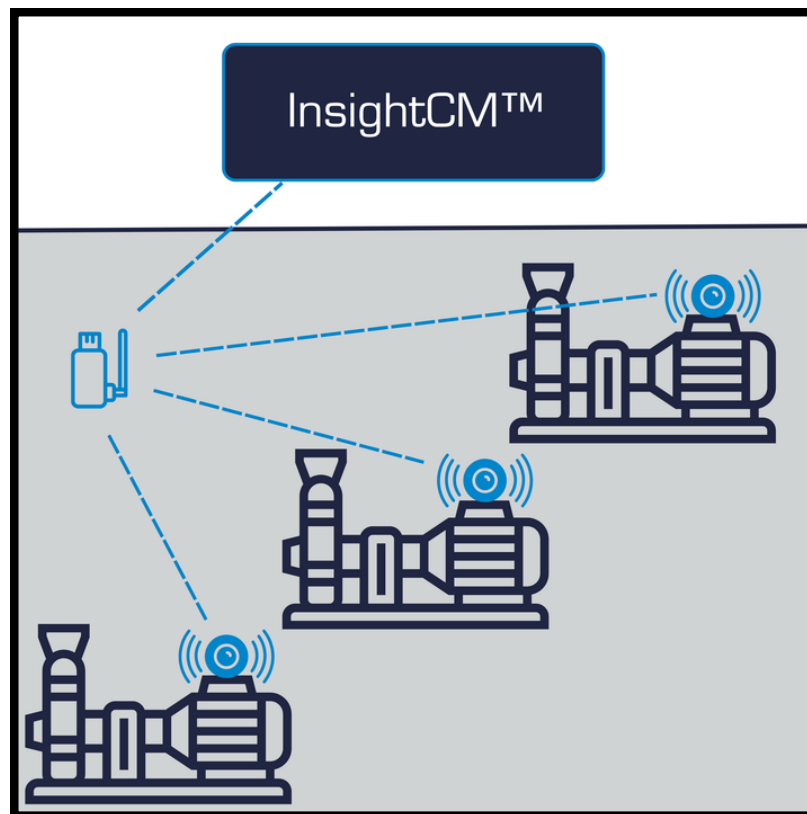


## Operations Manual Wireless Condition Monitoring EZDP-2157 Rev –



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## Safety Information

### Safety Information [English]

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

#### Safety Conventions



##### NOTE:

Additional information.



##### ELECTRICAL DANGER

Indicates an action or specific equipment area that can result in personal injury or death from an electrical hazard if proper precautions are not taken.



##### CAUTION

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury or equipment damage.



##### WARNING

Indicates a hazardous situation that, if not avoided, could result in death or serious injury.



##### ROTATING PART CAUTION

Indicates possible injury from rotating parts.



##### DANGER

Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

#### General Safety Instructions



##### ELECTRICAL DANGER

Only qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid injury should work with Cutsforth products. Among the many considerations are the following:

- Avoid contact with energized circuits.
- Avoid contact with rotating parts.
- Never install any component that appears not to be functioning in a normal manner.



##### ROTATING PART CAUTION

High-voltage and rotating parts can cause serious or fatal injury. Installation, operation, and maintenance of this product must be performed only by qualified personnel, in accordance with all applicable safety regulations and guidelines.

## Consignes de Sécurité [Français]

Les informations qui suivent sont essentielles afin d'assurer la sécurité de l'utilisateur lors de l'installation et de l'opération de l'équipement. Assurez-vous de bien lire et de comprendre tous les avertissements et mises en garde qui suivent.

### Conventions de Sécurité



#### NOTE:

Informations supplémentaires.



#### RISQUES DE CHOC ÉLECTRIQUE

Indique que l'action ou la partie de l'équipement concernée peut mener à des blessures par électrisation ou à la mort par électrocution si les précautions adéquates ne sont pas prises.



#### MISE EN GARDE

Indique la présence d'une situation dangereuse qui, si elle n'est pas évitée, pourrait mener à des blessures mineures à modérées ou à des dommages matériels.



#### AVERTISSEMENT

Indique la présence d'une situation dangereuse qui, si elle n'est pas évitée, pourrait mener à des blessures sévères ou à la mort.



#### MISE EN GARDE : PIÈCE ROTATIVE

Indique la présence de pièces d'équipement rotatives pouvant causer des blessures.



#### DANGER

Indique la présence d'une situation dangereuse qui, si elle n'est pas évitée, pourrait mener à des blessures sévères ou à la mort.

### Consignes de Sécurité Générales



#### RISQUES DE CHOC ÉLECTRIQUE

L'utilisation des produits Cutsforth n'est recommandée qu'aux professionnels qualifiés qui savent comment reconnaître la présence de risques de choc électrique ainsi que les consignes de sécurité à suivre pour éviter les blessures liées à ces risques. Lesdites consignes de sécurité incluent, sans s'y limiter :

- Éviter tout contact avec des circuits alimentés;
- Éviter tout contact avec des pièces d'équipement rotatives;
- Ne jamais installer de composante ne paraissant pas fonctionner normalement;



### MISE EN GARDE : PIÈCE ROTATIVE

Les pièces d'équipement rotatives et sous haute tension peuvent causer des blessures sévères ou fatales. L'installation, l'opération et la manutention de ce produit ne doivent être faites que par des professionnels qualifiés et en respectant toutes les règles et consignes de sécurité applicables.

# 1. System Overview

The Cutsforth Wireless Condition Monitoring System is a comprehensive machine health monitoring solution assembled and distributed by Cutsforth. It integrates Erbesd Instruments' Phantom wireless sensor ecosystem with a Cutsforth-assembled industrial enclosure to provide a robust, field-ready condition monitoring installation.

The primary user interface for this system is Cutsforth's InsightCM™ (ICM) condition monitoring software. InsightCM manages sensor configuration, data collection scheduling, trend monitoring, alarming, and data visualization for all connected Phantom wireless sensors. The Phantom Gateway 2.0 (EPH-GWG2), housed within the Cutsforth enclosure assembly, serves as the wireless data collection hub bridging the Phantom sensor network to InsightCM.

Two enclosure variants are available: the AC-powered variant (EPH-GWG2-ENC-120VAC), which incorporates a DIN-rail-mounted AC-to-24VDC power supply accepting 85–264VAC input; and the PoE variant (EPH-GWG2-ENC-PoE), which derives power from an IEEE 802.3bt PoE++ network connection via a DIN-rail-mounted PoE splitter, eliminating the need for a separate AC circuit. Both variants house the same gateway hardware and are functionally identical in all other respects.

## 1.1. Key Capabilities

- Wireless vibration, temperature, speed, current, and general-purpose condition monitoring
- Primary integration with Cutsforth InsightCM for data management, trending, and alarming
- Up to 250 sensor nodes per gateway
- Simultaneous data collection from multiple sensors
- Up to 100 meters wireless range (line of sight, ideal conditions)
- Offline storage of up to 100,000 recordings on the gateway
- Modbus TCP/IP, MQTT, and OPC UA communication protocols for DCS/SCADA integration
- BLE 5.0 encrypted wireless communication

## 1.2. System Components

### 1.2.1. Enclosure Assembly

The enclosure assembly houses power conversion, circuit protection, and gateway electronics in a weather-resistant enclosure designed for wall, pole, or flange mounting in industrial environments. Two power input variants are available:

### 1.2.1.1. AC-Powered Variant

The AC-powered variant uses a DIN-rail power supply to convert plant AC power to 24VDC for the gateway. This variant is appropriate where a conventional AC branch circuit is available near the installation point.

| Parameter           | Specification                                       |
|---------------------|-----------------------------------------------------|
| Part Number         | EPH-GWG2-ENC-120VAC                                 |
| Power Input         | 85–264VAC, 47–63 Hz                                 |
| Power Supply Output | 24VDC, 30W                                          |
| Circuit Protection  | 2A DIN-rail circuit breaker                         |
| Enclosure           | NF100806-DIN, weather-resistant polycarbonate       |
| Antenna             | Puck antenna, top-mounted                           |
| Mounting            | Wall, flange, or pole mount (mounting kit included) |

### 1.2.1.2. PoE Variant

The PoE variant uses an Industrial Gigabit PoE++ Splitter to derive DC power from a Power over Ethernet (PoE++) network connection. This variant eliminates the need for a separate AC branch circuit, combining network and power delivery over a single Ethernet run, and is appropriate where a PoE++ capable switch or injector is available.

| Parameter           | Specification                                                                 |
|---------------------|-------------------------------------------------------------------------------|
| Part Number         | EPH-GWG2-ENC-PoE                                                              |
| Power Input         | IEEE 802.3bt PoE++ (15.4W, 30W, 60W, or 90W PoE input supported) via TI-SG104 |
| Power Supply Output | 24VDC, up to 2.3A                                                             |
| Circuit Protection  | Integrated ESD (6kV) and surge (2kV) protection on PoE switch                 |
| Enclosure           | NF100806-DIN, weather-resistant polycarbonate                                 |
| Antenna             | Puck antenna, top-mounted                                                     |
| Mounting            | Wall, flange, or pole mount (mounting kit included)                           |



Both enclosure variants house the same Phantom Gateway 2.0 (EPH-GWG2) and are otherwise identical in function, sensor compatibility, and InsightCM integration. Select the variant based on available power infrastructure at the installation site.

