10Hz–10kHz (x,y), 5.1kHz (z) |
| Noise Floor (V16) | 630µg/√Hz (x,y), 900µg/√Hz (z) |
| Sample Rate | 25600 samples per second |
| Internal Temperature Accuracy | ±5°C |
| Operating Temperature Range | -40 to 80°C (-40 to 176°F) |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 35 x 24mm (1.4 x 0.9in) |
| Weight | 78grams (3.5oz) |
| Battery Type | 3V Lithium CR2032 |
| Battery Life | 12,000 Recordings |
| Transmission Type | Encrypted 2.4 GHz BLE 5.0 |
| Range to Gateway | 200m, Line of sight (long range mode) |
| Product Ratings | IP67 / MIL-STD-810G |
| ATEX Class Certification | Ex ic IIC T6 Gc X & Ex ic III Dc X |

## Expert Triaxial Sensors

Sold until January 2023, the first generation of Expert triaxial vibration sensors included the **EPH- V10** *High Sensitivity*, and the **EPH-V11** *High Range*. A battery retrofit kit is available for existing V10/V11 sensors to allow use of easier-to-replace and more cost-effective CR2477 batteries.

| | |
|---|---|
| Sensor Type | Triaxial MEMS Accelerometer |
| Dynamic Range(V10) | 2/4/8g Selectable |
| Dynamic Range(V11) | 8/16/32g Selectable |
| Sensor Accuracy | ± 3dB |
| Freq Range (V10) | 0.5Hz–4kHz (x,y), 2.5kHz (z) |
| Noise Floor (V10) | 120µg/√Hz (x,y), 200µg/√Hz (z) |
| Freq Range (V11) | 10Hz–10kHz (x,y), 5.1kHz (z) |
| Noise Floor (V11) | 630µg/√Hz (x,y), 900µg/√Hz (z) |
| Sample Rate | 25600 samples per second |
| Internal Temperature Accuracy | ±5°C |
| Operating Temperature Range | -40 to 80°C (-40 to 176°F) |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 48 x 34mm (1.85 x 1.3in) |
| Weight | 177grams (3.5oz) |
| Battery Type | 3.6V Lithium TL-5935 |
| Battery Life | Up to 100,000 Recordings |
| Transmission Type | Encrypted 2.4 GHz BLE 5.0 |
| Range to Gateway | 200m, Line of sight (long range mode) |
| Product Ratings | IP67 / MIL-STD-810G |

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## Gen 2 Expert Triaxial Sensors

The second generation of Expert sensors, the **EPH-V17** *High Sensitivity* and **EPH-V18** *High Range,* are smaller in size with the same MEMS accelerometer as the first generation. These sensors were discontinued in January 2023.

| | |
|---|---|
| Sensor Type | Triaxial MEMS Accelerometer |
| Dynamic Range(V17) | 2/4/8g Selectable |
| Dynamic Range(V18) | 8/16/32g Selectable |
| Sensor Accuracy | ± 3dB |
| Freq Range (V17) | 0.5Hz–4kHz (x,y), 2.5kHz (z) |
| Noise Floor (V17) | 120µg/√Hz (x,y), 200µg/√Hz (z) |
| Freq Range (V18) | 10Hz–10kHz (x,y), 5.1kHz (z) |
| Noise Floor (V18) | 630µg/√Hz (x,y), 900µg/√Hz (z) |
| Sample Rate | 25600 samples per second |
| Internal Temperature Accuracy | ±5°C |
| Operating Temperature Range | -40 to 80°C (-40 to 176°F) |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 35 x 24mm (1.4 x 0.9in) |
| Weight | 78grams (3.5oz) |
| Battery Type | 3V Lithium CR2032 |
| Battery Life | 12,000 Recordings |
| Transmission Type | Encrypted 2.4 GHz BLE 5.0 |
| Range to Gateway | 200m, Line of sight(long range mode) |
| Product Ratings | IP67 / MIL-STD-810G |

For all generations of Expert and ATEX vibration sensors, the sampling rate and resulting recording time are selectable.

**V10, V17, V10E and V15 High Sensitivity sensors**

| | | | | | |
|---|---|---|---|---|---|
| Recording time (s) 3 axes | 1 | 2 | 4 | 8 | 16 |
| Recording time (s) 1 axes | 3 | 6 | 12 | 24 | 48 |
| Sample rate (Hz) | 25,600 | 12,800 | 6400 | 3200 | 1600 |
| Max frequency (Hz) [x,y] | 4000 | 4000 | 2500 | 1250 | 625 |
| Max frequency (Hz) [z] | 1800 | 1800 | 1800 | 1250 | 625 |
| Lines of Resolution | 6400 | | | | |
| Spectral noise (@10 Hz) | 130 µg√Hz | | | | |

**V11, V18, V11E and V16 High Range sensors**

| | | | | | |
|---|---|---|---|---|---|
| Recording time (s) 3 axes | 1 | 2 | 4 | 8 | 16 |
| Recording time (s) 1 axes | 3 | 6 | 12 | 24 | 48 |
| Sample rate (Hz) | 25,600 | 12,800 | 6400 | 3200 | 1600 |
| Max frequency (Hz) [x,y] | 10,000 | 5000 | 2500 | 1250 | 625 |
| Max frequency (Hz) [z] | 5100 | 5000 | 2500 | 1250 | 625 |
| Lines of Resolution | 6400 | | | | |
| Spectral noise (@10 Hz) | 630 µg√Hz | | | | |



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# Phantom Specialty Sensor Specifications

## Temperature Sensors

Erbessd offers two types of Phantom temperature sensor, the EPH-T20 is a non-contact spot infrared radiometer, and the EPH-T25 supports K type thermocouples and has 3 channels. Thermocouple cables are sold separately in lengths up to 5 meters.

| | |
|---|---|
| Sensor type | **EPH-T20** spot radiometer |
| Temperature Range - Object | -70 to 380°C (-94 to 716°F) |
| Temperature Range - Base | -40 to 80°C (-40 to 176°F) |
| Temperature Range -Ambient | -40 to 125°C (-40 to 257°F) |
| Sensor Accuracy | ±5°C |
| Resolution | 0.25°C (0.45°F) |
| Effective Range | 1 to 10 cm |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 48 x 34mm (1.85 x 1.3in) |
| Weight | 177grams (3.5oz) |
| Battery Type | 3.6V Lithium TL-5935 |
| Battery Life | 3-5 years |
| Transmission Type | Encrypted 2.4 GHz BLE 5.0 |
| Range to Gateway | 100 meters line of sight |
| Product Ratings | IP67 / MIL-STD-810G |

| | |
|---|---|
| Sensor type | **EPH-T25** K typeThermocouple |
| Temperature Range - Object | -100 to 1250°C (-212 to 2282°F) |
| Temperature Range - Base | -40 to 80°C (-40 to 176°F) |
| Temperature Range -Ambient | -40 to 80°C (-40 to 176°F) |
| Channels | 3 |
| Sensor Accuracy | ±5°C |
| Resolution | 0.25°C (0.45°F) |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 100mm x 77mm x 26mm (3.9x3x1 in.) |
| Weight | 138 grams (4.9oz) |
| Battery Type | 2 x AAA Lithium |
| Battery Life | 12,000 measurements |
| Transmission Type | Encrypted 2.4 GHz BLE 5.0 |
| Range to Gateway | 100 meters line of sight |
| Product Ratings | IP67 / MIL-STD-810G |

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## Thermographic Camera

The Erbessd **EPH-T70** Phantom thermographic camera has a 32 by 24 pixel infrared sensor array with a 110 degree high by 75 degree wide field of view. It is intended for use with objects/targets at a distance of 1 meter (approx 39 in.) or less.

| | |
|---|---|
| Sensor type | **EPH-T70** Thermographic IR Camera |
| Temperature Range - Object | -40 to 300°C (-40 to 572°F) |
| Temperature Range - Base | -40 to 75°C (-40 to 176°F) |
| Field Of View (FOV) | 110°high by 75°wide |
| Frames to capture | 1 to 16 |
| Capture Rate | 0.25 to 4 fps |
| Sensor Accuracy | ±1°C |
| Max distance to object | 1 meter |
| Size | 100mm x 77mm x 26mm (3.9x3x1 in.) |
| Weight | 140 grams (5oz) |
| Battery Type | 2 x AAA Lithium |
| Battery Life | 1-2 years |
| Transmission Type | Encrypted 2.4 GHz BLE 5.0 |
| Range to Gateway | 100 meters line of sight |
| Product Ratings | IP5X |

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The area monitored by the EPH-T70, based on the Field Of View (FOV) is shown in the tables below

**Erbessd EPH-T70 Thermographic Camera 32x24 pixels**

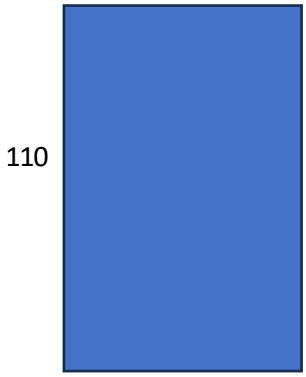
**Camera mounted horizontally**

| | Imaged area | |
|---|---|---|
| distance (cm) | Height | Width |
| 5 | 14.28 | 7.67 |
| 10 | 28.56 | 15.35 |
| 15 | 42.84 | 23.02 |
| 20 | 57.13 | 30.69 |
| 25 | 71.41 | 38.37 |
| 30 | 85.69 | 46.04 |
| 40 | 114.25 | 61.39 |
| 50 | 142.81 | 76.73 |
| 60 | 171.38 | 92.08 |
| 70 | 199.94 | 107.43 |
| 80 | 228.50 | 122.77 |
| 90 | 257.07 | 138.12 |
| 100 | 285.63 | 153.47 |

**Camera mounted vertically**

| | Imaged area | |
|---|---|---|
| distance (cm) | Height | Width |
| 5 | 7.67 | 14.28 |
| 10 | 15.35 | 28.56 |
| 15 | 23.02 | 42.80 |
| 20 | 30.69 | 57.20 |
| 25 | 38.37 | 71.40 |
| 30 | 46.04 | 85.69 |
| 40 | 61.39 | 114.25 |
| 50 | 76.73 | 142.82 |
| 60 | 92.08 | 171.38 |
| 70 | 107.43 | 199.94 |
| 80 | 122.77 | 228.50 |
| 90 | 138.12 | 257.07 |
| 100 | 153.47 | 285.63 |

**FOV 110 x 75 degrees**



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## Current Sensor

The Erbessd **EPH-C31** current sensor supports 4 channels up to 500 Amperes. Four types of current clamp are available -50A, 100A, 250A and 500A. (sold in sets of 3)

| | |
|---|---|
| Sensor Type | **EPH-C31** Current |
| Current Clamps | 50A/100A/250A/500A |
| Frequency | 50-400Hz |
| Sensor Accuracy | 50A ±0.5%/100A ±1.5%/250A & 500A ±1% |
| Channels | 4 |
| Operating Temperature Range | -40 to 80°C (-40 to 176°F) |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 100mm x 77mm x 26mm (3.9x3x1 in.) |
| Weight | 138 grams (4.9oz) |
| Battery Type | 2 x AAA Lithium |
| Battery Life | 12,000 measurements |
| Transmission Type | Encrypted 2.4 GHz BLE 5.0 |
| Range to Gateway | 100 meters line of sight |
| Product Ratings | IP67 / MIL-STD-810G |

## Speed Sensor

The **EPH-S40** speed sensor uses a Hall effect sensor/magnet(included with sensor).

| | |
|---|---|
| Sensor Type | **EPH-S40** Tachometer |
| Switching Speed | 600k RPM |
| RPM Range | 0-200,000 RPM |
| Sensor Gap | 5mm to 15mm (0.2 in to 0.6 in) |
| Receiver | Hall Effect Omni-polar |
| Magnet type | Neodymium |
| Operating Temperature Range | -40 to 80°C (-40 to 176°F) |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 100mm x 77mm x 26mm (3.9x3x1 in.) |
| Weight | 138 grams (4.9oz) |
| Battery Type | 2 x AAA Lithium |
| Battery Life | 12,000 measurements |
| Transmission Type | Encrypted 2.4 GHz BLE 5.0 |
| Range to Gateway | 100 meters line of sight |
| Product Ratings | IP67 / MIL-STD-810G |

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## General Purpose Sensors

Erbessd offers a variety of general-purpose sensors.

| Sensor Type | Interface | Channels |
|---|---|---|
| EPH-G60 | 2 V peak-to-peak sensors | 2 |
| EPH-G61 | 4-20 mA sensors | 4 |
| EPH-G62 | Dry Contact | 4 |
| EPH-G63 | 0-10 Volts sensors | 4 |

EPH-G60

EPH-G61

EPH-G62

EPH-G63

All four general purpose sensors share the following specifications:

| | |
|---|---|
| Operating Temperature Range | -40 to 80°C (-40 to 176°F) |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 100mm x 77mm x 26mm (3.9x3x1 in.) |
| Weight | 138 grams (4.9oz) |
| Battery Type | 2 x AAA Lithium |
| Battery Life | 12,000 measurements |
| Transmission Type | Encrypted 2.4 GHz BLE 5.0 |
| Range to Gateway | 100 meters line of sight |
| Product Ratings | IP67 / MIL-STD-810G |

## GP-8

The GP8 is a universal wireless adapter to interface with standard ICP accelerometers

| | |
|---|---|
| Sensor Type | Universal Accelerometer Wireless Adapter |
| Power Supply | 5VDC / 1A |
| Input Connector | BNC female |
| Channels | 8 Channels |
| Sampling Rate | 31,250 Hz |
| Internal Temperature Accuracy | ± 5 °C (± 41 °F) |
| Operating Temperatures | -40 to 75 °C (-40 to 167 °F) |
| Size | 102mm x 83mm x 51mm (4x3.3x2 in.) |
| Weight | 350 grams (12.5 oz) |
| Transmission Type | 2.4 GHz BLE 5.0 |
| Distance Range | 100 meters line of sight |
| IP Rating | IP65 |

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# Phantom Gateway Specifications

## Gateway Version 1

Gateway version 1 was end-of-sale in January 2023, replaced by Gateway 2.0.

The specifications include:

| | |
|---|---|
| Product Code | **EPH-GW** |
| Receiver Type | Encrypted 2.4 GHz BLE 5.0 |
| BLE Reception/WiFi Transmission Range | 100 meters line of sight |
| Operating Temperature Range | -40 to 80°C (-40 to 176°F) |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 88 x 69 x 30mm (3.4 x 2.5 x 1.2 in.) |
| Weight | 165 grams (5.9 oz) |
| Antenna Connector | Two RP-SMA male |
| Input Power | 5 VDC - 2 Amps |
| Wi-Fi Protocol | 802.11 B and G |
| IEEE Standard Compliance | IEEE 802.3 |
| Mounting | Dinrail |
| Sensor Capacity | 100 |
| Comm Protocols Supported | Modbus TCP/IP, UDP/HTTPS/DHCP |
| Wired Nework Interface | RJ-45 Ethernet 10/100 |

## Gateway 2.0

Gateway 2.0 was released in January 2023 and is the only version currently for sale.

The specifications for Gateway 2.0 are:

| | |
|---|---|
| Product Code | **EPH-GW2** |
| Receiver Type | Encrypted 2.4 GHz BLE 5.0 |
| BLE Reception/WiFi Transmission Range | 200m, Line of sight (long range mode) |
| Operating Temperature Range | -7 to 60 °C (20 to 140 °F) |
| Storage Temperature Range | -60 to 105°C (-76 to 221°F) |
| Size | 88 x 69 x 30mm (3.4 x 2.5 x 1.2 in.) |
| Weight | 170 grams (6.1 oz) |
| Antenna Connector | Two RP-SMA male |
| Input Power | Dual power - 5 VDC (4-pin connector) or 9-24 VDC |
| Input Current Required | 2 Amps |
| Wi-Fi Protocol | 802.11 B and G |
| IEEE Standard Compliance | IEEE 802.3 |
| Mounting | Dinrail |
| Sensor Capacity | 200 |
| Comm Protocols Supported | ModbusTCP/IP, UDP/HTTPS/DHCP/MQTT/OPC UA |
| Wired Nework Interface | RJ-45 Ethernet 10/100 |
| Storage Capacity | 100,000 recordings on embedded Micro SD Card |

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## System Requirements for DigivibeMX Phantom Software

Minimum desktop PC, laptop or tablet computer system requirements for *DigivibeMX Phantom* software installation:

- 64-bit (x64) system is required. **32-bit (x86) systems are not compatible with DigivibeMX Phantom**
- Windows 10 or newer OS preferred
- Intel® Celeron® processor (1.60 GHz / 400MHz) or higher
- 4GB RAM minimum (8GB recommended)
- SVGA/HDMI (touch screens are supported)
- Minimum of 500 MB disk space
- Ethernet/WiFi connection (for communication with EI-Gateway)

## Required Software for DigivibeMX

- **MySQL Connector Net 6.5.4** (Included with system purchase)
- **SSCERuntime_x64** (For SQLCe, included with system purchase)
- **MicrosoftEdgeWebview2 Plugin** (Included with system purchase)
- **Acrobat Reader 7.0** or higher (for opening user manual and reports)

## Other Software

- **EI-Monitor:** (also called EI-Monitoring)Phantom system monitoring software - <u>used for local network databases only</u> (Included with system purchase)
- **WiSER VIBE Pro**– free mobile app used as an option to collect on-demand recordings from Phantoms
- **Phantom Manager mobile app (**for iOS and Android) – only required for EPH-T70 Thermographic Camera Live View feature. (no cost to download from Google Play Store or the Apple App Store)


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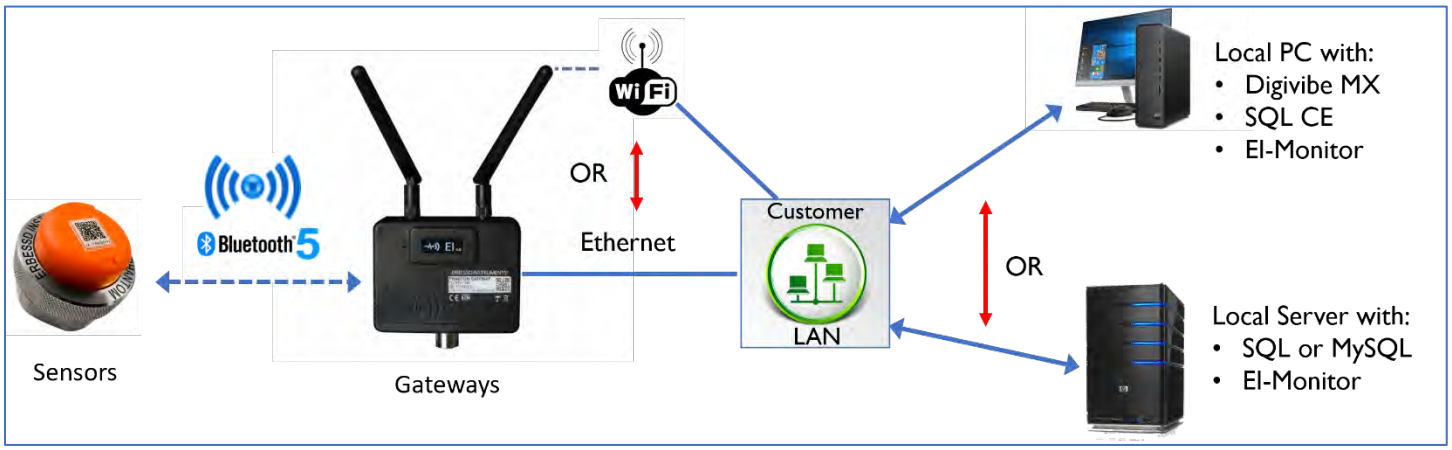
## Phantom System Configuration Options

Phantom is a versatile system, compatible with a wide range of off-the shelf hardware. It is impossible to predict all of the unique hardware and software configurations a user might implement, in order to adapt a Phantom system for their specific needs. There are 3 primary configuration models for receiving data from a Phantom system, described as follows:

### Option 1 - Local Database

The Phantom system supports SQL CE databases, typically used on a PC. Note – SQL CE has a 4 Gb file size limitation. Phantom also supports SQL and MySQL databases, usually resident on a server.

- DigivibeMX Phantom software is required to manage the database and analyze sensor data.
- EI-Monitor software, which relays data from the gateways to the local database, also needs to be installed, preferably on the same PC/server as the database.
- The gateways send data to EI-Monitor on Ethernet **TCP port 11050**.
- The EI Monitor software relays data to the local database on **TCP port 1433** for SQL servers, or **TCP Port 3306** for MySQL servers.
- Static or Dynamic (DHCP) IP addressing is supported. When Static addressing is selected, the DNS server can also be configured.
- If the EI-Monitor and the Phantom gateways are configured in separate VLANs or subnets, routing between them must be established.
- The Web Portal (app.eianalytics.com) and the WiSER VIBE Pro app for IOS/Android are <u>not</u> supported with local databases.
- Notifications via email/WiSER VIBE Pro app are not supported with local databases.





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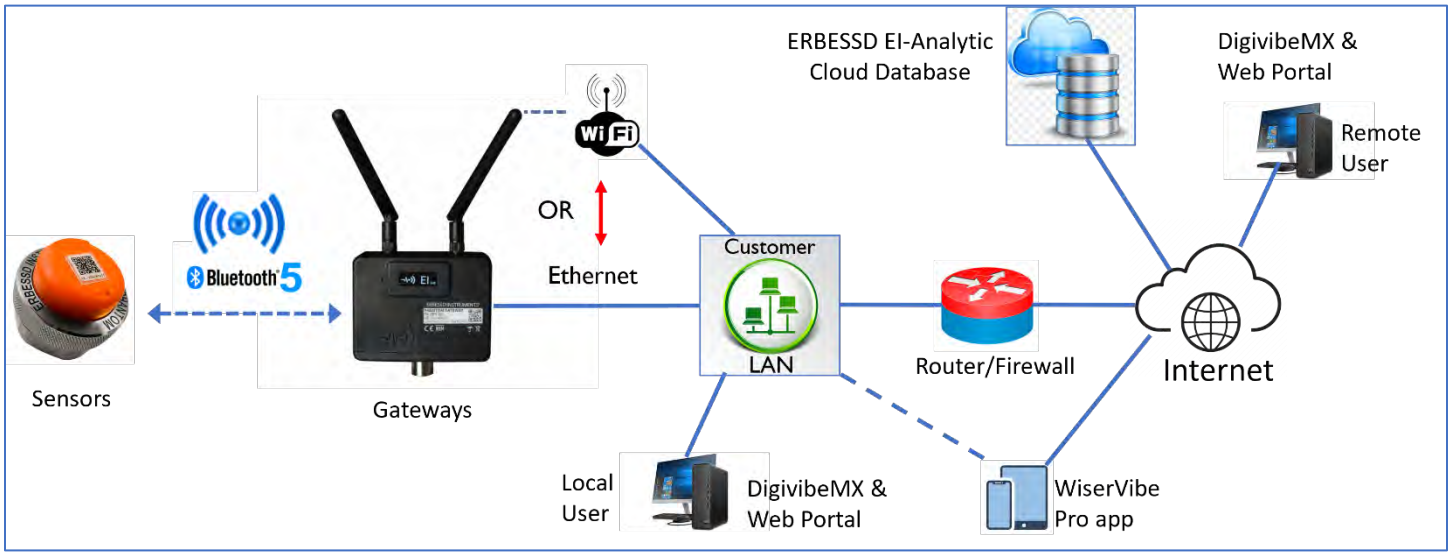
## Option 2 - EI-Analytic Cloud Database Service

Erbessd Instruments EI-Analytic is a cloud-based monitoring and data integration service. A free account can be created with a size limit of 1 GB. Paid subscriptions start at 10 GB in size and can expand to multiple TB.

Advantages of using the EI-Analytic cloud service to store Phantom data include:

- No need to backup data. (Data can be copied from the cloud to a local filesystem on demand)
- EI-Analytic provides a Web Portal (app.eianalytic.com) and supports the WiSER VIBE Pro mobile app for IOS/Android, both of which can be used to manage a Phantom database as an alternative to DigivibeMX.
- A flexible Task Manager feature to configure email and push notifications for alarms.
- EI-Monitor software is NOT required, the Gateways relay data directly to the EI-Analytic cloud database.
- Secure communications between Gateways and EI-Analytic use HTTPS over **TCP port 3030.**
- Gateways attempt to connect with https://ws.eidig.com:3030/PhantomService.svc upon bootup to start secure session with EI-Analytic.

**Note**- DigivibeMX v11 is also configured to use non-standard **TCP port 3030** for communication with an EI-Analytic database by default. See DigivibeMX User Guide for more details.

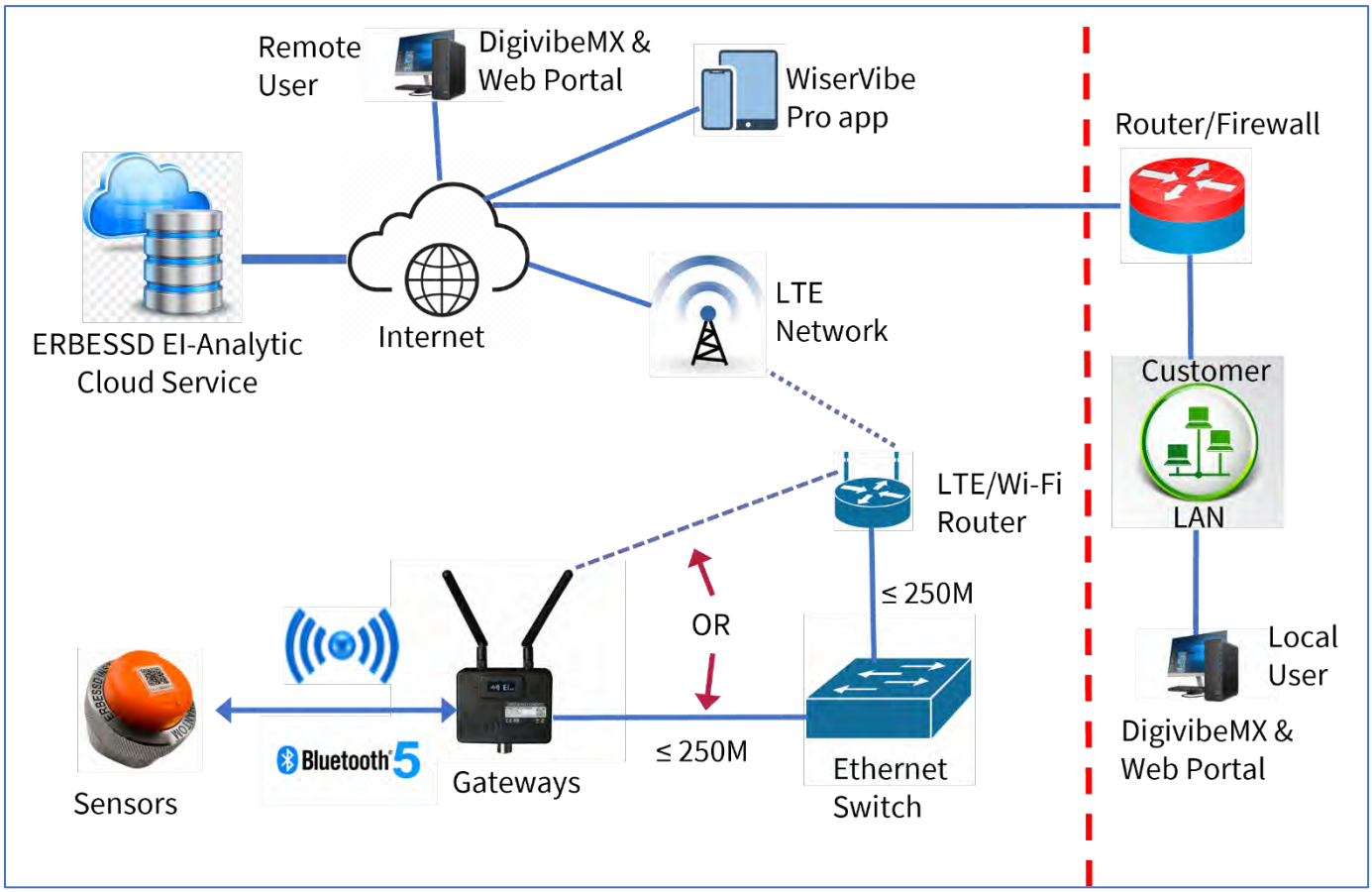


## Option 3 - EI Analytic Cloud Database using Cellular Network

This option is very popular in scenarios where using a customer network is not possible. A cellular data network (LTE or 5G) subscription is required to create an *overlay* network that has NO connection to a customer network.

This option offers:

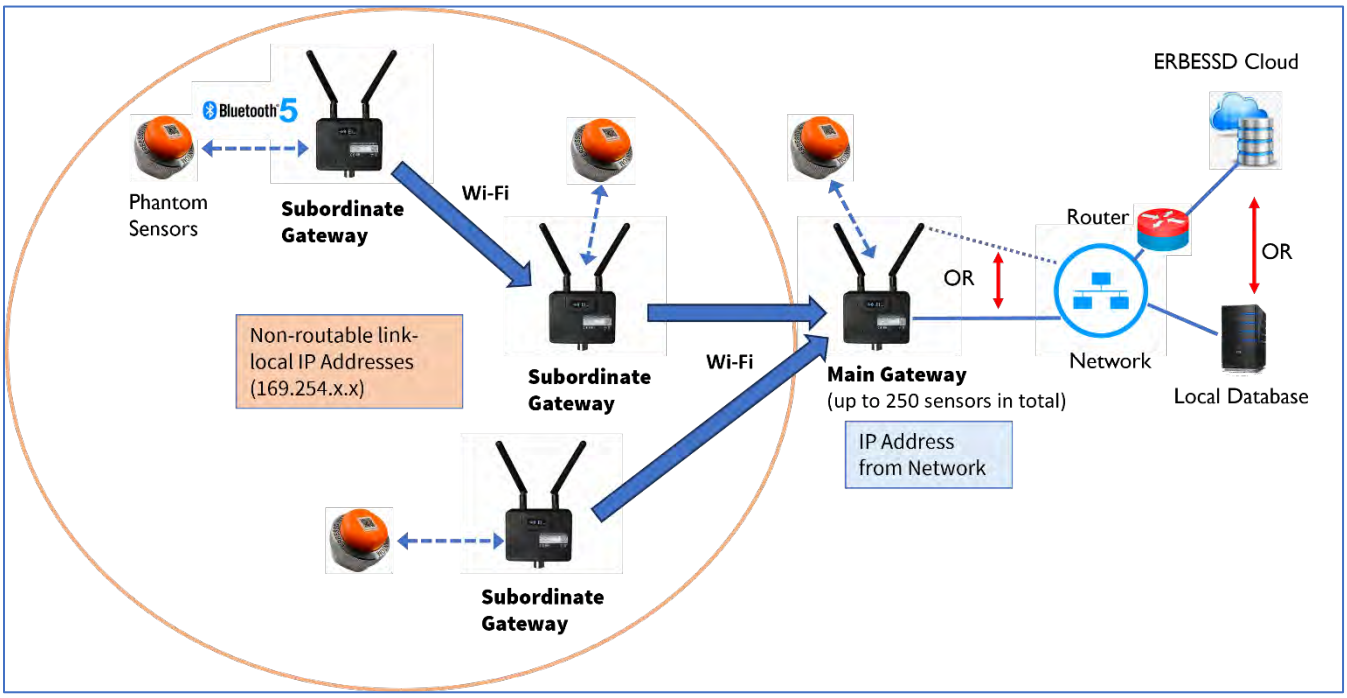
- All the benefits of the Erbessd EI-Analytic database service.
- No IT involvement necessary (assuming local user can access Internet/HTTPS).
- All communications to EI-Analytic cloud are secured end-to-end using HTTPS on **TCP port 3030**.
- Gateways attempt to connect with https://ws.eidig.com:3030/PhantomService.svc upon bootup.



## Gateway 2.0 Repeater Networks

Phantom Gateway 2.0 with Firmware Version **49** or higher can be configured as a standalone Wi-Fi network to extend range or share a network connection. The **Repeater Network** parameter allows each gateway to be configured as a **Main** or a **Subordinate.**

- All gateways must be version 2.0 and have **the same firmware version**. ( gateway v1 uses a different networking method for Repeater mode).
- The Main gateway creates a NON-PUBLIC Wi-Fi network for communication with Subordinate(Sub) gateways within range. The name of the Wi-Fi network created is not discoverable by any device.
- The Main GW can support up to 250 Phantom sensors. The number of Subs used does not affect this limit. All sensors *pair* with the Main GW.
- Only the Main GW is assigned an IP address from the network(DHCP or static).
- Sub gateways are assigned non-routable link-local IP addresses by the Main gateway.
- Individual Gateway Admin Consoles are accessed through the Main gateway Admin console (**Repeater** tab on the main menu). **Note** -Subs do not need to be registered in EI-Analytic.
- Global Collection Settings are configured only in the Main GW.
- Subordinates can connect directly or indirectly to the Main GW.
- All Modbus, MQTT and OPC UA data from Subs is stored in the Main GW.




Example OLED display when a Gateway is configured as a Subordinate:

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## Sensor to Gateway Communications

- Phantoms employ Bluetooth Low Energy (BLE) 5.0, which uses the 2.4GHz frequency spectrum. This is the same frequency band as Wi-Fi, found in commercial and residential settings. As with Wi-Fi, signal interference is caused by physical obstructions such as cement/cinder block walls and metallic objects. A wireless survey of the areas where Phantom sensors and gateways are to be deployed should be undertaken to determine the number and placement of gateways required for adequate coverage.
- Phantom sensor to gateway communication is 128-bit AES encrypted, using a Cryptocell 310 Cryptographic processor.
- Phantoms send a beacon every 2 seconds to the gateway via BLE Advertising.
- Phantom sensors are automatically detected by their advertising beacon, when in range and not in *Sleep* mode, by one or more Phantom gateways. The gateway Admin Console web interface is used to "pair" sensors to gateways and manage all their settings.
- Phantom Expert vibration sensors send two types of data:
    - **RMS data** (about 8 bytes) includes an RMS velocity value, temperature and battery voltage.
    - **Full data collection** (approx 150 Kb signal file). Includes a Time Waveform in addition to temperature and battery voltage.

## Phantom Long Range Mode

The Phantom Long Range option can be used to increase the distance between a Phantom Expert triaxial vibration sensor and a Phantom Gateway 2.0 to up to 200 meters line-of-sight. The Gateway Bluetooth scanning mode can be set to Regular, Long Range only, or both Long Range and Regular.

Some important notes:

- Phantom Gateway firmware version 54 is a pre-requisite for this feature.
- Phantom Expert Triaxial Vibration Sensor firmware version 186 is required on EPH-V11, V11E, and EPH-V10, V10E models.
- When set to Long Range mode, Phantom sensor battery life is affected. An estimated 15-20% life cycle reduction should be expected.
- The available bandwidth between sensor and gateway in Regular mode is 1 Mbps, in Long range mode it is reduced to 256 kbps.
- Phantom Gateways cannot scan in Regular mode and Longe range mode simultaneously. The Gateway switches between Regular and Long range mode for brief periods of time. In Regular mode, a Phantom vibration sensor will communicate with a Gateway approximately every 2 seconds. However if the Gateway is operating in dual mode, that interval may increase to more than 10 seconds . This could impact any Phantoms that are powered locally and are set to provide data at the minimum 10 second interval.


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# Installing A New Phantom System

The installation of a new Phantom system can be achieved by performing the following steps :

**Step 1**. Inventory Phantom sensors and create a spreadsheet database.

**Step 2**. Install required Software (DigivibeMX and optionally EI-Monitor).

**Step 3**. Set up EI-Analytic Account.

**Step 4**. Assemble gateways and power up.

**Step 5**. Set up Network configuration (Ethernet or Wi-Fi).

**Step 6**. Create a database (SQLCe, SQL,MySQL, Azure)and configure EI-Monitor (for local databases only).

**Step 7**. Configure Data destination(local or cloud) in gateways.

**Step 8**. Create the Machine database using Machine Manager.

**Step 9**. Create and assign Phantom sensors to Machines.

**Step10**. Pair sensors to gateways and configure settings.

**Step 11**. Check sensor status and test data collection.

## Step 1 -Familiarization and Preparation

Phantom system components and software are designed to install easily and integrate seamlessly. However, a little bit of preparation and product familiarization can save time and prevent frustration during the installation and setup process.

### Every Phantom is Unique

To precisely identify individual sensors and monitored data collection locations, every Phantom sensor is encoded with a unique serial number – which is translated to a QR Code for quick scanning purposes.

The model of this sensor is: EPH-V11E (accelerometer high-sensitivity)

The 2-digit product code for all EPH-V11E sensors is: **11**

The unique 9-digit serial number for the sensor pictured is: **189295990**.

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## Fast and Easy Installation

Phantom Gen 3 vibration sensors are designed with an integral adhesive mounting surface and common ¼”-28 thread receptacle. The large knurled ring compresses an o-ring between the top of the sensor and the base. When loosened, the orientation of the sensor may be rotated as needed. The knurled ring is locked in place by a set screw. Tighten the knurled ring hand-tight or to approx. 25 in/lbs of torque to compress the o-ring for a proper seal. Phantoms are shipped with a stud installed, so they can also be permanently installed via drill/tap or affixed to a shielded magnetic base for portability.

All Expert Phantoms have the axis orientation marked on top to align the sensor when installing on the machine point.

The Gen 3 Phantom Expert sensors consist of four parts, the base, sensor body, battery and knurled ring with set-screw.

The Expert Phantoms are shipped with a Panasonic CR2477 battery. The battery slides out of the holder easily for replacement. **Note** – Not all CR2477 batteries have the same specifications. For example, the maximum operating temperature may vary between manufacturers. Panasonic batteries are recommended.

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### Create a Database

Before beginning the hardware and software configuration process, Erbessd Instruments recommends documenting the unique ID number of each Phantom (auto-detected or manually-entered) and its machine health monitoring location. This will prevent a great deal of running back and forth to identify sensor IDs and their locations later, especially when it is time to build the machine database and assign sensors. A simple spreadsheet can be created that may look something like this:

| Sensor ID | Location |
|---|---|
| 11-189286917 | PressurePump001 – Motor Non Drive End |
| 11-189286918 | PressurePump001 – Motor Driven End |
| 11-189286919 | PressurePump001 – Pump Driven End |
| 11-189286920 | PressurePump001 – Pump Non Driven End |

### Locating Gateways

Gateways require AC power and must be located accordingly. They should be mounted as centrally as possible among the sensors they serve. The Gateway Admin Console Live State shows the signal strength of each sensor in bar-graph format. The signal strength for Phantoms is rated as either Good(-50 to -75dBm), OK(-76 to -90dBm), or Poor (less than -90dBm). In addition, the Phantom Manager App for iOS or Android devices has a signal strength tool, used to help determine if the Bluetooth signal between sensor and gateway is strong enough for proper operation. See the *Phantom Manager Mobile App* section of this guide for details.

## Step 2- Software Installation

### DigivibeMX Phantom Software Installation

From USB or Download: Open the *DigivibeMX_P_DV11P.11xx* folder location in Windows Explorer.

Open the IMPORTANT INSTALLATION INFORMATION text file and follow the instructions provided. Currently this includes:

1. Install the MySQL connector by double-clicking on mysql-connector-net-6.5.4.
2. Install SSCE Runtime by double-clicking on SSCERuntime_x64-ENU.
3. Install the WebView2plugin by double- clicking on MicrosoftEdgeWebview2Setup.exe.
4. Install *DigivibeMX* by double-clicking on the setup.exe file.

| | | | | | | |
|---|---|---|---|---|---|---|
| IMPORTANT INSTALLATION INFORM... | Text Document | 1 KB | No | 1 KB | 38% | 1/27/2022 10:44 AM |
| MicrosoftEdgeWebview2Setup | Application | 1,643 KB | No | 1,740 KB | 6% | 12/8/2021 4:31 PM |
| mysql-connector-net-6.5.4 | Windows Installer Package | 12,212 KB | No | 13,112 KB | 7% | 8/19/2015 10:04 AM |
| setup | Application | 239 KB | No | 519 KB | 55% | 5/25/2023 2:02 PM |
| SSCERuntime_x64-ENU | Application | 2,468 KB | No | 2,560 KB | 4% | 2/17/2019 10:01 PM |


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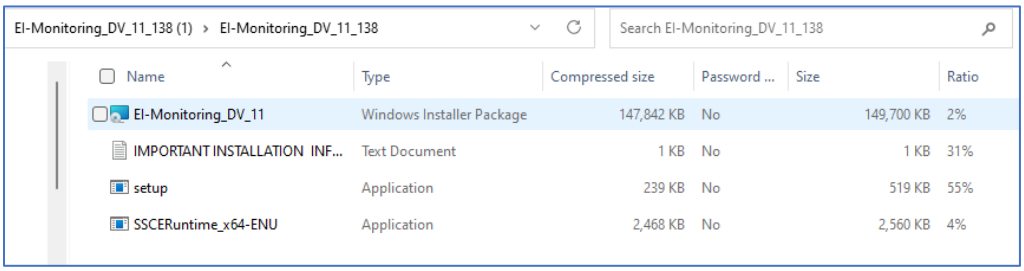
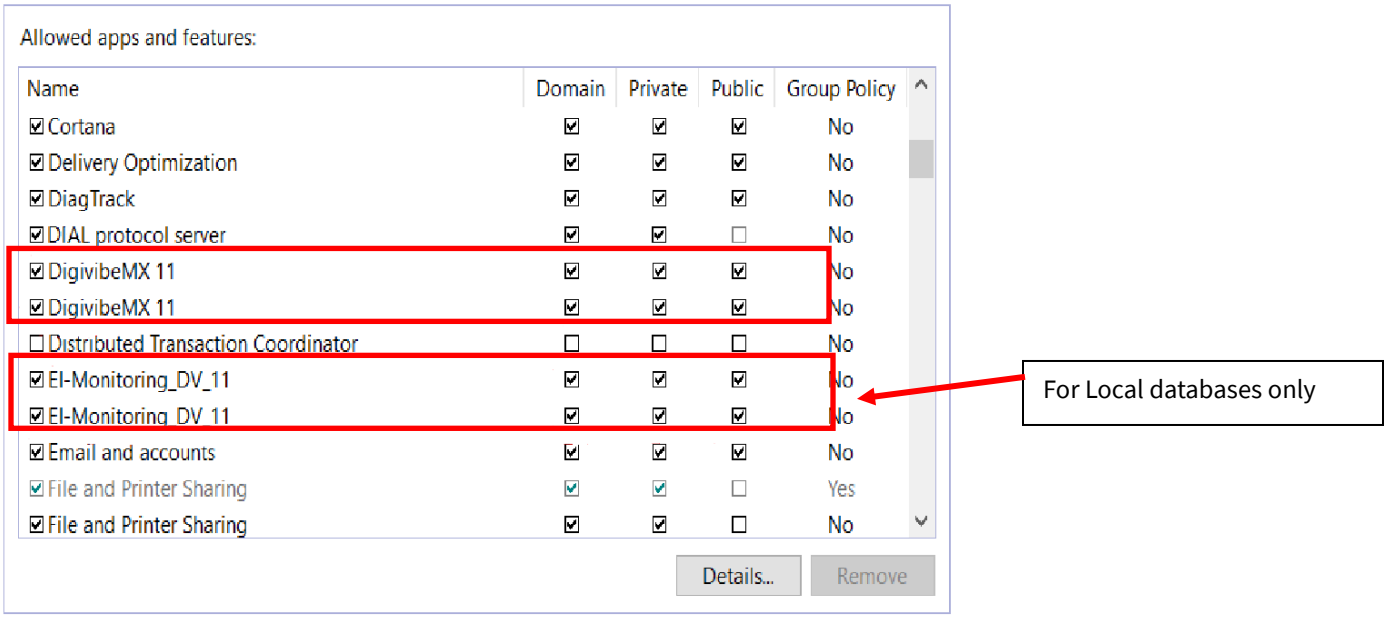
## EI-Monitor Software Installation

A local database requires EI-Monitor software to be installed, preferably on the same PC or server where the database resides. EI-Monitor is included at no cost, along with DigivibeMX Phantom and the SQL connectors. Open the EI-Monitoring_11 file folder and double-click the **SSCERuntime_x64-ENU** if you did not do so during the DigivibeMX software install and are using SQL CE. Then double-click on **Setup** to install EI-Monitor.




## Required Permissions in a Secure / Network IT Environment

Both DigivibeMX and EI-Monitoring require Read/Write permissions to C:\Program Files and C:\ProgramData (hidden folder). Antivirus and Firewall programs on a user's computer may interfere with these permissions and with Phantom system communications. Users in a secure / Network IT environment may require administrator assistance to enable these required permissions.





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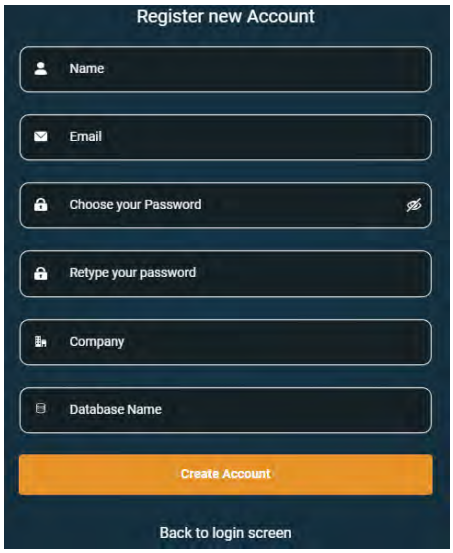
## Step 3 – Setup EI-Analytic Account

This is required to set up your cloud database. However, even if you plan on using a local database, you can create and use a free EI-Analytic account to register and manage your gateways and sensors remotely via the secure HTTPS web interface. Otherwise, managing your Phantom system must be done from the same network as the gateway(s) to make communication possible.




1. Go to app.eianalytic.com and click on New Account.
2. Enter a Name for the account.
3. Add the Email and password info, the address does not need to be valid, in fact if multiple users will access the account, it would be preferable to create a generic Username in email address format (Ex: user@companyname.com). However, if email notifications are desired when a sensor in the database enters an alarm condition, an actual email address should be used. To have a paid subscription service activated, please provide Erbessd Instruments Technical Support your EI-Analytic account Username at info@erbessd-instruments.com.
4. Enter a Company name – this must be all lowercase letters and/or digits 0-9 . The only special character allowed is an underscore.
5. The Database Name must be all lowercase letters and/or digits0-9 . The only special character allowed is an underscore.

## Step 4 – Assemble Gateways and Power Up

### Phantom Gateway 2.0

The following Phantom Gateway information does NOT apply to gateway version 1. For installation of a gateway V1, please reference the Phantom Setup Guide V3 document.

1. Attach the two identical antennae provided (both Wi-Fi and Bluetooth use the 2.4 GHz frequency band).
2. Connect an Ethernet cable to the RJ-45 port on the side, unless you are using Wi-Fi.
3. Connect power via one of two connectors on the bottom. The 4-pin aircraft-style power connector takes 5VDC @ 2 amps (A 4-pin female to USB-A male cable is included). The terminal block supports 9-24VDC @ 2 amps. **Note** – The reset button is located just left of the OLED display. See the *Gateway Resets* section of this guide for details.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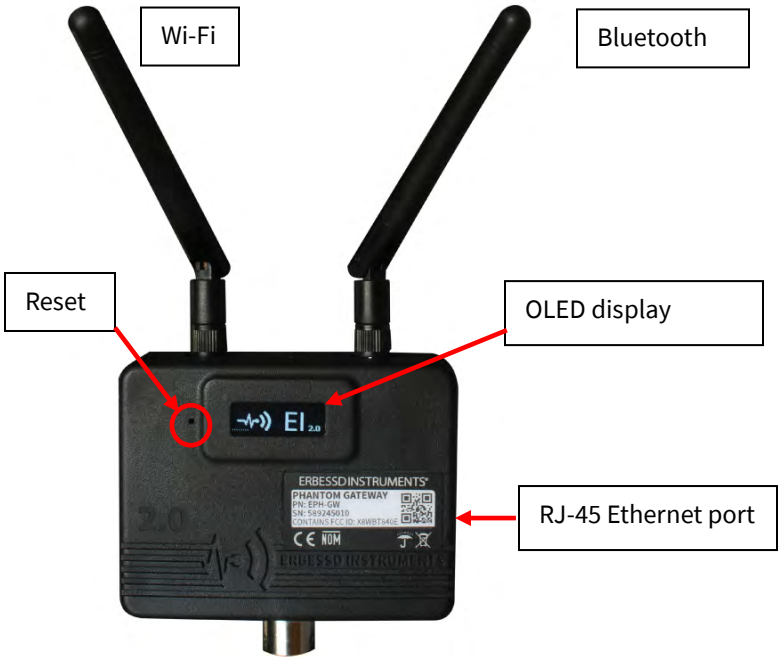
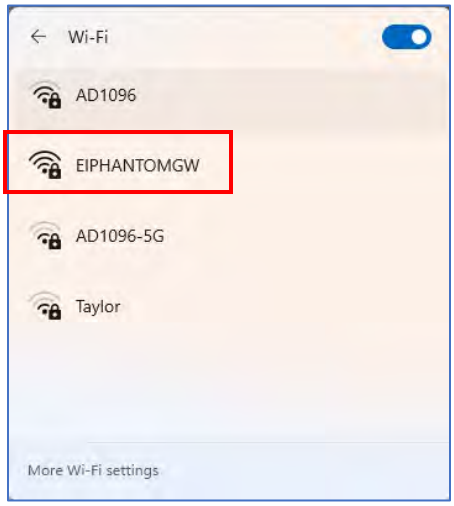


5. Upon power-up for the first time, the OLED display will show the EI logo to indicate the boot sequence.
    a. <u>If you did **not** connect an Ethernet cable</u>, the gateway will create a Wi-Fi Access Point with the name "EIPHANTOMGW". The IP address on the display should be **192.168.4.1 (AP)**. Look for the EIPHANTOMGW name in the **available Wi-Fi networks** of any PC, tablet or phone and connect to it using password **88888888** (eight 8 times. Once connected, open any web browser and enter **192.168.4.1** into the address bar and press enter.The Phantom Gateway Admin Console will open.



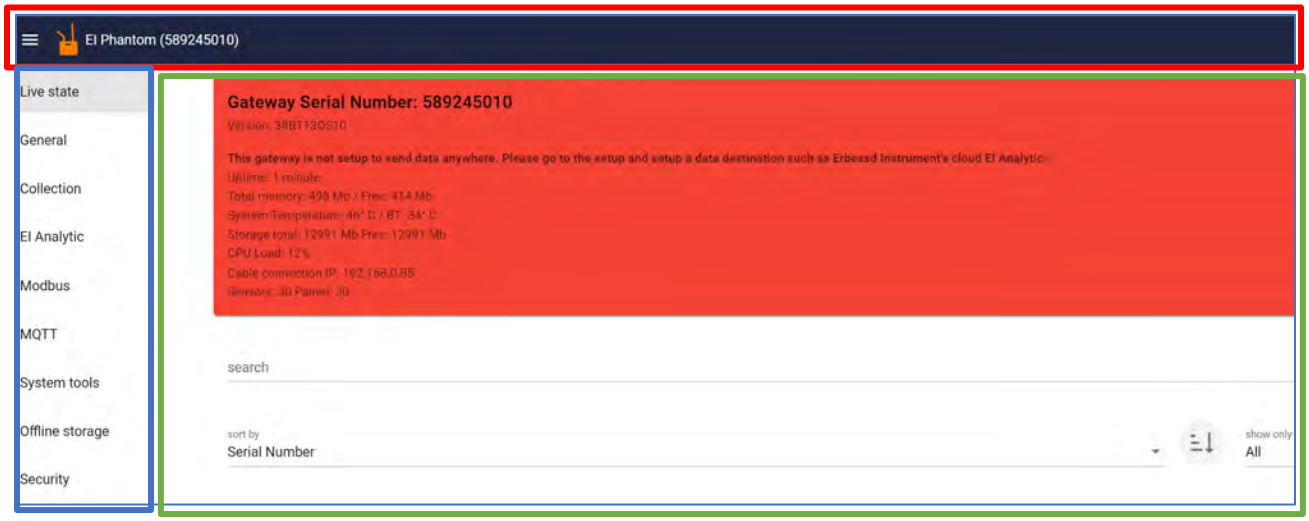

    b. For Ethernet cable connection, the IP address assigned by the network router should be displayed. If an address was assigned, enter it in the address bar of any browser <u>on a device connected to the same network</u> and press enter to open the Gateway Admin Console. If no address was obtained from the router, the IP will show as **192.168.4.1(AP)**, and you may need to configure a static IP address, see below.

**Note**- If you do not see an IP address on the display after powering up, reset the gateway – see the *Gateway Resets* section of this guide for more info. Contact Erbessd technical support if problems persist or the OLED display is blank. See the last section of this guide for contact details.

## Phantom Gateway Admin Console

The Admin Console has three sections:

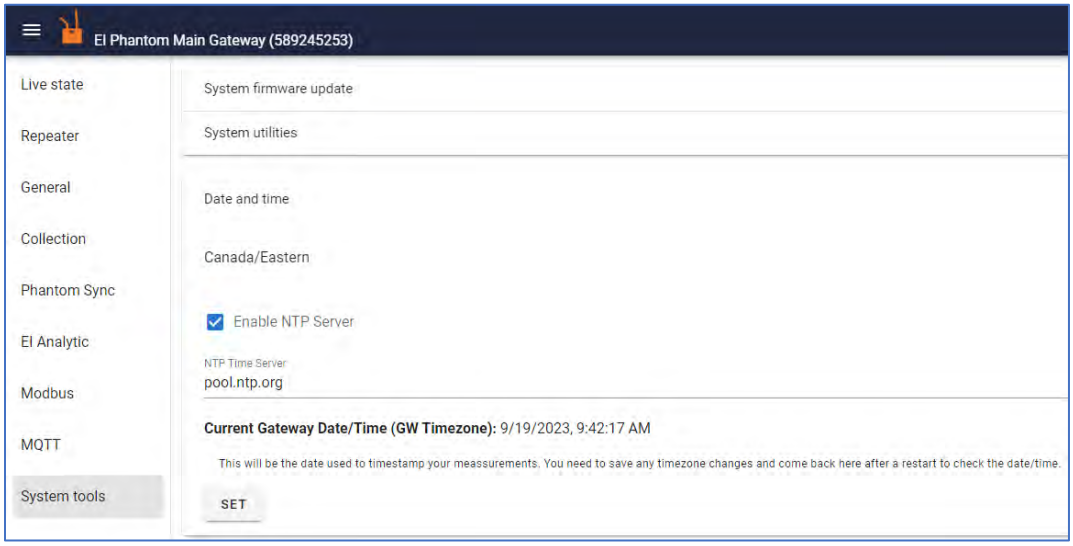
- Gateway Serial Number
- Menu
- Configuration display area




The Console opens to the **Live state** screen by default. The red panel indicates no database destination is configured. This is always the case when connecting for the first time. The panel will appear red until the data destination is set, then it will change to white.

## Initial Gateway Setup

1. Set the Gateway Time Zone in the System Tools tab on the Main menu:




2. Press **SET** and the Gateway will restart to save the changes.



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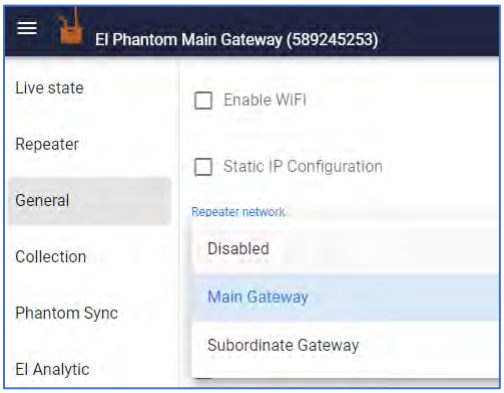
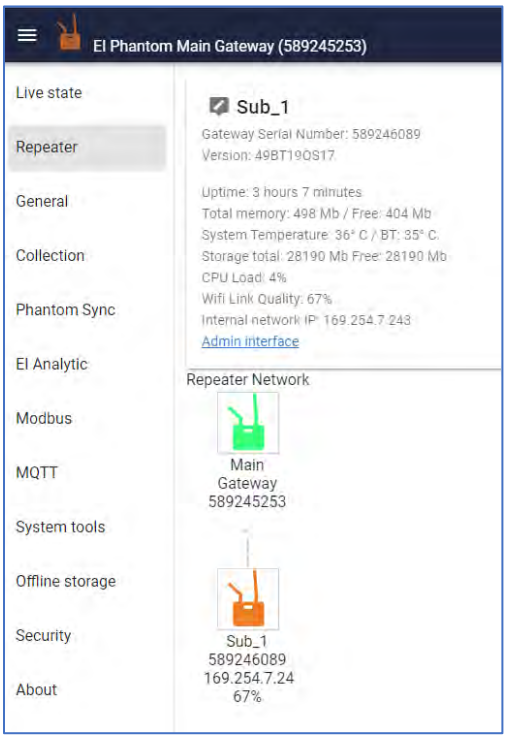
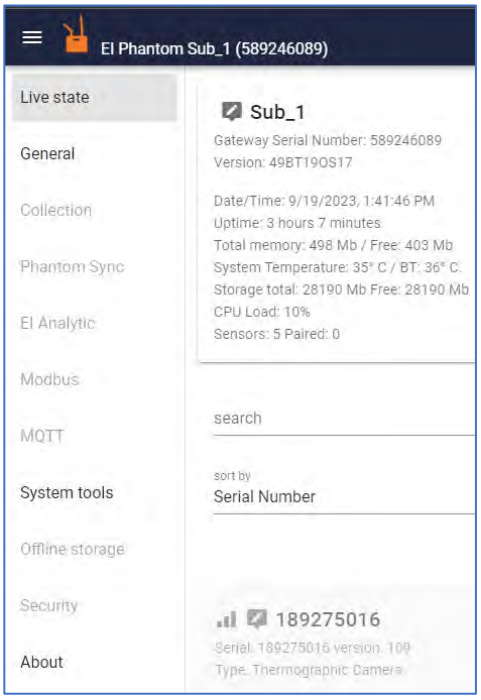
## Repeater Network Setup

If a Repeater Network with **Main** and **Subordinate** gateways is to be installed, click on the **General** tab and set the Repeater Network as required, otherwise skip to Step 5. **Note** - Main gateways should be installed first, followed by Subordinates. Once the setting is changed from **Disabled** (default), the gateway will restart.




