Asset Monitoring Gateway with SNAP ID Instruction Manual

Original Instructions
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Chapter 1 Asset Monitoring Gateway (AMG) with SNAP ID Overview

The Asset Monitoring Gateway (AMG) with SNAP ID provides commissioning, monitoring, and alarms for up to 20 supported Modbus® and SNAP SIGNAL® enabled sensors and converters. The gateway scans for individual sensors or converters and auto-detects model information, allowing users to change and assign Modbus server ID numbers to commission custom systems.

Identified devices report relevant register data every ten seconds, providing the quickest path to data that Banner Engineering offers for SNAP SIGNAL® and Modbus-equipped sensors. Connected units can be grouped and renamed. All relevant input registers can have threshold alarms assigned to them individually. The alarm status is indicated both on-screen locally by color and mirrored by the light on the enclosure.

All compatible sensors/converters attached to the Gateway are auto-detected locally (SNAP ID). All data and threshold settings/alarms are relayed to and mirrored in the Banner Cloud Data Services (BannerCDS) website using an Ethernet or cellular connection (requires additional BannerCDS data plan).

For more information, refer to the following documents on www.bannerengineering.com:

- Asset Monitoring Gateway with SNAP ID Quick Start Guide, p/n 233717
- Asset Monitoring Gateway with SNAP ID Brochure, p/n b_51583459

Asset Monitoring Gateway (AMG) Hardware



The items included with the Asset Monitoring Gateway with SNAP ID are:

- 4" Banner Touch Screen HMI with Ethernet connection
- M12 power and serial communications input connector

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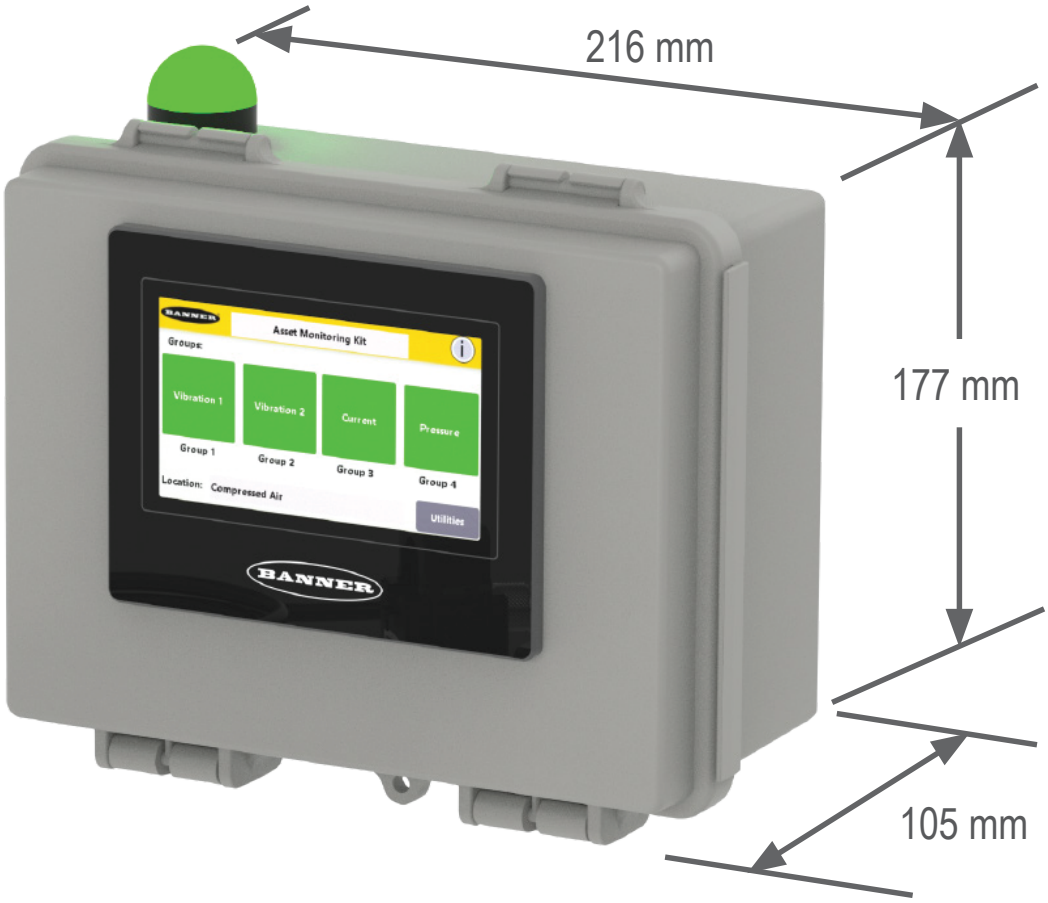
- **PSW-24-1** power supply
- Polycarbonate enclosure
- **STP-M12D-406** cordset (not included with cellular models)
- Mounting bracket packet
- Stylus, model **STYLUS-1** (p/n 10602)

Dimensions

All measurements are listed in millimeters, unless noted otherwise.

AMG dimensions



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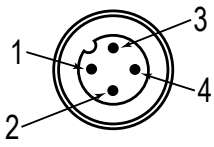
Chapter 2 Configuration Instructions

Wiring the AMG

4-pin M12 A-Code Male	Pin	Wire Color	Description
	1	Brown (bn)	10 to 30 V DC
	2	White (wh)	RS-485 + Serial
	3	Blue (bu)	Ground
	4	Black (bk)	RS-485 - Serial

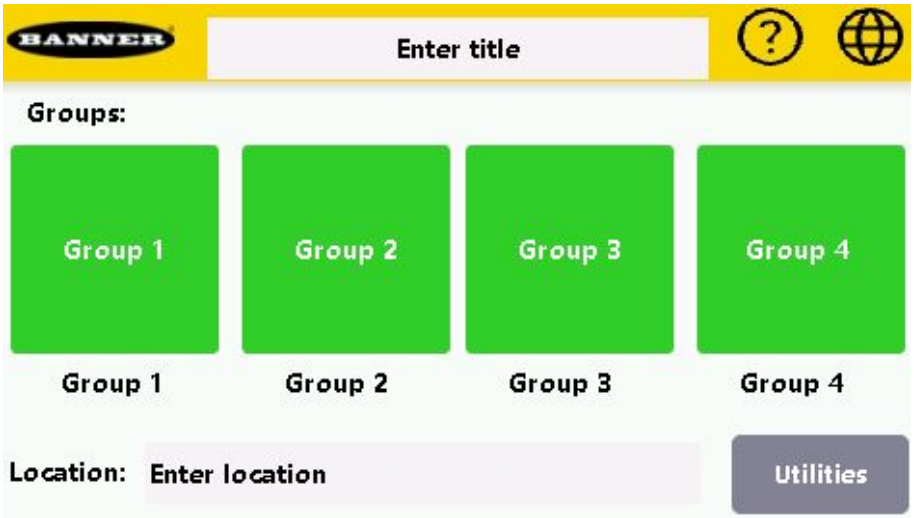
4-pin M12 D-Code Ethernet Female	Pin	Wire Color	Description
	1	white/orange	Tx +
	2	white/blue	Rx +
	3	orange	Tx -
	4	blue	Rx -

AMG HMI Home Screen

Customize the gateway name, located on the top title bar, by tapping **Enter title** and typing in a custom name.

For help information, click the help-information icon ( ) in the top right corner of the screen. Touch the globe icon to display a QR code that takes you to the product information from Banner Engineering.

The four status icons represent groups of sensing assets (up to 20 devices). Each icon's color indicates warnings, alarms, or connection status within that group. Group icons are nameable from within the group icon window. Select an icon to view the asset's status or additional sensor data.