### 1.2.2. Erbesd Phantom Gateway 2.0

The Phantom Gateway 2.0 is the central data collection and communications hub. It receives wireless data from Phantom sensors, stores measurements locally, and transmits data to InsightCM.

| Parameter               | Specification                                                   |
|-------------------------|-----------------------------------------------------------------|
| Part Number             | EPH-GWG2                                                        |
| Dimensions              | 88 x 69 x 30 mm (without antennas)                              |
| Weight                  | 170 g                                                           |
| Housing Material        | ABS / Ballistic Nylon                                           |
| Mounting                | Standard DIN Rail (35 mm, 42 mm wide)                           |
| Storage                 | 100,000 recordings (embedded)                                   |
| Nodes Supported         | Up to 250                                                       |
| Wireless Protocol       | Bluetooth Low Energy (BLE) 5.0                                  |
| Operating Frequency     | 2.4 GHz                                                         |
| Wireless Range          | Up to 100 m (line of sight, ideal conditions)                   |
| Wi-Fi                   | 2.4 GHz / 5 GHz dual-band                                       |
| Network Port            | 10/100M Ethernet RJ45                                           |
| Antenna Connections     | Two RP-SMA Male connectors, 3 dBi gain                          |
| Communication Protocols | Modbus TCP/IP, OPC UA, MQTT                                     |
| Compatible Software     | Cutsforth InsightCM, DigivibeMX® 11 Phantom & M30, EI-Analytic™ |
| Input Voltage           | 5 VDC or 9–24 VDC, 2A                                           |
| Operating Temperature   | -7°C to 60°C (20°F to 140°F)                                    |
| Protection Rating       | IP54                                                            |
| FCC ID                  | X8WBT840                                                        |

### 1.3. Compatible Erbesd Phantom Wireless Sensors

The Wireless Condition Monitoring System is compatible with the Phantom wireless sensor range listed below. InsightCM supports the following sensor models: V10E, V11E, V15-ATX, V16-ATX, T20, T25, T70, and S40. All sensors communicate via BLE 5.0 and are IP67 rated.

| Part Number | Sensor Type                       | Key Capabilities                                                     | InsightCM Asset Type                 |
|-------------|-----------------------------------|----------------------------------------------------------------------|--------------------------------------|
| EPH-T20     | Wireless Infrared Temperature     | Object and ambient temperature; -70 to +380°C; 2x AA batteries; IP67 | Phantom Thermocouple                 |
| EPH-T25     | Wireless Thermocouple Temperature | -210 to 1800°C; all thermocouple types; 2x AAA batteries; IP67       | Phantom Thermocouple                 |
| EPH-T70     | Wireless Thermal Camera           | -40 to +300°C; 110°x75° FOV; 0.25–4 fps; 2x AA batteries; IP67       | Phantom IR Camera                    |
| EPH-S40     | Wireless Speed (RPM)              | Hall effect; up to 600,000 RPM; 2x AA batteries; IP67                | Phantom RPM                          |
| EPH-V10E    | Wireless Vibration (Gen 2)        | Vibration with internal temperature; programmable RMS trigger        | Phantom Vibration (High Sensitivity) |

| Part Number | Sensor Type                   | Key Capabilities                                                                        | InsightCM Asset Type                 |
|-------------|-------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------|
| EPH-V11E    | Wireless Vibration (Gen 3)    | 10 kHz Fmax; full waveform and spectrum; configurable sample rate; internal temperature | Phantom Vibration (High Range)       |
| EPH-V15-ATX | ATEX/IECEX Wireless Vibration | Certified hazardous areas; ultra-low noise; high sensitivity                            | Phantom Vibration (High Sensitivity) |
| EPH-V16-ATX | ATEX/IECEX Wireless Vibration | Certified hazardous areas; extended frequency range                                     | Phantom Vibration (High Range)       |



Contact Cutsforth Support if uncertain which asset type applies to a specific sensor model.

## 1.4. InsightCM Software Platform

Cutsforth's InsightCM (ICM) is the primary software interface for the Wireless Condition Monitoring System. InsightCM manages the full lifecycle of condition monitoring data for all Phantom sensors connected through the gateway, including:

- Asset hierarchy configuration and sensor assignment
- Automated and on-demand data collection scheduling and triggering
- Vibration waveform and spectrum data visualization and analysis
- Trend monitoring and long-term data management
- Alarm configuration and notification management
- Sensor communication and battery status monitoring via the Phantom dashboard
- Machine speed configuration (fixed speed, Phantom speed sensor, or data source speed)

InsightCM support resources are available at [support.cutsforth.com](https://support.cutsforth.com). For sensor-specific configuration guidance, refer to [InsightCM System Configuration \(page 19\)](#) of this manual and the InsightCM User Manual (Configuring Phantom Sensors, Acquiring Data for Wireless Devices).

## 2. Installation

This section describes the installation of the Wireless Condition Monitoring System enclosure and Phantom wireless sensors. All electrical work must be performed by qualified personnel in accordance with applicable local electrical codes and standards.



### WARNING

Before connecting power to the enclosure, de-energize, lock out, and tag out all power sources. Ensure the AC voltage supply circuit is protected by an upstream circuit breaker. Failure to follow proper lockout/tagout procedures may result in electric shock or death.

### 2.1. Enclosure Mounting

The enclosure is designed for wall, flange, or pole mounting using the hardware included with the enclosure and the flange/pole mount kit. Both the AC-powered variant (EPH-GWG2-ENC-120VAC) and the PoE variant (EPH-GWG2-ENC-PoE) use the same enclosure body and mounting hardware. Select a mounting location that satisfies all of the following criteria:

- Provides easy access to the enclosure door and internal components for maintenance
- Places the gateway antenna within wireless range of all sensors to be monitored (up to 100 m line of sight)
- Is protected from direct water ingress, excessive vibration, and temperature extremes outside the specified operating range
- AC-powered variant: Provides access to a 120/240VAC, 47–63 Hz power supply circuit
- PoE variant: Provides access to an IEEE 802.3bt PoE++ capable network port (switch or injector)
- Provides access to a network connection for InsightCM integration (Ethernet or Wi-Fi)

Mount the enclosure using the provided mounting feet hardware. For pole or flange mounting, follow the hardware instructions included with the mount kit.

### 2.2. External Power and Network Connections

#### 2.2.1. AC-Powered Variant (EPH-GWG2-ENC-120VAC)

The AC-powered variant enclosure provides terminal blocks for external AC wiring. Connect external conductors as follows:

- Line (L): Connect the 120/240VAC hot conductor to the 'L' terminal block
- Neutral (N): Connect the 120/240VAC neutral conductor to the 'N' terminal block

- Ground ( $\perp$ ): Connect the equipment grounding conductor to the ground terminal block



### CAUTION

All 120/240VAC wiring must be run in appropriate conduit and comply with applicable local electrical codes. Verify correct polarity before energizing the enclosure.

## 2.2.2. PoE Variant (EPH-GWG2-ENC-PoE)

The PoE variant enclosure requires no separate AC power connection. Connect a single Ethernet cable from an IEEE 802.3bt PoE++ capable switch or injector to the PoE input port on the TI-SG104 splitter inside the enclosure. The TI-SG104 DIP switch must be set to 24V output to match the gateway's input voltage requirement. The same Ethernet connection supplies both power and network data to the gateway.

For both variants, if a wired network connection to the gateway is not practical, Wi-Fi (2.4 GHz / 5 GHz) may be configured through the gateway's web interface. See [Gateway Commissioning \(page 19\)](#) for gateway network configuration.

## 2.3. Sensor Physical Installation

Phantom wireless sensors are installed directly on the equipment to be monitored. Proper physical installation is essential for accurate vibration measurement.

### 2.3.1. Sensor Identification

Every Phantom sensor is encoded with a unique serial number, represented as both a printed number and a QR code on the sensor label. The label also includes a 2-digit product code identifying the sensor model (e.g., product code 11 = EPH-V11E; product code 10 = EPH-V10E).



Figure 1. Phantom sensor label showing QR code, product code (11), and 9-digit serial number.

Before installation, record the following information for each sensor:

- Sensor serial number (9-digit number from label or QR code scan)
- Sensor model and 2-digit product code
- Intended machine location and measurement point
- Axis orientation relative to the machine (see [Axis Orientation \(page 16\)](#))



This information is required when commissioning sensors in InsightCM. Accurate axis orientation records are essential for correct directional vibration analysis.

### 2.3.2. Axis Orientation

All Phantom Expert sensors have the X, Y, and Z axis directions marked on the top of the sensor body. The axis mapping must be recorded and entered correctly in InsightCM to obtain accurate directional vibration data.



**Figure 2.** Axis orientation markings (X, Y, Z) embossed on top of Phantom sensor.

Top-mounted (sensor on top of housing, as shown in [Figure 3](#)):

- X-axis = Horizontal direction
- Y-axis = Vertical direction
- Z-axis = Axial direction



Figure 3. Phantom sensor mounted on top of a motor housing (top-mount configuration).

Side-mounted (sensor on side of housing, as shown in Figure 4):

- X-axis = Vertical direction
- Y-axis = Horizontal direction
- Z-axis = Axial direction



Figure 4. Phantom sensor mounted on the side of a motor housing (side-mount configuration).



### ROTATING PART CAUTION

Record the mount orientation for each sensor before completing installation. This information must be entered correctly during InsightCM sensor configuration. Incorrect axis mapping will result in inaccurate directional vibration data.

## 2.3.3. Mounting Methods

Phantom Expert Gen 3 sensors (EPH-V10E, EPH-V11E) consist of three parts: the base, sensor body with battery holder, and knurled ring with set screw. Three mounting methods are available:

- Stud mount: Thread the sensor base onto a tapped stud. Apply Loctite 243 thread locker and torque to 2–5 ft-lb (2.7–6.8 Nm). Provides the most rigid coupling and best vibration measurement accuracy.
- Adhesive-pad mount: Attach the sensor base using Loctite AA330 adhesive with Loctite 7387 activator. Allow full cure time before attaching the sensor body.
- Magnetic mount: Place the sensor and magnet assembly onto a clean ferromagnetic surface. Suitable for temporary installations or survey measurements.