Click on the **Repeater** tab on the main menu to see the status of all gateways in the Network. The Admin Interface link provides access to the Admin Console of each Sub gateway. Note that most menu tabs are greyed-out for a Sub gateway. All collection and sensor settings are configured in the Main gateway only.



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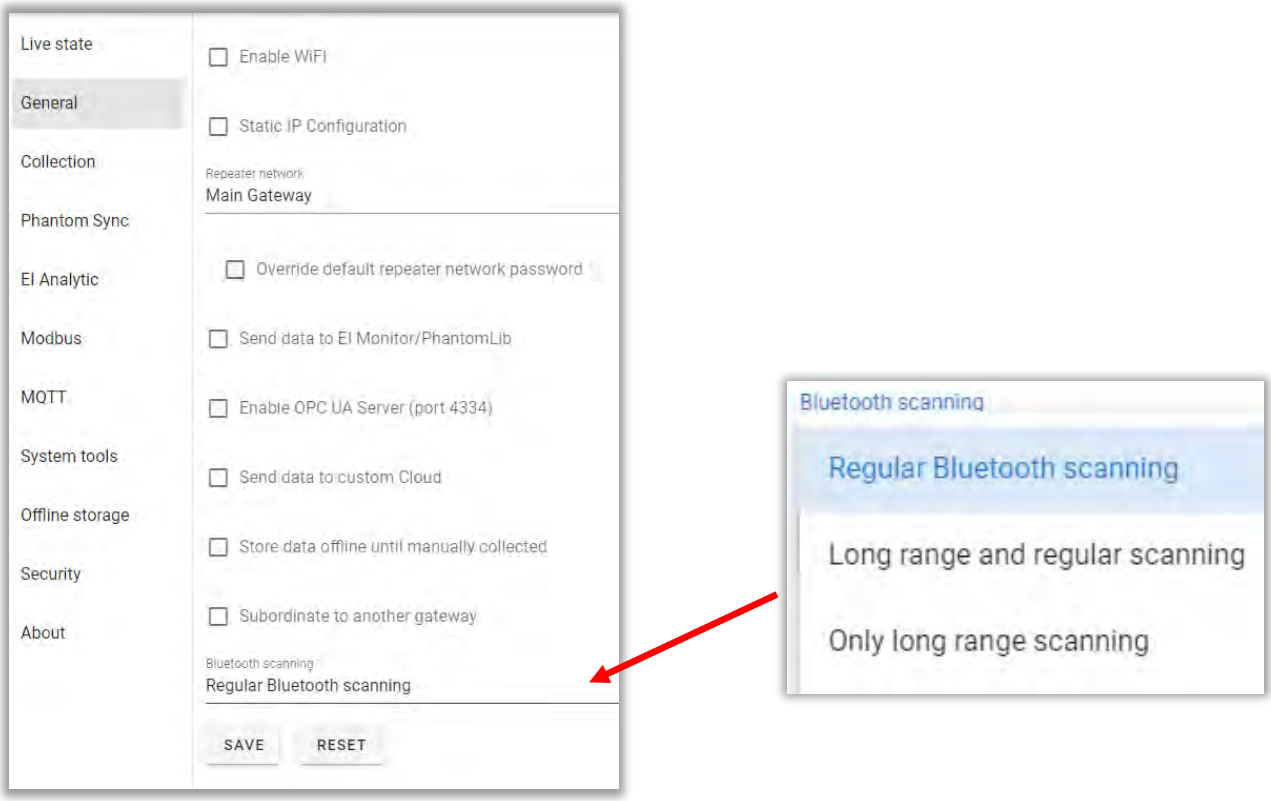
## Phantom Long Range Setup

If Phantom Long Range is required, change the default setting from Regular on the Gateway Admin Console **General** Tab. Otherwise, skip to Step 5:




Press **SAVE** and the Gateway will restart.

You may now proceed to setting the Network configuration.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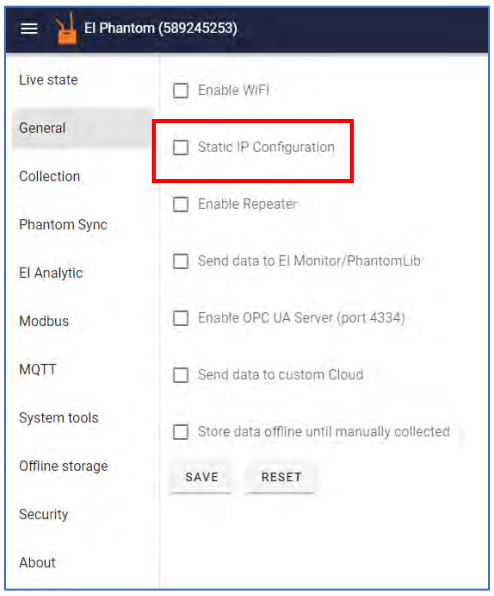
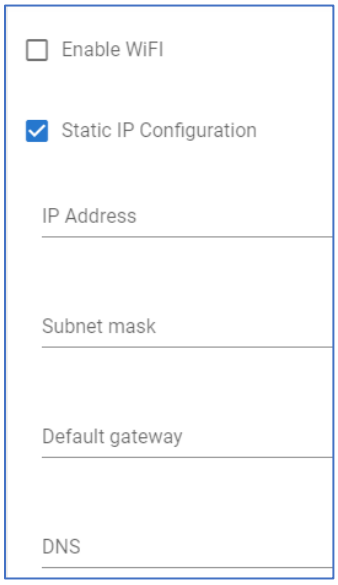
## Step 5 – Setup Network Configuration

### Option 1 – Ethernet Connection

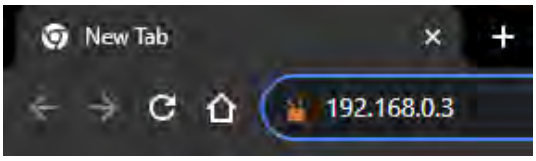
1. If you connected the gateway using an Ethernet cable, the OLED display should show the IP address assigned to the gateway by the local router and the Admin Console will show the IP address as **Cable connection IP**.
2. If you want the local router to manage this gateway's IP address using Dynamic Host Connection Protocol(DHCP), you do not need to configure anything else for network connectivity. Proceed to creating a database in the next section.
3. To set **static** addressing, open the **General** tab and click Static IP Configuration. enter the IP address, subnet mask, default gateway and optionally the DNS address. Consult with your local IT administrator to obtain this info, if possible. Otherwise, enter:
   - An unused IP address on the network
   - 255.255.255.0 for the subnet mask
   - Your router's address(always the .1 address in the network, e.g. 192.168.0.1) in the default gateway field.
   - DNS -set to the same address as the default gateway, or 8.8.8.8.




4. Click **Save;** the gateway will restart and any changes will be applied.

You can now use the gateway's IP address to access the Gateway Admin Console by entering it in the address bar of your browser. **Note** -This only works if your PC/tablet/phone is on the same network as the gateway.




If you have an EI-Analytic Account, you can access the Admin Console remotely (once registered) from the EI-Analytic web interface, see details in Step 7 -*Remotely Accessing a Gateway* below.

5. Check the Firmware version to ensure the gateway has the latest version. Click the **System Tools** tab on the main menu and select the **System Firmware update** button. Press the **Check Online Update** button to view the current and available versions. If they differ, the **Update** button will be available. (Internet access is required).



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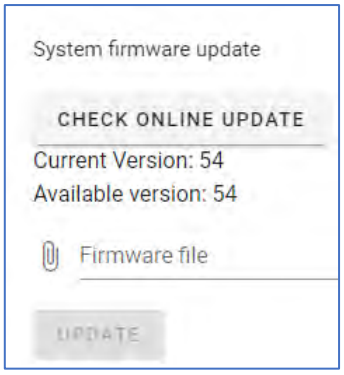
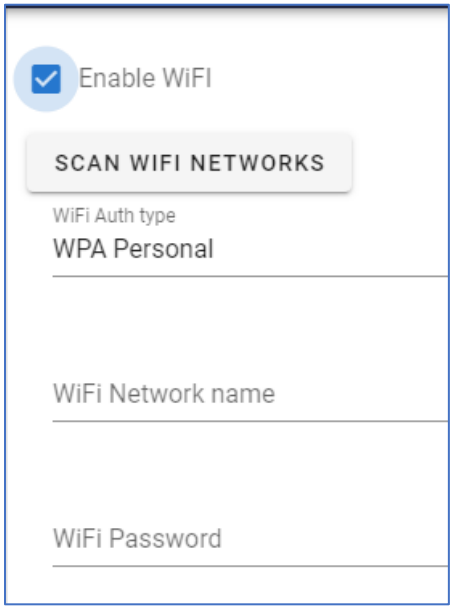


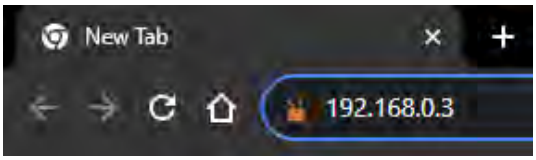

The next step is to create a database.

## Option 2 – Wi-Fi Connection

1. From the Live State screen, note the Wi-Fi connection IP should be **192.168.4.1**.
2. Click on the **General** tab and **Enable Wi-Fi**.
3. You can scan available Wi-Fi networks with the button or enter the **WiFi network name** directly. There is also a selector for **Auth Type**: WEP, WPA (Personal or Enterprise), or Open Network.
4. In the **Wi-Fi Password** section, enter the password of the selected network. You can view the password or hide it with the buttons.
5. Press **Save**, the gateway will restart.
6. Check the OLED display as the gateway reboots, you should see the newly assigned IP address.
7. You may now set static IP addressing if desired, using the same steps outlined previously for an Ethernet connection, Press **Save**, the gateway will restart again.




You can now use the gateway's IP address to access the Gateway Admin Console by entering it in the address bar of your browser.




**Note** -This only works if your PC/tablet/phone is on the <u>same network</u> as the gateway.

If you have an EI-Analytic Account, you can access the Admin Console remotely (once registered) from the EI-Analytic web interface, see details in Step 7 -*Remotely Accessing a Gateway* below.

8. Check the Firmware version to ensure the gateway has the latest version. Click the **System Tools** tab on the main menu and select the **System Firmware update** button. Press the Check Online Update button to view the current and available versions. If they differ, the **Update** button will be available. (Internet access is required)



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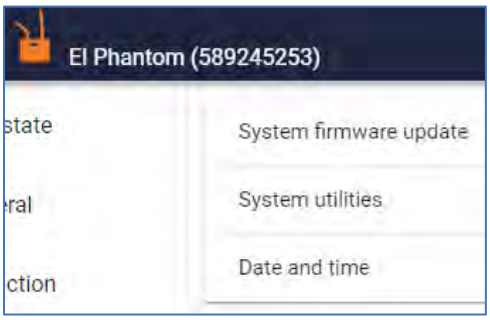
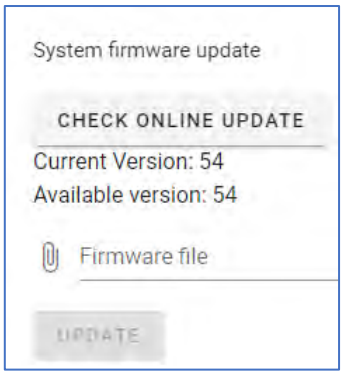


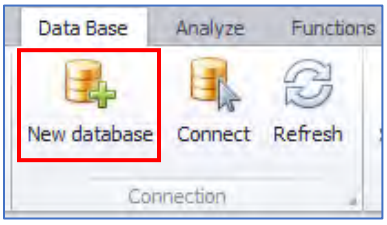




The next step is to create a database.

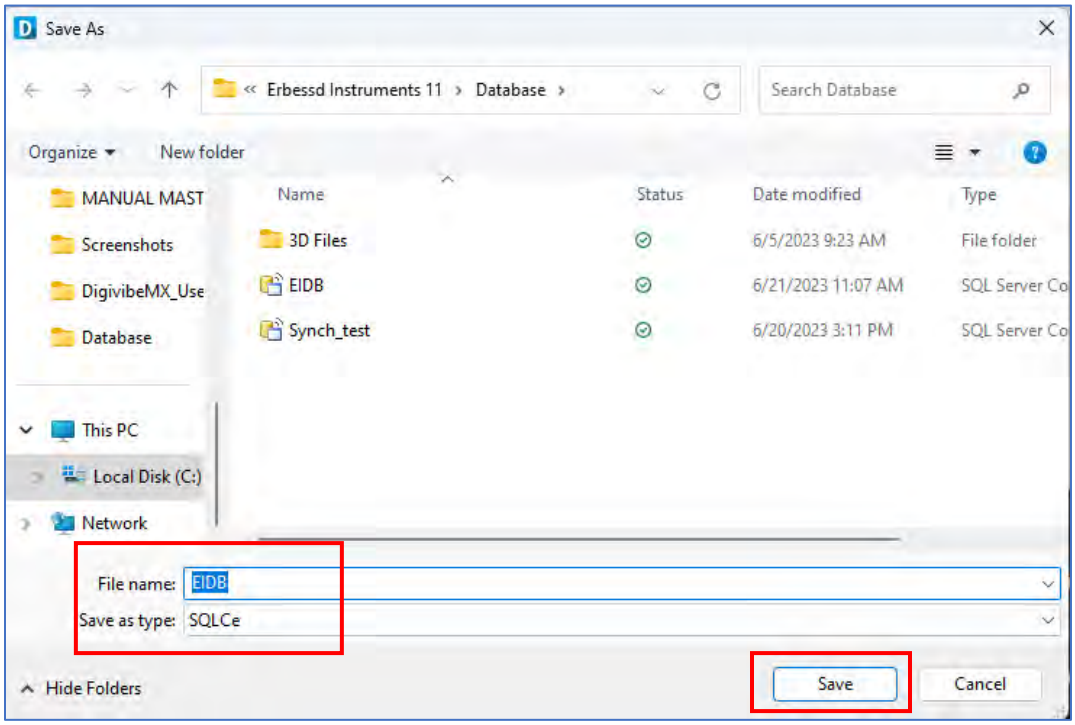
# Step 6 -Create a Database

## Option 1: Create Single-User SQLCe Database on a Local PC

A local SQLCe database is created on a PC using DigivibeMX Phantom software. Click on **Database** in the DigivibeMX11 main menu, then select New database.




The **Save As** window opens to the default database location (Documents > Erbessd Instruments 11 > Database). Specify an alternate location, if desired. Enter the name of the new database in the File Name text field**.** Save as type: SQLCe.




Click the Save button to save the new database. Click Yes for any notification boxes that may appear after the database file is created.

**NOTE**: SQLCe databases have a 4GB capacity limit. It may be necessary to periodically thin the SQLCe database of old data, or synchronize the database structure to a new SQLCe database to avoid having the database refuse new data because it has reached its maximum allowable capacity.



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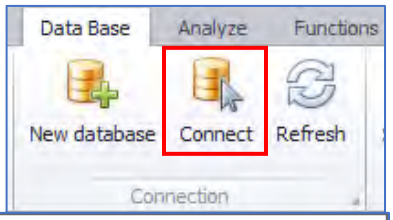
## Option 2 – Multi-User SQL Database on a Network Server

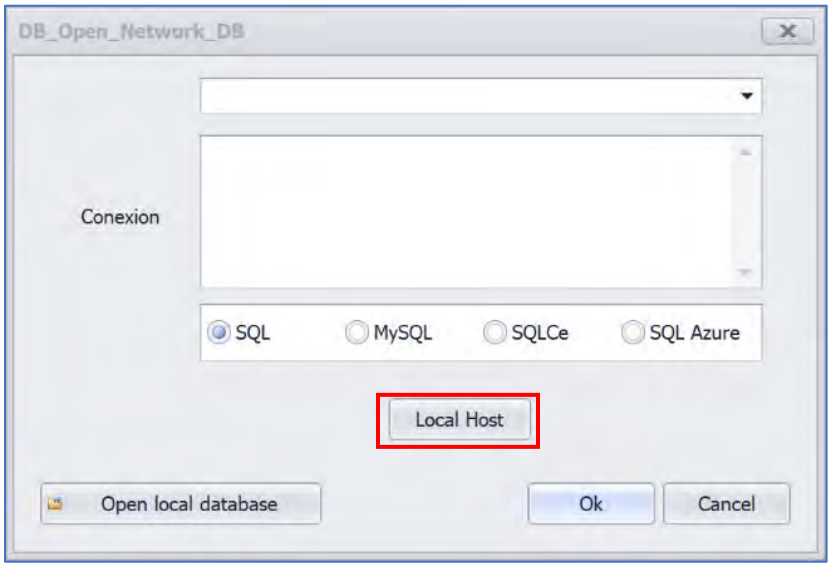
DigivibeMX software cannot create a new SQL Server, MySQL or SQL Azure network database. The empty database must be created independently, then DigivibeMX is mapped to the database location. Once connected, DigivibeMX will create the required fields and tables. Locating the SQL Server or MySQL database on a shared network server will require entering the destination server's IP address. Locating an SQL Azure database will require the TCP address. Accessing the database may also require a database administrator Username and Password authentication. Be prepared with this information before proceeding. Consult a local IT administrator or SQL database administrator for assistance.

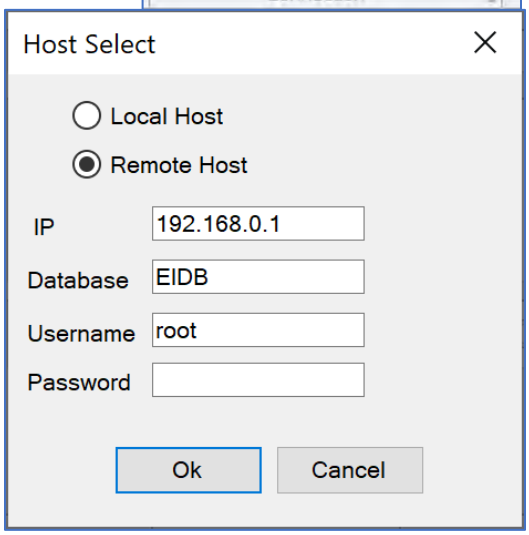
For MySQL,a step-by-step installation procedure can be found on the Erbessd website at https://www.erbessd-instruments.com/tutorials/mysql-server-installation/

Open the Data Base Menu in DigivibeMX. Select Connect on the Connection toolbar.




The **DB_Open_Network_DB** window opens. Select SQL, MySQL or SQL Azure database format. Click Local Host button to continue. The **Host Select** window opens.




For a SQL Server or MySQL database, enter the server's IP address. For an SQL Azure database, enter the TCP address. Then enter the Database name. Enter the Username and Password, if required. Click the OK button to continue.

The destination address connection string will appear in the DB_Open_Network_DB Connection window. Click the **Ok** button to connect.



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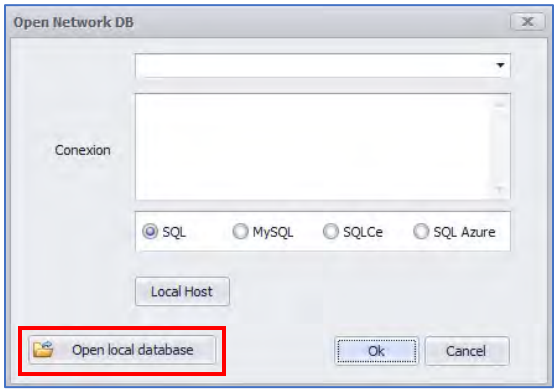
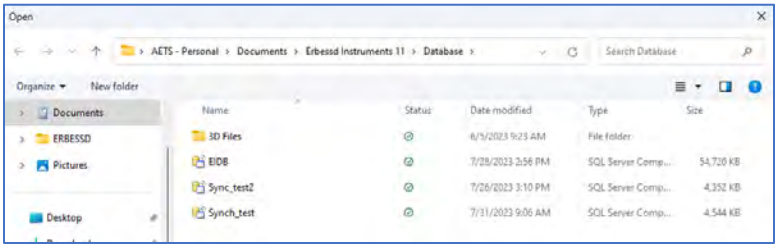
## Configure EI-Monitor software

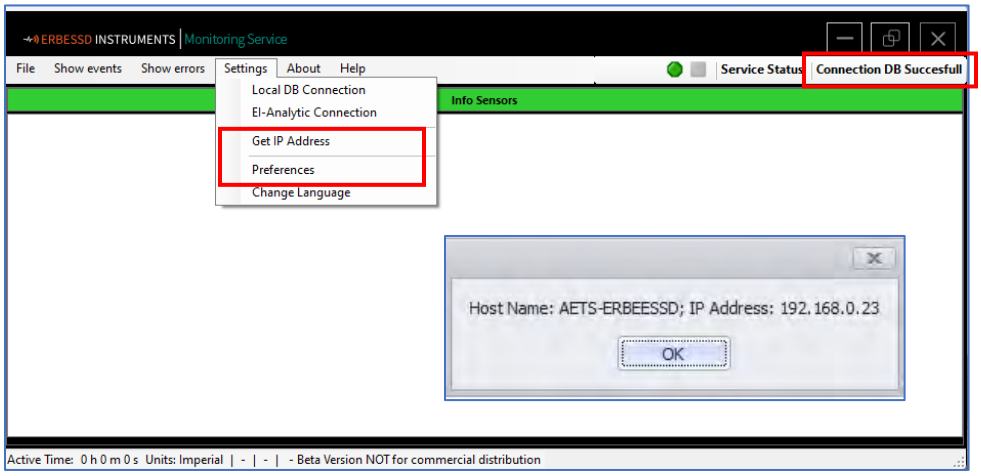
EI-Monitor software is used to relay data from gateways to a common SQL database.

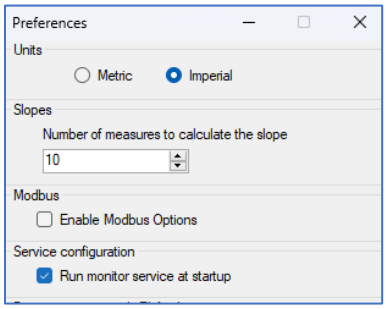
1. Launch EI-Monitor software on the PC/server.
2. When opening the first time, the **Open Network DB** window will automatically launch. For SQLCe, check the radio button and choose a local database by clicking Open local database. Navigate to the desired local DB and press **OK**.




3. For a SQL , MySQL or Azure database, click the appropriate radio button and press the **Local Host** button. Enter the database info and press OK.
4. The main menu will then open, and a Connection DB Successful message is displayed in the banner.
5. Select the **Settings** menu and click on Preferences. Check the box for **Run monitor service at startup**.
6. Get IP Address. This is the IP address of the device running EI-Monitor. Make note of this address, you will need to administer it in the Phantom gateway, if the computer/server and gateways are installed on different subnets. See details below.




**IMPORTANT**: **NEVER** close the EI-Monitoring program. This will interrupt communications between the Gateway and database. EI-Monitor must always be operating in the background. If the computer running EI-Monitor is shut down or restarted, the gateways will store data collections in their Offline Storage SD card(up to 100k files) until EI-Monitor restarts.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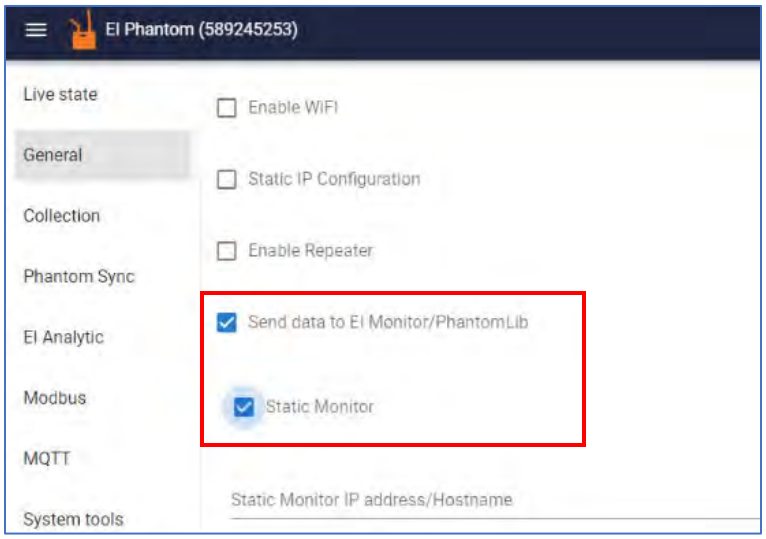
# Step 7 –Configure the Data Destination

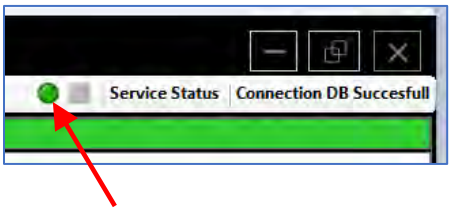
## Option 1 - Configure the Gateway for a Local DB

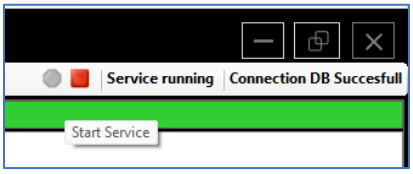
1. From the Gateway Admin Console open the **General** tab and select Send data to EI-Monitor/PhantomLib.
2. If the gateways and the PC/server running EI-Monitoring are on the same network, you do not need to enter anything in the Static Monitor IP Address/Hostname field, the gateways will automatically detect the EI-Monitor software. If the EI-Monitor is installed in another network, enter the IP address in this field. **Note** - Network routing must be possible between gateways and the EI-Monitor PC/server.
3. Select **Save**. The gateway will then restart.



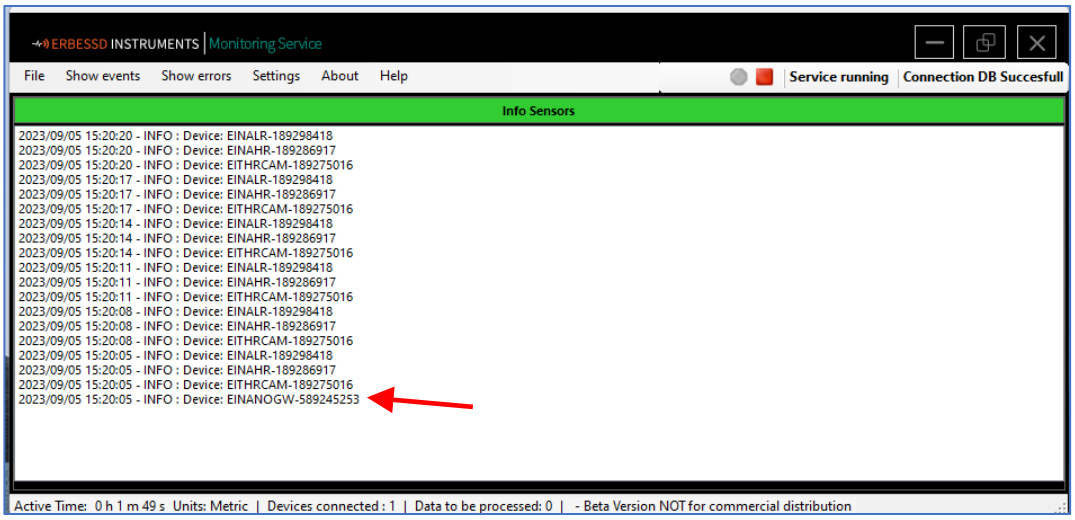

**Note**: A static IP address is recommended for the EI-Monitor PC/Server to ensure the address never changes. This will cause the database to go off-line.

4. Return to EI-Monitor software and click the green octagon to start the service. The banner will change to "Service running". To stop the data collection service, click the red stop button.




The main screen of EI-Monitor defaults to the Show Info mode. Upon startup a message from each gateway is sent with its serial number, followed by messages scrolling on the screen every few seconds from each sensor.



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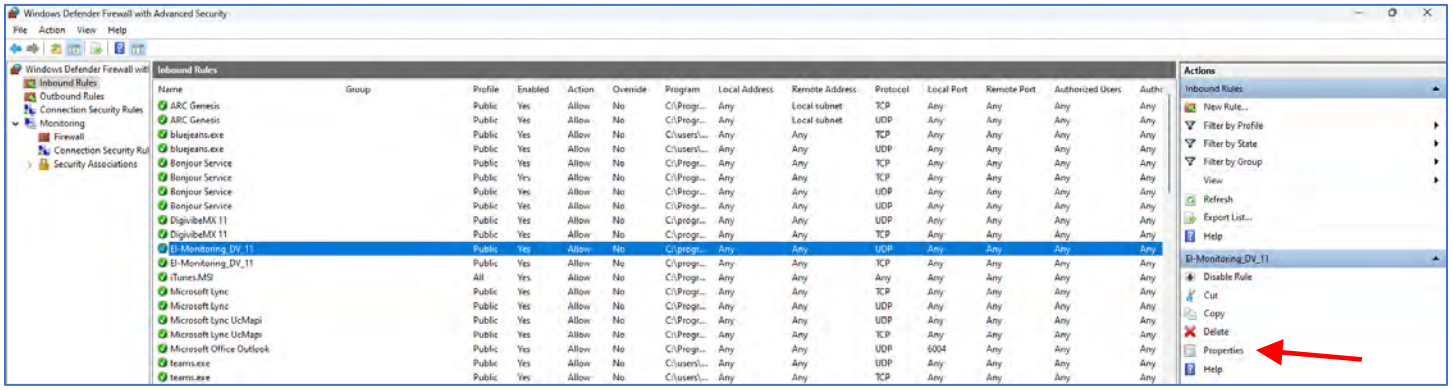
If you do not see any messages, but the Service is running, check the Live State screen for the connection status. It should show the Monitor IP address  if successfully connected.

If connected, then check your Windows Defender Firewall settings to ensure the UDP and TCP ports for EI-Monitoring_DV_11 are not blocked:




If blocked, click on Properties, and change both UDP and TCP to allowed.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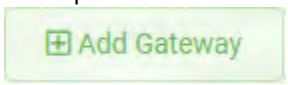
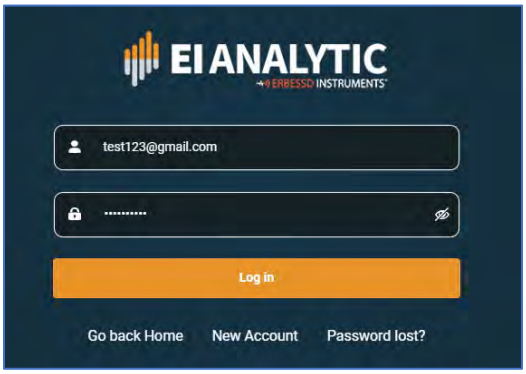
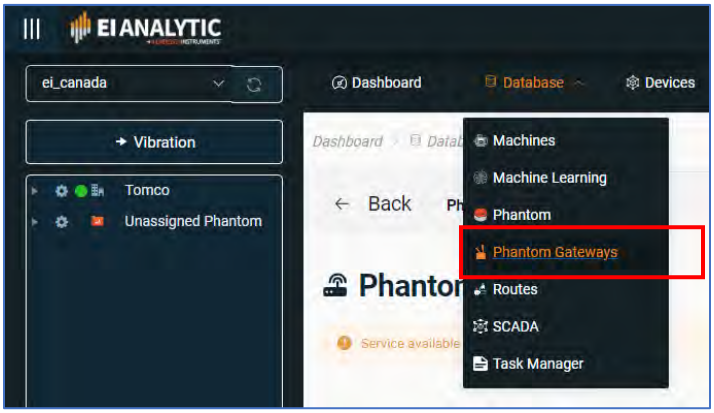
## Option 2 - Send Data to EI-Analytic

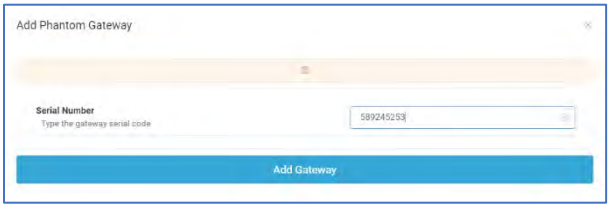
For a gateway to send data to an EI-Analytic cloud database, it must first be registered. To register a gateway:

1. Login to the EI-Analytic account and database that the gateway will be associated with at www.eianalytic.com.
2. Select Phantom Gateways from the **Database** drop-down list.
3. Click the **Add Gateway** button.
4. Enter the gateway serial number .
5. Click **Add Gateway.**

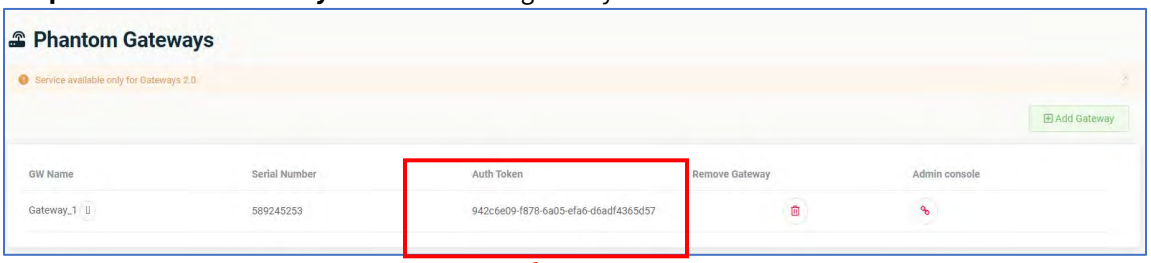


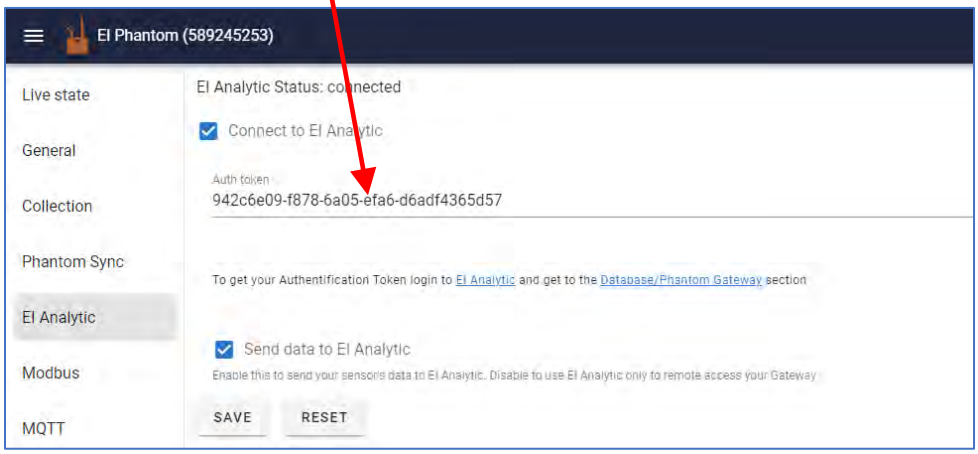




6. Once the gateway is registered, **copy** the Auth Token and **paste** it into the **EI-Analytic** screen on the gateway Admin Console.



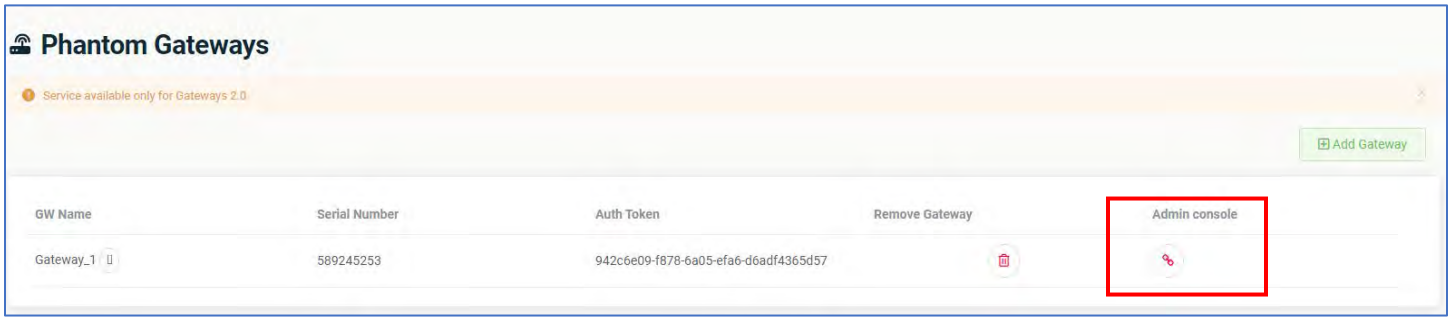




7. Ensure both **Connect to EI-Analytic** and **Send data to EI-Analytic** boxes are checked as shown.
8. Click on **Save** and the gateway will restart, Upon reboot it will start sending data to the EI-Analytic database.

### Remotely Accessing a Gateway

Once registered, gateways can be accessed through the EI-Analytic web interface. This requires the following steps:

1. Login to your EI-Analytic account where the gateway is registered.
2. From **Database** drop-down menu choose **Phantom Gateways**.
3. Click on the Admin console icon for the desired gateway. You now have full access to manage the gateway and all connected Phantom sensors. **Note** – you can set a password for access to the Gateway Console. See the *Security* section of this guide for details.




## Step 8 – Create Machine Database

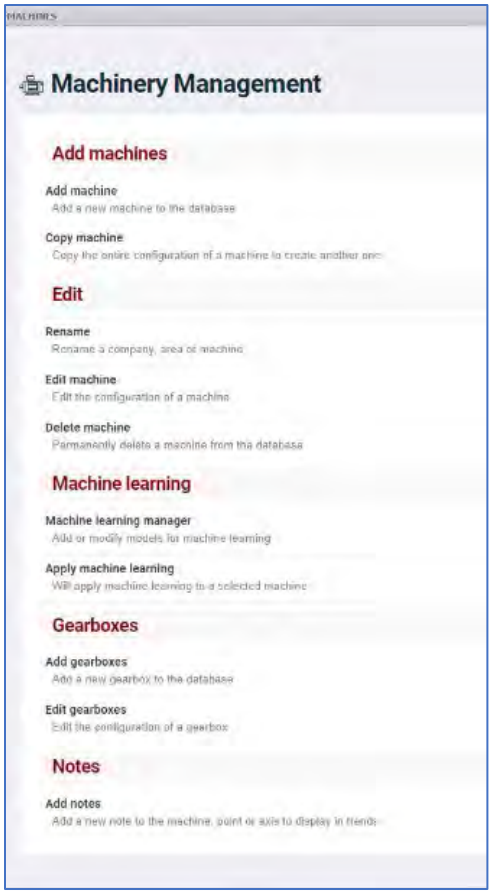
There are two databases used with the Phantom solution, the **Machine** database and the **Phantom** database.

Both Machines and Phantoms can be administered in three ways:

1. From DigivibeMX software (on a Windows device).
2. The EI-Analytic web portal (requires EI-Analytic cloud database account, supports any web browser).
3. Using the WiSER VIBE mobile app (requires EI-Analytic cloud database account, supported on iOS or Android devices.)

## Machine Manager

This web-based configuration interface is used to manage the **Machine** database.




**Add Machine**: Opens the Add Machine window for adding new machines to the database.

**Copy Machine:** Copies an existing machine for quick additions. This works well for creating multiple machines with the same parameters, e.g., RPM, bearings, etc.

The **Rename** feature allows renaming a Company, Area, Machine, or Point.

**Edit Machine**: To select a machine for editing, click on the arrow beside the machine name. The Edit function can be used to change a machine's *Company* or *Area* assignment in addition to all other fields in the machine configuration.

**Delete Machine:** Select from the list to delete a machine.

**Machine Learning Manager:** Opens the Machine Learning window to add or edit machine learning models**.**

**Apply Machine Learning:** Applies a machine learning model to a selected machine.

**Gearbox Add/Edit:** Opens the Gearbox window to allow adding and editing of gearboxes in the database.

**Notes:** Opens the Notes manager screen to allow adding, editing or viewing notes attached to a machine.

### *Option 1 - DigivibeMX*

To open from DigivibeMX, click the Machine Manager icon on the Main menu or on the Database menu.



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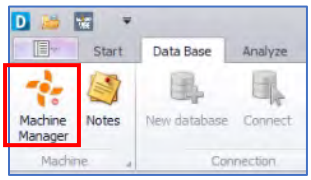
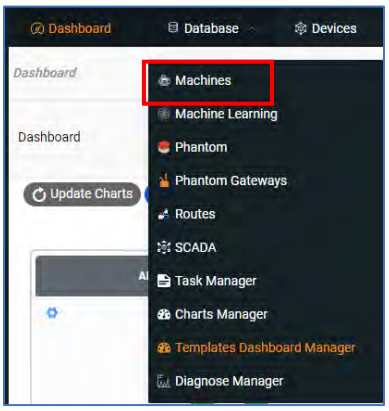



### *Option 2 – EI Analytic web portal*

To open from EI-Analytic, click Machines on the Database menu.



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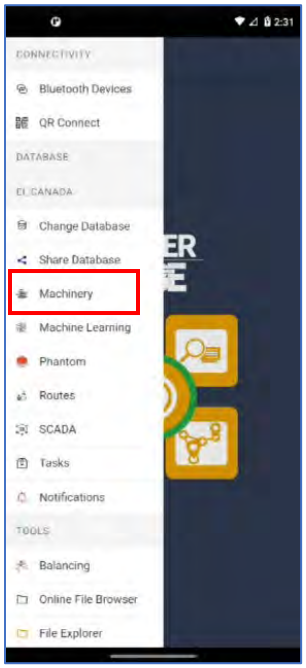
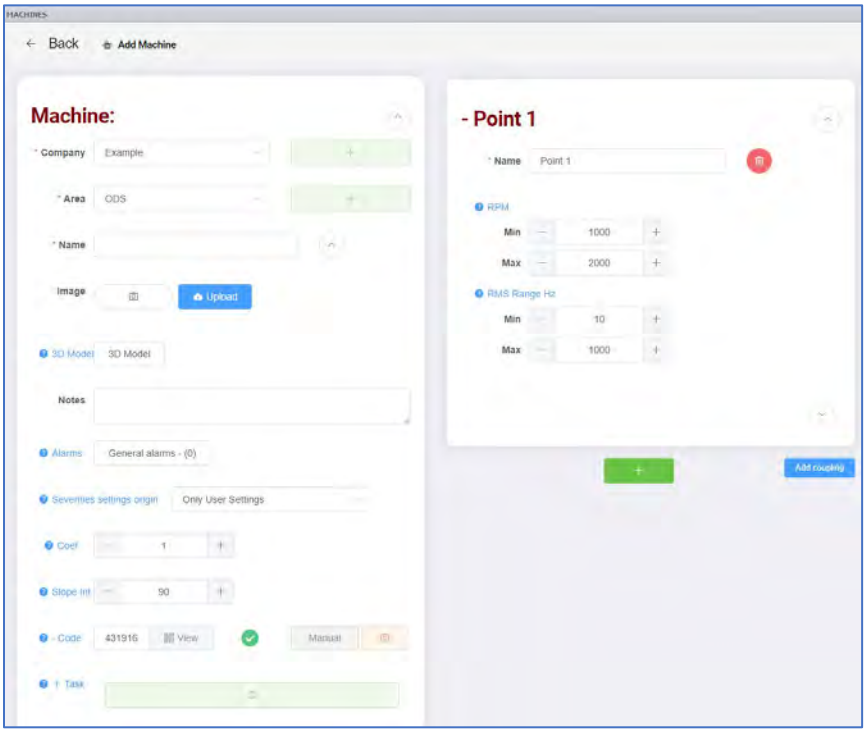
### *Option 3 -WiSER VIBE Pro*

To open from the WiSER VIBE Pro mobile app, select Machinery from the main menu.




## Creating a new Machine

The **Add Machine** screen has two sections, the Machine panel and the Points panel. Contextual Help is available for some fields by clicking the blue question marks.

The **Machine** panel contains fields for:

- **Company**: The company who owns the machine.
- **Area**: The production area in which the machine is located.

New Company and Area info can be added by using the add button.

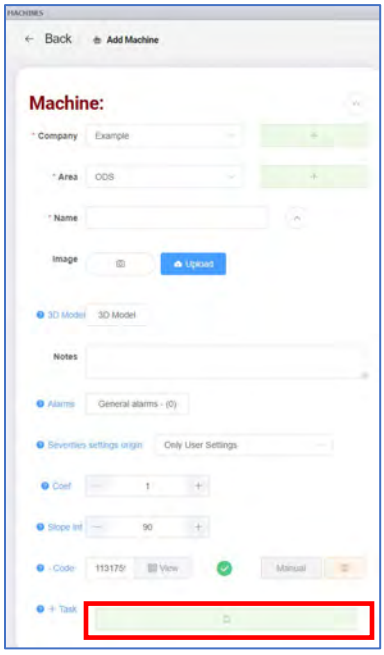
- **Name**: The machine name or ID number. **NOTE**: the only special character permitted in the name field is an underscore.
- **Image**: Optional 2D image of the machine may be uploaded to the database for reports. Also, clicking the photo button will capture an image using the PC camera.
- **3D Model**: 3D ODS models can be selected from the DigivibeMX database. External 3D models in .3ds, .xaml, or .obj formats can also be imported to DigivibeMX.
- **Notes**: Text field for documenting additional machine information.
- **Alarms**: General alarms may be configured here for non-vibration sensors such as Temperature, Speed, Current, etc. These types of sensors may be administered at the Machine level **or** the Point level in the database. If created at the Machine level, the corresponding alarms should be configured here, if created at the Point level, configure alarms in the Points panel **Extras** field as described in the next section.

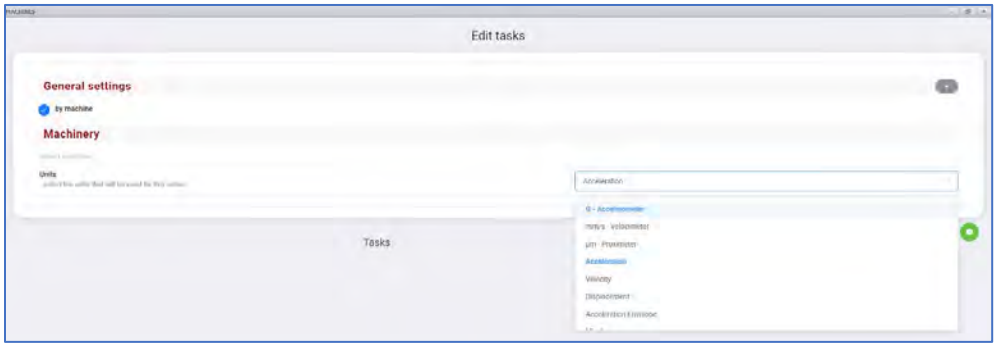
- **Severities settings origin**: The choice is used to determine the severity color (red, yellow, orange, green) of the icons shown in the Data Tree of DigivibeMX , EI-Analytic and the WiSER VIBE Pro App. The drop-down menu includes:
    - Only User Settings(default) – displays colors based only on User alarm severity settings.
    - Only Machine Learning Settings – displays colors based only on Machine Learning settings.
    - Default Settings - Shows User settings as source for colors, if configured. If not, shows Machine Learning settings.
    - Default Machine settings - Severity colors are shown based on Machine Learning, if configured. If not, colors reflect User settings.
- **Coefficient**: The machine maintenance priority or criticality for severity trending on a 1-10 scale (1 for critical machines, 10 for non-essential machines).
- **Slope Interval**: The time period of data to be considered for machine severity calculations.
- **Code:** DigivibeMX automatically generates a unique code(number) that can be used to identify a machine. Click the View button to see a unique QR code for scanning purposes. A Manual code may also be entered, or an image created via a device's camera.
- **Task:** Opens the Tasks window. **NOTE**- This feature is only available with an EI-Analytic cloud database subscription; it is not currently supported when using local databases. Task Manager provides notifications via email and/or push notifications to the WiSER VIBE Pro App, based on configurable thresholds for velocity, acceleration, etc., for a given machine.

## Setting Tasks for Machines

Tasks can be created to notify users of Machine health changes via email and/or push notifications to the WiSER VIBE Pro mobile app. A subscription to an EI-Analytic database is required for this feature to operate. Tasks cannot be assigned when a local database is used.

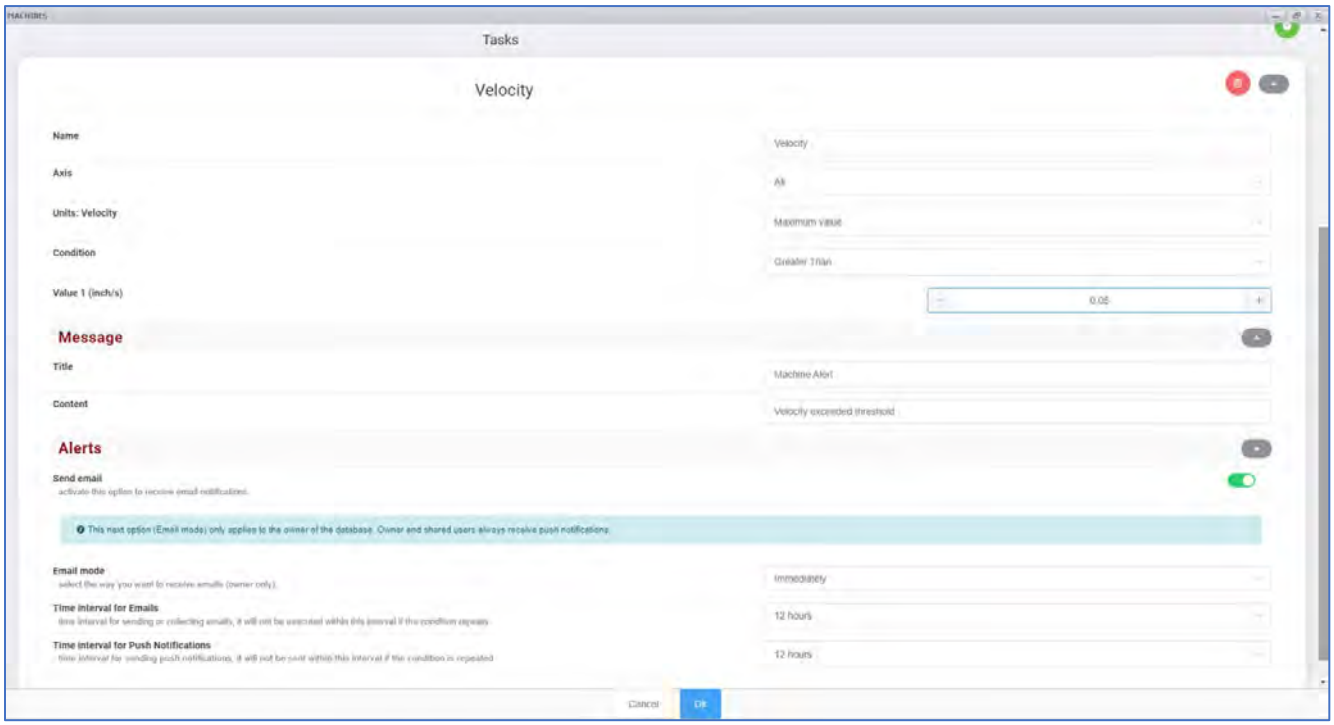
The Machine Manager allow Tasks to be created/assigned in the Add/Edit Machines windows. Click on the green Notification bar to open the Task manager window. When editing an existing machine, previously assigned Tasks will be shown for review or a New Task may be created using the New Tasks button.






Select the Units from the drop-down box for which Notification is desired. This includes vibration units of velocity, acceleration, and acceleration envelope in addition to non-vibration parameters such as temperature, RPM, Amperage, etc.

Then click the green Add button This opens the Tasks window.




- Assign a name for this Task.
- Choose which Axes will cause Notification.
- Depending on the Units chosen, the Units drop-down box will contain an appropriate list for selection. For example , if velocity is chosen, then RMS, Min, Max, Crest Factor, Peak to Peak, etc., will be included.
- Conditions include Equal to, Less than, Greater than, etc.
- Value is set for the chosen Units and Condition, such as the example above where the velocity Max Greater than .05 inch/s will cause Notification to be sent.
- Assign a title for the email Notification.
- Information entered in the Content field populates into the Subject line of the email.
- Check the Send email green slider to enable email Notification.
- Email mode can be set to **Immediate** (send email without delay)or **Batch** (sends all pending email notifications once a day).
- Time Interval for Emails allows setting a buffer to prevent repeat emails from being sent when immediate mode is used. If the condition repeats during the assigned time window, no email will be sent.
- Time Interval for Push Notifications provides the same function as described with emails.

Click **OK** when finished.

Multiple Tasks may be assigned to the same machine. E.g., one for Velocity, another for Acceleration. When initially creating a database, it is recommended to configure Tasks before using the Copy Machine feature.



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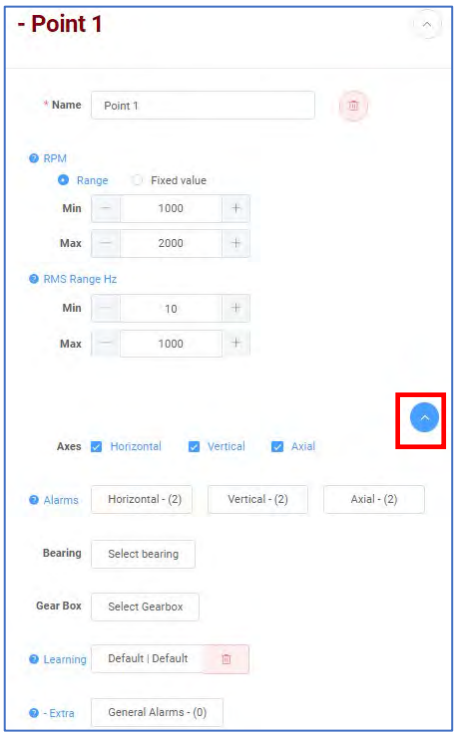
## Configuring Points on a Machine

Point 1 is created by default in a separate panel. Every machine has a minimum of 1 point, although it is not used when non-vibration Phantom sensors are assigned at the machine level. Click on the up/down arrow to expand or hide the bottom portion of the Points panel.



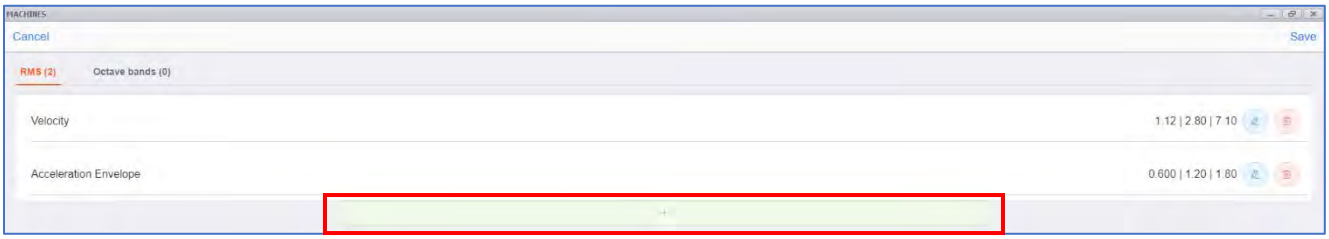

- **Name**: Use a naming convention for points that works for you. Names like MOB (motor outboard) or NDE (non-driven end) are commonly used. Only underscores are permitted as a special character in the name field.
- **RPM**: Enter a fixed value or the Min and Max RPM Range values for the machine point. An accurate RPM range is required for Acceleration Envelope calculation and identifying the machine's running speed.
- **RPM Range Hz**: For high-sensitivity Phantom sensors (V10, V10E) use the default range of frequencies from 10 to 1000 Hz. It is recommended to change this for high-range Phantom trixial sensors (V11, V11E) to 20 Hz Min and 1000 Hz Max to get higher precision.
- **Axes**: Defaults to triaxial, adjust as necessary.

## Alarms

These fields are used to set Axis-level severity alarms that can be used to determine the colors displayed in the data tree(in Digivibe or EI-Analytic). Click on Horizontal, Vertical or Axial to set the alarms for each axis.

This opens the Alarm config window. Two parameters are assigned by default for RMS alarms - Velocity and Acceleration Envelope.

Click on the large green Add bar to add another RMS alarm parameter (Acceleration and/or Displacement).




Click on the Edit button to change the default settings, which are based on ISO 10816 Class 2 standards.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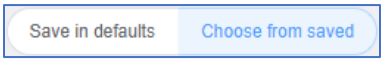
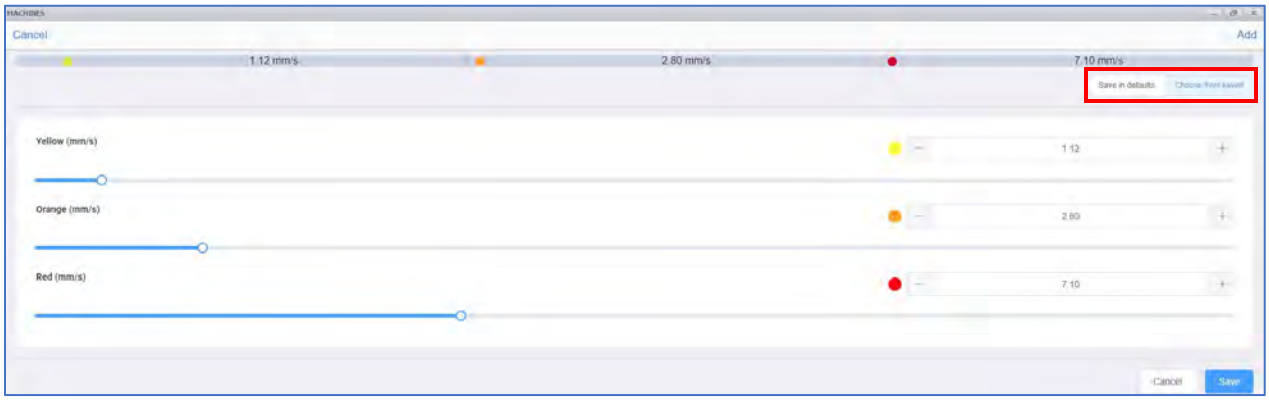
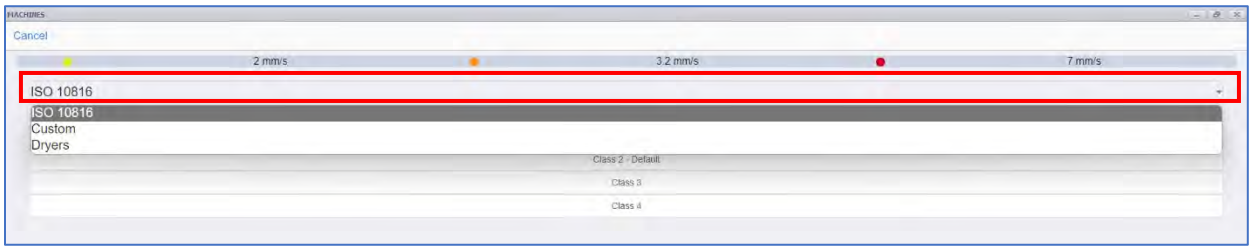
In the Alarm Settings window, modified alarm values can be saved in defaults. Previously created alarms can be applied by using the Choose from saved option.