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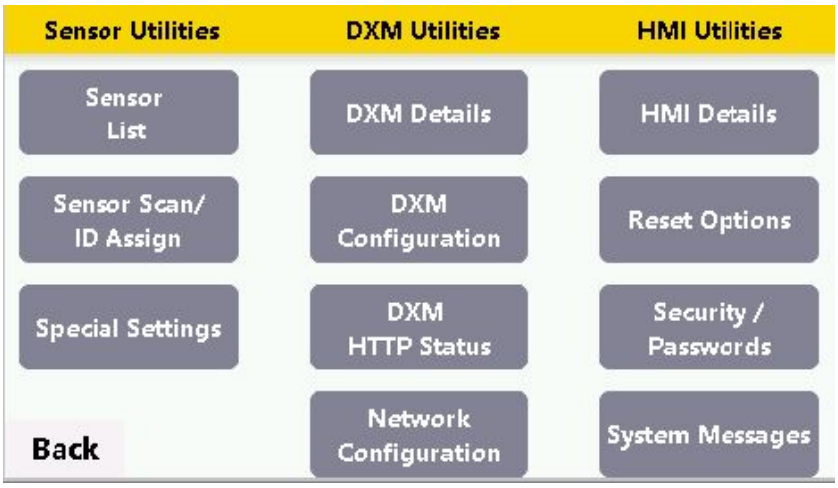
Change the location name by tapping the menu entry **Enter Location** and entering a valid location. Select the **Utilities** menu to bring up the main configuration and gateway information window.

Commission and Assign Connected Sensors or Converters

When commissioning several sensors, **connect each new sensor/converter one at a time** and repeat these instructions for each new sensor/converter.

1. After the AMG has initialized (about one minute), touch the **Utilities** icon in the lower right corner of the main page to go to the main configuration/device information menu.

Utilities screen



2. In the **Sensor Utilities** column, touch **Sensor Scan/ID Assign**.

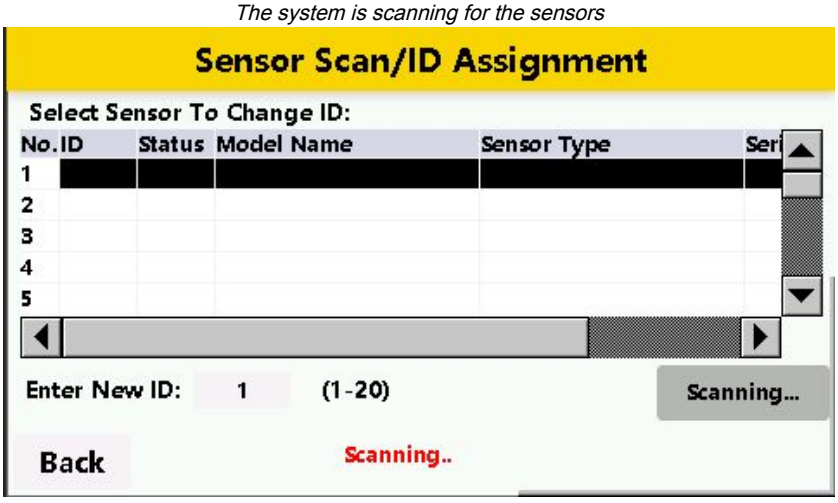
   The Sensor table will initially be unpopulated.

3. Connect any supported Banner Modbus sensor or S15 converter using a splitter cable or hub with power connected to the homerun cable and a branch connected to the Gateway M12 connector on the bottom right of the enclosure.

   See the Asset Monitoring Gateway with SNAP ID Brochure, p/n b_51583459 for lists of supported S15 converters, Modbus sensors, and accessories.

4. Select **Scan IDs** and touch **YES** when prompted to confirm.

The system is scanning for the sensors



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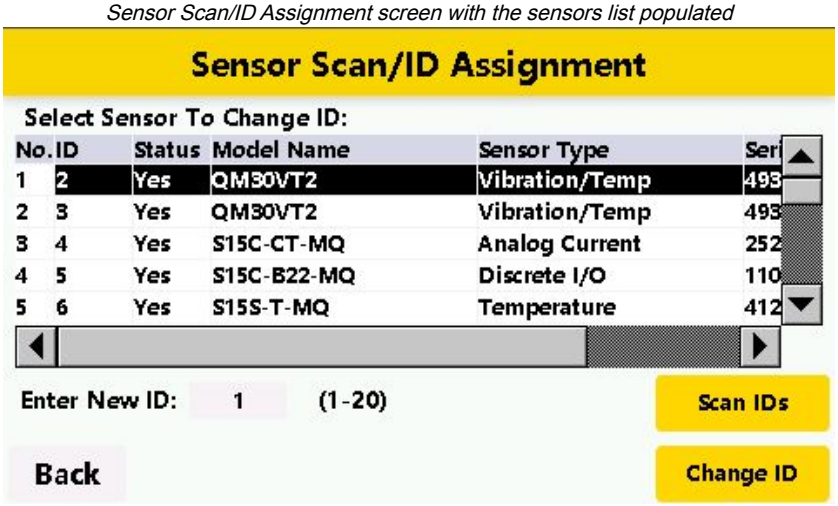
Sensor Scan/ID Assignment screen with the sensors list populated

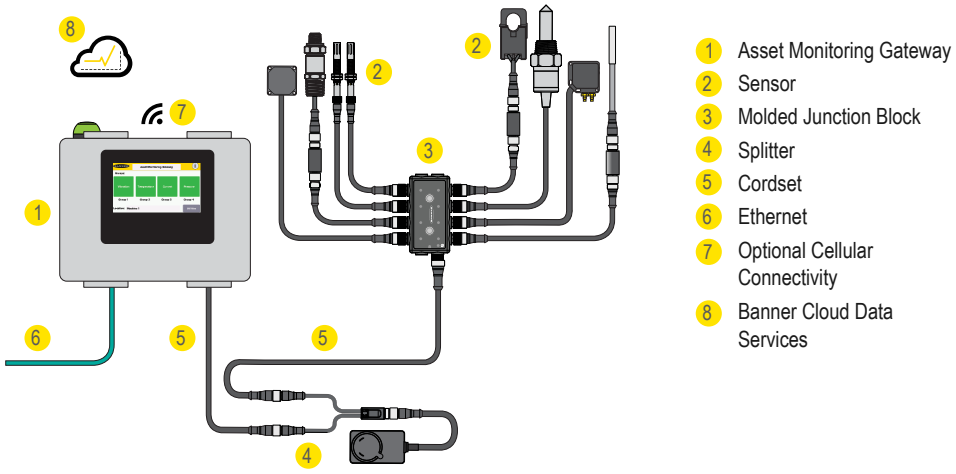


The Gateway scans for connected sensors for 20 seconds, as indicated by the red **Scanning....** message displayed at the bottom of the screen. Previously undetected devices appear in the table as ID 1 in the second column. The model name and sensor type should match the attached sensor/converter. When initially commissioning devices, it is important to **connect only one new sensor/converter at a time**. The gateway scans for new devices based on the default SID #1, making it important to **change all identified devices' SID # when you add more than one device.**

5. To change the detected devices' SID #, highlight the sensor by touching the row in which it appears and select **Change ID**. Touch **Yes** to confirm.

   The **Enter New ID** field automatically increments to the closest available SID #. (This field is also manually configurable.) After a SID # has changed, the sensor table repopulates and displays the new SID # associated with the learned device. All previously learned sensors continue to appear in the table unless they are deleted from the system using this screen.