### 2.3.4. Sensor Wake-Up Procedure

Phantom sensors are shipped in sleep mode and will not be detected by any gateway until activated. After physical installation:

1. Place the Erbesd magnetic key (EPH-MAG-P) on the sensor adjacent to the LED indicator or “reset” label, if one exists.
2. Hold the magnet against the sensor for 5 seconds, then remove the magnet. The sensor LED should illuminate, remain lit briefly, then blink and turn off.
3. If it does not illuminate, rub the magnetic key against the sensor for about 45 seconds, then remove the magnet to see if the LED will illuminate.
4. The sensor is now activated and visible to the gateway.



The same magnetic key and procedure are used to reset a sensor that has stopped communicating. Keep the magnetic key accessible for field use.

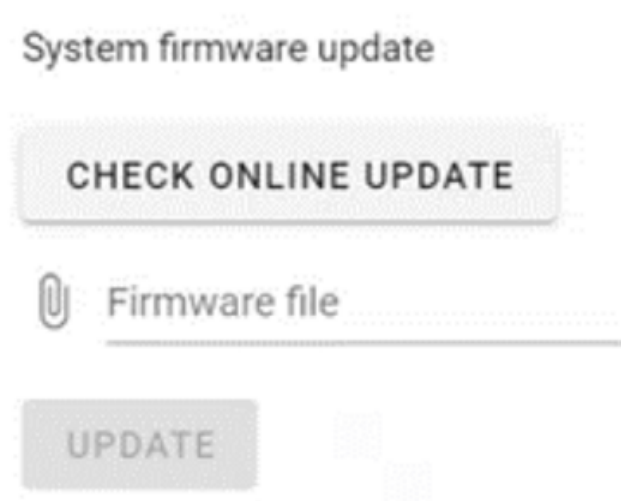
## 3. InsightCM System Configuration

This section describes the procedures for commissioning the Phantom Gateway 2.0 and configuring Phantom wireless sensors within InsightCM. Complete all gateway commissioning steps before adding sensor assets in InsightCM. For more information, refer to the InsightCM User Manual.

### 3.1. Gateway Commissioning

Perform these steps to prepare the Phantom Gateway 2.0 for integration with InsightCM. These steps must be completed before configuring any sensor assets in the software.

1. Connect an Ethernet cable to the RJ45 port on the Phantom Gateway 2.0 or to a spare port on the PoE switch.
2. Power on the gateway (either via AC power or PoE)
3. Note the IP address displayed on the gateway's screen.
4. Open a web browser on a computer on the same network and navigate to the gateway IP address. If prompted for a password, the factory default is 88888888.
5. Update the gateway firmware to the version officially supported by InsightCM. Contact Cutsforth Support to obtain the correct firmware package. Apply the update using the System Tools tab in the gateway web interface (see [Figure 5](#)).



**Figure 5. System firmware update dialog in the Phantom Gateway web interface (System Tools tab).**

6. Pair Phantom sensors to the gateway using the Live State menu. Click the Pair button for each sensor before configuring it in InsightCM (see [Figure 6](#)).

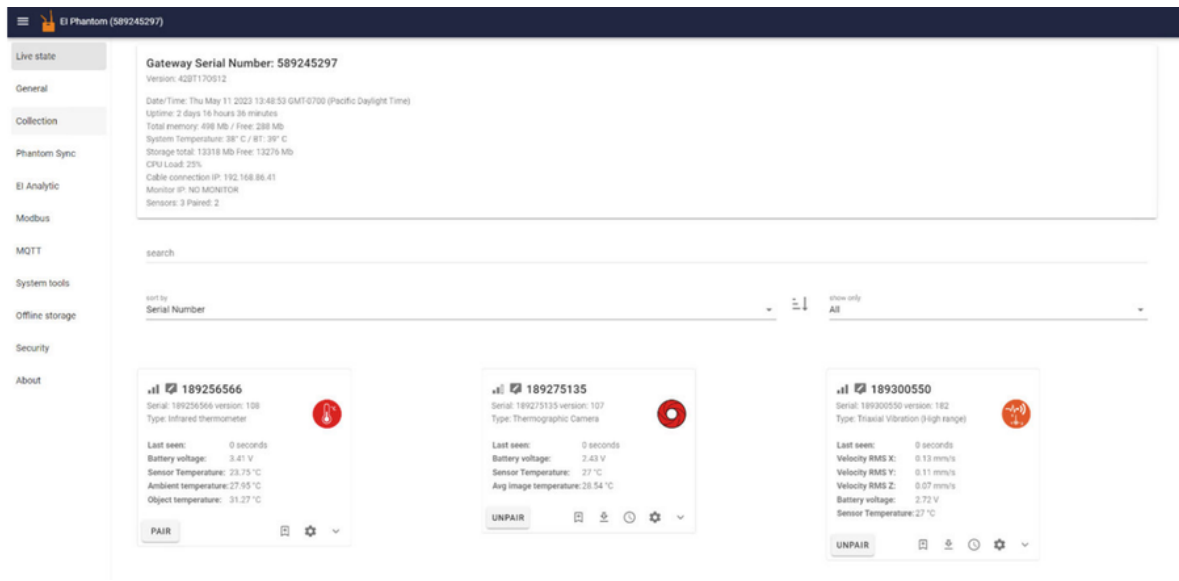


Figure 6. Gateway Live State screen showing paired and unpaired sensors with status details.

7. In the General menu, verify that both “Send data to EI Monitor/PhantomLib” and “Store data offline until manually collected” are enabled (see Figure 7).

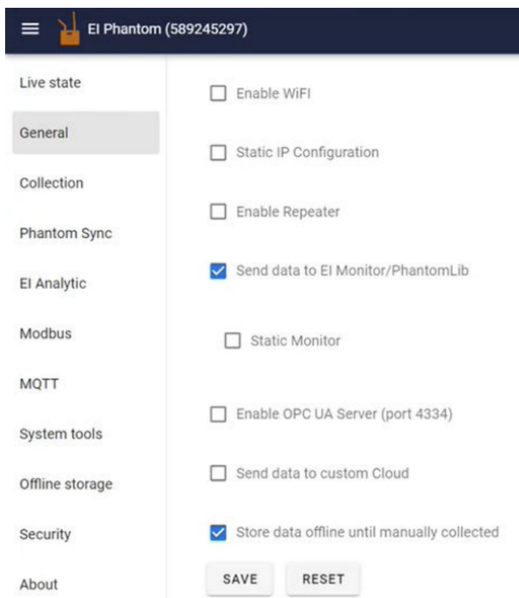


Figure 7. Gateway General menu. Both highlighted checkboxes must be enabled for InsightCM integration.



Optional: A static IP address may be configured in the General menu to simplify network management. Wi-Fi may also be configured here; disconnect the Ethernet cable after Wi-Fi is confirmed. Enable OPC UA Server (port 4334) here if OPC UA integration is required.

Optional — Gateway Password: To restrict access to the gateway web interface, navigate to the Security menu, enable Enable Gateway Console password, enter and confirm the password, and click Save (see [Figure 8](#)). Record the password in a secure location.

**Figure 8. Gateway Security menu for configuring access password.**

## 3.2. Adding Phantom Equipment Assets in InsightCM

Perform the following steps in InsightCM to add monitored equipment and associate Phantom sensors. These steps follow the sequence found in the ICM User Manual.

### 3.2.1. Create the Equipment Asset and Set Monitor Type

1. In InsightCM, click the Configuration button (wrench icon) and navigate to the Asset Configuration page. Ensure you are on the Asset Configuration page, not the Device Configuration page.
2. If the equipment asset does not yet exist, right-click the appropriate parent in the asset hierarchy tree and select Add Child Assets. In the New Asset dialog, expand General and select Equipment, then click OK.
3. In the equipment's right-side configuration panel, select the Vibration tab and then the Monitor sub-tab. Set the monitor Type to Wireless (Phantom) (see [Figure 9](#)). Set the Nominal Speed as appropriate.

The screenshot displays the 'Asset Configuration' window. On the left, a tree view shows the hierarchy: Cutsforth > OAWC Pump > RFM. The 'OAWC Pump' asset is selected. The main panel has tabs for 'Properties', 'Vibration', 'Description', and 'Fault Frequencies'. The 'Vibration' tab is active, and within it, the 'Monitor' sub-tab is selected. The configuration fields are as follows:

| Category | Field         | Value              |
|----------|---------------|--------------------|
| Type     | Type          | Wireless (Phantom) |
|          | Speed Type    | Fixed Speed        |
| Speed    | Nominal Speed | 1800               |

Buttons at the top include '+ Add', 'Remove', 'Validate', and 'Clear selections'. A filter dropdown is set to 'Invalid'. An 'Update Configuration' button is at the bottom right.

Figure 9. Asset Configuration – Vibration > Monitor tab with Type set to Wireless (Phantom) and Nominal Speed configured.

3.2.2. Add Sensor Nodes Under the Equipment Asset

With the equipment asset selected, click the Add button and navigate to Vibration » Phantom in the New Asset dialog. Select the Phantom sensor type that matches the sensor being installed (see Figure 10) and click OK.