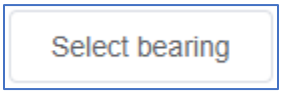

The saved choices are accessed via the large drop-down box.



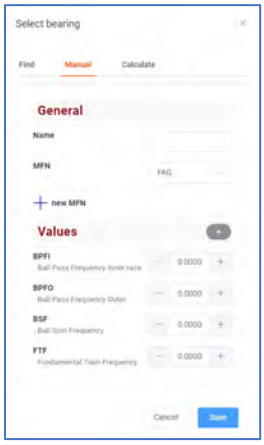

As shown, the ISO Class 2 alarms are the defaults. Once changes are made, click on **Save**.

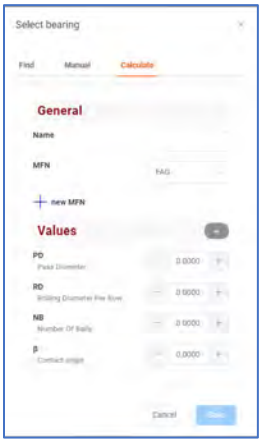
## Adding Bearings

The Select Bearing button opens the Bearing window.




DigivibeMX v11 features a Bearing database containing fault frequencies of over 40,000 common bearings from major manufacturers. Bearings may be permanently assigned to a machine measurement point or specified during Analysis. The Bearing database features a Search function, a Manual function for adding new bearings and fault frequencies to the database, and a Calculator to calculate bearing fault frequencies using bearing component measurements.



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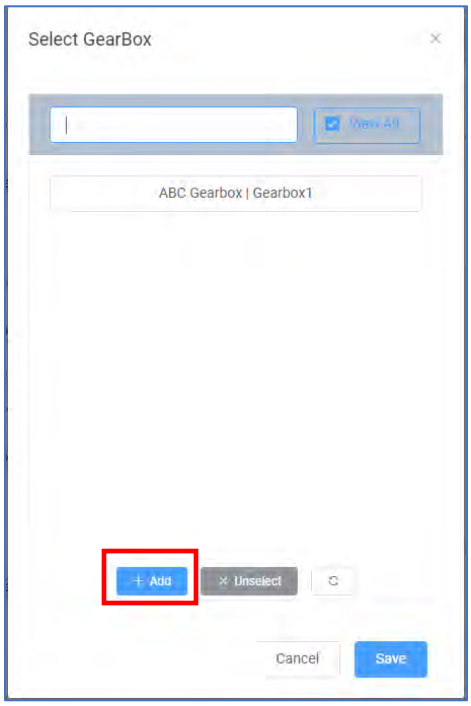
Enter complete or partial bearing part numbers to Search the database. Bearings can be manually created using calculated fault frequencies or those provided by the bearing manufacturer. The Calculator can be used to calculate fault frequencies using measurements or from data provided by the bearing manufacturer.

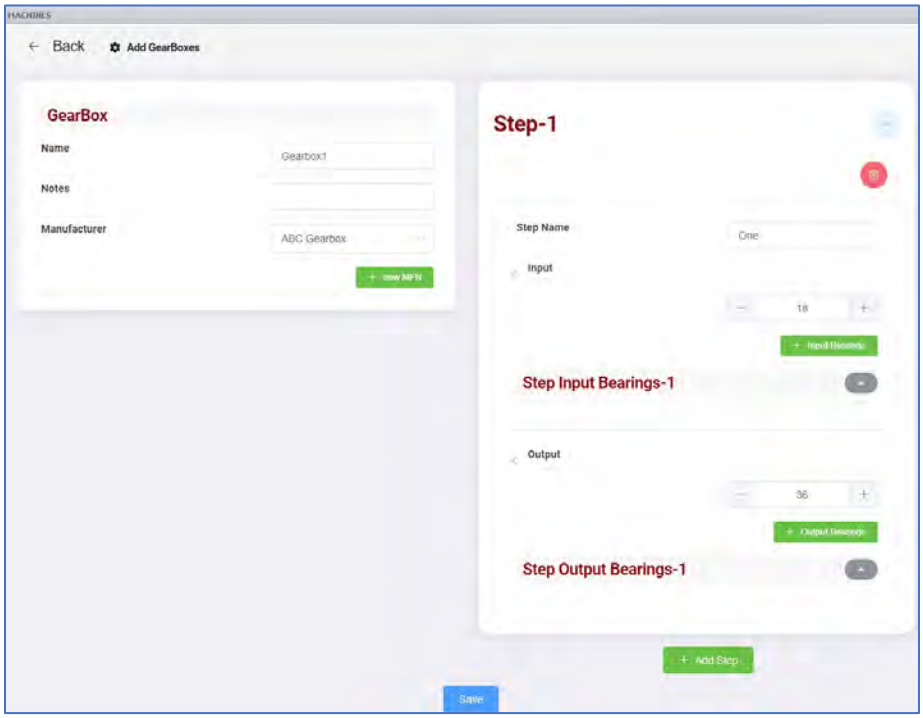
## Adding a Gear Box

To assign a gearbox to this machine point, or create a gearbox in the database, click on Select Gearbox.

This opens the Select Gearbox window, used to create a comprehensive library of gearboxes. Once created, the gearboxes may be permanently assigned to a machine measurement point or specified during analysis.

Select a previously configured gearbox from the list or click the +Add button to create a new gearbox configuration.




- **Name**: Enter the name of the new gearbox.
- **Notes**: Add any desired notes.
- **Manufacturer**: Select from previously configured list or Click on the + new MFN button to configure a new Manufacturer.
- **Step Name:** Add the step name to the Step-1 panel.
- **Input**: Enter the number of teeth.
- **Input Bearings**: A bearing configuration may be added by selecting the + Input Bearings button.
- **Output**: Enter the number of teeth.
- **Output Bearings**: Add an output bearing, if desired.

Select the + Add Step button to configure another step in the Gearbox configuration.

Click Save when finished. The new gearbox will be assigned to the current machine point.



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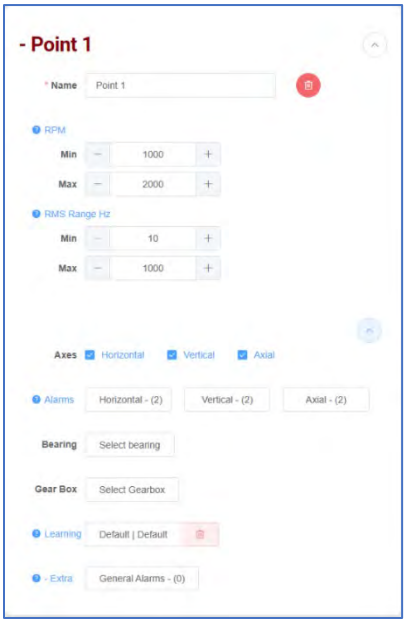
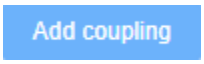
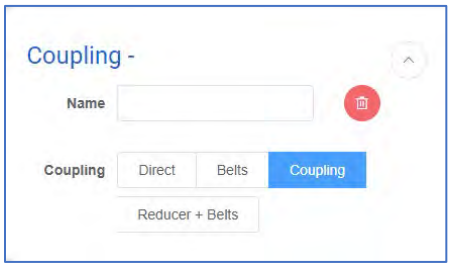
- **Learning:** The Machine Learning feature uses predictive algorithms to analyze historical data and thereby identify when notification is to be made regarding the health status of a machine point. See the Machine Learning Guide for further information regarding the creation of machine learning models.
- **Extras**: In addition to vibration data, Extra Values such as Temperature, RPM and Amperage may be documented. Extra Values may be assigned at the Machine level, or at a Measurement Point. Click on the General Alarms button to set alarms for sensors that are assigned at the point level. These point level alarms have no relation to the Axis alarms previously described.




## Adding a Coupling

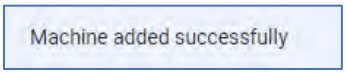
To add a Coupling, click the Add coupling button. 


Enter a name and select which type of coupling is used for this machine.




To add another machine point, click the green add button.


After adding all machine points, click on Save.

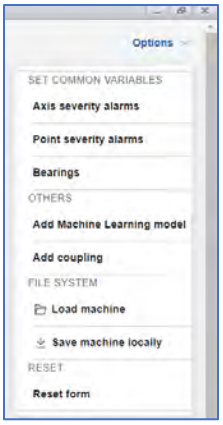

You should see a confirmation message appear. 


**Note**: At the top right of the Add Machine screen is an Options Menu.

This provides shortcut access to common functions such as Alarms, Coupling and Bearings configurations.

Machine configuration may be saved as a text file by using **Save Machine locally.**

**Load machine** loads a previously saved machine text file.



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Once all machines are configured, Phantom sensors can be assigned. Vibration sensors are assigned at the *Point* level of a machine, while Specialty sensors such as temperature, RPM, etc., can be assigned at the *Machine* level or *Point* level in software.

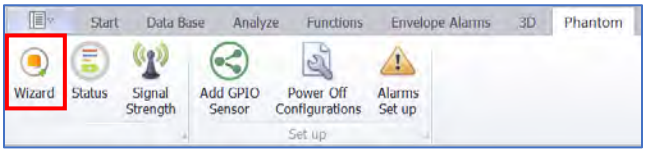
## Step 9 - Create Phantom Database

### Phantom Manager

This programming interface is used to manage the **Phantom** database and can be accessed in several ways:

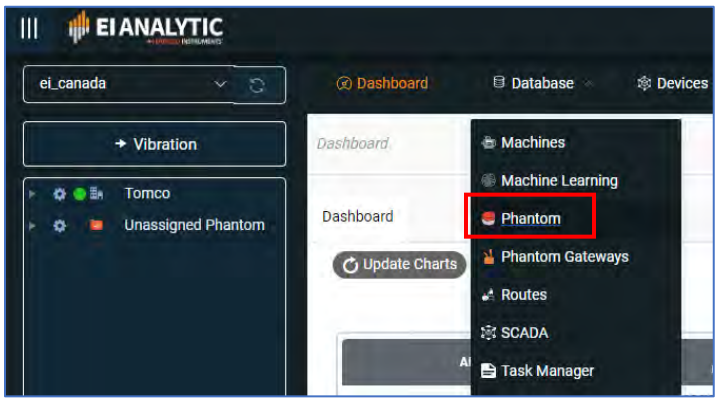
***Option 1 - DigivibeMX***

To open Phantom Manager from DigivibeMX, click the Wizard icon on the Phantom menu.



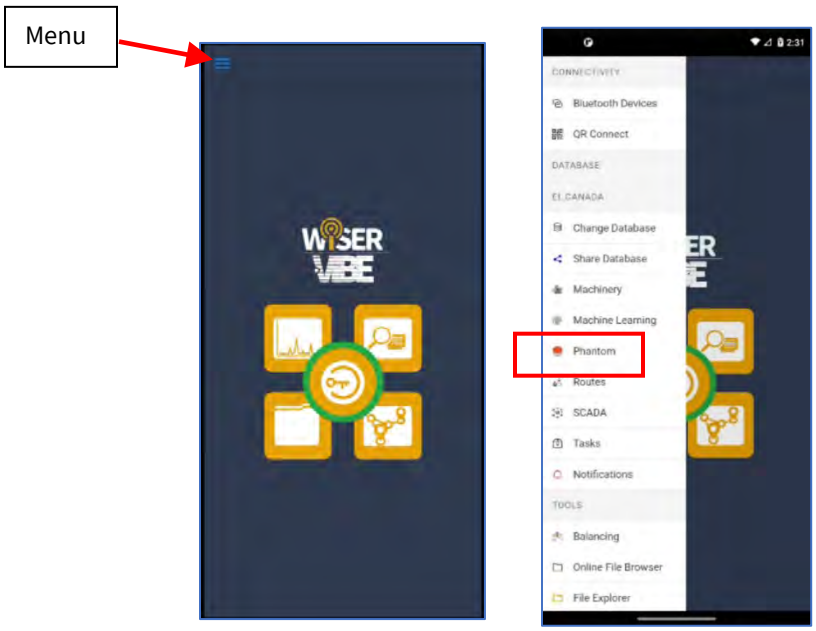

***Option 2 – EI Analytic web portal***

To open from EI-Analytic, click Phantom on the Database menu.




***Option 3 -WiSER VIBE***

To open from the WiSER VIBE mobile app, select Phantom from the main menu.



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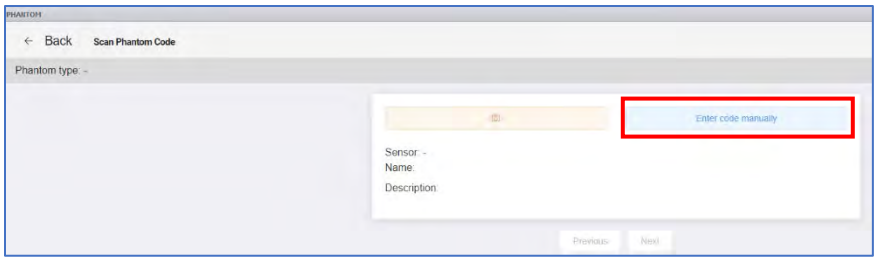
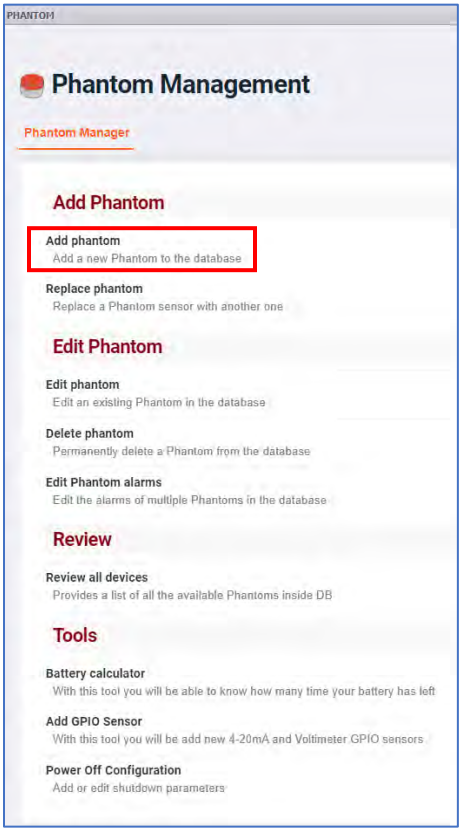
## Adding Phantom Vibration Sensors

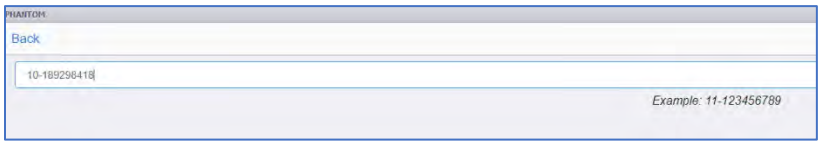
To add a Phantom vibration sensor:

1. Click Add Phantom; the Phantom Type screen will open:




2. Either scan the QR code of the sensor using the device's camera, or click Enter code manually, which opens a new screen:



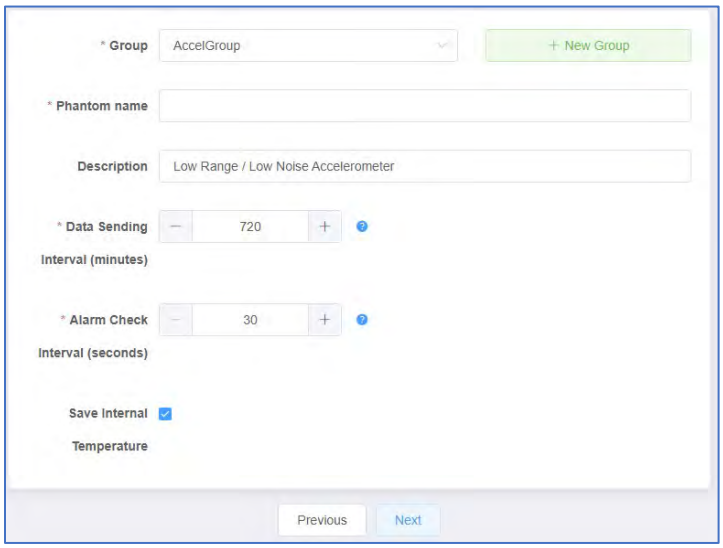

3. Enter the 11-digit code and click **Confirm.** Technical info is then displayed for the sensor, based on the Phantom code provided.

4. Verify the type of sensor is correct and click **Next**. **Note** -If the sensor is already in use, a message will appear indicating the machine and point to which it is assigned (if in the same database). For other errors encountered at this step, contact Erbessd Tech support for assistance. (see the last chapter of this document for details)

5. Configure the Group and Name screen.

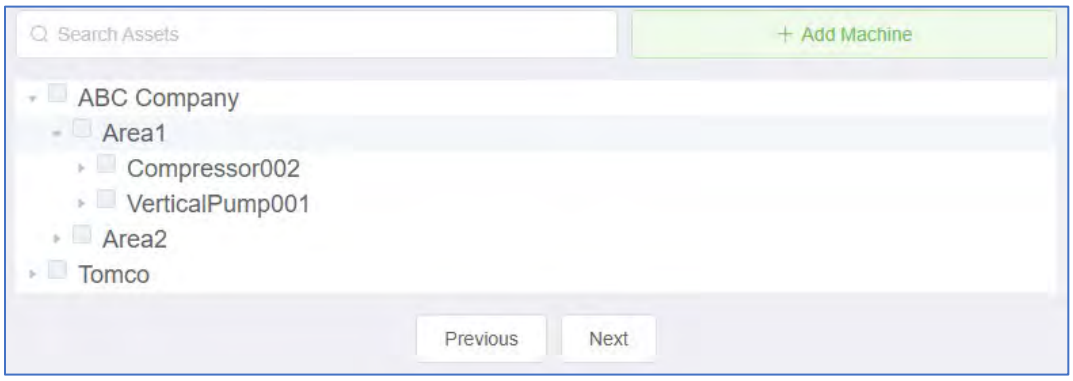
*Fields with a red asterisk are "required" entries.

Phantoms are configured in Groups (you can administer them all in one group). Enter a **Group** name. For example, if a machine has 4 Phantoms assigned, the Group name may be the same as the Machine name. It is NOT recommended to use special characters other than the underscore in the Group name or Phantom name fields.

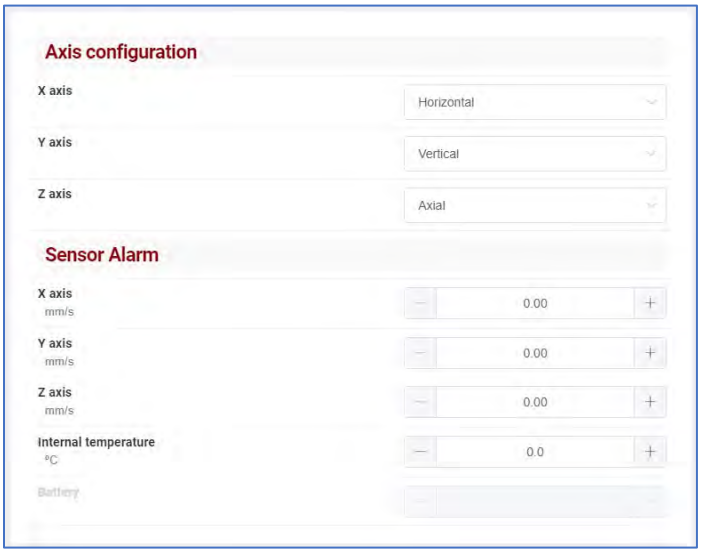



- The **Phantom name** should indicate the location of the sensor or anything else meaningful to distinguish it when all devices are listed. An example might be "Pump001NDE".
- The **Description** field is auto-populated according to the type of sensor being added.
- **Data Sending Interval (minutes)**** (For Gateway v1 ONLY!) is the time between Full data collections (RMS data interval is configured separately). The default is 720 mins (12 hr). The minimum interval for Phantom vibration sensors is 10 minutes. The maximum is 1440 minutes (24 hrs). For Gateway 2.0, data collection options for vibration sensors are configured via the Gateway Admin Console. See the next section for details.
- **Alarm Check Interval (seconds)****(For Gateway v1 ONLY!) This is the time between alarm checks performed by the sensor. For Gateway 2.0, the **Sensor Update** interval serves as the Alarm check interval.
- **Save Internal Temperature:** Uncheck if the internal sensor temperature is not required as part of the RMS data sent by the sensor.

6. Click **Next** to open the Assignment screen. Expand the Company>Area>Machine tree and select the Point where this Phantom sensor is to be installed. There is also an option to create a new Machine at this step, by clicking the **Add Machine** button.



7. Press **Next** to open the Config screen:
8. Check and adjust, if necessary, the sensor **Axis configuration** . All Expert Phantoms have the axis orientation marked on top: The default setting is top-mount. For side mounting, invert X and Y axes.

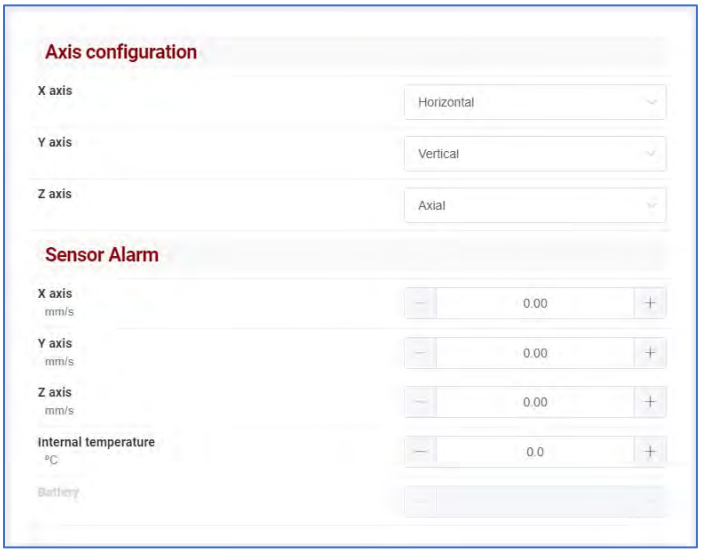



The image below shows a Phantom Triaxial Vibration Sensor attached to the top of a common electric motor.

The X-axis corresponds to the horizontal direction; the Y-axis corresponds to the vertical direction; the Z-axis corresponds to the axial direction. The vibration sensor should be configured as X=Horizontal, Y=Vertical, Z=Axial.

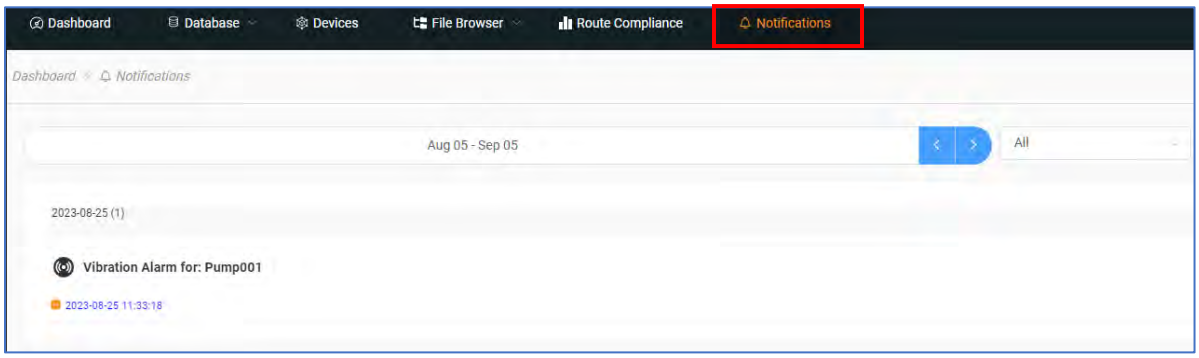
When the same sensor is attached to the side of the motor, the axis orientation is different. For this setting, the configuration is X=Vertical, Y=Horizontal, Z=Axial.

The **Sensor Alarm** section is used to set thresholds for RMS vibration and Internal temperature.




At the Sensor Update interval, the RMS velocity and internal temperature values are compared to the defined Alarm thresholds. Exceeding the threshold will cause the sensor to send a Full data collection, including a time waveform. EI-Analytic will send an email notification to the address of the EI-Analytic cloud database account (and to any address linked to the account).Push notifications are also sent to WiSER VIBE Pro mobile app users. The alarm values are displayed and administered using Imperial or Metric units, depending on the settings in either Digivibe Preferences or EI-Analytic. **Note** -Email and push notifications are <u>not</u> supported with local databases.

Notifications can be reviewed by clicking the Notifications Tab on the EI-Analytic dashboard, or in the WiSER VIBE app menu.



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Example email notification for vibration sensor RMS velocity alarm:

**The Pump001 machine triggered the following notifications.**

**Owner:**

**Database:** ei_

**Company:** erbessd_instruments - **Area:** Area1

**Machine:** Pump001 - **Point:** Motor-NDE

**Notification time:** 2023-08-25 11:33:18 a.m.

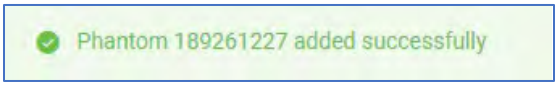
**Notification configured for a sensor**

- **Message:** Pump001 exceed the alarm threshold in Velocity for point: Motor-NDE
- **Sensor code:** 189286917

| Severity | Axis | RMS (mm/s) | | Status |
|---|---|---|---|---|
| | H | 35.623 | | Alarmed |
| | V | 64.616 | | Alarmed |
| | A | 53.389 | | Alarmed |

After setting alarms, press **Next** and the **Save Phantom** screen opens with a summary of the settings:

Click Save phantom and a confirmation message banner is displayed.




To add another sensor, click the Refresh button at top right of the screen.

For instructions regarding the installation of other types of Phantom sensors, see the *Adding Phantom Specialty Sensors* section of this guide.



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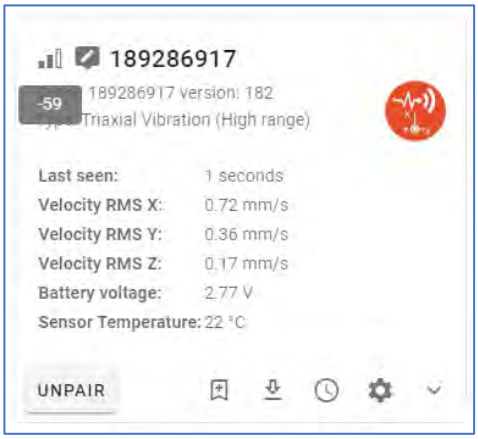
## Step 10 - Pair Sensors to Gateways and Configure Settings

Sensors are shipped from the factory in *sleep* mode. They will not be detected by any gateway until they are reset using the provided magnetic key. This will "wake up" the sensor and make it visible to gateways.

1. Begin by placing the magnet on the sensor just left of the LED and hold until the LED illuminates. If it does not, move the magnet around the sensor's radius until it does. Remove the magnet and the LED will stay lit for several seconds, then blink 3 times and turn off. The sensor is now activated/reset.

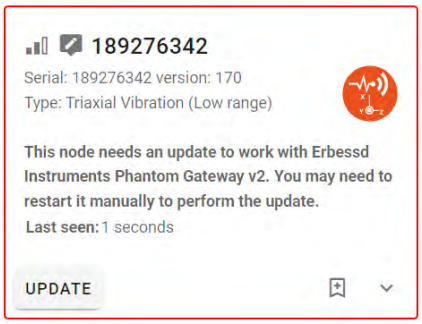


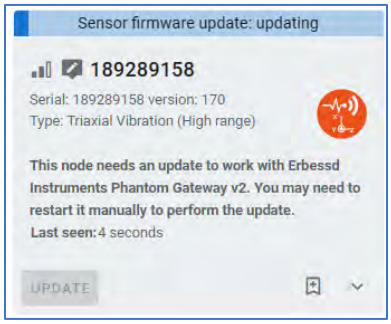

The Live State screen on the gateway Admin Console will show all sensors within Bluetooth range, listed by serial number.

Additional information is provided for each sensor, including:

- Signal strength (hover mouse over signal bars)
- Sensor name (can be changed using edit icon)
- When the gateway last communicated with this sensor
- The latest RMS velocity for each axis
- Battery voltage
- Temperature

2. Some sensors require an update when they first connect to a Gateway 2.0. They will appear with a red box and an update button. Press the **Update** button to download and install the latest sensor firmware version. The blue staus bar shows the update progress.You may need to reset the sensor using the magnetic key as part of the firmware update process.



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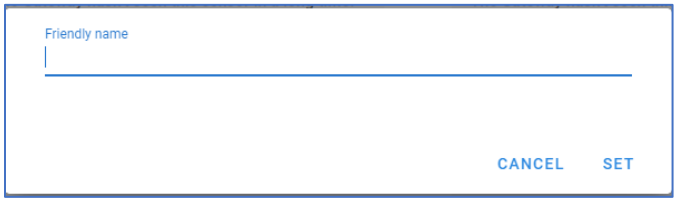
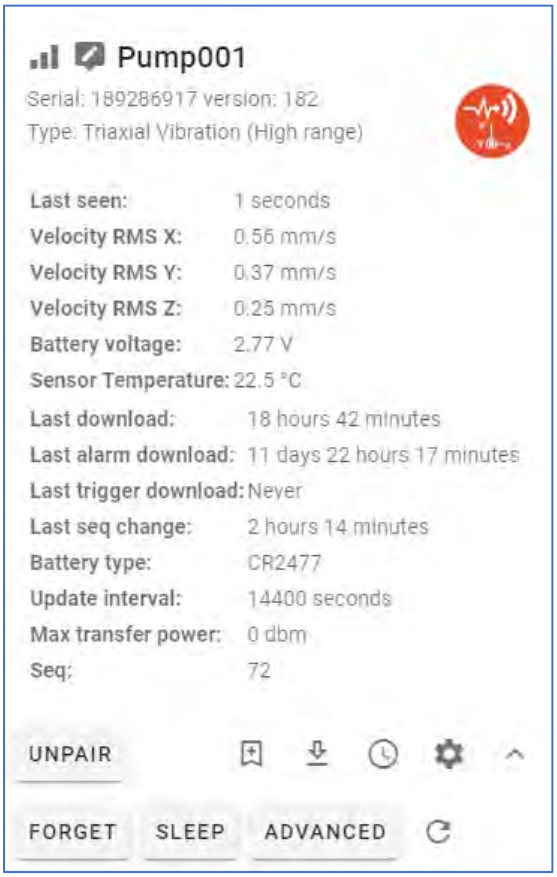
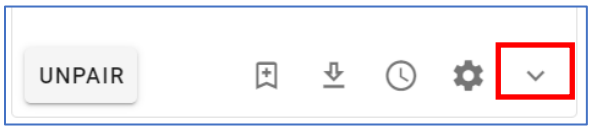
3. Select the sensors you would like to control from the gateway, and click PAIR for each. **Note –** all sensors in a Repeater Network are paired to the Main gateway only.
4. Rename the sensor by clicking (recommend using the same name as entered in Phantom Manager)



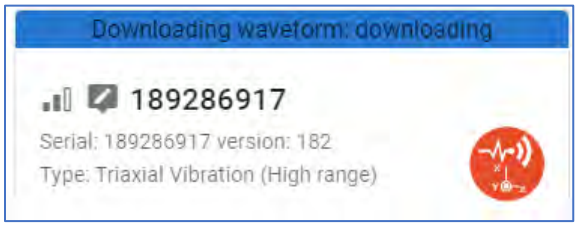




After pairing, more configuration options and info are available by clicking the down arrow.



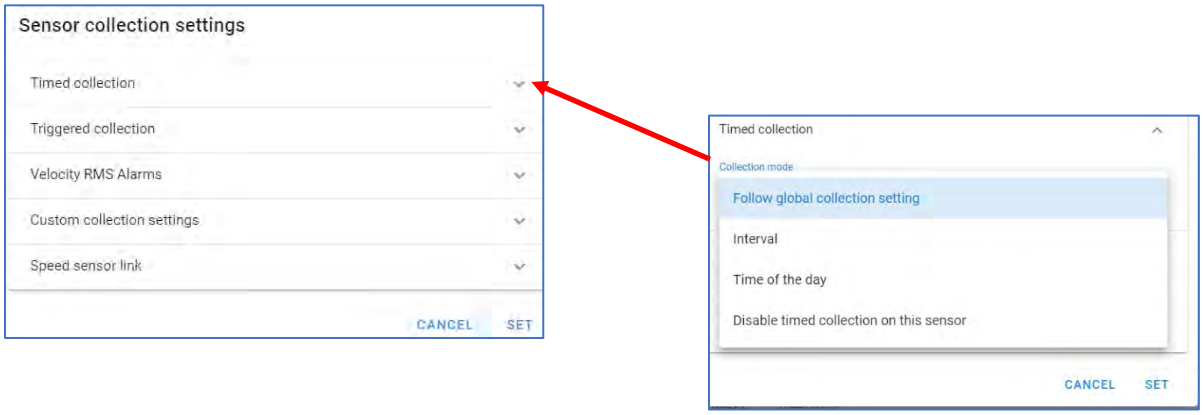

**Favorite** Adds the sensor to the list of favorites.

**Collect waveform now** Requests a data collection from the sensor. A blue message bar will appear, indicating the signal is downloading:



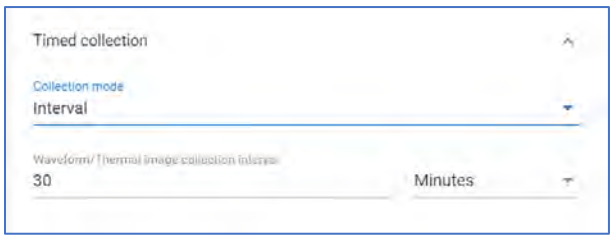

**Sensor Collection settings** Contains five parameters:

a) **Timed collection:** Allows you to select the sensor collection mode from the four available options:

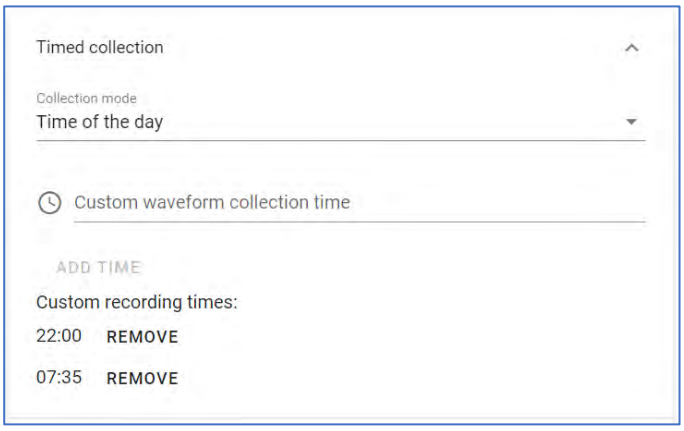


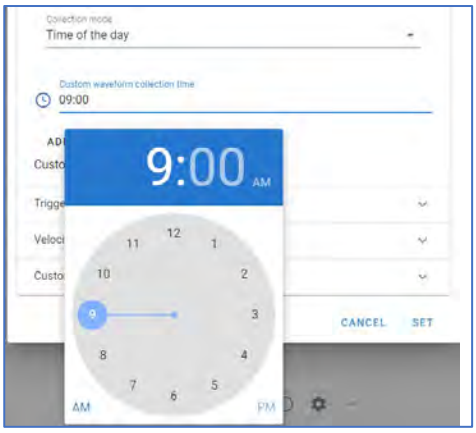
i. **Follow global collection setting:** Causes the sensor to record data according to the global configuration settings of the gateway. See *Global Collection Settings* in the next section of this guide.

ii. **Interval:** Allows you to send data with a defined interval. You can switch between minutes, hours or days as long as you stay within the allowed range of the sensor. The default Interval is 720 minutes(12 hrs).



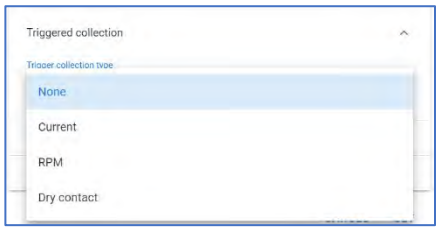

iii. **Time of the day:** You can choose specific times of the day to send data. When you click on **Custom waveform collection time** a clock will appear, allowing you to choose the time you want. By clicking on ADD TIME you can add this time to the list. You can add multiple Custom recording times by repeating this process, and delete them with REMOVE.



iv. **Disable timed collection on this sensor:** Disables data collection. RMS velocity, temperature and battery level will continue to be reported. This is useful if the only full data collections required are *triggered* by another sensor, see below for more details.

b) In the **Triggered collection** section, you can link vibration sensors with other sensors for parameters including current, speed, or dry contact. For details see the *Triggering Sensors* section of this guide.



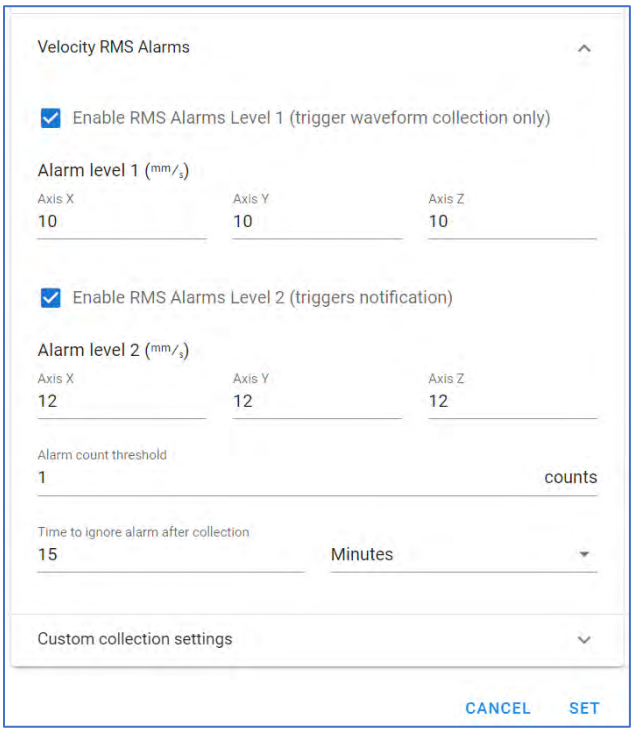

c) In the **Velocity RMS Alarms** section, you can activate sensor alarms. The values entered here should match the Sensor Alarm entries in the Phantom database, see page 46 of this guide. Currently, they need to be entered in both forms to function properly.

**Alarm level 1** will cause the sensor to send a data collection if the RMS velocity threshold is exceeded on any of the measured axes.

**Alarm level 2** will trigger an email/push notification if the RMS velocity threshold is exceeded on any of the measured axes.

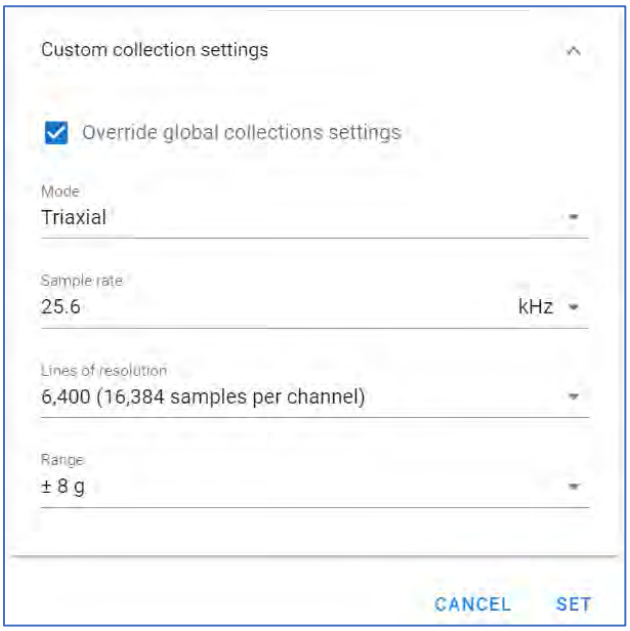
**Alarm count threshold:** This parameter defines number of consecutive *counts* for which an alarm condition exists before an alarm is triggered. A *count* is the amount of time defined by the **Sensor Update Interval** , which is set via the **In-Sensor Settings**(see next page).

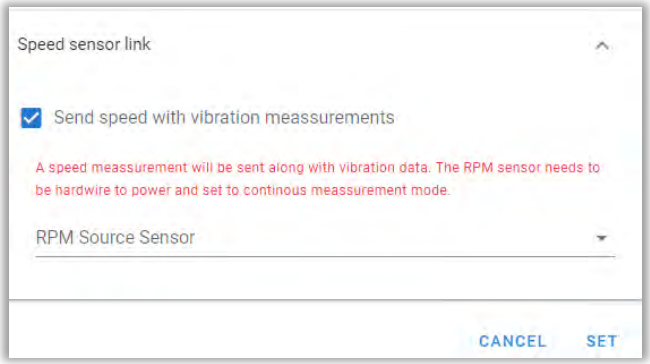
**Time to ignore alarm after collection** indicates how much time must pass before the sensor can alarm again (applies to both Level 1 and 2).



d) In **Custom collection settings** you can select **Override global collections settings** to modify the settings for *this sensor only*. Otherwise the sensor will take the global settings from the gateway. The options are explained in the next section.

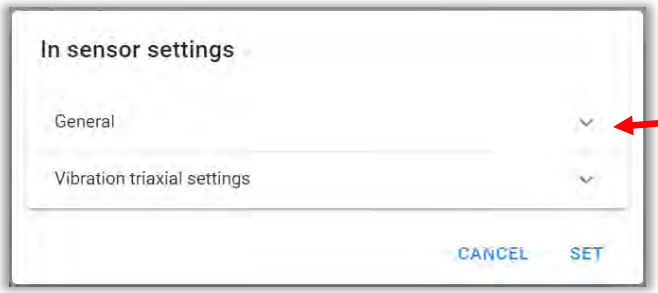
e) **Speed Sensor Link** When an EPH-S40 Phantom Speed sensor is installed in Continuous mode (powered locally via 5-24VDC), a parameter can be set to cause an RPM measurement to be sent whenever an Expert Triaxial Phantom sensor sends a full vibration signal file to the database.

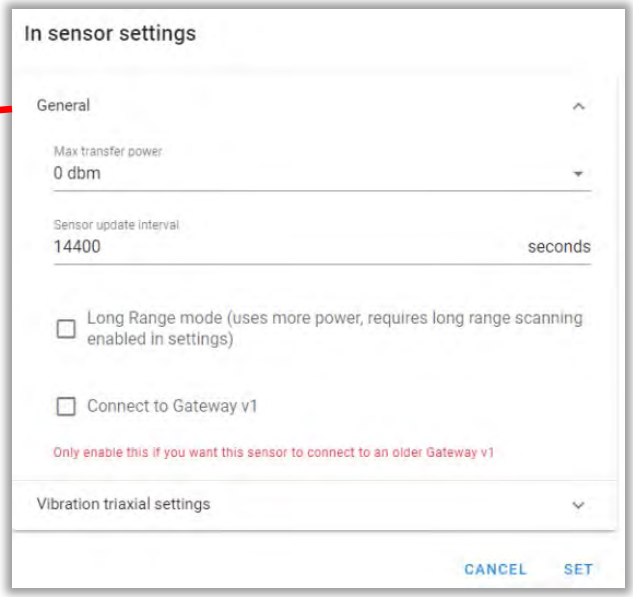



The **RPM Source Sensor** drop-down will contain the phantom code for all available RPM sensors.

**In sensor settings** allows you to modify the internal settings of the sensor.




In **General** , set the **Max transfer power**. The default and recommended setting is **8 dbm** for Expert Vibration sensors.

The **Sensor update interval** defines how often the sensor updates its status. For vibration sensors, this is the interval used to send an RMS velocity value, internal temperature and battery voltage level to the gateway This is called a sequence or **count**. This interval is also used to check the sensor's Alarm status.



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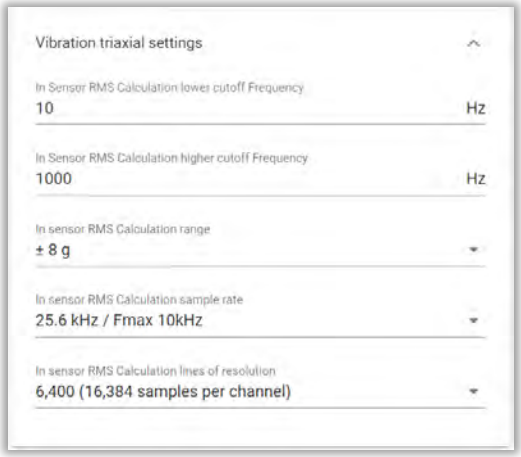
Check **Long Range mode** if this sensor is to use Long Range instead of Regular Bluetooth scanning mode.

You can check the **Connect to Phantom Gateway v1** option if you want this sensor to connect to an older Gateway v1 receiver.

The **Vibration triaxial settings** contains the options for the **RMS** value calculation:

- **Lower cutoff or Higher cutoff**: Defines the frequency range.
- **Calculation range:** Choose the dynamic range.
- **Sample rate:** Sets the sample rate and maximum frequency.
- **Lines of resolution:** Select the resolution lines for calculation.




Click SET to save the changes in the sensor.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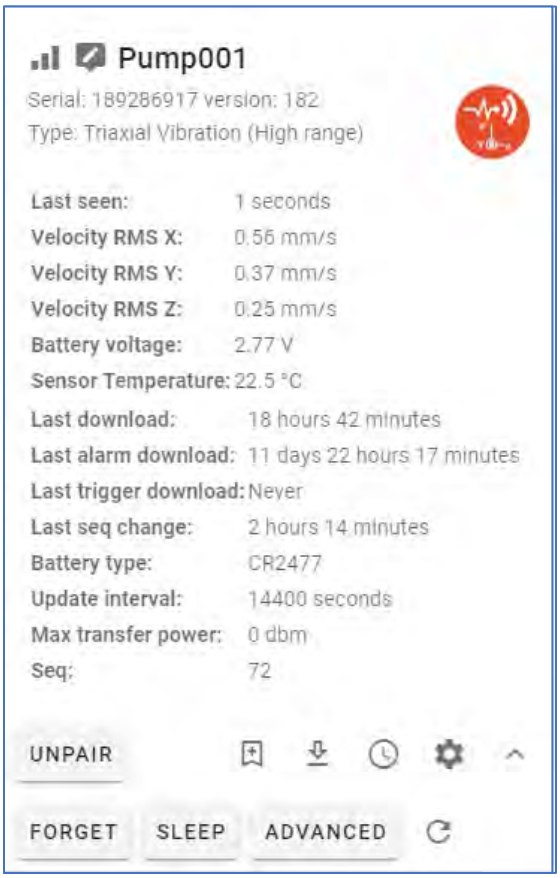
Additional information displayed after a sensor is paired includes:

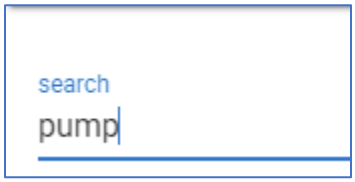



- **Last download:** Time since last downloaded signal.
- **Last alarm download:** Time since last signal downloaded by alarm.
- **Last trigger download:** Time since last signal downloaded by trigger activation.
- **Last seq change:** Time elapsed in the last sequence.
- **Battery type:** Sensor battery type.
- **Update interval:** Update interval set in sensor.
- **Max transfer power:** Maximum transfer power set in sensor.
- **Seq:** Number of sequences that the sensor has been through.
- **Unpair**: Unlinks the sensor from the Gateway.
- **Forget**: Forgets this sensor and its settings. It will not appear in the Gateway list until it sends data again.
- **Sleep**: Disables the sensor for battery conservation. The sensor will not take measurements or save new settings until it is reset with the magnetic key.
- **Advanced**: Allows you to add codes for specific firmware updates. This option requires the Gateway to have internet access. To avoid damage to your Phantom sensors, do not enter a code without the help of a Technical Support assistant.
- **Request Measurement Update** Causes the sensor to send an immediate RMS reading and resets the Update Interval timer to 0.

## Live State Screen Search and Sort

The Live State screen offers **Search** and **Sort** options:

Use the **Search** field to find sensors by serial number or name:



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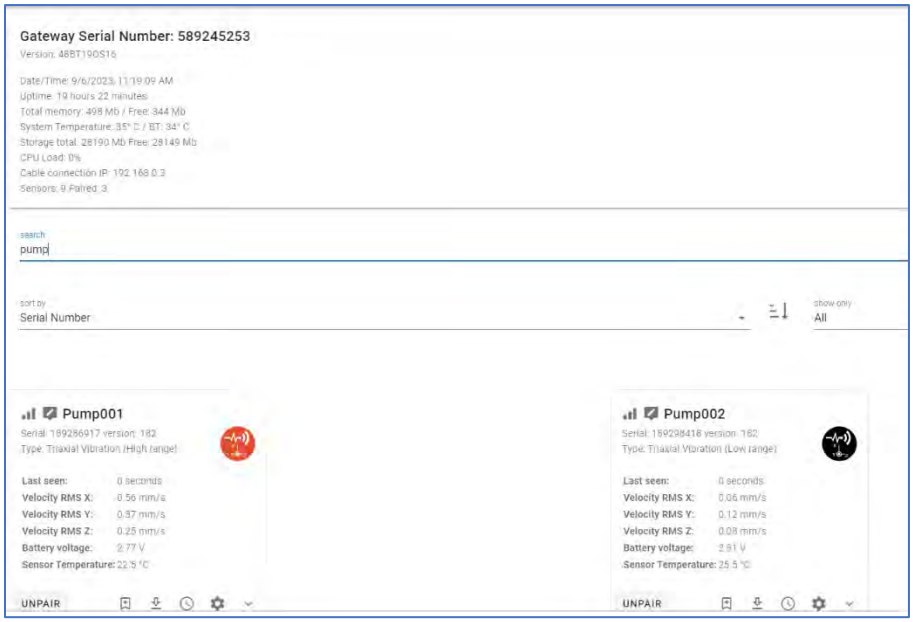
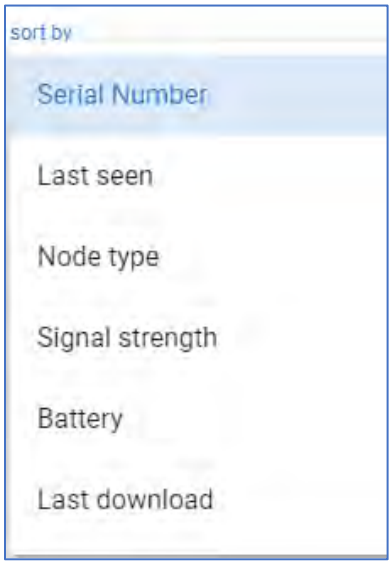
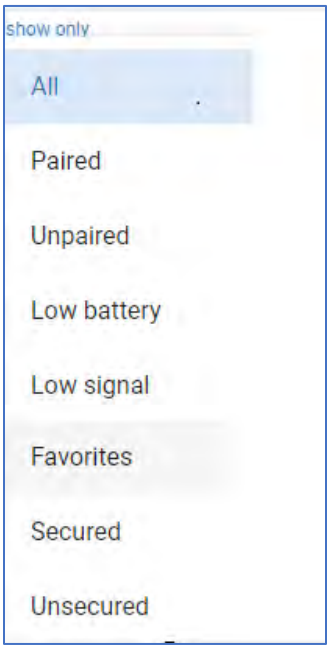
In this example, a search of “pump” results in 2 sensors being displayed.




The **sort by** field offers multiple options:




The **show only** field allows filtering the view by:




The Sort Order button toggles the display between sorted ascending or descending.



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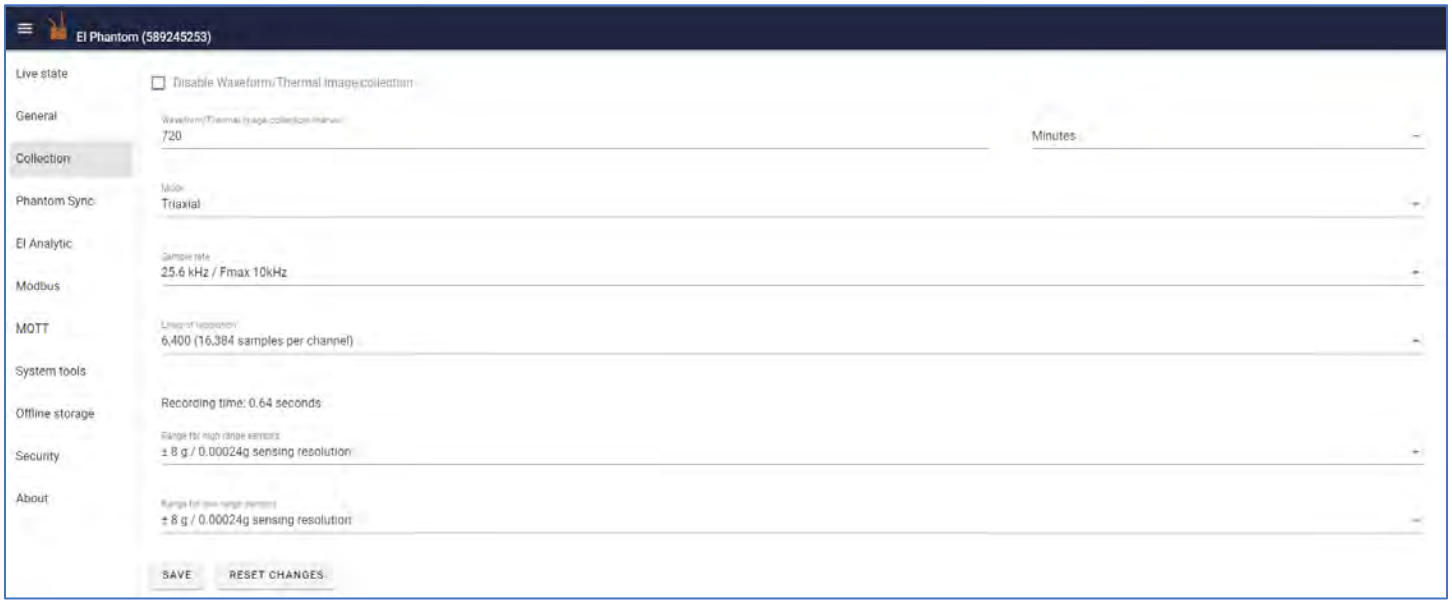
## Global Collection Settings

The **Collection** tab on the Main menu is used to configure the Global Settings.




**Disable Wavefrom/Thermal image collection** allows you to stop data collection of Time Waveform data from all vibration sensors and thermographic images from Phantom EPH-T70 sensors. RMS values will continue to be reported.

**Waveform/Thermal Image Collection Interval** :This is the collection interval for Time Waveform data from vibration sensors, and thermographic images from Phantom EPH-T70 sensors. It can be configured in days, hours, or minutes. The minimum interval for Phantom vibration sensors is 10 minutes. The default is 720 minutes(12 hrs).

**Mode** switches the type of data collection between **Triaxial** (three axes simultaneously) or **Single Axis** (one axis or three axes sequentially). When you select **Single Axis**, the **Axis** option will appear, where you can choose the axis on which you want to collect data (**x, y** or **z**), or if you want to collect on all axes **sequentially**.

**Sample rate** allows choice of rate and related Fmax of the sensor.

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The following tables show the relation between recording time, sampling rate and Fmax.

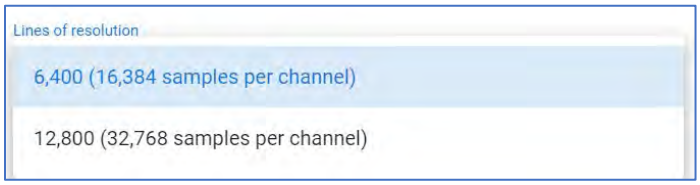
**V10, V17, V10E and V15 sensors**

| | | | | | |
|---|---|---|---|---|---|
| Recording time (s) 3 axes | 1 | 2 | 4 | 8 | 16 |
| Recording time (s) 1 axes | 3 | 6 | 12 | 24 | 48 |
| Sample rate (Hz) | 25,600 | 12,800 | 6400 | 3200 | 1600 |
| Max frequency (Hz) [x,y] | 4000 | 4000 | 2500 | 1250 | 625 |
| Max frequency (Hz) [z] | 1800 | 1800 | 1800 | 1250 | 625 |
| Lines of Resolution | 6400 | | | | |

**V11, V18, V11E and V16 sensors**

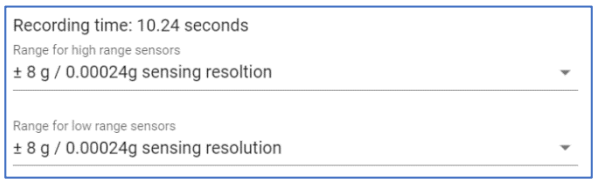
| | | | | | |
|---|---|---|---|---|---|
| Recording time (s) 3 axes | 1 | 2 | 4 | 8 | 16 |
| Recording time (s) 1 axes | 3 | 6 | 12 | 24 | 48 |
| Sample rate (Hz) | 25,600 | 12,800 | 6400 | 3200 | 1600 |
| Max frequency (Hz) [x,y] | 10,000 | 5000 | 2500 | 1250 | 625 |
| Max frequency (Hz) [z] | 5100 | 5000 | 2500 | 1250 | 625 |
| Lines of Resolution | 6400 | | | | |

If you selected **Triaxial** in the **Mode** section, you can choose between the following options for the resolution lines:




If you selected **Single axis** in the **Mode** section, you can choose between the following options for the resolution lines:

According to the selected collection type, sample rate and resolution lines, the collection time will change and will be displayed in **Recording time**.