Connection example with limitless combinations of SNAP ID sensors and connectivity accessories



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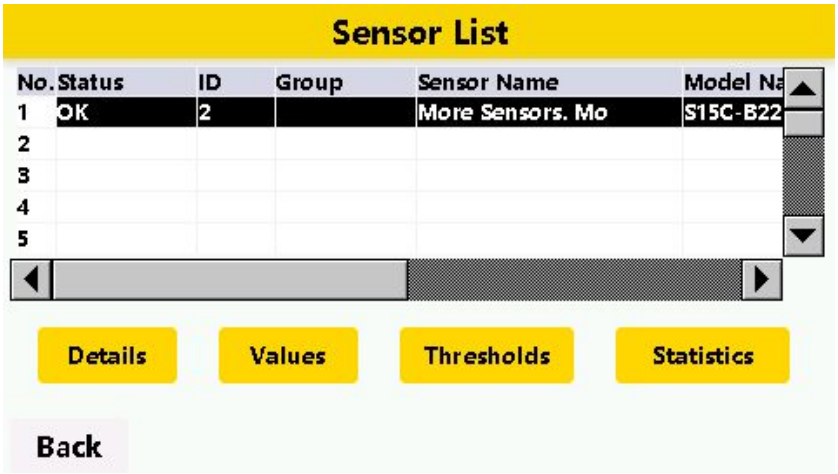
Chapter 3 Software Utilities Screens

The following sections explain the function of each screen in the **Sensor Utilities** column of the **Utilities Menu** screen.

Sensor List Screens

Select the **Sensor List** button to open the list of commissioned sensors/converters. Use the **Back** button to return to the previous screen.

Sensor List screen



Status

OK indicates the connected device is active and being monitored.

Comms indicates the sensor is disconnected or has a communications issue.

ThrhId1 or **ThrhId2** indicates an active threshold alarm, depending on the alarm that is triggered.

ID

Displays the current device Modbus Server ID

Group

If the sensor is grouped in the main display screen, **Group** displays that device's current group (numbered 1-4).

To add a sensor to a group, pick a group icon from the main page and select **Edit Group #**. Highlight the device you'd like to add to the group and select **Add To Group**.

To delete a device previously commissioned into a group, select the device and select **Delete From Group**.

Sensor Name

A customizable entry accessed using the **Details** button.

Model Name

The Banner part number nomenclature for the attached device.

Sensor Type

Displays the mode of sensing.

After sensors or converters have been commissioned, use the four buttons on the bottom of the screen for additional information and functions.

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Details

Details provides a more detailed view of the specific sensor. Customize the sensor name by touching the text entry next to the name and entering a new name. The details screen also provides a notes area intended for any applicable user data specific to that sensor, such as the date of installation, location, or the name of the monitored asset.

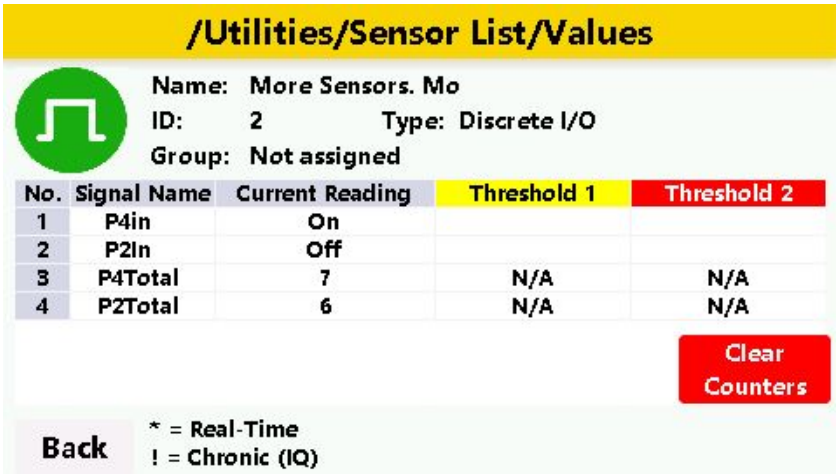
Sensor List Details screen



Values

Displays the current readings and thresholding settings for the selected sensor.

Sensors List Values screen



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Thresholds

Allows the user to configure alarm states for the selected device.

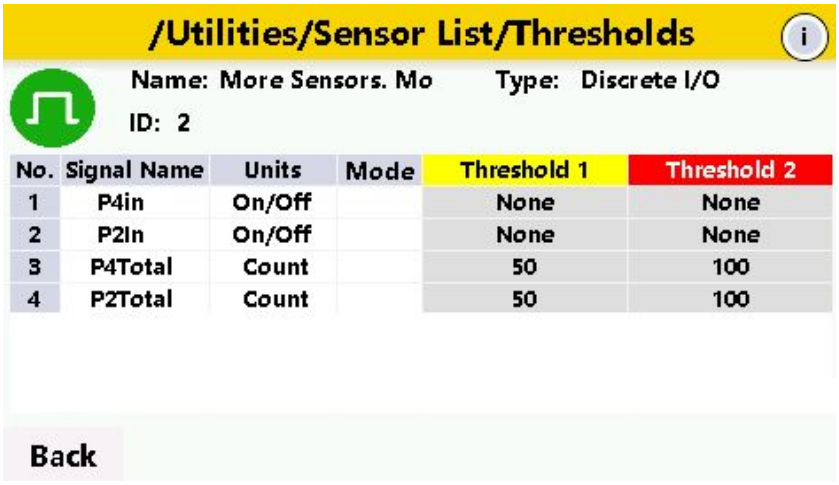
Threshold 1 (**Yellow**) indicates a **warning alarm**.

Threshold 2 (**Red**) indicates a **critical alarm**.

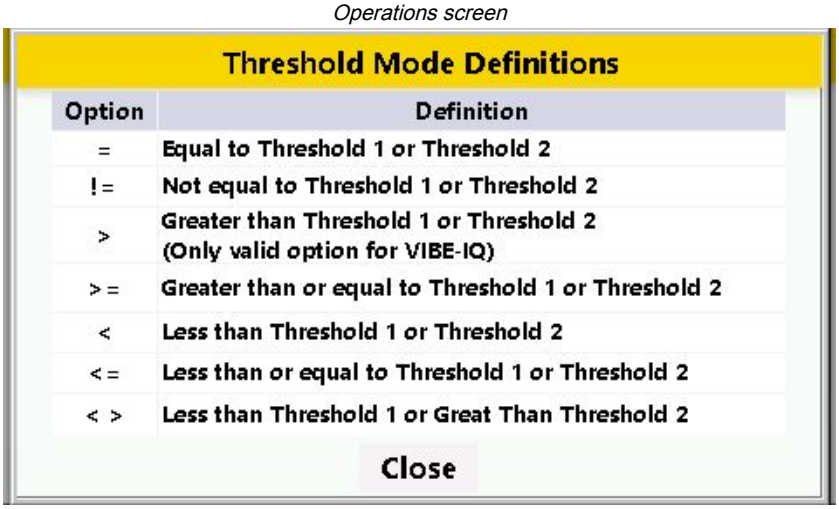
These alarm states are reflected in the group area (if the sensor has been grouped) by the asset icon changing color to reflect the alarm state. Alarms from any attached device are also indicated on the pendant light on the top left corner of the enclosure. Critical alarms (red) take priority, followed by yellow, then green for normal operation indication.

Set thresholds for specific registers by touching the thresholds in the table and manually typing in an alarm value. This prompts the AMG to enable the **Mode** operator. Tap the mode operator to browse through the operands and select the intended one. Select **Save** when you are satisfied with the alarm data, and then **Yes** for confirmation. **Thresholds saved** appears at the bottom of the screen after the settings are saved.