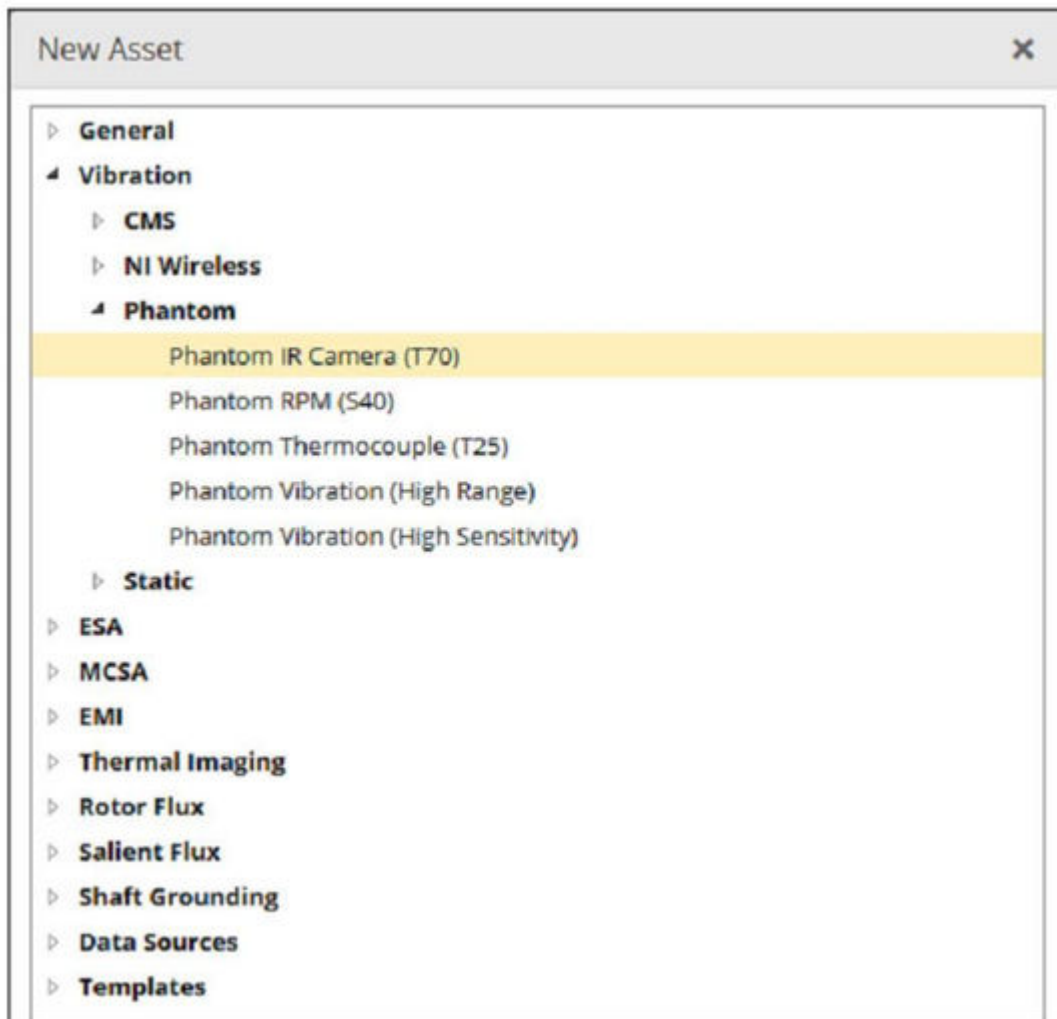


Figure 10. New Asset dialog showing available Phantom sensor types under Vibration » Phantom: IR Camera (T70), RPM (S40), Thermocouple (T25), Vibration (High Range), and Vibration (High Sensitivity).



Select the asset type that corresponds to the physical sensor model being added: EPH-V11E = Phantom Vibration (High Range); EPH-V10E = Phantom Vibration (High Sensitivity); EPH-T25 = Phantom Thermocouple (T25); EPH-T70 = Phantom IR Camera (T70); EPH-S40 = Phantom RPM (S40). Contact Cutsforth Support if uncertain.

### 3.2.3. Configure the Gateway Connection

1. In the right-side configuration panel, select the Sensors tab.
2. Enter the Phantom Gateway 2.0's IP address in the IP Address field (see [Figure 11](#)). The gateway Serial Number will populate automatically. If a gateway password was configured, enter it in the Password field.

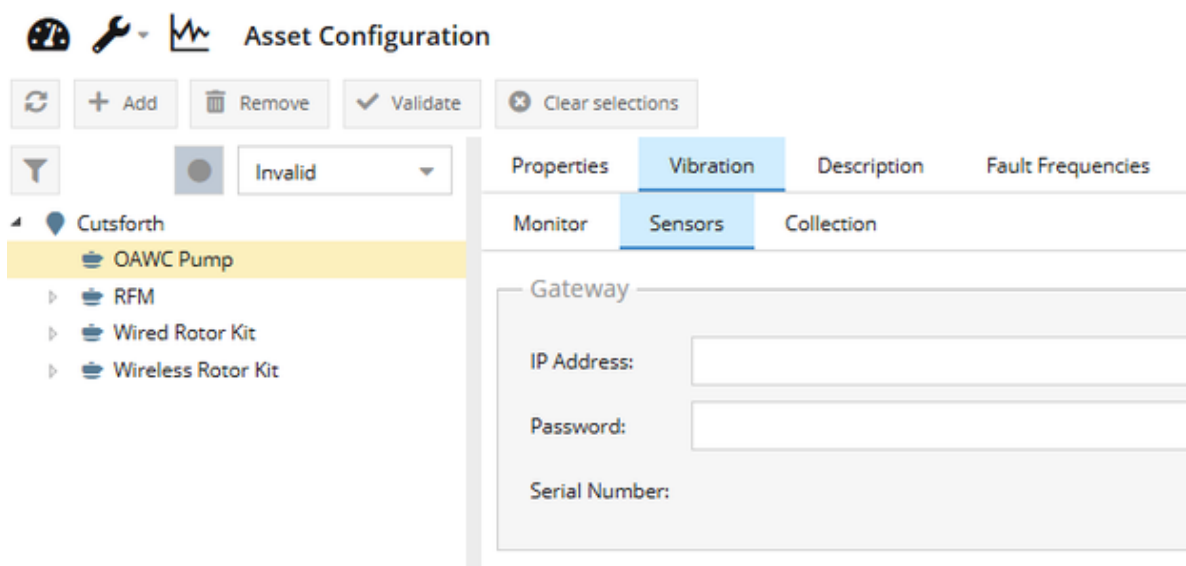


Figure 11. Sensors tab showing gateway IP Address, Password, and Serial Number fields.

- 3. Click on the Equipment node in the asset tree and within the Monitor tab in the right-side configuration panel, click Update Configuration. The Update Configuration button must be clicked any time a change is made to Phantom sensors or equipment nodes to apply those changes.

3.2.4. Discover and Assign Sensors

- 1. In the Sensors tab, click the Discover button (see Figure 12). InsightCM will query the gateway for all sensors currently within range and paired.

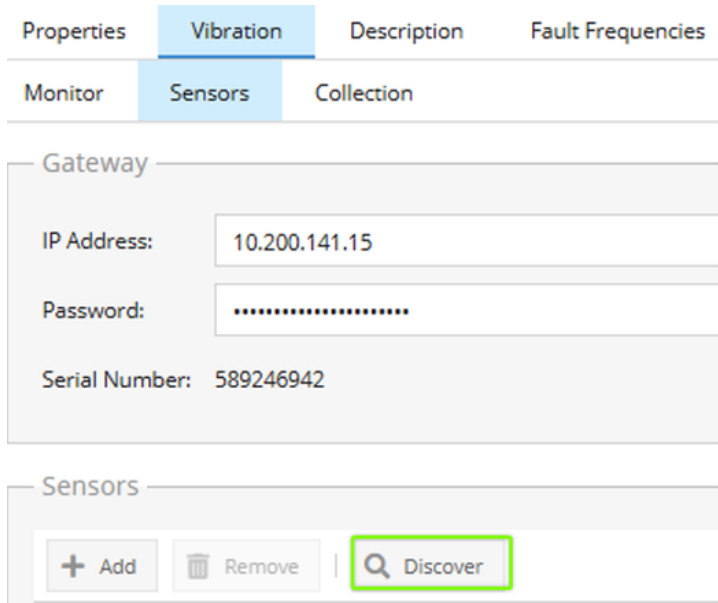


Figure 12. Sensors tab with Discover button. Gateway IP and Serial Number are populated after Update Configuration.

- The Select Sensor dialog will display all sensors detected by the gateway, showing Sensor Type, Serial Number, Signal Strength, and Paired status (see [Figure 13](#)). Select the sensor whose serial number matches the equipment measurement point being configured. Click OK.

| Select Sensor <span>×</span>                                                        |               |                 |        |
|-------------------------------------------------------------------------------------|---------------|-----------------|--------|
| Sensor Type ↑                                                                       | Serial Number | Signal Strength | Paired |
| Digital                                                                             | 189230109     |                 | No     |
| HighRangeAccelerometer                                                              | 189300641     |                 | No     |
| HighRangeAccelerometer                                                              | 189300873     |                 | No     |
| HighRangeAccelerometer                                                              | 189301415     |                 | No     |
| HighRangeAccelerometer                                                              | 189301426     |                 | No     |
| HighRangeAccelerometer                                                              | 189309232     |                 | No     |
| HighRangeAccelerometer                                                              | 189309243     |                 | No     |
| HighRangeAccelerometer                                                              | 189309262     |                 | No     |
| HighRangeAccelerometer                                                              | 189309378     |                 | Yes    |
| HighRangeAccelerometer                                                              | 189314527     |                 | No     |
| HighRangeAccelerometer                                                              | 189314572     |                 | No     |
| HighSensitivityAccelerometer                                                        | 189305431     |                 | No     |
| IrCamera                                                                            | 189275140     |                 | No     |
| IrCamera                                                                            | 189275202     |                 | No     |
|  |               | OK              | Cancel |

**Figure 13.** Select Sensor dialog listing sensors discovered by the gateway. Select the correct serial number and click OK.