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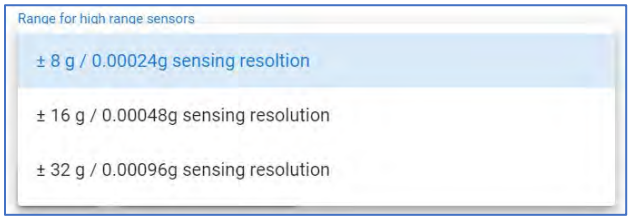
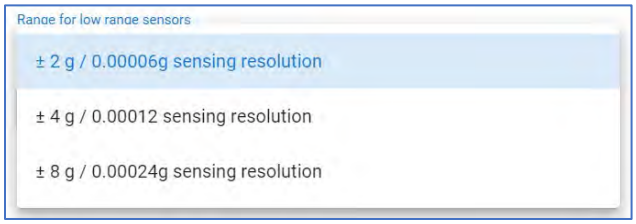
You can select the dynamic range in which your sensors will collect data.

For high range sensors, you can choose from the following options:




For high sensitivity sensors, you can choose from the following options:



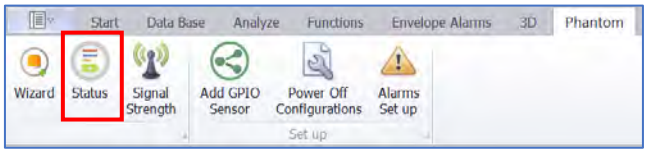

## Step 11 – Check Sensor Status and Test

Although detailed status information is displayed in the Live State screen of the Gateway Admin Console, it is limited to sensors connected to an individual gateway. For an all-encompassing status display, there are several options:

1. DigivibeMX - Phantom menu Status window
2. EI-Analytic – Devices tab on the main menu
3. The Review All Devices option in the Phantom Management tool (available on all devices)

### Option 1 – DigivibeMX Phantom Status

1. After logging in to a EI-Analytic database, click the Status button in the DigivibeMX **Phantom** menu.




This opens the Status Devices window The screen is divided into 2 functional sections.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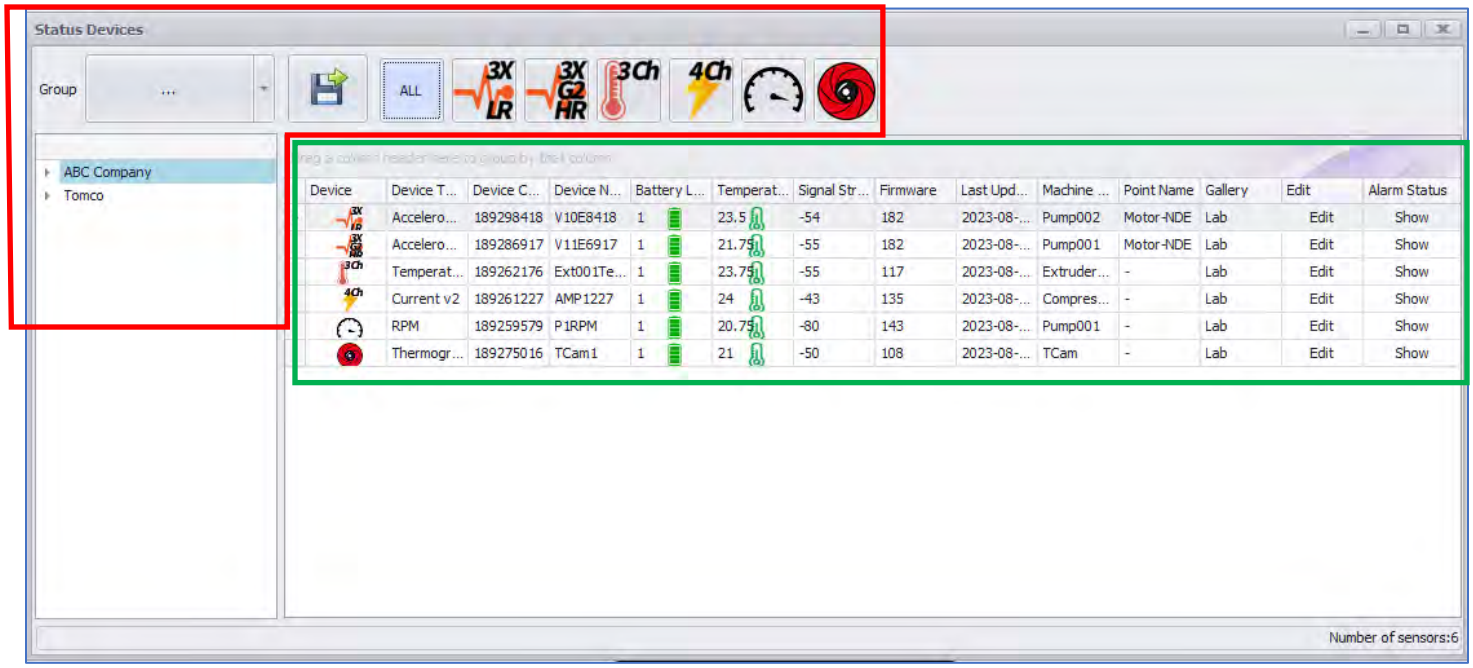


**Section 1 - Filters**: In this section of the Status window, select sensors can be displayed on the main screen. There are 3 different sorting options to choose from:

- **Group:** Displays and selects the sensors assigned or saved to a specific group, regardless of the type of sensor or its location within the database.
- **Tree:** Selecting items from the tree can easily locate sensors located in a specific machine, area or company. The screen will display the sensors assigned to a selected level of the database tree.
- **Sensor type:** By selecting a particular sensor icon, sensors are displayed according to the type of sensor selected.

**Section 2** – **Information:** This area displays general information sent by the sensor, divided into a table to facilitate easy reading. Column value details are as follows:

- **Device:** Shows the iconography designed for that sensor type.
- **Device Type:** Shows the Device Type name.
- **Device Code:** Shows the serial number of the sensor.
- **Device Name:** Shows the name of the sensor created in the Phantom database.
- **Battery Level:** Shows the remaining battery percentage: Green(1)=85-100%, Yellow(2)=50-84%, Red(3)=0-49%.
- **Temperature:** Shows the internal temperature of the sensor. NOTE: This temperature value is for the internal circuit temperature of the sensor – not room temperature or surface temperature where installed.
- **Signal Strength:** Shows the signal strength between sensor and gateway in dBm. (-50 to -75 is Good, -76 to -90 is OK and less than -90dBm is considered Poor).
- **Firmware**: Shows the installed firmware version.

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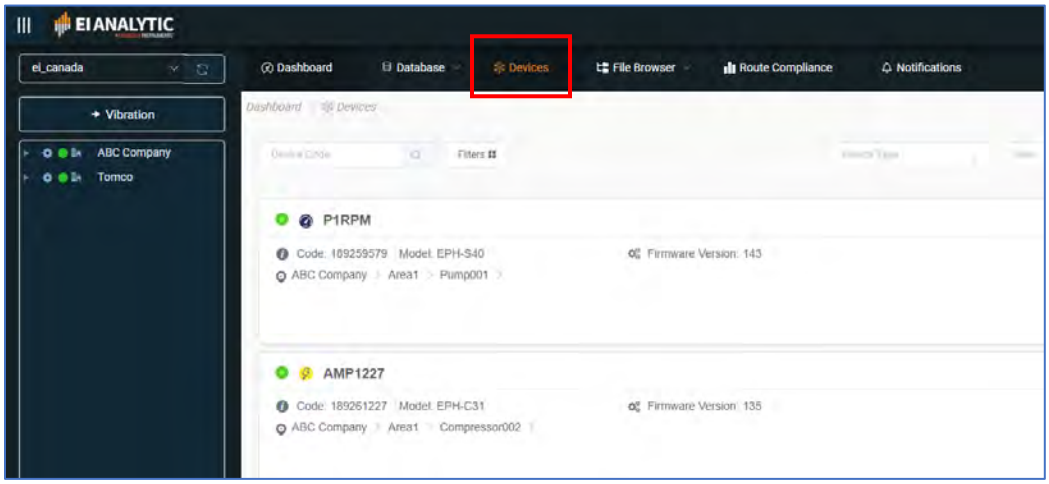
- **Last update:** This column shows the time of most recent Sensor Update transmission or full recording file.
- **Machine name:** Indicates the machine where the sensor is assigned.
- **Point Name:** Indicates the point of the machine where the sensor is assigned.
- **Gallery:** Indicates the group where the sensor is assigned.
- **Edit:** This editing interface is deprecated and should not be used. It was previously used to edit alarms and data collection settings.
- **Alarm Status:** opens a window to view any alarms registered for this sensor.

**IMPORTANT:** Sensor battery life and temperature values will not display accurate values until the sensor has sent a full recording file to the database.

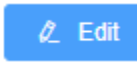
## Option 2 – EI-Analytic Devices

Open the Devices tab on the EI-Analytic dashboard:




The same information as shown in DigivibeMX above is displayed for each sensor in the database:

This interface has some extra options including:

- A **Process data** slider to easily turn off/on data collection for a sensor.
- A shortcut to the Task Manager function. For details see the *Task Manager* section of this guide.
- An Edit  button. **This is the fastest way to edit a Phantom sensor**, since you do not need to manually enter or scan the 11-digit sensor serial number.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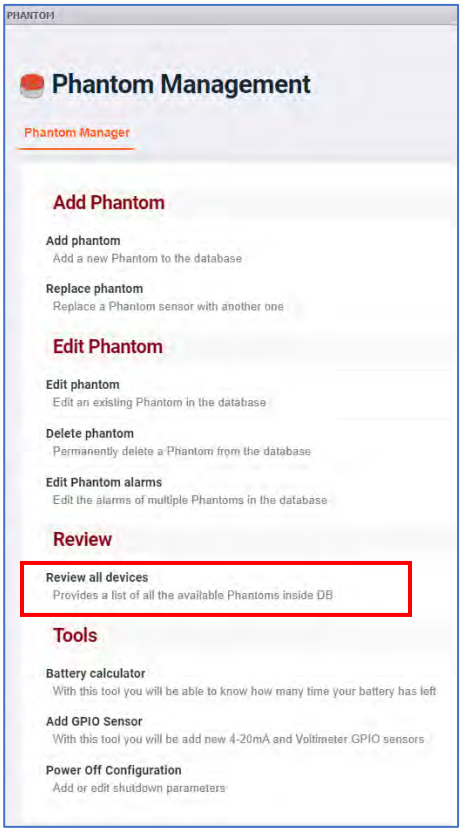
## Option 3 – Phantom Manager

Select the Review all devices option in the Phantom Manager tool, which is available on any device: PC, tablet or phone.

All sensors are displayed in an identical format to the EI-Analytic interface described above.



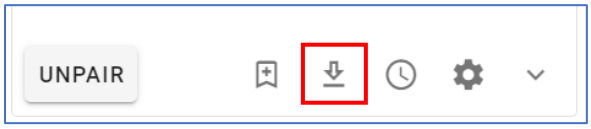

## Testing Sensors

To test your sensor for successful data collection and relay of the time waveform signal file to the database, you can can request an on-demand download from the Live State screen. If you do not have access to the gateway web interface, you can also reset a sensor using the magnetic key, which will cause it to send a data collection.

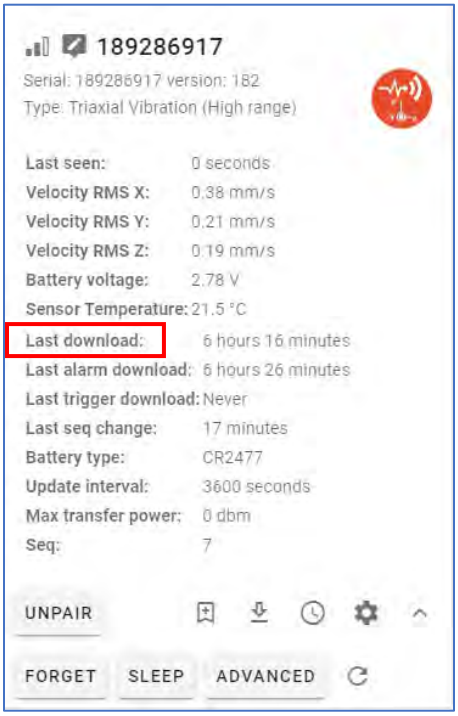
**Note** – If a gateway 2.0 cannot relay the data to a database (either local or cloud), it will store the files on the gateway's internal SD card until the connection to the database is re-established. The files will then upload automatically. See *Offline Storage* in the *Gateway 2.0 Additonal Features* section of this guide for more details.

To test a data collection from a gateway:

1. Open the gateway Admin Console.
2. Click Request Download on the sensor to be tested.



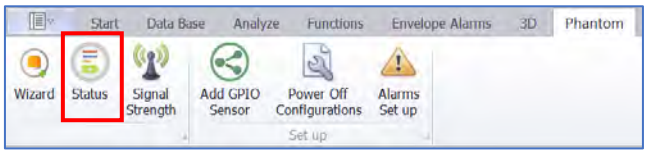
3. Note the blue downloading message; once it is complete, expand the sensor information box. The date/time of the Last download will show if the test was successful. An error message will appear if the download was NOT successful. For example, if it was received by the database, but the sensor serial number has not been assigned to a Machine or Point.
4. The status should also be checked using DigivibeMX, or EI-Analytic, or the WiSER VIBE Pro App (see next page). The database should then be examined to ensure the file was sent successfully, and can be opened for analysis.



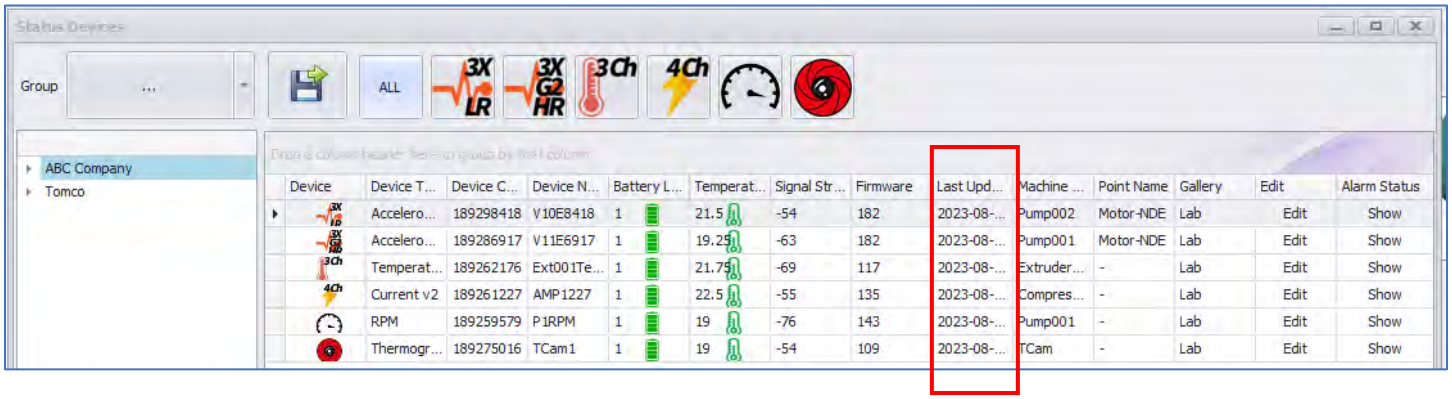
### *Checking with DigivibeMX*

You can check a local or cloud database using DigivibeMX software:

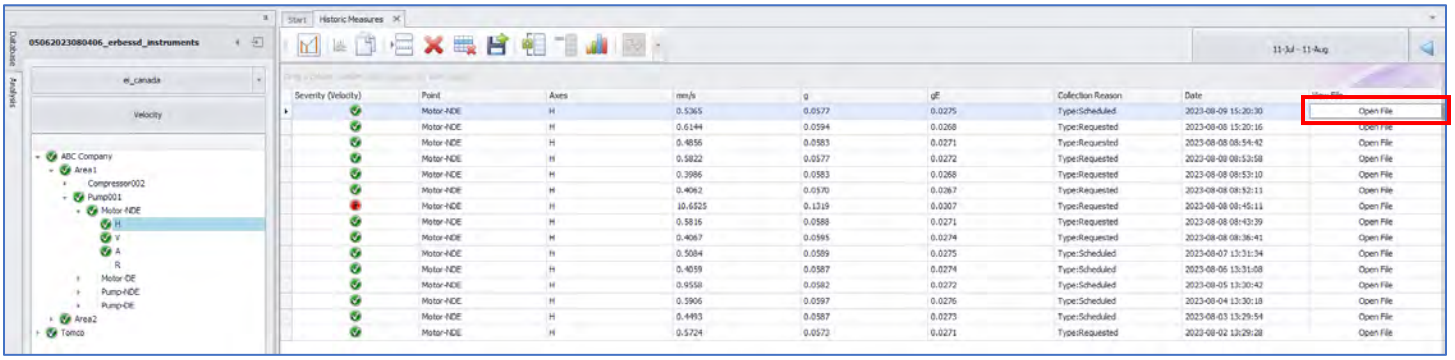
1. From the DigivibeMX Phantom menu click the Status button.




The Last Update field shows the most recent update time.




2. Open the Historic Measures window by clicking on any axis of theMachine point in the data tree for the tested Phantom. The signal file should be available to open and analyze using Open file.




Check to ensure the time waveform and FFT are successfully rendered.

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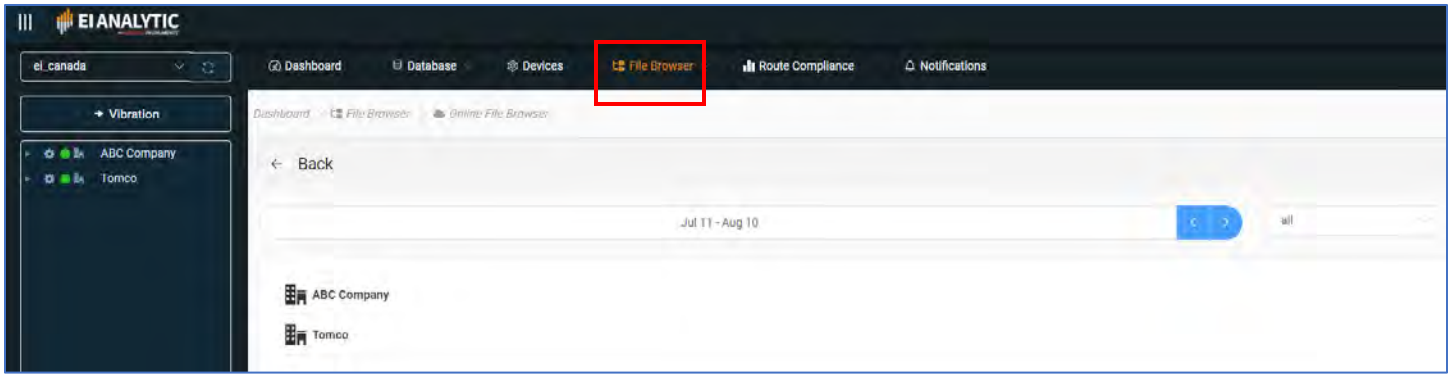
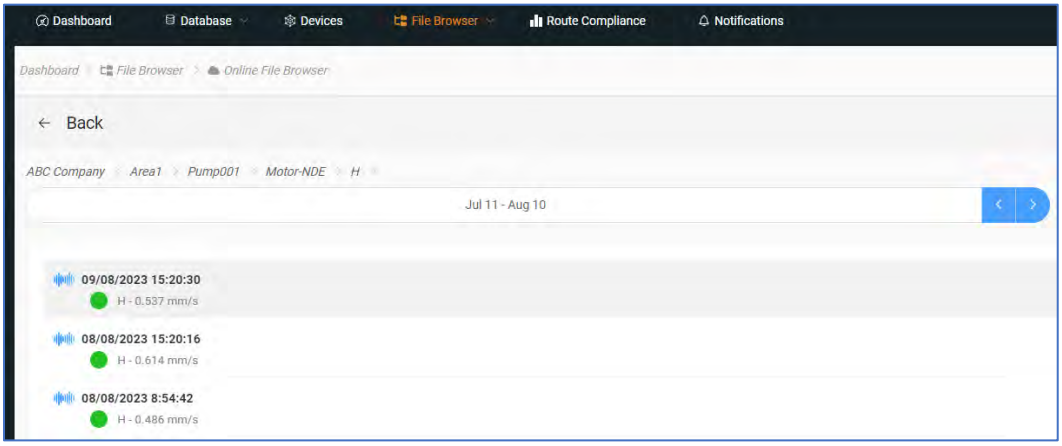
### *Checking with EI-Analytic*

To check a cloud database using EI-Analytic:

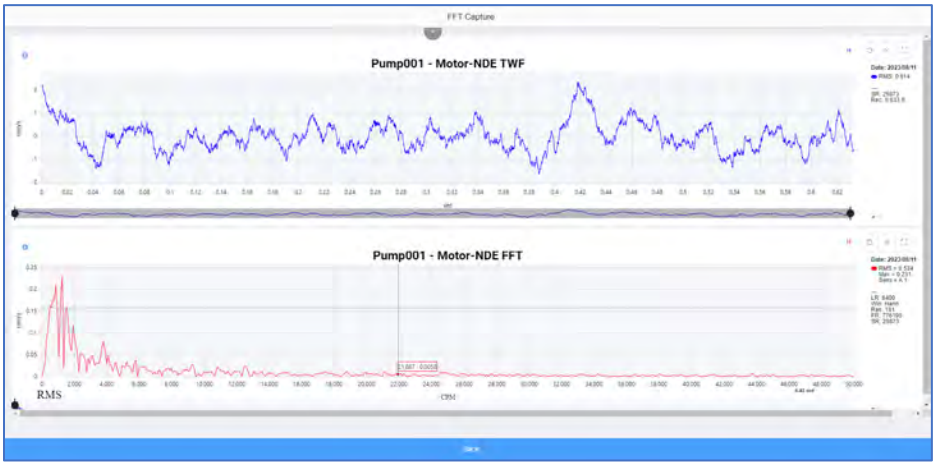
1. Login to the Account and select the database of the tested sensor.
2. Click File Browser>Online File Browser and drill down to the axis level of the database for the sensor being tested.




The test file should be listed, if it was received by the cloud database successfully. Note – there will be a small delay between the time the sensor creates the signal file and it appearing in the cloud database.




Click on it to open the time waveform and FFT:



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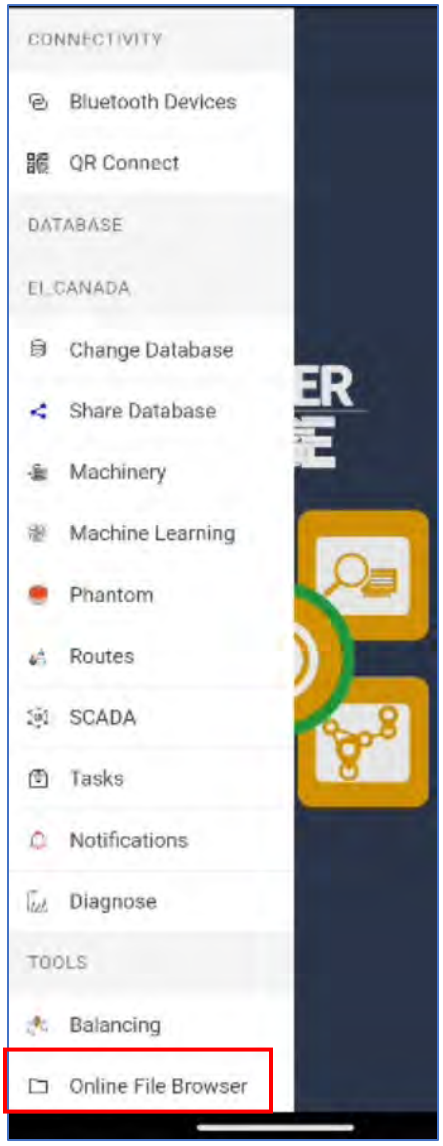
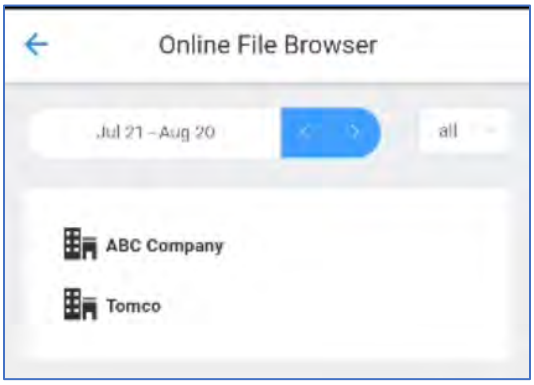
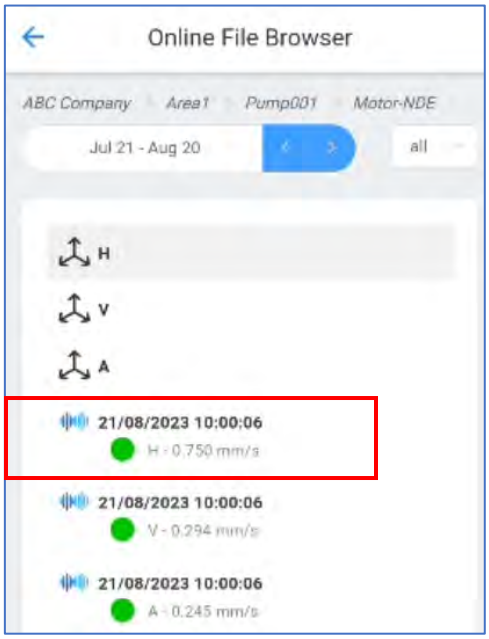
### *Checking with the WiSER VIBE Pro App*

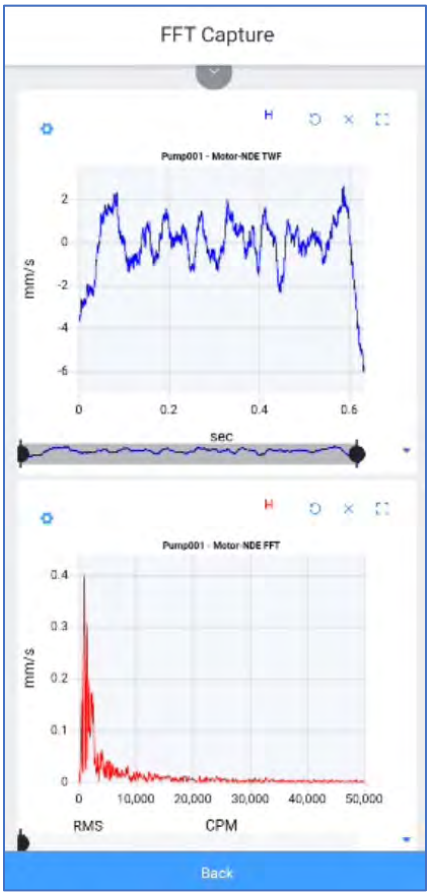
To check sensor status and database from the WiSER VIBE Pro mobile App:

1. Open the App and login to your EI-Analytic account.
2. Open the Online File Browser from the main Menu, and drill down to the axis level of the database for the sensor being tested.
3. Click on the file from the test download and the FFT Capture screen will open.



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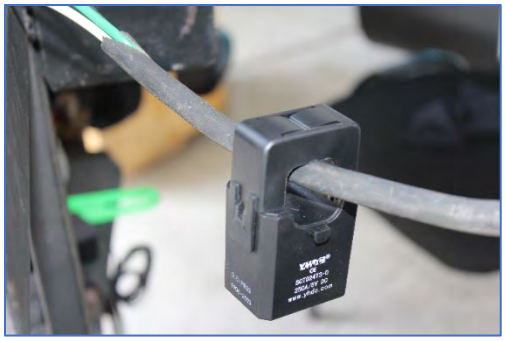
# Adding Phantom Specialty Sensors

## Adding an EPH-C31 Phantom Current sensor

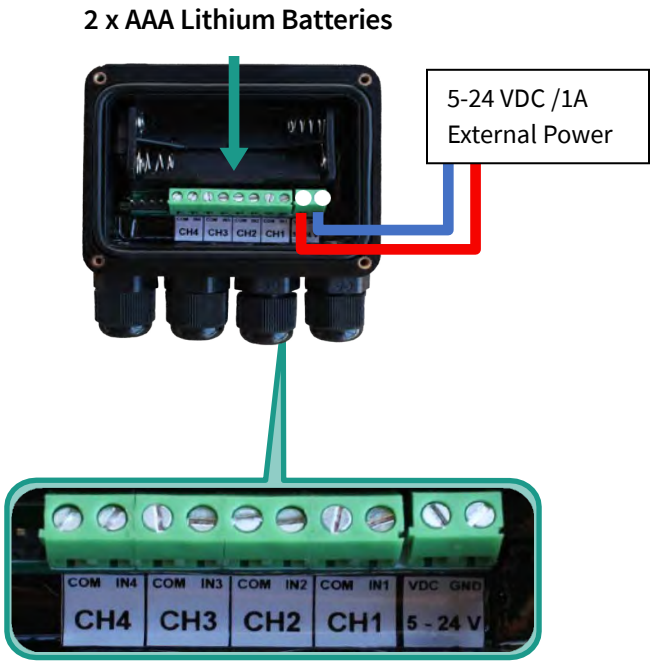
The Erbessd EPH-C31 current sensor supports 4 channels up to 500 Amperes. Four types of current clamp are available -50A, 100A, 250A and 500A. (sold in sets of 3)

An insulated wire bundle may contain multiple individual lines of inrush current. Even if the bundle contains only 1 phase of inrush current, installing the clamp over an entire wire bundle, as seen in this picture, will result in inaccurate amperage draw measurement.



Current clamps must be installed on each individual line of inrush current, as shown in this picture.

Remove the Phantom current sensor base plate (1.3mm hex-head machine screws) to connect the current clamp wires to the sensor. The current clamp wires should be fed through the sensor bulkhead connectors and connected to the Phantom current sensor bus bar as shown in this diagram:





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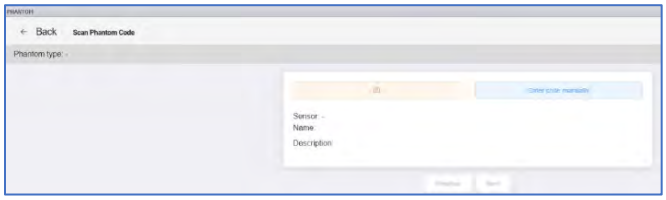
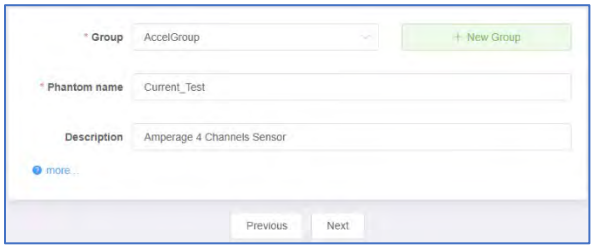
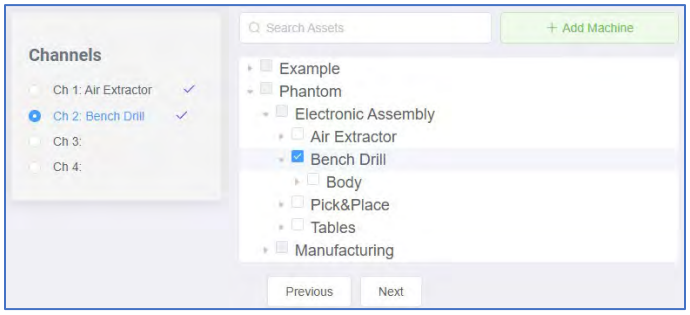
To add an EPH-C31 Phantom:

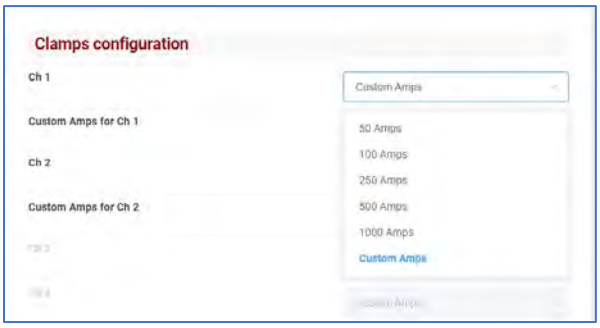
1. Open Phantom Manager and click **Add Phantom**.
2. Scan the QR code or enter the sensor code manually (31-189xxxxxx) and press **Next**.
3. Add the **Group** and assign a **Phantom Name**.and click **Next**.



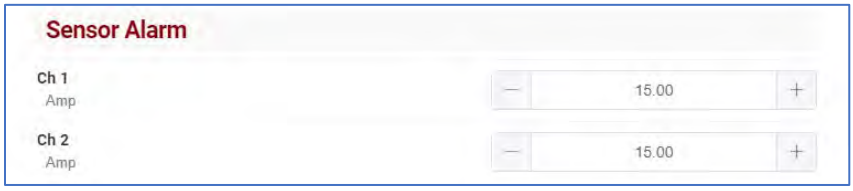



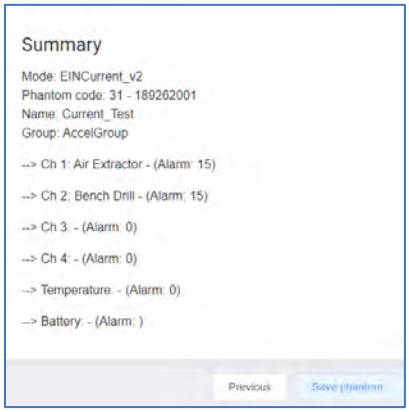

4. Assign one or more of the 4 channels to Machines or Points and click **Next**. You also have the option of adding a new machine dedicated to this sensor by clicking the Add Machine button.
5. Select the **Clamps configuration** for each channel, either pre-set amperage or Custom Amps.



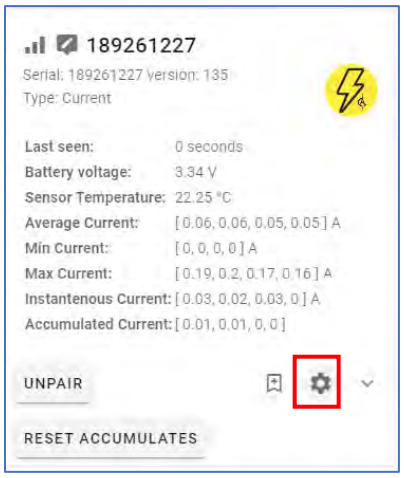



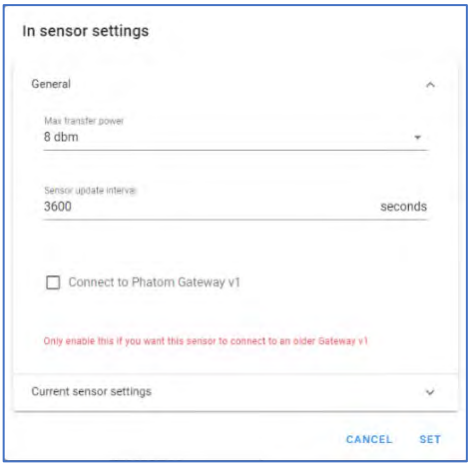

6. Set any notification alarm thresholds and click **Next**.
7. Click **Save Phantom** if the summary info is correct.

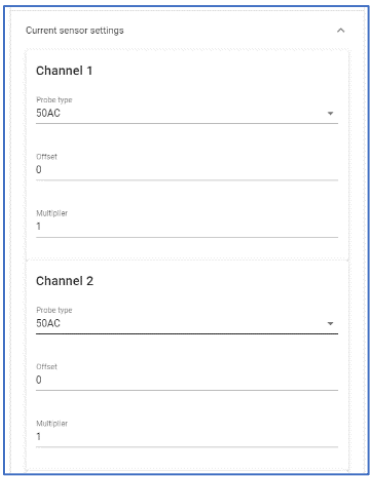


8. Open the Gateway Admin Console and click on the In sensor settings for the sensor being added. Under **General**, set the **Max transfer power** setting at 0dBm (default) for Phantoms when using AAA batteries**.** The **Sensor update interval** defines the interval at which current measurements are sent to the database along with the internal sensor temperature and battery voltage level. **Note** - The Amperage reading for each channel is updated to the gateway **every 5 seconds**.for triggering applications. The range is 10 to 86400 seconds(1 day). **Note**- this setting has a direct impact on battery life. This sensor can also be powered locally with hardwired 5-24VDC.
9. Check the **Current Sensor settings** to ensure the **probe types** are the same as was entered in Phantom Manager when configuring the sensor.




For an EPH-C31, the sensor status displays both the **Instantaneous Current** and **Accumulated Current** values, updated every 5 seconds. The Accumulated Current values can be reset on-demand.

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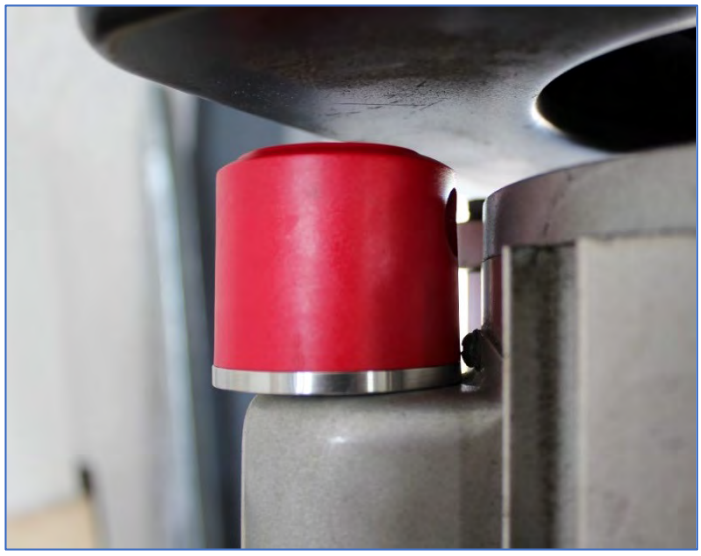
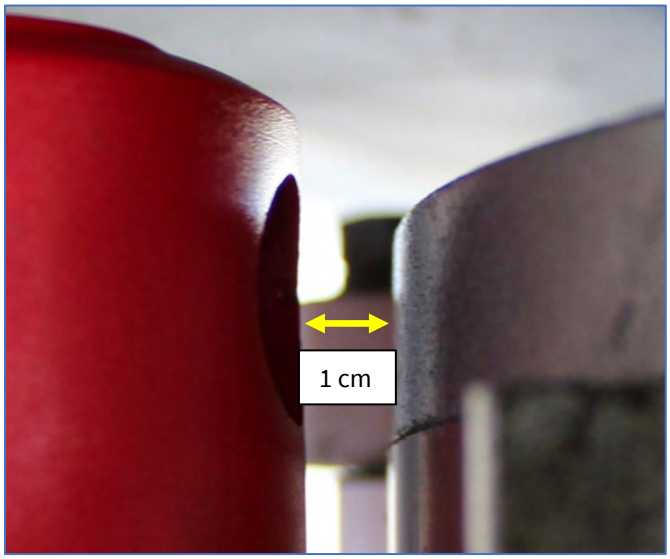
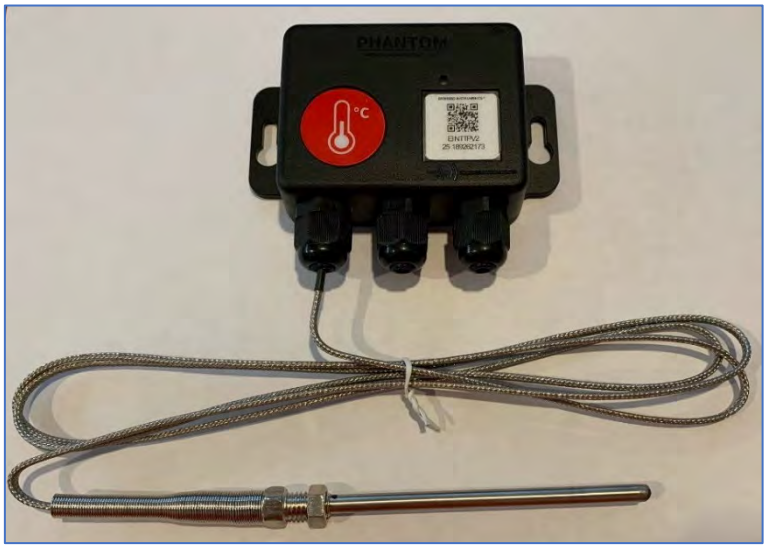
## Adding an EPH-T20 or T25 Phantom Temperature Sensor

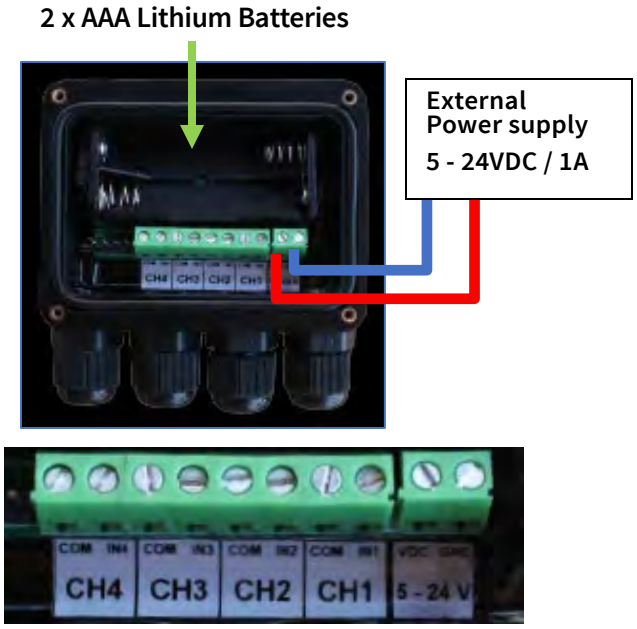
Erbessd offers two types of Phantom temperature sensor, the EPH-T20 is a non-contact spot infrared radiometer, and the EPH-T25 supports K type thermocouples and has 3 channels.

The EPH-T20 Non-contact Temperature Phantom has an effective range of 1 to 10 cm. To ensure a noise-free reading, it is recommended to be mounted 1/3 inch (1 cm) from the target component








EPH-T25 Thermocouple Phantoms may be mounted at the full extension of the thermocouple wire away from the monitored area. The thermocouple is installed in the monitored component. Wires are connected to the sensor module bus bar.



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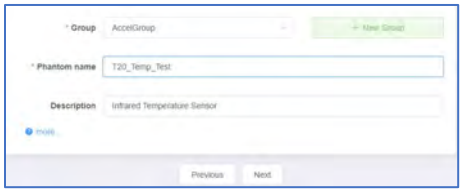
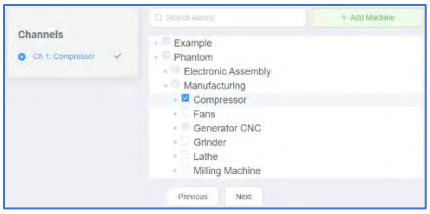
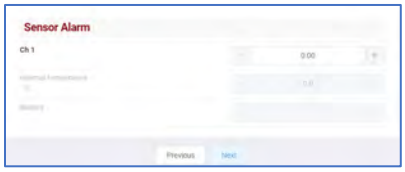
To add a Temperature Phantom:

1. Open Phantom Manager and click **Add Phantom**.
2. Scan the QR code or enter the sensor code manually (20-189xxxxxx or 25-189xxxxxx) and press **Next**.
3. Add the Group and assign a Name. Click **Next**.
4. Assign the channel(s) to Machines or Points (or create a new machine).
5. Set an optional alarm threshold(s) for the sensor.

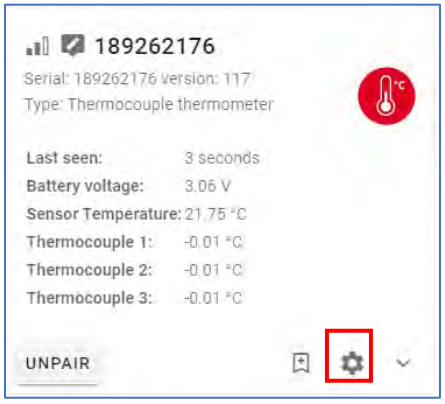


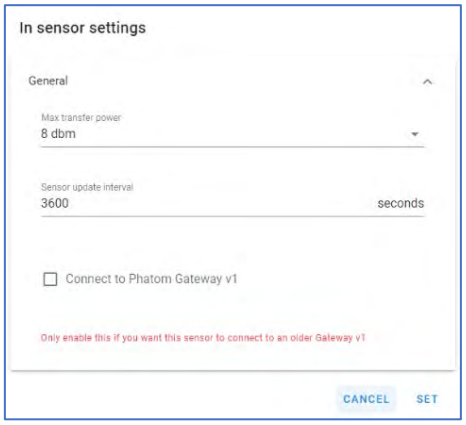




6. Click **Save Phantom** if the summary info is correct.

7. Open the Gateway Admin Console and click on the In sensor settings for the temperature sensor being added. Set the **Sensor update interval** as desired. The measured temperature from the infrared sensor or thermocouple for each channel is sent, along with the internal sensor temperature and battery voltage at this interval. The range is 10 to 86400 seconds(1 day). **Note**- this setting has a direct impact on battery life. It is recommended to keep the Update interval at 3600 sec (1 hr) or higher and the **Max transfer power** setting at 0dBm (default) for Phantoms that use AAA batteries. The T25 sensor can also be powered locally with hardwired 5-24VDC.Press the **SET** button to save any changes.



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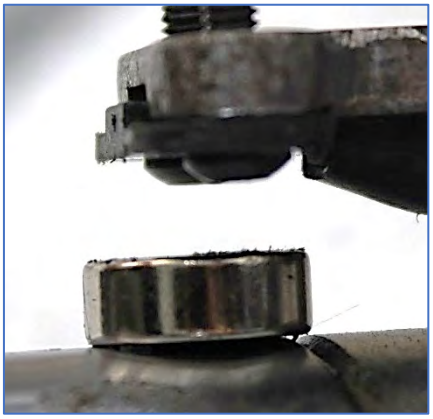
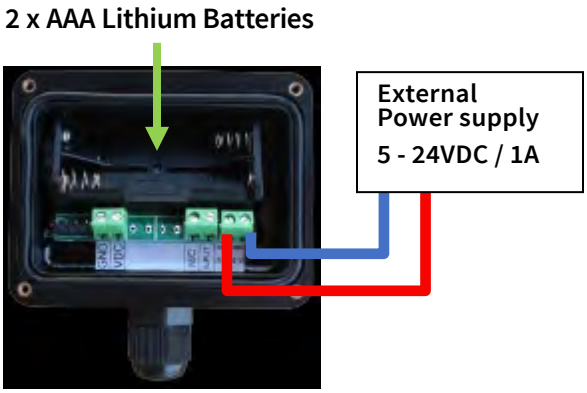
## Adding an EPH-S40 Phantom Speed Sensor

The RPM Phantom is optimized for use with a Hall effect sensor. Its case design enables screw or adhesive mounting and is capable of switching up to 28Vdc and 20mA.

**IMPORTANT:** To correctly install the Phantom Speed Sensor:

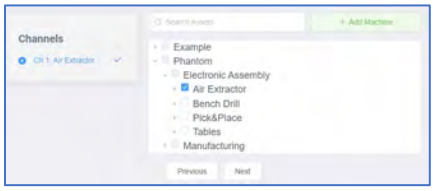
- It is recommended to use epoxy to affix the magnet.
- The receptor must be fixed 1/3 in (1 cm) from the magnet. The best way to read the signal is to focus the sensor directly over the magnet.
- Hall-effect sensor wires are connected to the sensor module bus bar. The base of the sensor is secured by 1.3mm hex-head machine screws.

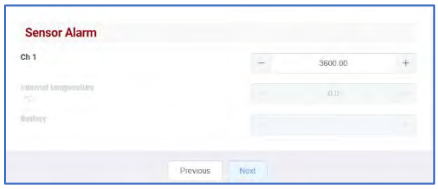




To add a Speed Phantom:

1. Open Phantom Manager and click **Add Phantom**.
2. Scan the QR code or enter the sensor code manually (40-189xxxxxx). Press **Next**.
3. Add the Group and assign a Name; click **Next**.
4. The Speed sensor has only one channel. Assign Channel 1 to a Machine or Point and click **Next.**
5. Set the alarm threshold, if desired, to receive notification if the RPM exceeds this limit, and click **Next**.




6. Click **Save Phantom** if the summary info is correct.

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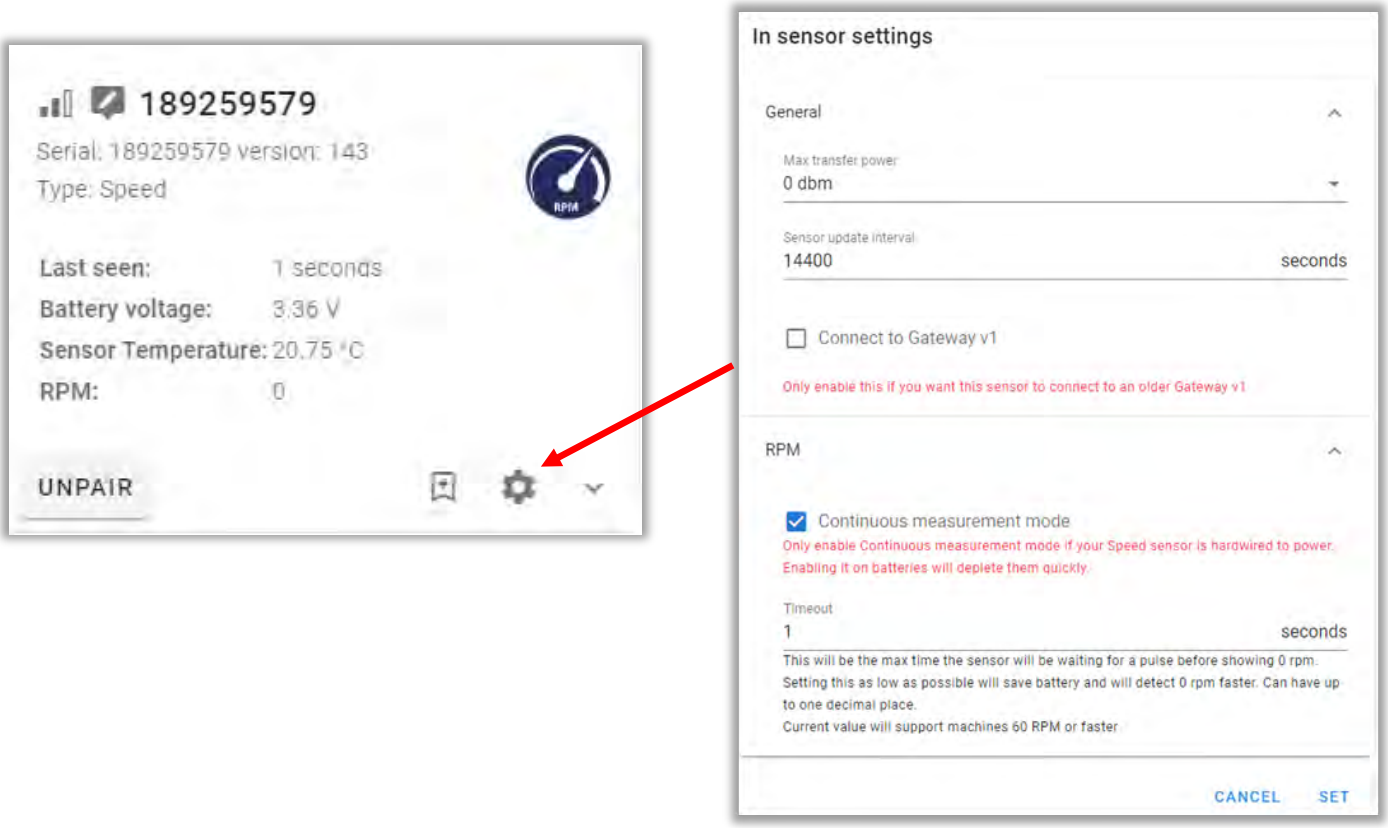
7. Open the Gateway Admin Console and click the In sensor settings for the sensor being added. Set the **Sensor Update interval** in the **General** section as required.The RPM reading is sent, along with the internal sensor temperature and battery voltage at this interval. The range is 10 to 86400 seconds(1 day). **Note**- this setting has a direct impact on battery life. It is recommended to use hardwired 5-24VDC power if the desired Update interval is less than 3600 sec (1 hr). Set the **Max transfer power** setting at 0dBm (default) if using AAA batteries. In the **RPM** section, there is an option to set **Continuous mode** for speed sensors that have hardwired 5-24VDC power. The **Timeout** defaults to 1 second to preserve battery life. Press the **SET** button. To make any changes.



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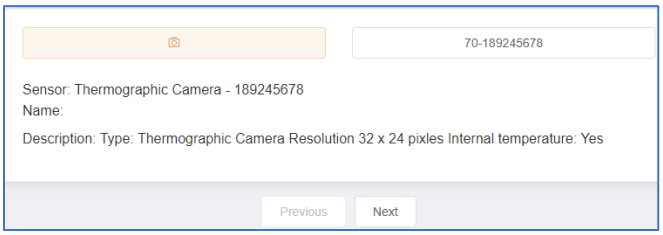
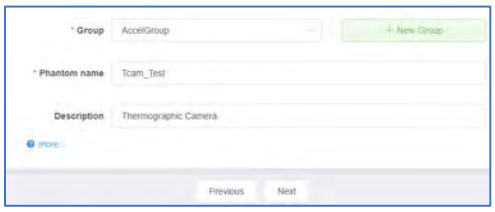
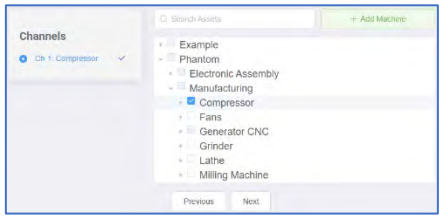
## Adding an EPH-T70 Phantom Thermographic Camera

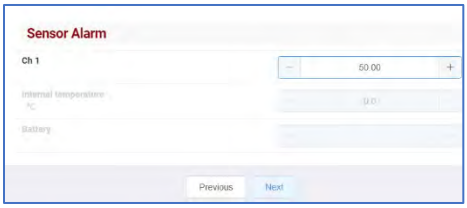
The Erbessd Phantom thermographic camera has a 32 by 24 pixel infrared sensor array with a 110 degree high by 75 degree wide field of view. It is indended for use with objects/targets at a distance of 1 meter (approx 39 in.) or less.

1. Open Phantom Manager and click **Add Phantom.**
2. Scan the QR code or enter the sensor code manually (70-189xxxxxx).Click **Next**.
3. Add the Group and assign a Name. Click **Next**.
4. Assign Channel 1 to a Machine or Point. Click **Next**.
5. Set Alarm threshold, if desired.

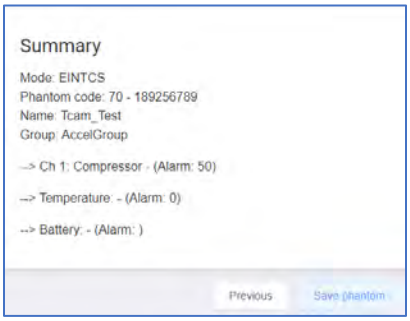



6. Press Save Phantom if the summary is OK.



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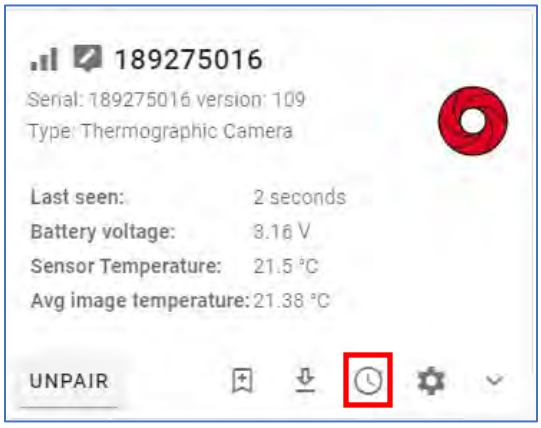
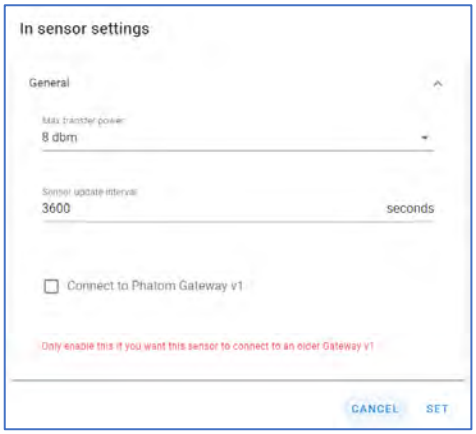
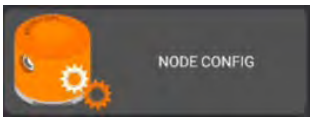
7. Open the Gateway Admin Console and click the collection settings for the thermographic camera being added. Set the collection interval as desired, using the Global or a custom setting. Set the Sensor Update interval in the in-sensor settings; the internal sensor temperature and battery voltage are updated to the gateway at this interval. It is recommended to keep the update interval at 3600 sec (1 hr) or higher and the **Max transfer power** setting at 0dBm (default) for Phantoms that use AAA batteries. Press the **SET** button to save any changes.



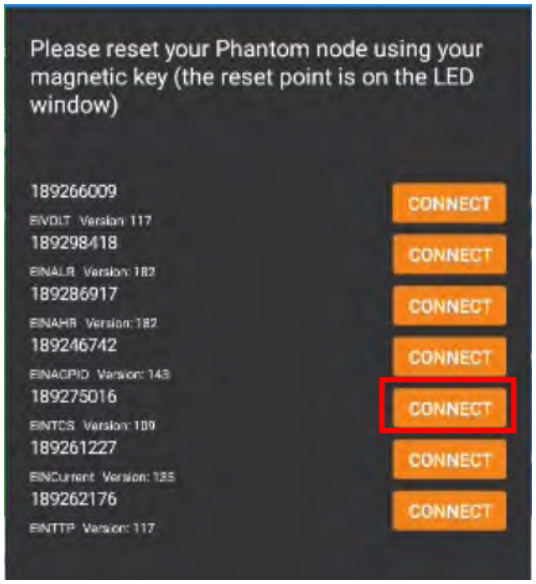




**Note** – The Thermographic camera has a **Live View** feature, available by using the Phantom Manager mobile app on an iOS or Android device. See the *Phantom Manager Mobile App* section of this guide for more details.