Sensor List Thresholds screen



Operations screen



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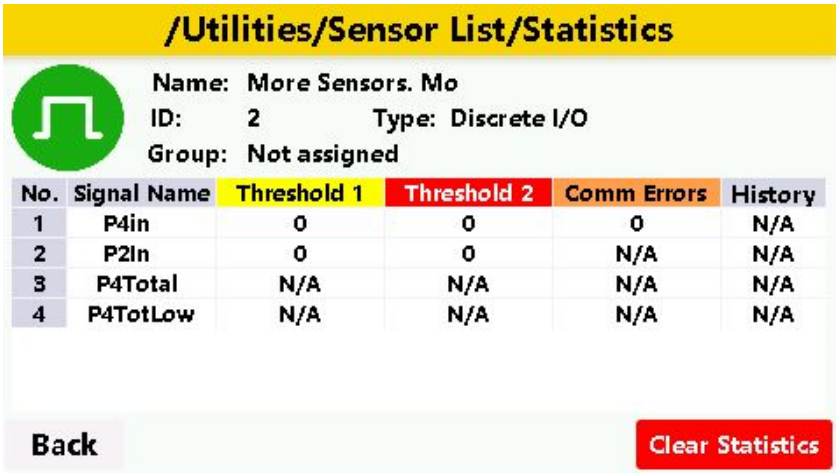
Statistics

Displays how many times a selected sensor has breached a threshold along with how many communications errors were detected (if applicable).

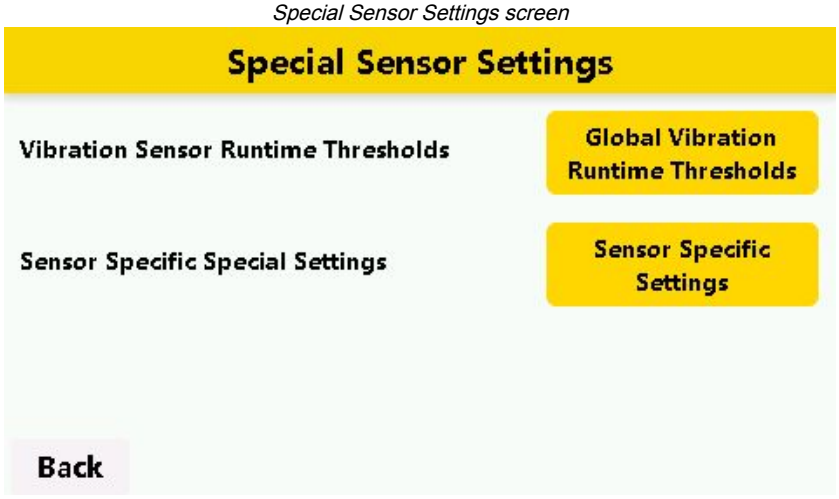
Sensor List Statistics screen



Special Sensor Settings Screen

The Special Sensor Settings screen contains the menus for specific sensor configurations, including global Vibration algorithm base settings (applicable when using QM30VT2 vibration sensors with VIBE-IQ® turned on) and a scaling option directed towards generic analog converters (S15C-U-MQ and S15C-I-MQ).

Special Sensor Settings screen



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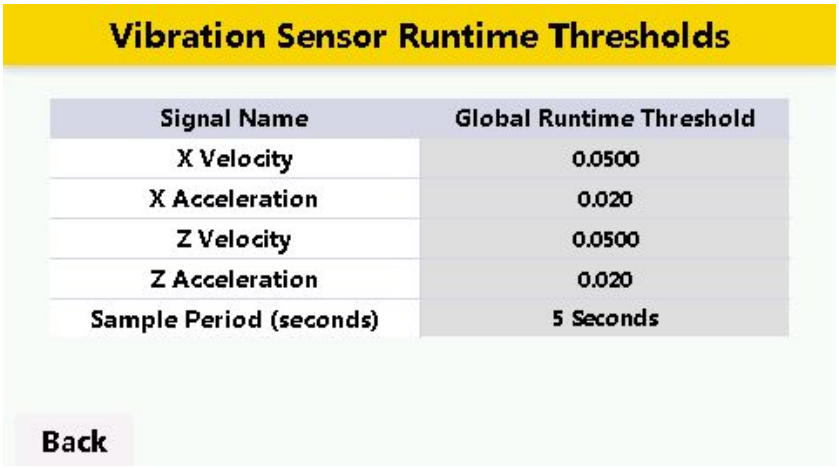
Vibration Sensor Runtime Thresholds

Applies only to the QM30VT2 vibration sensor running the VIBE-IQ® machine learning algorithm. This allows a user to globally set, for all connected vibration sensors, how the threshold settings for a vibration sensor are applied. These threshold settings define an active ON state for the monitored motor or rotating asset.

Definable ACTIVE ON values are the x-axis and z-axis velocity/acceleration. The sample period is the cycle time the algorithm uses to deem a sample applicable. The algorithm discards readings under the defined thresholds. VIBE-IQ typically requires 300 samples to accurately baseline a machine. If an application has a consistently operating rotating asset, with low standard variability, it may be acceptable to quickly retrieve an accurate baseline with a shorter sampling period. An asset with more extensive variability often requires a longer sampling period to characterize its behavior.

Global VIBE-IQ screen



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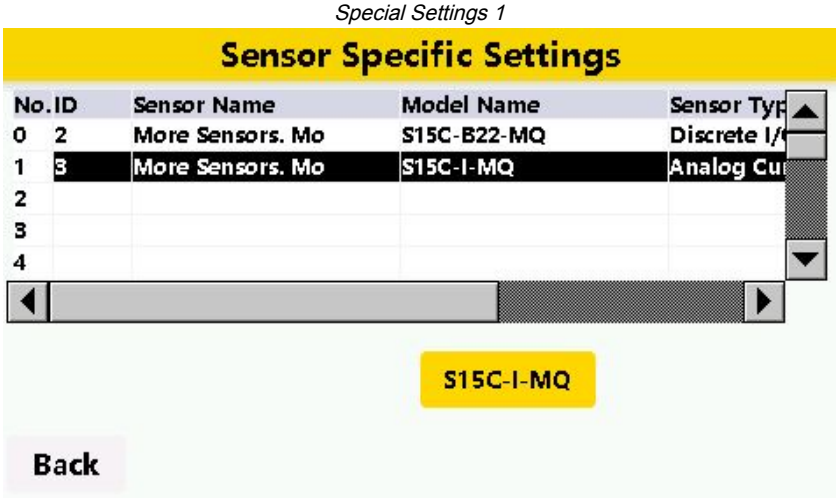
Sensor Specific Settings

Applies to two generic analog Modbus converters: S15C-I-MQ 4-20mA and S15C-U-MQ 0-10Vdc.

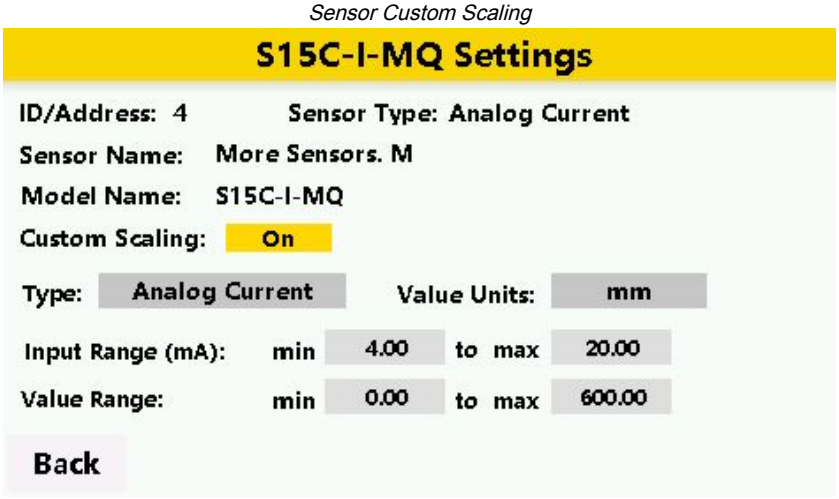
Special Settings 1



In this example, the special scaling is set for a 4-20mA current converter that is monitoring a 0-600mm LASER distance sensor (such as the Q4X series from Banner Engineering).