- The sensor node will appear in the asset tree under the equipment asset.

Alternative — Manual sensor entry: Instead of using Discover, sensors can be added manually. Click Add and select Sensors » Phantom and then the appropriate sensor type. In the Properties tab, enter the serial number. After specifying the serial number, click the Add button on the Sensors tab to add the sensor to the equipment node.

## 3.3. Phantom Node Properties Configuration

Once sensors are assigned in the asset hierarchy, configure the following properties for each sensor node in InsightCM.

### 3.3.1. Speed Type

In the Monitor tab for the equipment asset, select the appropriate Speed Type (see [Figure 14](#)):

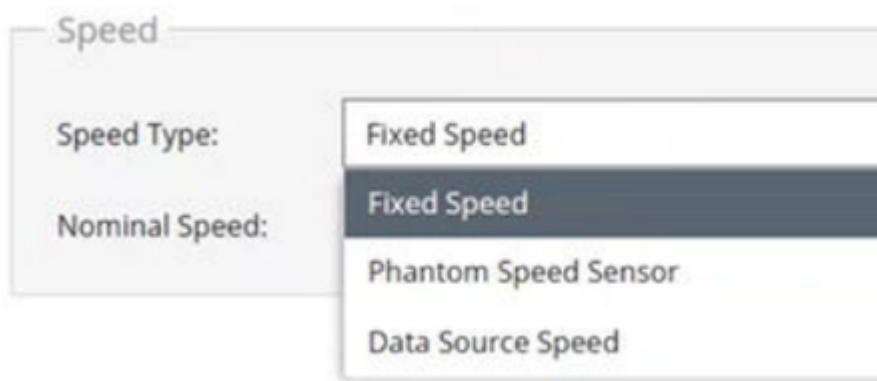


Figure 14. Speed Type dropdown showing the three available options.

- Fixed Speed: For equipment operating at a constant known speed. Enter the speed in RPM in the Nominal Speed field.
- Phantom Speed Sensor: Uses a live speed reading from an EPH-S40 wireless speed sensor installed on the equipment.
- Data Source Speed: Obtains the current rotating speed from a configured data historian source.

### 3.3.2. Axis Mapping

Using the physical installation records from [Axis Orientation \(page 16\)](#), configure the X, Y, and Z axis assignments in InsightCM. Each axis is mapped to an Axial (A), Horizontal (H), or Vertical (V) measurement channel. The node properties panel displays all axis assignments and collection settings together (see [Figure 15](#)).

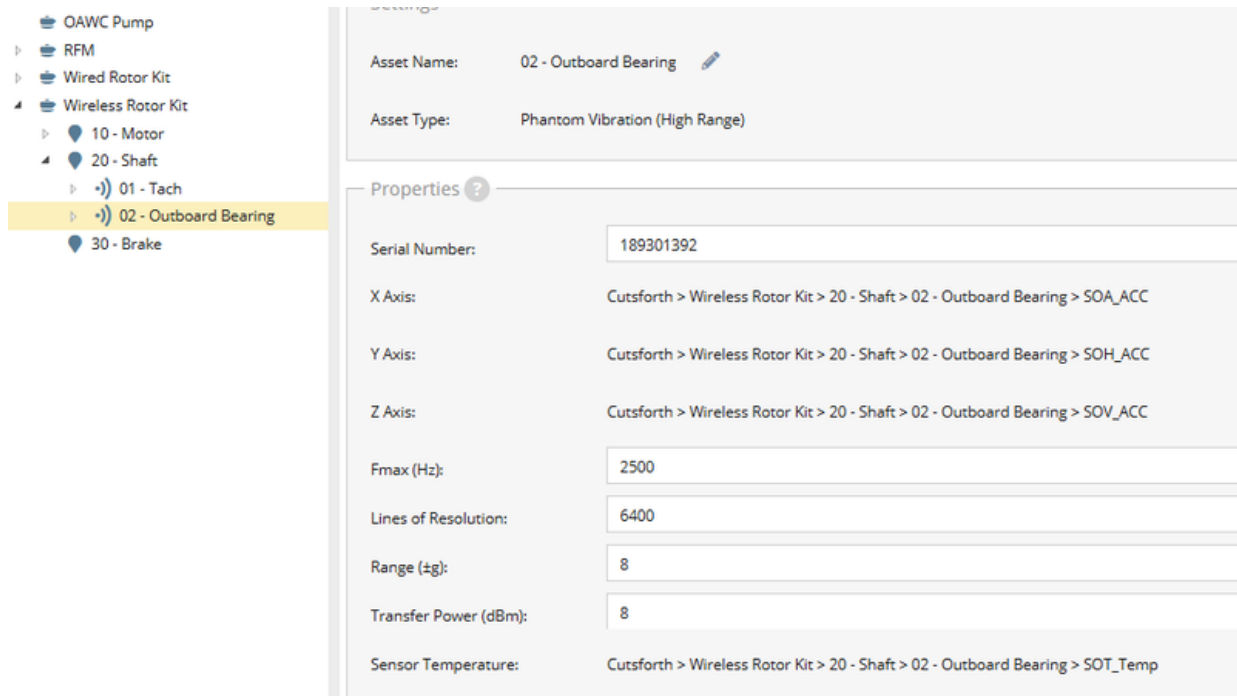


Figure 15. Phantom node properties panel showing serial number, axis assignments (X/Y/Z mapped to SOA/SOH/SOV channels), and the five configurable sensor settings.

### 3.3.3. Collection Settings

Five sensor collection settings are configurable in the node properties panel (Figure 15). These settings affect both measurement quality and sensor battery life. Select values appropriate for the application requirements.

| Setting              | Available Options and Guidance                                                                                                                                                                                                                                                                                |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fmax (Hz)            | 624, 1250, 2500, 5000, or 10000 Hz. Sets the maximum frequency captured in the vibration spectrum. Select the lowest Fmax that is at least 2–3× the highest bearing defect frequency of interest. Higher Fmax values reduce effective frequency resolution for a given lines-of-resolution setting.           |
| Lines of Resolution  | 6400 or 12800 lines. Determines the frequency resolution of the vibration spectrum. Higher resolution captures more spectral detail but increases data transfer time and reduces battery life. Use 6400 lines unless finer resolution is required.                                                            |
| Range (±g)           | 8, 16, or 32 g. Sets the accelerometer measurement range. Select the lowest range unlikely to be exceeded by normal machine vibration at the measurement point. A range that is too low will cause clipping; a range that is too high will reduce effective resolution.                                       |
| Transfer Power (dBm) | 0, 4, or 8 dBm. Sets the BLE transmission power from the sensor to the gateway. Use the lowest value (0 dBm) that achieves reliable communication. Increase to 4 or 8 dBm only when the sensor is at greater distance or communication is intermittent. Higher values reduce battery life.                    |
| Interval (min)       | Configurable collection interval in minutes. Sets how frequently the sensor performs a measurement. Shorter intervals provide more frequent data at the cost of reduced battery life. Set in accordance with the monitoring requirements for the equipment and the Data Set Collection schedule in InsightCM. |



Settings that most significantly reduce battery life are high Transfer Power, high Lines of Resolution, and short Interval. Configure these conservatively and increase only as required by the application.

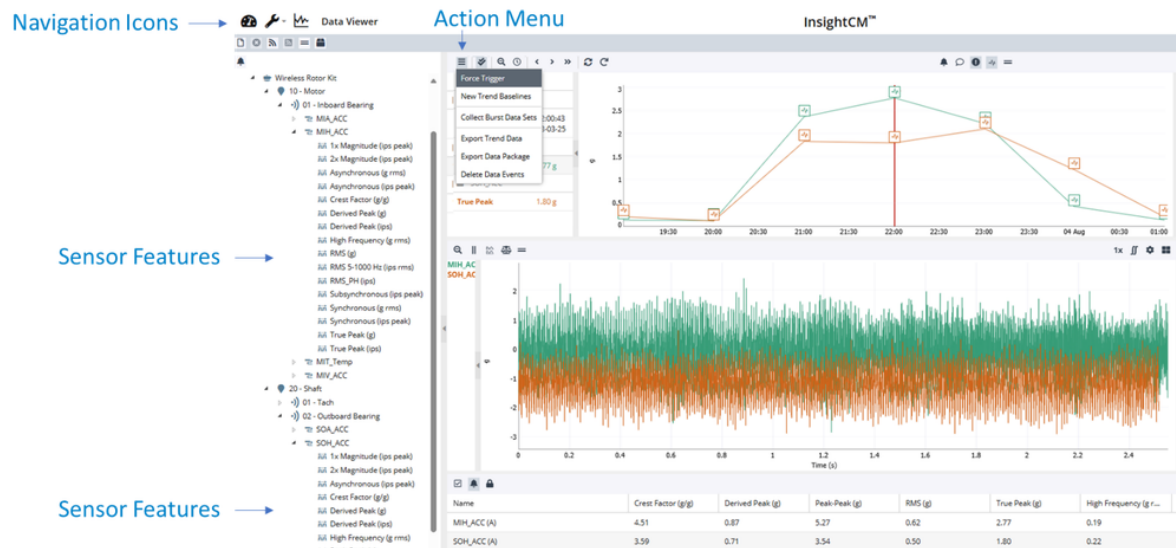
## 4. Data Collection and Monitoring

### 4.1. Acquiring Data in InsightCM

Once the gateway is online and sensors are mapped to equipment assets in InsightCM, data acquisition can be verified and initiated. Automatic acquisitions occur at the configured collection interval, but data can also be collected on demand using the Force Trigger function.