To use the Live View feature, connect to the sensor using the Node Config option on the Main Menu.




Either scan the QR code of the Phantom or press Select from List and Connect.



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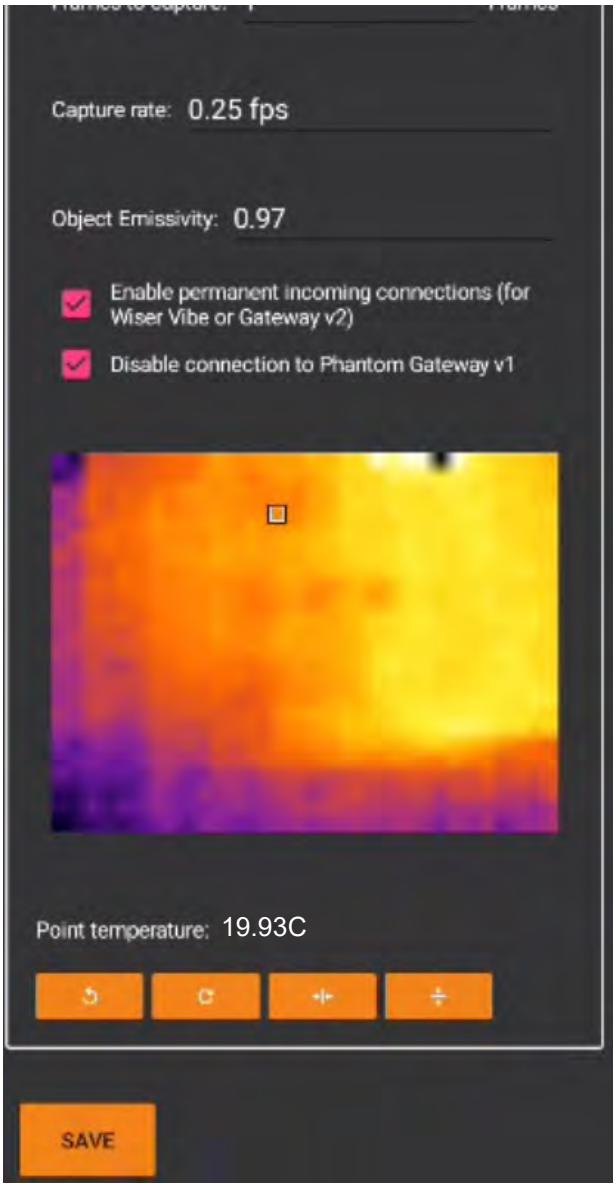
**Important Note** -The settings displayed on this screen ONLY apply to Phantom Gateway V1 installations.

The Start Live View feature provides a real-time temperature display from the camera and is available with both Gateway v1 and 2.0 systems. Touch anywhere on the image to see the Point temperature of the pixel chosen.





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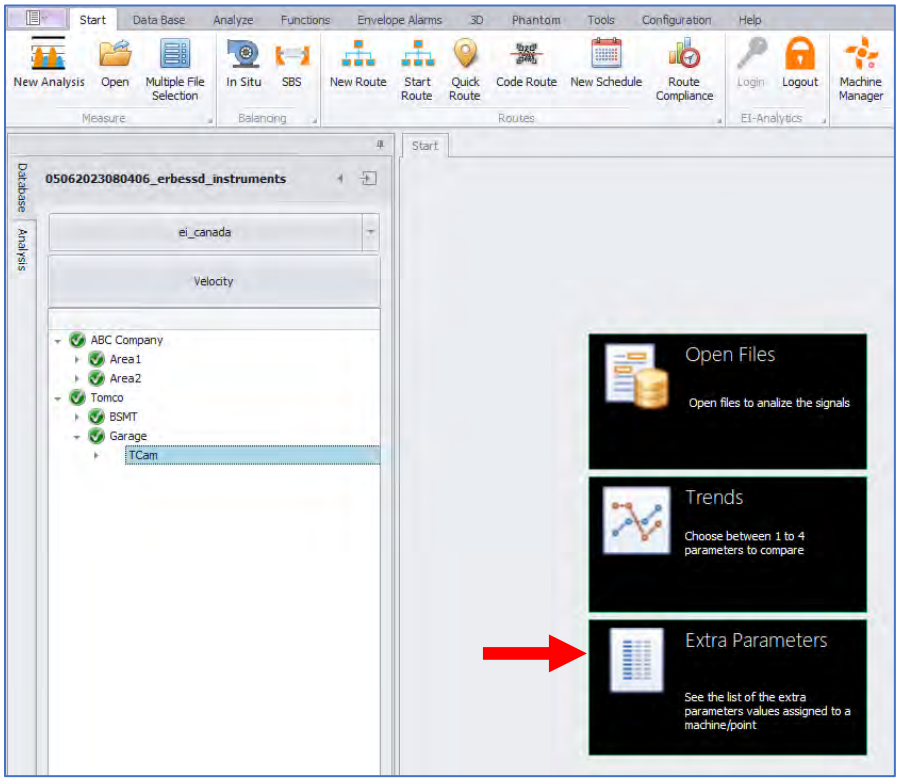
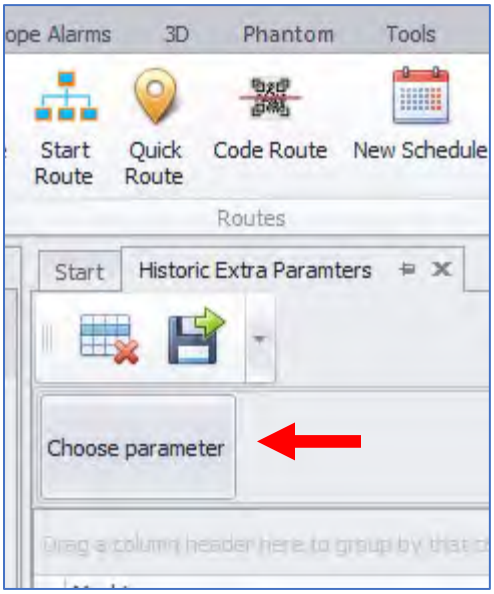
### *Viewing Thermal Camera Images in DigivibeMX*

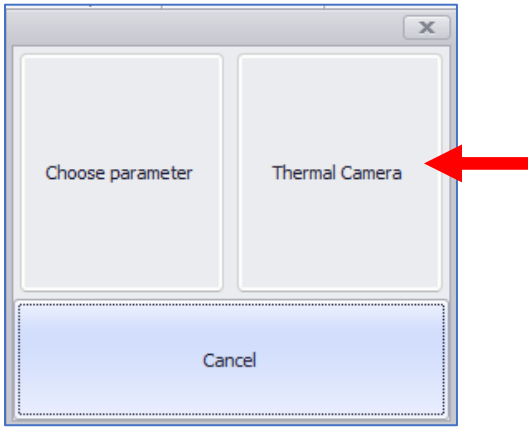
The thermographic image files are also viewable with DigivibeMX software.

1. Open the database and select the machine or point to which the thermal camera is assigned in the data tree.
2. Click on Extra Parameters, then press the Choose parameter button.




3. Select Thermal Camera.



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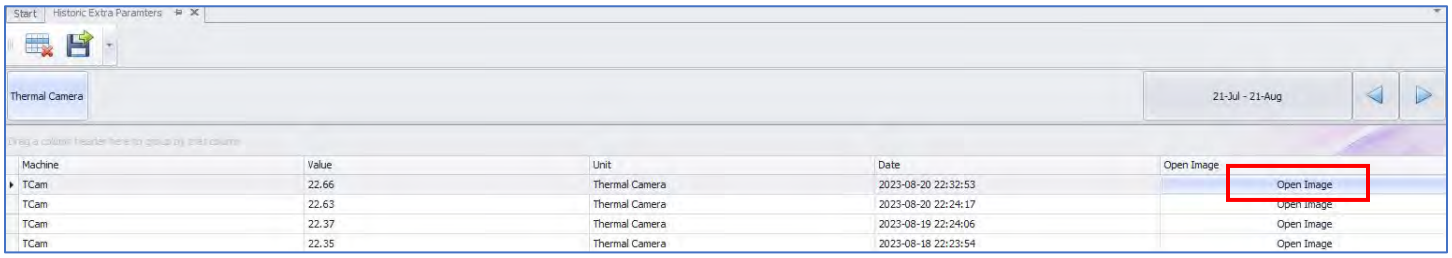
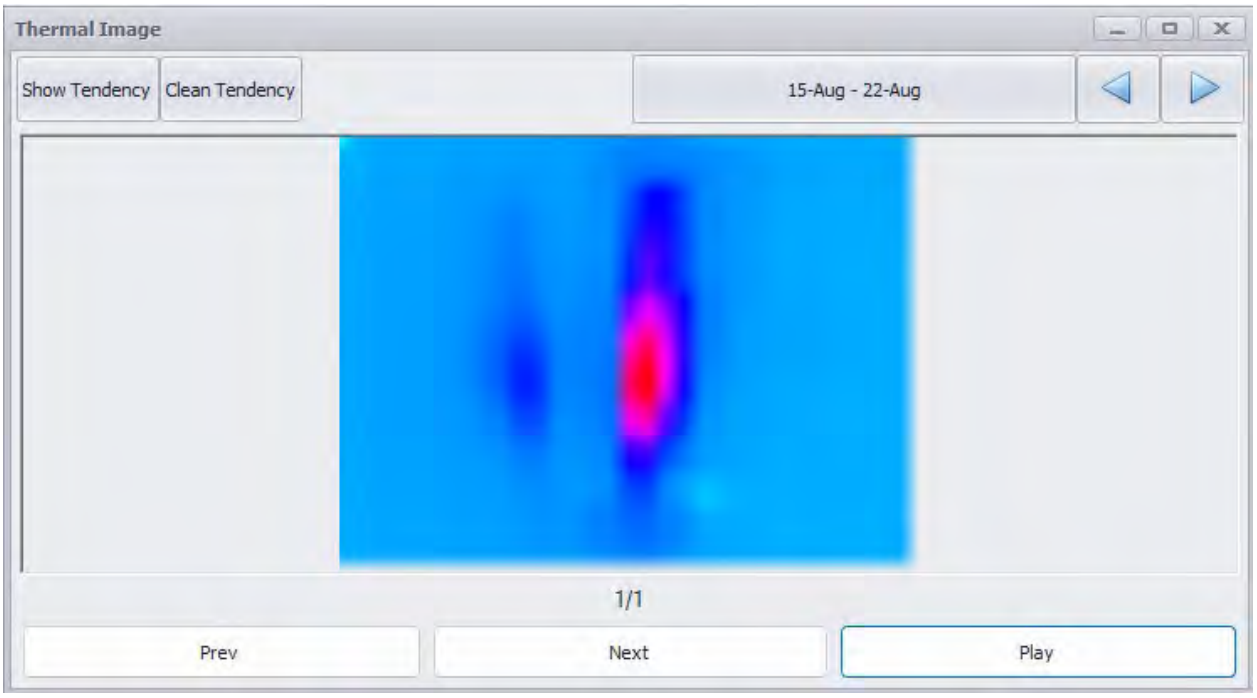
4. Click Open Image to view an image file for analysis.




If you have set more than one frame to capture, you may scroll through or Play them using the control buttons.

When the mouse pointer is hovered over any part of the image, the temperature for that pixel is displayed.



## Adding General Purpose Phantom Sensors

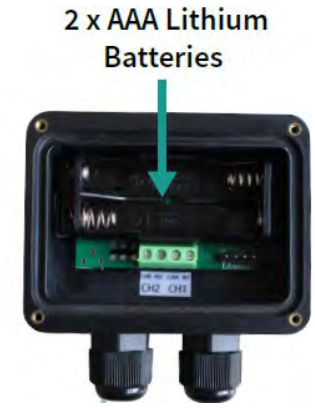
When adding a Phantom GPIO sensor, the first two digits of the serial number entered in Phantom Manager will determine the subsequent fields presented for configuration.

General Purpose Phantoms include:

| Sensor Type | Interface | Channels |
|---|---|---|
| EPH-G60 | 2 V peak-to-peak sensors | 2 |
| EPH-G61 | 4-20 mA sensors | 4 |
| EPH-G62 | Dry Contact | 4 |
| EPH-G63 | 0-10 Volts sensors | 4 |

### Adding an EPH-G60 2VPP Phantom sensor

The EPH-G60 Phantom is 2-channel device, compatible with any 2 volt peak-to-peak sensor, to make it wireless.



To add an EPH-G60:

1. Open Phantom Manager and click **Add Phantom**
2. Scan the QR code or enter the sensor code manually (60-189xxxxxx).Click **Next**.
3. Add the Group and assign a Name. **Note** - Disregard the warning that the data sending interval is not configurable! When used with a Gateway 2.0, the **Sensor Update** interval defines when data is sent (administered from the Gateway Admin Console), see below.
4. The **Alarm Check** interval ****NOTE-** This field only applies to sensors used with a Gateway v1.This is the time between alarm checks performed by the sensor. It can be set from 30 to 120 seconds. For Gateway 2.0, the **Sensor Update** interval serves as the Alarm Check interval. Click **Next** to continue.



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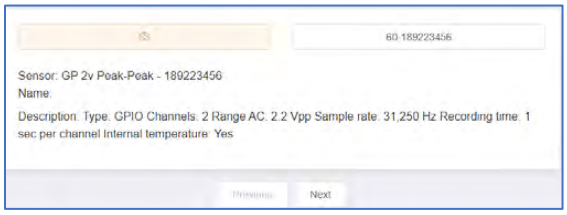
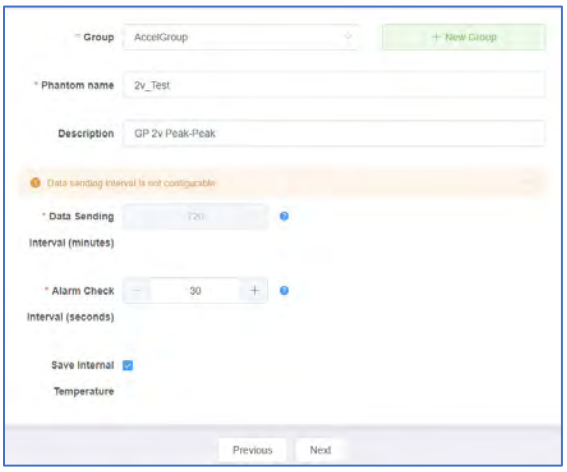
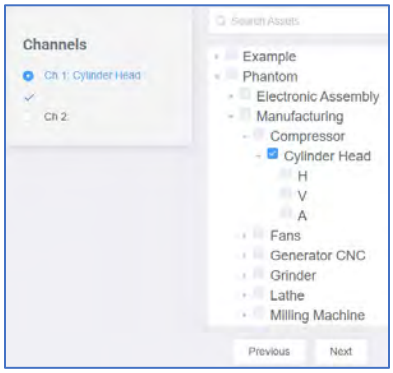
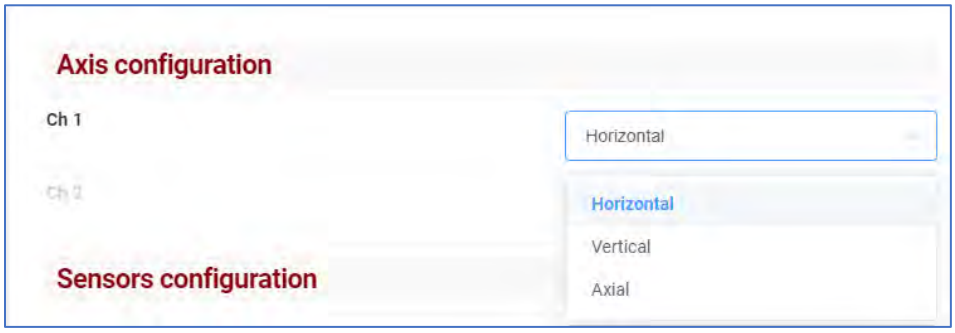


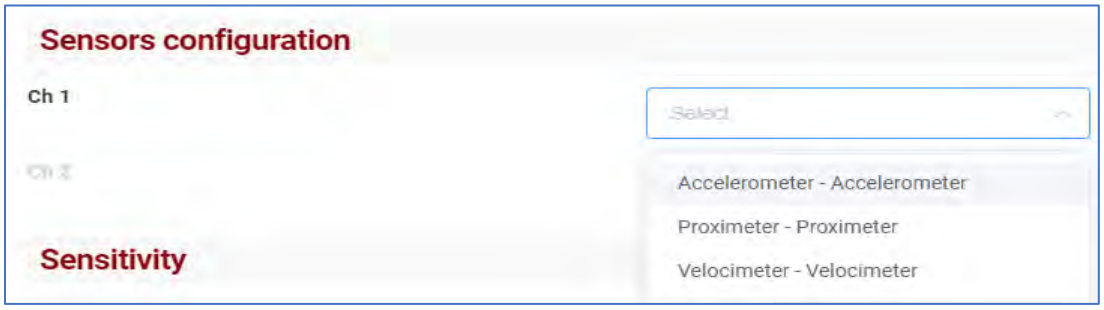




5. Assign the channel(s) to a Machine or Point and press **Next**.
6. Set the Axis configuration for the channel 1 and 2 sensors.

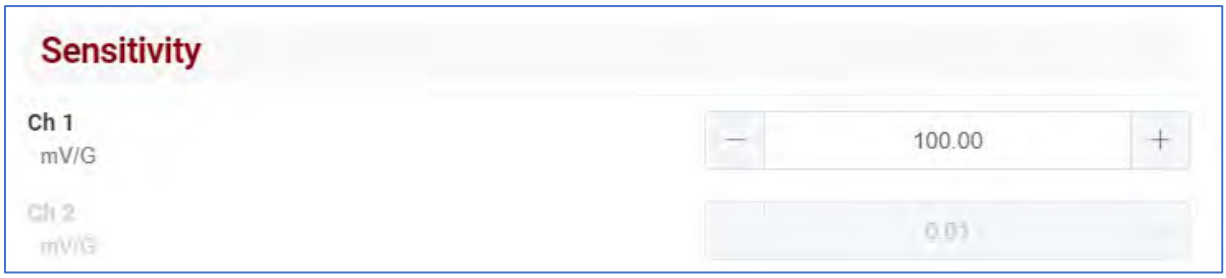



7. Set the Sensor config.




8. Set the sensitivity of the monitored sensor.



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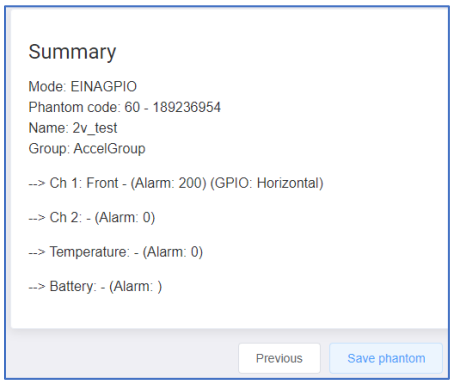
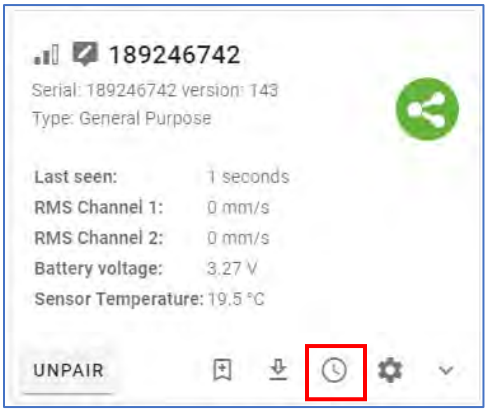
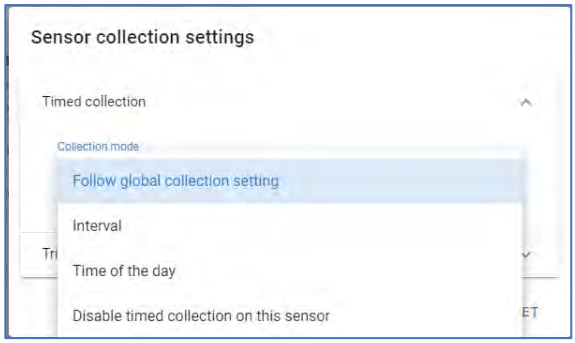
9. Set an optional Alarm threshold and press **Next**.

10. Click **Save Phantom** if the info summary is correct.

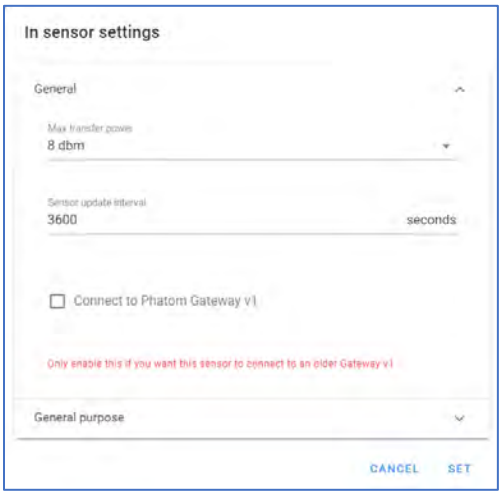


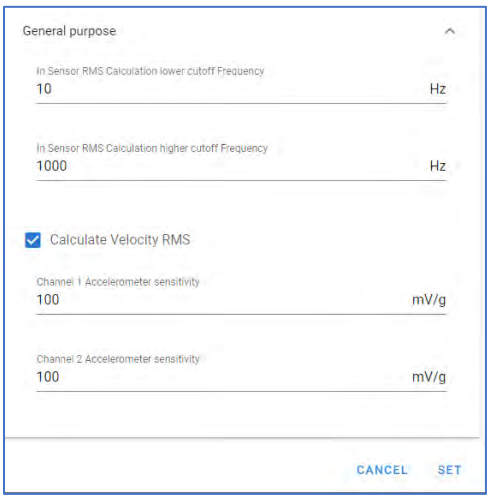

11. Open the Gateway Admin Console and click the collection settings for the sensor being added. Set the interval or time-of-day or use the Global data collection setting and press **SET.**



11. Set the **Sensor Update Interval** in the **General** section of the In sensor settings and the high/low RMS frequency settings in the **General Purpose** section.

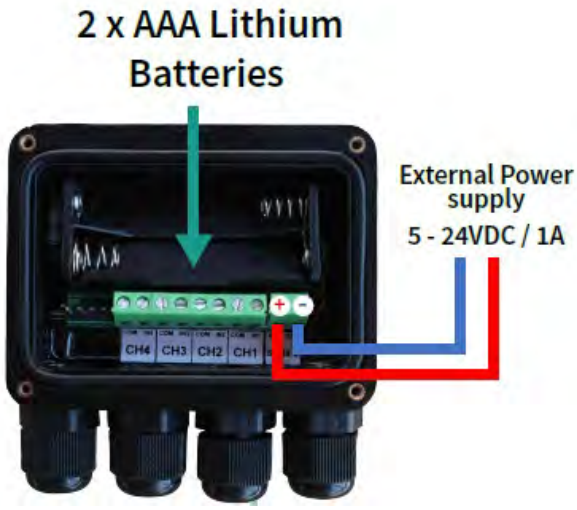



12. Click **SET** to save any changes.

## Adding an EPH-G61 (4-20 mA) Phantom sensor

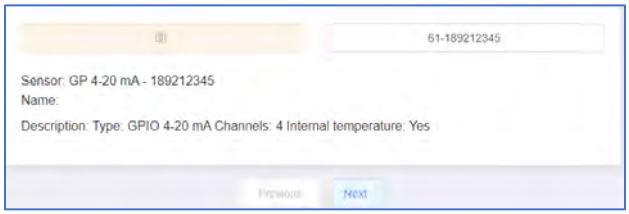
Any sensor with a 4-20mA constant current output range is compatible with this General Purpose Phantom sensor. Note – the EPH-G61 does not provide the loop current for the channels connected for monitoring.

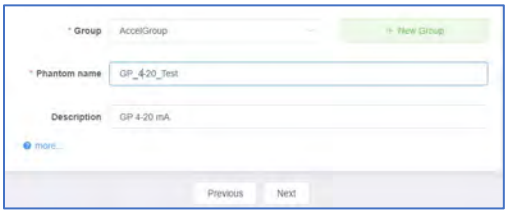


In this example, a 4-20 mA Phantom sensor is used to interface with an oil condition monitoring sensor, making it wireless. This device outputs a variable current related to the measured oil condition(called the OC number), which ranges from 1 to 100. Oil with an OC number under 50 is acceptable, but if it reaches 75, an alarm notification should be sent.

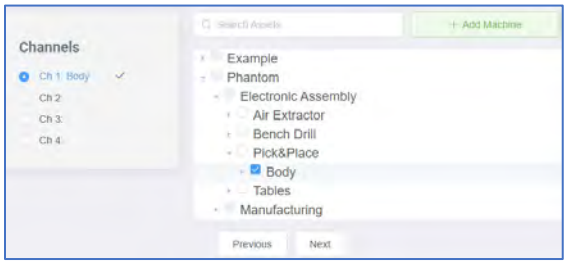
To add the Phantom:

1. Open Phantom Manager and click **Add Phantom**.
2. Scan the QR code or enter the sensor code manually (61-189xxxxxx) and click **Next**.
3. Add the Group and assign a Name and click **Next**.

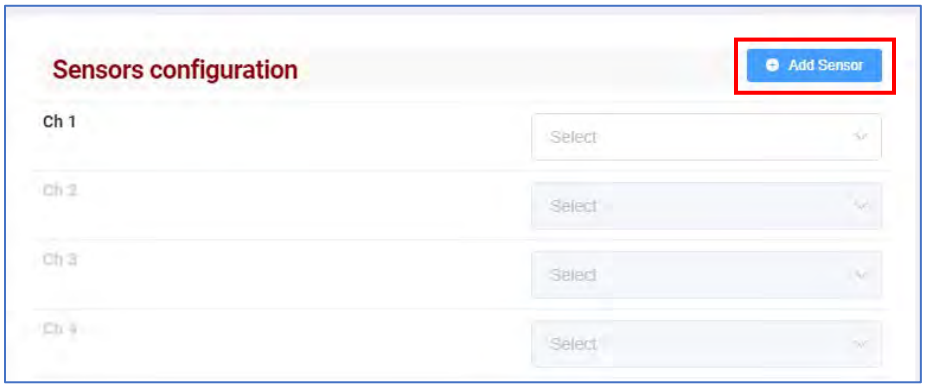


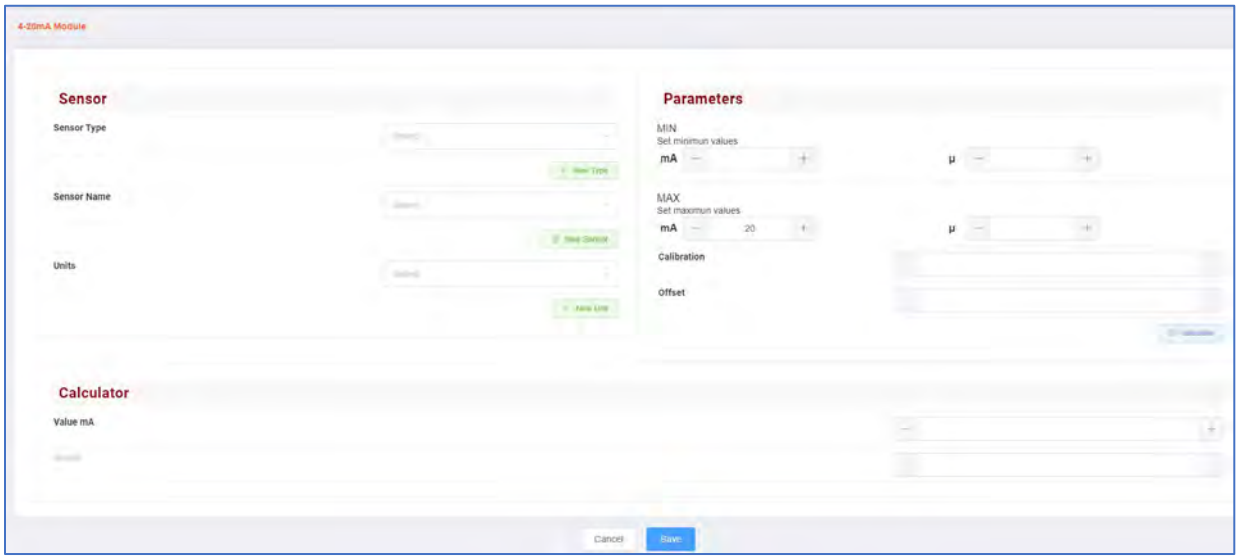

4. Assign one or more channels to Machines or Points and click **Next**.




5. Click the Add Sensor button.



6. The **4-20mA Module** screen opens containing several panels for a 4-20 mA sensor:




7. In the **Sensor** panel click on the + New Type button to choose what type of sensor you are using.

8. Then add a **sensor name** using ⊕ New Sensor

9. Add the **units** of the value you want to measure from the drop-down box. If the unit does not exist, you can add it with the + New Unit button. This opens another screen to enter the relevant information. In this example, the OC number is added. Press Confirm to save your settings.

10. In the **Parameters** Panel, set the **MIN** and **MAX** values (1 to 100 for this example).

Based on the MIN/MAX values, software calculates the **Calibration** and **Offset**. These characteristics have the multiplicative function for each mA introduced to the sensor (Calibration) and as the initial reference point considered 0 for the measurable values (Offset). These values are automatically populated by the program when you click on the ⊕ calculate button. Press **Save** to complete.



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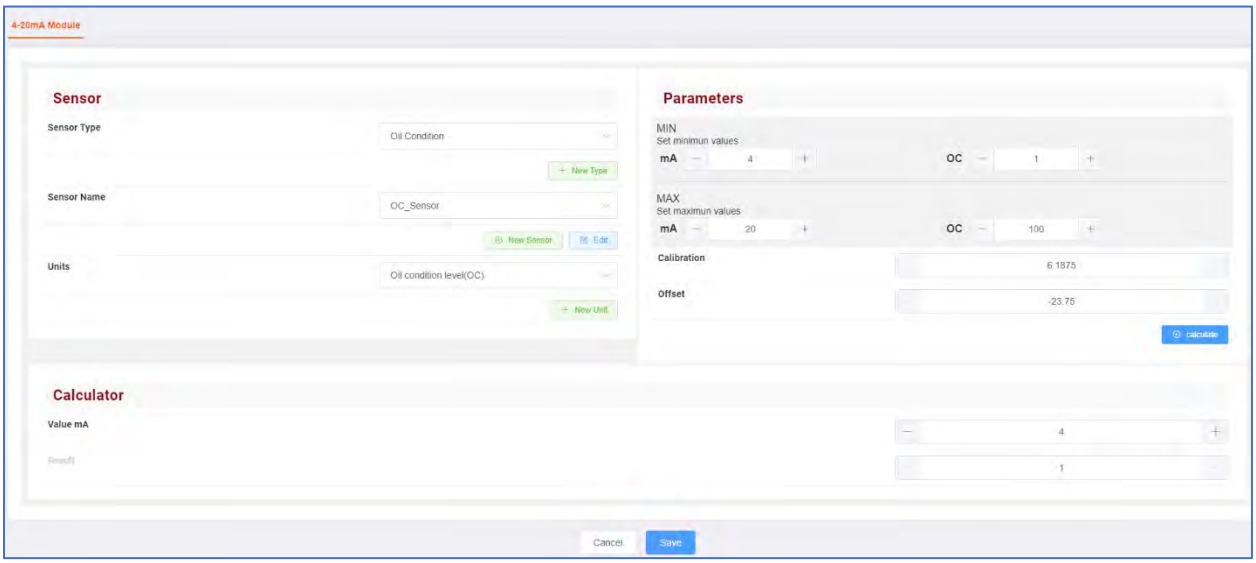
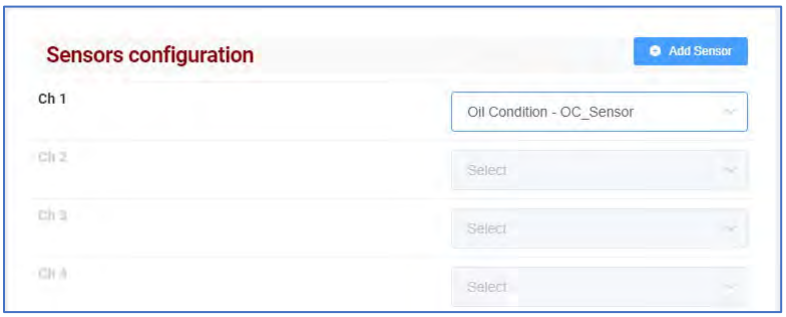
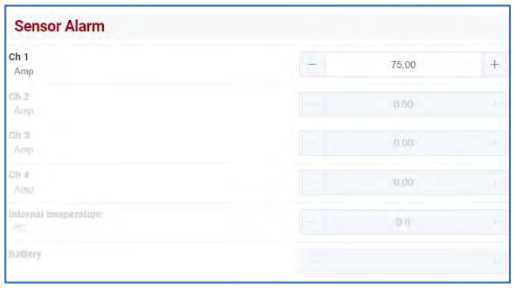


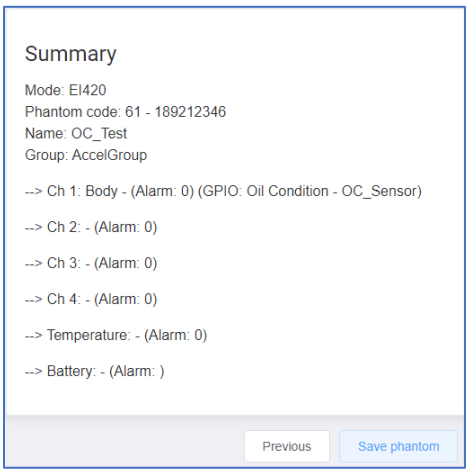

11. You can now set the channel assignment from the drop-down box, and the optional alarm threshold, then click **Next**.

**Note** – If the oil condition sensor outputs another parameter such as temperature on a separate 4-20mA circuit, you can assign it to a separate channel. Click Add Sensor and create New Type, New Sensor and New units for temperature, then assign to a channel.

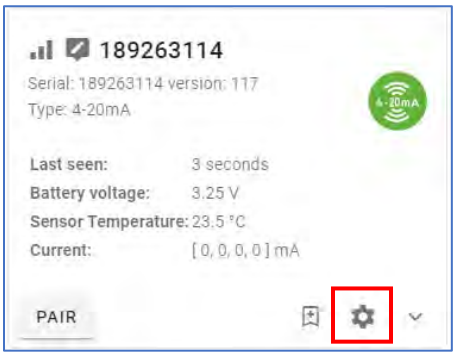


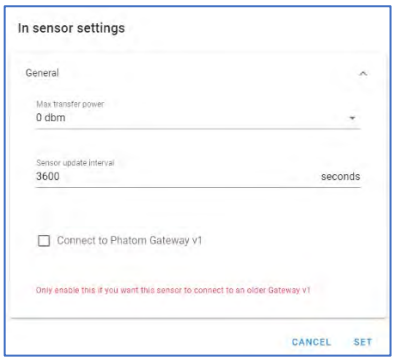




12. Click **Save Phantom** if the info summary is correct.



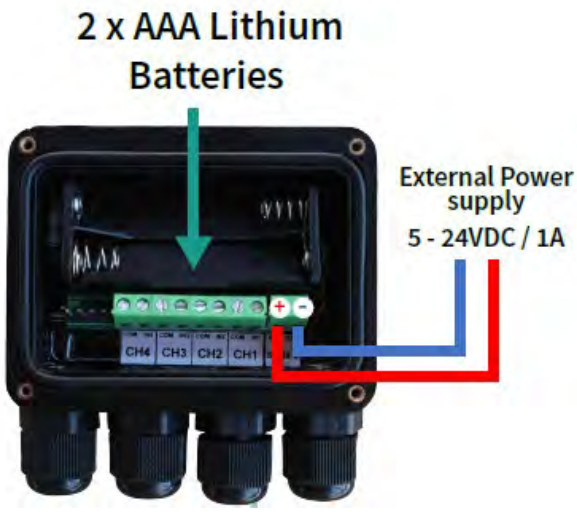
Open the Gateway Admin Console and click the in sensor settings for the sensor being added. Set the **Sensor Update interval** in the **General** section as required.The internal sensor temperature and battery voltage info is sent at this interval. The range is 10 to 86400 seconds(1 day). **Note**- this setting has a direct impact on battery life. It is recommended to keep the Update interval at 3600 sec (1 hr) or higher and the **Max transfer power** setting at 0dBm (default) for Phantoms that use AAA batteries. Press **SET** to save any changes.



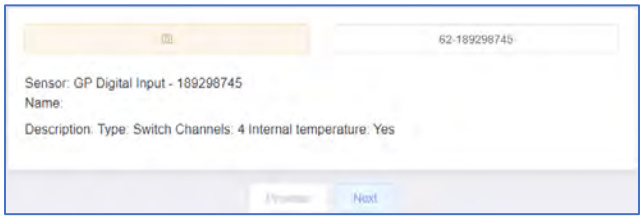

## Adding an EPH-G62 Dry Contact Phantom sensor

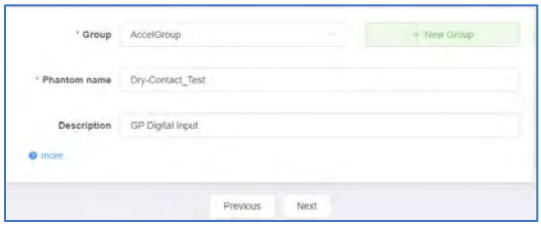
The EPH-G62 is designed to work with any normally-open relay contacts. When the contact is closed, it triggers a state change in the sensor from 1(open) to 0(closed). This sensor is often used to manually trigger a group of Phantom vibration sensors to send data collections on-demand. See *Triggering Phantoms* section of this guide for more details.



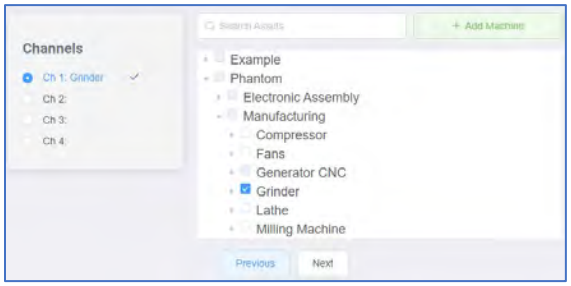
To add an EPH-G62:

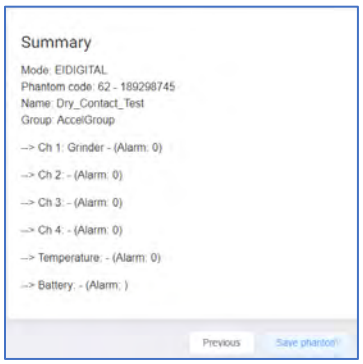
1. Open Phantom Manager and click **Add Phantom**
2. Scan the QR code or enter the sensor code manually (62-189xxxxxx). Click **Next**.
3. Add the Group and assign a Name.



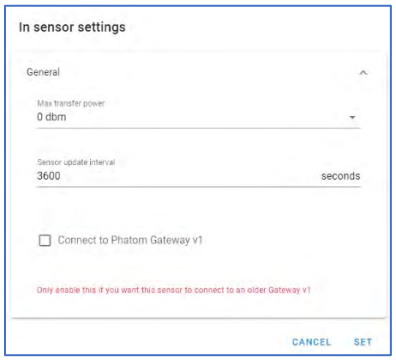




4. Assign the channel to a Machine or Point and press **Next**.
5. Click **Save Phantom**.



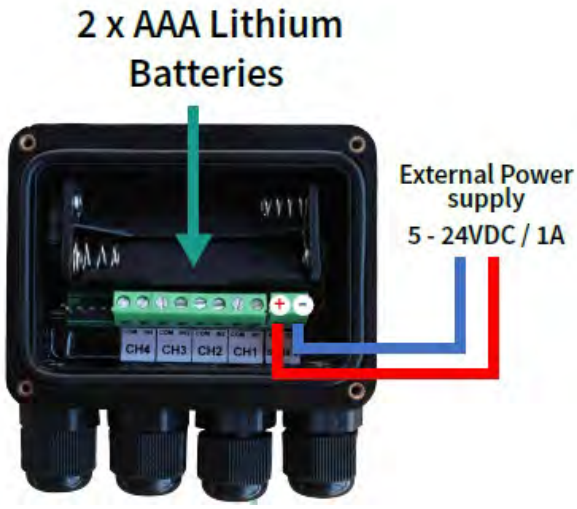

6. Open the Gateway Admin Console and click the in sensor settings for the sensor being added. Set the **Sensor Update interval** in the **General** section as required.The internal sensor temperature and battery voltage info is sent at this interval. The range is 10 to 86400 seconds(1 day). **Note**- this setting has a direct impact on battery life. It is recommended to keep the Update interval at 3600 sec (1 hr) or higher and the **Max transfer power** setting at 0dBm (default) for Phantoms that use AAA batteries. Press **SET** to save any changes.




**Note** -Sensor Alarms are not supported with the EPH-G62 sensor.

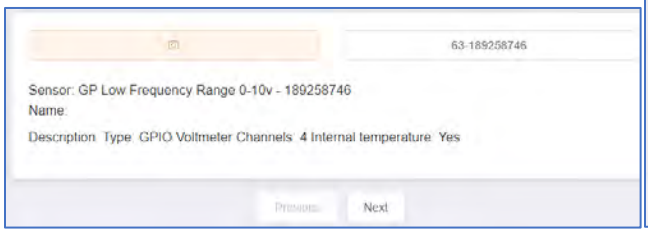
## Adding an EPH-G63 0-10 volt Phantom Sensor

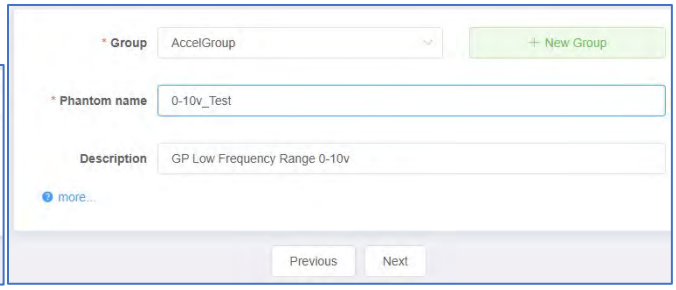
Any sensor with a 0-10V output range is compatible with the EPH-G63 General Purpose Phantom.



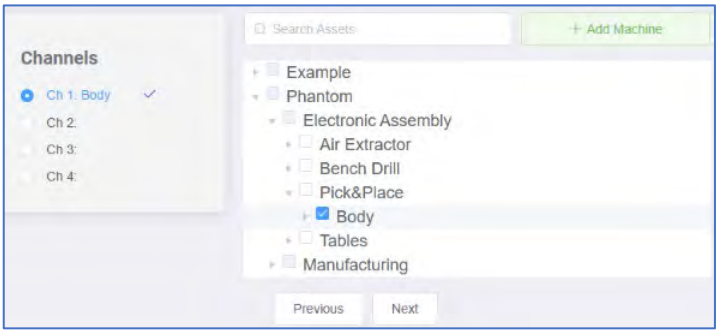
To add an EPH-G63:

1. Open Phantom Manager and click **Add Phantom**
2. Scan the QR code or enter the sensor code manually (62-189xxxxxx). Click **Next**.
3. Add the Group and assign a Name, then click **Next**.




4. Assign one or more channels to Machines or Points and click **Next**.



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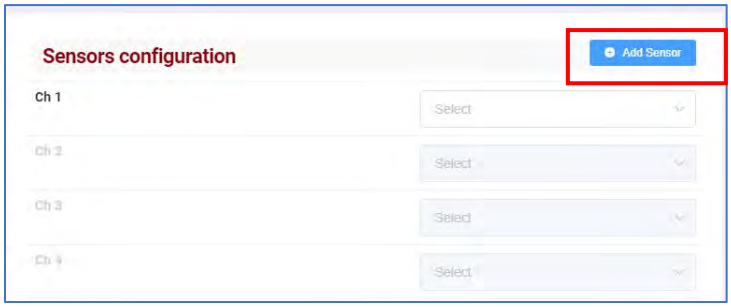
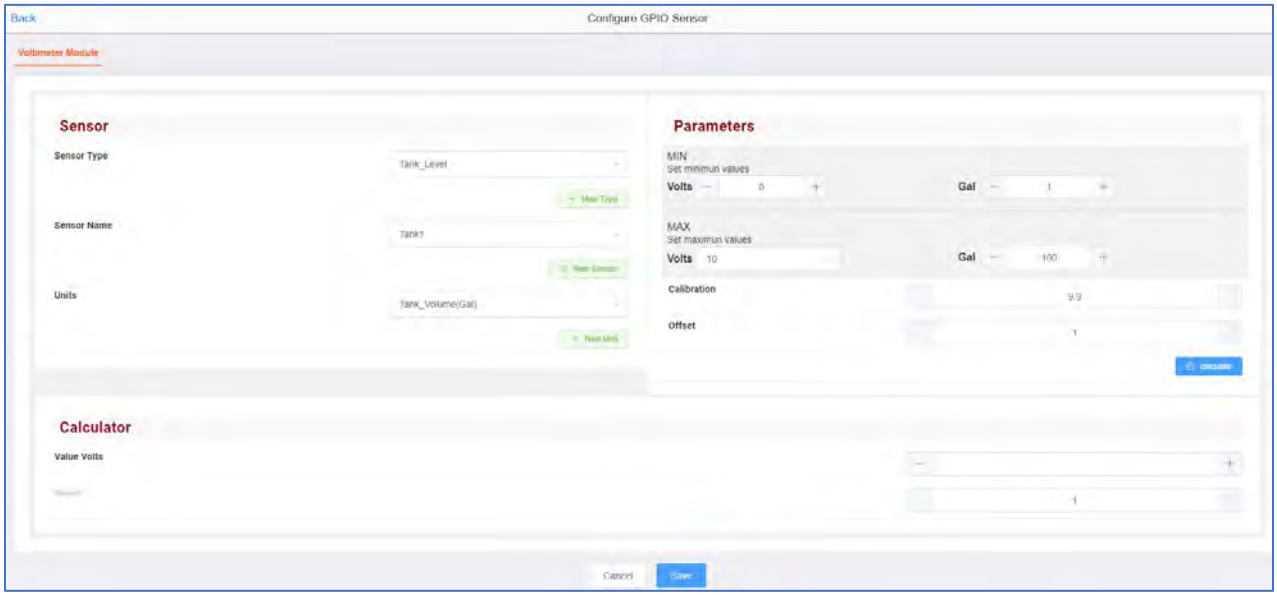
5. Click the Add Sensor button when the Sensor Config screen opens.



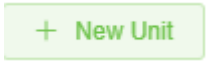

6. The Voltimeter Module opens, containing several panels to configure. In this example, a tank level indicator that outputs 0-10 volts is connected to the Phantom to wirelessly obtain a reading of the tank's fluid level in gallons.

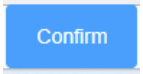



7. In the **Sensor** panel click on the

button to choose what type of sensor you are using.

8. Then add a **sensor name** using


9. Add the **units** of the value you want to measure from the drop-down box. If the unit does not exist, you can add it with the 

button. This opens another screen to enter the relevant information. In this example, the Gallons unit is added. Press 

to save your settings.

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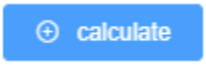
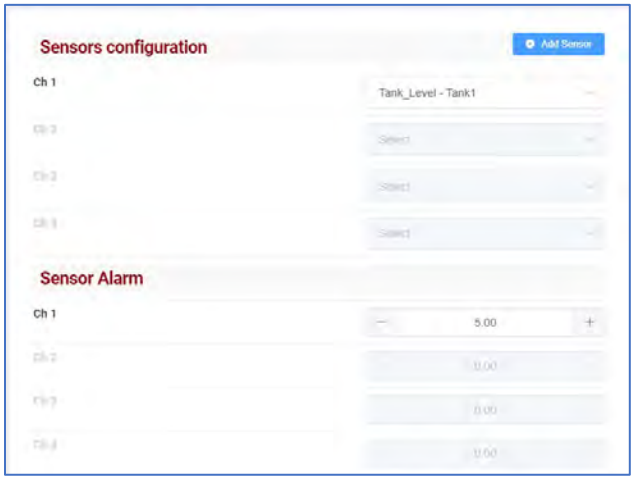
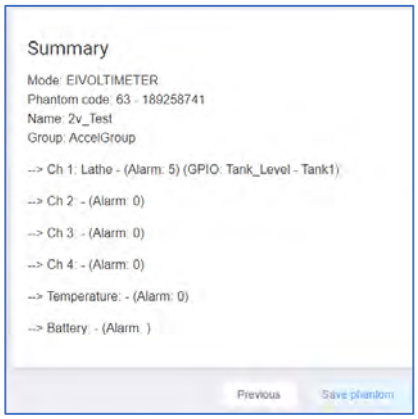
10. In the **Parameters** Panel, set the **MIN** and **MAX** values (1 to 100 for this example).

Based on the MIN/MAX values, software calculates the **Calibration** and **Offset**. These characteristics have the multiplicative function for each mA introduced to the sensor (Calibration) and as the initial reference point considered 0 for the measurable values (Offset). Click on the Calculate button to automatically populate the values. Press **Save** to complete.

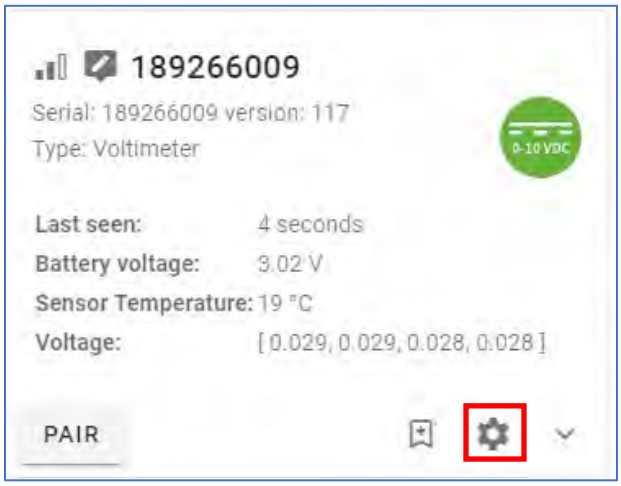


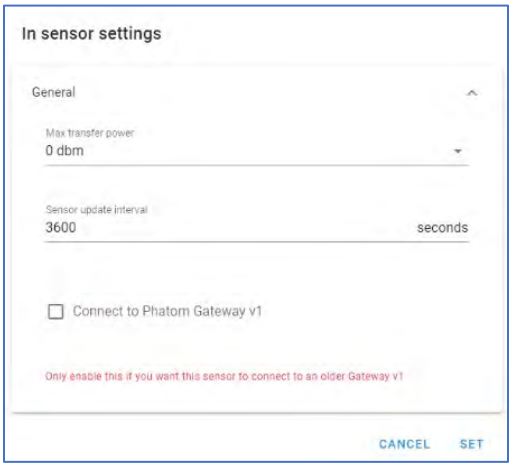

11. You can now set the channel assignment from the drop-down box, and the optional alarm threshold, then click **Next**.




12. Press **Save Phantom**. A "Phantom saved successfully" message is displayed.
13. Open the Gateway Admin Console and click the In sensor settings for the sensor being added. Set the **Sensor Update interval** as required.The internal sensor temperature and battery voltage info is sent to the gateway at this interval. The range is 10 to 86400 seconds(1 day). **Note**- this setting has a direct impact on battery life. It is recommended to keep the Update interval at 3600 sec (1 hr) or higher and the **Max transfer power** setting at 0dBm (default) for Phantoms that use AAA batteries. Press **SET** to save any changes.



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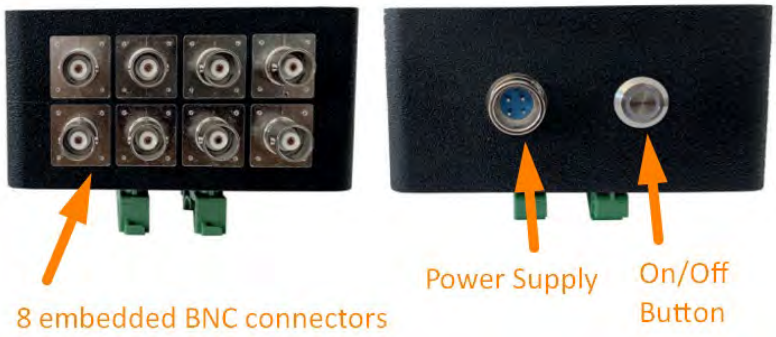
## Adding a GP-8

As its name implies, the GP-8 has 8 channels to interface with any standard ICP accelerometer, velocimeter or proximeter with a 2VDC peak-peak output and a BNC connector.

The GP-8 is shipped with a 4-pin aviation to USB-A male cable to connect a power source (requires 5VDC @ 1 amp).



The GP8 has 8 channels, however, this device uses only 4 unique Phantom serial numbers in the database, each serial number is assigned two channels. (The software sees this unit as four -EPH-G60 2vpp sensors).Example:

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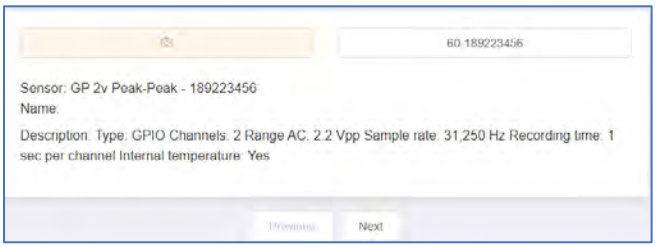
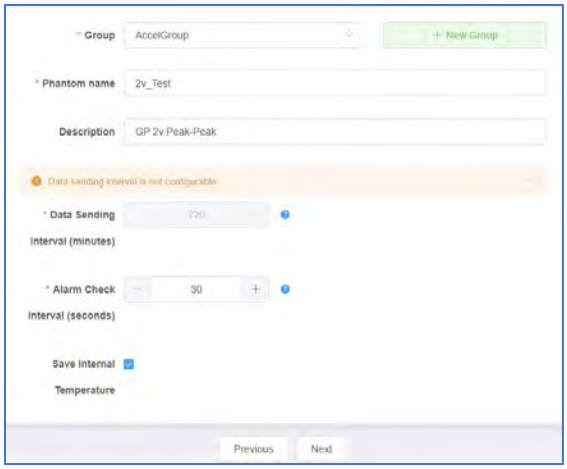
Each channel can be activated/deactivated using the blue dip-switch bank on top of the unit.

To configure a GP-8:

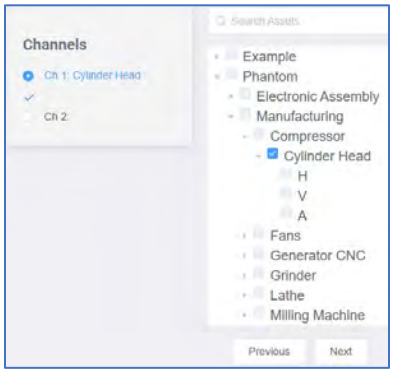
1. Open Phantom Manager and click **Add Phantom**
2. Scan the QR code or enter the sensor code manually (60-189xxxxxx) and click **Next**.

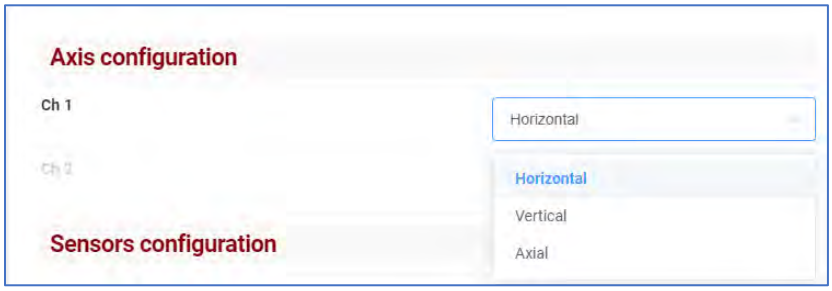



3. Add the Group and assign a Name. **Note** - Disregard the warning that the data sending interval is not configurable! When used with a Gateway 2.0, the **Sensor Update** interval now defines when data is sent (administered from the Gateway Admin Console), see below.
4. The **Alarm Check** interval ****NOTE-** <u>This field only applies to sensors used with a Gateway v1</u>.This is the time between alarm checks performed by the sensor. It can be set from 30 to 120 seconds. For Gateway 2.0, the **Sensor Update** interval serves as the Alarm Check interval. Click **Next** to continue.

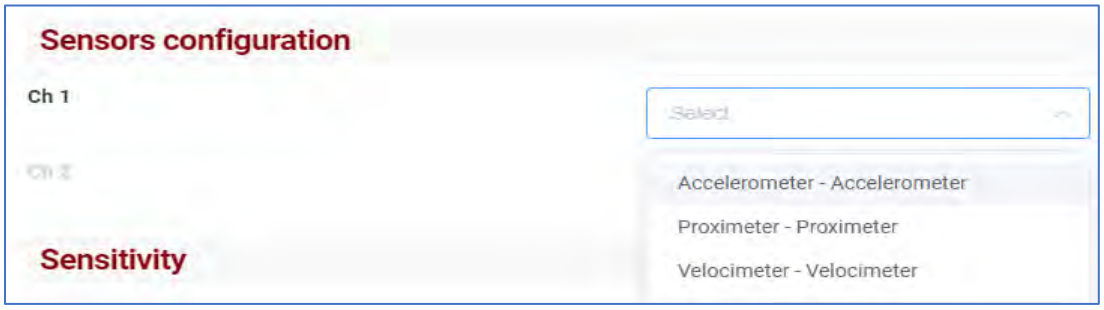


5. Assign the channel(s) to a Machine or Point and press **Next**.
6. Set the Axis configuration for the channel 1 and 2 sensors.