Select a sensor in the table to reveal a button to access the special scaling for that model. **Toggle Custom Scaling** to **ON**. In our example, the units to mm, the converter input range in mA to 4mA and 20mA, and the value range to 0 to 600 mm. Press **Save** and confirm. The change is saved to the device locally and is stored to display in the sensor's statistics and data in all menus.

Sensor Custom Scaling



IMPORTANT: If you need to push sensor-specific data to Banner Cloud Data Services, you must also configure the custom scaling in the cloud because the AMG only stores this data locally.

Machine Learning for Vibration Analysis

Vibe-IQ is the proprietary machine learning algorithm from Banner Engineering that monitors each motor and establishes baseline values and control limits for alerts with limited end-user interaction.

The algorithm continuously monitors the RMS velocity (10-1000 Hz), RMS high-frequency acceleration (1000-4000 Hz), and temperature on rotating equipment using the QM30VT2 vibration/temperature sensors. The machine learning intelligence determines whether or not a motor is running and uses the running data to calculate baseline and alert thresholds.

This Banner solution monitors vibration levels on rotating assets that are the result of:

- Imbalanced or misaligned assets
- Loose or worn components
- Improperly driven or mounted components
- Excessive temperature conditions

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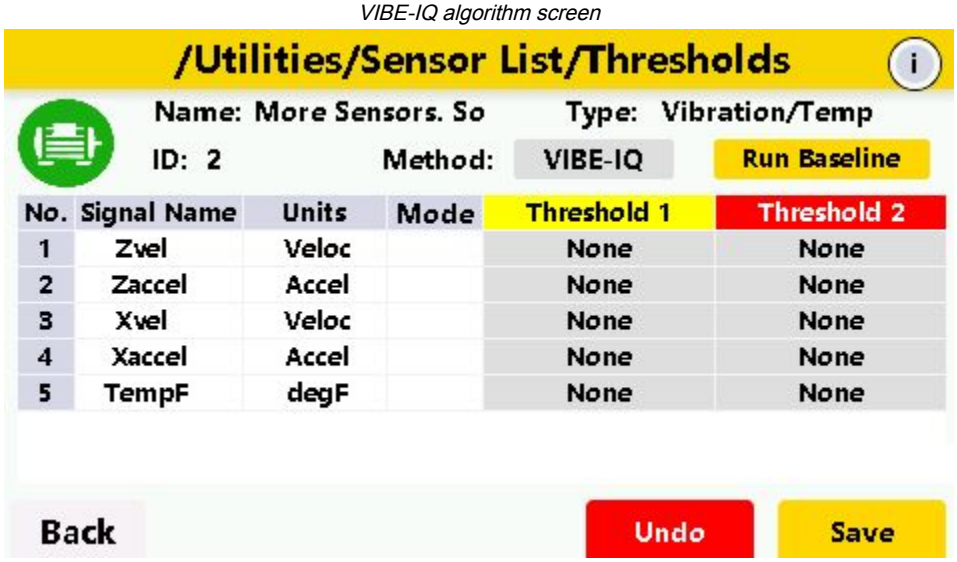
- Early bearing failure

Initialize the VIBE-IQ Machine Learning Algorithm

After global settings have been confirmed in the special settings window, previously commissioned vibration sensors can activate VIBE-IQ from the **Utilities › Sensor List › Thresholds** screen or the **Groups › Sensor Values › Thresholds** screen, and select the corresponding threshold for the specific sensor.

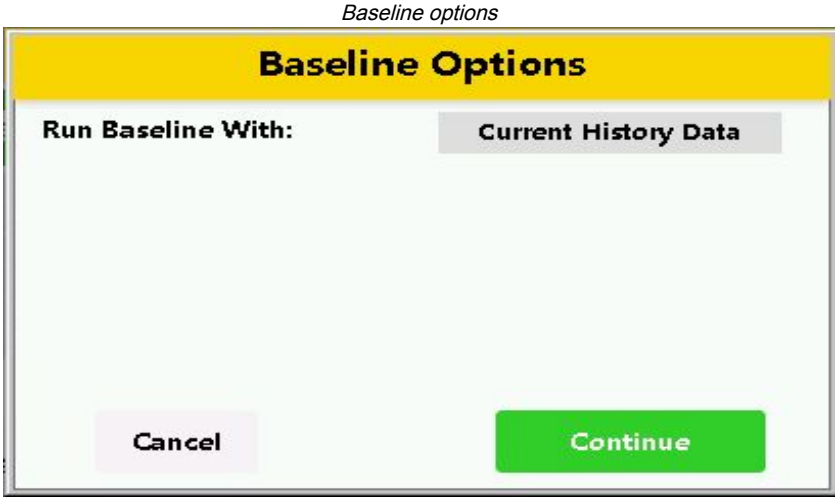
By default, the thresholding method is set to **real-time** to allow a user to manually configure known thresholds for the sensor.

VIBE-IQ algorithm screen



1. Tap the **Method** button to toggle on the VIBE-IQ learning algorithm.
2. Tap **Run Baseline** to open the **Baseline Options** prompt, which offers two baselining methods: manual or automatic.

Baseline options



3. To manually approve the baseline data set:

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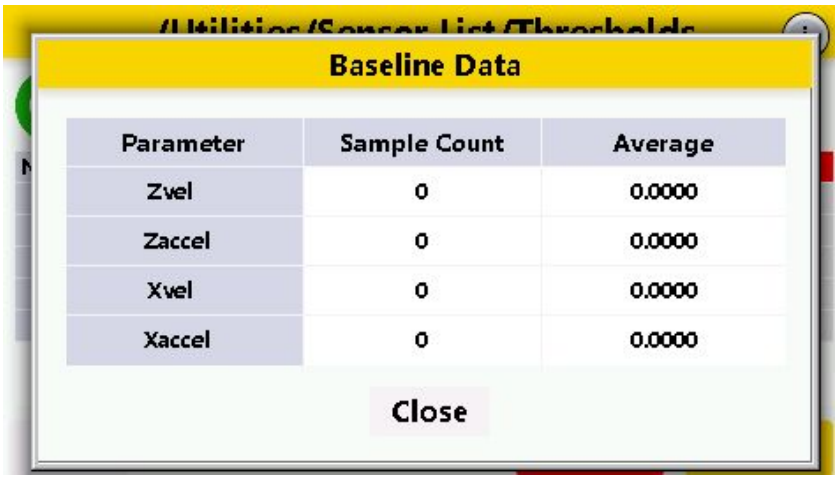
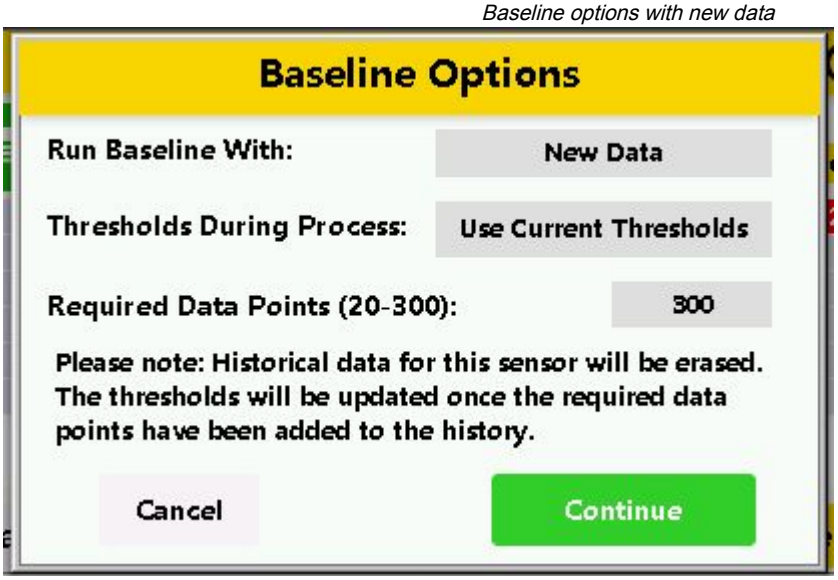
Baseline data



a. Leave the **Run Baseline With** selection as **Current History Data**.
b. Tap **Continue** and **Yes** to confirm. The Vibe-IQ baselining algorithm executes using the globally established settings. The number of samples the gateway has available (preferably up to 300) and the average value of the parameters is shown.
c. Press **Undo** if more samples are required. The suggested banked samples needed to accurately characterize a rotating asset is 300. Running the baseline procedure with all 300 samples is recommended but a sensor can be re-baselined at any time.
d. Press **Close** then **Save** to store the learned threshold information for each register within the register details.