To perform a manual (on-demand) data acquisition:

1. Click the Data Viewer button (chart icon) at the top left of the InsightCM screen.
2. Expand the wirelessly monitored equipment asset in the navigation tree, select a sensor asset, then select a measurement feature to activate the Trend viewer chart.
3. In the Trend viewer chart, click the Action menu (hamburger icon) and select Force Trigger (see [Figure 16](#)) to initiate data acquisition from the sensor mapped to the selected asset.



**Figure 16.** Data Viewer in InsightCM showing the Action Menu with Force Trigger option, asset navigation tree, trend chart, and time waveform viewer.

4. Wait several seconds for the acquisition to complete, then click the Refresh button to confirm that new data points have been received.
5. Repeat the force acquisition several times to populate multiple data sets for initial trend verification.
6. Select a feature for a different equipment asset to confirm that its Trend viewer is not yet populated. Before data is available for a second asset, the gateway must complete its acquisition and InsightCM must receive and store the data.



Acquiring data from all endpoints simultaneously can create network congestion on the wireless network. Acquire data one endpoint at a time when verifying initial commissioning. If acquiring from all endpoints, allow several minutes for the gateway to complete all acquisitions. The duration of force-triggered acquisitions can be adjusted on the Operating States tab for the equipment on the Asset Configuration page.

## 4.2. Configuring Automatic Data Collection

InsightCM provides two types of automated collection for Phantom wireless sensors: Data Set Collection (full time waveform and spectrum data) and Trend Collection (periodic overall vibration readings). Both are configured in the Asset Configuration tab for each monitored equipment asset under the Vibration > Collection sub-tab.

### 4.2.1. Verifying the RMS-PH Trend Feature

Before configuring gated data collection, verify that the RMS-PH feature is active for the sensor. RMS-PH is a single-point overall vibration value that uses minimal battery life and is used as the gating signal to control full time waveform collection.

1. In the Data Viewer, select the sensor asset and look for the RMS-PH feature in the feature list.
2. Confirm that a trend is present for RMS-PH. If no data is present, configure Trend Collection as described in [Trend Collection \(page 31\)](#) before proceeding.
3. Note the RMS-PH level when the machine is running and when it is stopped. This establishes threshold values for gate configuration.

### 4.2.2. Data Set Collection

Data Set Collection defines how often InsightCM collects full time waveform and spectrum data. Collection can be scheduled at intervals from every 5 minutes to several hours, or at specific times of day.

A gate condition can be applied to restrict data set collection to periods when the machine is in a defined operating state, using RMS-PH as the gating signal:

- Set the gate condition to an RMS-PH value greater than a threshold that corresponds to normal machine operation. When RMS-PH exceeds this threshold, time waveform collections occur at the configured interval.
- When RMS-PH falls below the threshold (machine stopped or at low load), time waveform collection is suspended.

To configure: In the Asset Configuration tab, select the equipment asset and navigate to Vibration > Collection. Use the pencil icon to edit Data Set Collection settings (see [Figure 17](#)).

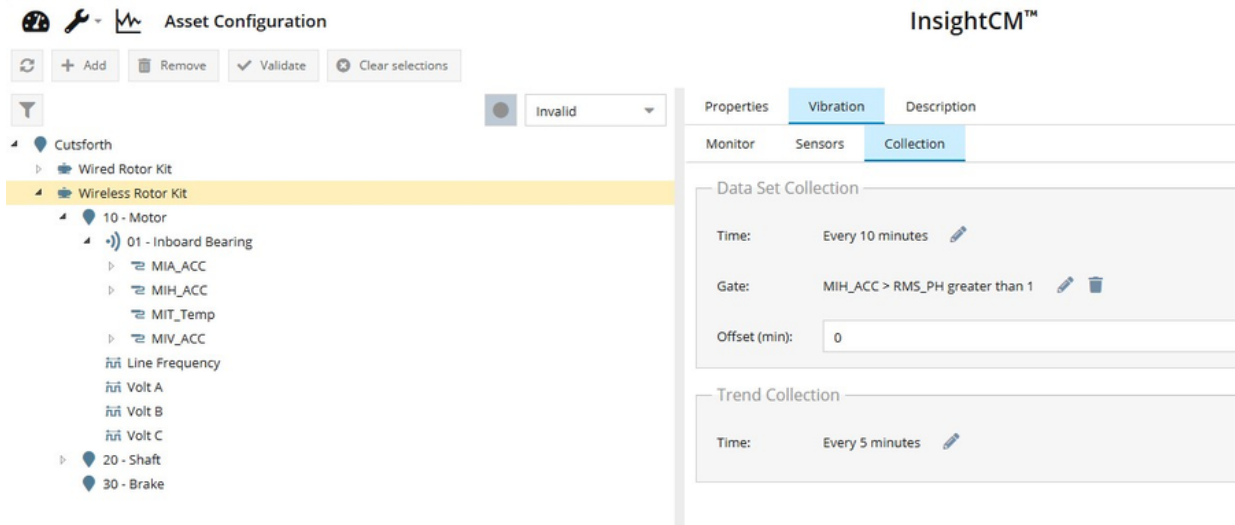


Figure 17. Vibration > Collection tab showing Data Set Collection (every 10 min, with RMS-PH gate) and Trend Collection (every 5 min) settings.

### 4.2.3. Trend Collection

Trend Collection controls how often InsightCM collects RMS-PH and other overall-value trend features. Trend Collection must be enabled and configured for the Data Set Collection gate to function. Configure Trend Collection in the same Vibration > Collection sub-tab as Data Set Collection (Figure 17).

## 4.3. Monitoring Sensor Communication and Battery Status

InsightCM provides a dedicated dashboard for monitoring communication and battery health of all Phantom sensors. Open the Dashboard Viewer and select the Phantom tab. This view displays the Asset path, Gateway IP, Serial Number, Sensor Type, Signal Strength, Battery voltage, Last Communication timestamp, Last Static, and Last Waveform collection timestamp for each sensor node (see Figure 18).

| Asset                                                     | Gateway       | Serial Number | Type                           | Signal Strength | Battery | Last Communication  | Last Static         | Last Waveform       |
|-----------------------------------------------------------|---------------|---------------|--------------------------------|-----------------|---------|---------------------|---------------------|---------------------|
| Cutsforth/Wireless Rotor Kit 20 - Shaft 01 - Tach         | 10.200.141.15 | 189311271     | Phantom RPM (540)              | Strong          | 3.41    | 2026-04-04 14:05:08 | 2026-04-04 14:01:53 |                     |
| Cutsforth/Wireless Rotor Kit 10 - Motor 01 - Inboard B... | 10.200.141.15 | 189309142     | Phantom Vibration (High Range) | Strong          | 2.58    | 2026-04-04 14:05:14 | 2026-04-04 14:01:05 | 2026-04-03 21:31:13 |
| Cutsforth/Wireless Rotor Kit 20 - Shaft 02 - Outboard ... | 10.200.141.15 | 189301392     | Phantom Vibration (High Range) | Strong          | 2.78    | 2026-04-04 14:05:16 | 2026-04-04 14:01:07 | 2026-04-03 21:31:36 |

Figure 18. InsightCM Dashboard Viewer – Phantom tab showing communication status, signal strength, battery level, and collection timestamps for each sensor.

## 5. Wireless Communication Troubleshooting

This section provides guidance for diagnosing and resolving wireless communication issues between Phantom sensors and the gateway, and between the gateway and InsightCM.

### 5.1. General Troubleshooting

| Symptom                                                             | Possible Cause                                                                                          | Recommended Action                                                                                                                                                                                                 |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gateway does not power on                                           | No AC voltage supply; PoE from the network is not available; tripped circuit breaker; wiring fault      | Verify AC voltage supply is energized or PoE power is present. Check upstream and internal circuit breaker. Inspect wiring connections inside the enclosure.                                                       |
| Gateway powers on but no sensors visible in Live State or InsightCM | Sensors not yet activated; out of range; pairing not completed                                          | Perform sensor wake-up procedure ( <a href="#">Sensor Wake-Up Procedure (page 18)</a> ). Confirm sensors are within 100 m line of sight. Pair sensors via gateway Live State menu before configuring in InsightCM. |
| Sensor visible in gateway but not in InsightCM                      | Sensor not assigned to asset; gateway IP incorrect; Update Configuration not clicked; firmware mismatch | Verify gateway IP address in Sensors tab. Click Update Configuration on the Equipment node. Use Discover. Confirm gateway firmware is the InsightCM-supported version.                                             |
| Intermittent sensor data loss                                       | Poor wireless signal; low sensor battery; obstructions                                                  | Increase sensor Transfer Power ( <a href="#">Adjust Sensor Transmission Power (page 33)</a> ). Replace sensor battery if low. Add repeater nodes if needed.                                                        |
| Cannot access gateway web interface                                 | Network mismatch; gateway not on network                                                                | Verify Ethernet link light is active. Confirm computer is on the same subnet. Cycle power to gateway if necessary.                                                                                                 |
| Changes to sensors/equipment not taking effect in InsightCM         | Update Configuration not clicked after making changes                                                   | Click on the Equipment node in the asset tree and click Update Configuration in the Monitor tab. This must be done after any change to Phantom sensors or equipment nodes.                                         |
| Modbus / MQTT / OPC data not appearing in SCADA                     | Incorrect protocol configuration; firewall blocking                                                     | Verify protocol settings in gateway administration panel. Check network firewall rules.                                                                                                                            |
| Antenna connection warning or poor wireless performance             | Loose SMA connector; cable damage                                                                       | Verify both SMA cables are fully finger-tight (hand only, no tools). Inspect cables for damage.                                                                                                                    |