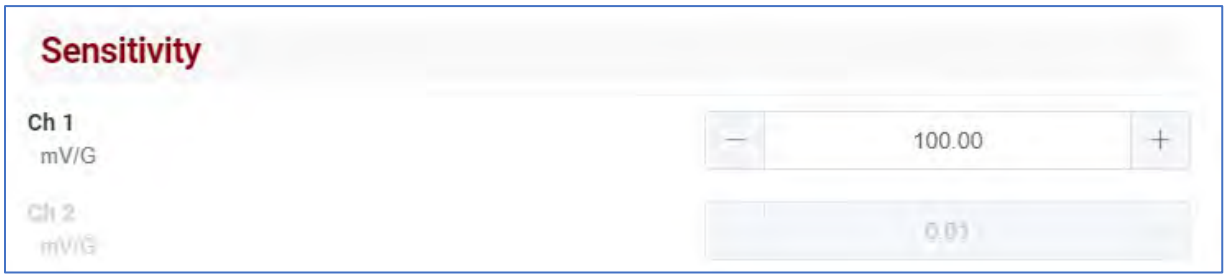


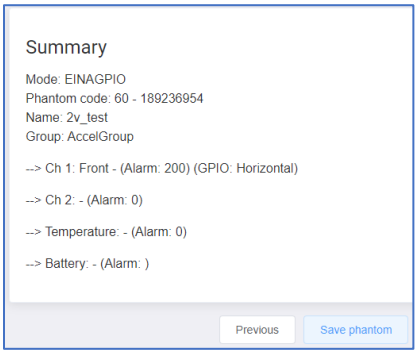

7. Set the Sensor config from one of three choices:




8. Set the sensitivity of the monitored sensor.




9. Set an optional Alarm threshold and press **Next**.
10. Click **Save Phantom** if the info summary is correct.



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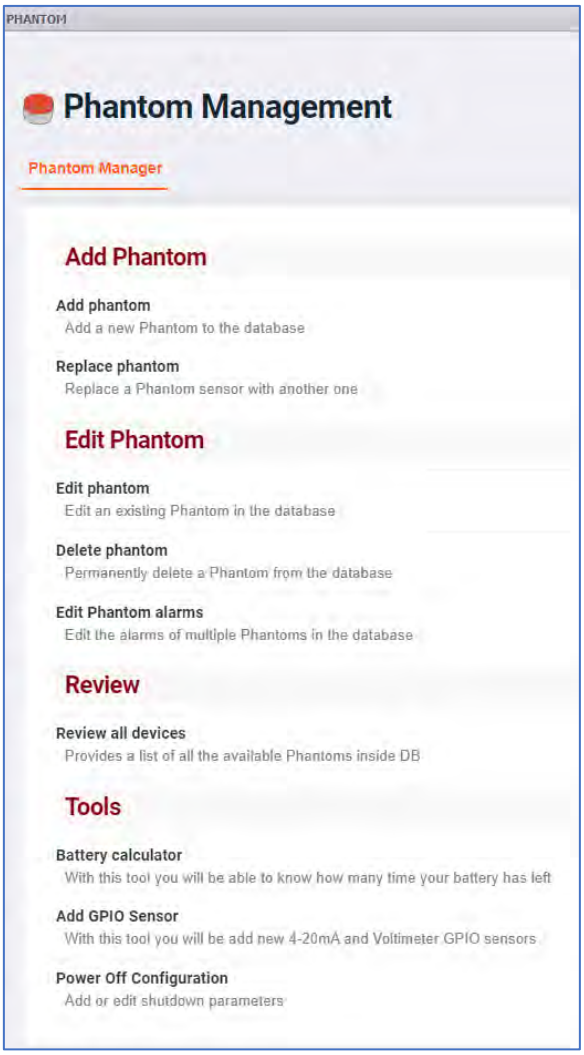
## Other Phantom Tools

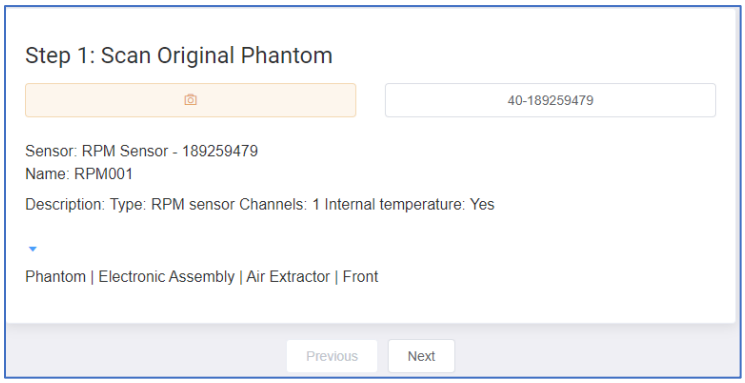
In addition to adding Phantoms, the Phantom Manager tool has options to:

- Replace Phantoms
- Edit Phantoms
- Delete Phantoms
- Edit Phantom Alarms(a shortcut)
- Add GPIO sensors (a shortcut)
- Set Power Off Configurations
- Estimate battery life with a Battery Calculator tool.

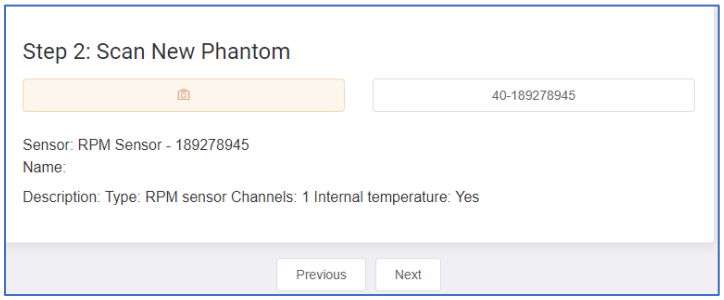



### Replace Phantom

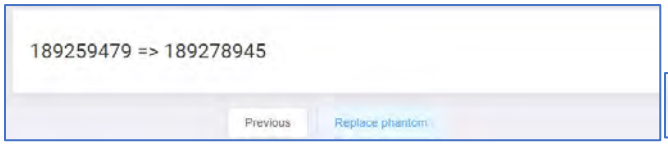
To replace one Phantom with another in software, click **Replace Phantom** and input the Phantom code(or scan) and press **Next**. **Note** – both Phantom sensors must be the same model. A V10 sensor cannot be replaced with a V11 for example.

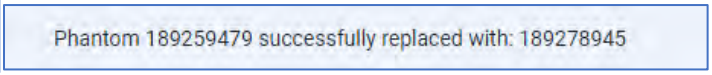



Enter the replacement Phantom serial number and click **Next**.




Make sure the numbers are correct and press **Replace Phantom**. A message will be displayed upon success.



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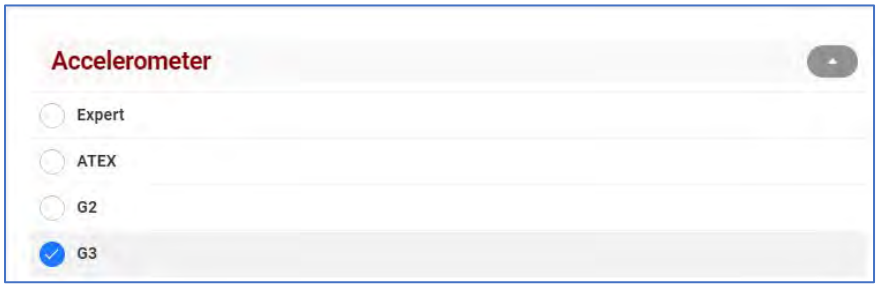
## Battery Calculator

This tool provides an estimate of the battery life for Phantom vibration sensors, based on settings. There is no tool available for Phantoms that use AAA batteries. To use the tool, first select the version of sensor:

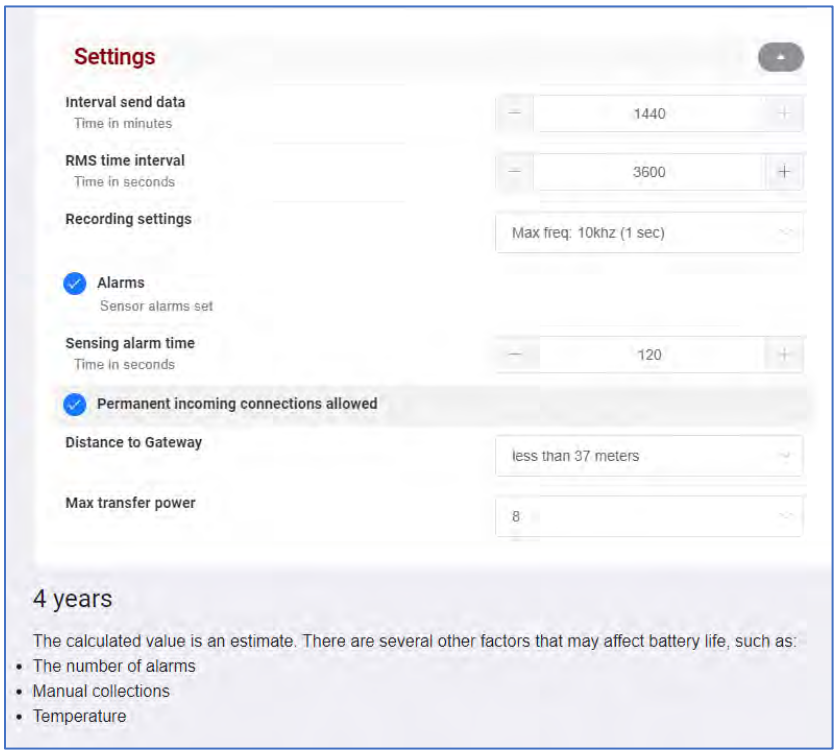



- **Expert** -Gen 1 triaxial -with a 3.6v lithium battery (E.g. Tadiran TL-5135+).
- **ATEX** - are Phantoms equipped with a sealed non-replaceable CR123 battery.
- **G2** – Gen 2 triaxial with a CR123 battery.
- **G3** – Gen 3 triaxial with a CR2477 battery.

Input the desired parameters to determine the estimated lifespan, which is displayed at the bottom.

In this example, a G3 Phantom taking a full data collection once a day, with a Sensor Update interval of 1 hour, is installed less than 37 meters from a gateway, and has the Max transfer power set to 8 dBm, can expect a battery life of 4 years.

Like any battery, the ambient temperature and other factors can shorten the lifespan. The frequency of alarms, and manual data collections also will have a noticeable effect.



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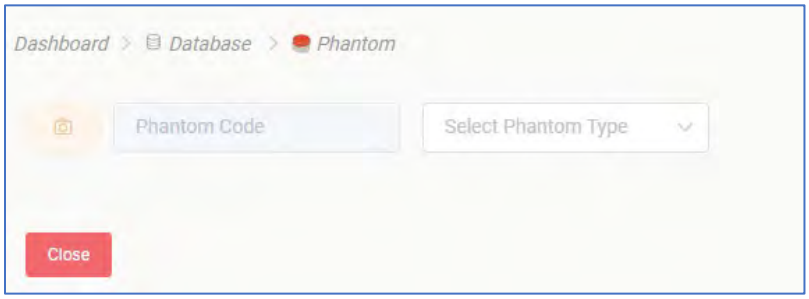
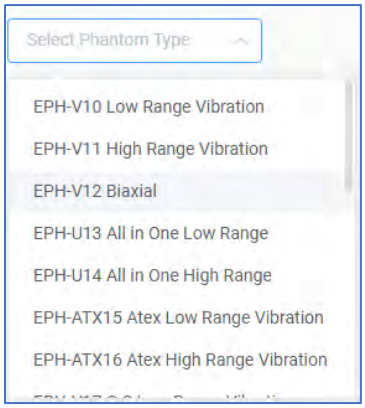
## Power Off Configuration

The **Power Off Configurations** tool is used to set minimum thresholds for sensor data. All values below the specified threshold level will be discarded, rather than recorded to the database. This prevents wasting database capacity on saved recordings from inoperative equipment.

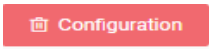
To configure sensors for the Power Off feature:

1. Open the Power Off Configuration tool in Phantom Manager (from DigivibeMX or EI-Analytic/WiSER VIBE Pro)



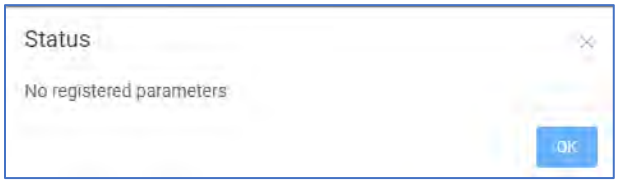




2. Select the Type of Phantom from the drop-down field. All matching Phantoms in the database will be displayed.
3. Click the box(es) beside the desired sensor serial number(s).

4. The  button will appear to allow deletion of any previous configurations.

Click on the Edit button to create or edit a configuration.

5. If no previous configurations were set up for the sensor, the following message will appear. Click **OK**.



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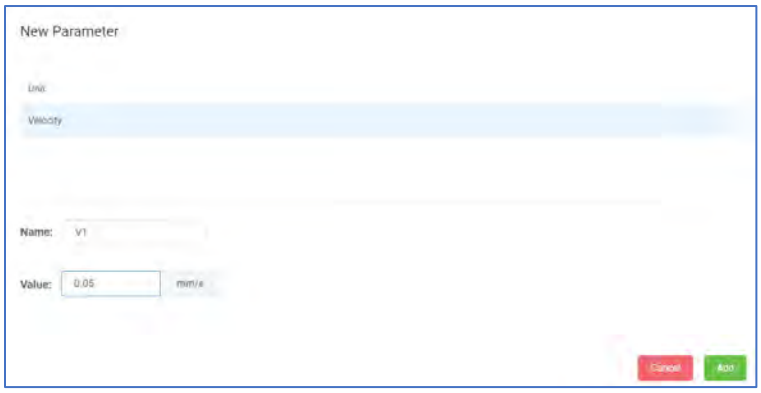
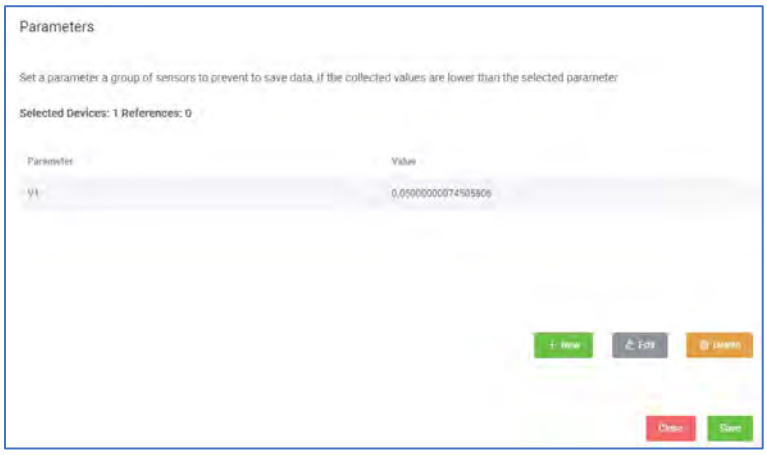
6. Click the **+ New** button to add a parameter.

7. Add a **Name** and **Value** for the Unit (options are shown based on sensor type) **Note**- ensure you click on the Unit to highlight it before pressing **Add** or an error will be displayed.




8. Highlight the Parameter by clicking on it. Press Save , and a completion message is flashed at the top of the screen.



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# Phantom Triggering

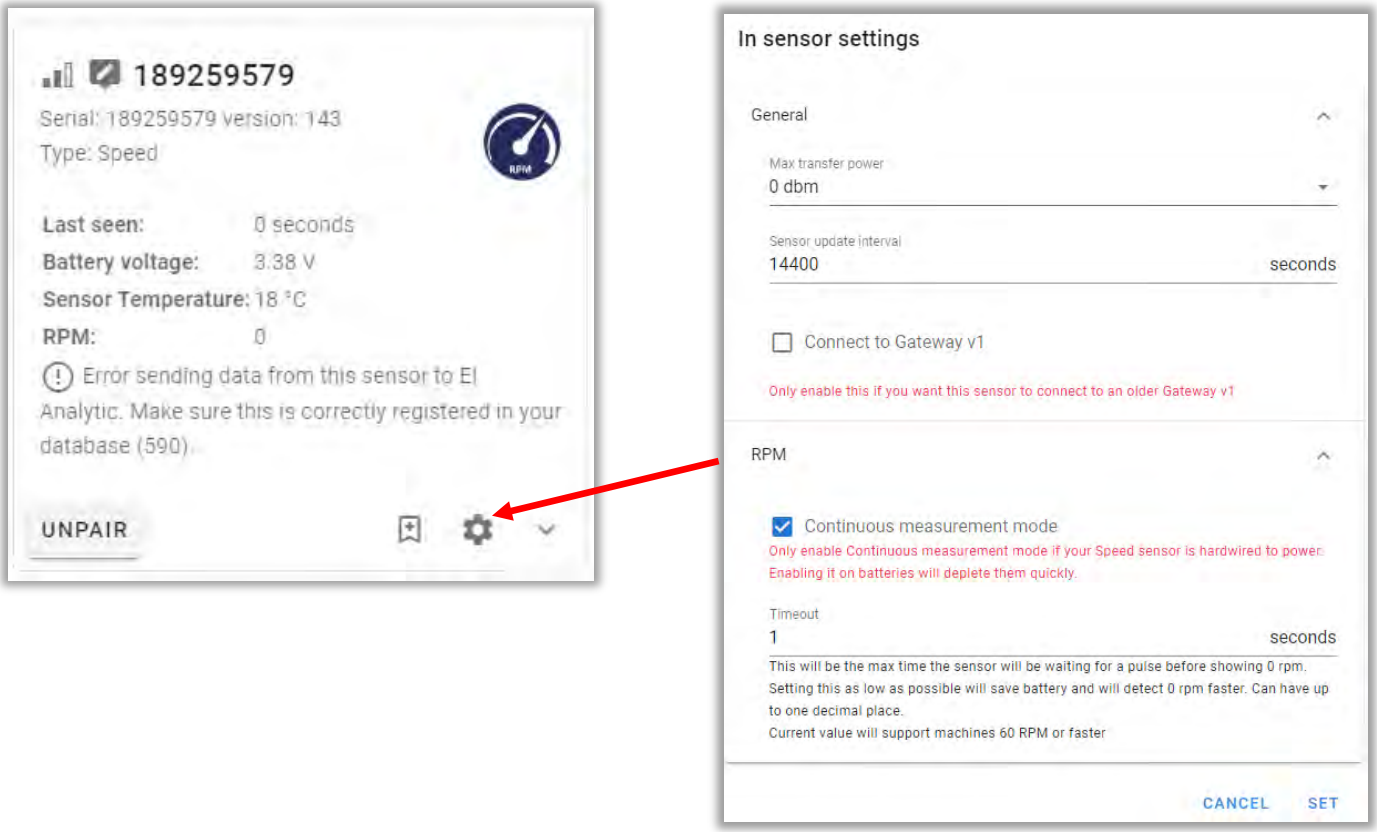
To ensure vibration measurements are taken when a machine is running in a desired state, e.g., RPM or current draw are within a specific range, Erbessd Instruments Phantom Specialty sensors can **trigger** triaxial vibration sensors to provide measurements. Three models of Phantom sensor are supported to provide triggering:

1. EPH-S40 Speed Phantom for RPM triggering
2. EPH-C31 Current Phantom for Amperage triggering
3. EPH-G62 Dry Contact Phantom for manual or automatic contact-closure triggering

These three Phantom sensor models update their associated Gateway with information (RPM, current, on/off condition) at various intervals. When triggering conditions are met, the vibration measurement(s) begin within a few seconds, depending on the gateway traffic load.

## RPM Trigger

The EPH-S40 Phantom Speed sensor reports RPM to the Gateway using the **Sensor Update** interval as configured in the **In-sensor Settings**. It is beneficial to set this value to a minimum so there is no delay in triggering. However, the negative impact on battery life makes this undesirable. Therefore, it is highly recommended to install the Speed Phantom in **Continuous measurement mode**. This requires hard-wired 5-24VDC power in lieu of batteries.



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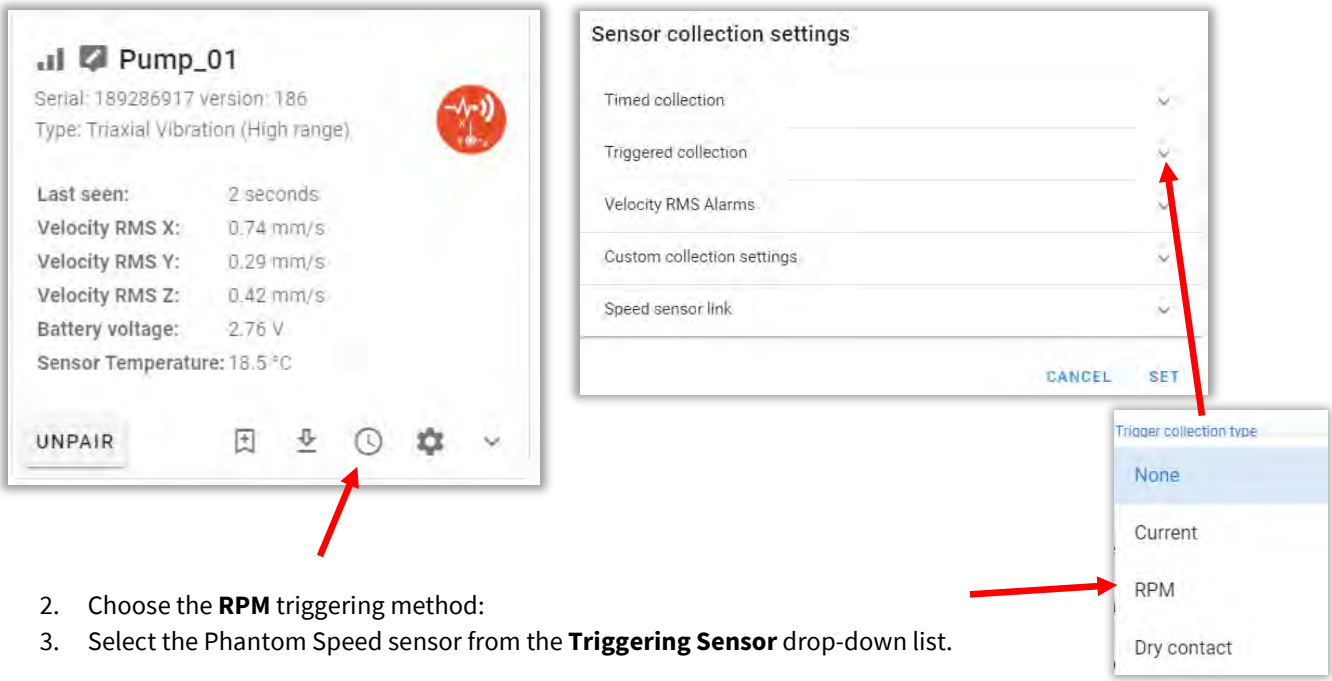
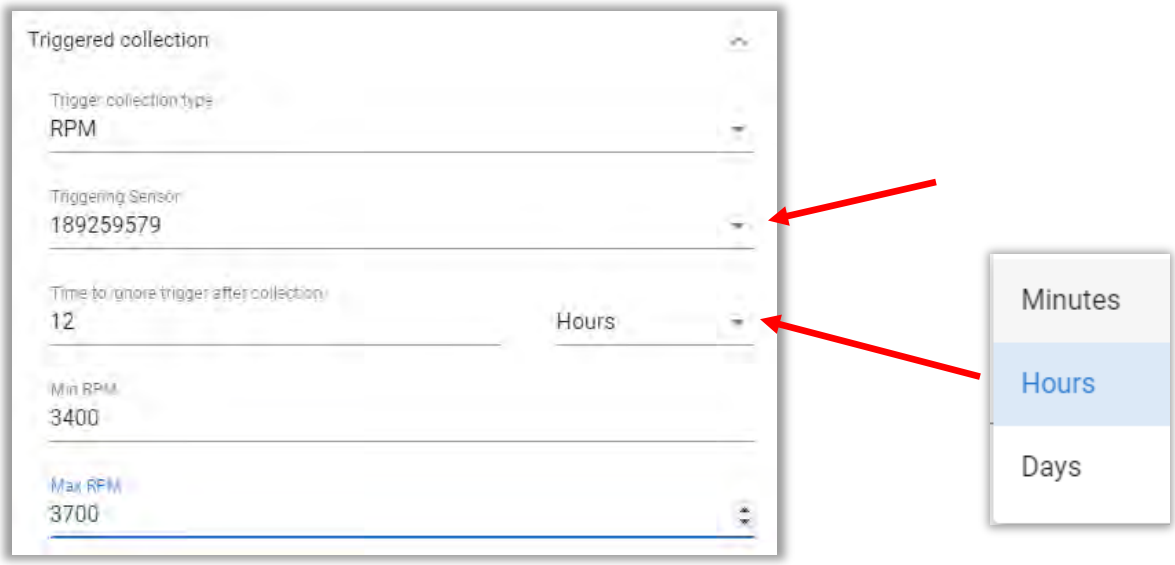
With an EPH-S40 Phantom Speed sensor installed to provide RPM information, the steps to set up triggering of Phantom vibration sensors(V10 or V11) are as follows:

1. In the Live State screen of the Phantom Gateway Admin Console, locate each V10/V11 sensor to be triggered. For EACH sensor, click on the **Collection Settings** icon, and select **Triggered collection**




2. Choose the **RPM** triggering method:
3. Select the Phantom Speed sensor from the **Triggering Sensor** drop-down list.




4. Set the **Time to ignore trigger after collection** value. This sets an interval between triggered events. Once the timer has elapsed, and the RPM Min/Max conditions are met, a new trigger will occur.
5. Set **Min and Max RPM** to define the range in which the RPM must fall to cause a trigger event.
6. Press **SET** to save changes.



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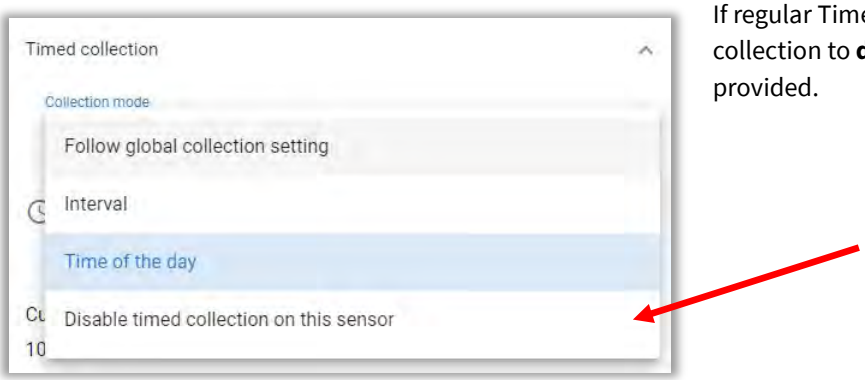
**Note** – A Triggered collection setting is independent of the normal **Timed collection** setting for the V10/V11 vibration sensor.




If regular Timed collections are not desired, set the Timed collection to **disabled**. Only triggered collections will now be be provided.



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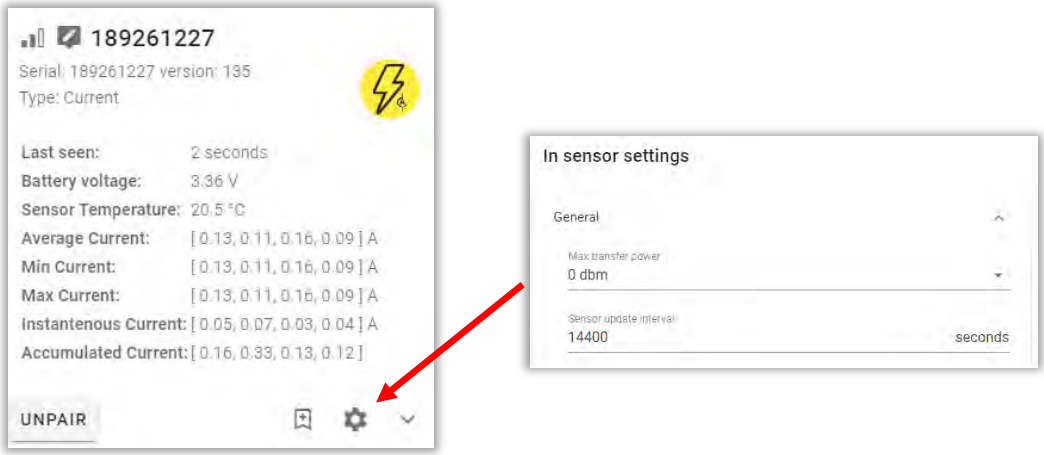
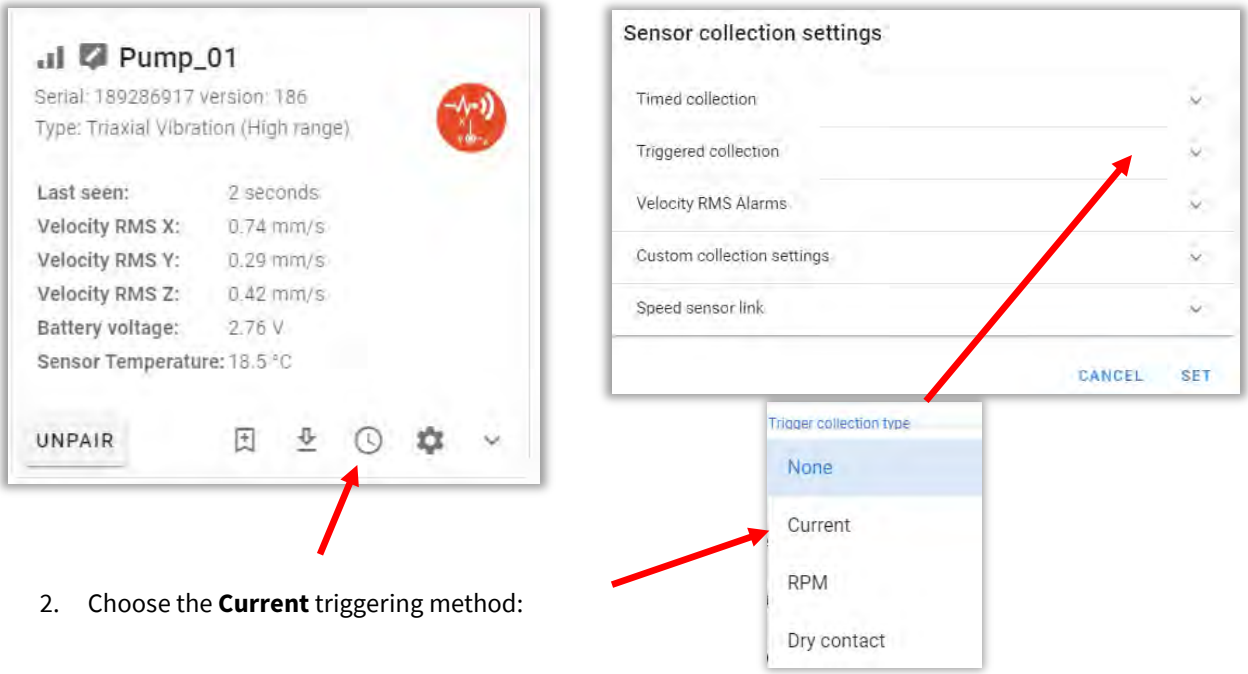
## Current Trigger

The EPH-C31 Current sensor updates the Amperage values from all 4 channels to the Gateway **every 5 seconds** regardless of the **Sensor Update** interval assigned in the **In-Sensor settings**.(which is the interval at which data is sent to the database)



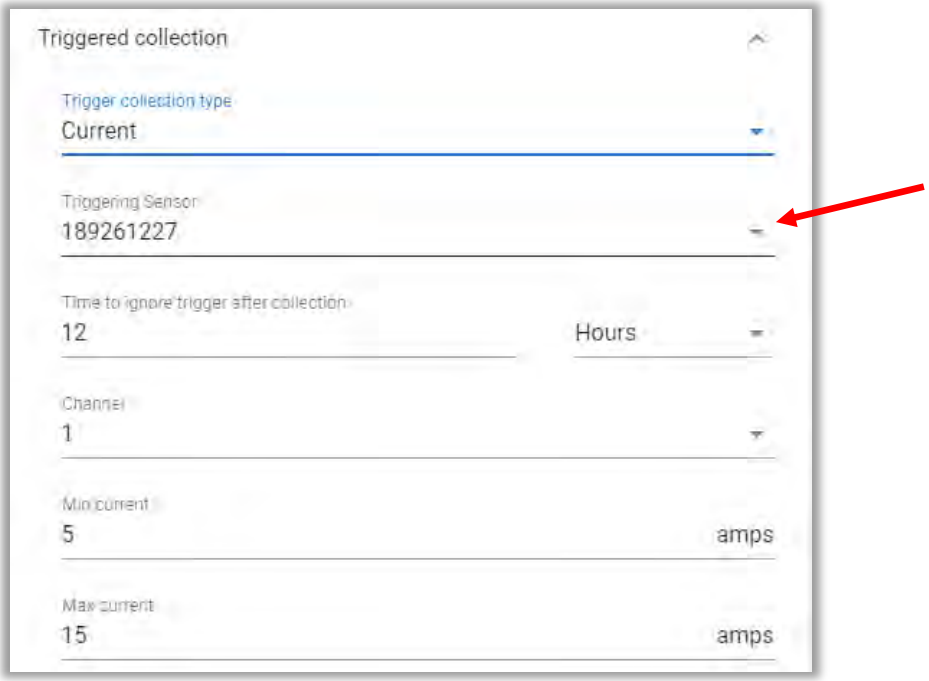

With an EPH-C31 Current Phantom sensor installed, any of the channels can be used to trigger a V10 or V11 vibration sensor. The steps to set this up are:

1. In the Live State screen of the Phantom Gateway Admin Console, locate each V10/V11 sensor to be triggered. For EACH sensor, click on the **Collection Settings** icon, and select **Triggered collection**



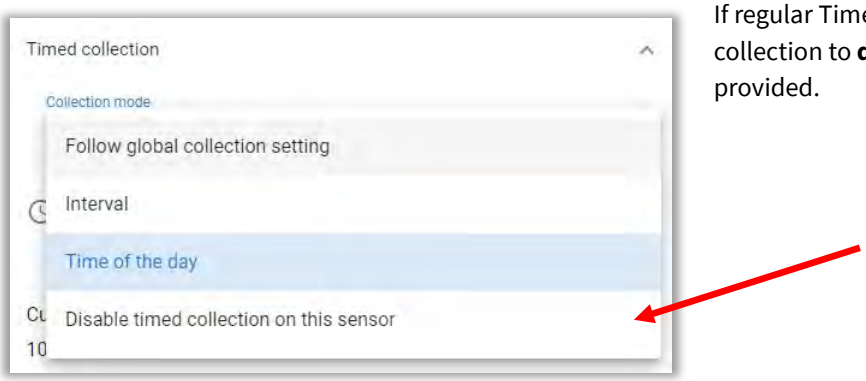

2. Choose the **Current** triggering method:

3. Select the Phantom Current sensor ID from the Triggering Sensor drop-down list.




4. Set **theTime to ignore trigger after collection** value. This sets an interval between triggered events. Once the timer has elapsed, and the current Min/Max conditions are met, a new trigger will occur.
5. Choose the **Channel** (1-4)
6. Set **Min and Max current** to define the range in which the current must fall to cause a trigger event.
7. Press **SET** to save changes.

**Note** – A Triggered collection setting is <u>independent</u> of the normal **Timed collection** for the V10/V11 vibration sensor.




If regular Timed collections are not desired, set the Timed collection to **disabled**. Only triggered collections will now be be provided.



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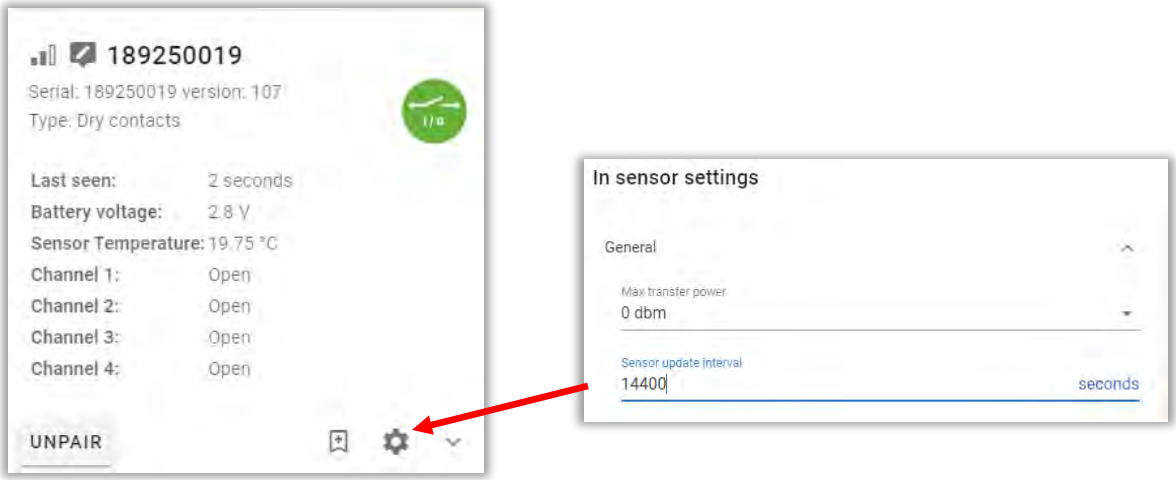
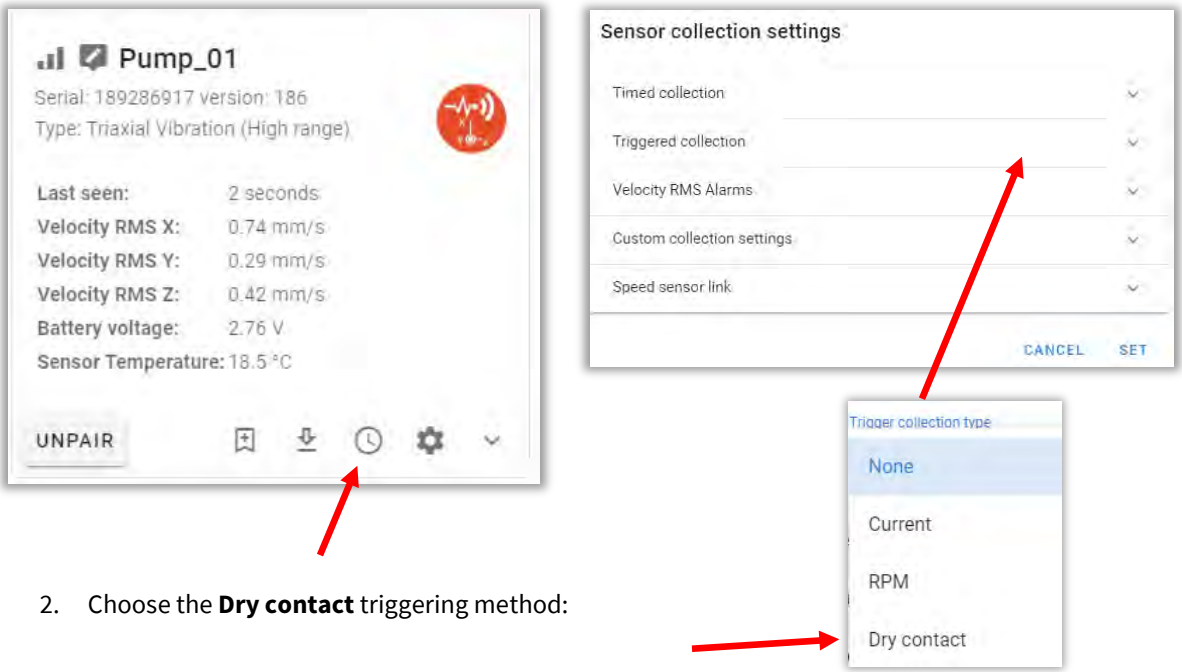
## Dry Contact Triggering

An EPH-G62 Dry contact Phantom sensor can be used to tigger V10/11 vibration sensors. This Phantom Specialty sensor updates the open/closed state of each channel every 5 seconds or less to the Gateway. The state information is sent to the database using the **Sensor Update** interval in the **In-sensor settings** of the sensor.




To configure Dry Contact triggering, follow these steps:

1. In the Live State screen of the Phantom Gateway Admin Console, locate each V10/V11 sensor to be triggered. For EACH sensor, click on the **Collection Settings** icon, and select **Triggered collection**




2. Choose the **Dry contact** triggering method: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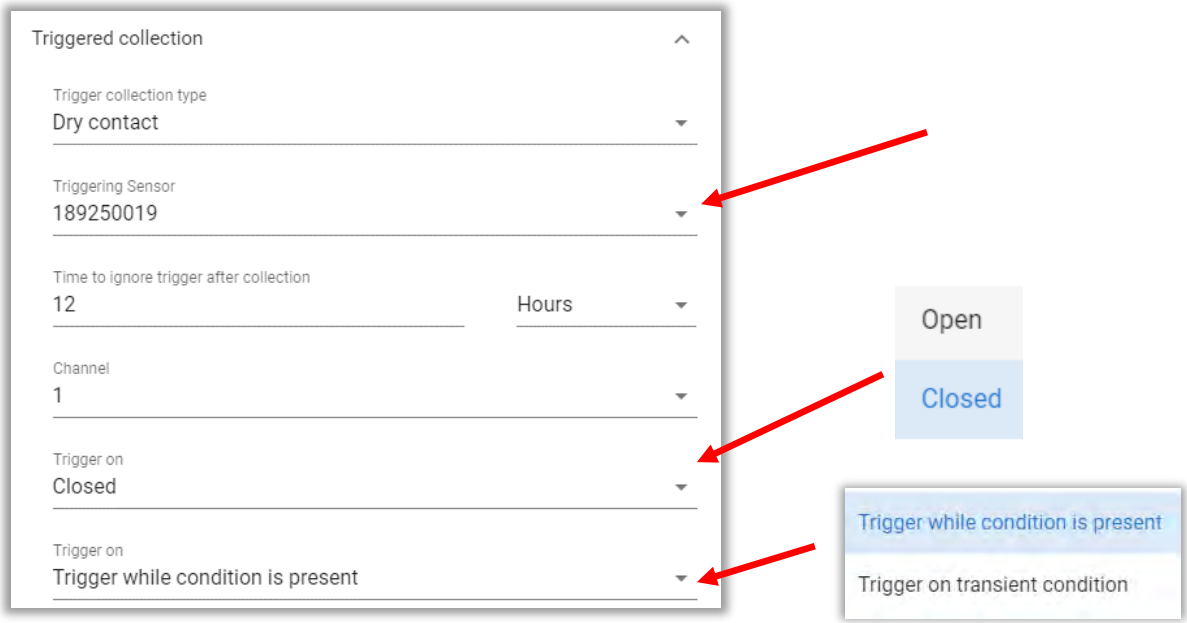
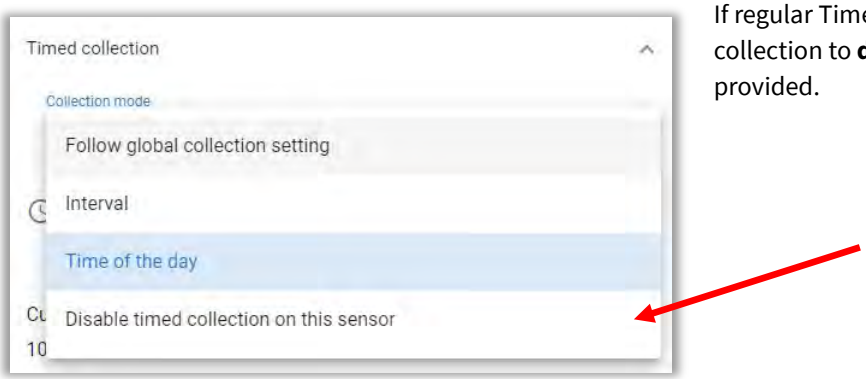
3. Select the Phantom Dry contact sensor ID from the Triggering Sensor drop-down list.




4. Set **theTime to ignore trigger after collection** value. This sets an interval between triggered events. Once the timer has elapsed, and the trigger conditions are met, a new trigger will occur.
5. Choose the Channel (1-4)
6. Set the **Trigger on** parameter to **Closed** or **Open**. When the Sensor Update Interval expires, the sensor reports the contacts as open or closed. Triggering can be done based on either condition.
7. **Trigger while condition is present** uses the open or closed setting above to determine if triggering should take place. Tyically, this is used when a remotely-controlled relay is connected to the sensor, and is closed automatically when a machine is in operation. **Trigger on transient condition** causes triggering to occur whenever the condition changes , which would be used in a case where a button is pressed manually to cause a trigger. Note – the manual button-press method works with either selection of this parameter.
8. Press **SET** to save changes.

**Note** – A Triggered collection setting is <u>independent</u> of the normal **Timed collection** setting for the sensor.




If regular Timed collections are not desired, set the Timed collection to **disabled**. Only triggered collections will now be be provided.

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## Phantom Manager Mobile App

This mobile App is used to configure Phantom Gateway v1 and associated Phantom sensors. With the release of Phantom Gateway 2.0, most functions were moved to the Gateway Admin Console web interface. Some functions are still valid when Gateway 2.0 is installed, including the Debug and Diagnostic tool (used as an optional method to upload firmware files to sensors and to display signal strength) and the EPH-T70 Thermographic Camera Live View feature.

Get the free Phantom Manager App from the App Store or Google Play Store.

Download, install and launch the App.

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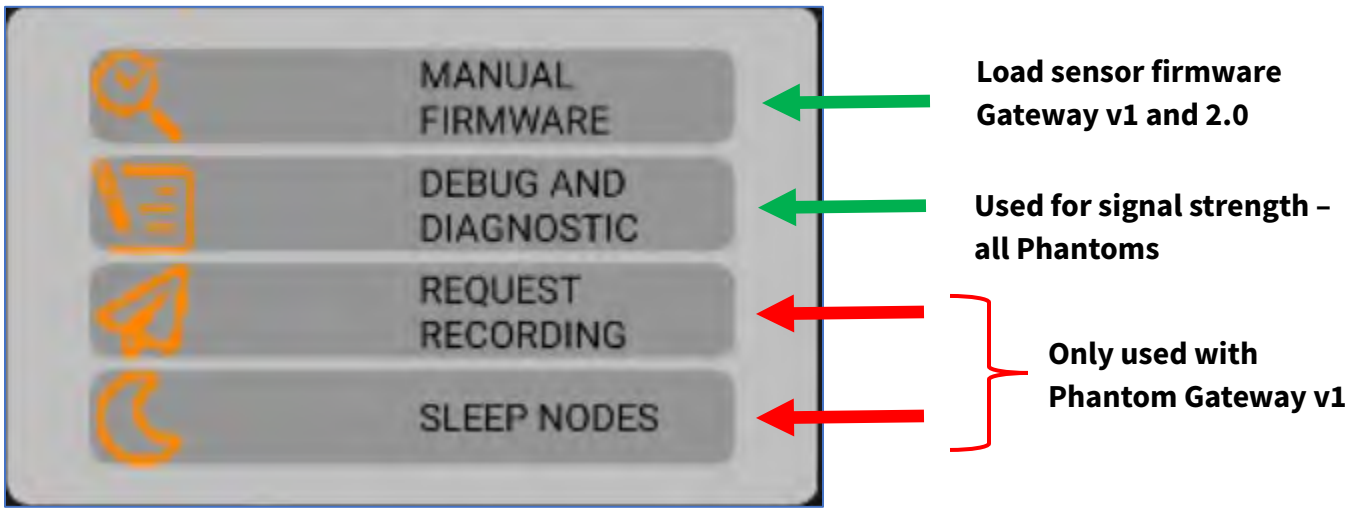
## Signal Strength Tool

The Menu (aka the hamburger) at top left of the Home screen contains the **Debug and Diagnostic** tool used to display the Bluetooth signal strength between the phone/tablet and any sensors within range.

**Note – Ensure the Bluetooth option on the mobile device is turned on!**

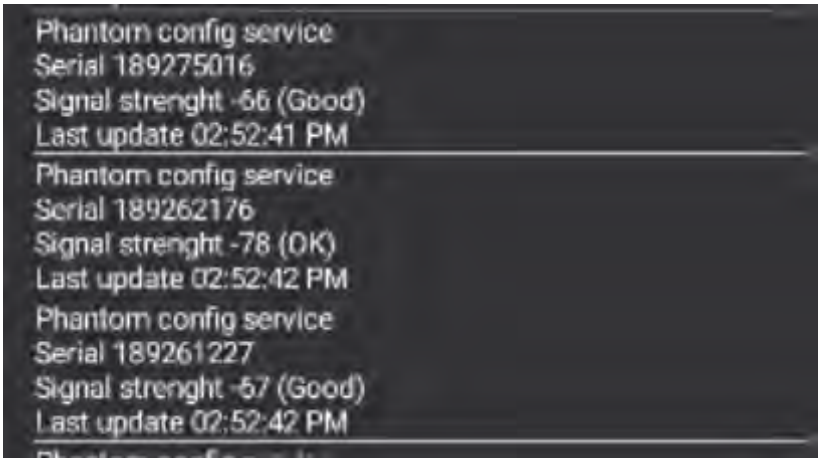



This can be used to roughly estimate the signal strength expected between a particular gateway and nearby Phantom sensors.

Place all sensors in their desired locations temporarily. Then hold your phone or tablet near the prospective location for the gateway, and press the Menu> Debug and Diagnostic button to observe the signal strength for each sensor.

The signal strength is rated as either Good(-50 to -75dBm), OK(-76 to -90dBm), or Poor (less than -90dBm).

**Note** –the gateway has a superior software mechanism to resolve the signal strength from Phantom Expert vibration sensors, as compared to most mobile devices. It is likely the values will vary between those observed via mobile device and those shown in the Gateway Admin Console Live State screen, which is considered to be much more accurate.



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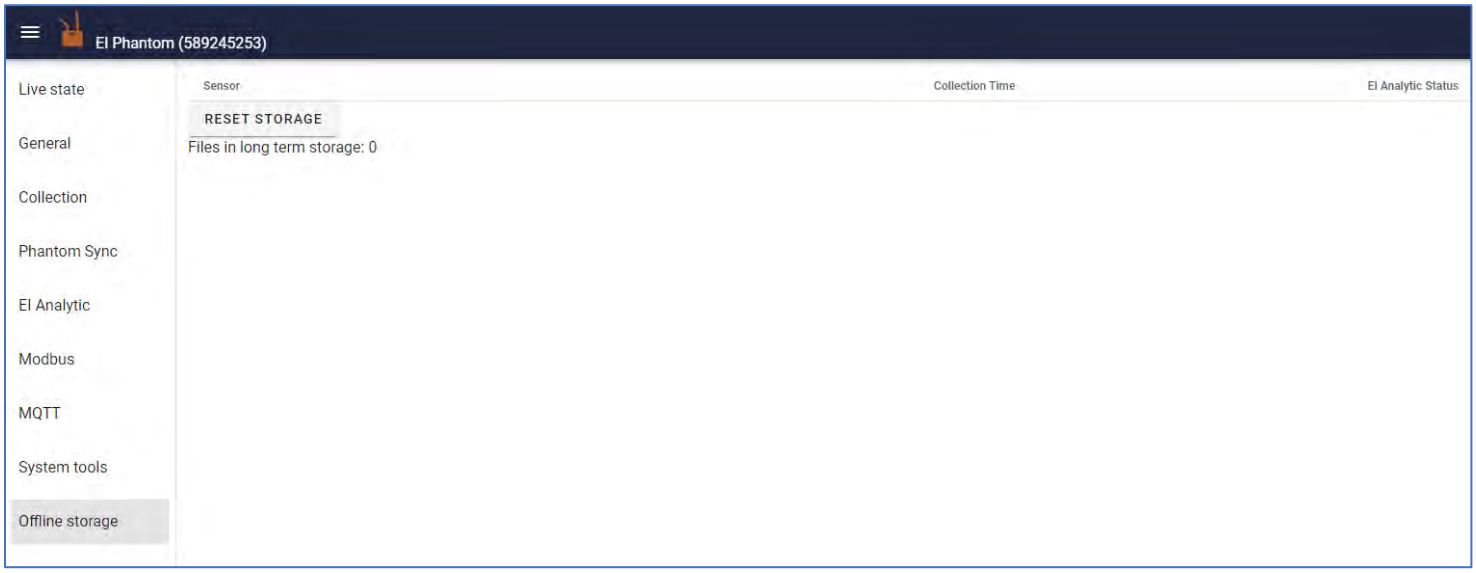
# Gateway 2.0 Additional Features

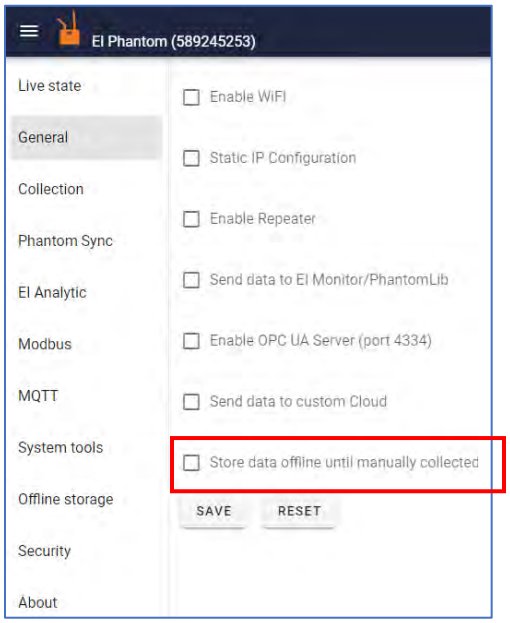
## Offline Storage

Phantom Gateway 2.0 has an on-board SD card for storage of up to 100,000 files when no Internet or EI-Monitor is available. Once connection to the database is restored, the files are uploaded automatically.

The **Offline Storage** tab on the Main Menu shows the number of files currently in storage. Storage may be purged by clicking the **Reset Storage** button.




The gateway can also be set to store all data offline until manually collected. (under the **General** tab)



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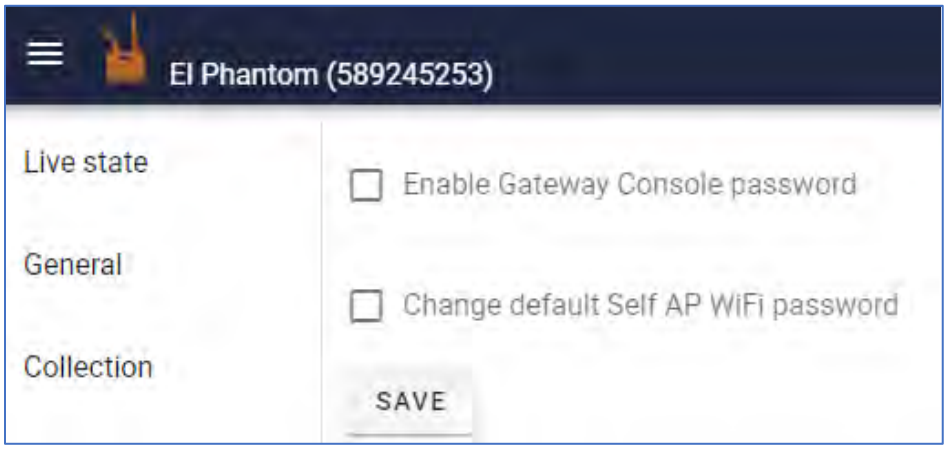
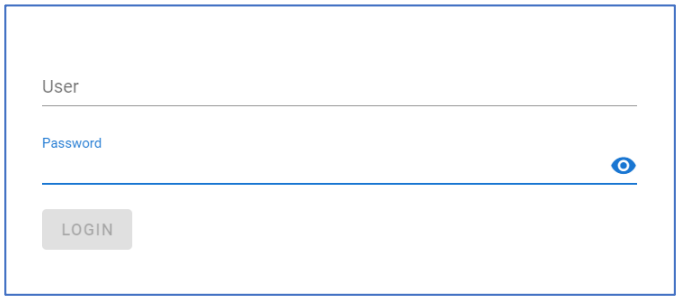
## Security

The Gateway Security tab has two options:




Checking **Enable Gateway Console password** forces the entry of a password to access the Console Admin screen . The **User** is hard-coded as “Admin”.




**Change default Self AP WiFi password** allows you to change the default password (88888888) used by the gateway for SELF AP Wi-Fi mode.

## Gateway Resets

The Phantom Gateway 2.0 has a two-tier Reset mechanism.

**Tier 1** – Insert a paper clip or similar reset tool into the small hole located just left of the OLED display. Press and hold the internal reset button for about **5 seconds** until the display changes. The **Basic Config Reset** screen will appear on the display. If you release the button, the gateway will restart. This will delete the Wi-Fi network configuration, but keep the sensor configurations.

**Tier 2** - After you see the **Basic config reset** message, continue to press the button for **another 10 seconds** until the **Factory Resetting** message is displayed. This level of reset returns all gateway settings to factory values. Recycle the power to the gateway once the **Factory Reset** message is displayed.