4. To automate the baseline algorithm:

Baseline options with new data



a. Select**Run Baseline With** to the **New Data** selection.
b. Select whether to **Use Current Thresholds** or **Clear Thresholds**.
c. Select the number of **Required Data Points** for the machine learning algorithm to use.
d. Tap **Continue** and **Yes** to confirm the execution of the algorithm.

The operation completes and applies the baseline and thresholds automatically for that sensor. A countdown for the number of required remaining samples appears on the screen. The time the machine learning process requires is directly related to the **Sample Period** designated in the **Global Vibration Runtime Thresholds** menu, the number of **Required Data Points** chosen, and whether or not the machine provides consistent running samples.

Configure the Power Usage Calculator

1. To access the power usage calculator, go to **Utilities › Sensor List › Values › Power Usage** for a current (mA) measuring sensor (such as **S15C-CTxxx-MQ** or **S15S-Rxxx-MQ**).
2. Change **Enabled** to **Yes**.

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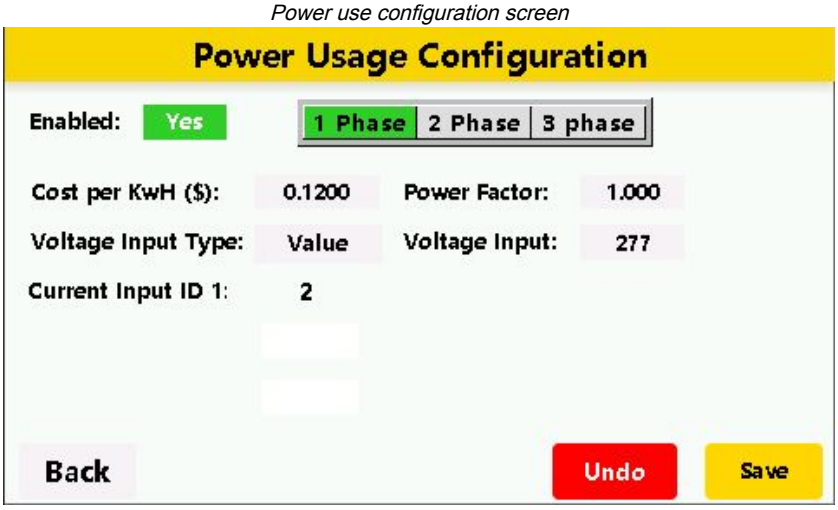
3. Enter the values for the requested information, including **Voltage Input**, **Cost per KwH**, and **Power Factor**.

Power use configuration screen



4. Select the **Voltage Input Type**.
   - For **Value**, enter a voltage by tapping on the Voltage Input field.
   - For **Sensor ID**, tap **Voltage ID** and select a voltage converter from the **Sensor List** (such as **S15C-UT460-MQ**).
5. When monitoring multiple phases, tap **2 Phase** or **3 Phase** to apply additional **Current Input IDs** to the calculator. Tap on the field for each **Current Input ID** and select the additional current converters from the **Sensor List**.
6. Click **Save**.

To view the data from the power calculation, go to **Utilities › Sensor List** and select a S15C Current Converter. Tap **Statistics** to view the data from the power calculations. Tap **Power Usage History** to view the data over several days.

The power calculations execute automatically once per day.

DXM Utilities Screens

DXM Details

Contains the firmware version, program version, serial number, MAC Address, and applicable cellular modem identification (IMEI and ICCID). Note that the IMEI and ICCID fields only populate for cellular-enabled devices.

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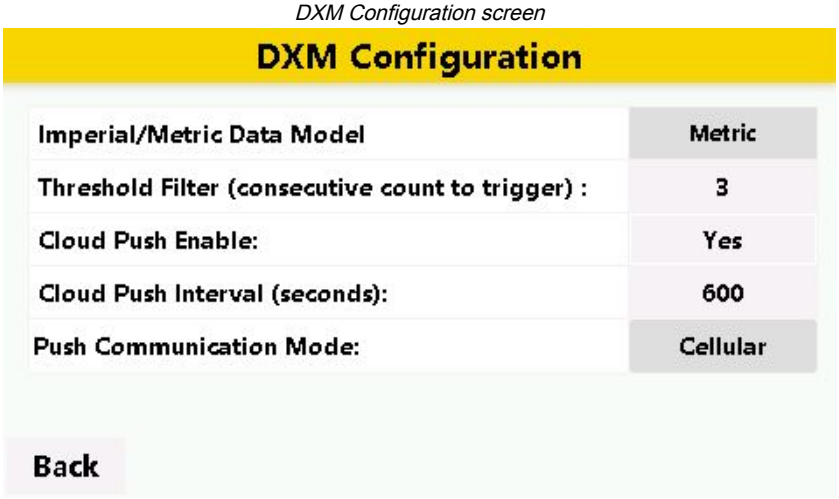
DXM Configuration

Contains options for pushing data to the Banner Cloud Data Services website and Imperial/Metric Data Model selection.

DXM Configuration screen



The **Cloud Push Enable** toggle field defaults to **No**. To change this to **Yes**, press the field entry toggle, then press **Save**.

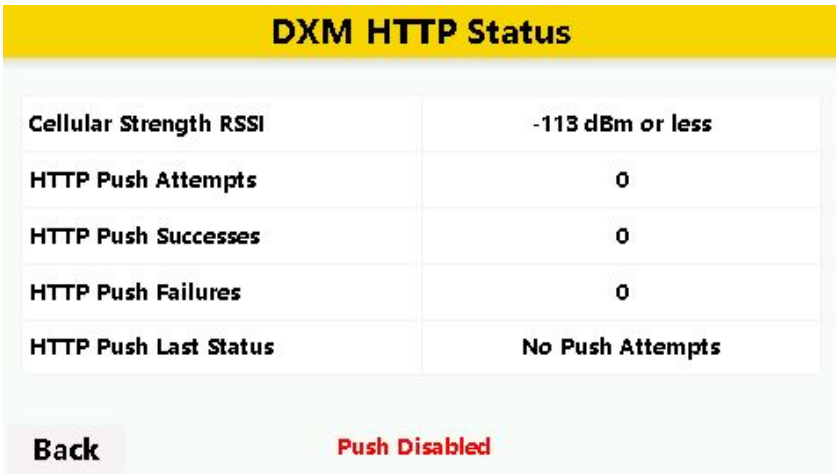
The **Imperial/Metric Data Model** is set to **Metric** by default. To change this to **Imperial**, press the field entry toggle then press **Save**.

> **IMPORTANT:** You must configure your Banner CDS portal and set up a gateway destination on the Banner CDS website before you turn Cloud Push Enable on.

DXM HTTP Status

Contains cellular signal strength (if applicable) along with cloud push statistics. By default, the AMG is configured with Push disabled (shown at the bottom of the screen). When cloud push is turned on (via the DXM Configuration Screen) the status changes in this window to **Push Enabled**.