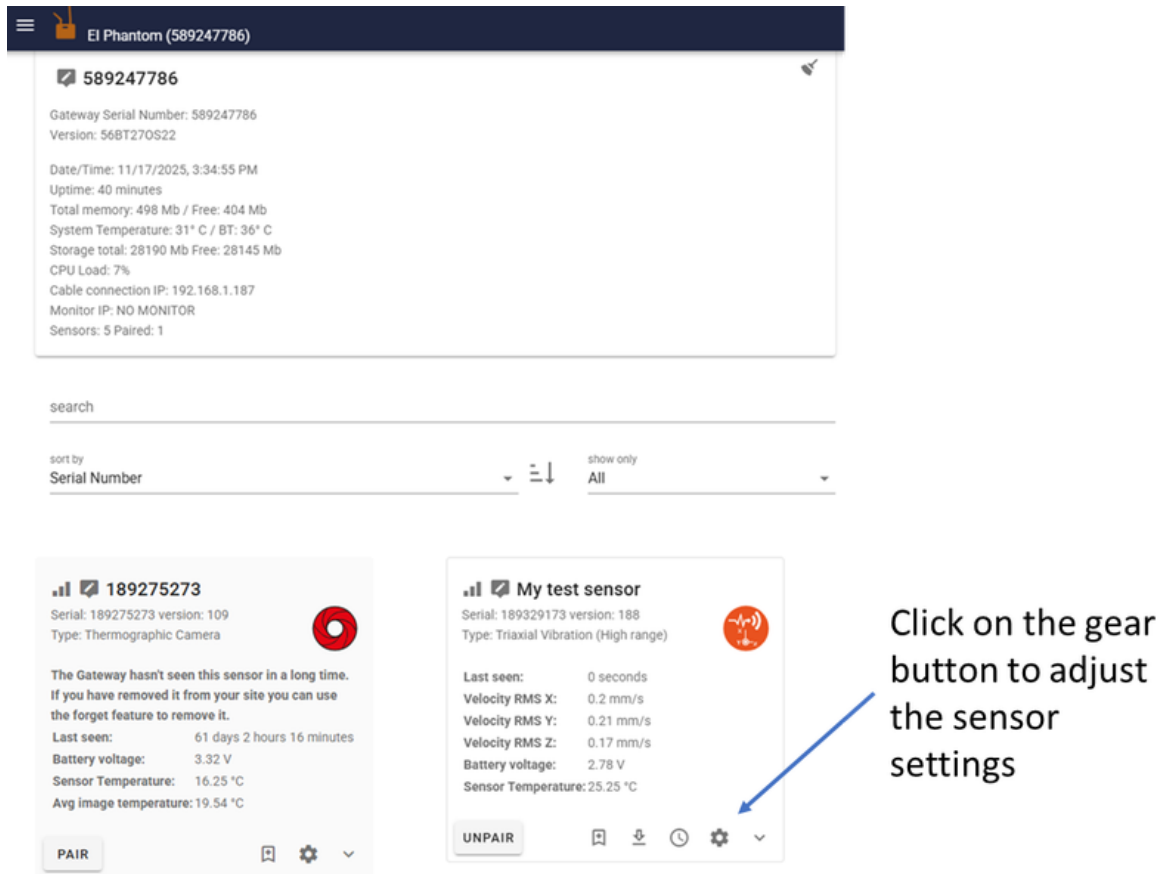
### 5.2. Improving Wireless Signal Strength

If the gateway cannot reliably communicate with one or more Phantom sensors, the most common cause is insufficient Bluetooth signal strength or physical obstruction. Follow this procedure to diagnose and improve communication.

#### 5.2.1. Access the Gateway Web Interface and Locate the Sensor

1. Connect a computer, tablet, or smartphone with a browser to the same network as the gateway.

2. Navigate to the gateway IP address. If prompted for a password, the factory default is 88888888.
3. Open the Live State screen. Locate the affected sensor by serial number (see [Figure 19](#)). If the sensor is not visible, temporarily bring it physically closer to the gateway.



**Figure 19.** Gateway Live State screen. Click the gear button on a sensor card to access individual sensor settings.

## 5.2.2. Adjust Sensor Transmission Power

1. In the Live State screen, click the gear (settings) button on the sensor card.
2. Under General settings, increase Max Transfer Power. Available options are 0, 4, and 8 dBm; 8 dBm is the maximum (see [Figure 20](#)).
3. If communication issues persist, enable Long Range mode on the sensor by checking the Long Range mode checkbox. Note that Long Range mode requires long-range scanning to also be enabled on the gateway (see [Enable BLE Power Amplifier on the Gateway \(page 34\)](#)).
4. Click SET to apply the changes.

**In sensor settings**

---

**General** ^

Max transfer power  
4 dbm

Sensor update interval  
65535 seconds

Advertising interval (uses more power)  
2 seconds

☐ Long Range mode (uses more power, requires long range scanning enabled in settings)

☐ Connect to Gateway v1

Only enable this if you want this sensor to connect to an older Gateway v1

---

Vibration triaxial settings

---

CANCEL SET

First try increasing the transmit power. 8dbm is the maximum transmit power.

If communication issues persist, Enable Long Range mode

Figure 20. Sensor settings panel showing Max Transfer Power (currently 4 dBm) and Long Range mode option.

### 5.2.3. Enable BLE Power Amplifier on the Gateway

1. In the gateway web interface, navigate to the General page.
2. Enable BLE Power amplifier (29 dBm output power) at the bottom of the General settings. This increases the gateway's BLE transmission and receiving sensitivity (see [Figure 21](#)).
3. Click Save to apply.

**Live state**

**General**

**Collection**

(589247786)

uration

☒ Static IP Configuration

IP Address  
192.168.1.187

Subnet mask  
255.255.0.0

Default gateway  
192.168.1.1

DNS  
192.168.1.1

Repeater network  
Disabled

☒ Send data to EI Monitor/PhantomLib

☐ Static Monitor

☐ Enable OPC UA Server (port 4334)

☐ Send data to custom Cloud

☒ Store data offline until manually collected

☐ Subordinate to another gateway

Bluetooth scanning  
Regular Bluetooth scanning

☒ Enable BLE Power amplifier (29 dBm output power )

Figure 21. Gateway General page showing the Enable BLE Power amplifier option (circled). Also visible: static IP configuration and required InsightCM settings.



Increasing Transfer Power on sensors reduces battery life. Enable Long Range mode and the BLE Power Amplifier only when necessary. If communication issues persist after following this procedure, contact Cutsforth Support.

## 6. Calibration and Preventive Maintenance



### WARNING

Maintenance must be conducted only by qualified electrical personnel. Follow all plant safety and lockout/tagout (LOTO) requirements before accessing the enclosure or any electrical components.

### 6.1. Visual Inspection and Cleaning

| Parameter | Details                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency | Annually, or as required by site conditions                                                                                                                                                                                                                                                                                                                                                        |
| Action    | Inspect all wiring connections for loosening, corrosion, or damage. Inspect antenna and SMA connectors. Using a compressed-air duster approved for electronics, blow all dust and debris from internal components. Inspect the enclosure door gasket and all conduit/cable entry points for degradation, moisture ingress, or damage. Replace the gasket if compression set or damage is observed. |

### 6.2. Sensor Battery Replacement

Replace the battery when indicated by a low battery alert in InsightCM (Dashboard Viewer > Phantom tab) or in the gateway Live State screen, or when the sensor has reached end of its battery service life.

#### 6.2.1. Required Tools and Materials

| Item                                              | Notes                                                                                 |
|---------------------------------------------------|---------------------------------------------------------------------------------------|
| Panasonic CR2477 battery (vibration sensors only) | Replacement battery for Phantom Expert Gen 3 sensors (see <a href="#">Figure 22</a> ) |
| AA batteries (x2) (non-vibration sensors only)    | Replacement battery for non-vibration Phantom sensors                                 |
| 3mm hex key (non-vibration sensors only)          | For removing sensor base to access battery compartment                                |
| Flat-head screwdriver (vibration sensors only)    | For removing the locking set screw                                                    |
| Erbesd magnetic key (EPH-MAG-P)                   | For sensor wake-up/reset after battery replacement                                    |
| Browser-capable device                            | For communication verification via gateway Live State                                 |
| Gateway IP address                                | Required to access gateway web interface                                              |
| Loctite 243 (optional)                            | Required only if remounting a stud- or magnetically-mounted sensor                    |
| Loctite AA330 + Loctite 7387 (optional)           | Required only if an adhesive-pad mount must be replaced                               |



Figure 22. Panasonic CR2477 3V battery used in Phantom Expert Gen 3 sensors.

### 6.2.2. Pre-Job Information

Before beginning, record the following for each sensor:

- Sensor serial number
- Machine location and measurement point
- Mount type (stud, adhesive-pad, magnetic, or other)
- Sensor orientation and axis mapping, if applicable (top-mount or side-mount; X/Y/Z to H/V/A)



Record vibration sensor orientation before removal. Reinstalling the sensor in an incorrect orientation will produce inaccurate directional vibration readings in InsightCM.

### 6.2.3. Battery Replacement Procedure – Vibration Sensor

The EPH-V11E sensor disassembles into three parts to access the battery compartment (see [Figure 23](#)).



Figure 23. EPH-V11E sensor disassembled: base (left), sensor body with battery holder (center), and knurled ring with set screw (right).

Remove the Sensor from the Machine

- Magnetic mount: Carefully rock and lift the sensor and magnet assembly off the mounting surface.
- Stud mount: Unscrew the sensor body from the tapped mounting stud, preserving orientation notes.
- Adhesive-pad mount: Unscrew the sensor body from the adhesive-mounted pad. Do not remove the pad unless pad replacement is required.