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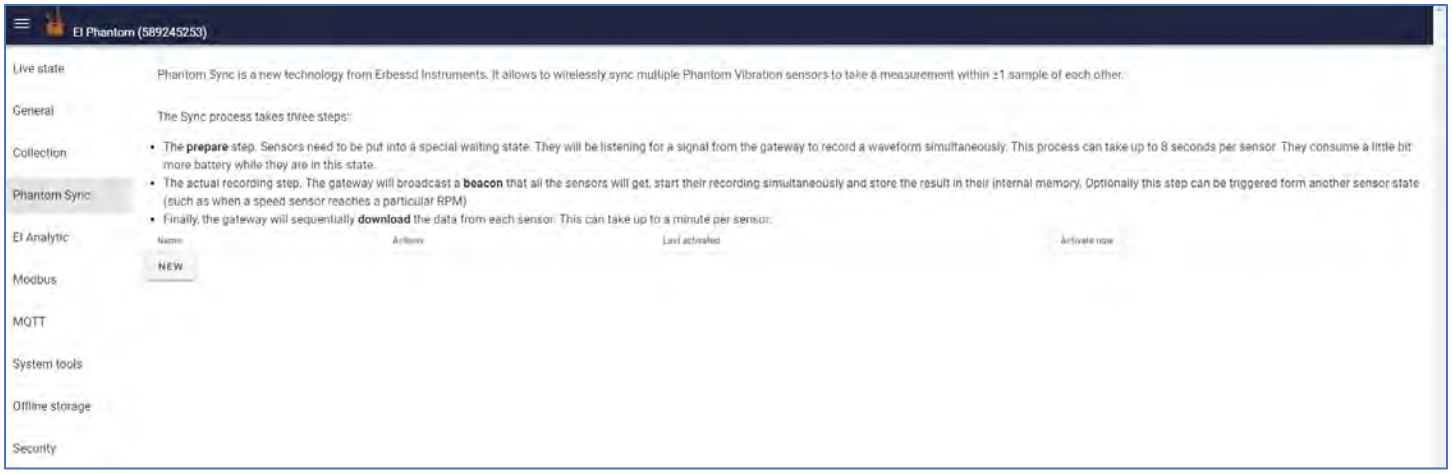
## Phantom Sync Feature

Multiple Phantom vibration sensors can be configured in a Sync group so when initiated, a data collection is performed by all sensors in the group simultaneously, to within a fraction of a second.

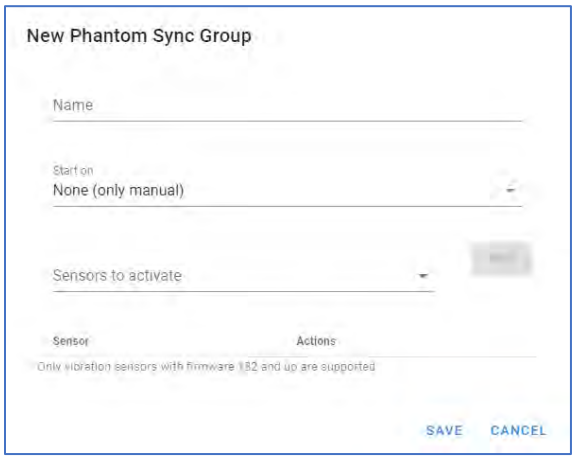
The Sync process takes three steps:

1. The prepare step. Sensors need to be put into a special *waiting* state. They will be listening for a signal from the gateway to record a waveform simultaneously. This process can take up to 8 seconds per sensor. They consume a little bit more battery while they are in this state.
2. The actual recording step. The gateway will broadcast a beacon that all sensors will receive, causing them to start their recording simultaneously and store the result in their internal memory. Initiation of a Sync recording can be set manually, or by setting an interval or a time-of-day value. Optionally, recording can be triggered by another sensor state such as when a speed sensor reaches a particular RPM (see next page).
3. Finally, the gateway will sequentially download the data from each sensor. This can take up to a minute per sensor.




To set up a Sync group, open the Sync tab on the Main Menu and click **New**.

Enter a **Name** for the group and select the **Start on** option, None(manual),Interval or Time of day. Pick a sensor fromthe **Sensors to activate** drop-down field and click **ADD**. Repeat this for all the sensors to be added to the group. Click **Save**.



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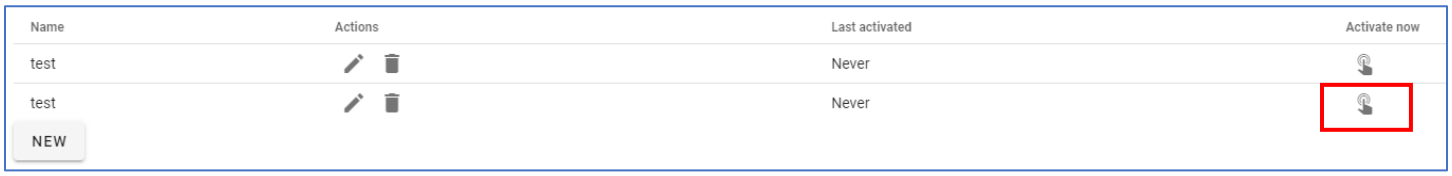
To take a Sync recording manually:

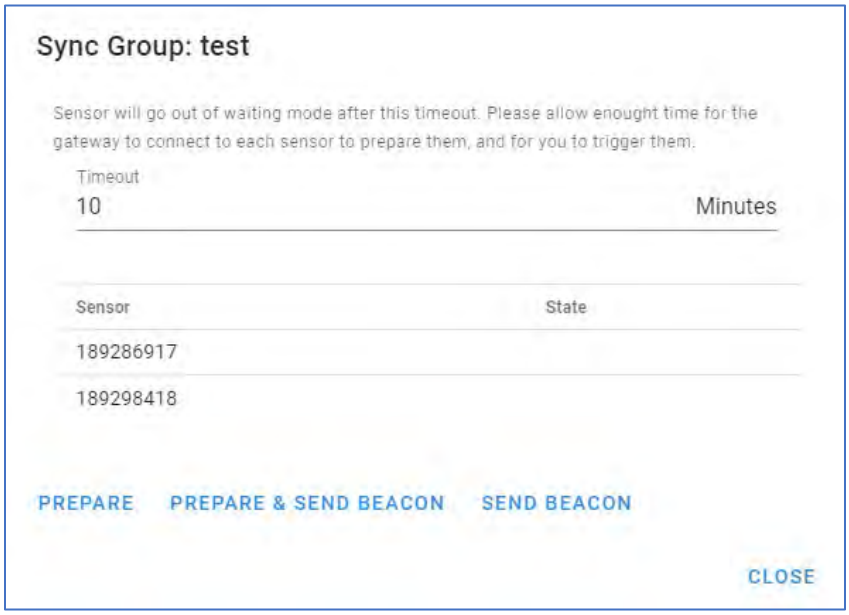
1. Open the Phantom Sync tab and click on Activate Now for the group.




2. Three options are available:

- Prepare
- Prepare and send beacon
- Send beacon

The Prepare and Send Beacon actions can be performed separately or both together, one immediately after the other, depending on the option chosen.



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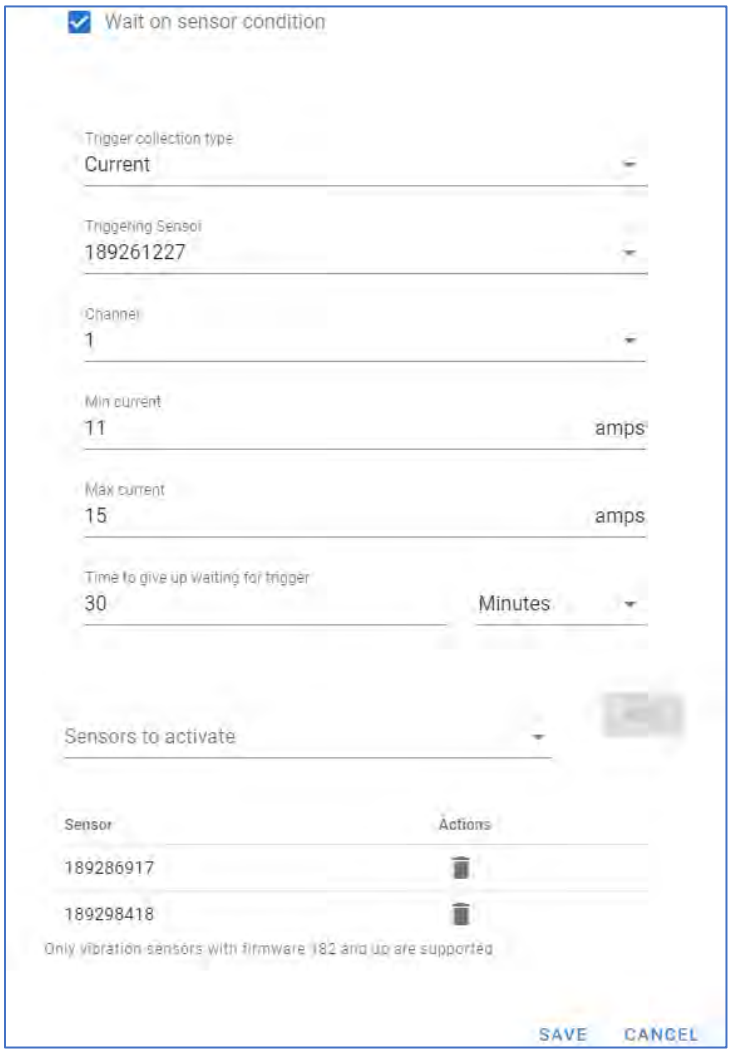
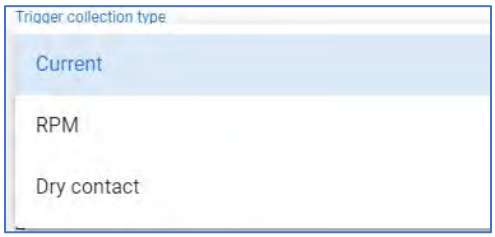
To enable triggering, check the **Wait on sensor condition** box and select the **Trigger collection type**. Pick the sensor serial number from the available list under **Triggering Sensor**. In the example, channel 1 of the Current Phantom will trigger the Sync Group containing 2 vibration sensors when the current is between 11 and 15 amps. This will occur at the interval or time-of-day value chosen in the **Start on** field. The sensors will be held in the "Waiting state", until the min/max conditions are met. To conserve battery life, a timer is used to remove the sensors from the Waiting state if the triggering conditions are not met within the specified value.



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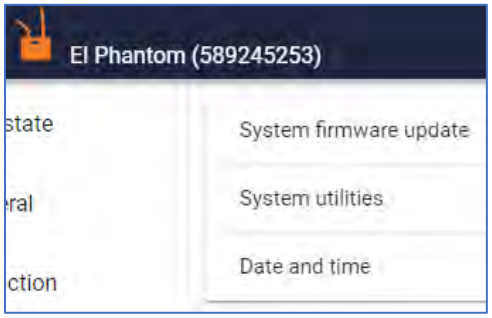
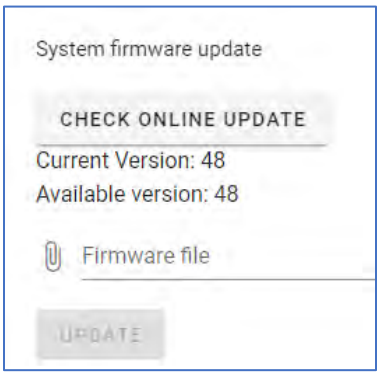
## System Tools

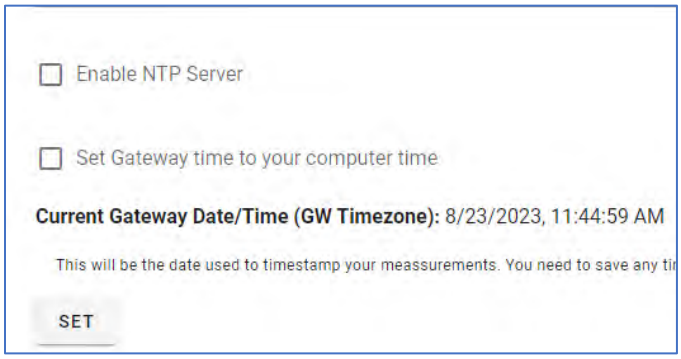
The Gateway 2.0 firmware version is updated via the **System firmware update** tab. Click the **Check Online Update** button to show the current and available versions. **Firmware file** allows uploading a firmware file directly from your computer to update the gateway. This option does not require internet access.

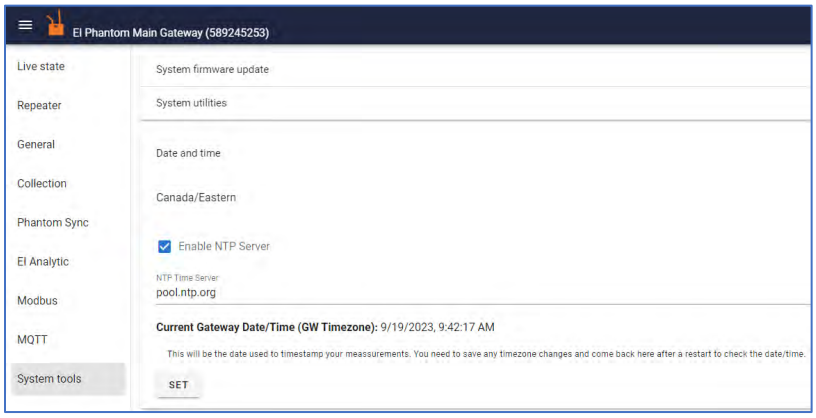
**System Utilities** include a Restart option and access to the System Log. You may be asked to access the log by an Erbessd technical support representative as part of a troubleshooting procedure.



The **Date and Time** tab is used to select the time zone for the gateway from the drop-down field. Check **Enable NTP Server** if you wish to use a Network Time Protocol server via the Internet(defaults to pool.ntp.org). You may specify the URLin the NTP Time Server field. The other option is to **Set Gateway time to your computer time**.and press **SET**.




**Note-** Changing the timezone or NTP source will cause the gateway to restart.



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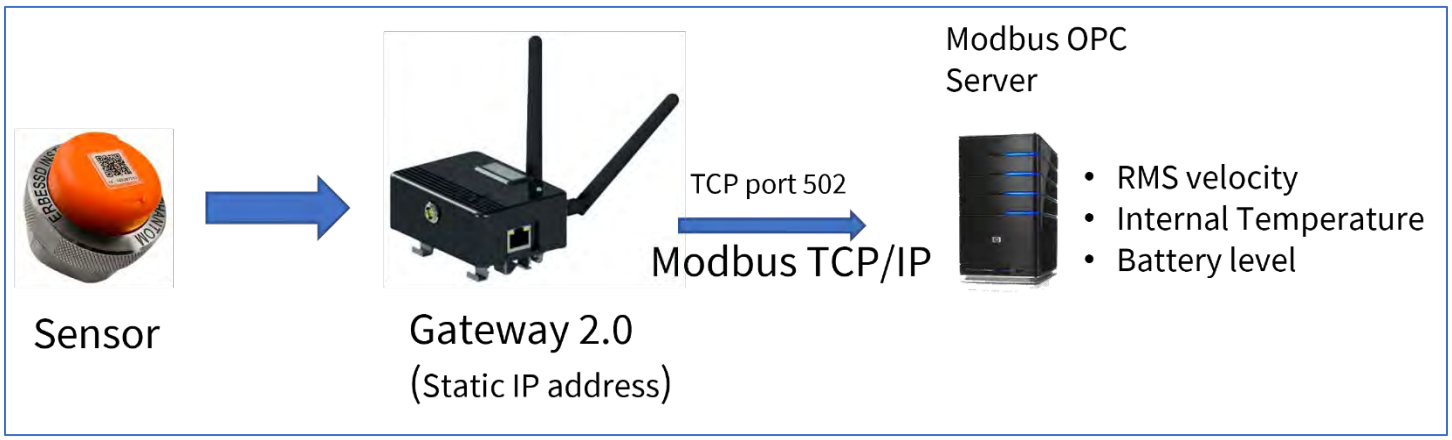
## Modbus

The Erbessd Instruments Phantom solution supports Modbus TCP integration. A Phantom gateway can operate as a Modbus *server* , configured to store sensor data in registers in the gateway. Gateways configured for Modbus listen on well-known **TCP port 502** for incoming requests from Modbus *clients*. Gateways do not initiate contact with Modbus clients, only respond to them. Upon request, they send their register contents to the client.

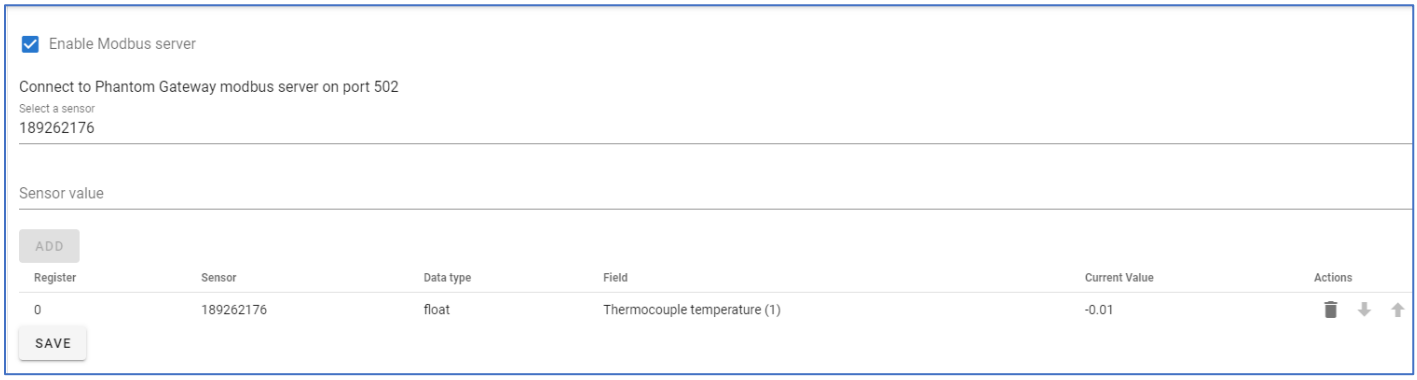



The information stored varies by sensor type. In the example below, data from an EPH-T25 Temperature Phantom is to be stored in the gateway. For details regarding the data formats for all Phantom sensors , see the Erbessd website at: https://www.erbessd-instruments.com/docs/phantom/modbus-integration/.

**NOTE - Static IP** addressing must be used on Phantom gateways with Modbus integration. The gateways are identified to the Modbus client by IP address (not by hostname), therefore DHCP is not viable. ONLY the Main gateway in a Repeater Network is configured as a Modbus server. All Modbus data from Subordinate gateways is stored in the Main GW.

To activate the Modbus server feature:

1. Open the Modbus tab on the Main Menu and check **Enable Modbus server.**




2. Select a sensor from the **Select a sensor** drop-down field.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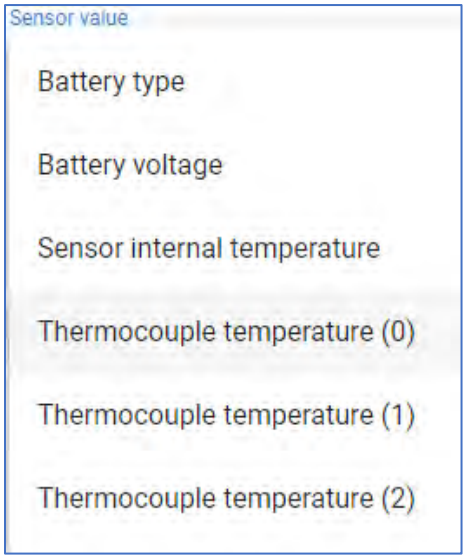
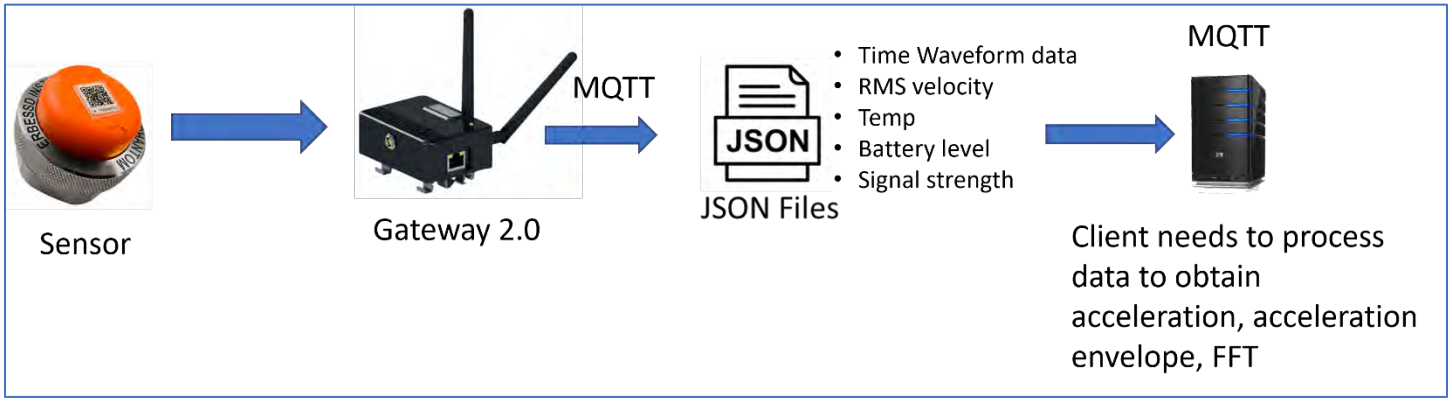
3. Choose the data type from the **Sensor Value** field. In the example, the Thermocouple temp from channel 1 will be stored in register 0 of the gateway. Different options are presented, based on the type of sensor chosen. Click **Add** to configure another sensor.
4. Click on **Save**, and the gateway will restart.

The data in the gateway registers is refreshed using the **Sensor Update** interval, as set in the Gateway Admin Console, for each sensor.




## MQTT

Phantom Gateway 2.0 supports MQTT protocol integration. The gateway acts as a MQTT client and can connect to any compatible MQTT broker from version 3.1.1 up to MQTT 5. **Note** – In Repeater Neyworks, Subordinate gateways send MQTT data to the Main gateway, where the interface to the MQTT broker is configured.



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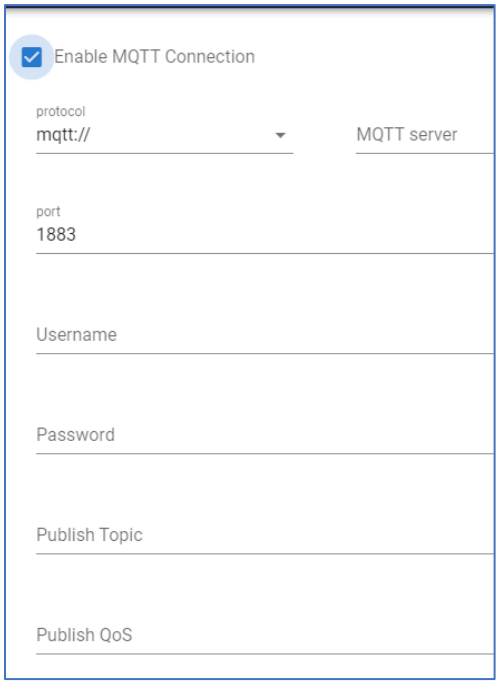
To set up MQTT, open the MQTT tab in the Gateway Admin Console and click **Enable MQTT connection**.




**Protocol**: Can be either mqtt://, mqtts://, ws:// or wss:// depending on the transport supported by your MQTT broker.

**MQTT server**: Is the hostname or IP address of your MQTT broker.

**Port**: The network port your MQTT broker is listening on.

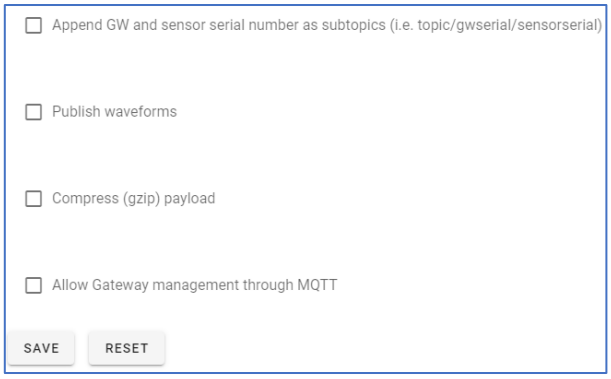
**Username**: The (optional) username to connect to your MQTT broker.

**Password**:The (optional) password to connect to your MQTT broker.

**Publish Topic**: The topic where the gateway will be publishing the sensor data and will subscribe for commands.

**Publish QoS**: A Quality Of Service (QoS) tag can be applied to the MQTT data allowing management of the data packet priority on the network. (Data packets with higher QoS tags get routed first) When in doubt, use 0.

**Append Gateway and serial number as subtopics** is an option for formatting the data.




**Publish waveforms**: Whether or not to publish complete time waveforms to MQTT. These measurements represent about 160kB of data per waveform. They require additional post processing to render an FFT.

**Allow Gateway management through MQTT**: Allow full gateway management so that clients connected to the same broker can change all gateway and sensor settings.

**Save**: Will save the settings and the gateway will restart.

**Reset**: Will reset all settings to their previous values.

- After you save the settings the gateway will restart. After it restarts it will try to connect to the MQTT broker and show a state in the MQTT section at the top.
- MQTT is supported at the same time as any other protocol supported by the gateway, including EI Analytic, EI Monitor, OPC UA and Modbus.
- The gateway will start publishing messages every time a sensor updates its data (Sensor Update interval) or whenever a time waveform measurement is taken, e.g., alarm or on-demand.

The messages are in JSON format, here is an example:

Topic: eitesttopic QoS: 0

{"rssi":-56,"type":3,"version":178,"phantomCode":189281421,"gwSerial":4294967295,"seq":27,"advFlags":6,"batteryType":1,"battery":3.07,"temperature":23.75,"updateInterval":10,"txPower":8,"minRMSFreq":30,"maxRMSFreq":1000,"rms":[0.42,0.15,0.08],"range":8,"recordingSettings":0}

2022-12-08 12:38:28:758



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The JSON messages contain the following standard fields:

| Variable Name | Description |
|---|---|
| dataType | can be either "collection" or "stateupdate". "collection" refers for time waveforms for vibration sensor. Every other sensor dataType is "stateupdate", vibration sensors report "stateupdate" for it's internal rms meassurement |
| type | Sensor type |
| phantomCode | Sensor's serial number |
| gwSerial | Gateway serial number |
| timestamp | The time in seconds since 1970 where this measurement was taken. |
| battery | Battery level in volts |
| batteryType | Battery type. 1/6D (1), AAA(2), CR2032(3), CR2477(4) |
| temperature | Sensor internal temperature (in Celsius) |
| version | Firmware version |
| rssi | Sensor signal strength |

For more information regarding MQTT, visit the Erbessd website at :

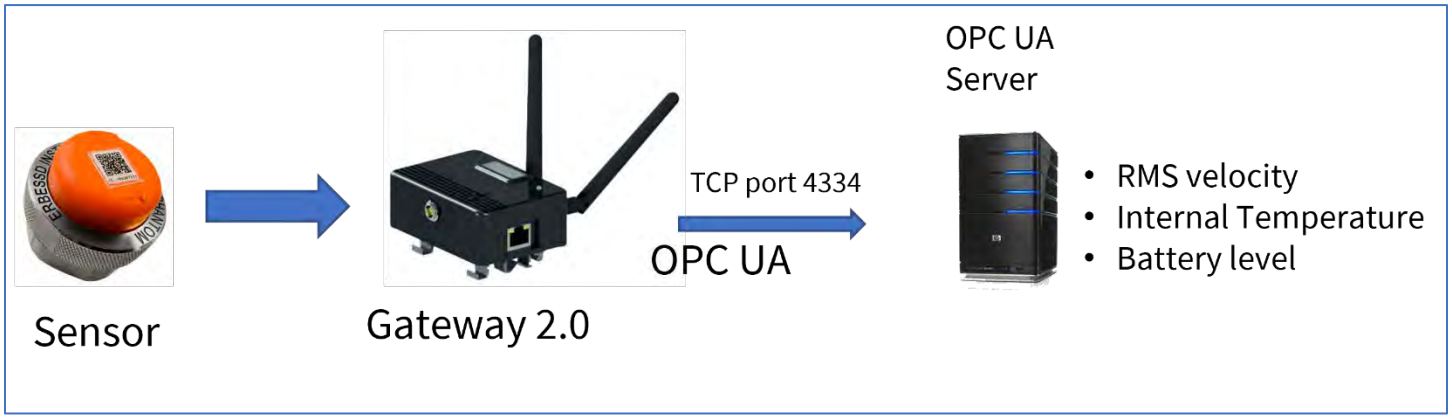
https://www.erbessd-instruments.com/gateway-2-0-mqtt-support/

## OPC UA

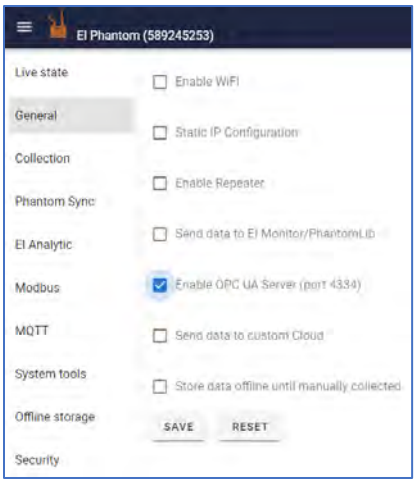
Phantom Gateway version 2 supports the OPC UA industrial protocol. All sensor *processed* data is available through OPC. Subordinate gateways forward OPC data to the Main gateway for connection to the OPC UA server.

**Note** - Due to how the OPC UA protocol works, the full time waveform or FFT is not available.

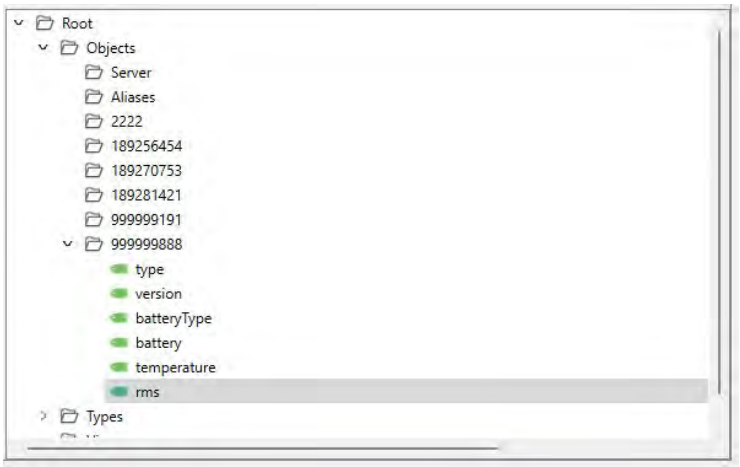
The gateway acts as a OPC UA server and listens for TCP connections on port 4334.



To activate OPC UA, simply check the box in the General tab of the Gateway Admin Console.




- You can use the OPC UA server at the same time as any other protocol supported by the gateway, including EI Analytic, EI Monitor, MQTT and Modbus.
- After the OPC UA server has been enabled you can access the server using the following URL format with a OPC UA client: opc.tcp://192.168.1.2:4334/UA/PhantomGW, where 192.168.1.2 is replaced by the IP Address of your gateway. Use Security Mode none and Security Policy None.
- The OPC UA is organized in a tree like structure. For the Phantom Gateway Under the root folder is an Object folder, under which all the sensor serial numbers will be shown. Under each serial number there will be a number of different variables depending on the sensor type.




OPC messages contain the following standard fields:

| Variable Name | Description |
|---|---|
| **type** | Sensor type |
| **battery** | Battery level in volts |
| **batteryType** | Battery type. 1/6D (1), AAA(2), CR2032(3), CR2477(4) |
| **temperature** | Sensor internal temperature (in Celsius) |
| **version** | Firmware version |

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OPC messages also contain the following metrics, calculated in the gateway for each full time waveform measurement received:

| Variable Name | Description |
|---|---|
| **ACF** | Acceleration crest factor |
| **APEAK** | Max acceleration amplitude seen in the timewave form |
| **ARMS** | RMS over the whole acceleration spectrum |
| **DCOFFSET** | This is the acceleration constant, i.e., gravity, included in the acceleration |
| **HIGHFREQ** | Acceleration measured from 5khz to 10khz |
| **MAX FREQ** | Peak frequency in Hz |
| **VRMS** | The Velocity RMS value measured from 10Hz to 1KHz |

The VRMS value is derived from an in-sensor calculation of the spectrum from 10 to 1KHz (hard-coded). The interval is set via the In-sensor settings **Sensor Update** interval as administered from the Gateway Admin Console.

For more details regarding OPC UA, visit the Erbessd website at:

https://www.erbessd-instruments.com/elementor-10128978/

## Phantom Gateway Gen2 Management API

The Phantom Gateway Gen2 Management API supports multiple languages and provides full access to all features and controls of the Gateway Gen2.
The Gateway's administration console web page uses the same API, so anything that can be done using the admin GUI can also be done through the API. This includes:

- changing Gateway settings
- observing all sensors current state
- changing sensor configuration
- requesting on-demand time waveforms from vibration sensors
- etc.

The management API is accessible either through a web socket connection directly to the gateway IP address, or using a MQTT broker, to which the gateway connects.


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## Web Socket interface

The gateway has a web socket interface at the following url:

ws://GATEWAY-IP-ADDR/realtime

Connecting to this URL using a web socket client library allows the receipt of updates from the Gateway as well as issuing commands to it.

Upon connection, the gateway will start sending messages to the client with the following websocket interface format:

```
{
    "type": "stateupdate",
    ...
```

All messages are in JSON format and all start with a *type* property. How the message is to be handled on the client side depends on this *type* property.

The very first message the gateway will send has *type* "stateupdate". This contains the complete gateway internal state in the "payload" property.

Subsequently, the Gateway will start sending message with *type* "statepatch". These messages contain a JSON Patch (RFC 6902) that needs to be applied to the original state send in the "stateupdate" message. This will keep the gateway state up to date without sending the complete state every time.

Commands that have the following general format can be sent to the Gateway:

```
{
    "type": "observeerequest",
    "phantomcode": "189281421",
    "action": "signal"
```

The message is sent over the websocket in JSON format. The *type* always need to be "observeerequest".
Then the parameters change, depending on the action. The above example requests a time waveform measurement from the sensor serial number 189281421.


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## MQTT Interface

The Gateway can be configured to connect to an MQTT broker, allowing the management API to be used to publish messages to this MQTT broker from a client. Please ensure the "Allow Gateway management through MQTT" setting in the Gateway's MQTT config is enabled.

Unlike the web socket interface, the gateway won't automatically publish it's state continuously. But it can be requested to publish the following JSON message to the same topic as the Gateway is configured:

```
{
    "type": "observeerequest",
    "action": "getstate",
    "gwSerial": 589245105
```

All messages to the Gateway, unlike the web socket interface, must include the "gwSerial" property with the serial number of the gateway receiving the message. This is necessary as there maybe multiple gateways subscribed to the same topic.

## The State Object

The gateway maintains its internal state and of its sensors in a single object that can be accessed using the management API.

The basic structure of the state object is as follows:

```
{
    "nodes": {
    },
    "deviceInfo": {
    },
    "phantomSync": [
    ],
    "basicconfig": {
    }
```

The "nodes" property contains objects with information on all the sensors that the Gateway is seeing (or has seen).

The "deviceInfo" property contains information on the running state of the Gateway itself. The

"phantomSync" property is an array of all Phantom Sync groups.


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The “basicconfig” property contains configuration for the Gateway.

Inside the “nodes” property is a list of all sensors the gateway has seen. The following is an example from a vibration sensor:


```
        "189281421": {
            "lastseqchange": 1679600932675,
            "advdatav2": {
                "company_id": 65535,
                "phantomCode": 189281421,
                "version": 183,
                "type": 3,
                "canForceUpdate": true,
                "cmd": 1,
                "gw2adv": true,
                "canupdateSettings": true,
                "candownloaddata": true,
                "seq": 1,
                "advFlags": 7,
                "batteryType": 1,
                "battery": 3.28,
                "temperature": 30.75,
                "updateInterval": 3600,
                "txPower": 8,
                "minRMSFreq": 14,
                "maxRMSFreq": 1000,
                "rms": [
                    0.52,
                    0.24,
                    0.19
```



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```
        ],
        "range": 8,
        "recordingSettings": 0,
        "gw1Disabled": true,
        "advertisingEnabled": true
    },
    "phantomCode": 189281421,
    "type": 3,
    "version": 183,
    "rssi": -50,
    "ch_index": 34,
    "lastseen": 1679600932676,
    "isDFUmode": false, "hasupdate":
    false, "actions": {},
    "bootloaderadvdata": {
        "company_id": 65535,
        "version": 183,
        "type": 3,
        "lastseen": 1679600922081
    },
    "lastcollection": 1679600904167,
    "lastManualCollection": 1679589071263,
    "bledevice": {
        "ble_addr": {
            "type": "Buffer", "data": [
                133,
                148,
                84,
                69,
                29,
                238
            ]
```




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```
            },
            "rssi": -50,
            "ch_index": 34
        },
        "settings": {
            "isFavorite": true,
            "isPaired": true, "timed": {
                "collectionMode": "global",
                "collectionInterval": 6,
                "collectionUnits": 3600,
                "timeArray": []
            },
            "alarms": {
                "enabled": false,
                "waitAfter": 12,
                "waitAfterUnits": 3600, "rms": [
                    0,
                    0,
                    0
                ],
                "rmsLevel2": [ 0,
                    0,
                    0
                ],
                "alarmCount": 1,
                "enabledLevel2": false
            },
            "trigger": {
                "type": "none",
```




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```
                "phantomCode": "",
                "waitAfter": 12,
                "waitAfterUnits": 3600,
                "channel": 0,
                "min": 0,
                "max":  0, "dryState":
                "closed", "transient": false
            },
            "triaxialRecording": { "custom":
                true, "mode": "triaxial",
                "axis": "x", "sampleRate":
                12800,
                "range": 8,
                "samples": 2
            }
        }
    },
```


The “lastseqchange” property is expressed in milliseconds since 1970, in the gateway’s time, when the “seq” property of the sensors last change. This tells you when was the last time the gateway update it’s internal measurement.
The “lastseen” property is also expressed in milliseconds since 1970 and gateway’s time. This represents the last time the sensor was seen by the Gateway’s Bluetooth radio.

The “phantomCode” property contains the sensor serial number.


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The “type” property contains the sensor type according to the following table:

| | |
|---|---|
| 3 | Vibration Triaxial high range |
| 5 | Vibration Triaxial low range |
| 6 | Vibration Triaxial low range, different internal accelerometer |
| 7 | All in one sensor |
| 10 | Thermal camera |
| 30 | Current sensor |
| 32 | Current sensor v2 |
| 40 | Speed sensor (RPM) |
| 20 | Thermocouple temperature sensor |
| 21 | Thermocouple temperature sensor v2 |
| 25 | Infrared temperature sensor |
| 31 | Dry contacts sensor |
| 26 | 4-20mA general purpose sensor |
| 27 | 0-10v sensor general purpose sensor |
| 60 | -2v to 2v high speed sensor |

The “version” property contains the version of the sensor firmware.

The “rssi” property contains the signal strength of the sensor. The following is a rough guidance on signal strength:

Up to -55 is excellent.

From -56 to -75 is good.

From -76 to -85 as is ok.

And from -86 and up is bad.

The “isDFUmode” property is a Boolean that if true, indicates that the sensor is currently in DFU (device firmware update) mode. This means that a device firmware update can be initiated. This mode is entered for a few seconds after the sensor is reset with a magnet. Or the Gateway can put the sensor in this mode if an update is required.

The “hasupdate” property means there’s a newer firmware for this sensor that can be applied.

The “lastcollection” property indicates the last time a time wave form was downloaded from this sensor.

The “advdatav2” contains the information that is in the advertising package of the sensor. It contains the following properties:

“seq” this property is a number that the sensor updates every time it takes a measurement internally. It wraps around after 255.


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"batteryType": Contains the battery type of the sensor according to the following table:

| | |
|---|---|
| 1 | 1/6D |
| 2 | AAA |
| 3 | CR2032 |
| 4 | CR2477 |

"battery": Contains the battery voltage.

"temperature": Contains the internal sensor temperature, in Celsius. "updateInterval":

Contains the sensor internal measurement update interval. "txPower": Contains the sensor

radio power, can be 0db, 4db or 8db.

The "settings" property contains settings that are stored in the gateway for this sensor. It contains the following properties:

"isFavorite": A Boolean indicating if the sensor is market as favorite in the Gateway GUI.

"isPaired": A Boolean indicating if the sensor is paired to this Gateway. The Gateway will only send data of paired sensors to a number of services, such as EI Monitor, EI Analytics and MQTT.

"timed": This propert contains configuration on how to collect time wave forms based on time. It contains the following properties:

"collectionMode": It can be either "global" to follow the global configuration. "interval" this will override the global configuration with a local to this sensor interval. "timeoftheday" will override the global configuration with a local list of times to capture waveforms. "disabled" will completely disable time-based waveforms collection for this sensor (but will allow alarm, trigger or manual collections).

"collectionInterval": The interval in which collection will happen for this sensor if the collectionMode is set to "interval", see below for units.

"collectionUnits": The units in seconds for the "collcetionInterval" property. Can be 60 (minutes), 3600 (hours) or 86400 (days).

"timeArray": An array of strings in the format "HH:ss" indicating the times of the day (in 24hour format in which collection will happen if "collectionMode" is set to "timeoftheday"

"alarms": Contains the alarms settings, it contains the following properties: "enabled:" A

Boolean indicating if alarm based collection is enabled.

"waitAfter": The time the alarm will be ignored after it was triggered once.

"waitAfterUnits": The units in seconds for the "waitAfter" property. Can be 60 (minutes), 3600 (hours) or 86400 (days).


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"rms": An array of three elements that indicate the alarm levels in mm/s for each of the axis of a vibration sensor.

"rmsLevel2": An array of three elements that indicate the alarm level 2 levels in mm/s for each of the axis of a vibration sensor.

"alarmCount": The number of times the alarm has to be maintained (in sensor update interval times) for the alarm to actually trigger (to avoid transient events triggering the alarm).

"enableLevel2": Boolean indicating if alarms level 2 are enabled. "trigger": Contains

the triggers options as follows:

"type": Can be either "none" to disable triggering, "current" to use a current sensor for triggering. "rpm" to use a rpm sensor for triggering or "gpio" to use a dry contact sensor.

"phantomCode": The serial number of the sensor that will be used for triggering. The sensor has to be of the appropriate type for the trigger type.

"waitAfter": How long to ignore the trigger condition if it keeps presenting after triggering once.

"waitAfterUnits": The units in seconds for the "waitAfter" property. Can be 60 (minutes), 3600 (hours) or 86400 (days).

"channel": Channel to use for triggering for current or dry contact sensors. "min" and

"max": Indicate the window for the current or rpm triggers.

"dryState": What state to trigger for the dry contact sensor, can be "open" or "closed".

The "deviceInfo" property contains running information about the Gateway, it can contain the following properties:

"serialNumber": Contains the Gateway serial number.

"version": Contains the main application firmware version of the gateway.

"btVersion": Contains the firmware version of the Bluetooth controller in the gateway. "osversion":

Contains the operating system version of the Gateway.

"btTemperature": Contains the temperature as reported by the Bluetooth controller. In Celsius

"cpuTemperature": Contains the main CPU temperature of the gateway. In Celsius.

"netinfaces": Contains a list of the active network interfaces of the Gateway along with its network settings.

"wifimac": Contains the mac address of the wifi network interface.

"ethmac": Contains the mac address of the ethernet network interface.

"apmac": Contains the mac address of the Gateway wifi network intervace in Access point mode. "uptime":

The gateway update in minutes.



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"totalmem": The total amount of RAM in the gateway "freemem":

The amount of free RAM in the gateway

## Commands to the Gateway

The gateway can receive a number of commands. If published in MQTT, all messages must include the "gwSerial" property with the serial number of the Gateway.

```
{
    "type": "observeerequest",
    "phantomcode": 189281421,
    "action": "signal"
```

This command will request a time waveform measurement to be taken from this sensor. The request will be pending for the sensor until the gateway has time to actually collect the waveform.

```
{
    "type": "observeerequest",
    "phantomcode": 189281421,
    "action": "cancelsignal"
```

This will cancel the above request if it still hasn't been serviced

```
{
    "type": "observeerequest",
    "phantomcode": 189281421,
    "action": "updatestate"
```

This command will request an internal measurement state (this updates the internal rms measurement in vibration sensor as well as all measurements in other kind of sensors). You will see a seq increase after this is completed

```
{
    "type": "observeerequest",
    "phantomcode": 189281421,
    "action": "cancelupdatestate"
```

This will cancel the above request if it still hasn't been serviced



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```
{
    "type": "observeerequest",
    "phantomcode": 189281421,
    "action": "sleep"
```

This request will schedule a sleep request to the sensor.

```
{
    "type": "observeerequest",
    "phantomcode": 189281421,
    "action": "cancelsleep"
```

This will cancel the above sleep request if it still hasn't been serviced.

```
{
    "type": "observeerequest",
    "phantomcode": 189281421,
    "action": "forget"
```

Forget a sensor. This deletes all the gateway specific configuration for this sensor.

```
{
    "type": "observeerequest",
    "phantomcode": 189281421,
    "action": "pair"
```

Pair a sensor to the gateway. This will cause the sensor to send data from this sensor to all its configured sources (MQTT, EI Monitor, EI Analytic, etc)

```
{
    "type":
    "observeerequest",
    "phantomcode":
    189281421,
    "action": "unpair"
}
```

Unpair a sensor to the gateway

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```
{
    type: "observeerequest",
    phantomcode: 189281421, action:
    "changesettings", params: {
        general: {
          radioPower: 0, // Values a 0, 4 and 8 (for 0dbm, 4dbm and 9dbm) updateInterval:
          3600, // Interval on which the sensor will update its
internal meassurement
          gw1: false,        // Wherer or not this sensor will connect to a legacy
Gateway v1.
          advertising: true // Wherer this sensor will perform advertising (this is
required to work for GW2)
        },
        // This only applies to triaxial sensors triaxial: {
          minRMSFreq: 10,  // Low frequency filter for internal rms calculation (default
10hz)
          maxRMSFreq: 1000, // High frequency filter for internal rms calculation (default
1khz)
          range: 8,  // Meassurement range 2g, 4g, 8g for low range sensors. 8g, 16g, 32g
for high range sensors
          recordingSettings: 0,  // Internal rms sample rate 0 = 25.6khz, 1 = 12.8khz,
2 = 6.4kHz, 3 = 3.2kHz, 4 = 1.6kHz. Recording time will double with every halving of
sampling rate.
          extRMS: false // extended internal rms calculation false = rms calculation will be
done over 8192 points. true internal rms calculation will be done over 16,384points
        },
        // Current (Amps) sensor settings current: {
          currentProbeType: [0, 0, 0, 0], // Current probe type for all 4
channels

multiplier: [1, 1, 1, 1], // Multiplier for each channel
```


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```
 offset: [0, 0, 0, 0], // Offfset for each channel
        },
        // Settings for -2v to 2v sensor gp: {
          minRMSFreq: 0,  // Low frequency filter for internal rms calculation (default
 10hz)
         maxRMSFreq: 0, // High frequency filter for internal rms calculation (default
1khz)
         velocity: false, // true = Calculate RMS of velocity (assumre it has an
accelerometer connected), false = calculate RMS of voltage
         sensitivity: [0, 0] // Sensitivity for accelerometer in each of two
channels
        }
         }
}
```

Change internal sensor settings. All sensor types support the "general" field. Other sensors have their own settings. Only settings for the particular sensor type should be present.

```
{
    "type": "observeerequest",
    "phantomcode": 189281421,
    "action": "cancelchangesettings"
```

Cancel change settings request if it hasn't been serviced yet.