DXM HTTP Status screen



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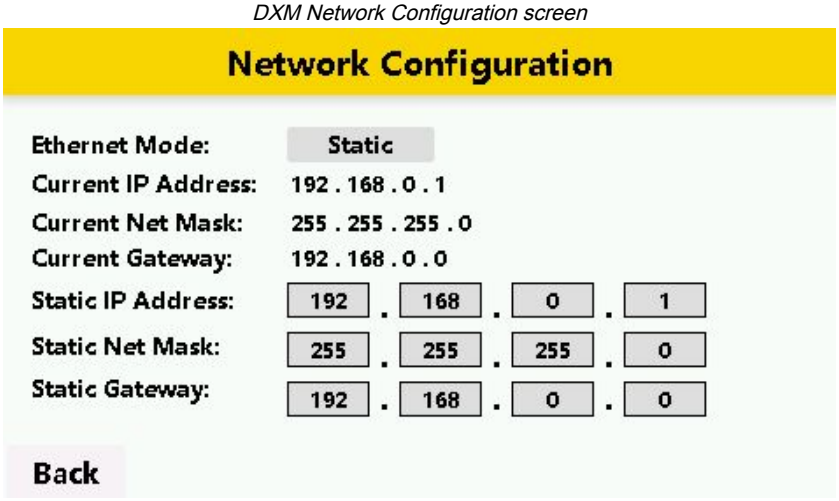
Network Configuration

By default, the **Ethernet Mode** is configured with an IP address of 192.168.0.1 using the internal XML configuration file.

DXM Network Configuration screen



To manually change the IP address, toggle the **Ethernet Mode** to **Static**. Touch the Static IP Address fields and enter an appropriate value. Press **Save** to apply the new settings. Toggle the **Ethernet Mode** field between **Static**, **DHCP**, and **XML Config** (default settings and not intended to be user configured).

> **IMPORTANT:** Banner Engineering Corp. does not recommend manually changing the default IP settings of the internal XML configuration file. This can be detrimental to the programming of the AMG.

HMI Utilities Screen

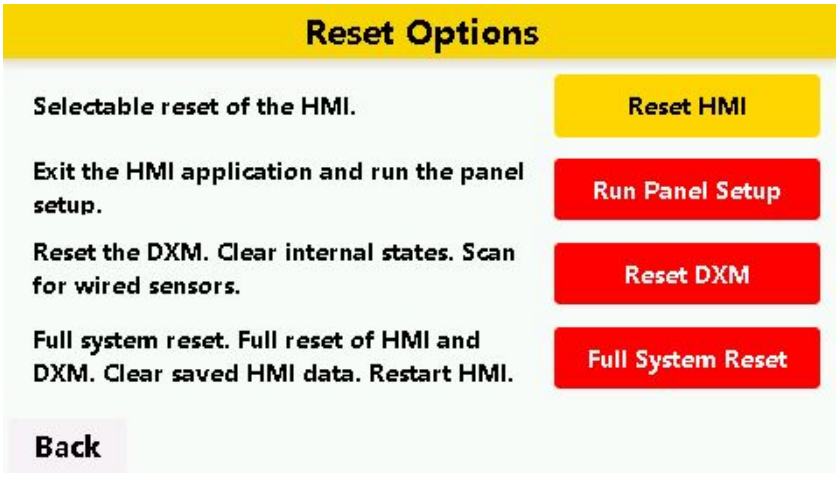
HMI Details

Contains firmware and serial numbers of the internal HMI.

Reset Options

Reset HMI resets the screen to the splash page and main window.

HMI Reset screen



Run Panel Setup accesses the internal HMI startup menu to update the screen with new firmware.
Reset DXM resets the internal gateway but the HMI screen remains active.
Full System Reset triggers an entire reset of the AMG.

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Security/Passwords

Logout secures the device to the current configuration; no settings can be changed without the administration password. The default administration password, if prompted, is 8888.

HMI Security/Passwords screen

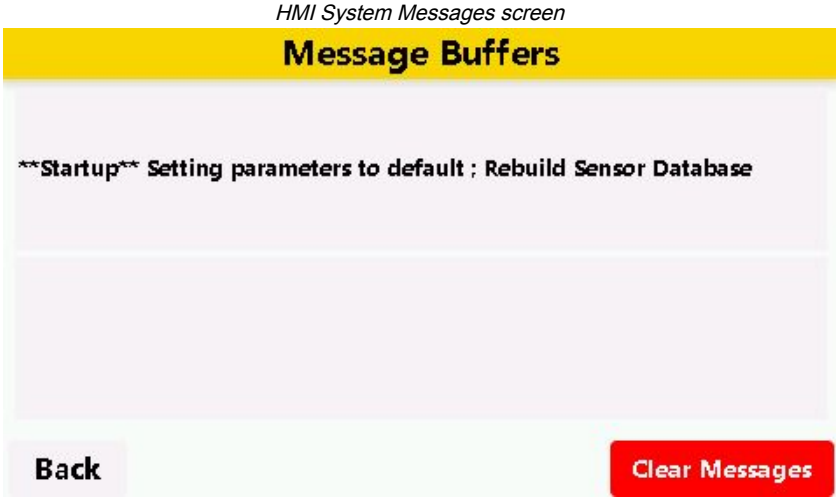


Passwords displays the custom password table. There can be up to seven user passwords, configurable by entering and saving new values within this screen. By default, **Require Login at Startup** is turned off to allow for initial set up and configuration.

System Messages

Contains communication messages, critical error messages, global settings, and sensor scan data.

HMI System Messages screen



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Chapter 4 Additional Information

Push Information to BannerCDS

The Asset Monitoring Gateway can connect to the Web via Ethernet or an internal cell module. The controller pushes data from the AMG to be stored and displayed on a website.

The Banner platform for storing and monitoring the system's data is https://bannercds.com. The Banner Cloud Data Services website automatically generates dashboard content for the application that is populated onto the Dashboard. Email alerts can be configured using the Alarms screen.

To push data to the cloud, change register 844 to one (1).

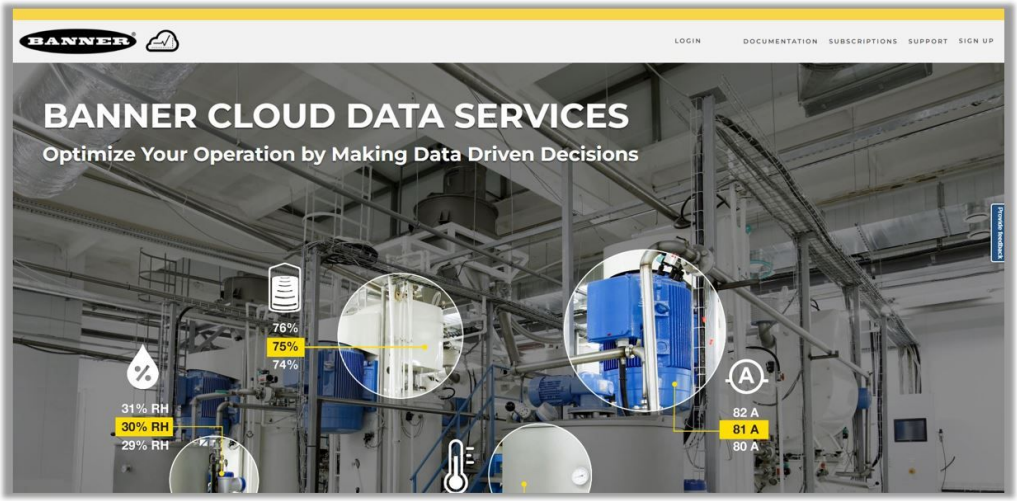
For more information on creating accounts on and using the Banner Cloud Data Services (CDS) system, please refer to the Banner CDS Quick Start Guide (p/n 201126).

Create a New Gateway on BannerCDS (New Accounts)

The web server captures data from the AMG using either a cellular connection or an Ethernet connection. Users collect and view the data or update and manage the AMG using a web browser.