Inspect the sensor exterior for physical damage or signs of a compromised seal before opening.

#### **Open the Sensor and Replace the Battery**

1. Use a flat-head screwdriver to remove the locking set screw.
2. Unscrew the knurled ring to open the sensor body, exposing the battery compartment.
3. Keep track of the O-ring and protect it from damage or contamination.
4. Slide out the old Panasonic CR2477 battery.
5. Install the new Panasonic CR2477 battery.

#### **Reassemble the Sensor**

6. Verify the O-ring is correctly positioned in its groove before closing the sensor.
7. Close the sensor body and tighten the knurled ring hand-tight (approximately 25 in-lb / 2.83 Nm, if controlled torque is used).
8. Reinstall and secure the locking set screw.
9. Visually confirm that no gap is present and the enclosure is fully sealed.

#### **Reinstall the Sensor**

10. Reinstall the sensor at the same machine location and with the same mount type recorded before removal.
11. Restore the same axis orientation recorded before removal.
12. For stud and magnetic mounts, apply Loctite 243 and torque to 2–5 ft-lb (2.7–6.8 Nm) as required.
13. For adhesive-pad mounts requiring pad replacement, apply Loctite AA330 with Loctite 7387 activator and allow full cure time before attaching the sensor body.

### **6.2.4. Battery Replacement Procedure – Non-Vibration Sensor**

The Phantom sensors disassemble into two parts to access the battery compartment (see [Figure 24](#)).

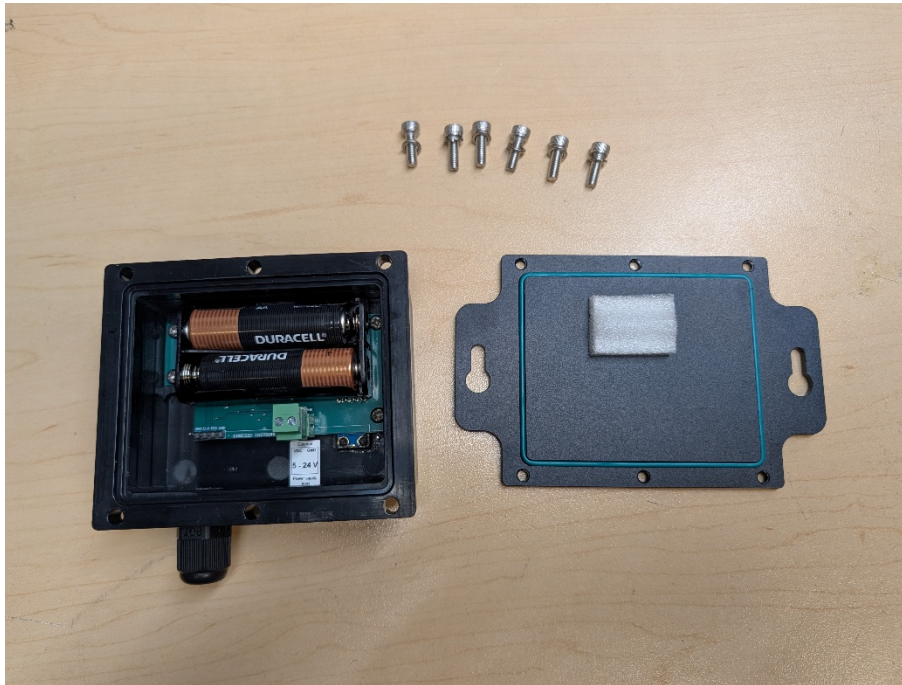


Figure 24. EPH-T70 sensor disassembled: sensor body with battery holder (left) and base plate (right)

### Remove the Sensor from the Machine

Inspect the sensor exterior for physical damage or signs of a compromised seal before opening.

### Open the Sensor and Replace the Battery

1. Use a 3mm hex key to remove the six screws around the perimeter of the sensor body.
2. Remove the old AA batteries.
3. Install the new AA batteries.

### Reassemble the Sensor

4. Inspect the O-ring for damage and verify it is correctly positioned in its groove in the sensor base plate before closing the sensor.
5. Close the sensor body and fasten shut using the six socket screws.

### Reinstall the Sensor

6. Reinstall the sensor at the same machine location as what was recorded before removal.

## 6.2.5. Post-Replacement Communication Verification

After reinstallation, verify that the sensor is communicating before returning to service:

1. Navigate to the gateway IP address in a browser and open the Live State screen.
2. Locate the sensor by serial number. If not visible, perform the wake-up procedure using the magnetic key (EPH-MAG-P) (see [Sensor Wake-Up Procedure \(page 18\)](#)).
3. If the sensor appears but is not linked, click Pair.
4. Confirm the sensor shows a recent Last Seen timestamp and reasonable battery voltage.
5. Confirm that General settings show "Send data to EI Monitor/PhantomLib" and "Store data offline until manually collected" as enabled.

Optional InsightCM End-to-End Verification:

6. In InsightCM Data Viewer, select the sensor asset feature and use Force Trigger to request data.
7. Click Refresh and confirm that fresh data points are received.
8. Check Dashboard Viewer > Phantom tab to confirm communication and battery status are displayed correctly.

### 6.2.6. Battery Replacement Acceptance Criteria

- Sensor is physically reassembled and sealed with O-ring correctly seated
- Sensor is reinstalled at the correct location and in the correct orientation, if applicable
- Sensor is visible in the gateway Live State screen
- Sensor is paired to the gateway
- Communication and data verification completed successfully in InsightCM

## 6.3. Firmware Updates

Gateway firmware must be maintained at the version officially supported by InsightCM. Contact Cutsforth Support to obtain the correct firmware package before performing any gateway firmware update. Apply updates using the System Tools tab in the gateway web interface (see [Figure 5 in Gateway Commissioning \(page 19\)](#)).

Sensor firmware updates may be available periodically and can be applied over-the-air through the gateway interface. Contact Cutsforth Support for current firmware revision requirements before performing updates.

## 7. Glossary

|                     |                                                                                                                                                                                            |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BLE 5.0             | Bluetooth Low Energy version 5.0. Ultra-low power wireless communication protocol used by Phantom™ sensors to communicate with the gateway.                                                |
| DIN Rail            | A standardized metal rail used for mounting industrial electrical and electronic components inside enclosures.                                                                             |
| EI-Analytic™        | Erbessd Instruments' cloud-based online condition monitoring and data management platform (eianalytic.com).                                                                                |
| EPH-GWG2            | Erbessd Phantom™ Gateway 2.0. The central data collection and communications hub of the wireless monitoring system.                                                                        |
| EPH-GWG2-ENC-120VAC | The Cutsforth-assembled enclosure variant housing the Phantom™ Gateway 2.0 with an AC-to-DC power supply.                                                                                  |
| EPH-GWG2-ENC-PoE    | The Cutsforth-assembled enclosure variant housing the Phantom™ Gateway 2.0 with a PoE splitter.                                                                                            |
| EPH-MAG-P           | Phantom reset magnet. Used to wake up or reset Phantom™ wireless sensors.                                                                                                                  |
| Fmax                | Maximum frequency captured in a vibration spectrum acquisition. Configurable in the Phantom™ node properties in InsightCM™.                                                                |
| force trigger       | An InsightCM™ function that initiates an immediate on-demand data acquisition from a selected sensor asset.                                                                                |
| InsightCM™ (ICM)    | InsightCM™ is application software for condition monitoring with full access to waveforms, multiple sensor technology inputs, enterprise software connectivity, and analytics packages.    |
| interval (min)      | The per-sensor measurement collection interval, configurable in the Phantom™ node properties in InsightCM™. Shorter intervals increase data frequency at the cost of reduced battery life. |
| live state          | Real-time sensor status view in the Phantom™ Gateway 2.0 web interface showing all sensors detected by the gateway.                                                                        |
| LOTO                | Lockout/Tagout                                                                                                                                                                             |
| Modbus TCP/IP       | An industrial communication protocol used for integration with SCADA systems, PLCs, and data historians.                                                                                   |

|                                      |                                                                                                                                                                                                  |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MQTT                                 | Message Queuing Telemetry Transport. A lightweight IoT messaging protocol supported by the gateway for cloud and third-party platform integration.                                               |
| Node                                 | An individual Phantom™ wireless sensor registered and communicating with the gateway.                                                                                                            |
| OPC UA                               | Open Platform Communications Unified Architecture. An industrial communication protocol for interoperability with automation and historian systems.                                              |
| Phantom™                             | Erbessd Instruments' wireless condition monitoring system brand, comprising gateways, wireless sensors, and associated software.                                                                 |
| Phantom Vibration (High Range)       | The InsightCM™ asset type for EPH-V11e (Gen 3) vibration sensors.                                                                                                                                |
| Phantom Vibration (High Sensitivity) | The InsightCM™ asset type for EPH-V10e (Gen 2) vibration sensors.                                                                                                                                |
| RMS-PH                               | A single-point overall vibration feature generated by Phantom™ vibration sensors. Used in InsightCM™ as a low-power trend feature and as a gate signal to control time waveform data collection. |
| RP-SMA                               | Reverse Polarity SMA. The antenna connector type used on the Phantom™ Gateway 2.0.                                                                                                               |
| transfer power (dBm)                 | The BLE transmission power setting for a Phantom™ sensor. Higher values improve wireless range at the cost of increased battery consumption. Maximum is 8 dBm.                                   |
| update configuration                 | An InsightCM™ button in the Monitor tab that must be clicked on the Equipment node to apply any changes made to Phantom sensors or equipment node settings.                                      |