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```
{
    type: "observeerequest", phantomcode:
    189281421, action:
    "setsensorgwsettings", settings: {
        timed: {
          collectionMode: "global", // Can be global = follow global setup,
"interval" = custom colllection interval for this sensor, "timeoftheday" = custom times to
collect for this sensor, or "disabled" do not do any timed collection for this sensor.
          collectionInterval: 6, // Interval
          collectionUnits: 3600, // Units for the interval in seconds timeArray: [], //
          An array of times in the "HH:ss" format for time of
the day collection (24hour format)
        },
        trigger: {
          type: "none", // trigger type "none", "current", "rpm", "gpio" phantomCode: "", //
          phantom code of the node to be used for trigger waitAfter: 3600, // Time to ignore
          the trigger after it has been done
once
waitAfterUnits: 60, // Wait units of the waitAfter in seconds channel: 0, // Channel for
GPIO and current triggers
min: 0, // Window for triggering for current and rpm triggers
         max: 0,
         dryState: "closed", // "closed"/"open" state for triggering for gpio
sensor
         transient: false // true: For gpi otrigger: trigger all sensors on single click
even if the state doesn't hold
        },
        alarms: {
         waitAfter: 3600, // Time to ignore alarm condition after it has been
triggered
         waitAfterUnits: 60, // Units of the above in seconds enabled:
         false, // Trigger level 1 enabled
```


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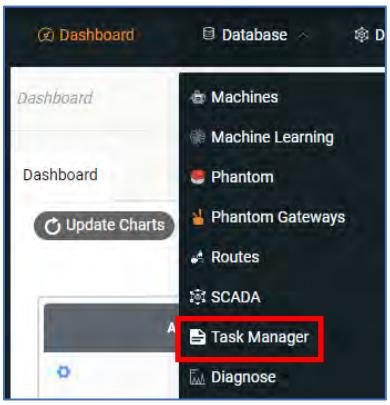
```
          rms: [0, 0, 0], // Array for alarm level 2 on mm/s
          rmsLevel2: [0, 0, 0], // Array for alarm level 2 on mm/s
          alarmCount: 1, // Number of times the alarm has to show up for it to be
triggered
          enabledLevel2: false // Alarm level 2 is enavled
        },
        triaxialRecording: {
          custom: false, // Wherer this triaxial sensor has custom collection
settings
          mode: "triaxial", // Mode "triaxial" or "singleaxis" axis: "x", //
          If single axis select axis "x", "y", "z" sampleRate: 25600, sample
          rate 25600, 12800, 6400, 3200
          range: 8, // Range 2, 4, 8 for low range, 8, 16, 32 for high range samples: 0 // 0
          = normal samples 1 = extended samples
        },
      }
        }
```

Change settings for this sensor inside the gateway (these settings are stored in the gateway, rather than the previous ones that are stored in the sensor).

## EI-Analytic Task Manager

Task Manager is a notification engine for EI-Analytic cloud data service accounts. Email and Push notifications can be configured to be sent when certain configurable conditions of the Machine or Phantom Sensor exist. Task Manager is not available when a local database is used.

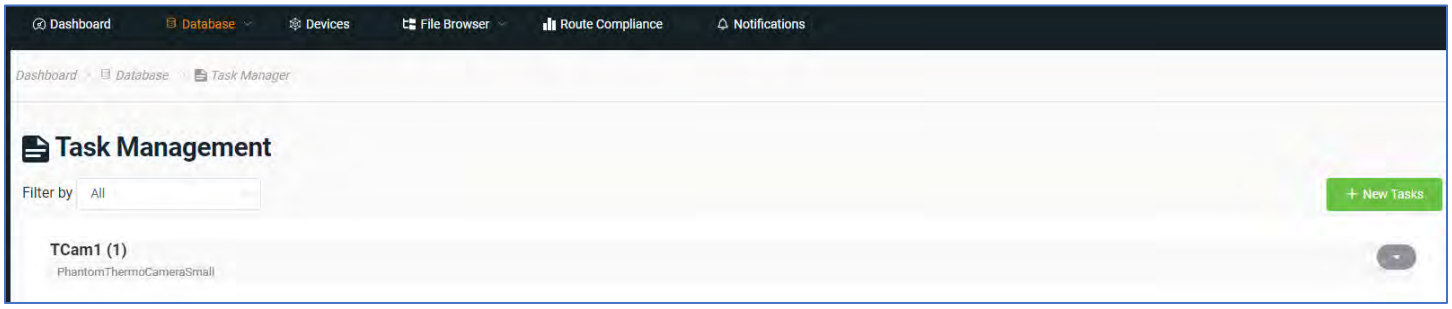



Tasks are assigned at two levels of the database, Machine level or Phantom (point) level.

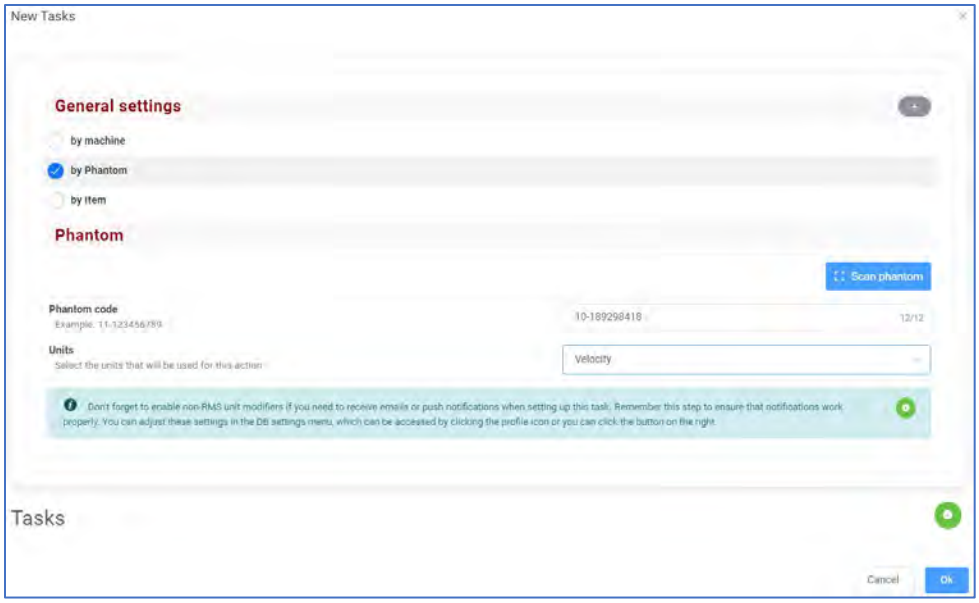
This section includes information regarding Phantom tasks. For details regarding Machine tasks, see the *Setting Tasks for Machines* section of this guide.

Task Manager is accessed through the Database Menu of the EI-Analytic dashboard. **Note** - Only the prime account login can access the Task Manager feature.

The Task Management window shows all existing Tasks. Click on a task to edit. Press + New Tasks to create a new task.




In General Settings assign the task to either a Machine, an individual Phantom sensor, or by item:



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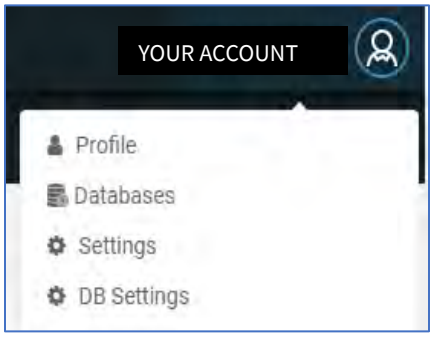
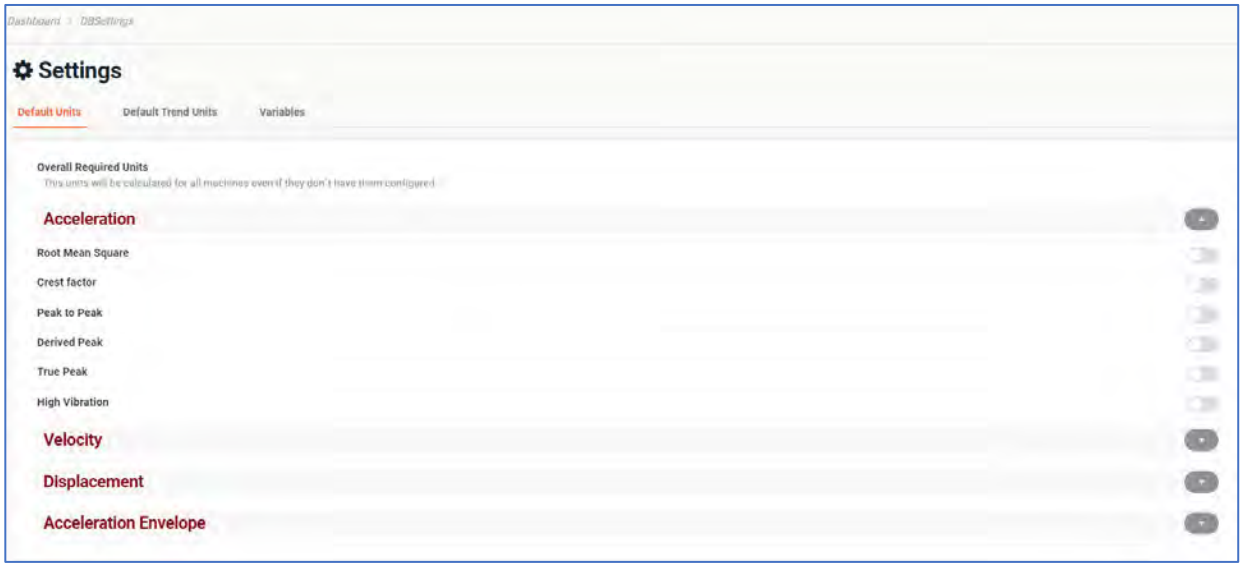
When **by Phantom** is selected, either scan the sensor or enter the serial number in the **Phantom code** field. Depending on the type of sensor, the **Units** drop-down field will have all available options. In this example, a V10E triaxial Phantom will have a Task assigned relating to velocity.

**Note** - As per the on-screen tip, If you want to use any unit modifier other than RMS, you must edit the DB Settings of the EI-Analytic account. E.g., you want to receive notification based on a peak-to-peak value instead of RMS.

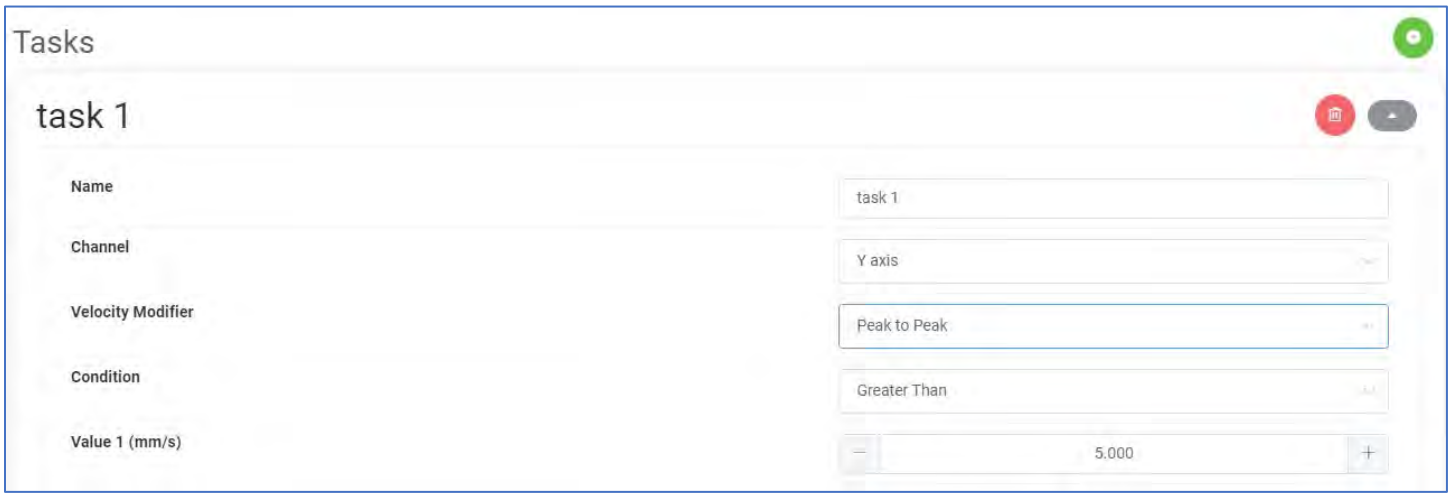
Click the icon to go directly to the DB Settings page, or click the Account settings in the EI-Analytic home page.




Use the sliders to select the unit modifiers you want to use for Acceleration, Velocity, Displacement and AccelerationEnvelope and press **Save**.

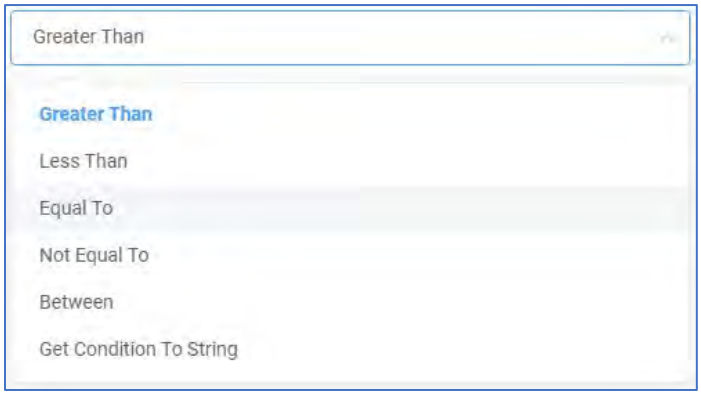



To continue setting the Task, press the button.



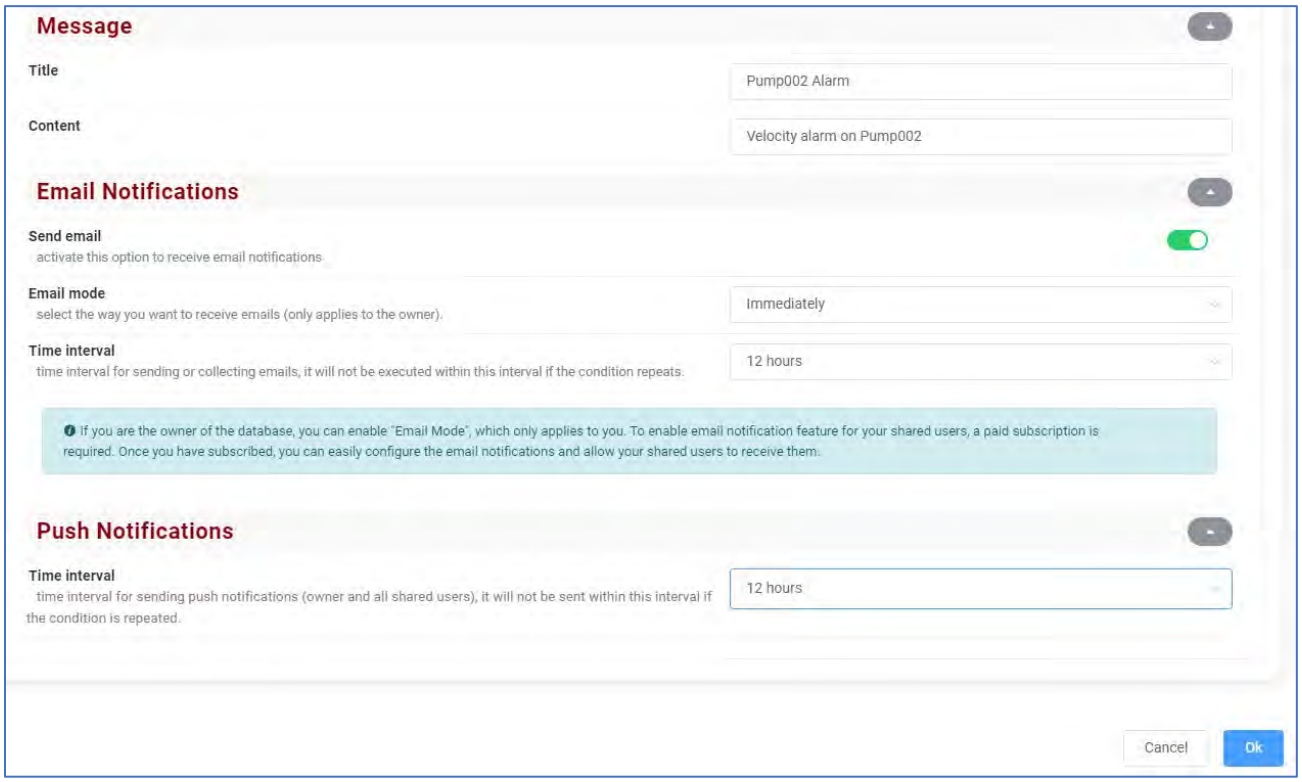

1. In the Tasks Panel, start by assigning the Task a **Name**.
2. Select which **Channel** or all channels
3. Pick the **Modifier** from the drop-down box:

4. Choose a **Condition**:



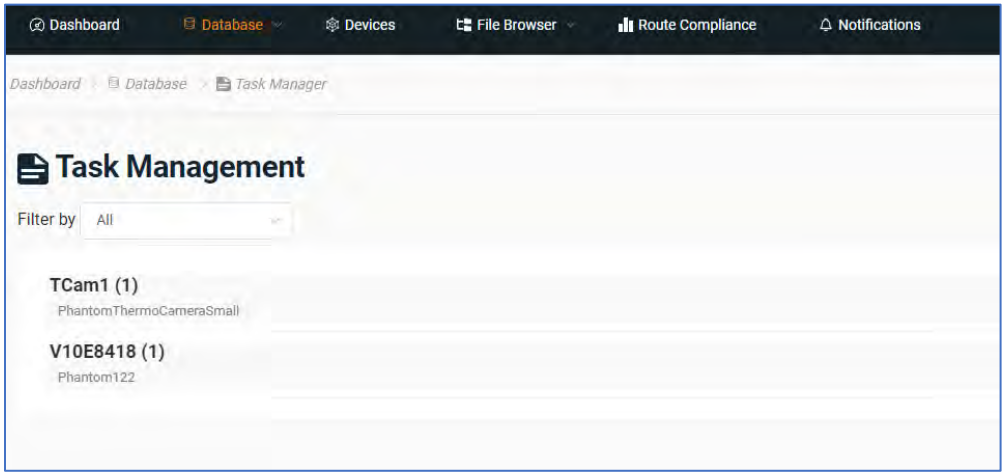

5. Set the **Value**. The units shown reflect the account settings(Imperial vs Metric). In this example a Phantom is to notify the Account if the peak-to-peak velocity exceeds 5 mm/s on the Y axis.

6. In the Message Panel, add the **Title** (displayed in the Task Name field of the email), and the **Content** (shown in the Message field in the email)to help identify which machine/point has experienced an alarm.



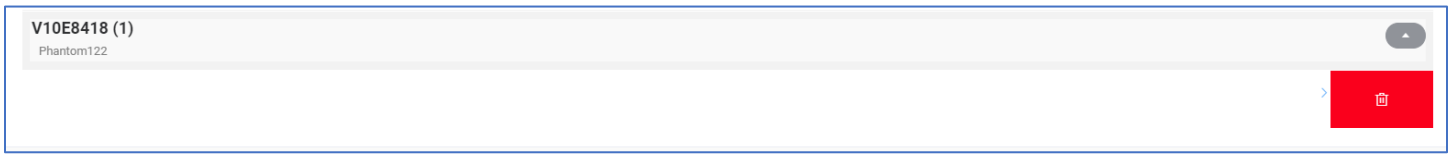

7. The **Send email** slider provides a quick enable/disable option.
8. **Email mode** allows a choice between Batch and Immediately. Batch emails are sent daily (usually between 9 and 10 AM EST).This way, if your notification is not considered to be critical, it can be sent only once a day.
9. The **Time interval** provides a buffer between notifications to avoid unnecessary emails. Push notifications to WiSER VIBE Pro mobile app users likewise has a configurable **Time interval**.
10. Click **OK** to save the Task.

The Task Manager page now shows the new Task, it can be edited or deleted by clicking on it.

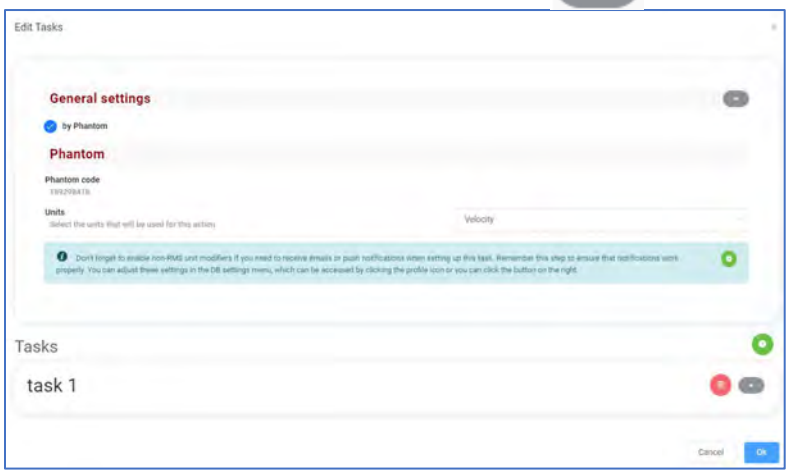


Clicking on the task displays all Tasks assigned to that Machine or Phantom.

Press the blue right arrow > to access the delete option.




To edit this Task, just click on the down arrow.




Below is an example email received for a Task assigned to a Phantom Thermographic camera.

# EI-Analytic Diagnose Manager

The Diagnose Manager feature is available to Erbessd EI-Analytic cloud database service accounts.

Diagnose Manager analyzes vibration signal files from Phantom Expert triaxial or WiSER 3X portable sensors and assigns a percentage probability to the possible root cause(s) of the vibration measured.

This tool calculates the probability of the following types of failure(Faults), based on a set of parameters(Rules), including the specific configuration of a Machine and its Points:

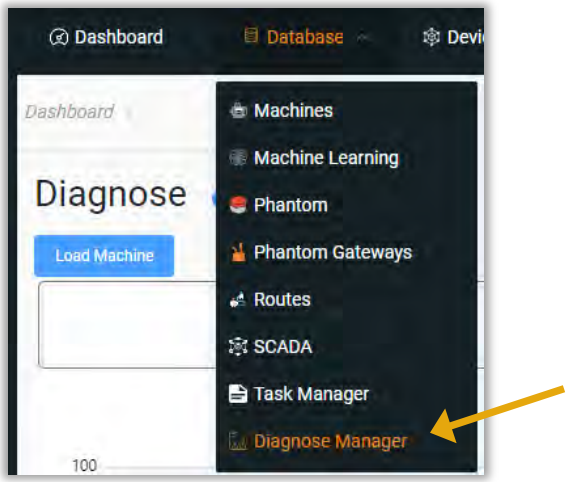
- Static Imbalance
- Couple Imbalance
- Dynamic Imbalance
- Parallel Misalignment
- Angular Misalignment
- Bent Shaft
- Bearing Fault: Stage 2, 3, 4.
- Cocked bearing
- Bearing Looseness

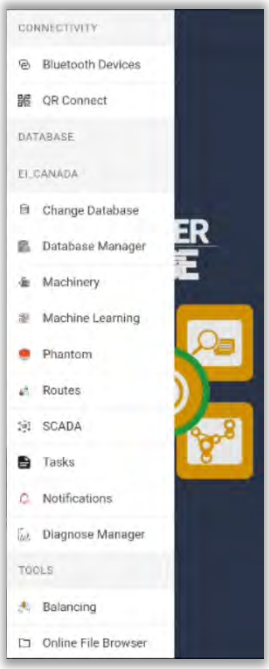
For each parameter, certain conditions must be met to a greater or lesser extent, which is reflected in the Diagnostic evaluation.

Diagnose Manager also allows the creation of Custom Faults and associated Rules that can be applied to the machine database. See below for more details.

## Accessing the Feature

Diagnose Manager is accessed from the Database drop-down menu on the EI-Analytic Dashboard. It can also be opened from the Options Menu of the WiSER Vibe Pro mobile app.




Also, links to Diagnose Manager have been added to many screens in EI-Analytic. In the Machine Tree, right-click on any Machine or Point, and an **Auto Diagnose** option is now available. In machine or Point views, as well as the Bad Actor List all now have links to the Diagnose feature.



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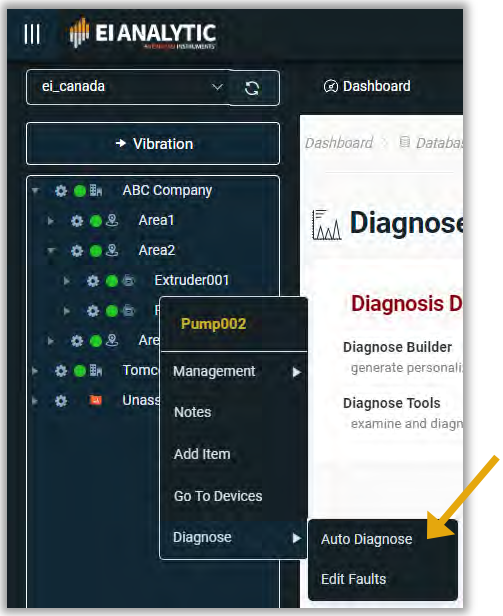
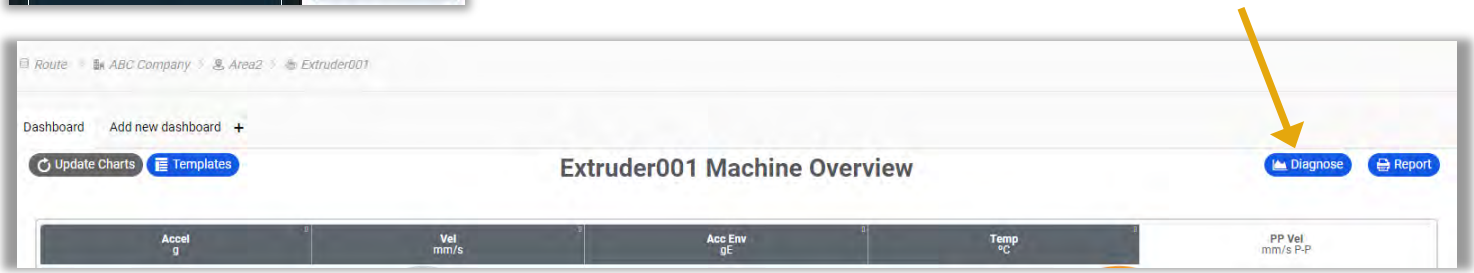


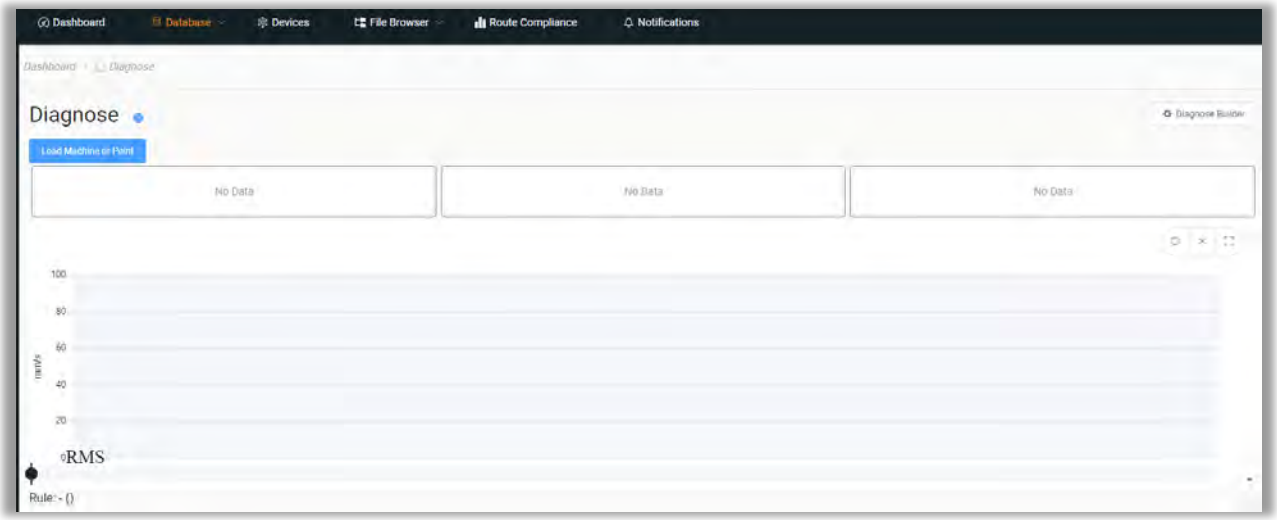



The **Diagnose Management** screen has two functions:

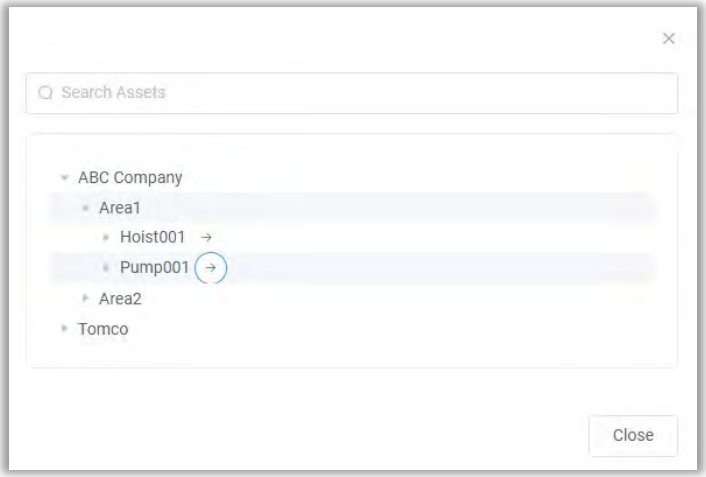
- **Diagnose Builder** – used to create custom rules for diagnostics
- **Diagnose Tools** - Load a machine for diagnostics using defaults or custom values.

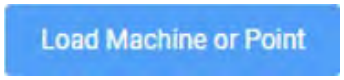
## Diagnose Tools

The Diagnose Tools screen is used to load a Machine Point for analysis and displays the results:




Press the Load Machine or Point button to open the Machine Tree in order to select a Machine or Point for analysis:

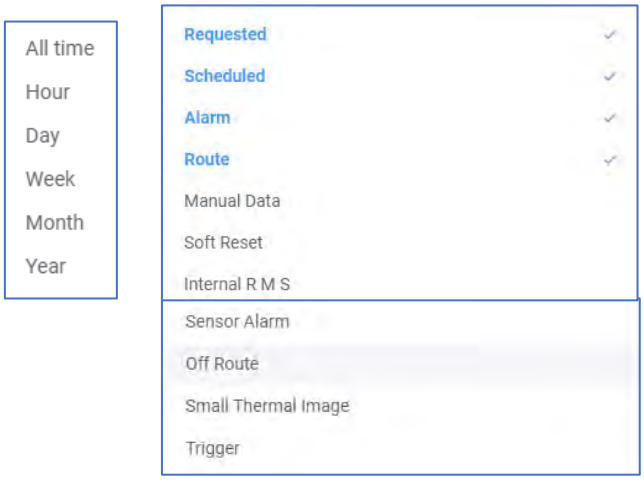


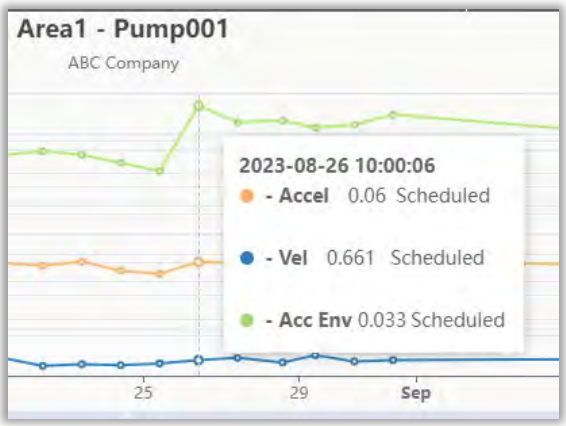
When a Machine/Point is selected, the default display shows a trend graph with data for the past 30 days.

**Toggle on/off**

**Date Range**




- To change the period, click on the drop-down menu:
- To filter the reason(s) for data collection, use the center drop-down menu.
- To change the date range, click on the Blue right/left buttons.
- Hover the mouse pointer over any point in the graph to see values for Acceleration, Velocity, and Acceleration Envelope. Each can be toggled on or off by clicking the top of the tile.



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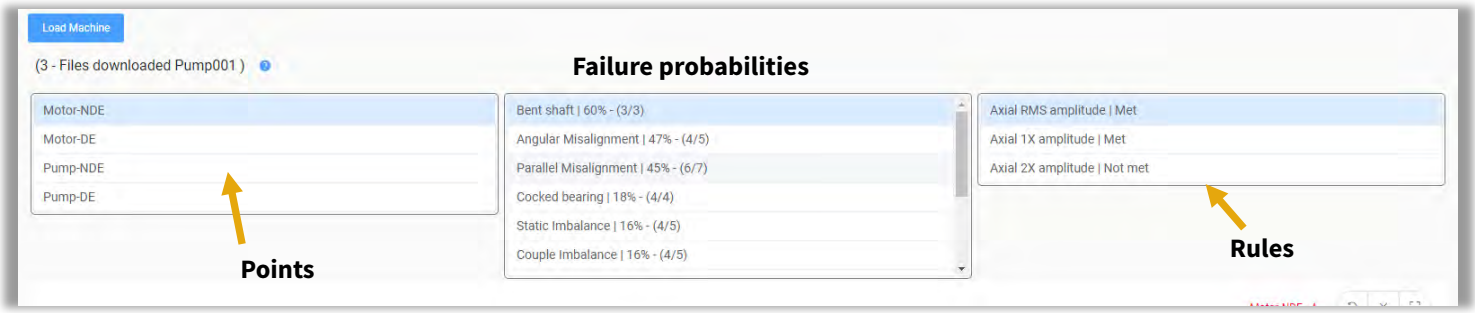
As the Help pop-up states:

Click on any point in the trend graph to open the Diagnostic results and the FFT.




Results are listed by Machine Point. **Note** -The **H** axis is always used for trends and fault diagnosis.

A list of faults and their probability are shown, based on analysis. The Rules used are listed in the right panel. Click on a Rule to see the results in the FFT, with more detail displayed at the bottom of the screen, including the default operators and values used.

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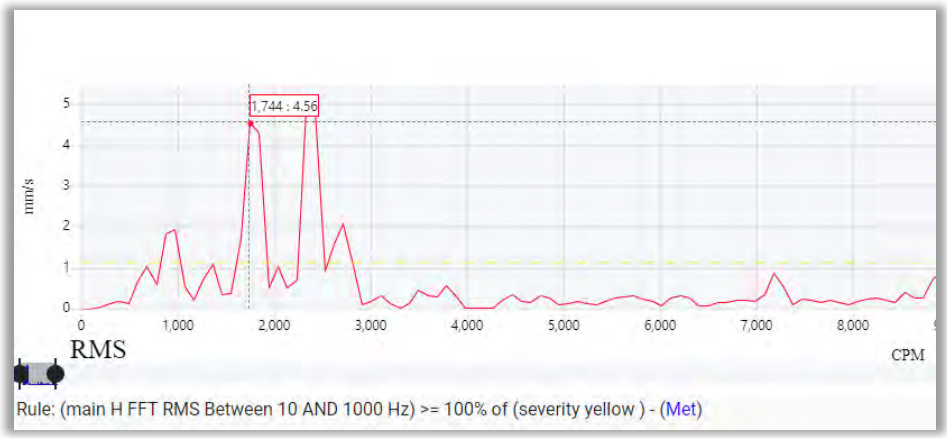
The FFT can easily be zoomed by using the slider tool at the bottom

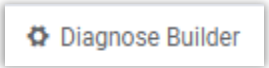
Hover the mouse over any point in the FFT to see the values for x and y axes.



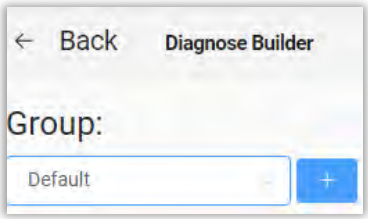

**Note** the X Axis of the FFT is only displayed in CPM, and the Y-Axis only in Metric units at this time.(irrespective of account settings).

## Using Diagnose Builder

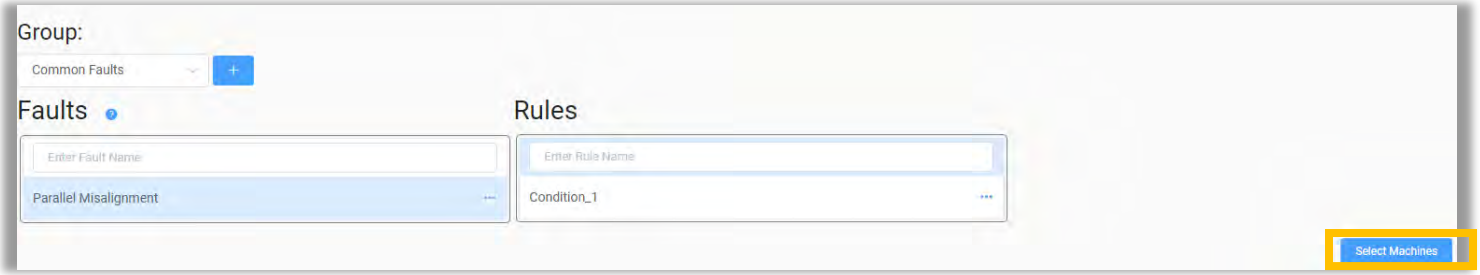
To create custom faults, use the Diagnose builder button on the main Diagnose screen.



- Create a **Group** name for custom Faults by clicking the blue add button.




- **Faults and Rules**: Name the Fault and the Rule for the first condition to met. Click on the checkmark when finished.
- Now select which Machine and Points to apply the Rule using the Select Machines button.



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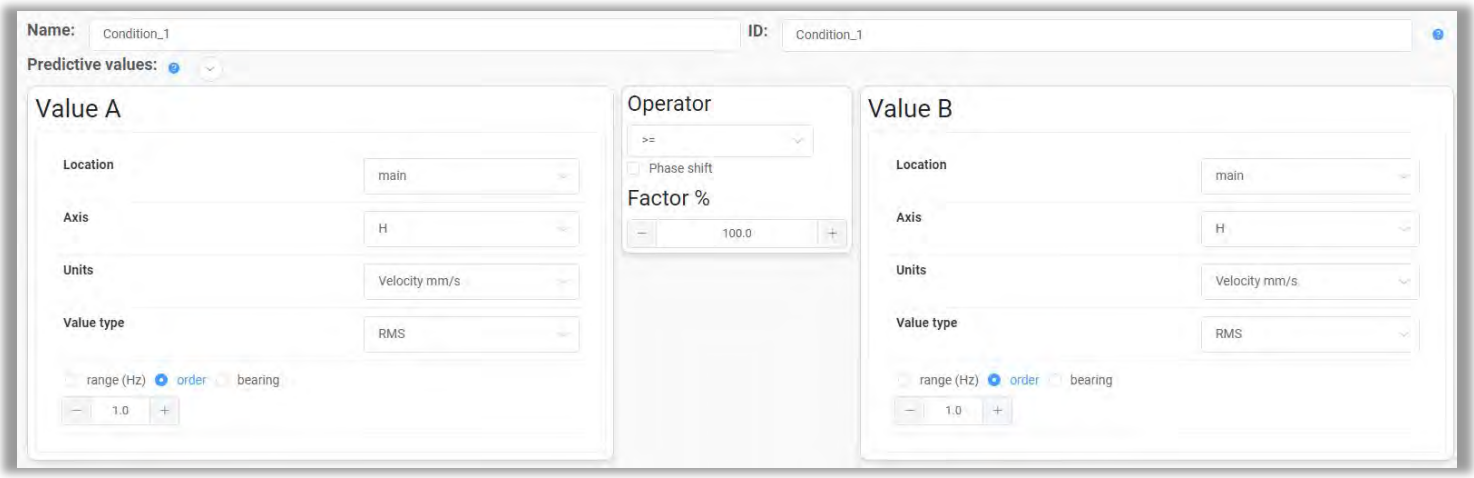
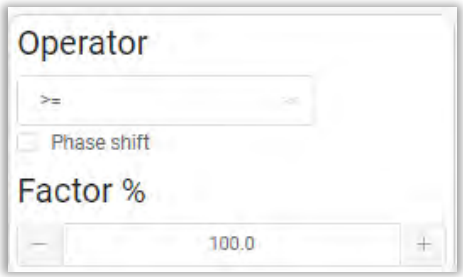
- **Name and ID**: The Name will be used for user reference and ID is used internally to identify the rule.




- **Value A and B** - The equation is composed of two values; both values are taken as reference for comparison and must be configured.
    - **Location –** set to one of three options: 1**)** the point to be analyzed, 2) the complement to compare with, or 3) the coupling between them.
    - **Axis** – Select the axis for the Point to be diagnosed.(the default rules always use the H axis)
    - **Units** – Choose the preferred units.
    - **Value type** - Value of the signal that will be taken as a reference.
    - **Range** – Set the range of frequencies to analyze.
    - **Order** - Select the number of orders.
    - **Bearings** - Choose one or more bearing frequency faults. In case of multiple selections, the highest value will be used.
- **Operator** - used for comparing Value A and Value B. (equal to, greater than, etc)
- **Factor %** - This is a "weighting" factor applied to the result of the comparison of Value A and B. The higher the percentage, the more absolute the comparison between A and B must be to meet the Rule.




Press

to complete the custom Fault and Rule configuration.

**For further information, please contact the Erbessd Instruments support team.**



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# WiSER VIBE Pro Mobile App

## On Demand Recordings from Phantoms

There may be situations when immediate recordings are desired from a Phantom sensor. On-demand recordings can be requested from the Gateway Admin Console, or by using the magnetic key to manually reset the sensor, causing it to send an immediate recording.

Immediate on-demand recordings can also be generated using the WiSER VIBE mobile app. This mobile app was developed for use with the WiSER 3X portable triaxial sensor to perform Routed data collections. The app is a versitile tool with all the features of EI-Analytic, adapted to hand-held devices using iOS or Android.

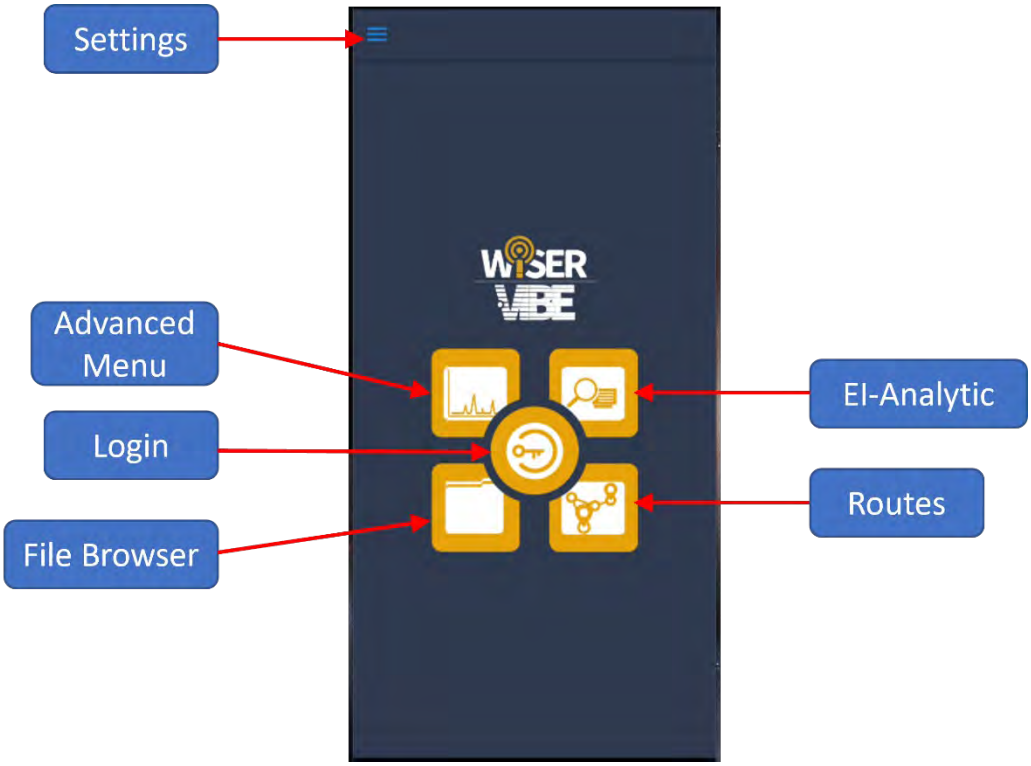
Recording files are saved on the mobile device and can be uploaded directly from WiSER VIBE to the EI-Analytic cloud service (if the sensor is registered in an EI-Analytic database) or emailed from the app to a DigivibeMX user for analysis. WiSER VIBE is a free download for iOS devices from the Apple App Store or the Google Play Store.

To take on-demand recordings from Phantoms:

Download the WiSER VIBE Pro application from the Google Play Store or App Store. Search on Wiser Vibe for quick access.

Install and launch the WiSER VIBE Pro App.

Once installed and opened, the Home screen appears as shown below. Make sure Bluetooth is activated on your wireless device.





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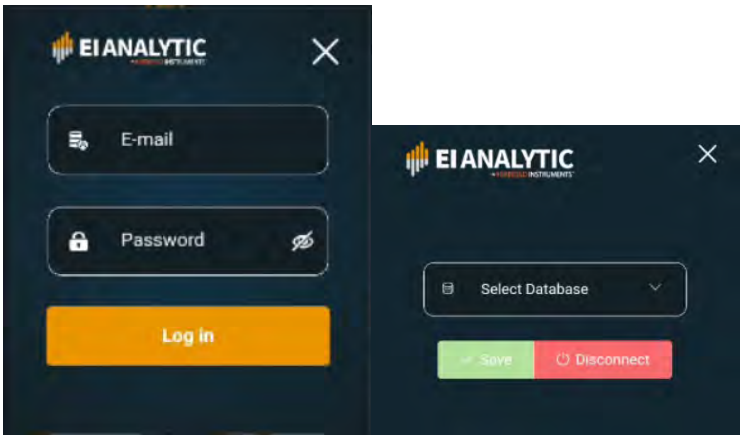
Logging in to your EI-Analytic account is optional to take recordings from Phantoms, however if you have Internet access, you may choose to login:

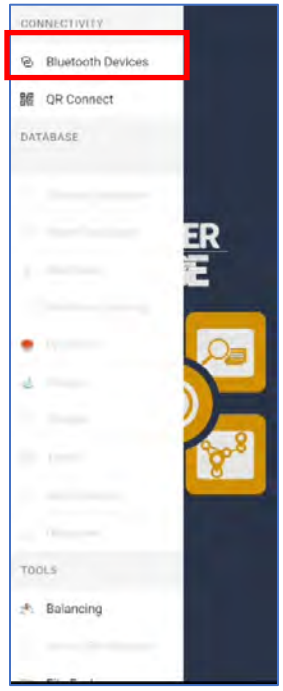
1. Tap the centre of the Home screen to login to your EI-Analytic cloud database.
2. Input your account credentials and press Log in.
3. Select the desired database and press

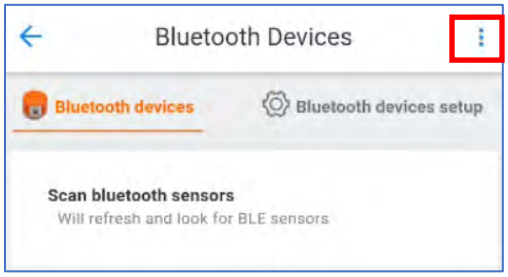



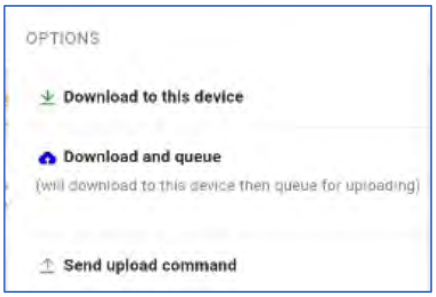

- The Home screen shows a green ring around the Login icon to indicate successful connection to an EI-Analytic database. Your Login credentials will be saved, so subsequent logins will not require entering your Email address and password.
- You <u>must</u> be logged in to your EI-Analytic account to upload files to the cloud database.

## Scan for Phantoms

Tap the Options icon (aka the hamburger) at the top left of the Home screen, and select Bluetooth Devices. Click the Options icon and choose **Download to this device** or **Download and Queue**.



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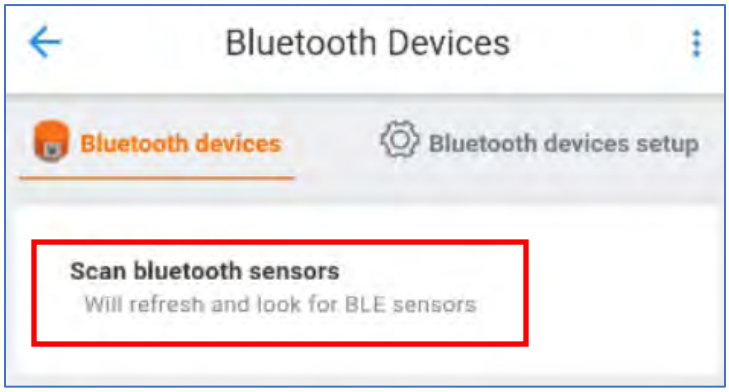
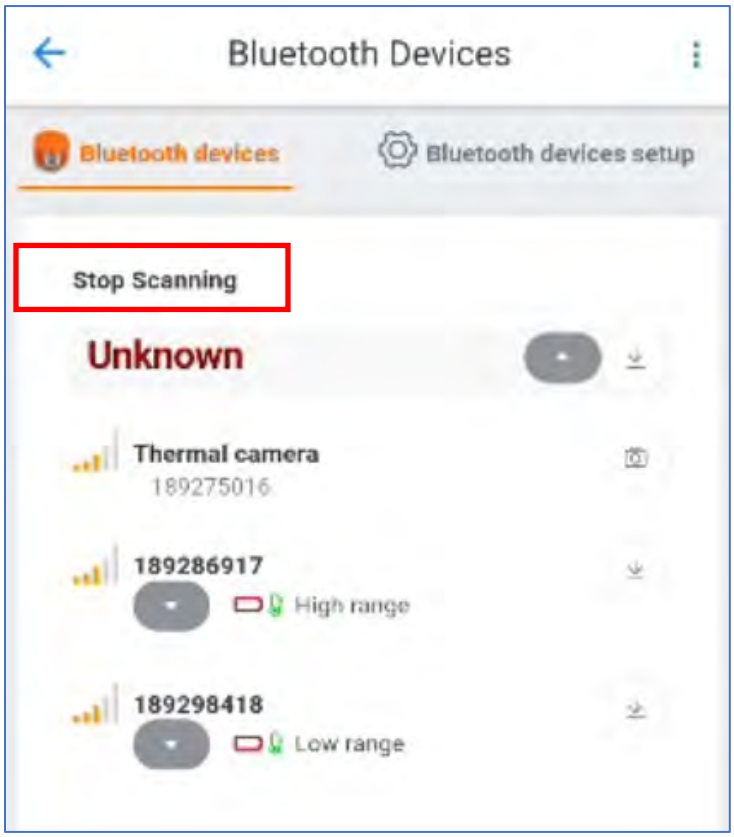
Press Scan bluetooth sensors




Sensors will show as “Unknown” if you are not logged into an EI-Analytic database.

When the desired sensor(s) appear, you can press Stop Scanning.



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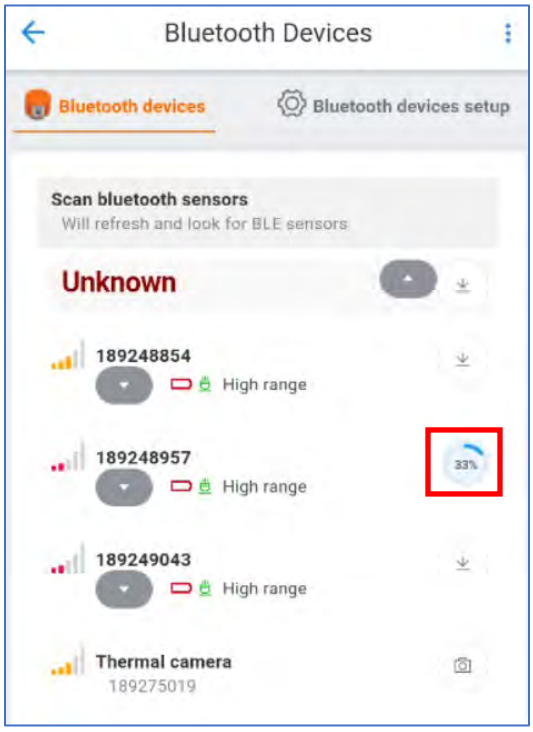
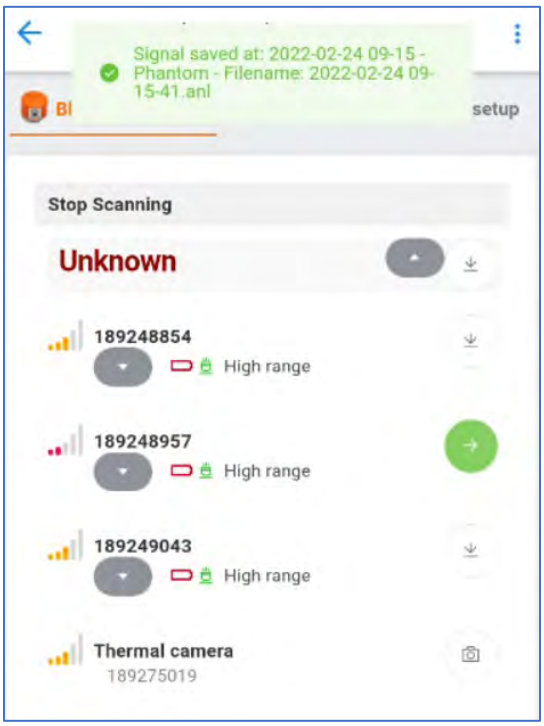
## Collecting Data

Tap the download icon(s) to request a data collection from one or more sensors.

Progress is shown by a percent complete circle that replaces the download icon on your screen.

A message is displayed to indicate a successful data collection. The data is now saved in a file on your device. If you tap the green right arrow, the file will be opened for analysis.





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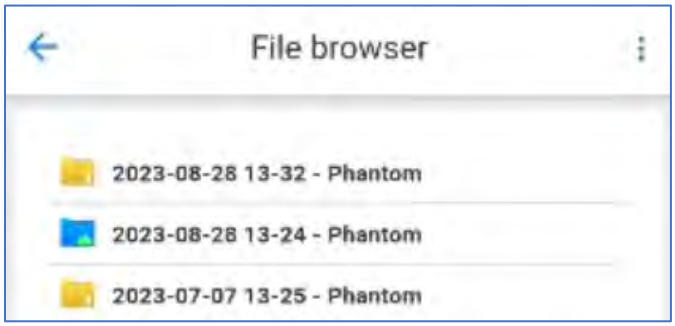
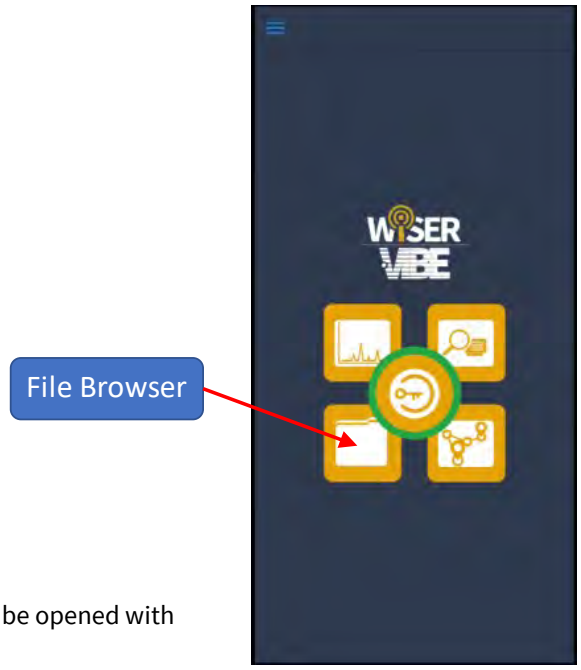
## Uploading files to the Cloud

To upload a recording to the EI-Analytic cloud database:

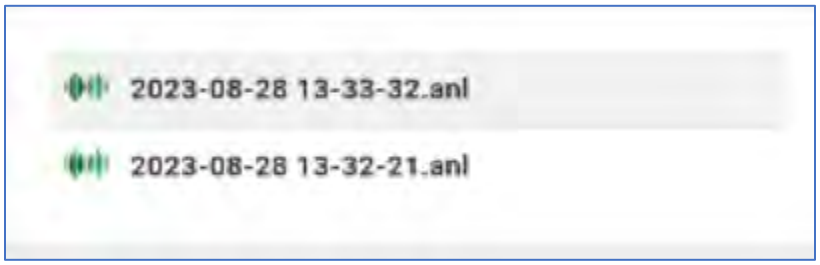
1. Log in to your EI-Analytic account as described above.
2. Open the File Browser from the Home screen:



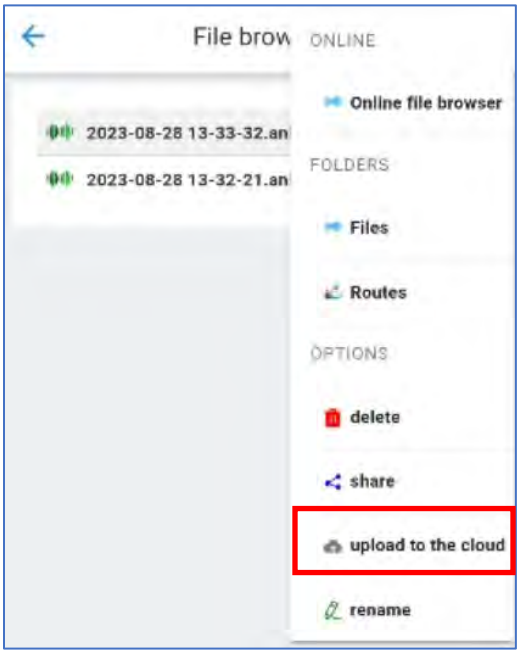




Blue folders have previously been uploaded, yellow folders have not.

3. Click on a folder to view its contents. These .anl signal files can only be opened with DigivibeMX , EI Analytic, or the WiSER VIBE Pro mobile app.




4. Tap the Menu icon ⋮ and select upload to the cloud.



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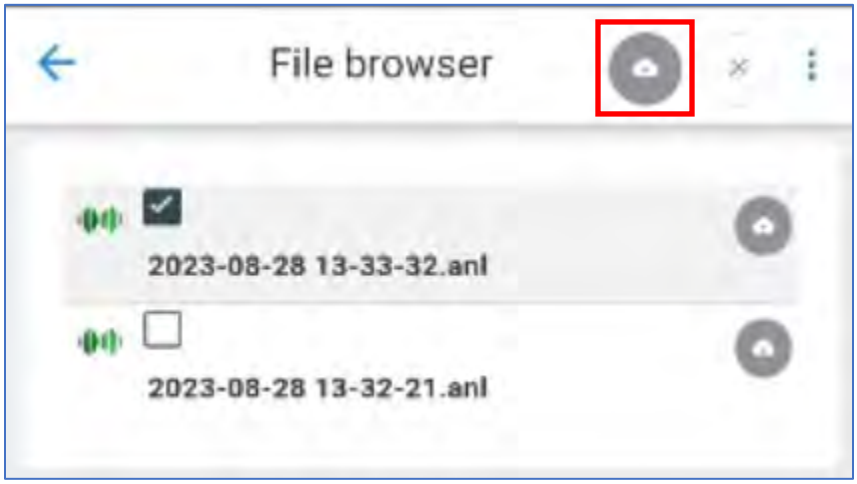
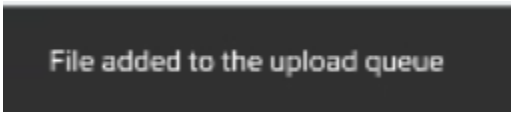
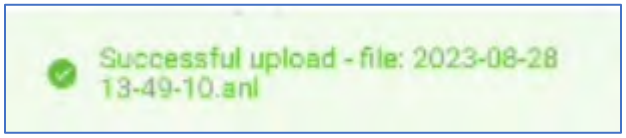
5. Choose the folders you want to upload (will be shown by checkmarks). All files in the selected folder(s) will be uploaded. You can also open folders to select individual files for upload as an option.




6. Tap the cloud icon at the top.
7. A message will be flashed at the bottom of the screen:




8. As the files upload successfully, you will see a message flashed at the top of the screen for each file.




If you do not see a successful upload message, or receive an error message, check to ensure you are logged into EI-Analytic, and are connected to the correct database. If you are logged in, but are receiving error messages, contact Erbessd Technical Support @ 1-877-223-4606, or open a ticket at https://www.erbessd-instruments.com/ticket/ for assistance.

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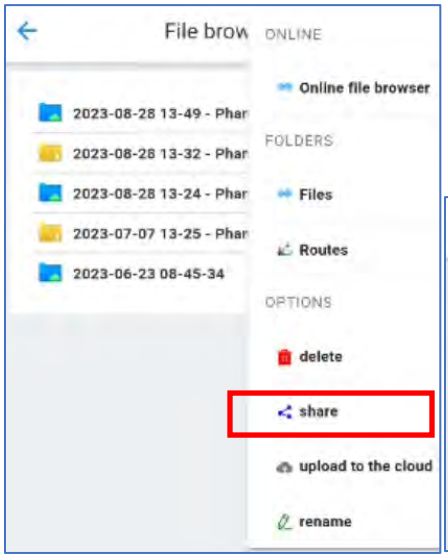
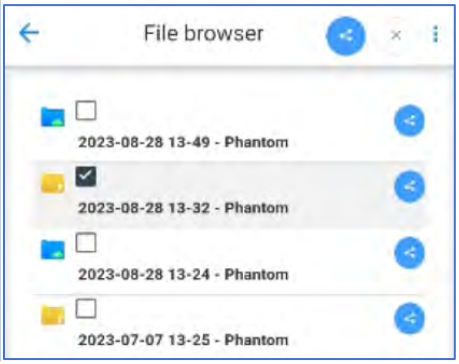
## Sharing Files

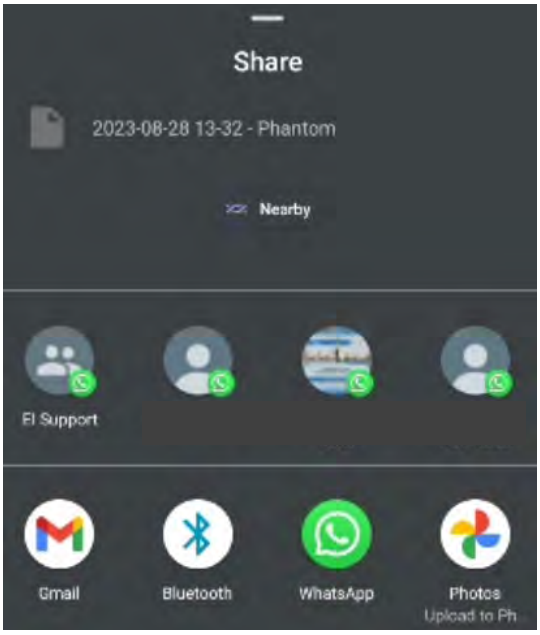
To share data files stored on your device via E-mail, text or other app:

1. Open the File browser menu and select share
2. Select the folder(s) to be shared (shown by checkboxes).
3. Tap the share icon at the top of the screen.

9. The Share screen will open; choose text, email, WhatsApp etc., to send the .anl file(s) as attachments. **Note** - Phantom vibration sensors create data files of approximately 160kb in size. These .anl signal files can only be opened with DigivibeMX , EI Analytic, or the WiSER VIBE Pro mobile app.





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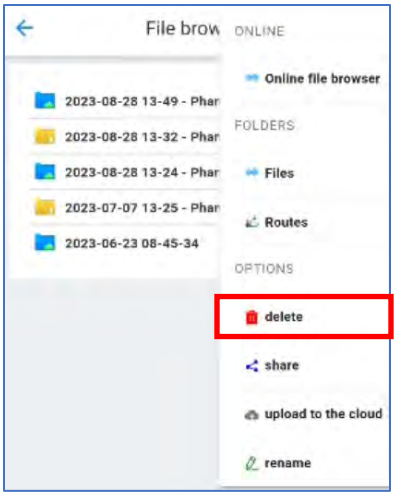
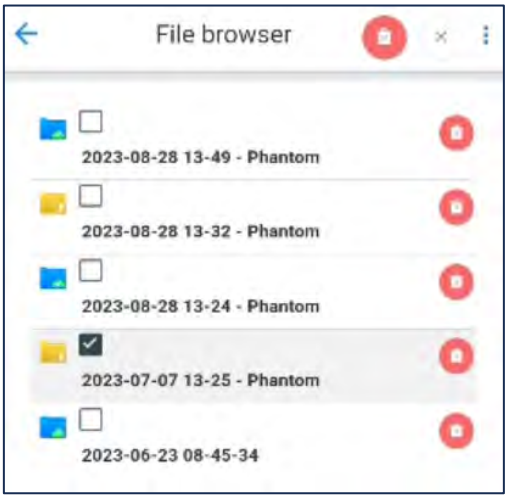
## Deleting Files

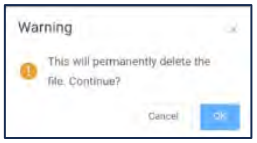
To delete files stored on your device:

1. Open the menu in the File Browser and select **delete**



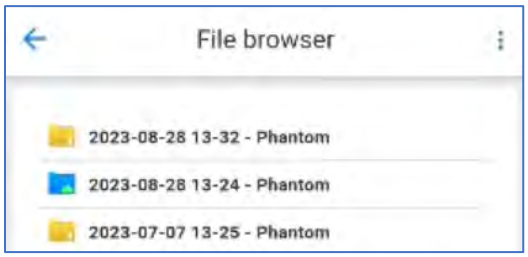



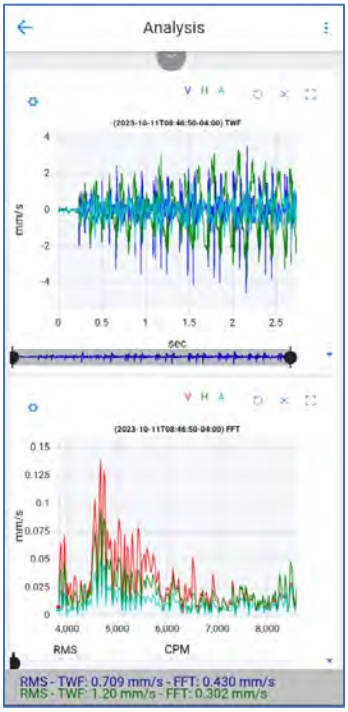

2. Select the folders to be deleted (shown by checkboxes) and press the delete icon at the top of the screen.
3. Confirm by pressing OK on the warning pop-up.




## Open File for Analysis

To open a vibration recording for analysis with WiSER Vibe Pro, select the File Browser from the Home screen. Open the folder and tap on the desired .anl file. The Analysis screen will open, with the Time Waveform and FFT displayed. Many of the same tools used in DigivibeMX, such as Markers, are available in WiSERVIBE Pro. Details regarding analysis are not included in this guide.





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## Contacting Erbessd Instruments Technical Support

If at any point this guide does not answer your questions or resolve an issue, please contact Erbessd Instruments technical support using any of the following methods:

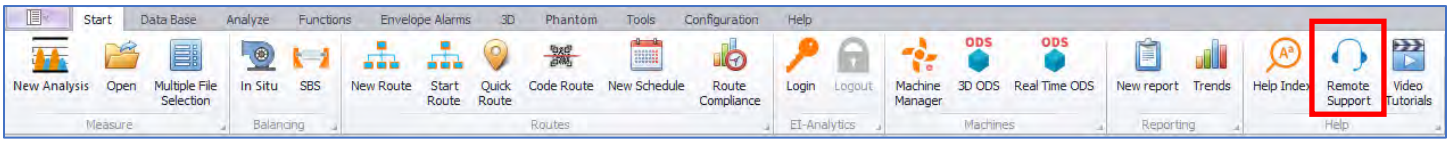
1. Visit our website and leave us a support ticket, to report minor software/firmware/device functionality concerns. Go to www.erbessd-instruments.com. From the Support menu, select Log A Ticket. Or initiate a Live Chat.

2. For more urgent assistance, contact our support team by email at: support@erbessd-instruments.com

3. For the most immediate emergency assistance, contact us by phone at +1 877-223-4606 (International Toll Free)

Erbessd Instruments technical support staff use TeamViewer remote support software to provide real-time remote PC support. A download link for the free QuickSupport version of TeamViewer is provided in the DigivibeMX software.

Click Remote Support on the DigivibeMX Start Menu to download TeamViewer QuickSupport. Allow the program to download, install and launch. Then be prepared to provide the TeamViewer User ID and Password it provides to the responding Erbessd Instruments support engineer.




For additional information on other specific Phantom system configurations and options, please visit the Tutorials section of our website at: https://www.erbessd-instruments.com/erbessd-tutorials/