1. Use the latest version of your browser (Google Chrome is recommended) and enter the URL: https://bannercds.com.
   The login page appears.

Banner CDS home screen



2. To register your account, click **Sign Up**.
   A prompt appears.
3. Enter the **Authorization Code**, an **Email** address, **Company Name**, and desired **Login** credentials.
   The authorization code is on the Authorization Card included with Asset Monitoring Gateways purchased with bundled Banner Cloud Data Services (BannerCDS).
4. Click **Sign Up** and **Sign In**.
5. Read and accept the **Services Access and Use Agreement**.
6. Type your chosen device name into the **AMG Gateway Name** text field.

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7. Enter the **AMG Serial Number** into the corresponding text field.
   The AMG Serial Number is displayed in the device's **Utilities › DXM Details** screen and is indicated internally on a label within the device.
8. To use Ethernet connectivity (authorization code prefix AME), click **Finish Setup**.
9. To use cellular connectivity (authorization code prefix **AMG**), select the cellular carrier for the Gateway:
   - For a gateway model number ending in **-V**, select **Verizon**.
   - For a gateway model number ending in **-A**, select **AT&T**.
   - For a gateway model number ending in **-W**, select **Worldwide**.

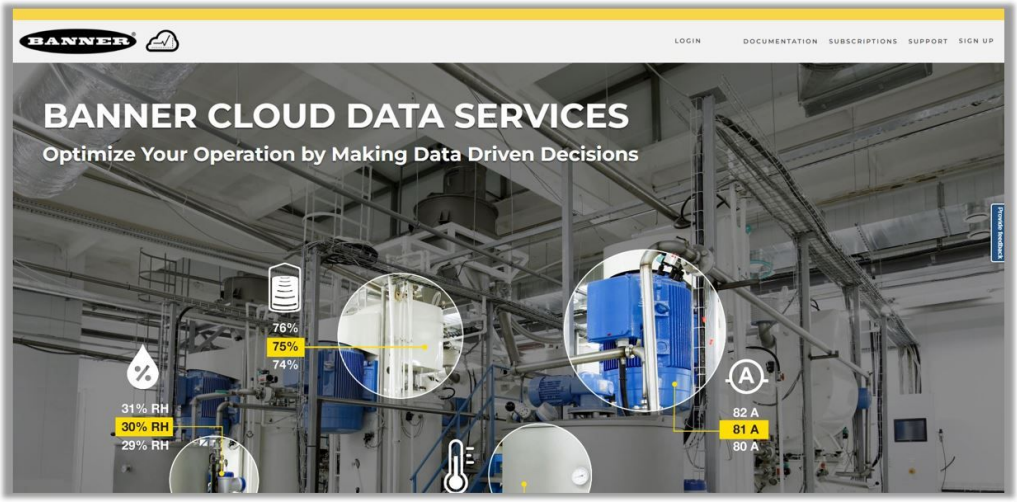
   a. Enter the **Cellular IMEI** into the corresponding entry field.
      The Cellular IMEI can be determined by navigating to the **Utilities › DXM Details** screen using the device display. It is also indicated internally on a label within the device.
   b. Enter the **Cellular ICCID** into the corresponding entry field.
      The Cellular ICCID can be determined by navigating to the **Utilities › DXM Details** screen using the device display. It is also indicated internally on a label within the device.
   c. Click **Finish Setup**.

Create a New Gateway on BannerCDS (Existing Accounts

For users who have an existing Banner Cloud Data Services account, follow these steps to add the Asset Monitoring Gateway with SNAP ID onto the web server.

1. Use the latest version of your browser (Google Chrome is recommended) and enter the URL: https://bannercds.com.
   The login page appears.

Banner CDS home screen



2. Click on **Login**, then enter your **Username** and **Password** for the account.
3. Click on **New Gateway** (top right corner of the **Overview** screen).
   Create a new Gateway for each DXM Controller that sends data to the web server.
   A **New Gateway** prompt appears.
4. Verify **Cloud ID/SNAP ID** is selected for the **Gateway Type**.
5. Enter a **Gateway Name**.
6. Select the **Company** from the drop-down list.
7. Enter the AMG serial number found in the **Utilities › DXM Details** screen and on the label inside the device.
8. Click **Save**.

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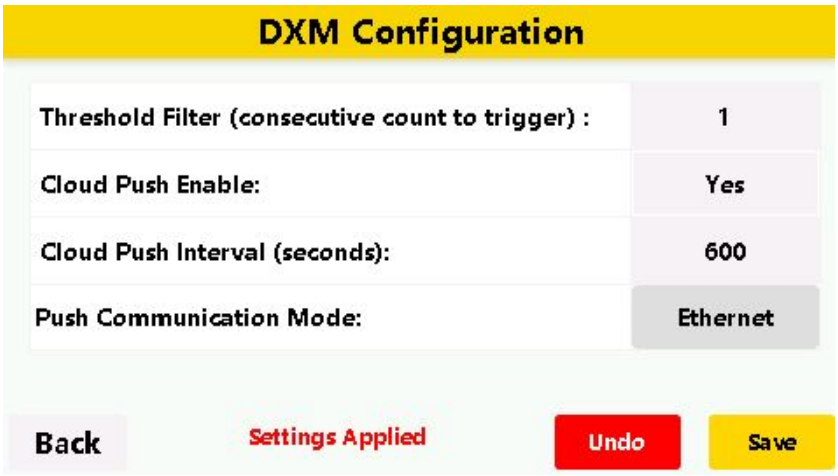
Configure the HMI to Push Information to the Cloud

> **IMPORTANT:** Always create a new gateway with the BannerCDS system and commission applicable sensors before turning Cloud Push Enable to Yes. Failure to do so can result in long wait times for the website to autodetect.

1. On the HMI: Go to **DXM Utilities › DXM Configuration** to enable cloud pushing.
2. Change the **Threshold Filter** to a number greater than 0 (3 is recommended).
3. Verify your device's **Push Communication Mode** is accurate to your model.
4. Toggle **Cloud Push Enable** to **Yes**.

HMI Utilities screen



5. Change the **Cloud Push Interval** to a desired time.
   The default push interval is 600 seconds (10 minutes).
6. Press **Save** and confirm. The AMG pushes immediately upon confirmation. The user can track the HTTP data within the **DXM Utilities › DXM HTTP Status** screen.

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Chapter 5 Product Support

Specifications for the Asset Monitoring Gateway with SNAP ID

Supply Voltage

24 V DC (±10%) (use only with a Class 2 (UL) power supply or a Limited Power Source (LPS) (CE) power supply)

Power Consumption

9 W average; 30 W maximum

Mounting

A mounting system that provides for various mounting options has been provided with this enclosure.

To connect the mounting brackets, turn the enclosure such that the backside is visible. Place the mounting brackets over the bosses either horizontally, diagonally, or vertically, and fasten them with the ¼”-20 x 0.25” SS, countersunk Philips drive screws provided (torque limit = 30 in. lbs.). The enclosure can be mounted vertically (on a wall) or horizontally (tabletop)

Enclosure Construction

ABS polycarbonate NON-UV Stabilized. Not for use outdoors.

Operating Conditions

–10 °C to +60 °C (+14 °F to +140 °F)

90% maximum relative humidity (non-condensing)

Environmental Rating

IP65

Certifications

Banner Engineering BV
Park Lane, Culliganlaan 2F bus 3
1831 Diegem, BELGIUM

Turck Banner LTD Blenheim House
Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN

FCC Part 15 Class A for Intentional Radiators

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate this equipment.

Industry Canada Statement for Intentional Radiators

This device contains licence-exempt transmitters(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs/récepteurs exemptés de licence conformes à la norme Innovation, Sciences, et Développement économique Canada. L’exploitation est autorisée aux deux conditions suivantes:

1. L’appareil ne doit pas produire de brouillage.
2. L’utilisateur de l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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